

Part II

Draft Form of Contract

for

Construction of Bunding for Flood protection of Adhiya River in Dholera Special Investment Region, Dholera

Dholera Industrial City Development Limited (DICDL)

6th Floor, Block No. 1 and 2, Udyog Bhavan,

Sector-11, 'GH-4' Circle, Gandhinagar – 382017

Gujarat, India

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Program Manager for New Cities (PMNC)

AECOM

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Section 1. Standard Form of Contract

STANDARD FORM OF CONTRACT

CONTRACT FOR

Between

[Name of Employer]

[Name of Contractor]

[Date]

I Draft Form of Contract

Contract to undertake [name of assignment]

This CONTRACT (hereinafter called the “Contract”) is made on the [Date in words] day of the month of [month] [year in ‘yyyy’ format], by and between

The Dholera Industrial City Development Limited, a company incorporated under the Companies Act, 1956, having its Registered Office at 6th Floor, Block No. 1 and 2, Udyog Bhavan, Sector-11, ‘GH-4’ Circle, Gandhinagar – 382017 Gujarat, India, hereinafter referred to as the “Employer” which expression unless repugnant to context or meaning thereof shall include its successors, affiliates and assigns) of the First Part.

AND,

[Name of Contractor and registered address]

(Hereinafter called the “Contractor”) which expression unless repugnant to context or meaning thereof shall include its successors, affiliates and assigns) of the Second Part

WHEREAS

- a) The Employer has requested the Contractor to provide certain consulting services as defined in the General Conditions attached to this Contract (hereinafter called the “Services”);
- b) The Contractor, having represented to the Employer that they have the required professional skills, personnel and technical resources, have agreed to provide the services on the terms and conditions set forth in this Contract.

NOW THEREFORE the parties hereto hereby agree as follows:

- a) The following documents attached hereto shall be deemed to form an integral part of this Contract:
- b) The General Conditions of Contract (hereinafter called “GC”);
- c) The following Appendices:

Appendix A: Bill of Quantities (BOQ)

Appendix B: Copy of Letter of Award

Appendix C: Copy of letter of Award/ acceptance by Consultant

Appendix D: Specifications

Appendix E: Copy of Bank Guarantee for Performance Security and insurances

Appendix F: Response to queries and Addendum issued during bid processing

Appendix G: Correspondences

1. The mutual rights and obligations of the Employer and the Contractor shall be as set forth in the Contract; in particular:

- a) The Contractor shall carry out the work in accordance with the provisions of the Contract;
and
 - b) Client will make payments to the Contractor in accordance with the provisions of the Contract.
2. Priority of documents: The Parties expressly agree that in the event of any conflict, inconsistency or contradiction between any clauses forming part of the documents constituting the Contract, and more particularly mentioned in Clause 1 (of this contract) hereinabove, the documents shall be interpreted in the following order of precedence:
- a) The provisions of this Contract shall override all provisions of other documents comprising the Contract.
 - b) the provisions of the GCC shall be subject to the Contract, but shall override all provisions of other documents comprising the Contract;
 - c) the Appendices shall subject to each of the Contract, and the GCC.
 - d) Any decision of the Client in relation to the priority of documents shall be final and binding upon the Contractor.

IN WITNESS WHEREOF, the Parties hereto have caused this Contract to be signed in their respective names as of the day and year first above written.

FOR AND ON BEHALF OF DICDL

[Signature]

[Name]

[Designation]

FOR AND ON BEHALF OF CONTRACTOR

[Signature]

[Name]

[Designation]

Witness:

1. [Signature, name and address]

2. [Signature, name and address]

II General Conditions of Contract

1.1 Definitions

In the contract (as hereinafter defined) the following words and expression will have the meanings hereby assigned, to them:

- a. Approved/ Approval means approved in writing.
- b. Construction plant means all equipment, appliance or things of whatsoever nature required for the execution, completion or maintenance of the works or temporary works but do not include materials or other things intended to form or forming part of the permanent work.
- c. Contract means the contract Agreement entered between the Employer and Contractor. The instruction and information, general rules and direction for tenderers, terms and conditions of contract, specification, drawings, the schedules of quantities and tender prices, the formal agreement and all addenda (including corrigendum if any) and attachments related to the above, referred in the contract agreement shall constitute the contract.
- d. Contractor means the particular person, firm or Company or Group of firms or Companies or his designated representative with whom the contract has been made for executing the works and includes his legal successors.
- e. Day means a day from midnight to midnight.
- f. Defects liability period shall mean 24 (Twenty four) months from the certified date of completion. (The certified date of completion shall be in accordance with Clause – 1.43.).
- g. Drawings means the drawings referred to in the specifications, any modification of such drawings approved in writing and such other drawings as may from time to time be furnished or approved in writing by the Employer.
- h. Employer/ Owner mean Dholera Industrial City Development Ltd and include its legal successor.
- i. Employers Representative: Person/Agency appointed by the Employer to Discharge its Obligations under this Contracts.
- j. IS means Indian Standards, prescribed by the Bureau of Indian Standards
- k. Month means period from the beginning of a given date of a calendar month to the end of the preceding date of the next calendar month.
- l. Site means the lands and other places on, under, in or through which, the works are to be executed or carried out and any other lands or places provided by the owner for the purposes of the contract together with such other places as may be specifically designated in the contract or subsequently approved as forming part of site.
- m. Temporary Works means all temporary works of every kind required for the performance of the contract.

- n. Tendered Amount means the total tender amount indicated in the letter of acceptance of the tender.
- o. The expression “work” or “Works” where used in these conditions shall, unless, there be something in the subject or context repugnant or such construction be construed to mean the work, or the works contracted to be executed under or in virtue of contract, whether temporary or permanent, and whether original, altered, substituted or additional.
- p. Week means seven consecutive days.
- q. S.O.R. means schedule of rates.

1.2 Interpretations

Words imparting the singular only, also include the plural, he include she and vice a versa unless this is repugnant to the context. Wherever the term “Specification” is used apart from a specified standard specification, it shall mean the specification or plan prepared for a particular item as per the instruction to the Contractor in executing that item of works.

1.3 Language of Contract

All written matter and correspondence in connection with the Contract shall be in English.

1.4 Contract Document and Matters to be treated as Confidential

All documents, correspondence, decision and order concerning the contract shall be considered as confidential and/or restricted in nature by the Contractor and he shall not divulge or allow access to them by any unauthorized person.

1.5 Stamp Duty

The Stamp Duty for entering into agreement shall have to be paid by the Contractor.

1.6 Performance security

- a. The Contractor shall, for the performance of its obligations hereunder during the Construction Period, provide to the Employer, within 30 (Thirty) days of the date of issue, of letter accepting the tender, an irrevocable and unconditional guarantee from a Bank in the form set forth in Part II, section 2 Annexure I (the “**Performance Security**”) for an amount equal to 5% (Five Percent) of the Contract Price.
- b. In addition to the above, the Employer shall deduct security deposit from the intermediate bills i.e. the running account bills an amount at the rate of 5% (five percent) of the total amount of each bills, as a remaining Security Deposit subject to the condition that the total amount of such deductions shall not exceed 5% (Five percent) of the Tendered amount put to Tender as mentioned in the letter of acceptance of the tender.
- c. The Bank Guarantee must remain valid for at least three months after the Defect Liability Period is over.
- d. Fifty percent (50%) of the Security Deposit less any amount due shall be returned to the contractor after completion of the Works as per clause no 1.43 and the remaining Fifty percent (50%) of the security deposit shall be returned only after three months of the defect liability period is over and subject to the Employer certifying that no liability is attached to the contractor.

- e. Additional security deposit shall be furnished by the bidder as decided by the Employer's authority at the time of entering into contract, if any.

1.7 Actions When Performance Security is forfeited

1.7.1 In any case, in which under any clause or clauses of this contract, the Contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit (Whether paid in one sum or deducted by instalments) or in the case of abandonment of the work owing to serious illness or death of the Contractor or any other cause, the Employer's Representative on behalf of the Employer, shall have powers:

- a. To rescind the contract (of which rescission notice in writing to the Contractor under the hand of Employer's Representative shall be conclusive evidence) and in that case the security deposit of the Contractor shall stand forfeited and be absolutely at the disposal of the Employer.
- b. To employ labour paid by Employer and to supply materials to carry out work , or any part of the work, debiting the Contractor with the cost of the labour and the price of the materials (as to the correctness of which cost and price, the certificate of the Employer's Representative shall be final and conclusive against the Contractor) and crediting him with the value of the work done in all respects in the same manner and at the same rate as if it had been carried out by the contractor under the terms of this contract and in that case the certificate of the Employer's Representative to the value of the work done shall be final and conclusive against Contractor.
- c. To order that the work of the Contractor be measured up and to take such part thereof as shall be unexecuted out of hands, and to give it to another Contractor to complete, in which case any expenses which may be incurred in excess of the sum which would have been paid to the original Contractor if the whole work had been executed by him (as to the amount to which excess expenses the certificate in writing of the Employer's Representative shall be final and conclusive) shall be borne and paid by the original contractor and shall be deductible from any money due to him by the Employer under this contract from his security deposit or the proceeds of sale thereof or a sufficient part thereof.

1.7.2 In the event of any of the course being adopted as per clause 1.7.1 above by the Employer's Representative, the Contractor shall not claim to compensate for any loss sustained by him by reason of his having purchased or procured any materials, or made any advances on this account or with a view to the execution of the work or the performance of the contract and in case the contract shall be rescinded under the provision aforesaid, the Contractor shall not be entitled to recover or be paid any sum for any work thereof actually performed by him under this contract unless and until the Employer's Representative shall have certified in writing the performance of such work and the amount payable in respect thereof and shall only be entitled to be paid amount so certified.

1.7.3 If the Contractor is an individual or a proprietary concern and the individual or the proprietor dies than unless the accepting authority is satisfied that legal heirs or representatives of the individual Contractor or of proprietary concern, are capable of carrying out and complete the contract, as the accepting authority shall be entitled to cancel the contract, as to its uncompleted part by forfeiting the security deposit under clause 1.7.1(a) without Employer being in anyway liable to pay any compensation to the heirs of the deceased contractor on account of the cancellation of the contract. The decision of the Accepting Authority that the legal representatives of the deceased contractor cannot carry out and complete the contract shall be final and binding on the parties. In the event of such a cancellation, Employer shall not hold the heirs of the deceased Contractor liable for damages for not carrying out the work remaining incomplete as on the date of death of individual Contractor or the proprietor.

- 1.7.4 In any case in which any of powers conferred upon the Employer's Representative under clause 1.7.1 hereof shall have become exercisable and the same shall not have been exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable at any future date.
- 1.7.5 In the event of the Employer's Representative taking action under clause 1.7.1 to 1.7.4 he may if so desires, take possession of all or any tools, plants, machineries, materials and stores in or upon the work or the site thereof or belonging to the Contractor or procured by him and intended to be used for the execution of the work or any part thereof, by paying or allowing for the same in account at the contract-rate or in case of contract rates not being applicable at such reasonable rates, as may be comparable with current market rates where ascertainable of similar articles and comparable condition, to be certified by the Employer's Representative. In the alternative the Employer's Representative may by notice, in writing to the Contractor or his clerk of the works. Foreman or other authorized agent require him to remove such tools, plants, machineries, materials or stores from the premises within a time to be specified in such notice and in the event of the Contractor failing to comply with any such requisitions, remove them at the Contractor's expenses or shall remove them by auction or private sale at the risk and cost of the Contractor in all respect, and the certificate of the Employer's Representative as to the expenses of any such removal and the amount of the proceeds shall be final and conclusive against the Contractor.

1.8 Setting Out

The Contractor shall establish at his cost reference points, reference lines and bench marks at suitable points as may be considered necessary by the Employer's Representative. The Contractor shall be responsible for the proper setting out of the works and the correctness of positions. Levels, dimensions and alignments of all parts of the work and for the provision of all necessary instrument, appliance and labour in connection therewith. If, at any time, during the progress of the work any errors, appear or arise in the positions, levels, dimensions or alignments of any part of the work, the contractor on being required to rectify such errors by the Employer's Representative shall rectify it at his own expense to the satisfaction of the Employer's Representative. The checking of and setting out of any line or level by the Employer's Representative or the representative shall not in any way relieve the contractor of his responsibilities for the correction of the error. The Contractor shall carefully protect and observe all bench marks, site nails, pegs and other things used in setting out of the work(s).

1.9 Progress Schedule

- a. The Contractor shall furnish to the Employer's Representative within one week micro level planning from the date of the order to start the work, the progress schedule in quadruplicate indicating the date of starting, the monthly progress expected to be achieved and the anticipated completion date of each major item of work to be done by him, also indicating dates of procurement and setting up the materials, plants and machinery. The schedule should include a statement of proposed general and detailed arrangements for carrying out works, and of item, order and manner in which it is proposed that these shall be executed. The schedule should be framed keeping in view the requirement of the terms and conditions and be such as in practice to the achievement towards completion of the work in the time limit and of the particular items on the dates specified in the contract and shall have the approval of the Employer's Representative. Further, the dates for the progress, indicated in the schedule shall be adhered to.
- b. The Employer's Representative shall have, at all times, the right, without in any way vitiating this contract forming grounds for any claim, to alter the order of the work or any part thereof and the Contractor shall after receiving such direction, proceed in the order directed. The Contractor shall also revise the progress schedule accordingly and submit

four copies of the revised schedule to the Employer's Representative within seven days of the said Engineer's direction to alter the order of works.

- c. The Contractor shall furnish sufficient plant, equipment and labour and shall work such hours and shifts as may be necessary to maintain the progress of the works as per approved progress schedule. The working and shift hours shall comply with all the Employer's regulations in force and shall be such, as may be approved by the Employer's Representative and the same not be varied without the prior approval of Employer's Representative.
- d. The Contractor shall from time to time as may be required by the Employer's Representative, furnish the Employer's Representative with a statement in writing of the arrangements he proposes to adopt for the execution of this contract and the Employer's Representative, may if he considers necessary at any time advice alteration in the same, which the Contractor shall adopt on notice thereof.
- e. The progress schedule(s) shall be in the form of progress chart, forms, statements and/ or reports prepared in latest version of Microsoft Project or Primavera as may be approved by the Employer's Representative.
- f. In case it is found necessary, at any stage to alter the schedule, the Contractor shall submit in good time a revised schedule incorporating necessary modifications proposed and get the same approved from the Employer's Representative.

Revised schedule shall not be operative without such acceptance in writing. The Employer's Representative is further empowered to ask for more detailed schedule or schedules say week by week, for any item or items and the Contractor shall supply the same as and when asked for. The approval of the progress-schedules by the Employer's Representative shall not relieve the contractor of any of his duties, responsibilities under the contract. The adoption of any modification in the schedule required by the Employer's Representative shall not entitle the Contractor to any extra payment. The contractor shall submit four copies showing the progress of work in the form of a chart etc. at periodical intervals as may be specified by the Employer's Representative.

1.10 Action when the progress of the work is unsatisfactory

If the progress of any particular portion of the work is unsatisfactory, the Employer's Representative shall, notwithstanding that the general progress of the work is satisfactory, in accordance with clause 1.56, be entitled to take action under clause 1.7.1(b) after giving the Contractor 10 days' notice in writing and the Contractor will have no claim what so ever for any compensation or loss sustained by him in owing to such action.

1.11 Time for completion and extension of time

The contractor shall commence the work immediately upon the notification of award and proceed in accordance with the time schedule furnished pursuant to Clause 1.9 and complete the work in all respects within 06 (Six) months from notification of award. If the contractor desires for an extension of time for completion of the work on the ground of his having been unavoidable hindered in its execution or any other ground, he shall apply in writing to the Employer's Representative before the expiry of the period stipulated in the tender or the expiry of 30 days from the date on which he was hindered whichever is earlier and the Employer may, if in their opinion, believes that there are reasonable grounds for granting the extension, grant such extension, as he thinks necessary or proper. The decision of the Employer in this matter shall be communicated to the Contractor by the Employer's Representative and shall be final.

1.12 Action where no specifications

1.12.1 In the case of any type of work for which there is no specifications, such work shall be carried out in accordance with the Employers specifications and in the event of there being no Employers specifications, then, in such case the work shall be carried out in all respects in accordance with the instructions, and requirements of the Employer's Representative.

1.12.2 Purpose of Drawings and specifications and conformance thereto shall be treated as under:

- a. The contract drawings read together with the contract specifications are intended to show and explain the manner of executing the work and to indicate the type or class of materials to be used.
- b. The work shall be carried out in accordance with the directions of the Employer's Representative in accordance with such further drawings, details and instructions as may be given by the Employer's Representative, from time to time.
- c. It shall be the responsibility of the contractor to promptly bring to the notice of the Employer's Representative any error or discrepancy in the contract documents and obtains his orders thereon. Only stated dimensions are to be taken and not those obtained from scaling the drawings. In case of any discrepancy between the description of an item in the Appendix-A and the specifications, the later shall prevail and in case any discrepancy between the specification and drawings, the drawings shall prevail. In case any feature of the work is not fully described and set forth in the item drawings and specification, the contractor shall forthwith apply to the Employer's Representative for further instructions, drawings or specifications.

1.12.3 Modifications

- a. The Employer's Representative may order modifications at any time before completion of the work. No modification shall be made unless so ordered in writing.
- b. For all modification, the Employer's Representative will issue revised plans.

1.12.4 Signed Drawings – No Authority to the contractor

Signed drawings alone shall not be deemed to be an order for the work unless it is entered in the agreement or schedule of drawings under proper attestation of the contractor and the Employer's Representative or unless it has been sent to the contractor by the Employer's Representative with a covering letter conforming that the drawings is an authority for the work under the contractor.

1.12.5 Copies of drawings and specifications

Copy of the typical modified or supplementary drawings and the specifications shall be furnished to the contractor.

1.13 Land required by the Contractor

The Contractor shall have to make his own arrangement for land required by him for his camp, workshops, labour camps, stock-piling of materials and machineries etc.

1.14 Entering Upon or Commencement of Work

The contractor shall not work upon or commence any portion of work except with the written authority and instruction of the Employer's Representative of the work, failing which

the contractor shall have no claim to ask for measurement or payment for work.

1.15 Accesses to Site and Work

The Employer/ Employer's representative may, if he consider fit from time to time, enter upon any land(s), which may be in possession of the Contractor under this contract for the purpose of executing any work not included in this contract and may execute such work not included in this contract by agents or by other Contractor in his opinion and the Contractor shall, in accordance with the requirements of the Employer's Representative, afford all reasonable facilities for execution of the work including occupation of lands by structure or otherwise for any other Contractor employed by the Employer and his workmen or for the workmen of the Employer who may be employed in the execution on or near the site of the work not included in the contract or of any contract-in connection with or ancillary to the work and in default, the Contractor shall be liable to the Employer for any delay or expense incurred by reason of such default, provided always that if the exercise of these powers shall cause any damage to the construction, he may, within, fifteen days of such damage arising make statement of the same to the Employer's Representative who shall, from time to time, assess the value in his judgment of such damage and the Employer shall from time to time pay to the Contractor the amounts (if any) accepted as justified by the Employer's Representative.

1.16 Works to be executed under direction of Employer's Representative

All works to be executed under the Contract shall be executed under the direction of Employer's Representative and subject to approval in all respect of the Employer who shall be entitled to direct at what point or points and in what manner they are to be commenced and from time to time carried on.

1.17 Materials and Workmanship

1.17.1 Materials

- a. All materials, articles and workmanship shall be of the most suitable quality for the work. The unit rates quoted shall deem to have included procurement, transport, handling, storage etc.
- b. Equivalency of Standards and Codes

Wherever reference is made in the Contract to the respective standards and codes in accordance with which goods and materials are to be furnished, and works is to be performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly set forth in the Contract. Where such standards and codes are national in character, or relate to a particular country or region, other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be accepted subject to the Employer's Representative prior review and written approval. Differences between the standards specified and the proposed alternative standards must be fully described in writing by the Contractor and submitted to the Employer's Representative at least 30 days prior to the date when Contractor desires the Employer's Representative's approval. In the event the Employer's Representative determines that such deviations do not ensure equal or higher quality, the Contractor shall comply with the standards set forth in the contract documents.

- c. The Contractor shall without extra cost provide sample for the testing of materials and facilitate inspection of the works. The Employer's Representative shall have access at all times to the places of storage and to the places where materials are being manufacture or

processed for use on the works under the Contract, to determine whether their manufacture and process are proceeding in accordance with the drawings and specifications.

- d. All materials, articles shall be specified and in accordance with the instructions of Employer's Representative.

1.17.2 Workmanship

The Contractor shall execute the whole and every part of the work in substantial and workman-like manner and both as regards materials and in other respects in strict accordance with specifications. The Contractor shall also conform exactly, fully and faithfully to the design, drawings and instructions in writing for the work signed by the Employer's Representative.

The Contractor will be entitled to receive the certified copy of the accepted tender along with the work order free of cost and will also be entitled to receive, on request two sets of working drawings, according to the progress of work, as and when needed, free of cost.

1.17.3 Employment of Qualified Engineer

The contractor shall employ a full time technically qualified staff during the execution of this work. The engineers so employed for the work must have sufficient experience to handle the work independently. Such Engineers shall have to stay at the site of work and they shall not be entrusted with any other duty except of this work.

Even if the contractor or a partner of the contractor, firm is a graduate Civil Engineer, employment of adequate number of engineers will however be necessary for the execution of the work on site as may be decided by the Employer's Representative.

1.17.4 Work to be open for inspection - Contractor or Responsible Agent to be present

All works under or in course of execution or executed in pursuance of the contract shall, at all times be open for the inspections and supervision of the Employer's Representative and his sub-ordinate and the contractor shall, at all times during the usual working hours and all other times at which reasonable notice of the intimation of the Employer's Representative or his sub-ordinate to visit the works shall have been given to the Contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing present for that purpose. Orders given to the Contractor's duly authorized agent shall be considered to have the same force and effect as if they had been given to the Contractor himself.

1.17.5 Notice to be given before work is covered up

The contractor shall give not less than five days' notice in writing to the Employer's Representative or his subordinate in charge of the work before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof taken before the same is so covered up or placed beyond the reach of measurement, any work without the consent in writing of the Employer's Representative or his sub ordinate in charge of the work and if any work shall be covered up or placed beyond the reach of measurement without such notice having been given or consent obtained, the same shall be uncovered at the Contractor's expense and in default there of no, payment or allowance shall be made for such work or for the materials with which the same was executed.

1.17.6 Action and Compensation for Bad Work

If at any time before the expiry of Defects Liability period as detailed in clause 1.17.7, it shall appear to the Employer's Representative or his sub-ordinate in charge of the work, that any work has been executed with unsound, imperfect or unskilled workmanship or with materials of inferior quality or that any materials or articles provided by him for execution of the work are unsound., or of a quality inferior to that contracted for or are otherwise not in accordance with the contract, it shall be lawful for the Employer's Representative to intimate this fact in writing to the Contractor and then notwithstanding the fact that the work, materials or articles complained of may have been passed. Certified and paid for, the Contractor shall be bound forthwith to rectify, or remove and reconstruct the works so specified in whole or in part as the case may be required or if so required shall remove the materials or articles so specified and provide other proper and suitable materials or articles at his own charge and cost, and in the event of his failing to do so within a period to be specified by the Employer's Representative in the written intimation aforesaid, the Contractor shall be liable to pay compensation at the rate of one percent of the amount of the estimate of the rectification for every day not exceeding ten days during which the failure so continues and in the event of any such failure as aforesaid continuing beyond ten days, the Employer's Representative may rectify or remove and re-execute the work or remove and replace the materials complained as the case may be at the risk and expense in all respects of the Contractor. Should the Employer's Representative consider that any such inferior work or materials as described above may be accepted or made use of, it shall be within his discretion to accept the same at such reduced rates as he may fix thereof. However, the contractor shall be responsible for normal maintenance of the work till the final bill for the work is prepared by the Employer.

1.17.7 Defect Liability Period

The contractor shall be responsible to make good and remedy at his own expense any defect which may develop or may be noticed before the period mentioned hereunder from the certified date of completion. The Employer's Representative shall give a notice in writing to the contractor about the defect and the Contractor shall make good the same within 15 days of receipt of the notice. In the case of failure on the part of the contractor, the Employer's Representative may rectify or remove or re-execute the work at the risk and cost of the Contractor. The Employer's Representative shall be entitled to appropriate the whole or any part of the amount of security deposit towards the expenses, if any, incurred by him in rectification, removal or re-execution. The Defects Liability period shall be 24 Months from the certified date of completion (The certified date of completion shall be as per clause 1.43)

1.18 Testing of Materials

- a. All materials before being utilized in works shall be inspected and tested, if found necessary, by the Employer's Representative or his representative. The nature of testing and periodical intervals at which such testing is to be done etc. shall be as per the latest editions of relevant IS Codes and determined by the Employer's Representative. The day-to-day and periodical tests to be carried out on materials mixes and placed concrete, mortar etc. shall be specified by the Employer's Representative from time to time and the Contractor shall provide free of cost all facilities towards collections of samples etc. unless otherwise specified. Labours for collecting samples and transportation of the samples to quality control authorities for test shall be provided free cost of by the contractor. Also electricity, fuel, water curing tank and stores etc. shall be provided free of cost by the contractors.
- b. The materials shall be tested at any place directed by the Employer's Representative. The Contractor shall obtain the test results from the concern authority and the results given by such authorities shall be considered to determine whether all materials, workmanship are

of respective standard described in contract and in accordance with the instructions of the Employer's Representative. The Contractor's representatives shall, however, be given access to all operations and tests that may be carried out as aforesaid so that he may satisfy himself regarding the procedure and methods adopted. It shall then be the Contractor's responsibility to produce on the work, materials and finished item to the standard as determined by the laboratory tests or to take follow up action to rectify the quality.

All Testing charges shall, however, be borne by the Contractor.

- I. When the supply of the samples and the carrying out of such test at Contractor's cost is provided for or clearly intended in the Contract and is carried out either at the site of work or at place of manufacturer.
 - II. When the supply of the samples and the carrying out of such tests is not provided for or clearly intended in the contract, but on testing the material is found defective and has to be rejected.
 - III. Testing charges for testing of Cement, TMT bars, RCC pipes, M.S. pipes and all materials to be used in the works including cost of samples and its collection shall be borne by the Contractor.
- c. The Contractor shall, however, supply all materials, required for tests and also make good at his cost, materials, mixes and bore/ core hole with similar or other materials as may be directed by and to the satisfaction of the Employer's Representative.
 - d. The Contractor shall make suitable arrangements to see that one of his representatives remains present at the time of taking samples and shall authenticate the facts. If the Contractor, fails to keep his representative present at site at the time of taking samples or fail to provide required labours and other equipment to collect the samples, the same shall be taken by the Employer, and the samples selected shall be considered as authentic. The cost incurred by the Employer when the Contractor fails to provide required men and materials for collecting samples and or their transport shall be recovered from the Contractor.

1.19 Quality Assurance

1.19.1 Assurance Programme

In addition to the testing procedure as laid down in clause -1.18 (Testing of Materials), the contractor shall submit a detailed field Quality Assurance Programme containing the overall quality management and procedures which he proposes to be followed during various phases of constructions as detailed in the relevant clause of the technical specifications of the contract and get it approved from the Employer's Representative within week after the letter of intent is issued. This shall include arrangements of testing apparatus/ instruments covering the requirements of items envisaged in the contract and details of the testing programme. The documents of Quality Assurance Programme shall generally cover but not limited to the following:-

- I. Contractor's organizational structure for the management and implementation of the quality assurance programme.
- II. Sources of various materials.
- III. Inspection and test procedure, both for material and their product and field activities.

IV. System of handling storage and delivery of material.

V. Laboratory testing facilities along with test of equipment's proposed to be installed along with a laboratory building plan.

VI. System of preparation and maintenance of test records.

The Quality Assurance Programme shall also include the programme proposed to be followed by his sub-contractor. Contractor shall bear all cost / expenditure for implementation of provisions made under quality assurance clause.

1.19.2 Testing of Materials

All materials, before bringing to the site of work shall be inspected and tested by the Contractor. For testing, the contractor may set up his own laboratory at his own cost. The place (Laboratory) of testing should be got approved from Employer's Representative. Test results shall be furnished by the contractor to the Employer's Representative. The cost of all such testing shall be borne by the contractor.

After materials are brought to site, if necessary, Employer's Representative or his sub – ordinate shall test in accordance with relevant clauses of contract. In case of discrepancy in the Employer's and contractor's results, the Employer's result shall be final and binding to the contractor. Materials which test result does not conform to the standards and is not acceptable to the Employer's Representative, shall be rejected and removed from the site.

1.19.3 Testing Procedure

The Contractor shall carryout all sampling and testing in accordance with the relevant Indian Standard and / or International Standard or as stipulated in the contract, where no specific testing procedure is mentioned, the test shall be carried out as per the prevalent accepted engineering practice and direction of the Employer's Representative.

The Frequency of sampling and testing of all materials and products of construction shall be as mentioned in the technical specifications and relevant IS codes used in Practice. In case of discrepancy in the standards, the decision of the Employer's Representative will be final. In case due to changes in the codal provisions during course of execution if the acceptance criteria of the test gets changed, the Contractor shall have to follow the revised criteria of acceptance. The contractor shall not claim for any compensation as a result of rejection of his material or product of construction due to inferior quality on account of such changes. The testing frequencies set forth in different technical specification are the desirable minimum and Employer's Representative shall have a full authority to revise it as he finds necessary to satisfy himself that the quality of materials and the works together comply with appropriate specification requirement.

The ingredients of concrete got tested and approved by Employer's Representative in accordance with forgoing Para of this clause and clause 1.18 of this document.

1.19.4 The contractors shall have to use such materials which must fulfil the required qualities as per the specifications. The Employer is not going to compromise with the quality of the work in any case. The Employer may carry out in situ testing for the quality of earth, zoning of earthwork and other important components wherever required. The contractor will be held responsible for poor quality of work if the work is not done as per the specification.

1.20 List of Machinery to be brought and used on works by the Contractor

The Contractor shall furnish list of machinery immediately available with him for use on the work and which they propose to procure for the work.

1.21 Construction at existing water courses and utilities

1.21.1 Where the work to be performed under these specifications crosses or otherwise interferes with water, sewer, gas or oil pipelines, buried cable or other public or private utilities, or with artificial or natural watercourses, the Contractor shall preserve and protect such utilities and watercourses and shall perform such construction during the progress of the work so that no damage will result to either public or private interests till alternative arrangement for relocating such facilities are made. The term "Watercourses" included ditches, terraces, furrows or other features of surface irrigation systems

It shall be the responsibility of the Contractor to determine the actual locations of and make provision for all watercourses and utilities.

1.21.2 Before any watercourse or utility is taken out of service, permission shall be obtained from the Employer by the Contractor. The Contractor shall be liable for all damages that may result from failure to preserve and protect watercourses or utilities during the progress of the work and the Contractor shall indemnify and hold harmless the Employer from claims of whatsoever nature or kind arising out of or connected with damage to water courses or utilities encountered during Construction, damages resulting from disruption of service and injury to persons or damage to property resulting from the negligent, accidental or intentional breaching of watercourses or utilities.

1.21.3 If the Contractor does not maintain the existing watercourse and utilities in such condition that no damage will result to either public or private interests, the Employer will make the necessary repairs to be made and recover charges from the Contractor for such work.

1.21.4 Except as otherwise provided below, the cost of all work described in this paragraph, shall be included in the price bid in the schedule for relevant other items of work.

1.21.5 Where construction of new structures or modification of existing structures are required to render the watercourses or utilities operative beyond the period of the Contract, the Contractor shall notify the Employer's Representative so that the arrangements can be made with the owners for the construction of modifications required. When it is determined that such works are to be performed by the Contractor, and such item of work is not provided for in the schedule, the Contractor shall perform the necessary work in accordance with clause 1.35.

1.21.6 In case of watercourses and utilities in addition to those for which details are available with the Employer, all additional work required to be performed by the Contractor as a result of encountering the watercourse or utilities shall be performed in accordance with clause 1.35.

1.21.7 In case of forest, nursery or plantation near state highways and National highway for which details are available with the Employer, all care shall be taken by the contractor to preserve the plantation during Construction. If the contractor does not take care to preserve the plantation, the Employer may recover the loss, to forest department, from the contractor.

1.22 Construction at Telephone and Power line Crossings

1.22.1 The details of telephone and power-line crossings are available with the office of the Employer's Representative. The concern authorities under agreement with the Employer will remove or raise these lines and relocate them permanently at other locations which will

permit the Contractor to proceed with his construction operations without delay.

- 1.22.2 Equipment and vehicles shall not be operated where, it is possible to bring such equipment or vehicles or any part thereof within 5 meters of any high voltage line or installation unless Electricity company/Service provider, has been notified the line de-energized and grounded, and positive control measures taken to prevent points along the conductor will vary due to changing ambient and operating temperatures.
- 1.22.3 The Contractor shall notify Employer's Representative immediately when removal and/or raising and relocation of the utility are required so that he can proceed with construction of the M.S. Pipeline work and roadway relocation at that location in accordance with his sequence of operations. The Electricity company/Service provider, and Telephones Authorities under agreement with the Employer, will perform all work required before, during and after project work and road construction to remove, relocate, and maintain them in service at all times at no cost to the Contractor. The Contractor will not be required to perform any work for the crossings, but shall co-operate with The Electricity company/Service provider and Telephone Authorities so that they may perform the required work with as little interference from the Contractor's operations as is practicable.
- 1.22.4 If, for his convenience the Contractor wishes the Electricity company/Service provider, and Telephone Authorities to make temporary relocations or minor alterations at existing utility crossing, it will be the Contractor's responsibility to make arrangements with the Electricity company/Service provider, and Telephone Authorities for performing such work and the costs thereof shall be paid to the Electricity company/Service provider, and Telephone Authorities by the Contractor.
- 1.22.5 The Contractor shall provide for the utility crossings so that no damage will result there to.

1.23 Work during Night or on Sundays and Holidays

The work shall not be carried out during night or on Sunday and authorized holidays without the prior written consent of Employer's Representative. However, it will be allowed to be carried out the work during night, Sundays or authorized holidays subject to:

- a. The provisions of relevant labour laws being adhered to.
- b. Adequate lighting, supervision and safety measures established to the satisfaction of the Employer's Representative.
- c. The Construction programme given by the Contractor and agreed upon by the Employer's Representative envisages such working.
- d. If it is necessary or required to ensure the safety of work, protection of life, or to prevent loss or damage to property.

1.24 Maintaining Public Traffic

- 1.24.1 The Contractor shall make all necessary provisions including diversion for maintaining the flow of public traffic and conduct his operations so as to offer the least possible obstruction and inconvenience to public traffic. Temporary approaches to crossings or intersecting roads shall be provided and kept in good condition. Public traffic shall be permitted to cross over and pass through construction operations at all times with as little inconvenience and delays as possible and the Contractor shall, when so directed, provide and station competent flagman whose sole duties shall consist of directing and controlling the movement of public traffic either through or around the work operation shall be so conducted as to provide a reasonably smooth, even dustless and unobstructed passage for traffic at all times. Water

shall be sprinkled as directed for the abutment of dust in connection with maintaining public traffic. The Contractor shall construct temporary connection of sufficient width for traffic between the existing road way and new construction where necessary. At any and all points along with the work where the nature of the construction operations in progress and the equipment and machinery in use are of such character as to endanger passing traffic, the Contractor shall provide such personnel as may be necessary to safeguard against accidents and avoid damage or injury to passing traffic. At night times, the Contractor should provide barricades around the portion of excavation and have some arrangement in form of posts, warning signboards etc. painted in fluorescent paint to see that the public traffic moves smoothly without any accident happening to moving traffic and if it is found conclusively that it was because of contractor's mistake in providing adequate arrangement, the contractor shall be responsible for the damage done and will have to compensate the aggrieved persons Employer will not be responsible for such accidents.

1.25 Local and Haul Roads

- 1.25.1 The Contractor shall acquaint himself with the existing public roads and construction road parallel to the River near the site of work. The Contractor may construct and maintain additional roads parallel to the River and additional roads as required at his expense. Maintenance of these roads including construction road (already constructed and / or to be constructed) shall be done by the Contractor at his own cost till completion of the entire work, under the scope of this contract. The construction roads used by the contractor of this work should be maintained by them with mutual understanding.
- 1.25.2 The Contractor's heavy construction traffic or tracked equipment's shall not travel on any public roads or bridges unless the Contractor has made arrangements with the authority concerned and approval of the Employer's Representative to such arrangements has been obtained.
- 1.25.3 The Contractor shall plan transportation of construction materials to work site in such a way that road accidents are avoided.
- 1.25.4 The Contractor shall construct and maintain at his own cost all suitable temporary haul roads at the work site as may be found necessary by him for execution of the works. The location of all such haul roads and any subsequent modifications thereof shall be got approved by the Employer's Representative.
- 1.25.5 During the period of the Contract, the Employer and other Contractors employed by the Employer will be engaged on other works in the vicinity of the works covered by this contract, the contractor shall allow the Employer and other contractors free and reasonable use of all temporary haul roads except vital haul roads upon which the Contractor may impose restriction to prevent, interruptions to concrete hauling operations. Any such restrictions must be approved by the Employer's Representative.
- 1.25.6 Separate payment will not be made for the construction and maintenance of the temporary haul roads including any necessary special protections or strengthening required and all cost of such works shall be deemed to have included in the cost of the items included in the Appendix 'A'.

1.26 Electric Power

The contractor shall make his own arrangements for electric power supply at his own cost. The Employer shall not take any responsibility for power connection from Electricity Board. The Contractor shall provide and operate generating sets of suitable capacity at required locations at his own cost to meet with the situations arising out of interruptions of electric power supply either or short or long duration. The Contractor shall not raise any claim

against the Employer for failure or stoppage of power supply for any reasons whatsoever. Demand charges and any other charges over and above energy charges as levied by the Electricity Company shall also be borne by the Contractor.

1.27 Other Contractors

1.27.1 When two or more Contractors are engaged on work in the same vicinity, they shall work together in a spirit of co-operation and accommodation. The Contractor shall not take or cause to be taken any steps or actions that may cause disruptions, discontent or disturbance to the works, labour and arrangements of other Contractor in the neighbouring project localities. In case of any difficulties amongst the Contractors, the Employer's Representative shall direct the manner in which each Contractor shall conduct his works so far as it does not affect the others.

1.27.2 It is possible that work at, or in the vicinity of the site of work will be performed by the Employer or by other Contractors engaged in work for the Employer during the Contract period. The Contractor shall without charge permit the Employer and such other Contractor's and other workmen to use the access facilities including roads, lighting installation and any other facilities constructed or acquired by the Contractor for use in the performance of the works till they are required to be maintained for the purpose of this work.

1.28 Ecological Balance

1.28.1 The Contractor shall maintain ecological balance by preventing deforestation, water pollution and defacing of natural landscape. The Contractor shall so conduct his construction operations as to prevent any unnecessary destruction, scarring or defacing of the natural surroundings in the vicinity of the work. In respect of ecological balance, Contractor shall observe the following instructions.

- a. Where unnecessary destruction, scarring, damage or defacing may occur as a result of the operations the same shall be repaired, replanted or otherwise corrected at the Contractor's expense. The Contractor shall adopt precautions when using explosives which will prevent scattering of rocks or other debris outside the work area. All work areas shall be smoothed and graded in a manner to conform to the natural appearance of the landscape as directed by the Employer's Representative.
- b. All trees and shrubbery which are not specifically required to be cleared or removed for construction purposes shall be preserved and shall be protected from any damage that may be caused by the Contractor's construction operations and equipment. The removal of trees or shrubs will be permitted only after prior approval of the Employer's Representative. Special care shall be exercised where trees or shrubs are exposed to injuries by construction equipment, blasting, excavating, dumping, chemical damage or other operation and the Contractor shall adequately protect such trees by use of protective barriers or other methods approved by the Employer's Representative. Trees shall not be used for anchorages. The Contractor shall be responsible for injuries to trees and shrubbery caused by his operations. The terms 'injury' shall include, without limitation, brushing scarring, tearing and breaking of roots trunks or branches. All injured trees and shrubs shall be restored as nearly as practicable without delay to their original condition at the Contractor's expenses.
- c. The Contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage of solid matter contaminants, debris and other objectionable pollutants and wastes into river. Such pollutants and wastes include earth and earth products, garbage, cement concrete, sewage effluent, industrial wastes, radio-

active substances, mercury, oil and other petroleum products, aggregate processing, tailings much products, minerals, salts and thermal pollution. Pollutants and wastes shall be disposed off in a manner and at sites approved by the Employer's Representative.

- d. In the conduct of construction activities and operation of equipment's, the Contractor shall utilize such practicable methods and devices as are reasonably available to control, prevent and otherwise minimize air pollution.
- e. Excessive emission of dust into the atmosphere will not be permitted during the manufacture, handling and storage of concrete aggregate and the Contractor shall use such methods equipment as are necessary for collection and disposal or prevention of dust during these operations. The Contractor's method of storing and handling cement shall also include means of eliminating atmospheric discharge of dust. Equipment and vehicles that give objectionable emission of exhaust gases shall not be operated. Burning of materials resulting from clearing of trees, brush, combustible construction materials and rubbish may be permitted only when atmospheric conditions for burning are considered favourable.

1.28.2 Separate payment will not be made for complying with provisions of this Clause and all costs shall be deemed to have been included in costs of items included in Appendix 'A'.

1.29 Contractors Liability for Damage and Imperfection after Completion Certificate

If the contractor or his workmen, or servant shall break, deface, injure or destroy any part of the work in question in / on which they may be working or any building, road, fence, enclosure or grass land or cultivated ground continuous to the premises on which the work or any part thereof is being executed or if any damage shall occur to the work from any cause whatever before completion of the work or before the completion of the Defect liability period whichever is later or damage occurred / caused due to normal flood or rain or if any imperfection become apparent in it within twelve months from grant of a certificate of completion, final or otherwise by the Employer's Representative the contractor shall make good the same at his own expenses or in default, the Employer's Representative may cause the same to be made good by other contractor and deduct the expenses (of which the certificate of the Employers' Representative shall be final) from any sums that may there after become due to the Contractor or from his security deposit or the proceeds of sale thereof or a sufficient portions thereof.

1.30 Liability of Contractor for Damage Done in or Out Side Work Area

Compensation for all damage done intentionally or unintentionally by Contractor's labours whether in or beyond limit of the Employer's property including any damage caused by the spreading of fire shall be estimated by the Employer's Representative, or such other officer as he may appoint and the estimates of the Employer's Representative, subject to the decision of the Employer, on appeal, shall be final and the Contractor shall be bound to pay the amount of the assessed compensation on demand, failing which the same will be recovered from the Contractor as damages in the manner as decided by the Employer's Representative and deducted from any sums that may be due or become due from the Employer to the Contractor or under this contract or otherwise.

The Contractor shall bear the expenses of defending any action or other legal proceeding that may be brought by any person for injury sustained by him owing to neglect of precautions to prevent the spread of the fire and he shall also pay the damages and cost that may be awarded by the Court in Consequence.

1.31 Liability of Contractor for Accidents to Persons

In addition to responsibilities and liabilities of the Contractor under workmen's Compensation Act given in clause 1.47 following shall also apply:

- a. On the occurrence of an accident, which results in death of workmen employed by the Contractor or which is as serious as is likely to result in death of any such workmen, the Contractor shall within 24 hours of happening of such accident(s), intimate in writing to the Employer's Representative, the fact of such accident(s). The Contractor shall indemnify the Employer against all loss or damage sustained by the Employer resulting directly or indirectly from his failure to give intimation in the manner aforesaid including the penalties or fines, if any, payable by the Employer as a consequence of Employer's failure to give notice under the Workmen's Compensation Act or otherwise to conform to the provisions of the said Act regard to such accident(s).
- b. In the case of an accident, in respect of which compensation may become payable under workmen's Compensation Act, whether by the Contractor or by the Employer, it shall be lawful for the Employer's Representative to retain out of money due and payable to the Contractor such sum or sums of money as may, in the opinion of the Employer's Representative be sufficient to meet such a liability. The opinion of the Employer's Representative shall be final in regard to all matters arising under this Clause.

1.32 Liability of Contractor for Taking over Completed Portion of Work

In the event the Employer takes over portions of works as they are completed, the liability of the Contractor for those portions shall extend to a period of twenty four months from the actual date on which such portions of the works were taken over.

1.33 Indemnities

The Contractor shall indemnify the Employer against all actions, suits, claims and demands, through or made against the Employer in respect of work of this contract and against any loss or damage to Employer in consequence of any action or suit being brought against the Contractor for anything done or omitted to be done in execution of the work of this contract.

1.34 Variation of Quantities and Extra Items

The Employer's Representative shall have authority to make any alterations in the original specifications, drawings, designs and issue instructions that may appear to him to be necessary or advisable during the progress of the work and the Contractor shall be bound to carry out the work in accordance with any instructions in this connection which may be given to him in writing and signed by the Employer's Representative and such alteration shall not invalidate the contract and additional work which the Contractor may be directed to do in the manner specified as part of the work shall be carried out by the Contractor on the same conditions in all respects on which he agreed to do the work and rate as specified below. The quantities shown in the tender are approximate and no claim shall be entertained for quantities of work executed being less than those entered in the Tender.

1.35 Variation in Schedule of Quantities

1.35.1 Increase in Quantities

- a. If the quantity for any individual item increases by a quantity limited to 30 % of tender quantity, such quantity shall be executed only after written approval of the Employer's Representative and paid at tendered rate with price adjustment, if applicable. The contractor shall not undertake any excess beyond 30% / extra work without written orders

from the Employer's Representative and any violations to this shall lead to non-payment to the contractor.

- b. No payment shall be entertained for excess quantity, if any, beyond the 30% of the tendered quantity (that means total 130% of the tendered quantity) until such executed quantity and the rates thereof are correctly derived afresh with mutual agreement and approved by the Employer.

1.35.2 Decrease in Quantity

If the quantity for any individual item decreases by more than 30% of tender quantity, such quantity i.e. executed quantity shall be paid at tendered rate with price adjustment, if applicable.

1.35.3 Extra Item

Extra item of work shall not vitiate the contract. The contractor shall be bound to execute extra items of work as directed by Employer's Representative.

No payment shall be entertained for extra item until such executed quantity and the rates thereon are correctly derived and approved by the Employer.

1.36 Lumpsum in Estimates

When the estimate on which a tender is made includes lump sum in respect of part of the work, the Contractor shall be entitled to payment in respect of the items of work involved or the part of the work in question at the same rates as are payable under this contract for such items, or if the part of the work in question is not in the opinion of the Employer's Representative capable of measurement, the Employer's Representative at his discretion, pay the lump sum amount entered in the estimate and the certificate in writing of the Employer's Representative shall be final and conclusive against the Contractor with regard to any sum or sums payable to him under the provisions of this clause.

1.37 Submission of Bills

- 1.37.1 The Contractor on submitting a monthly bill therefore, be entitled to receive payment proportionate to the part of the work then approved and at the rates quoted in Appendix – A and passed by the Employer's Representative, whose certificate of such approval and passing of the sum so payable shall be final and conclusive against the Contractor.

All such intermediate payments shall be regarded as payments by way of advance against, the final payment only and not as payments for work actually done and completed and shall not preclude the Employer's Representative from requiring bad, unsound, imperfect or unskilled work to be removed and taken away and reconstructed or re-erected, nor shall any such payments be considered as an admission of the due performance of the contract or any part thereof in any respect or the accruing of any claims, nor shall it conclude, determine or affect in any way the power of Employer's Representative as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affects the contract.

- 1.37.2 The rates for items of work shall be valid only when the item concerned is accepted as having been completed fully in accordance with the sanctioned specifications. In case where the items of work are accepted as not so completed, the Employer's Representative may make payment on account of such items at such reduced rates as he may consider reasonable in preparation of running account or final account bill.

- 1.37.3 A bill shall be submitted by the contractor each month on or before the date fixed by the Employer's Representative for all works executed in the previous month and the Employer's Representative shall take or cause to be taken the requisite measurements for the purpose of having the same verified and the claim so far as it is admissible, shall be adjusted within fifteen days from the submission of the bill.
- 1.37.4 The Contractor shall submit all the bills on the printed forms to be had on application at the office of the Employer's Representative. The charges to be made in the bills shall always be entered at the rates specified in the agreement or at the part / reduced rates subject to the approval by the Employer's Representative in the case of items not completed/executed as per agreements.
- 1.37.5 Payment to the Contractor shall be made within 45 days of receipt of the invoice and certification of the work done by the Employer's Representative in the approved format. However, the final bill payment shall be made on Completion of Completion of Works within 75 days of receipt of invoice by the Employer.
- 1.37.6 Amount due for recovery on other facilities as well as also for other services, water supply and electricity charges and for other expenditure, if any, incurred by the Employer on Contractor's behalf on labours and materials which may become due from the Contractor as per the Contract as well as under any other laws prevailing which may become due, will be recovered from the payments to the Contractor, as and when due.

1.38 Price Adjustment

- 1.38.1 No Price Adjustment is applicable due to increase or decrease in input cost of the works.
- 1.38.2 Changes in cost due to legislation:
- a. If the law of any local or duly constituted authority, or the introduction of any such state statute, Ordinance, decree, law regulations or bye-law which causes additional or reduced cost to the contractor other than under the first two sub- clauses of the clause in the execution of the works, such additional or reduced cost shall be certified by the Employer's Representative after examining the records provided by the claimant and shall be paid by or credited to the Employer.
 - b. Notwithstanding the foregoing such additional or reduced cost shall not be separately paid or credited if:
 - I. The same shall have been reflected in the indexing of any of the inputs to the price adjustment in accordance with the provision of this clause 1.38.
 - II. The same shall have been taken into account by any other clauses of the contract.

1.39 Deleted

1.40 Non-Refund of Quarry Fees and Royalties

The Contractor shall pay the royalty directly to the competent authority /local body as per rules and shall produce "No Due Certificate" from the Royalty Inspector having jurisdiction over the work site area to Employer's Representative. The royalty charges shall be borne by the contractor and shall not be refunded. The contractor shall produce 'no due certificate' once in a year as under:

- I. For time limit less than 1 year at the time of final bill and

- II. For time limit more than 1 year, after end of every year and at the time of final bill, otherwise the Employer's Representative shall deduct the royalty charges from the next running account bill at the prevailing rates.

1.41 Income Tax

Deduction will be made at source from the contractor's bill towards income Tax by the Employers as per prevailing rules of the Income Tax Authority.

1.42 VAT/ Service Tax/ Other Taxes/Local Taxes

- 1.42.1 The rate quoted by the Contractor shall be deemed to be inclusive of VAT/ Service Tax/Other State Taxes/ Local Taxes prevailing as on 30 days prior to submission of bid where applicable on materials that have to be purchased for performance of the contract including completed items of work.
- 1.42.2 VAT/Service Tax/Other State Taxes/ Local Taxes leviable for the work (including material component) under the Contract shall be borne by the Contractor and it shall not be reimbursed by the Employer.
- 1.42.3 If the Contractor is assessed of VAT/ Service Tax/Other State Taxes/ Local Taxes he should produce valid VAT/ Service Tax/Other State Taxes / Local Taxes clearance certificate before the payment of the final bill, otherwise the final payment to the Contractor shall be withheld. The contractor even after completion of the work and final payment have been made to him will be liable to pay any VAT/ Service Tax/ Other State Taxes/ Local Taxes liability and The Employer shall not be responsible for any VAT/ Service Tax/Other State Taxes / Local Taxes liability of the contractor.
- 1.42.4 Deleted
- 1.42.5 Difference of payment due to any upward revision of VAT/ Service Tax/Other State Taxes/ Local Taxes (Except on those components whose price rise is fully compensated as per Clause No. 4.38, Price Adjustment) during the period of contract shall be borne by the Employer. Such tax shall be paid by the Contractor and it will be reimbursed by the Employer upon production and verification of proof of payment. Similarly, in the event of reduction or abolition of VAT/ Service Tax/Other State Taxes/ Local Taxes on any or all materials purchased by the Contractor for completion of the work under contract, the Contractor shall pass on this benefit to the Employer. For above purpose, the Contractor shall produce a certificate from their auditor/ Chartered Accountants/ Tax consultants giving year wise details of purchases, revised rates of VAT/ Service Tax/Other State Taxes/ Local Taxes quantum etc. along with the proof. The Employer will reimburse or deduct as the case may be such amount, after scrutiny of the claim at the time of final payment of the bill.
- 1.42.6 The contractor enjoying VAT exemption, at the time of submission of tender and / or during the currency of the contract shall pass on this benefit to the Employer. He shall provide certificate duly signed by their Auditors/ Chartered Accountant Tax- Consultants before payment of final bill otherwise payment of final bill shall be withheld.

1.43 Completion Certificate of Work and Final Payment

As soon as the work is completed, in all respect as specified in the contract document the Contractor shall give a notice of such completion to the Employer's Representative and on receipt of such notice, the Employer's Representative shall inspect the work, and if he is satisfied that the work is completed in all respects then:

- I. The final measurements shall be recorded within 30 days from the date of physical completion of the work and the final bill shall be submitted by the contractor within 45 days from the date of recording final measurements, otherwise the Employer's Representative's certificate of the measurements and of the total amount payable for the work shall be final and binding on all parties.
- II. The completion certificate shall be issued within one months from the date of final measurements subject to the Contractor fulfilling his obligations as provided in the contract and subject to the work being complete in all respects. When separate periods of completion have been specified for items or groups of items, the Employer's Representative shall issue separate completion certificate for such items or groups of items.

No certificate of completion shall be issued, nor shall the work be considered to be completed till the Contractor shall have removed from the premises, on which the work has been executed, all scaffoldings, sheds and surplus materials, except such as are required for rectification of defects, rubbish and all huts and sanitary arrangements required for his workmen on the site in connection with the execution of the work, as shall have been created by the Contractor for the workmen and cleared all dirt from all parts of building(s) in, upon or about which the work has been executed or of which he may have/ had possession for the purpose of the execution thereof and cleared floors, gutters, and drains, cased doors and sashes oiled lock and fastenings, labelled keys clearly and handed them over to the Employer's Representative or his representative and made the whole premises fit for immediate occupation or use to the satisfaction of the Employer's Representative. If the Contractor fails to comply with any of aforesaid requirements of these on or before the date of completion of the works, the Employer's Representative may, at the expense of the Contractor, fulfil such requirements and dispose of the scaffolding or surplus materials and rubbish etc. as he thinks fit and the Contractor shall have no claim in respect of any such scaffolding or surplus materials except for any sum actually realized by the sale thereof less the cost of fulfilling the requirements and any other amount that may be due from the Contractor. If the expense of fulfilling such requirements is more than the amount realized on such disposal as aforesaid, the Contractor shall forthwith, on demand, pay such excess. The Employer's Representative shall also have the rights to adjust the amount of excess against any amounts that may be payable to the Contractors. No Payment shall be entertained in the intervening period of last R.A. Bill and before the pre-audit of the final bill and before excess / extra item approved by the Employer.

1.44 Errors, Omissions and Discrepancies

1.44.1 The several documents forming the contract are essential parts of the contract and a requirement occurring in one is as binding as through occurring in all they are intended to be mutually explanatory and complementary and to describe and provide for a complete work. In the event of any discrepancy in the several documents forming the contract or in any one document, the following order of precedence should apply.

- I. Between the written description of the item in the Appendix-A or written dimensions on the drawing and the corresponding one in the specifications, the later shall apply.
- II. Figured dimensions shall supersede scaled dimensions. The drawing on a large scale shall take precedence over those on smaller scale.
- III. Drawing issued as construction drawings from time to time shall supersede the corresponding drawings previously issued.

In the case of defective description or ambiguity, the Employers representative is entitled to issue further instructions directing in what manner the work is to be carried out. The

contractor shall point out any apparent error or omission in the tender documents while submitting the tender and particularly while signing the contract. The contractor cannot take any advantage of any apparent error or omission in the tender document and if the contractor fails to bring out the apparent error or omission to the notice of the Employer in writing, he shall have no right to claim which may arise due to such error or omission subsequently and the decision of the Employer in this regard shall be final and binding to the contractor.

- 1.44.2 Typographical error leading to absurdity shall be ignored and correct technical, financial and legal meaning of such errors shall be considered.

1.45 Old Curiosities

In the event of discovery by the contractor or his employees during the progress of work, of any gold, silver, oil or other minerals of any description and precious stones, treasures, coins, antiques, relic, fossil or other articles or value of interest whether geological, archaeological or any other such treasure and other things shall be deemed to be the absolute property of the Employer and the contractor shall duly preserve the same to the satisfaction of the Employer's Representative, from time to time and deliver the same to such persons as the Employer's Representative may appoint.

The Contractor shall take all reasonable precautions to prevent his workmen or any other person from removing or damaging any such articles or things, immediately after the discovery there of and before removal acquaint the Employer's Representative with such discovery and carry out his order for the disposal of the same.

1.46 Safety Provisions

- 1.46.1 The Contractor in his operations shall arrange for the safety measure as required inclusive of the provisions in the latest safety manual published by the Central Water and Power Commission, New Delhi (January-1962 edition Reprinted in November 1986) In case the Contractor fails to make such arrangements, the Employer's Representatives shall be entitled to cause them to be provided and to recover the costs there of from the Contractor.

- 1.46.2 For failure to comply with the provisions of the Safety Manual the Contractor shall, without prejudice to any other liabilities, pay to the Employer a sum not exceeding Rupees one thousand per day for each day default.

1.47 Labour Compensation under the Workman's Compensation Act

- a. The contractor shall be responsible for and shall pay any compensation to his workmen payable under the workmen's compensation Act 1923 (VIII of 1923) (hereinafter called the said Act) for injuries causes to the workmen. If such compensation is paid by Employer as principle employer under sub-section (1) of section 12 of the said Act, on behalf of the Contractor, it shall be recoverable by the Employer from the Contractor under sub-section (2) of the said section. Such compensation shall be recovered in the manner as decided by the Employer's Representative.
- b. The Contractor shall be responsible for and shall pay the expenses of providing medical aid to any workmen who may suffer a body injury as a result of an accident. If such expenses are incurred by Employer, the same shall be recoverable from the Contractor forthwith and be deducted without prejudice to any other remedy of Employer from any amount due or that may become due to the Contractor.
- c. The Contractor shall provide all necessary personal safety equipment and first aid apparatus available for the use of the persons employed on the site and shall maintain the

same in suitable condition for immediate use at any time and shall comply with the following regulations in connection therewith:

- I. The workers shall be required to use the equipment so provided by the Contractor and the Contractor shall take adequate steps to ensure proper use of the equipment by those concerned;
 - II. When work is carried out in proximity of any place where there is risk of drowning, all necessary steps shall be taken for the prompt rescue of any person in danger;
 - III. Adequate provision shall be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.
- d. Employment of famine or other labour. The Contractor shall employ any famine, convict or other labour of particular kind or class, if ordered in writing to do so by the Employer's Representative.
- e. Details of labourers employed
- I. The contractor shall not employ in connection with the works any person who has not completed his Eighteen (18) years of age.
 - II. The Contractor shall furnish to the Employer's Representative information about various categories of labours employed by him in the form and at such interval as may be specified.
 - III. The contractor shall in respect of labour employed by him comply with or cause to be complied with the provisions of the various labour laws and rules and regulations as applicable to them in regard to all matters provided therein and shall identify the Employer in respect of all claims that may be made against the Employer for non-compliance thereof by the Contractor.
- f. Notwithstanding, anything contained herein the Employer's Representative may take such action as may be necessary for compliance of the various labour laws and recover the costs thereof from the Contractor.
- I. In the event of the Contractor committing a default or breach any of the provisions of the labour laws and rules and regulations applicable, the Contractor shall, without prejudice to any other liability under the Act, pay to Employer a sum not exceeding Rupees one thousand per day for each of the defaults subject to a maximum of one percent of the tendered amount.
- g. The Contractor should, as far as possible, obtain his requirement of labours, skilled and unskilled, from the nearest Employment Exchanges so as to utilize the local employment potential. If there are no local Employment Exchanges or such Exchanges are not able to provide the required labour locally, suitable available labours should be utilised to the maximum extent possible. The contractor shall have to engage local labour and person seeking employment where available on normal rate.
- h. Fair Wages
- I. If a Contractor fails to pay within '7' (Seven) days to any the labour(s)/worker(s) the minimum wages prescribed by the Government under the minimum wages Act 1948 as in force from time to time, the Employer's Representative shall be at liberty to deduct the amount payable by the contractor to the labour/worker from his

(Contractor's) bills or deposit(s) after making due inquiries and establishing claims of the labour(s)/worker(s).

- II. The Contractor shall not be entitled to any payment of compensation on account of any loss that the Contractor may have to incur on account of the action as aforesaid. Before the action as aforesaid, is enforced, a notice in writing to the Contractor shall be issued by the Employer's Representative to pay the wages as per Minimum wages Act in force at the relevant time. If Contractor does not act as aforesaid within seven days then the action contemplated as above shall be taken against him.
- i. Local labour on normal rates. The contractor shall have to engage local and person seeking employment where available on normal rates.

1.48 Labour Reports

The contractor shall submit the following reports to the Employer's Representative:

- I. A daily report in the form as may be prescribed of the strength of labour both skilled and unskilled employed by him on the work(s). The Contractor shall increase or decrease the strength both skilled and unskilled, if directed by the Employer's Representative. The submission of such report shall not, however relieve the Contractor of his responsibilities and duties regarding progress or any other obligations under the contract.
- II. A classified weekly return in the prescribed form of the number of person employed on the works during the preceding week.
- III. A weekly medical report in the prescribed form showing the health of the Contractor's camp, the number of person ill or incapacitated and the nature of their illness.
- IV. A report of any accident, which may have occurred to be sent within 24 hours of the occurrence.

1.49 Deleted

1.50 Employment of Scarcity Labour

If Government declares a state of scarcity or famine to exist in any village situated within 16 kilometres of the work, the Contractor shall employ upon such parts of the works, as are suitable for unskilled labour, any person, certified to him by the Employer's Representative or by any persons to whom, the Employer's Representative may have delegated this duty in writing to be in need of relief and shall be bound to pay to such persons, wages not below the minimum which Government may have fixed in this behalf. Any dispute which may arise in connection with the implementation of the Clause shall be decided by the Employer's Representative whose decision shall be final and binding on the contractor.

1.51 Insurance

- 1.51.1 The Contractor shall secure and maintain throughout the duration of this Contract insurance of such types and in such amounts as may be necessary to protect himself against all the usual hazards or risks or loss. The form and limits of such insurance and the company together with the under writing thereof in each case, shall be such as will be acceptable to the Employer but, regardless of such acceptance, it shall be the responsibility of the contractor to maintain adequate insurance at all-time at least to cover:

- I. Workmen's compensation in accordance with the law in force from time to time.

- II. Third party liability including Employer's personnel on duty with a cover of minimum Rs. 5 lac for each person in case of fatal accident/permanent disability.
- III. All plant and equipment of the Contractor hypothecated to the Employer and all Employers material and machinery handed over to the contractor till they are properly installed.
- IV. Failure of the Contractor to maintain adequate insurance coverage shall not relieve him of any contractual responsibility.

1.51.2 Attested copies of certificate or policies of insurance shall be filed with the Employer prior to starting any construction work on this contract. The certificates shall state that fifty days advance written notice will be given to the Employer before any policy covered thereby is changed, cancelled or expired.

1.52 Camp Regulations

1.52.1 Huts

The Contractor shall build a sufficient number of huts on a suitable plot of land for the use of the labours according to the following specifications:

- I. Deleted.
- II. A good site shall be selected; high ground removed from jungle but well provided with trees shall be chosen wherever it is available. The neighbourhood of rank jungle, grass or weeds should particularly be avoided. Camp should not be established close to large cutting of earth-work.
- III. The lines of huts shall have open spaces of at least 10 m between rows. When good natural site cannot be procured, particular attention should be given to the drainage.
- IV. There should be no over-crowding floor spaces at the rates of 2.8 square meter per head shall be provided. Care should be taken to see that the huts are kept clean and in good order.
- V. The contractor must find out land for the hut and if he wants Employer land, he should apply for it and pay assessment for it.

1.52.2 Drinking Water

The Contractor shall, as far as possible, provide an adequate supply of chlorinated pure potable drinking water for the use of labours. This provision shall be at the rate of not less than 45 litres per head.

1.52.3 Deleted

1.52.4 Deleted

1.52.5 Drainage

The Contractor shall make sufficient arrangement for draining away the sewage water as well as water from the bathing and washing places and shall dispose of this waste water in such a way as not to cause nuisance. The Contractor would put malarial oil once in a week in stagnant water round about the residence.

1.52.6 Medical Facilities

The Contractor shall engage a medical officer with a travelling dispensary for a camp having 500 or more persons if there is no Government or other private dispensary situated within 6 Km from the camp.

1.52.7 Conservancy and Cleanliness

The Contractor shall provide the necessary staff for effecting the satisfactory conservancy and cleanliness of the camp to the satisfaction of the Employer's Representative.

1.52.8 Health Provisions

The District Health Officer of the District or the Deputy Director of Health Services shall be consulted before opening a labour camp and his instructions on matters, such as water supply, sanitary convenience, camp-site, accommodation and food supply shall be followed by the Contractor.

1.52.9 Deleted.

1.52.10 Rest Rooms

- a. In every place wherein contract labour is required to halt at night in connection with the contract works and in which employment of contract is likely to continue for three months or more, the Contractor shall provide and maintain rest rooms or other suitable alternative accommodation within fifteen days of the coming in to force of the rules in the case of existing establishment, and within fifteen days of the employment of contract labour in new establishment.
- b. If the amenity referred to in sub rule is not provided by the Contractor within the period prescribed, the principal employer shall provide the same within a period of fifteen days of the expiry of the period laid down in the sub-rule.
- c. Separate rooms shall be provided for women employees.
- d. Effective and suitable provision shall be made in every room for securing and maintaining adequate ventilation for the circulation of fresh air and there shall also be provided and maintained sufficient and suitable natural or artificial lighting.
- e. The rest room or other suitable alternative accommodation shall be of such dimension so as to provide at least floor area of 1.1 sq.mt. for each person making use of rest room.
- f. The rest room or rooms or other suitable alternative accommodation shall be so constructed so as to afford adequate protection against heat, wind, rain and shall have smooth, hard and impervious surface.
- g. The rest room or other suitable alternative accommodation shall at a convenient distance from the establishment and shall have adequate supply of wholesome drinking water.

1.52.11 Canteen Facilities

- a. In every establishment of contract work and where in work regarding the employment of contract labour is likely to continue for six months and where in contract labour numbering one hundred or more ordinarily employed, the adequate canteen facilities shall be provided by the contractor for the use of such contract labour within sixty days of the date of coming in to force of the rules in the case of existing establishment and within 30

days of the commencement of the employment of contract labour in the case of new establishment.

- b. Deleted.
- c. The canteen shall be maintained by the Contractor.

1.53 Observance of Laws, Local Regulations

The Contractor shall conform to all laws of the land and regulations and bye- laws of any local authority and of any water or electricity supply companies with whose system the structure is proposed to be constructed. He shall before making any variations from the drawings or specifications that may be necessitated for so conforming, give to the Employer's Representative a written notice, specifying the variations proposed to be made and the reasons for the Contractor does not receive such instructions within seven days, he shall proceed with the work conforming to the provisions, regulations or bye laws in question and any variation in the drawing or specifications so necessitated shall be dealt with under the clause 1.35. The Contractor shall give notices required by the said Acts, regulations or bye-laws and bear the required fees in connection therewith. He shall also ensure that no attachments are made against materials for works related to the Contracts. The Contractor shall protect and indemnify the Employer against all claims or liabilities arising from or based on the violation of such laws, ordinances regulations, bye-laws, decrees or attachments by him or by his employees. The contractor shall also notify Employer in case any other unforeseen permit / NOC required to carry out the work.

1.54 Force Majeure

- 1.54.1 Neither party shall be liable to the other for any loss or damage occasioned / caused by or arising out of act of God and in particular "Unprecedented floods", volcanic eruption, earthquake or other convulsion of nature and other acts, such as but not restricted to invasion, the act of foreign countries, hostilities or war like operations before or after declaration of war rebellion military or usurped power (but excluding strikes and lockouts) which prevent performance of the contract and which could not have been foreseen of avoided by a prudent person.

Note: "Unprecedented flood" means the flood crossing the highest observed flood level which is on the available record.

- 1.54.2 If any loss of damage happens to the works, or any part thereof, or materials or plant for incorporation therein, during the period for which the contractor is responsible for the care thereof, from any cause whatsoever, other than the risk defined in the clause 1.54.1 as above, the Contractor shall at his own cost, rectify such loss of damage so that the permanent works conform in every respect with the provisions of the contract to the satisfaction of the Engineer-in-Charge.

1.55 No Compensation for Delay in Availability of Land

No Compensation shall be allowed for any delay caused in execution of the work on account of delay in making available the full site of land at a time.

1.56 Liquidated Damages

- a. The time allowed as stipulated in the Tender for carrying out the work is 06 (Six) months and it shall be strictly observed by the Contractor and reckoned from the date on which the order to commence work is given to the Contractor. The work throughout the stipulated period of the contract shall be proceeded with all due diligence (time being

deemed to be the essence of the contract on the part of the Contractor). To ensure good progress during the execution of the work, the Contractor shall be bound in all cases to complete the work as under:-

- I. Entire length of Embankment construction to be completed within 4 (four) months.
 - II. 100% of the work within 6 (Six) months.
- b. In the event of the Contractor failing to comply with the condition, stipulated in para (a) above he shall be liable to pay as liquidated damage an amount equal to point one percent (0.1%) of the contract per day of delay up to the date of Completion subject to the maximum amount of Ten percent (10%) of Tendered Amount.
 - c. The penalty levied due to non-completion of work at intermediate milestones will be refunded if the entire work is completed within the specified time limit to the satisfaction of the Employer's Representative. No interest shall be payable on the amount so refunded.
 - d. Failure in completion of work in stipulated time limit shall be sufficient cause for termination of Contract and forfeiture of security deposit.

1.57 No Compensation for Delay in the Execution of Work Due to Water Pools

No compensation shall be allowed for any delay in execution of the work on account of water standing in borrow pits / borrow area, work site or compartment. The rates are inclusive of hard or cracked soil, excavation in mud, subsoil water or water standing in borrow-pits / borrow area and no claim for an extra rate shall be entertained unless otherwise expressly specified.

1.58 No Compensation for Change or Restriction of Works

If at any time after the execution of the Contract documents, the Employer's Representative shall for any reason whatsoever, required the whole or part of the work as specified in the tender be stopped for any period or shall not require the whole or part of work to be carried by the contractor, he shall give notice in writing stating the fact to the contractor who shall there upon suspend or stop the work totally or partially as the case may be. In such case except provided hereunder the contractor shall have no claim to any payment or compensation whatsoever except as provided hereunder. on account of any profit or advantage which he might in consequence of the full amount of work not having been carried out on account of the any loss that he may put to on account of material purchased or agreed to be purchased or for unemployment of labour recruited by him. He also shall not have any claim for compensation by reason of any alternation having been made in the original specifications, drawings, designs and instructions which may involve any curtailment of the work as originally contemplated.

- a. During the period of suspension, the contractor shall not remove any plant or equipment from the site and any part of the work without prior written consent of the Employer's Representative.
- b. The contractor shall not be entitled for loss of expected profit from such work.

1.59 Claims

The Contractor shall not be entitled to any claim/claims from the Employer on any account unless where allowed by the condition of this contract. In such cases, the Contractor shall have to submit a claim in writing to the Employer's Representative within one month on the

cause of such claim occurring. All claims arising as a dispute of any kind out of the contract shall be governed by clause 1.60.

1.60 Arbitration

If any dispute or difference of any kind whatsoever arises between the parties in connection with or arising out of or relating to or under this Contract, the parties shall promptly and in good faith negotiate with a view to its amicable resolution and settlement. In the event no amicable resolution or settlement is reached within a period of thirty (30) days from the date on which the above-mentioned dispute or difference arose, such dispute or difference shall be finally settled by arbitration. The arbitral tribunal shall consist of a sole arbitrator appointed by mutual agreement of the parties. In case of failure of the parties to mutually agree on the name of a sole arbitrator, the arbitral tribunal shall consist of three arbitrators. Each party shall appoint one arbitrator and the two arbitrators so appointed shall jointly appoint the third arbitrator. The seat of arbitration shall be Gandhinagar, Gujarat and the arbitration shall be conducted in the English language. The Arbitration and Conciliation Act, 1996 shall govern the arbitral proceedings. The award rendered by the arbitral tribunal shall be final and binding on the parties.

1.61 Rescinding of Contract in Case of Subletting Contract or Contractor Becomes Insolvent

The entire contract shall not be assigned or sublet. The Employer may allow subletting the part of portion of the work not exceeding up to 40% (Forty percentages) of Tender cost, if the sub-contractor satisfies the requirement of the work to be sublet. If the Contractor shall assign or sublet his contract or attempt to do so or become insolvent or commence any proceedings to get himself be adjudicate and insolvent or make any compromise with his creditors, or attempt to do so, the Employer's Representative may by notice in writing, rescind the contract. Also if any bribe, gratuity, gift, loan, perquisite, reward or advantage, pecuniary or otherwise, shall either directly or indirectly be given, promised or offered by the Contractor or any of his servants or agents to any public officer or person in the employment of Employer in any way relating to his office or employment or if any such officer or person shall become in any way directly or indirectly interested in the contract, the Employer's Representative may thereupon by notice in writing rescind the contract. In the event of contract being rescinded, the security deposit of the Contractor shall thereupon stand forfeited and be absolutely at the disposal of Employer and the same consequence shall ensue as if the Contract had been rescinded under clause 1.7 here of and in addition the Contractor shall not be entitled to recover or be paid for any work thereof actually performed under the contract.

1.62 Deleted

1.63 Change in Constitution of Firm to be notified

In the case of a Tender by firm partnership or limited company, any change in its constitution shall be forthwith notified by the Contractor to the Employer's Representative for his information.

1.64 Mobilization Advance

- a. The Employer shall make an interest bearing advance payment @ Bank Rate + 5% per annum (the "Advance Payment"), equal in amount to 10 (ten) percent of the Contract Price, for mobilisation expenses and for acquisition of equipment. The Advance Payment shall be made in two installments. The first installment shall be an amount equal to 5% (Five percent) of the Contract Price, and the second installment shall be equal to 5% (five

percent) of the Contract Price. Here the Bank Rate means the Repo rate of interest announced by the Reserve Bank of India for all its lending operations on the Base Date that is 28 days before the Bid submission date. The Contractor may apply to the Employer for the first installment of the Advance Payment at any time after the commencement date and signing of Contract Agreement, against an irrevocable and unconditional guarantee from a Scheduled Bank for an amount equivalent to 110% (one hundred and ten per cent) of such installment, substantially in the form provided, to remain effective till the complete and full repayment thereof.

- b. At any time after 30 (thirty) days from the commencement Date, the Contractor may apply for the second installment of the Advance Payment against an irrevocable and unconditional guarantee from a Scheduled Bank for an amount equivalent to 110% (one hundred and ten per cent) of such installment, substantially in the form provided, to remain effective till the complete and full repayment thereof.
- c. The first and second installments shall be paid by the Employer to the Contractor within 15 (fifteen) days of the receipt of its respective requests.
- d. The recovery of all Advances shall commence when 20% of the original Contract Price of the work has been paid, and it will be completed by the time 80% of the original contract value has been paid or by the time of original Completion Date whichever is earlier.

1.65 Termination

1.65.1 By the Employer: The Client may terminate this Contract, by not less than thirty (30) days' written notice of termination to the Contractor, to be given after the occurrence of any of the events specified in this clause:

- I. if the Contractor do not remedy a failure in the performance of their obligations under the Contract, within a period of thirty (30) days', after being notified or within such further period as the Client may have subsequently approved in writing;
- II. within thirty (30) days, if the Contractor become insolvent or bankrupt;
- III. if, as the result of Force Majeure, the Contractor are unable to perform a material portion of the Services for a period of not less than sixty (60) days;
- IV. within thirty (30) days, if the Contractor fails to comply with any final decision reached as a result of arbitration proceedings pursuant to relevant clauses hereof;
- V. within thirty (30) days, if the Contractor, in the judgment of the Client has engaged in Corrupt or Fraudulent Practices in competing for or in executing the Contract;
- VI. if the Employer, in its sole discretion and for any reason whatsoever, within a period of thirty (30) days' decides to terminate this Contract.

1.65.2 By the Contractor: The Contractor may terminate this Contract, by not less than thirty (30) day's' written notice to the Employer, such notice to be given after the occurrence of the events specified in this clause:

- I. if the Employer fails to pay any money due to the Contractor pursuant to this Contract and not subject to dispute pursuant to relevant clauses hereof within forty-five (45) days after receiving written notice from the Contractor that such payment is overdue; or
- II. if, as the result of Force Majeure, the Contractor are unable to perform a material portion of the work for a period of not less than sixty (60) days.

- 1.65.3 Cessation of Rights and Obligations: Upon termination of this Contract pursuant to actual Termination, or upon expiration of this Contract pursuant to relevant clause hereof, all rights and obligations of the Parties hereunder shall cease, except (i) such rights and obligations as may have accrued on the date of termination or expiration, (ii) the obligation of confidentiality set forth in relevant clause hereof, (iii) the Contractor's obligation to permit inspection, copying and auditing of their accounts and records (iv) the rights of indemnity of the Client v) any right which a Party may have under the Applicable Law.
- 1.65.4 Cessation of Services: Upon termination of this Contract by notice of either Party to the other pursuant to relevant clauses hereof, the Contractor shall, immediately upon dispatch or receipt of such notice, take all necessary steps to bring the Services to a close in a prompt and orderly manner and shall make every reasonable effort to keep expenditures for this purpose to a minimum. With respect to the work done by the Contractor and equipment and materials furnished by the Client, the Contractor shall handover all project documents under procedure described in this contract.
- 1.65.5 Payment upon termination: Upon termination of this Contract, the Employer will make the following payments to the Contractor:
- I. Payment pursuant to satisfactorily performed work prior to the effective date of termination.
- 1.65.6 Disputes about Events of Termination: If either Party disputes Termination of the contract under relevant clauses hereof, such Party may, within forty-five (45) days after receipt of notice of termination from the other Party, refer the matter to arbitration under relevant clauses hereof, and this Contract shall not be terminated on account of such event except in accordance with the terms of any resulting arbitral award.

Section 2. Appendices

Appendix A – Bill of Quantities

It No.	Item Description	Unit	Estimated Quantities	Rates		Amount
				In Figure	In Words	
1	Carry out 2 m x 2 m grid survey work by using total station in reference to Control station and GTS benchmark or Benchmark suggested by engineer in charge along the corridor including marking of center line of alignment with GPS, taking ground level, details of all existing structures, Electric poles, trees, overhead electrical lines including fixing necessary reference RCC pillars, establishing bench mark, establishing day light lines on ground and submission of Survey Drawing with readable spot level, longitudinal section, cross section and drawing report of survey work as directed.	Ha	10.00			
2	Clearing & grubbing the land including uprooting rank vegetation ,grass, bushes, shrubs, sapling and trees girth up to 300 mm, removal of stumps of tree cut earlier and disposal of unserviceable materials with all lead and lift as directed by mechanical means in area of light jungle	Ha	10.00			
3	Construction of embankment with approved material obtaining from borrow area with all leads and lifts transporting to site, spreading, grading to required slope and compacting to meet requirement to MoRTH table 300- 2 in layers not more than 200 mm thick, including rolling with vibratory roller of 8 to 12 tonnes etc. complete as per MORTH Clause 305. (Soaked CBR Not less than 5 %)	Cu m	156580.00			

It No.	Item Description	Unit	Estimated Quantities	Rates		Amount
				In Figure	In Words	
4	Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2) all complete as per MoRTH Specification Clause 305(CBR Not less than 8 %)	Cu m	14548.00			
5	Construction of granular sub-base (Grade - I) by providing coarse graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per MoRTH clause 401.	Cu m	5967.00			
6	Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub-base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density, complete as per MoRTH clause 406. (250 mm thick)	Cu m	3327.00			
7	Providing and laying Prime coat using Emulsion asphalt binder @ rate of 7.5 Kg. /10 sq.m. of road surface using Emulsion pressure sprayer etc. complete including cost of Emulsion asphalt.	Sqm	13309.00			

It No.	Item Description	Unit	Estimated Quantities	Rates		Amount
				In Figure	In Words	
8	Providing and laying 50 mm thick compacted Bituminous Macadam with specified graded Black trap crushed stone aggregates as per MORTH gradation using asphalt for tack coat @ 2.5 Kg. / 10 Sq.m. with mechanical sprayer and VG 30 bulk bitumen for mixing at the rate of 3.4 % (34 Kg./M.T.) including heating the asphalt and aggregate by continuous batching Drum mix plant and spreading same by paver finisher to the required camber and grade, and rolling with vibratory roller to achieve desire density including cost of fire wood, oil, Kerosene, flushing of stone dust as required, labour charges and hire charges of machineries etc. complete	MT	1464.00			
9	Providing and laying 20 mm thick mix seal surfacing using specified graded crushed Black Trap stone aggregates as per MORTH gradation using VG 30 bulk bitumen for mixing at the rate of 4.5 % (45 Kg. /M.T.) by hot mix process and hot laid process using paver finisher to the required camber and grade, including rolling with vibratory roller to achieve desire density including cost of fire wood, oil, Kerosene, labour charges and hire charges of machineries etc. complete.	MT	612.00			
10	Construction of cement concrete kerb in M 25 with kerb stone laid with kerb laying machine, foundation concrete in M 10 laid manually as per detailed drawing all complete as per detailed specification	Rmt	3485.00			
11	Providing pucca rubble pitching in CM 1:4 with joints pointing in CM 1:3 including curing finishing, transporting as directed etc. complete.(i) 30 cm thick pitching	Sqm	58011.00			

It No.	Item Description	Unit	Estimated Quantities	Rates		Amount
				In Figure	In Words	
12	Construction of Rain chute by coursed rubble masonry with approved quality in cement mortar 1:4 (1 cement : 4 sand) etc. complete on prepared earthen slope including all labour & materials.	Cu m	1669.00			
13	Providing and laying in position Cement concrete in M- 20 grade for Toe wall and PCC in M 10 using cement, sand and machine crushed coarse aggregate 20 mm size including necessary excavation formwork, vibrating, finishing and curing etc. completed	Rmt	6970.00			
14	Providing and laying TMT CRS fe 500 reinforcement for RCC works and anchor bar with providing binding wires including cutting, bending, welding, binding in position hooking placing in position with all leads & lifts etc. complete.	MT	65.29			
15	Excavation in all type of soil by mechanical means including cutting and loading in tippers and disposal with in all lifts and lead trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections. (Including dewatering) (a) 0 to 3 mt. Depth	Cu m	6970.00			
16	Providing & laying 7.5 cms thick controlled cement concrete lining of M 15 grade in bed side slope and curvature including weigh batching, mixing ,transporting, placing, vibrating, dressing the slopes and bed in earth to correct profile with finishing as required to the exposed surface making asphalt joints as directed and watering curing including dewatering where required etc. completed.	Sqm	18540.00			

It No.	Item Description	Unit	Estimated Quantities	Rates		Amount
				In Figure	In Words	
17	Retro- reflectorised signs (Providing and fixing of retro-reflectorised cautionary, mandatory and inforatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing)					
	(1) 60 cm circular	No	5.00			
	(2) 80 mm x 60 mm rectangular	No	5.00			
	(3) 90 cm equilateral triangle	No	5.00			
18	Excavation for foundation up to 1.5 m depth including sorting out and stacking of useful material and disposing off excavated stuff up to 50 m lead (1) Loose or Soft Soil	Cu m	195.38			
19	Providing and laying in position cement concrete M 15 using cement, sand and machine crushed coarse aggregate 25 to 40 mm size compaction, finishing, and curing as required etc. completed.	Cu m	71.30			
20	Providing ast in situ controlled concrete M-30 mix for RCC including necessary centering, form work, scaffolding and vibrating curing finishing as specified with all lead and lifts etc. complete.	Cu m	349.79			
21	Providing and laying TMT CRS Fe 500 reinforcement for RCC works and anchor bar with providing binding wires including cutting, bending, welding , binding in position hooking placing in position with all leads & lifts etc. complete.	MT	26.289			
22	Providing and fixing flap gate including material, labour for cutting, bending, fixing as per detail drawing and as directed by engineer in charge.	MT	4.838			

It No.	Item Description	Unit	Estimated Quantities	Rates		Amount
				In Figure	In Words	
23	Providing and fixing in position PVC heavy duty water stops in barrels, troughs and wing walls with 25 mm wide expansion joints as shown in drawing including filling the joints with asphalt pad or bitumen cork board of approved quality.	Rmt	18.40			
24	Marking the Gauge on concrete surface with paint as per standard and as directed by engineer in charge.	No	4			
25	Providing and fixing marble plate of 20 cm x 15 cm x 2.54 cm thick including engraving and filling oil paint for letters as directed	No	4			
Total						

Appendix B – Form of Bank Guarantee

Annexure I – Performance Security

Employer.....,
Gandhinagar, Gujarat

WHEREAS:

_____ [name and address of Contractor] (hereinafter called “the Contractor”) and [name and address of the EMPLOYER], (“the EMPLOYER”) have entered into an agreement (the “Agreement”) for “[Name of the work]_”

- (A) [Name of the work], subject to and in accordance with the provisions of the Agreement.
- (B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the Construction Period and Defects Liability Period (as defined in the Agreement) in a sum of Rs. Crore (Rupees Crore) (the “Guarantee Amount”).
- (C) We,through our branch at (the “Bank”) have agreed to furnish this bank guarantee (hereinafter called the “Guarantee”) by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor’s obligations during and under and in accordance with the Agreement, and agrees and undertakes to pay to the Employer, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the guarantee amount as the EMPLOYER shall claim, without the EMPLOYER being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the EMPLOYER, under the hand of an officer not below the rank of [.....of EMPLOYER], that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the EMPLOYER shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any difference between the EMPLOYER and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the EMPLOYER shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the EMPLOYER to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The EMPLOYER shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the EMPLOYER against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the

Agreement and/or the securities available to the EMPLOYER, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the EMPLOYER of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the EMPLOYER or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the EMPLOYER in respect of or relating to the Agreement or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.
7. Notwithstanding anything contained herein before, the liability of the Bank under this Guarantee is restricted to the Guarantee amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the EMPLOYER on the Bank under this Guarantee all rights of the EMPLOYER under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Performance Security shall cease to be in force and effect 60 (sixty) days after the end of the Defects Liability Period as set forth in Clauses 1.1
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the EMPLOYER in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the EMPLOYER that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the end **** month in the year ***** or until it is released earlier by the EMPLOYER pursuant to the provisions of the Agreement.

Signed and sealed this day of 20..... at

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Annexure II – Form for Guarantee for Advance Payment

.....,

.....EMPLOYER,

Gandhinagar, Gujarat

WHEREAS:

[name and address of Contractor] (hereinafter called “the Contractor”) has executed an agreement (hereinafter called the “Agreement”) with the [name and address of the EMPLOYER], (hereinafter called “the EMPLOYER”) for the “[Name of the work], subject to and in accordance with the provisions of the Agreement.

(A) in accordance with the Clause 1.64 of the Agreement the EMPLOYER shall make to the Contractor an interest bearing advance payment (hereinafter called “Advance Payment”) equal to 10% (ten per cent) of the contract price for mobilization expenses and acquisition of equipment; and that the Advance Payment shall be made in subject to the Contractor furnishing an irrevocable and unconditional guarantee by a scheduled bank for an amount equal to the 110% amount of each instalment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement; and the amount of instalment of the Advance Payment is Rs. **** cr. (Rupees ***** crore) (the “Guarantee Amount”).

(B) We,through our branch at (the “Bank”) have agreed to furnish this bank guarantee (hereinafter called the “Guarantee”) for the Guarantee Amount.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid installment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the EMPLOYER, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the guarantee amount as the EMPLOYER shall claim, without the EMPLOYER being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the EMPLOYER, under the hand of an officer not below the rank of [.....of EMPLOYER], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the installment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the EMPLOYER shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any difference between the EMPLOYER and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the EMPLOYER shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the EMPLOYER to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The EMPLOYER shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any

of the rights and powers exercisable by the EMPLOYER against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the EMPLOYER, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the EMPLOYER of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the EMPLOYER or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the EMPLOYER in respect of or relating to the Advance Payment.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the EMPLOYER on the Bank under this Guarantee all rights of the EMPLOYER under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The guarantee shall cease to be in force and effect 90 (ninety) days after the end of the one year from the date of payment of the installment of the Advance Payment, as set forth in Clause 19.2 of the Agreement.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the EMPLOYER in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the EMPLOYER that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the end **** month in the year ***** or until it is released earlier by the EMPLOYER pursuant to the provisions of the Agreement.

Signed and sealed this day of 20..... at

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Section 3. Scope of Work and Technical Specifications

A. Scope of Work

i. Introduction

The Adhiya River (Tributary of Sukhbhadar River) originates at village Cher and meets the Sukhbhadar River near village Khoon. Adhiya River and Sukhbhadar River do not have well defined banks and also pass through flat topography so flood water spills over the area and slowly flows into sea. The work of TP-2E is under progress hence the protection work to TP-2E is required in first phase.

ii. Salient features of the project

In the first phase, Right side 5.0 m wide Embankment with 3.75 service lane is proposed from SH-6 to existing embankment of Khoon village(From Ch 11+530 to 15+030). The soils for construction of embankment is required to be brought from suitable borrow areas.

Service lane consisting of 250 mm thick GSB (Grade I), 250 mm WMM covered by 50 mm thick Bituminous macadam.20 mm thick Mix seal surface layer is proposed to seal top surface. 150 mm wide kerb is proposed on one side of Service lane.

There is provision of four sluice flap gates at Ch 12+220, 12+900, 13+600 & 14+340.

The Side slope is protected with 300 mm thick pucca pitching and Rain chute is provided at every 10 m towards river side embankment.

The earth work rate has been worked out considering average 28 km lead.

iii. Scope of Work

The Adhiya (Tributary of Sukhbhadar River) originates near village Cher and meets Sukhbhadar River at village Khun. The river does not have well defined banks and passes through flat topography. Due to this reason, flood water spills over in the area.

Adhiya river passes through the TP-2W and north of TP-2E of DSIR.

This flood protection embankment is to be provided in part of the river flowing north of TP-2E from the SH-6(Ahmedabad – Dholera – Bhavnagar Highway) upto existing flood protection bund for Khun Village.

The scope of services to be provided by the Contractor are briefly described below:

- 1) Carrying out topographical survey and preparation of working drawings.
- 2) Constructing flood embankment along Adhiya River between State Highway (SH-6) to existing embankment (From Ch 11+530 to Ch. 15+030) for protection of village Khun (Approx length 3.5 km). This includes constructing earthen embankment with top width of 5 m wide with suitable earth from borrow area.
- 3) Prepare and submit working drawings viz. i) Plan and Profile with daylight line, ii) cross sections (20m interval) for the entire corridor width including embankment, service lane, gutter etc. and iii) Longitudinal profile of side gutter in A2 drawings (both soft and hard copies) with the approval of Engineer in charge. Contractor has to submit As Built drawings of all the components as directed by engineer in charge.

- 4) Construction of 3.75 m. wide single lane bituminous service road on top of embankment and other items as per Schedule –A and as shown in drawing.
- 5) The slope of embankment is proposed as 1V:2H with 300 mm thick pucca pitching as per schedule –A. Rain chutes in CR Masonry are proposed at 10 m interval on the River side slope.
- 6) Four nos of Sluice structures for inlet of water from the South of the Embankment are proposed. The exact location of the structures will be decided based on the topographic survey. The sluice structures will be provided with MS Flap gates to prevent water from flowing from river in to the TP-2E area.
- 7) Construction of trapezoidal drain gutter is proposed on the TP-2E side parallel to the embankment to convey the water from the TP area upto the sluices. The bottom width of the drain is proposed as 1m and the drain will be lined with 7.5 cm cement concrete.
- 8) All works are to be carried out as per relevant MORTH and IS specifications or as directed by engineer in charge.
- 9) This is a time bound project and milestones will have to strictly followed by the contractor.

B. Technical Specifications

I Materials for Project

All the materials to be used in the work shall be as per section 1000 of MoRT&H Specification (5th revision).

If any materials not covered in these specifications are required to be used in the work, it shall conform to relevant Indian standards, specified in specification of particular items or to the requirements specified by engineer in charge.

II Quality Control for Project

For Quality control and testing schedule, MoRT&H Specification (5th revision) Section 900 shall be followed.

All the basic materials shall be tested as specified by per relevant Indian standards or to the requirements specified by engineer in charge.

III Item Wise Specifications

For Quality control and testing schedule, MoRT&H Specification (5th revision) Section 900 shall be followed.

Item No. 1 – Topographic Survey

Carry out 2 m x 2 m grid survey work by using total station in reference to Control station and GTS benchmark or Benchmark suggested by engineer in charge along the corridor including marking of center line of alignment with GPS, taking ground level, details of all existing structures, Electric poles, trees, overhead electrical lines including fixing necessary reference RCC pillars, establishing bench mark, establishing day light lines on ground and submission of Survey Drawing with readable spot level, longitudinal section, cross section and drawing report of survey work as directed.

- a. Item shall be executed as specified in the item description and specified as below.
- b. Conducting topographical survey in the specified area indicating all permanent features like Highways, Roads, Rivers, nallas, lakes, ponds, culverts, existing structures, transmission lines, telegraphs, telephones and electric poles, cross drainage works etc. and plotting the same showing true North including establishing survey reference stations including supply of all equipment, instruments, personnel, labours, etc., required to complete the work as directed by of Engineer - in - Charge.
- c. Spot level with respect to GTS benchmark of Survey of India or Benchmark suggested by engineer in charge in a grid of 2 meters both ways, including establishing survey reference stations and supply of equipment, instruments, personnel, labours, etc., required to complete the work. L-section, cross section shall be prepared and submitted. Centerline and all the day light lines with respect to GPS are to be marked on ground surface in prior to starts the work. At start of construction Chainage pillar at 50 m interval shall be established along the bund.
- d. Providing and constructing Pillars of 0.3 m x 0.3 m x 1 m (depth) at every 200m interval for TBM and PBM as required.
- e. All the Drawings and report containing all the details regarding survey shall be submitted in Hard copy and Soft copy (Drawing and PDF).
- f. Prepare and submit working drawings viz. i) Plan and Profile with daylight line, ii) Detail cross sections at 10m interval for the entire corridor width including embankment, service lane, gutter etc. and iii) Longitudinal profile of side gutter (both soft and hard copies) with the approval of Engineer in charge. Contractor has to submit As Built drawings of all the components as directed by engineer in charge.
- g. The Item shall be measured in hectare.
- h. The rate includes all materials, labor, equipment, formwork, curing and painting, Printing etc. & everything required to complete this item.

Item No. 2 – Cleaning the Land Width of Alignment

Clearing & grubbing the land including uprooting rank vegetation, grass, bushes, shrubs, sapling and trees girth up to 300 mm, removal of stumps of tree cut earlier and disposal of unserviceable materials with all lead and lift as directed by mechanical means in area of light jungle.

Item shall be executed as per Clause 201 of section 200 of MoRT&H Specification (5th revision).

Item No. 3 – Construction of Embankment

Construction of embankment with approved material obtaining from borrow area with all leads and lifts transporting to site, spreading, grading to required slope and compacting to meet requirement to MoRTH table 300- 2 in layers not more than 200 mm thick, including rolling with vibratory roller of 8 to 12 tonnes etc. complete as per MoRTH Clause 305.

Item shall be executed as specified in description and as per Clause 305 of section 300 of MoRT&H Specification (5th revision). The methodology for construction of embankment shall be follows:

Methodology for Construction of Embankment

As the soil in the area is very poor, the construction of embankment shall be carried out as per following methodology.

1. After Clearing Grubbing, prior to embankment construction stripping should be carried out as specified in MoRTH Specification.
2. Necessary earthen berms (2.5 m wide x 0.6 m height with 1:2 slope) shall be constructed at embankment Toe on both sides.
3. The contractor shall install piezometers and settlement gauges at every 200 m interval on either side of embankment. The Piezometer tip shall be placed at least 2.0 meter below the Ground level or below water table as directed by engineer in charge. The settlement gauge shall be kept at stripping level.
4. In the first stage, the earthwork in a height of 1 m shall carried out by the contractor in required layers with necessary rolling & compaction as specified.
5. After completion of stage - 1 embankment, the reading of piezometers and settlement gauges shall be taken regularly and when pore pressures dissipate and settlement gauges indicate at least 50% consolidation or 30 days whichever is later, second stage shall be commenced. Each subsequent stage should not be more than 1.0 m height.
6. The same methodology shall be followed for subsequent stages.

Item No. 4 – Construction of Subgrade

Construction of subgrade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2) all complete as per MoRTH Specification Clause 305.

Item shall be executed as specified in description and as per Clause 305 of section 300 of MoRTH Specification (5th revision).

Item No. 5 – Construction of GSB

Construction of granular sub-base(Grade - I) by providing coarse graded Material, mixing in a mechanical mix plant at OMC, carriage of mixed Material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per MoRTH clause 401.

Item shall be executed as specified in description and as per Clause 401 of section 400 of MoRTH Specification (5th revision).

Item No. 6 – Providing WMM

Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site, laying in uniform layers with paver in sub- base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density, complete as per MoRTH clause 406. (250 mm thick).

Item shall be executed as specified in description and as per Clause 406 of section 400 of MoRTH Specification (5th revision).

Item No. 7 – Providing Prime Coat

Providing and laying Prime coat using Emulsion asphalt binder @ rate of 7.5 Kg. /10 sq.m. of road surface using Emulsion pressure sprayer etc. complete including cost of Emulsion asphalt.

Item shall be executed as specified in description and as per Clause 502 of section 500 of MoRT&H Specification (5th revision).

Item No. 8 – Providing 50 mm thick BM

Providing and laying 50 mm thick compacted Bituminous Macadam with specified graded Black trap crushed stone aggregates as per MORTH gradation using asphalt for tack coat @ 2.5 Kg. / 10 Sq.m. with mechanical sprayer and VG 30 bulk bitumen for mixing at the rate of 3.4 % (34 Kg./M.T.) including heating the asphalt and aggregate by continuous batching Drum mix plant and spreading same by paver finisher to the required camber and grade, and rolling with vibratory roller to achieve desire density including cost of fire wood, oil, Kerosene, flushing of stone dust as required, labour charges and hire charges of machineries etc. complete.

Item shall be executed as specified in description and as per Clause 501, 503 and 504 of section 500 of MoRT&H Specification (5th revision).

Item No. 9 – Providing 20 mm thick Seal Coat

Providing and laying 20 mm thick mix seal surfacing using specified graded crushed Black Trap stone aggregates as per MORTH gradation using VG 30 bulk bitumen for mixing at the rate of 4.5 % (45 Kg./M.T.) by hot mix process and hot laid process using paver finisher to the required camber and grade, including rolling with vibratory roller to achieve desire density including cost of fire wood, oil, Kerosene, labour charges and hire charges of machineries etc. complete.

Item shall be executed as specified in description and as per Clause 501 & 508 of section 500 of MoRT&H Specification (5th revision).

Item No. 10 – Construction of Kerb in M25

Construction of cement concrete kerb in M 25 with kerb stone laid with kerb laying machine, foundation concrete in M10 laid manually as per detailed drawing all complete as per detailed specification.

Item shall be executed as specified in description and as per Clause 409 of section 400 and section 1500 (except 1512 & 1513) of MoRT&H Specification (5th revision).

Item No. 11 – 300 mm thick Pucca Pitching

Providing pucca rubble pitching in CM 1:4 with joints pointing in CM 1:3 including curing finishing, transporting as directed etc. complete (i) 30 cm thick pitching.

- a. The work shall consist of covering the slopes of embankment with Rubble, stone or boulders, over a layer of compacted earth work.
- b. Stone subject to marked deterioration by water or weather will not be accepted. The stone shall be sound, hard durable and fairly regular in shape and its thickness in any one direction shall not be less than the thickness of pitching as specified in the item and thickness of the stone at any place shall not be less than 15% of the thickness specified.

The largest stones procurable shall be supplied on site. The sizes of spalls shall be minimum 25 mm and shall be suitable to fill the voids in the pitching. Thickness of the pitching shall be as specified in the pitching item.

- c. Before laying the pitching, the sides of banks shall be trimmed to the required slopes and profiles put up by means of line and pegs at intervals of 3 meters to ensure regular straight work and uniform slope throughout. Depressions shall be filled and thoroughly compacted.
- d. The stone pitching shall commence below the toe of the slope. Stone shall be placed by derrick or by hand to the required length, thickness and depth conforming to the drawings. Stones shall be set normal to the slope and placed so that the largest dimensions are perpendicular to the face of the slope, unless such dimensions are greater than the specified thickness of pitching. The largest stones shall be placed in the bottom courses and for use as header for subsequent course. When full depth of pitching can be formed with a single stone, the stones shall be laid breaking joints and all interstices between adjacent stones shall be filled in with spalls of the proper size and wedged in with hammers to ensure tight packing.
- e. All the joints shall be filled thoroughly with cement mortar in 1:4 (1 Cement: 4 Sand) proportion.
- f. Panel for pitching shall be done with providing C.R. masonry the size of panel shall be 3 m x 5 m c/c.
- g. Cement Pointing with cement mortar 1:3 – Flush Pointing:-
 1. For a surface which is to be subsequently jointed the joints shall be squarely raked out to a depth of 15 mm while the mortar is still green. The raked joints shall be well brushed to remove dust and loose particles and the surface shall be thoroughly washed with water cleaned and wetted.
 2. Cement and sand shall be mixed in proportions as specified in the item Cement and sand shall be proportioned by volume after making due allowance for bulking. The required quantity of water shall then be added and the mortar mixed to produce workable consistency.
 3. The mixing shall be done intimately by hand-mixing. The operation shall be carried out on a clean watertight platform and cement and sand shall be first mixed dry in the required proportion to obtain a uniform colour and then the mortar shall be mixed for at least two minutes after addition of water. In case of cement mortar that has stiffened because of evaporation of water the same shall be re-tempering shall be permitted only with thirty minutes from the time of addition of water at the time of initial mixing.
 4. For pointing the mortar shall be filled and pressed into the raked out joints before giving the required finish. The pointing shall then be finished to proper type given on the drawings. If type of pointing after the mortar has been filled and pressed into the joints and finished off level with the edge of the stone it shall while still green be ruled along the center with a half round tool of such width as may be specified by the Engineer-in-charge. The superfluous mortar shall then be cut off from the edges of the lines and the surface of masonry shall also be cleaned of all mortar.
 5. Curing shall be started as soon as the mortar used for finishing has hardened sufficiently not to be damaged when watered. It shall be kept wet for a period of at least 7 days. During this period it shall be suitably protected from all damage.

6. The work of pointing shall be carried out by flush pointing in CM 1:3.
7. The rate for pointing shall include erecting & the removal of scaffolding all labour materials and equipment incidental to complete the pointing raking out joints wetting filling with mortar toweling point and watering.

Mode of Measurement

Payment shall be made on sq.mt basis of the finished work. If directed by the Engineer in charge, for measurement the materials may have to be stacked at site before laying and nothing extra will be paid to the Contractor for this stacking. Preparation of base for laying bedding shall be deemed indicated to the work.

Rate

The rate shall include the cost for preparing the base, trimming/filling the earthwork to the profiles, as per embankment slopes, lines, curves, slopes levels, filling joint in C.M 1:4, cement pointing in C.M 1:3 and all labour and materials as well as tools and plant required of the work.

Item No. 12 – Construction of Rain Chute by CR Masonry

Construction of Rain chute by coursed rubble masonry with approved quality in cement mortar 1:4 (1 cement: 4 sand) etc. complete on prepared earthen slope including all labour & materials.

Item shall be executed as specified in description and as per section 1400 of MoRT&H Specification (5th revision).

Item No. 13 – Providing M20 Grade for Toe Wall

Providing and laying in position Cement concrete in M- 20 grade for Toe wall and PCC in M 10 using cement, sand and machine crushed coarse aggregate 20 mm size including necessary excavation formwork, vibrating, finishing and curing etc. completed.

Item shall be executed as specified in description and as per Clause 301, 304 of section 300 (except 301.8 & 304.4), section 1500 (except 1512 & 1513) and section 1700 (except Clause 1718) of MoRT&H Specification (5th revision).

The item shall be measured in running meter.

Item No. 14 – Providing TMT CRS Fe 500 Reinforcement

Providing and laying TMT CRS Fe 500 reinforcement for RCC works and anchor bar with providing binding wires including cutting, bending, welding, binding in position hooking placing in position with all leads & lifts etc. complete.

The specifications and relevant IS /BS code of Corrosion Resistant steel shall be apply to this item.

Item shall be executed as specified in description and as per section 1600 of MoRT&H Specification (5th revision).

Item No. 15 – Excavation for Gutter

Excavation in all type of soil by mechanical means including cutting and loading in tippers and disposal with all lifts and leads, trimming of bottom and side slopes in accordance with requirements of lines, grades and cross sections. (Including dewatering).

(a) 0 to 3 mt. Depth

Item shall be executed as specified in description and as per Clause 301 section 300 of MoRT&H Specification (5th revision).

Item No. 16 – 7.5 cm thick CC lining in M15

Providing & laying 7.5 cms thick controlled cement concrete lining of M 15 grade in bed side slope and curvature including weigh batching, mixing, transporting, placing, vibrating, dressing the slopes and bed in earth to correct profile with finishing as required to the exposed surface making asphalt joints as directed and watering curing including dewatering where required etc. completed.

Scope of Work

Concrete lining shall be done by manually by laying plain cement concrete of M-15 grade with maximum size of aggregate as 20 mm for lining thickness up to 10 cm and 40mm for lining thickness above 10 cm. Cement shall be Ordinary Portland Cement (OPC) The thickness of lining shall be as mentioned in relevant items of Schedule - A Free water cement ratio and low degree of workability will be as per IS 456-2000 and compacting factor as per IS 1199-1959. The channel sections shall be as shown on relevant drawings. If during construction it is found necessary to alter the channel sections and side slope without altering the thickness of lining the Contractor shall be informed in writing such changes. The rates quoted being on square metre basis for the specified thickness, the Contractor shall have to execute the work at the same rates as quoted without any extra claim for change in the section of channel.

Lining shall be provided for the length and thickness as specified on the drawing on either side of structure on slopes curvature and in bed with reinforcement or without reinforcement as specified on the relevant drawings.

During the preparation of subgrade for channel lining the proud in earthwork shall be excavated and dressed by manually. This excavation for trimming for preparing the base for lining shall be carried out immediately prior to laying of the lining but in no case the time interval should exceed 3 days in normal weather & 2 days in adverse weather conditions.

The scope of work also includes the following:

- a. De-silting and / or dewatering whenever and wherever required in the channel section for preparing the base for lining and laying concrete lining.
- b. Trimming of the channel section for preparing the base for lining and laying concrete lining / reinforced concrete lining.
- c. Providing and fixing in position bitumen sealing compound in channel joints in C.C. lining works.

Applicable Publications

All concrete, its constituents, methods and procedure of manufacture shall conform to relevant Indian standard specifications and other technical publications / Specification as by engineer in charge.

Clearing Site

The area proposed for lining the channel as a whole shall have to be cleared of all objectionable material. Any waste material obtained from such site clearance shall be disposed of in a manner directed by the Engineer-in-Charge. The cost of this operation shall be deemed to have been covered under the rates quoted for channel lining.

Trimming the Channel Section And Preparation of Sub Grade for Concrete Lining

The provision of this paragraph applies to the preparation of subgrade upon which concrete lining is to be placed backfilling the over excavated section, if any, watering and compacting where ever required.

The work of trimming the channel section up to and underside of concrete lining 7.5 cm for C.C. Lining and preparing sub grade shall be carried out immediately prior to laying of the lining but in no case the time interval should exceed 3 days in normal weather and 2 days in adverse weather conditions. All along the channel alignment the rain cuts on the banks shall be filled up with approved excavated material and shall be compacted adequately to required line and level. The material required for filling the over excavation in rain cuts if not available during excavation in soils to be done under this item, shall be hauled from spoil bank and placed in position. The bed and slopes shall be trimmed. The channel bed and slopes shall be dressed, watered to a depth of 15 cm and 20 cm or upto an impervious layer whichever is less and compacted by suitable rollers and slope compactors. This item also includes dewatering and / or de-silting the channel section as and where required.

If at any point material has been excavated beyond the pay line required to receive the concrete lining, the excess excavation shall be refilled in horizontal layers with selected material moistened, if required, and compacted using rollers and slope compactors. Where placing and compacting bedding material is on a sloping foundation, the layers may be placed parallel to the surface of the foundation. If at any point the foundation material is disturbed or loosened during the excavation process or otherwise it shall be moistened, if required, and thoroughly compacted by tamping, rolling or other approved methods to form firm foundations for placing the concrete lining.

Immediately prior to placing the first lift of bedding material, the surfaces of the excavation and embankment to receive the material shall be adequately wetted to a depth of 15 cm and impermeable material whichever is less as approved by the Engineer-in-Charge.

After the channel prism has been shaped to a reasonably true and even surface as described above, bedding material shall be placed on adequately wet surface in layers of 15 cm maximum thickness to bring the bedding material to a height where it can be trimmed to form a true and even surface upon which the concrete for lining is to be placed. Each layer of bedding material shall be moistened and thoroughly compacted.

At the end panels of existing lining against which lining is to be placed under these specifications, all loose material shall be removed and all voids beneath the existing lining shall be refilled and thoroughly compacted.

At the end of panels of existing lining just before monsoon the contractor shall take all measures to adequately protect the underneath of lining in slope and bed so as to prevent the monsoon water entering below the lining to damage it.

Suitable material trimmed from the channel shall be used to complete channel embankments or to construct road embankments or for backfill around structure or to deposit bedding material. Where material suitable for bedding as determined by the Engineer-in-Charge is encountered during trimming operations and cannot be placed in one continuous operation, such material shall be stockpiled along the right of way where designated by the Engineer-in-Charge.

Preparation of Subgrade Consisting Earth

The subgrade shall be prepared, dressed and rolled true to level and according to the required cross section of the channel to form a firm compacted bed for the lining.

In other than predominantly sandy reached where the dry bulk density of the natural soil is not less than 1.8 g/cm^3 , initial excavation shall be done up to about 30 cm above the final section and the cutting to final shape shall be done immediately before lining.

Sample profile true to the cross section of the channel shall be made at an interval of 4 to 5 m to ensure correct formation of subgrade. To ensure uniformity of side slopes a chord shall be stretched across two profiles over a spacer of uniform thickness of 1.2 cm. A third spacer shall be run under the chord to check the evenness of the surface. This process shall be repeated at short intervals along the slopes till the surface between two profiles is properly leveled and dressed from top to bottom. Suitable wooden templates may be used to layout and check the profile.

If at any point material of prepared subgrade has been excavated beyond the neat lines required to lining, the excess excavation shall be filled with grade filter material compatible with subgrade material and thoroughly compacted in accordance with para(e) and (f) as below.

To cover up any lapses in the compaction of the inner core of the banks near the edges and to allow sufficient width for a labourer to work conveniently a lip cutting width of not less than 50.0 cm horizontally shall be provide. Depending upon the nature of soil and the side slopes of the channel, the lip cutting width may be in the range of 50 to 100 cm.

Compaction of Subgrade in predominantly Sandy Reaches.

Bed – The compaction of the bed shall be done by over saturating the bed by flooding it with water before lining is laid.

Sides – The compaction of sides shall be done either by overcutting the subgrade by 15 cm and refilling it with sand or concrete with adequate quantities of lime or cement and compaction by vibro – compactors.

Note:- Admixtures of 5 percent cement are generally found satisfactory.

Compaction of subgrade in other than predominantly Sandy Reaches:

All compaction shall be done at optimum moisture content in layers not more than 15 cm thick to obtain a dry bulk density of not less than 95% of the density at optimum moisture content obtained in accordance with IS : 2720 (part- VII) – 1965 (Methods of test for soils)

Where the dry bulk density of the natural soil is equal to or more than 1.8 g/cm^3 , the procedure described in para (a) shall be followed.

Bed – Where the dry bulk density of the natural soil is less than 1.8 g/Cm^3 and the subsoil water is near the subgrade, the consolidation shall be done by undercutting the bed by 7.5 cm

and then polughing up to 15 cm. below the subgrade level. The loosened soil shall then be re-compacted with sheep foot rollers or other suitable devices.

Where the subsoil water is low, requiring no dewatering and the dry bulk density of the natural soil is less than 1.8 g/cm^3 , the consolidation shall be done by digging the channel upto subgrade level and after loosening the earth below subgrade upto 15 cm by disc harrows, or ploughing and compacting the same to a layer of 11 cm. After that, the second layer of 15 cm of earth shall be laid over the compacted layer by taking earth from lip cutting and compacting this to a depth of 11 cm. The compacted layer of 7 cm above the subgrade level shall be removed and the subgrade brought to design profile before laying the lining.

Sides – Construction on sides shall be done by manual labour or suitable compactors to a depth of 30 cm to obtain a minimum dry bulk density of not less than 90 percent of the density at optimum moisture content obtained in accordance with IS : 2720 (Part – VII) – 1965.

Tolerances:

Excavated profile provides the final base for lining and tolerances i.e. departure from established alignment shall be as indicated here below.

± 20 mm on straight section.

± 50 mm on Tangents.

± 100 mm on curves.

± 20 mm Departure from established grade.

The above tolerances shall be negotiated gradually through smooth transition in a length of 50 m. No extra quantity shall be paid to the contractor. Subgrade shall be got approved from designated quality control staff. The above mentioned tolerance limits are for the earthwork only and do not apply to the thickness of lining.

Composition

- a) Concrete shall be composed of cement, fine aggregate (natural sand or manufactured sand or both), coarse aggregates, (manufactured), admixtures and water well mixed in proportion and brought to proper consistency. The design mix proportions shall be adjusted to produce a durable and workable cohesive concrete, suitable for specified conditions of placement & design strength.
- b) For all items of concrete in any portion of the structure or its associated works, concrete manufactured by batching and mixing (B & M) plant which shall be termed as controlled concrete shall be used where specified.

Materials for Concrete Lining

All the materials shall be as per Section 1000 of MoRTH Specification (5th Revision)

Strength Requirement of Concrete

The compressive strength requirements for the various grades of controlled concrete shall be as given below:

Grade of Concrete	Compressive test strength in N/mm ² on 150 mm cube after mixing conducted in accordance with IS 456-2000
	Min at 28 days
M-15	15
M-20	20
M-25	25
M-30	30

In all cases the 28 days compressive strength specified in Table shall alone be the criterion for acceptance or rejection of the concrete. Where the strength of a concrete mix as indicated by tests lies in between the strength for the two grades specified in Table, such concrete shall be classified for all purposes as concrete belonging to the lower of the two grades between which its strength lies.

Proportioning Concrete

As specified in Item description

Cast in-situ Concrete Lining

The work shall conform to IS:3873–1993. All concrete for lining shall be governed by IS:456–2000. The concrete shall be of controlled grade with suitable admixture of approved air entraining agents, using well graded aggregates with maximum size of aggregate of 40 mm for above 10 cm thick lining and 20 mm up to 7.5 cm thick lining. Ordinary Portland Cement (OPC) shall be used as per mix design for lining.

Placing and Compaction:

Concrete shall be placed only in the presence of a duly authorized representative of the DICDL. Concrete shall be placed and compacted before initial setting time and shall not be subsequently disturbed.

Placing of concrete shall not be started until subgrade is ready. All form work, installation of parts to be embedded, if any and preparation of surface upon which concrete is to be laid have been completely inspected by the Engineer-in-Charge. All absorptive surfaces against which concrete is to be laid shall be moistened adequately so that moisture shall not be withdrawn from freshly placed concrete. The surfaces however shall be free from standing water and slush.

Concrete shall be deposited in all cases as neatly as practicable directly in its final position and shall not be caused to flow in a manner to permit segregation. Excessive separation of the coarse aggregate caused by allowing the concrete to fall freely from too great a height or at too great an angle from the vertical shall not be permitted and where such separation would otherwise occur the contractor shall provide suitable means to convey the concrete without allowing such separation.

Placement of concrete:

Concrete when deposited shall unless otherwise specified have a placement temperature of not less than 4.5⁰C and not more than 32⁰C unless otherwise specified. The specifications of para 3.10.6 shall also apply.

Concrete shall be deposited and spread on the bed and sides of the channel as indicated on the drawings. Concrete may be laid to facilitate placing vibrating, finishing and curing operations. The side lining concrete on the sides of channels shall be screeded up the slope,

while the concrete is being vibrated with a head of the screed. Concrete required for keys as shown on the drawings shall be laid integrally along with the side slope lining.

Alternatively, the contractor can select to use longitudinally operating self-aligning slip form machine with built in vibrator attached to the side forms so as to effectively compact and finish the slope and bed concrete.

Sequence of placing of concrete shall be indicated by the Engineer-in-Charge.

Hand Placing:

Manual placing of concrete shall be permitted only failure of equipment to complete the work of particular day or concrete mixing whichever is earlier.

Finishing:

All exposed concrete surfaces shall be cleaned of impurities, lumps of mortar or ground and unsightly stains. The finished surface shall be even, smooth and free from pockets and equivalent to that obtainable by effective use of a long handle steel trowel. Surface irregularities when tested with a straight edge of 1.5 meter length shall not exceed 6 mm in channel bed for bottom slab and 12 mm in that laid on side slopes.

The surface of concrete finished shall be smooth and free from projections, honeycombing and other objectionable defects.

Repairs concrete surface and additions where required shall be made by cutting regular opening into the concrete and placing fresh concrete to the required lines. Chipped openings shall be sharp and shall not be less than 75 mm in depth.

Form Work

General

Forms shall be used wherever necessary to confine the concrete and shape it to the required lines or to ensure against construction of the concrete by material caving in or sloughing from adjacent surface left by excavation or other features of the work. All exposed concrete surfaces having slope steeper than that of two horizontal to one vertical shall be formed.

Formwork may be of plywood, timber, steel or precast concrete panels or of such other suitable materials or combination of such materials. Formwork shall be substantially and rigidly constructed to the shapes, lines and dimensions required, efficiently propped and braced to prevent deformation due to placing, vibrating and compacting, other incidental loads or the effect of weather. If settlement or deflection of forms under the load of fresh concrete is to be expected, allowance should be made in the original construction of the forms so that the finished lines and dimensions of the structures are in accordance with those specified on the drawings.

The surface of formwork shall be made such as to produce surface finishes as specified and formwork joints space is tight enough to prevent loss of liquid or bleeding from concrete. Joint between the formwork and existing concrete structure shall also be grout tight. Formwork shall be arranged to facilitate easing and removing of the various parts in correct sequence without jarring or damaging the concrete.

Material to be used

Timber sheathing for lining shall be of such kind and quality and shall be so treated / coated that there will be no chemical deterioration or discoloration of the formed concrete surface. The type and condition of form sheathing and lining and the ability of forms to withstand distortion caused by placement and vibration of the concrete, and the workmanship used in the form construction shall be such that the formed surface will conform to applicable requirements of this specification pertaining to finish or formed surfaces.

Forms required to be used more than once shall be maintained in serviceable condition and shall be thoroughly cleaned and repaired before reuse. Where metal sheets are used for lining forms, the sheets shall be placed and maintained in the forms without lumps or other imperfections. All forms shall be checked for shape and strength before reuse.

Forms shall be removed with care so as to avoid damage of the concrete. Concrete damaged if any in forms removal shall be repaired

Curing

General

The concrete lining on slopes with key including curvature portions at junction of slope and bed lining shall be cured with liquid membrane forming curing compound in accordance with specifications given in para 4.18.3. The concrete lining in channel bed shall be cured with water in accordance with the specifications given in para 4.18.2. If water curing of lining in the channel bed is not carried out to the satisfaction of the Engineer-in-Charge as per specifications, the contractor shall be directed to switch over to liquid membrane forming curing compound for curing for which no extra payment shall be made to the contractor.

All equipment, material etc. needed for curing and protection of concrete shall be at hand and ready for installing before actual concreting begins. Detailed plans methods and procedures whereby the various phases of curing and protection shall be firmly established, shall be settled and got approved in writing from the Engineer-in-Charge sufficiently in advance of the actual concreting. The equipment and method proposed to be utilized shall provide for adequate control and avoid interruption or damage to the work of other agencies.

Membrane Curing

These specifications cover curing of concrete using membrane forming compound to retard the loss of water during the early hardening period and to reduce the temperature rise in concrete exposed to radiation from the sun. This compound shall be suitable for use as curing media for fresh concrete and after initial moist curing.

Concrete of channel lining on slopes including key at the top and curved portion at the bottom of the slope of channel shall be cured with liquid membrane forming white pigmented curing compound which shall form water retaining surface to achieve the desired effect of water curing at 28 days. The curing compound shall be white pigmented of approved quality conforming to ASTM – C – 309 – 81 Type – 2.

White pigmented compound (Type – 2) shall consist of finely divided white pigments and vehicle solids, ready mixed for immediate use without alteration. The compound shall present a uniform white appearance when applied uniformly to a fresh concrete surface at a specified rate of application. It shall be of such consistency that it can be readily applied by spraying to provide uniform coating at temperatures above 4⁰C. If two coats are to be applied then it should be applied at an interval of approximately one hour. They shall adhere to freshly placed concrete that has stiffened or sufficient to resist marking during the

application and to damp hardened concrete and shall form a continuous film when applied at the specified rate of application. When dry, the covering shall be continuously flexible and without visible breaks or pin holes and shall remain as unbroken film at least 28 days after application. It shall not react deleteriously with the concrete.

The compound shall meet with the requirement of water retention test as per ASTM designation C-156-80. The loss of water in this test shall be restricted to not more than 0.55 Kg / m² of exposed surface in 72 hours.

The white pigmented compound (Type-2) when tested as specified in accordance with method E – 97 of ASTM shall exhibit a daylight reflectance of not less than 60% of that of magnesium oxide.

It shall fulfill the requirement of drying time when tested in accordance with ASTM-C-309-81. The compound applied shall be dry to touch in not more than 4 hours. After 12 hours it shall neither be tacky nor tack off (peel off) concrete when walked upon nor shall it impart a slippery surface.

Testing

The liquid membrane forming curing compound to be brought in the manufactures original clear containers. Each container shall be legibly marked with the name of the manufacturer, the trade name of the compound, the type of compound and class of vehicle/solids, the nominal percentage of volatile material and batch or lot number / date / week / month / year. The lot numbers will be assigned to the quantity of compound mixed, sampled and tested as single product. The manufacturer test results from manufacturer's lab shall be furnished to the Engineer in-Charge for approval.

Curing compound to be used on site shall be got tested at least 14 days in advance so that the result of water retention tests, reflectance test, drying time test etc. are available before it can be permitted for use. All of the filled containers represented by the approved samples shall then be sealed to prevent leakage, substitution or dilution. The Engineer-in-Charge or his authorised representative should mark each container represented by the samples with a suitable identification mark for later identification and correlation and shall be kept in store with double lock arrangements of which one key shall be kept with the contractor and the other with Engineer-in-Charge. Random samples shall be collected from every batch of the compound. Frequency of random sampling shall be one sample for every 2000 litres of each batch, or as directed by the Engineer-in-Charge. The contractor shall provide sample and labour for collecting samples free of cost. Testing shall be carried out by the SSNNL GICC for which contractor shall not be charged.

Method of Application

The compound shall be sprayed using mechanical sprayer with agitator only of approved design to ensure uniform and continuous membrane on the concrete surface. The coverage shall be at the rate specified by the manufacturer or at the rate of 4 to 5 m² per liter. Field trials shall be conducted to decide effective coverage rate which depends upon surface finish. If the effective coverage rate works out to less than that specified by the manufacturer or the rate specified above, no compensation whatsoever shall be paid to the Contractor for less coverage. Before applying the curing compound the concrete surface shall be cleaned by brooms or other means, not to disturb, damage or any foot impression on concrete. With a view to ensure through and complete coverage, approximately one half of the compound for a given area should be applied by moving the spray gun back and forth in one direction and the remaining half at right angle to this direction. In case the application is still not found uniform, the contractor shall have to apply the second coat as and when directed by the Engineer-in-Charge. If a second coat is to be applied it should be applied approximately after

an interval of one hour. No additional payment for this will be paid. The curing compound shall be applied as soon as the bleeding water or shine disappears, leaving dull appearance. Equipment for spraying curing compound shall be of pressure tank type (5 to 7 kg /cm²) with provision of continuous agitation. Spraying on concrete lining shall be done in such a way that the green concrete is not disturbed or damaged or any foot impressions left. Necessary schemes or spraying by mechanised means shall be got approved from the Engineer-in-Charge. However in emergency for very small areas (patches) it can be applied with brush as per the direction of the Engineer-in-Charge. Such compounds shall be used on the work only after production of test results and approval of the schematic plan on spraying curing compounds. Adequate care shall be taken to prevent any movements on cured surface up to 28 days after application of curing compound.

Under unavoidable circumstances, created by non-availability or short supply of specified curing compound, the contractor may be allowed to resort to water curing of concrete lining on slopes after obtaining prior approval of the Engineer-in-Charge in writing. Such water curing shall be restricted to only a short reach and for very short period and will in no case be considered as a general relaxation. It shall be carried out without any extra cost to DICDL and in accordance with the following specifications.

The concrete lining on slopes including curvature portion at junction of slope and bed lining shall be moist cured with Hessian cloth tied and spread over the slope, soon after that the concrete is initially hardened and shall be kept moist with light water spray. The hessian cloth shall be kept continuously wet for at least 21 days by supplying water through perforated pipe laid along the top edge of the channel lining or by any other method approved in writing by the Engineer-in-Charge. Adequate care shall be taken to ensure that the perforations in the pipe do not get choked.

Water curing

Unformed top surface of invert of the channel shall be kept continuously moist by covering it completely with wet burlap as soon as the concrete has hardened sufficiently says, 4 to 6 hours after concrete placement. The burlap shall be kept continuously wet by spraying water for at least 12 hours. There after curing by ponding shall be resorted to. Concrete cured with water shall be kept wet by ponding for at least 14 days in case of OPC. Water lost by evaporation shall be replenished periodically to keep the surface continuously (not periodically) submerged under water.

When the curing of concrete in the channel bed and slope is not found satisfactory the Engineer-in-Charge may ask the Contractor to resort to membrane curing without any extra cost to DICDL.

Testing of Concrete and Acceptance of Work

As per relevant specification of Section 1700 of MoRTH (5th Revision).

Joints

In channel lining construction joints shall be provided to accommodate expansion and contraction of the concrete or to provide continuity between the breaks in construction work. Joints shall be provided as shown on the drawings or as directed by the Engineer-in-Charge. Normally in plain cement concrete lining joints shall be provided at 4 m longitudinally centre to centre. & expansion joints in transverse direction @ 7.5 m centre to centre. The detailed specification for PVC joints filling bituminous sealing compound in grooves kept for joints in plain cement concrete lining shall be as per para 4.20

Construction joints are placed as an exigency to construction (interruption of works) in situ sleepers in case of bed and precast in sides shall be provided under the joints as shown on drawings. Size of sleeper shall be of 15 cm wide and 7.5 cm deep. The sleepers shall be placed centrally below the joints. Concrete to be used for sleepers shall be of same grade of lining. No extra payment shall be made for providing sleeper at contraction joints and deemed to be included in the rate of providing and laying cement concrete lining i.e. relevant items of Schedule - A.

Tolerances

The intent of this paragraph is to establish tolerances that are consistent with modern construction practice and yet be governed by the effect that permissible deviations will have upon or the structural action or operational function of the structure. Deviations from the established lines, grades and dimensions shall be permitted to the extent set forth herein below provided that the DICDL reserves the right to diminish the tolerance set forth if such tolerance impairs the structural action or operational function of the lining.

Tolerances in concrete thickness, alignment and grade for lining shall be permitted within the following limits.

Departure from established alignment	+ 20 mm on straight reaches + 50 mm on tangent
Departure from established grade	+ 100 mm on curves + 20 mm on straight reaches
Variation in concrete lining thickness	10 % of lining thickness provided average thickness of each day placement is not less than specified thickness.

Any departure from alignment or grade shall be uniform and no corrections in alignment be made in less than 50 m. No overrun in concrete quantity shall be paid to the contractor.

DEWATERING & DESILTING

Dewatering due to water enter into channel for any reason shall be resorted to and continued during preparation of subgrades, providing under drainage arrangements if any and placing of concrete for lining in bed & slope till such period the concrete attains necessary strength. No separate payment shall be made for dewatering of water due to any reason in the channel operations, as the same is deemed to have been included in rate of related item of schedule - A.

Bituminous Sealing Compound

Expansion joints:

Expansion joints shall not be provided except where structures intersect the channel.

At intersecting structures, an expansion joints of 20mm width filled with sealing compound conforming to relevant portion of IS : 5256 – 1992. Code of practice for sealing joint in concrete lining of its latest edition where they do not conflict with the specific provision made in this document shall be provided.

Construction joints:

Construction joints shall be placed as per drawing. The joint shall be provided with cement concrete sleeper and sealing compound layers as per drawing. Before laying fresh cement

concrete, the top of the sleepers in bed and side slope shall be treated with two layers of sealing compound as per drawing.

The grooves at the joint shall be of the size and shape prescribed above and filled with hot applied sealing compound.

Filling of the joint with hot applied sealing compound shall be taken up after curing period is over. In the meantime the joints are liable to be filled with earth, which will be difficult to clean. It is therefore, advisable to fill these joints with coarse sand during the curing period. The sand can be easily blown out from the joints when required.

Filler:

The grooves in channel lining shall be filled with sealing compound conforming to the relevant portion of IS : 5256 – 1992 code of practice for sealing joints in concrete lining or its latest edition where they do not conflict with the specific provision made in this document.

The grooves shall be clean and free from foreign substances when sealing compound is filled.

The grooves shall not be filled while it is raining or when there is free water in the grooves. The grooves shall be filled as the concrete has become sufficiently stiff to prevent appreciable distortion of groove shape or damage to the concrete.

No separate payment shall be made for providing sleeper for construction joints and also filling of sealing compound in these joints as per drawing.

Measurement and Payment

Measurement will be on the basis of square meter of plain cement concrete lining and payment will be at the unit rate quoted in Schedule – A. Payment for lining will be made for the thickness shown on the drawings and on square meter basis of the surface area in bed and on sides including keys. The thickness of lining shall be maintained in relation to final sub grade on which lining is to be laid. The thickness shall be cross checked by (i) volume of concrete placed from batching and mixing plant and area covered. (ii) use of probe when concrete is green and (iii) coring if required. Any overrun in quantity of concrete in lining shall not be paid to the contractor.

The unit rate for lining also includes costs of all material, transport with all leads and lifts, mixing, formwork, conveying, placing, compacting, smooth finishing, filling of joints, curing of grooves at joints, curing, dewatering as and when required etc. However, the rate does not include providing of sleeper for construction joints, dewatering etc.

No overrun in concrete quantity shall be paid to the contractor.

The unit rate quoted by the contractor for the respective item shall be deemed to have included the requirement of cement for miscellaneous operations like priming of mixer, laying cement slurry for successive lifts, finishing of concrete etc. also.

Item No. 17 – Providing Sign Boards

Retro-reflectorised signs (Providing and fixing of retro- reflectorised cautionary, mandatory and informatory sign as per IRC :67 made of encapsulated lens type reflective sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed

foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing) (1) 60 cm circular (2) 80 mm x 60 mm rectangular (3) 90 cm equilateral triangle.

Item shall be executed as specified in description and as per Clause 801 of section 800 of MoRT&H Specification (5th revision).

Item No. 18 – Excavation for Foundation of Structure

Excavation for foundation up to 1.5 m depth including sorting out and stacking of useful material and disposing off excavated stuff up to 50 m lead (1) Loose or Soft Soil.

Item shall be executed as specified in description and as per Clause 301 & 304 of section 300 of MoRT&H Specification (5th revision).

Item No. 19 – PCC in M15 for Foundation

Providing and laying in position cement concrete M 15 using cement, sand and machine crushed coarse aggregate 25 to 40 mm size compaction, finishing, and curing as required etc. completed.

Item shall be executed as specified in description and as per section 1500 (except 1512 & 1513) and 1700 of MoRT&H Specification (5th revision).

Item No. 20 – M30 for RCC Box type Structure

Providing Cast in situ controlled concrete M-30 mix for RCC including necessary centering, form work, scaffolding and vibrating, curing, finishing as specified with all lead and lifts etc. complete.

Item shall be executed as specified in description and as per section 1500 (except 1512 & 1513) and 1700 of MoRT&H Specification (5th revision).

Item No. 21 – Providing and Fixing Flap Gate

Providing and fixing flap gate including material, labour for cutting, bending, fixing as per detail drawing and as directed by engineer in charge.

Scope

The work consists of supplying, Manufacturing, Erection, Painting, and commissioning of Flap Gates including embedded parts.

This work includes:

- a) Detail fabrication/ workshop drawings for embedded parts, Flap gate etc. shall be prepared and Get Approval from engineer in charge before the fabrication.
- b) Manufacturing, supplying of embedded/ stationary parts, Flap gate etc.
- c) Erection of embedded/ stationary parts of Flap gates like anchor Plate with Lug bar
- d) Commissioning, performance test for Flap gate as directed.

General

- a) The gate leaf shall be manufactured from structural steel conforming to IS : 2062-1992
- b) The gate leaf shall be fabricated from structural steel plate. The frame shall be of structural steel as specified in the drawings and shall be welded construction. Field joints should be water tight. The bottom of the gates shall be so shaped as to have the best hydraulic performance.
- c) Embedded parts consist of anchor plate and lug bars per drawings.
- d) Where tolerances are not specified on drawings, the Contractor should adopt the tolerance for various parts of gates conforming to IS:5620-1985, (Appendix – E) or its latest version.

Painting

Preparation of Surfaces:

- a) All paints and painting materials required for painting shall be supplied by the contractor and shall be included in the price bid. The paints proposed by the contractor must be approved by the representative of Engineer – In – Charge before acceptance. The analysis in respect of paint properties, paint composition and performances requirements of the paint shall be submitted by the contractor for examination and approval.
- b) Surface preparation shall be made in accordance with the following procedure:
 - Weld spatter or any other surface irregularity shall be removed by suitable means before cleaning;
 - All oil, grease and dirt shall be removed from the surface by the use of clean mineral spirits, xylol or white gasoline (Lead free) and clean wiping materials and;
 - Following the solvent cleaning, the surface to be painted shall be cleaned of all rust, mill scale, and other tightly adhering objectionable substances by sand blasting or grit blasting to uniform bright base metal. Any grit or dust remaining after the cleaning operation shall be completely removed from the surface by wire brushing, air blowing, suction or other effective means before the surface is painted.

Priming and Shop Painting

- a) Stainless steel and bronze surface only be cleaned but not painted.
- b) All surface of the embedded parts which are to come in contact with concrete shall be cleaned as mentioned above and given two coats of cement wash to prevent rusting during shipment and while awaiting installation.
- c) All unfinished surfaces of the embedded parts and gates to be exposed to atmosphere or water shall be given one coat of priming paints.
- d) All finished surface of the gate that will be exposed to atmosphere during shipment while awaiting installation, shall be cleaned and given a heavy uniform coating of gasoline and should be applied removable rust preventive compound or equivalent.
- e) All ferrous surface including non-meeting finished surface portions of gate leaves, gate, arms, guides etc. exposed to atmosphere or water shall be given a coat of rust inhibitive

phosphate wash by brush immediately following the cleaning operation. Proper reaction of the following the cleaning operation. Proper reaction of the phosphate was indicated by a light grey film after drying. A dark sticky residual results if the reaction is not complete. This should be wiped off with dampened rags and area shall be retreated. If the surface is very hot, it may be necessary to dilute the phosphate wash solution with water to obtain proper reaction. Within one hour after the rust inhibitive wash has dried, thoroughly one coat of priming paint shall be applied by brushing without thinning.

Field Painting

The painted metal work shall be handled with care so as to preserve the shop coats. The areas of the shop paint, which have been damaged during transport, shall be cleaned to base metal and repainted as per the painting schedule, Paint applied to such areas shall be of the same type as used originally in the shop painting.

During the erection the metal work shall be handled with care so as to preserve the shop coats. The area of paint, which has been damaged during erection, shall be cleaned to base metal and repainted. The last coat of finishing, if not applied in the shop shall be applied in the fields after erection.

Repair and Protection of Coating

Metal work that has been shop painted or field painted should be handled with care so as to preserve the coatings in best practicable conditions. Before proceeding with the regular painting or coating operation the contractor shall clean and repair all areas of shop coat which are defective or damaged. Areas on which the paint is loose, weakly, blistered, abraded, rusted or otherwise defective the paint shall be cleaned by scrapping, chipping power wire brushing or other effective means. Areas thus prepared shall be cleaned of all dust, dirt and other contamination using clean rags and clean solvent. This surface shall then be repainted in accordance with the painting schedule.

Hair line cracks or thin areas of paint which are otherwise undamaged shall be cleaned of all dust, dirt, wash or other contaminations and shall be recoated with additional paint. All repainted areas of paint will be required to pass acceptance tests performed by the Engineer-In-Charge.

Mode of Payment

Flap gate item shall be measure in M.T Basis. No extra payment made for any accidental works arise during installation of Flap gate. The Rate includes all labour, Material, fabrication, installation etc. complete.

Item No. 22 – Providing 225 mm wide PVC Water Stop

Providing and fixing in position PVC heavy duty water stops in barrels, troughs and wing walls with 25 mm wide expansion joints as shown in drawing including filling the joints with asphalt pad or bitumen cork board of approved quality.

General

- a) Polyvinyl Chloride (PVC) water stops shall normally have a center bulb of 12.4 mm inside diameter and 25 mm outside diameter. It shall be 225 mm in width and shall have minimum of two or three longitudinal ribs on each side of the bulb evenly distributed between the bulb and the edge of the water stop. Each rib shall be 6.35 mm high and the rib adjacent to the center bulb shall have web thickness 12.4 mm and the rib adjacent to edge shall have a web thickness of 10 mm. The Contractor, however, will be permitted

to use water stops of any alternative manufacture, such as water stops with diamond shape and bulb provided conform the specification and the functional and constructional requirements. For this purpose, the contractor shall submit to the Engineer-in-Charge for approval four sets of drawings, showing details of the water stops, including dimensions. Shape and details of intersections and splices between water stops of the same size and of different sizes. Fabrication and Procurement of materials shall be made only after the approval of the drawings by the Engineer-in-Charge. Any fabrication or procurement of materials performed prior to approval of the drawings shall be at the contractor's risk. The Engineer-in-Charge have the right to ask the contractor to make any changes in the drawings which may be necessary to make the finished installation conforming to the requirements and intent of these specifications without additional cost to the DICDL. Approval by the Engineer-in-Charge to the contractor's drawings shall not relieve the contractor of his obligation to meet all the requirements of these specifications or of the responsibility for the correctness of the contractor's drawings.

- b) One set of the above drawings will be returned to the Contractor either approved or disapproved or conditionally approved and these shall be resubmitted for approval if so directed.
- c) The water stops shall be dense, homogenous and free from holes and other imperfections. The water stops shall meet the material and test requirements given hereinafter. The cross section of the water stops shall be uniform along its length and the thickness shall be symmetrical transversely. Tolerance for the dimensions given above shall be plus 5mm in width, plus 2 mm in thickness and plus 1 mm for other dimensions.
- d) Certified copies of the laboratory test reports on the physical properties of the PVC water stops and a certificate stating that PVC water stops as furnished meeting with all other requirements of those specifications shall be obtained by the contractor from the manufacturer of the PVC water stops and submitted to the Engineer-in-Charge for approval. Three 1.5 metre long samples of the PVC water stops shall be obtained by the contractor from the supplier and submitted to the Engineer-In-Charge. These samples shall be furnished at least 60 days prior to embedment of any water stops in the structure.
- e) The contractor shall arrange to obtain the water stops from the suppliers in rolls securely packed containing a single length of not less than 12 linear metre and having inside diameter of not less than 0.3 metre.

Materials

- a) The PVC water stops shall be fabricated by an extrusion process from an elastomeric plastic compound, the basis resin of which shall be virgin polyvinyl Chloride. No reclaimed polyvinyl chloride shall be used.
- b) The compound shall contain any additional resins, plasticizers, stabilizers or other materials, needed to ensure that the finished product will have the following physical characteristics.
 - i. Tensile strength minimum 116 Kg / cm²
 - ii. Ultimate elongation minimum 300%
 - iii. Tear resistance minimum 49 Kg/ cm²
 - iv. Stiffness in flexure minimum 24.6Kg / cm²
 - v. Accelerated extraction:

- a. Tensile strength minimum 105Kg/ cm²
- b. Ultimate elongation minimum 250%
- c) When tested in accordance with the effect of alkali test as described in the following paragraphs, the materials shall not show an increase in weight of more than 0.25 percent or a loss in weight of more than 0.10 percent after 7 days or more than 0.40 percent increase in weight or more than 0.30 percent loss in weight after 28 days. After 28 days immersion the dimensions of the sample shall not differ from those of the original sample by more than 1.0 percent. After 7 days immersion the Durometre hardness reading of the sample shall not differ by more than plus or minus 5 from the reading on the original sample.
- d) When tested in accordance with the cold bend test described in the following paragraph, the material shall show no signs of cracking or chipping.

Inspection and Tests

- a) All water stops shall be subject to laboratory tests before transport. Samples of the finished water stops and material for tests shall be furnished to the Engineer-in-Charge. All tests shall be made by and at the expense of the contractor.
- b) Samples for laboratory test to determine physical properties of the compound shall be taken in with the random process to obtain following number of test units from each lot received.

Sr.No.	Size of lot received	Number of test unit
1	45 linear metre	1
2	45 to 90 linear metre	2
3	90 to 450 linear metre	4
4	450 to 900 linear metre	8
5	Over to 900 linear metre	Additional one test for every 100 m

- a) Laboratory tests to determine physical properties of the water stop required to be furnished under these specifications shall be performed on test specimens cut from test units taken from the finished products. The contractor shall furnish the specimens at his cost for tests at places as directed.
- b) Tests shall be made in accordance with the following methods.

Tensile strength	ASTM Designation D638
Elongation	ASTM Designation D638
Durometer hardness	ASTM Designation D2240 (Type A)
Accelerated contraction test	Effect of alkali
Cold bend test	Impact resistance

Installation

- a) Location and embedment of the PVC water stops shall be as shown in the drawings with approximately one-half of the width of the water stops embedded in the concrete on each side of the joint. In order to eliminate faulty installation that may result in leakage, care shall be taken that the water stops are correctly positioned and secured during installation. All water stops shall be installed so as to form a continuous watertight

diaphragm in the joint. Unless otherwise shown adequate provision shall be made to completely protect the water stops during the progress of the work.

- b) Additional vibration over and above that used for adjacent concrete placement shall be carried out to ensure complete embedment of the water stop in the concrete. Larger pieces of aggregate near the water stop shall be removed by hand during embedment to ensure complete contact between the water stops and the surrounding concrete. Splices in the continuity or at the intersections of junctions of PVC water stops shall be performed by heat sealing the adjacent surface in accordance with the Manufacturer's recommendations. A thermostatically controlled electric heat source shall be used to make all splices. The correct temperature at which splices should be made will differ with the material compounds but should be sufficient to melt. All splices shall be neat with the ends of the joined water stops in true alignment. A meter box guide and Portable saw shall be provided and used to cut the ends to be joined to ensure good alignment and contact between joined surfaces. After splicing a remolding iron with ribs and corrugations to match the pattern of the water stop shall be used to reform the ribs at the splices. The continuity of the characteristics members of the cross sections of the water stop (ribs, tubular center axis, protrusions and the like) shall be maintained across the splices.
- c) Where splices are required between water stops of different sizes, the splices shall be made as recommended by the manufacturer of the water stops and drawings showing the details of the splices shall be submitted to the DICDL for approval, as required in paragraph 'General' above.
- d) Prior to embedment the edges of the water stops shall be secured to tap wire in the end bulbs to improve the concrete bond as shown on the drawings. The bars shall conform to the provisions of section-5 "Reinforcement". The manner in which the water stop is secured to the reinforcing bars shall be subject to approval.
- e) To provide an even surface these joints must be filled and at the same time the materials used for filling should permit expansion and contraction of the concrete. The joint filler is a strip of compressible material used to form and fill the expansion joints in structures, The joint in structure joint filler are produced from a variety of materials such as bitumen impregnated fiber (asphalt pad), cork ships sponge or synthetic rubber, expanded plastic epoxy, coconut pitch and CMSL resin or as directed by the Engineer-in-Charge. The materials are conformed with IS 1838 – 1983/84. Sealing compounds shall be employed above expansion joint fillers. Suitable primers may be first applied to the vertical faces of concrete joint before the pouring of sealing compounds in order to improve the adhesive qualities of the latter. Sealing compounds are conformed to IS: 1834 – 1984.

Measurement and Payment

Measurement, for payment, for furnishing and placing PVC water stops will be made at the applicable unit price for linear meter measured along the center line of the water stop tendered thereof in the Schedule - A with no allowance for lap or splices at intersection. The unit price shall include the cost of filling the sealing materials such as asphalt pad or cork board as directed, making splices and intersections and of furnishing all labour, equipment and materials required for installing the water stops and protecting the water stops from damage during the progress of the work. The unit rate shall also include the cost of preparing and submitting the drawing, producing samples for approval of the Engineer-in-Charge and cost of all incidental work needed to complete the work as per the specification.

Item No. 23 – Marking Gauge on Concrete Surface

Marking the Gauge on concrete surface with paint as per standard and as directed by engineer in charge

General

The work consists of Painting Gauge on Concrete Surface as directed. Concrete surface shall be clean and dry before starting of work. The accuracy of painting should be maintained. The color should be oil paint and of ISI mark company. Primer coat shall be applied on concrete surface. The work shall be carried out as per directed by engineer in charge.

Mode of Payment

Gauge item shall be measure in Number. The rate includes material, labour and other required equipment etc. complete.

Item No. 24 – Providing and Fixing Marble Data Plate

Providing and fixing marble plate of 20 cm x 15 cm x 2.54 cm thick including engraving and filling oil paint for letters as directed.

General

- a) The Marble data plate shall conform to the relevant portions of IS: 1128 – 1974 lime stone (slags and tiles) or its latest additions where they do not conflict with specific provision made in this document.
- b) The plate shall be 20cm x 15 cm x 2.54 cm of marble of approved quality. The letters as directed shall be engraved inside the surface and the letters shall be properly filled with approved quality of lead. The plate shall be fixed on the parapet of the C.D. works or at the appropriate place as directed. The marble shall be of approved quality, uniform in texture with white shining surface duly polished. It shall be free from stains veins or any other weak points. The size shall be machine cut with square edges.
- c) The fixing shall be done in cement mortar 1: 1. The cement plaster border in proportion 1: 3 of 20mm thickness shall be made all round the fixed plate. The curing shall be done for at least 14 days. Any damage to marble plate shall be borne by Contractor and shall be replaced at his own cost.

Mortar

The mortar shall consist of cement sand and water thoroughly mixed. Proportion of cement and sand shall be on weight basis. Due allowance shall be made for the moisture content in sand. Mixing water shall be added to achieve required workability. The mortar shall be used within 30 minutes of mixing.

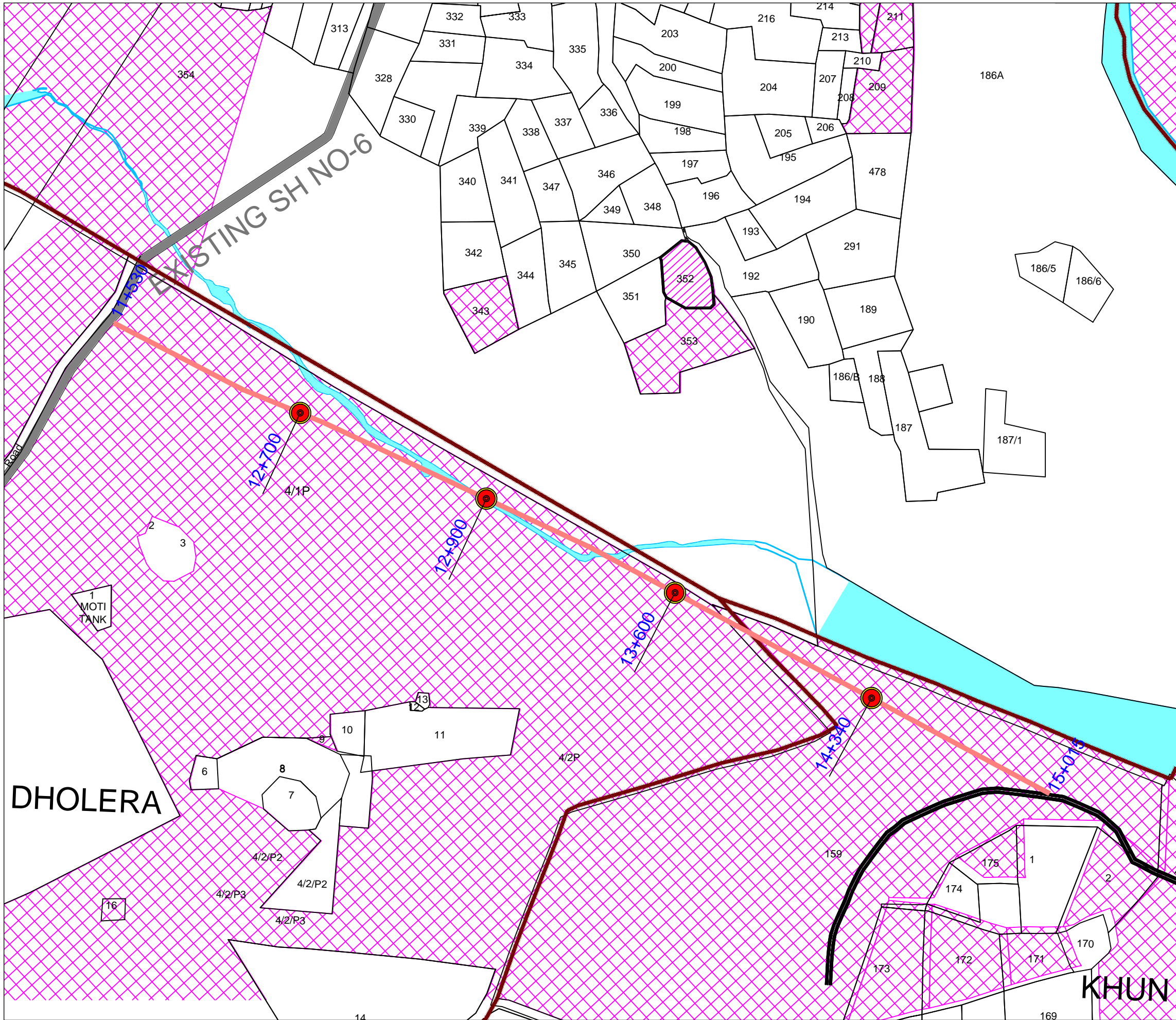
Measurement and payment

The payment shall be made at unit tendered rate per number of plate fixed including cost of all materials, labours, engraving, filling with lead etc.

IV Drawings

- a. The drawings which form part of these specifications show the work to be done under these specifications as definitely and in as much detail as possible at the present stage of development of the designs.
- b. Some of the working drawings included herein may show few details of construction and other details and specifications not forming a part of the work required under this contract. Such details shown on some of these drawings that are not applicable shall be disregarded.
- c. Parts of the work for which dimensions are not shown have been drawn to a scale as nearly final dimensions as possible. However dimensions scaled from the drawing shall only be considered as approximate and the contractor must own all responsibility for deduction and conclusions that may be made as a result of scaling dimensions from the drawings.
- d. Except as otherwise provided in these specifications for drawing to be furnished by the Contractor, the enclosed drawings will be supplemented by additional or revised general and detailed drawings as may be necessary or desirable as the work progresses and the Contractor shall not execute the work without proper drawings and instructions. The additional or revised general and detailed drawings furnished by the SSNNL GICC will show dimensions and details necessary for construction purposes.
- e. All features of the work are not shown completely in the enclosed drawings but only for the knowledge of the bidder, tentative and typical drawings are enclosed. The contractor shall be required to perform the work in accordance with the additional, general and detailed drawing of revisions furnished by the Engineer-in-Charge during the course of execution. No claim of any kind, on account of typical drawings shall be entertained.
- f. The contractor shall check all the drawings carefully and suggest to the Engineer-in-Charge of any errors or omissions as are discovered.
- g. The contractor will be furnished with such additional copies of the specifications and drawings as may be required for carrying out the work.
- h. Drawing of the structures proposed to be constructed on Right Side Embankment is available online. It is also advisable to refer the drawings before quoting the rates for the works.
- i. Following Drawings are given in **Section 4** of this document:
 1. Alignment of Right bank Embankment Ch 11+530 to 15+015.
 2. Proposed Plan & Profile of right side of Embankment
 3. Typical Cross section of Embankment
 4. Typical Drawing of Sluice
 5. RCC details of Twin Cell Box
 6. RCC details of U wall
 7. Typical details of Flap Gate

Section 4. Tender Drawings



LEGEND

- VILLAGE BOUNDARY
- EXISTING EMBANKMENT
- ALIGNMENT OF EMBANKMENT
- GOVERNMENT LAND
- LOCATION OF SLUCE

NOTE

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER
 CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
 * Multi House *, Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006.
 in JV with

DHI **DHI (India) Water & Environment Pvt. Ltd.**
 3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
 DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

PROJECT CODE
 15-571

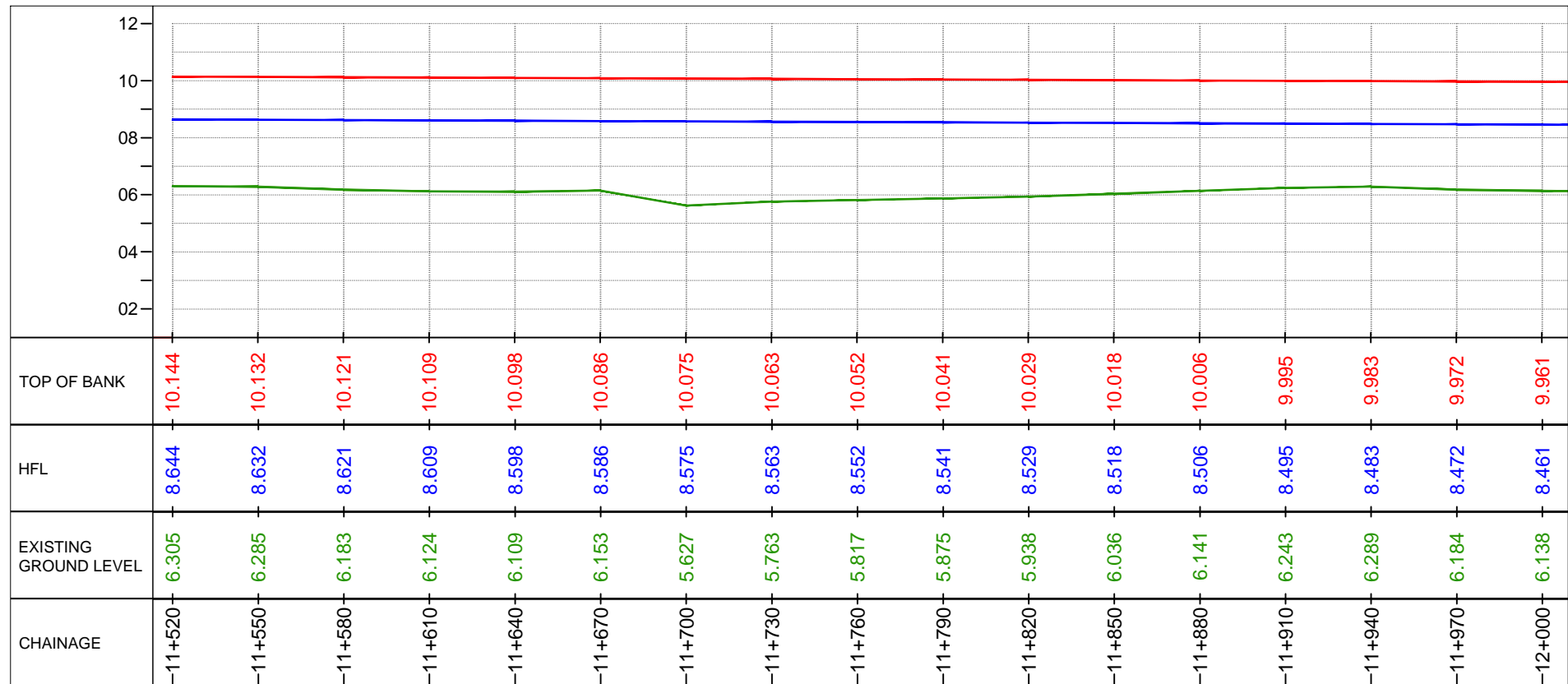
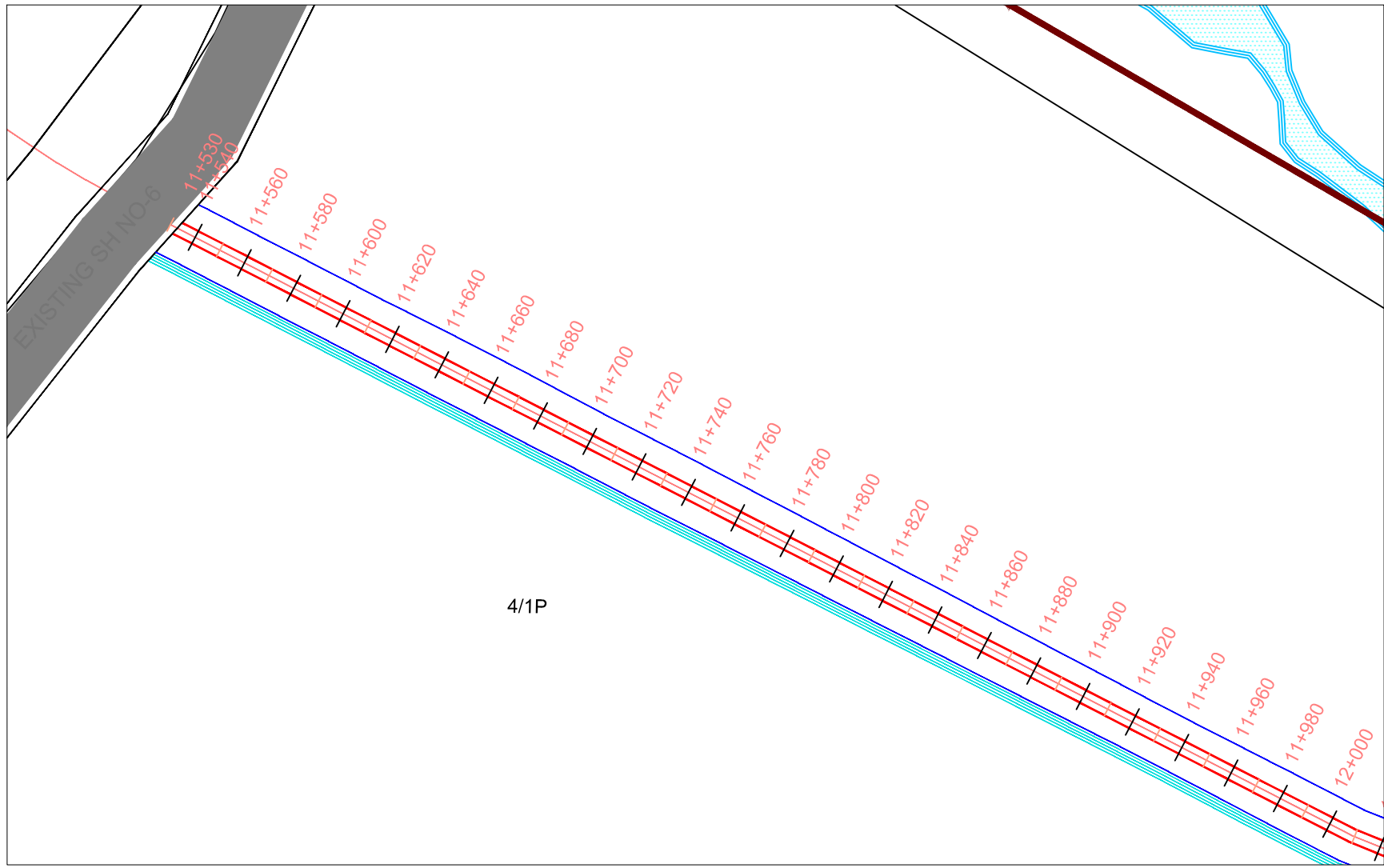
TITLE
 ALIGNMENT OF RIGHT SIDE EMBANKMENT
 CH.: 11+530 TO 15+015

Designed: J. B. PATEL
 Reviewed:

Checked: A. N. P.
 Approved:

SCALE 24m 12 0 24 48m

Project Drawing No: DICDL/ADHIYA/EMB-01 REV. R0



LEGEND

- VILLAGE BOUNDARY
- TOB
- GUTTER
- TOE OF EMBANKMENT
- PROP SLUICE LOCATIONS

NOTE

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
 * Multi House *, Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006.
 in JV with

DHI (India) Water & Environment Pvt. Ltd.
 3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

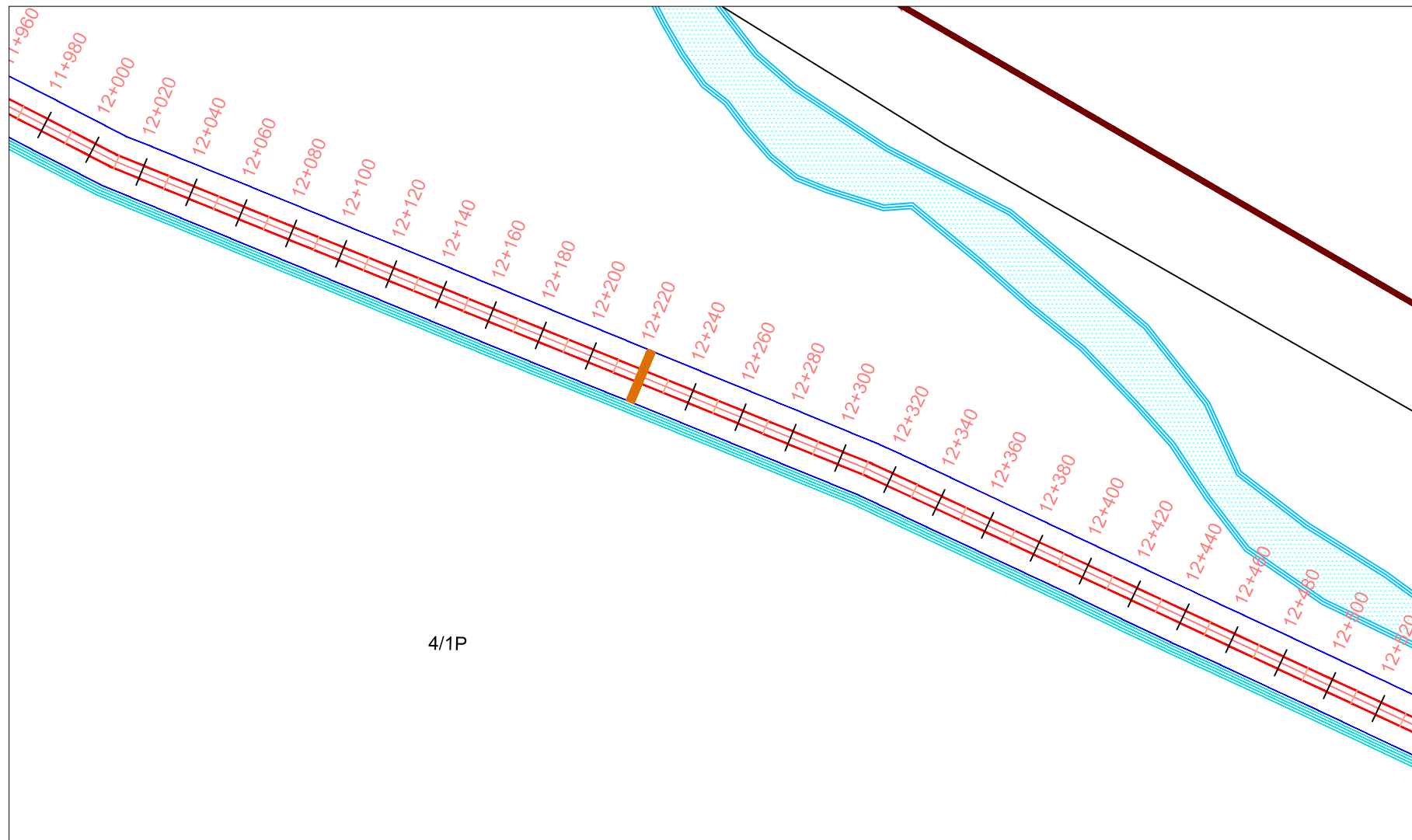
PROJECT
 DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

PROJECT CODE
 15-571

TITLE
 PROPOSED PLAN AND PROFILE OF RIGHT SIDE EMBANKMENT
 (CH.: 11+530 TO 12+000)





Designed: J. B. PATEL Reviewed: _____
 Checked: A. N. P. Approved: _____

SCALE
 Project Drawing No: DICDL/ADHIYA/LS-01 REV. _____



CHAINAGE	12+000	12+030	12+060	12+090	12+120	12+150	12+180	12+210	12+240	12+270	12+300	12+330	12+360	12+390	12+420	12+450	12+480
EXISTING GROUND LEVEL	6.138	6.120	6.060	5.993	5.964	5.946	5.979	6.014	6.011	6.020	6.012	6.003	5.997	5.999	5.991	5.994	5.968
HFL	8.461	8.449	8.438	8.426	8.415	8.403	8.392	8.381	8.369	8.358	8.346	8.335	8.323	8.312	8.300	8.289	8.278
TOP OF BANK	9.961	9.949	9.938	9.926	9.915	9.903	9.892	9.881	9.869	9.858	9.846	9.835	9.823	9.812	9.800	9.789	9.778

LEGEND

-  VILLAGE BOUNDARY
-  TOB
-  GUTTER
-  TOE OF EMBANKMENT
-  PROP SLUICE LOCATIONS

NOTE

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
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 in JV with

DHI (India) Water & Environment Pvt. Ltd.
 3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
 DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

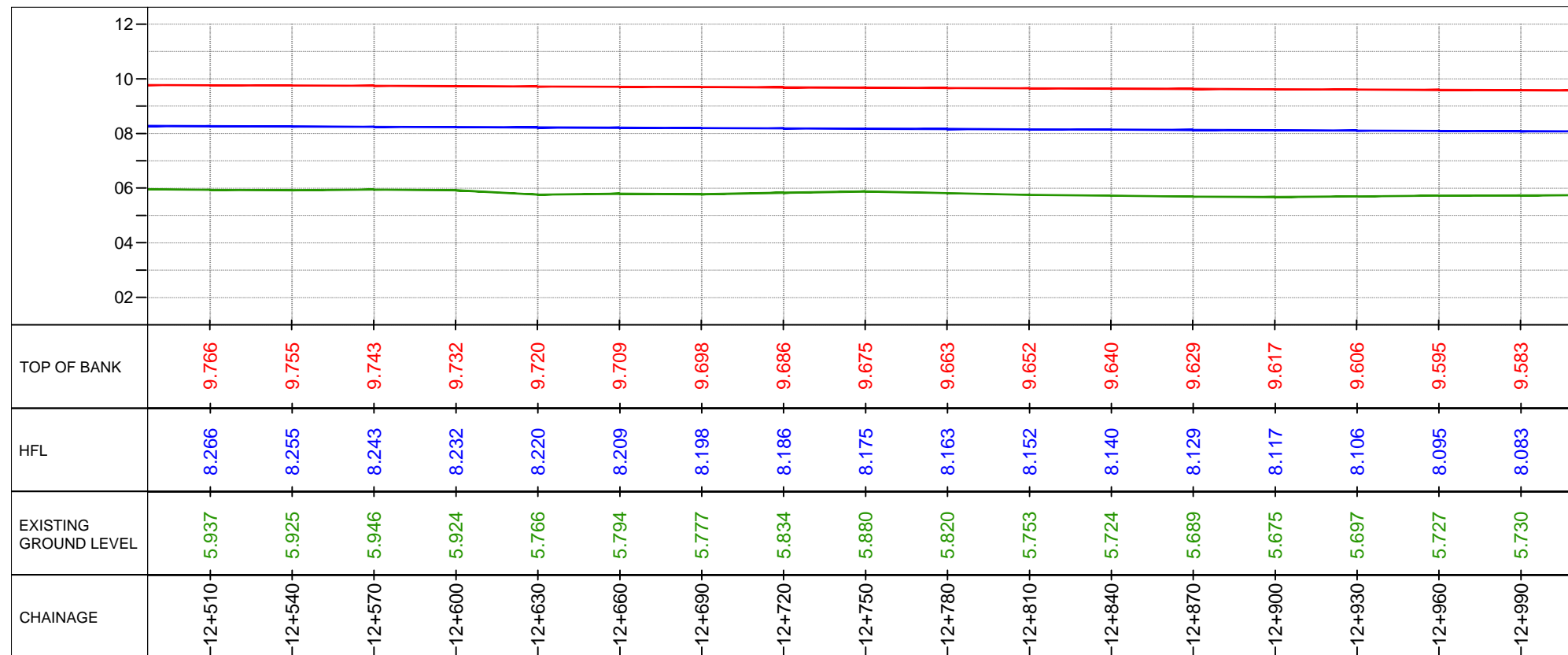
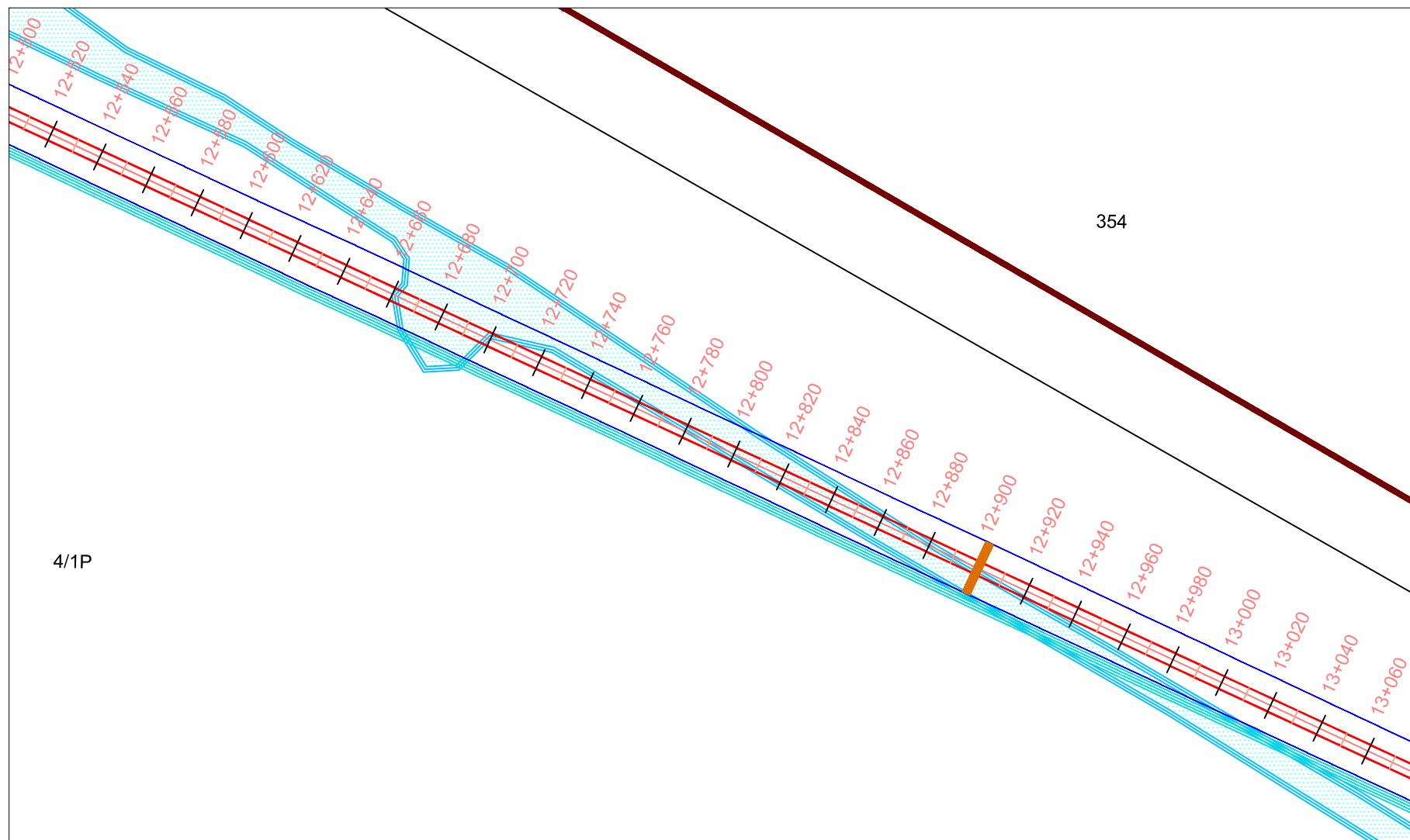
PROJECT CODE
 15-571

TITLE
 PROPOSED PLAN AND PROFILE OF RIGHT SIDE EMBANKMENT
 (CH.: 12+000 TO 12+500)




Designed: J. B. PATEL Reviewed:

Checked: A. N. P. Approved:

SCALE
 Project Drawing No: DICDL/ADHIYA/LS-02 REV.



LEGEND

-  VILLAGE BOUNDARY
-  TOB
-  GUTTER
-  TOE OF EMBANKMENT
-  PROP SLUICE LOCATIONS

NOTE

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
 * Multi House *, Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006.
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DHI (India) Water & Environment Pvt. Ltd.
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PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
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PROJECT CODE
 15-571

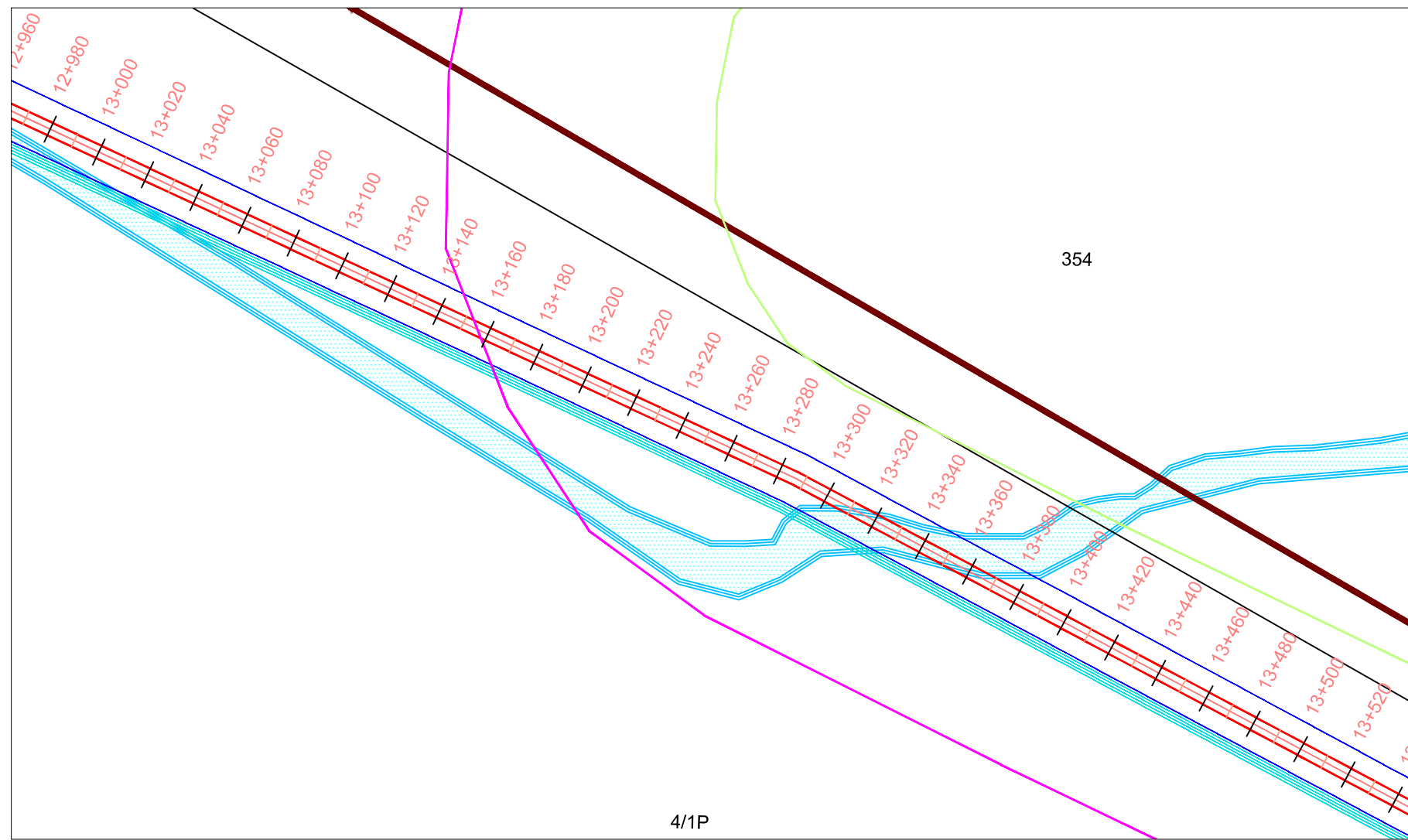
TITLE
 PROPOSED PLAN AND PROFILE OF RIGHT SIDE EMBANKMENT
 (CH.: 12+500 TO 13+000)

Designed: J. B. PATEL Reviewed:

Checked: A. N. P. Approved:

SCALE

Project Drawing No: DICDL/ADHIYA/LS-03 REV.



4/1P

	12																		
	10																		
	8																		
	6																		
	4																		
	2																		
TOP OF BANK	9.572	9.560	9.549	9.537	9.526	9.515	9.503	9.492	9.480	9.469	9.457	9.446	9.435	9.423	9.412	9.400	9.389		
HFL	8.072	8.060	8.049	8.037	8.026	8.015	8.003	7.992	7.980	7.969	7.957	7.946	7.935	7.923	7.912	7.900	7.889		
EXISTING GROUND LEVEL	5.751	5.778	5.808	5.841	5.874	5.896	5.896	5.892	5.872	5.850	5.843	5.813	5.803	5.808	5.821	5.836	5.862		
CHAINAGE	13+020	13+050	13+080	13+110	13+140	13+170	13+200	13+230	13+260	13+290	13+320	13+350	13+380	13+410	13+440	13+470	13+500		

LEGEND

- VILLAGE BOUNDARY
- TOB
- GUTTER
- TOE OF EMBANKMENT
- PROP SLUICE LOCATIONS

NOTE

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
 * Multi House *, Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006.
 in JV with

DHI (India) Water & Environment Pvt. Ltd.
 3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
 DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

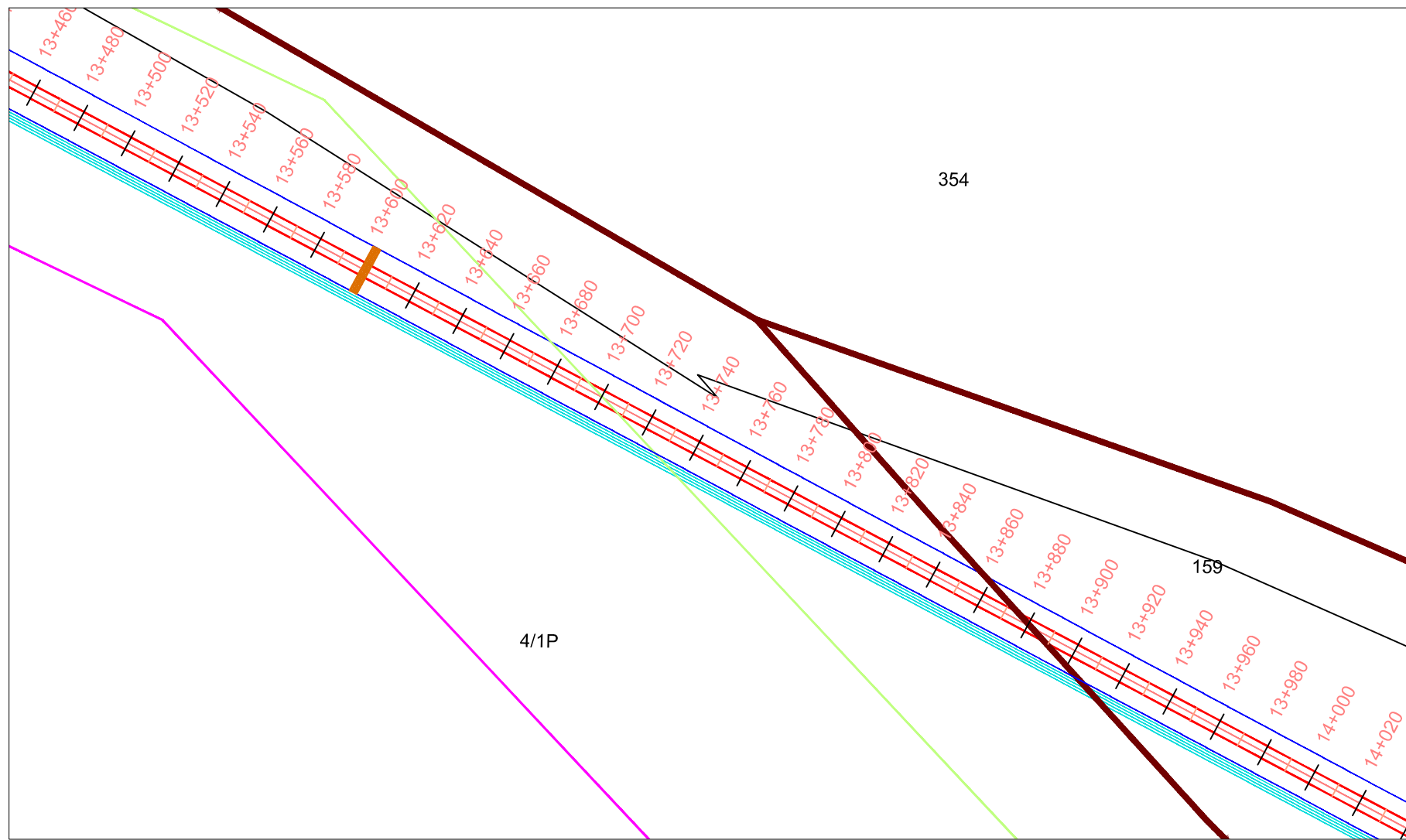
PROJECT CODE
 15-571

TITLE
 PROPOSED PLAN AND PROFILE OF RIGHT SIDE EMBANKMENT
 (CH.: 13+000 TO 13+500)


Designed: J. B. PATEL Reviewed:

Checked: A. N. P. Approved:

SCALE
 Project Drawing No: DICDL/ADHIYA/LS-04 REV.



LEGEND

-  VILLAGE BOUNDARY
-  TOB
-  GUTTER
-  TOE OF EMBANKMENT
-  PROP SLUICE LOCATIONS

NOTE


REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER
 CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
 * Multi House *, Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006.
 in JV with

 **DHI (India) Water & Environment Pvt. Ltd.**
 3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
 DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

PROJECT CODE
 15-571

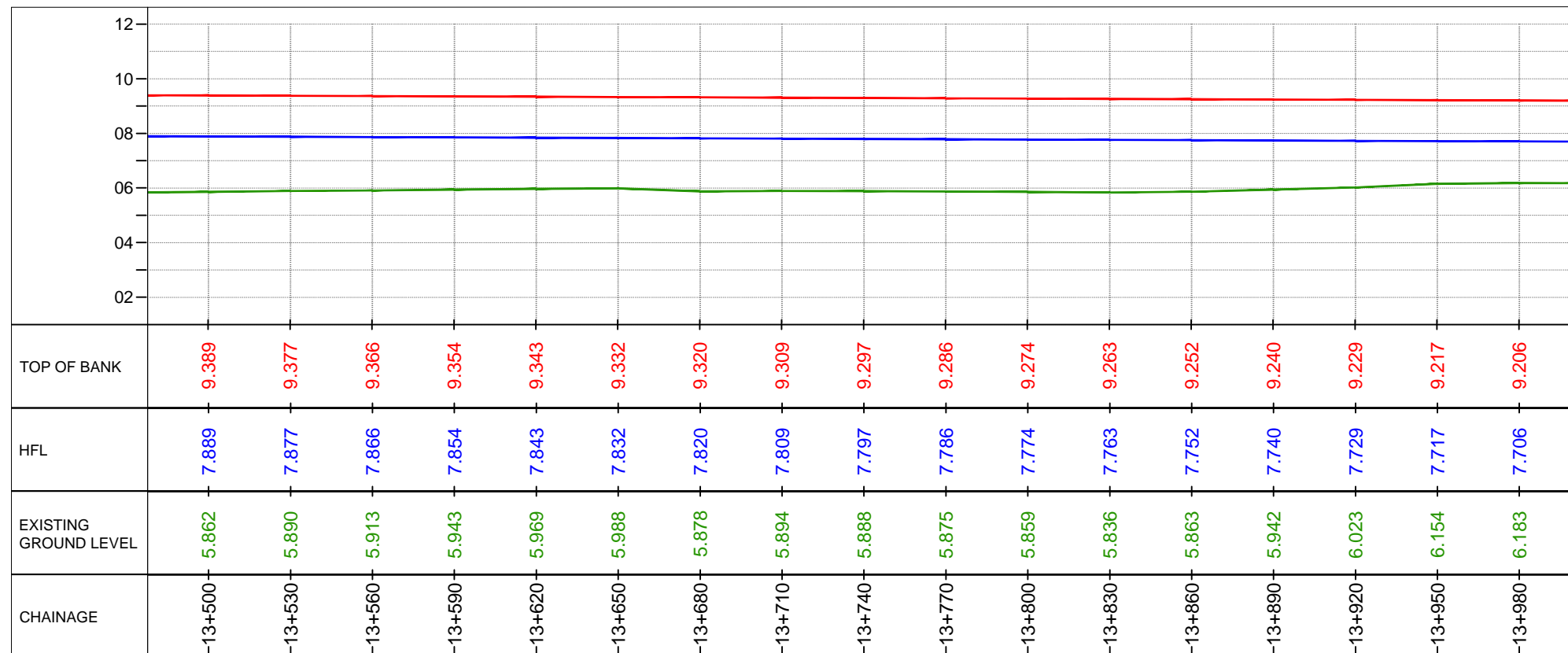
TITLE
 PROPOSED PLAN AND PROFILE OF RIGHT SIDE EMBANKMENT
 (CH.: 13+500 TO 14+000)

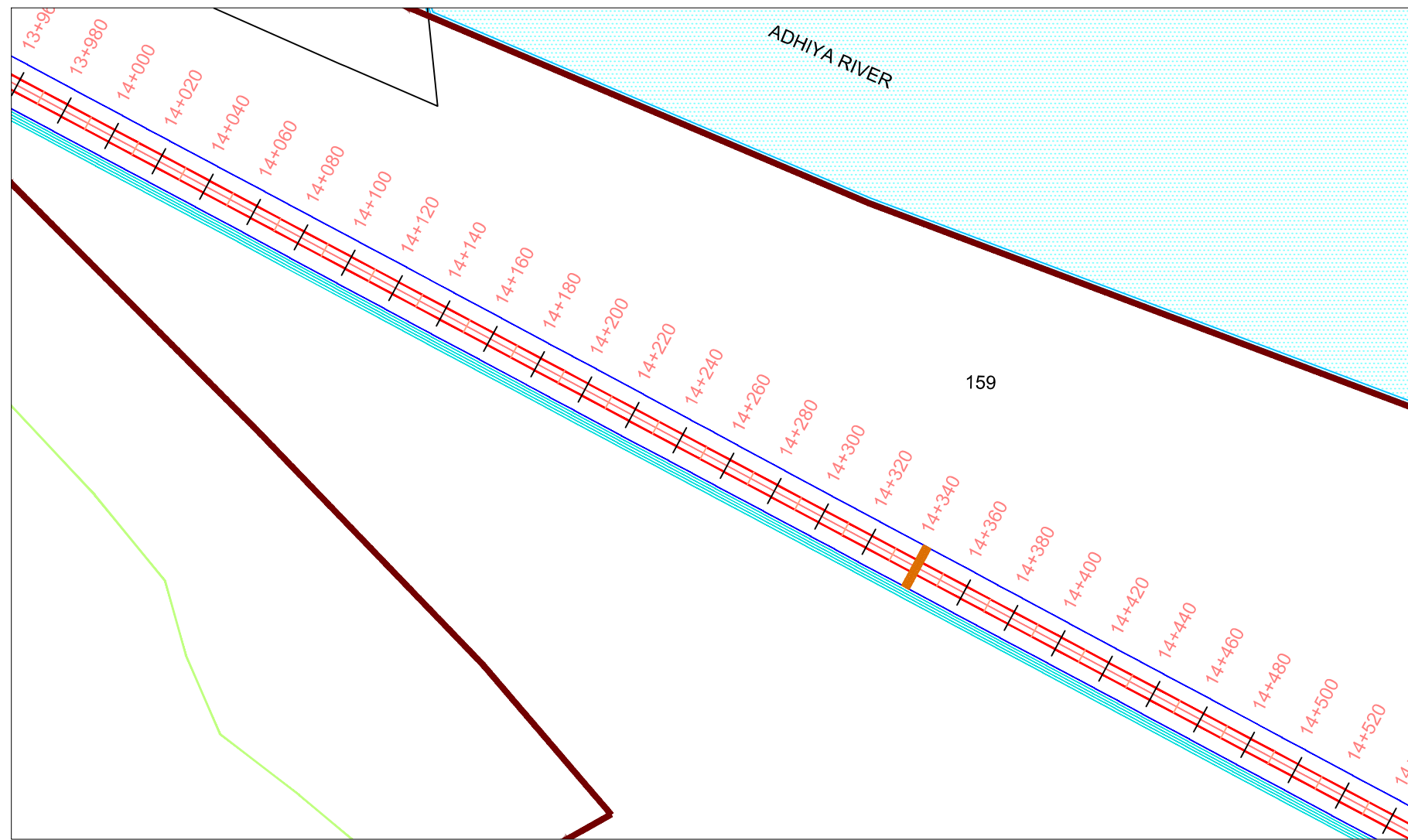
Designed: J. B. PATEL Reviewed:

Checked: A. N. P. Approved:

SCALE

Project Drawing No: DICDL/ADHIYA/LS-05 REV.





	12																			
	10																			
	08																			
	06																			
	04																			
	02																			
TOP OF BANK		9.194	9.183	9.171	9.160	9.149	9.137	9.126	9.114	9.103	9.091	9.080	9.069	9.057	9.046	9.034	9.023	9.011		
HFL		7.694	7.683	7.671	7.660	7.649	7.637	7.626	7.614	7.603	7.591	7.580	7.569	7.557	7.546	7.534	7.523	7.511		
EXISTING GROUND LEVEL		6.178	6.148	6.096	6.055	6.026	6.017	6.010	5.998	6.043	6.082	6.082	6.075	6.076	6.094	6.085	6.046	6.043		
CHAINAGE		14+010	14+040	14+070	14+100	14+130	14+160	14+190	14+220	14+250	14+280	14+310	14+340	14+370	14+400	14+430	14+460	14+490		

LEGEND

- VILLAGE BOUNDARY
- TOB
- GUTTER
- TOE OF EMBANKMENT
- PROP SLUICE LOCATIONS

NOTE

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
 * Multi House *, Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006.
 in JV with

DHI (India) Water & Environment Pvt. Ltd.
 3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
 DESIGN OF FLOOD PROTECTION WORK ALONG ADHYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

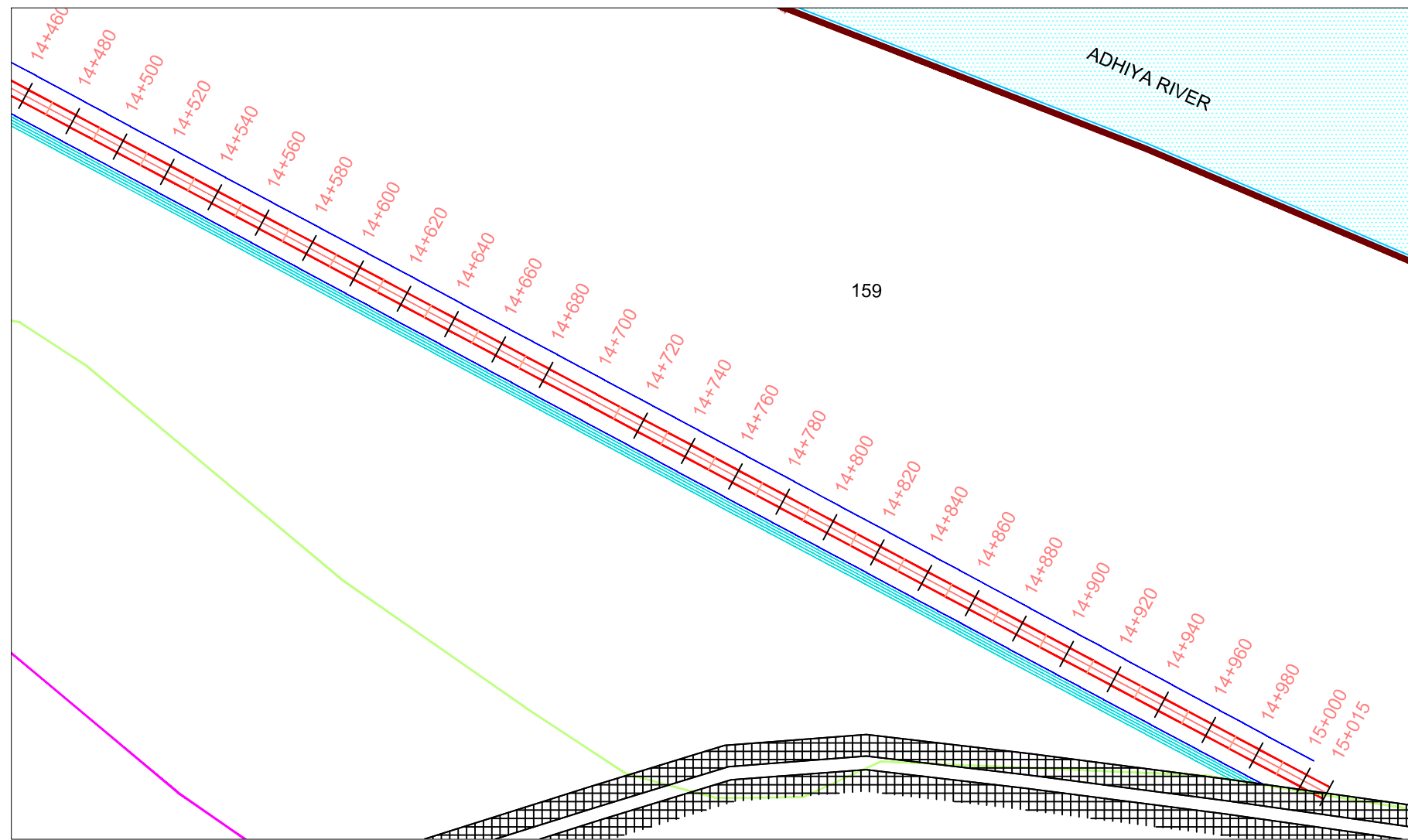
PROJECT CODE
 15-571

TITLE
 PROPOSED PLAN AND PROFILE OF RIGHT SIDE EMBANKMENT
 (CH.: 14+000 TO 14+500)

Designed: J. B. PATEL Reviewed:

Checked: A. N. P. Approved:

SCALE
 Project Drawing No: DICDL/ADHYA/LS-06 REV.



	14+520	14+550	14+580	14+610	14+640	14+670	14+700	14+730	14+760	14+790	14+820	14+850	14+880	14+910	14+940	14+970	15+000	15+015
TOP OF BANK	9.000	8.989	8.977	8.966	8.954	8.943	8.931	8.920	8.908	8.897	8.886	8.874	8.863	8.851	8.840	8.828	8.817	8.811
HFL	7.500	7.489	7.477	7.466	7.454	7.443	7.431	7.420	7.408	7.397	7.386	7.374	7.363	7.351	7.340	7.328	7.317	7.311
EXISTING GROUND LEVEL	6.052	6.032	5.994	5.953	5.924	5.897	5.871	5.845	5.820	5.859	5.874	5.831	5.826	5.842	5.876	5.905	5.913	5.923
CHAINAGE	14+520	14+550	14+580	14+610	14+640	14+670	14+700	14+730	14+760	14+790	14+820	14+850	14+880	14+910	14+940	14+970	15+000	15+015

LEGEND

- VILLAGE BOUNDARY
- TOB
- GUTTER
- TOE OF EMBANKMENT
- PROP SLUICE LOCATIONS
- EXISTING EMBANKMENT

NOTE

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER
 CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
 * Multi House *, Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006.
 in JV with

DHI (India) Water & Environment Pvt. Ltd.
 3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
 DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

PROJECT CODE
 15-571

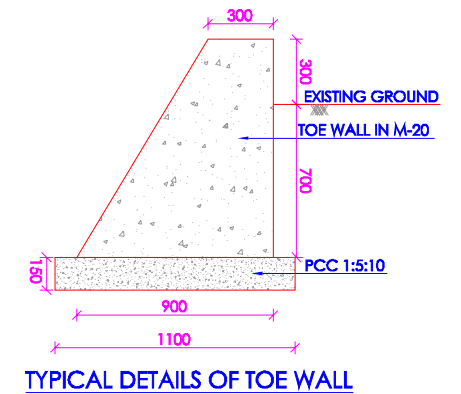
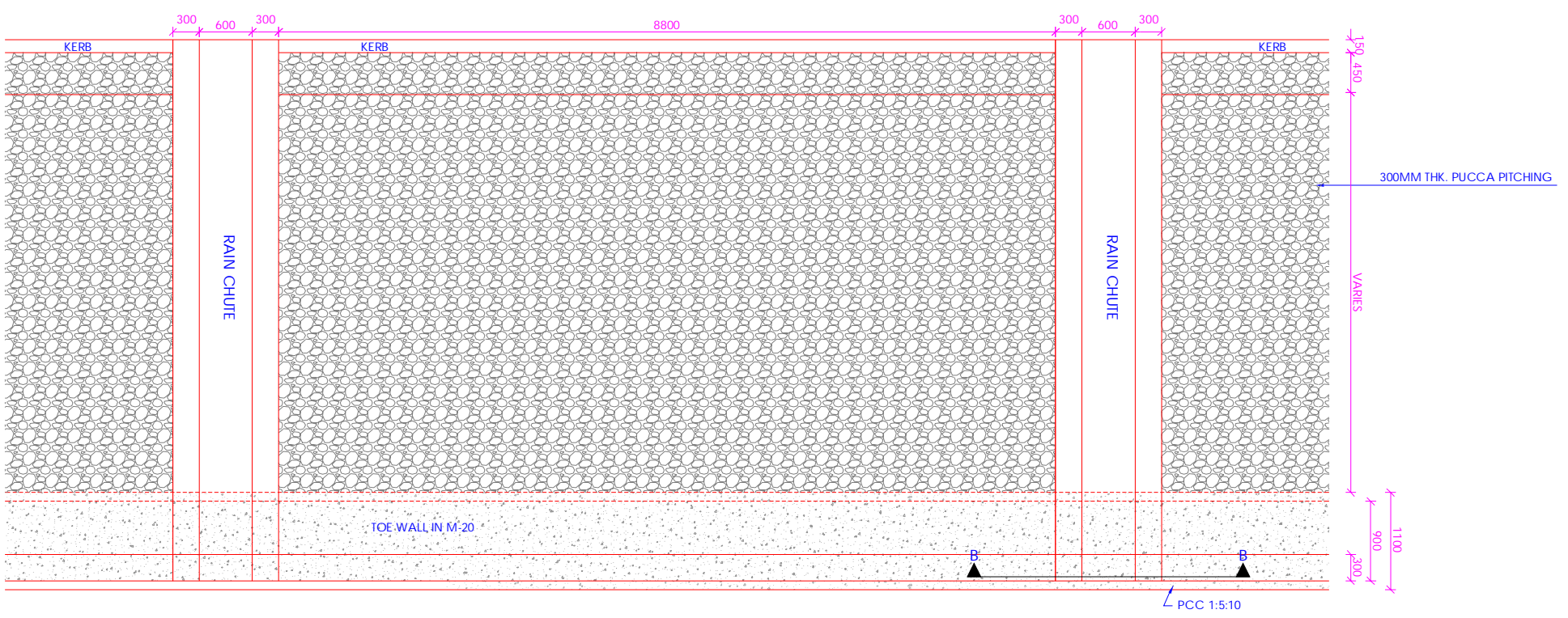
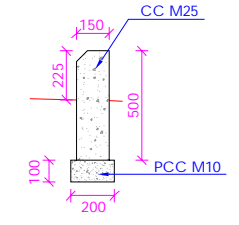
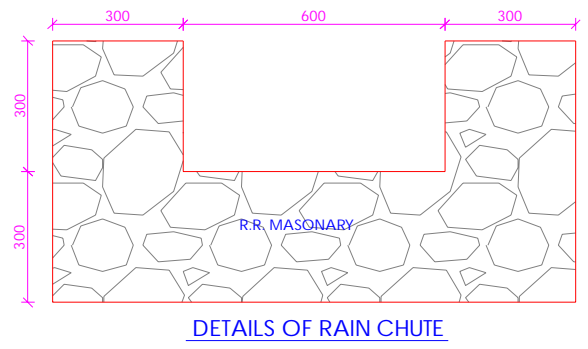
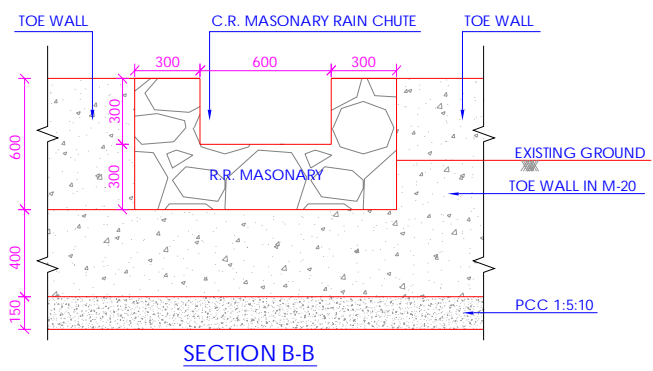
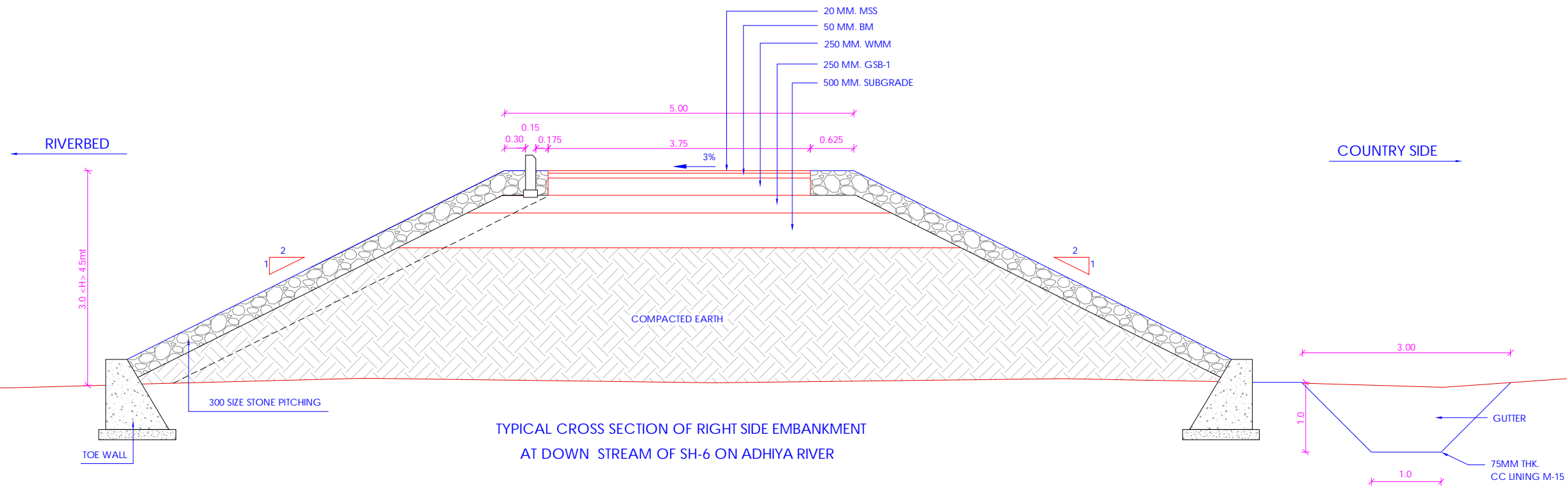
TITLE
 PROPOSED PLAN AND PROFILE OF RIGHT SIDE EMBANKMENT
 (CH.: 14+500 TO 15+015)

Designed: J. B. PATEL Reviewed:

Checked: A. N. P. Approved:

SCALE

Project Drawing No: DICDL/ADHIYA/LS-07 REV.



LEGEND

NOTE

REV.	Date	Revision Description	Checked	Approv

PURPOSE :

TENDER CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
" Multi House ", Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 001 in JV with

DHI (India) Water & Environment Pvt. L
3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

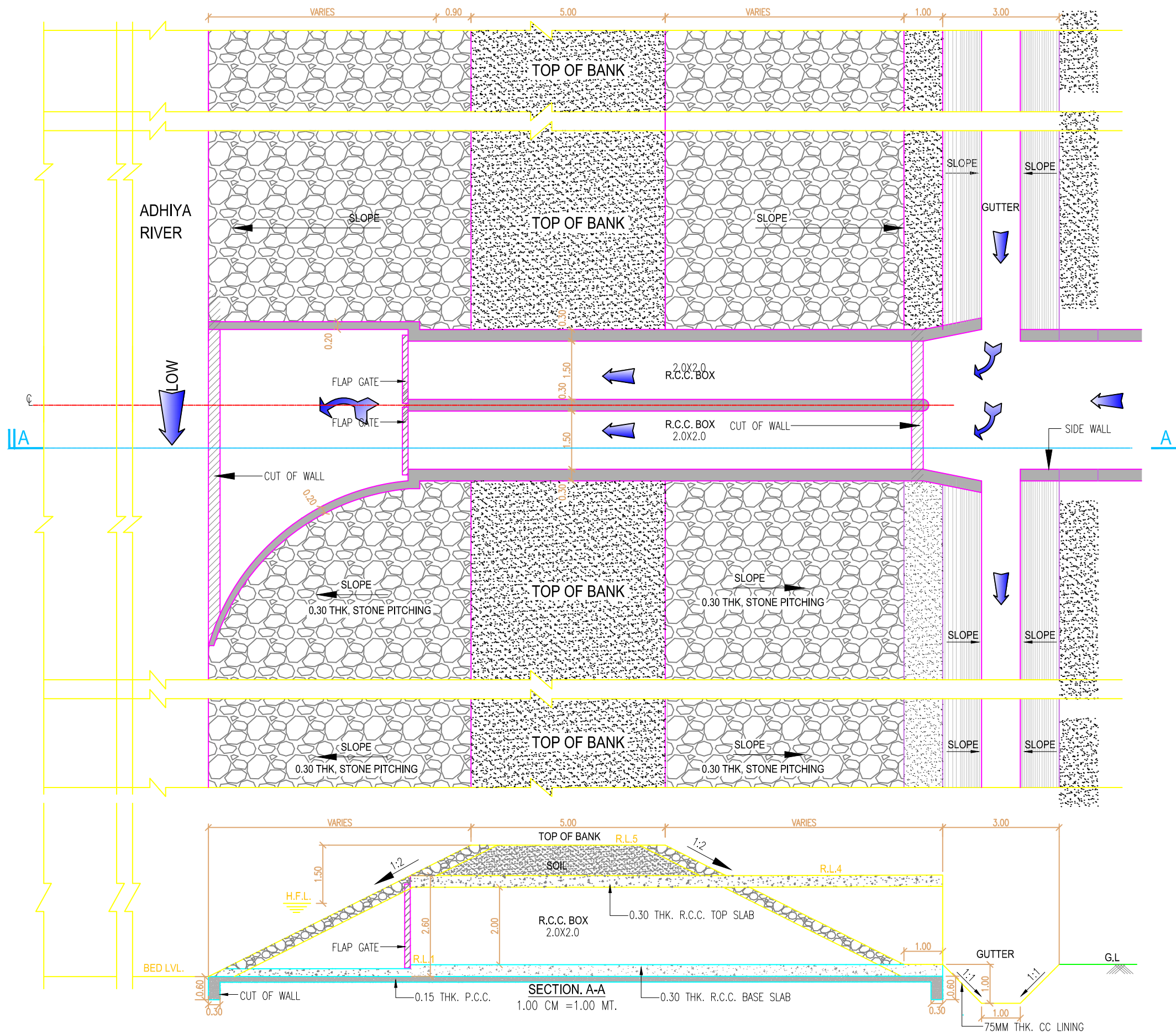
PROJECT
TYPICAL CROSS SECTION OF EMBANKMENT

PROJECT CODE
15-571

TITLE
DETAILED CROSS SECTION (NO STORM WATER)
(CH.: 11+530 TO 15+015)

Designed: J. B. PATEL Reviewed:
Checked: A. N. P. Approved:

SCALE
Project Drawing No: DICDL/ADHIYA/CS-01 REV.



LEGEND

NOTE

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER
 CONSTRUCTION

CLIENT **DICDL** DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
 " Multi House ", Lane Next to C.N. Vidyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006. in JV with

DHI (India) Water & Environment Pvt. Ltd.
 3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER **AECOM** AECOM ASIA COMPANY LTD.

PROJECT DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

PROJECT CODE 15-571

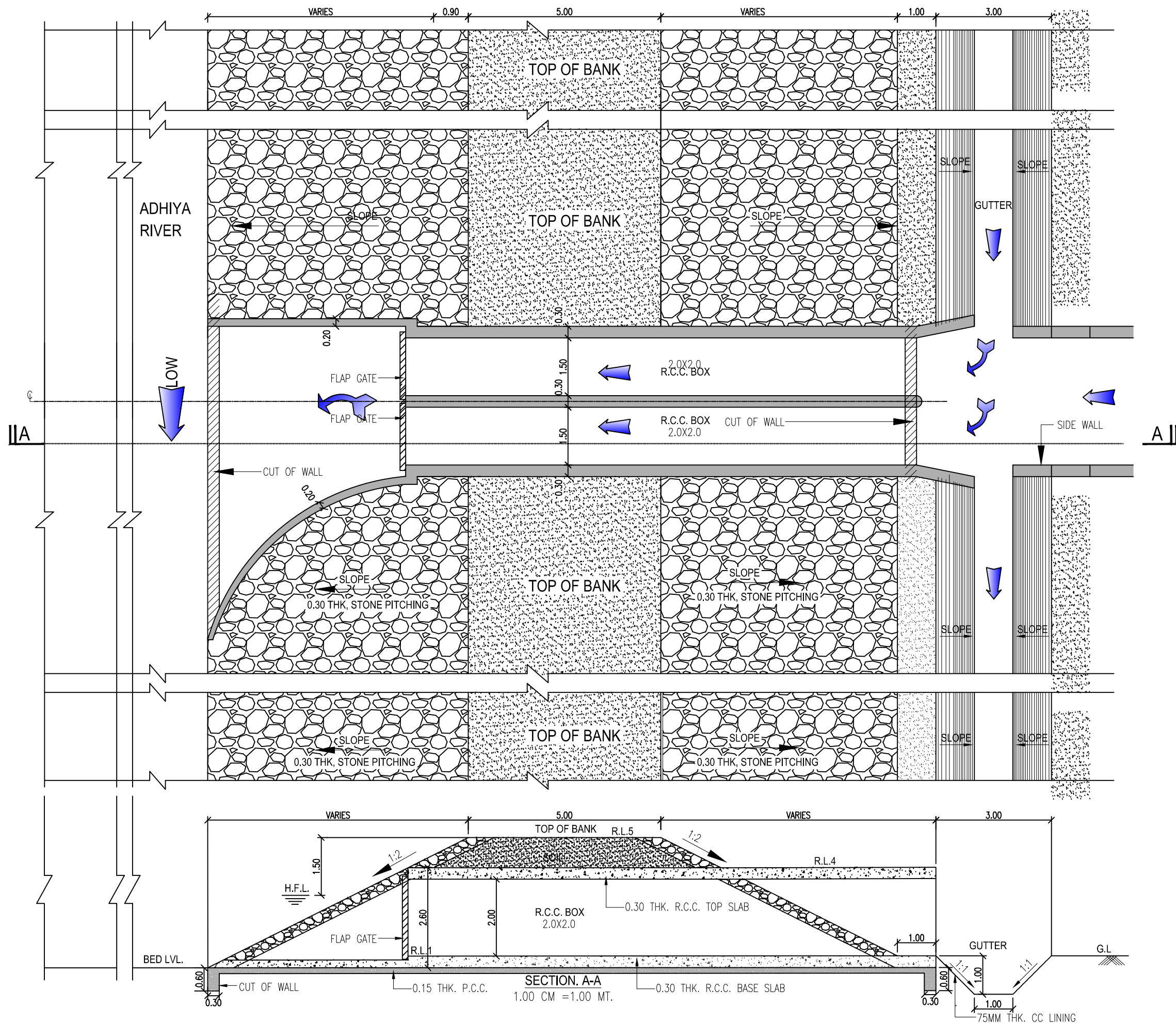
TITLE GAD OF SLUICE GATE FOR TWIN R.C.C. BOX (1.5 X 2.0mt.)

Designed: J. B. PATEL Reviewed:

Checked: A. N. P. Approved:

SCALE 02m 01 0 04 08m

Project Drawing No: DICDL/ADHIYA/GAD-01 REV. R0



LEGEND

NOTE

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT :
Multi Media Consultants Pvt. Ltd.
 * Multi House *, Lane Next to C.N. Vidhyalaya,
 Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006.
 in JV with

DHI (India) Water & Environment Pvt. Ltd.
 3rd Floor, NSIC - STP Complex, NSIC Bhavan,
 Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
 DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

PROJECT CODE
 15-571

TITLE
 GAD OF SLUICE GATE FOR TWIN R.C.C. BOX (1.5 X 2.0mt.)

Designed: J. B. PATEL Reviewed:

Checked: A. N. P. Approved:

SCALE 02m 01 0 04 08m

Project Drawing No: DICDL/ADHIYA/GAD-01 REV. R0

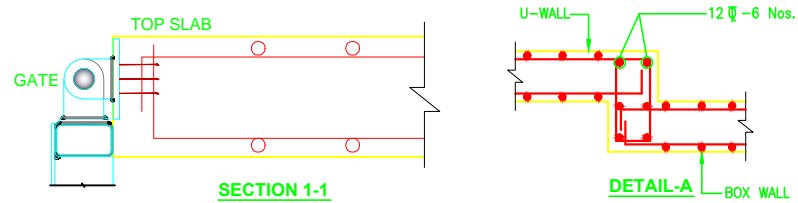
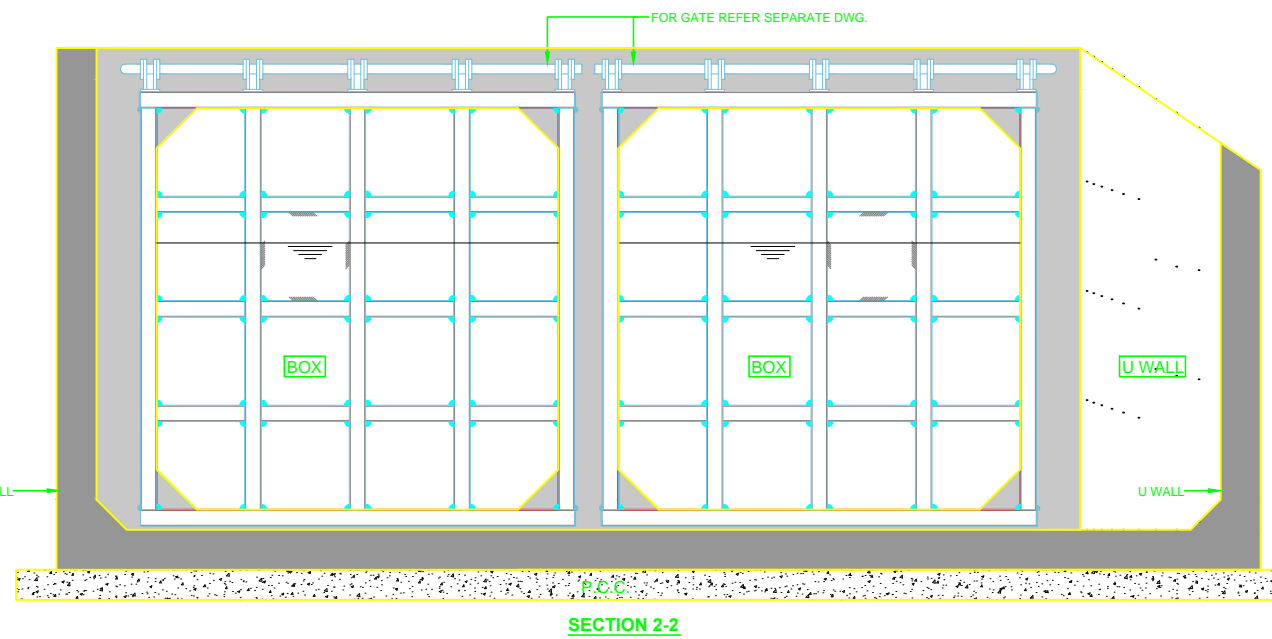
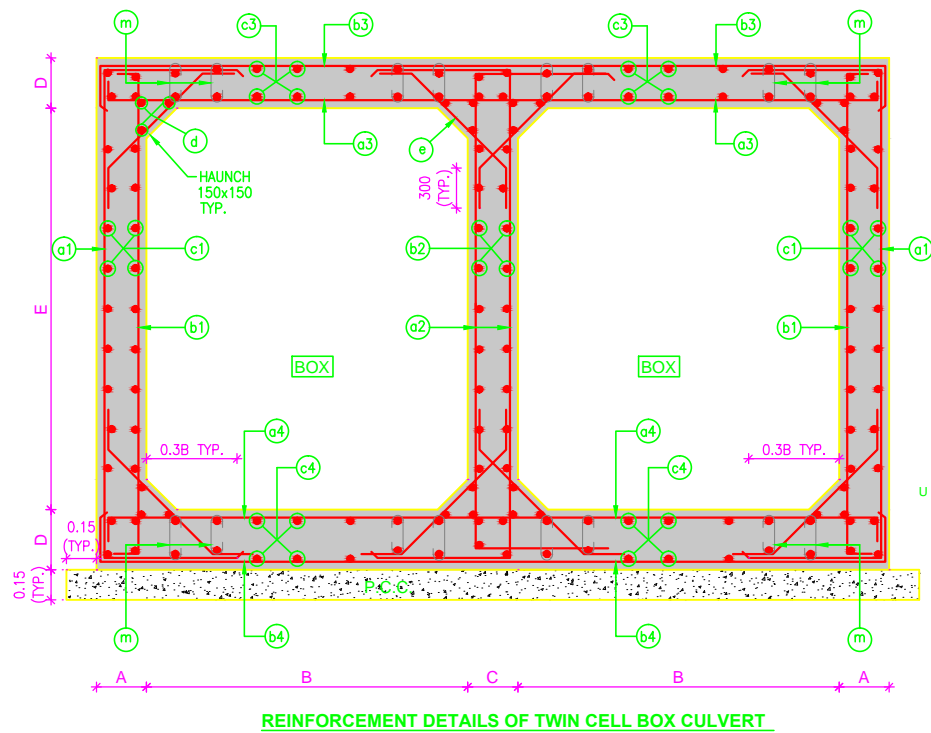


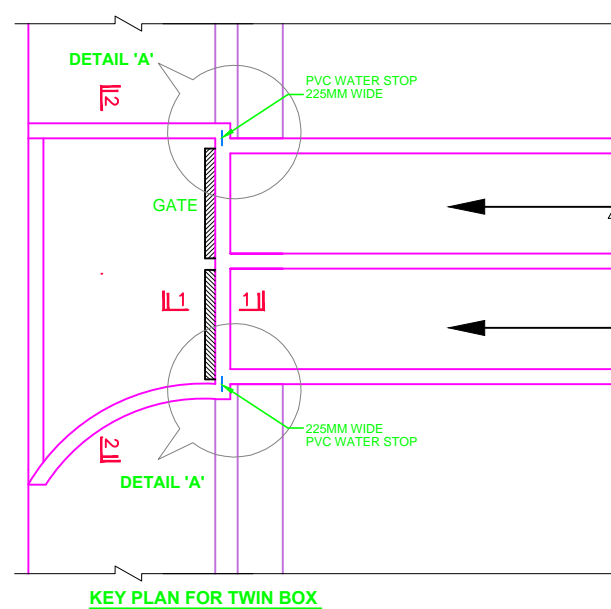
TABLE SHOWING LAP LENGTH

% OF STEEL LAPPED	M:30 CONC.
<= 25%	68 x DIA.
> 25% TO <= 40%	77 x DIA.
> 40% TO <= 50%	87 x DIA.

REINFORCEMENT DETAILS

BOX SIZE	B X E 1.5 X 2 (0 M EARTH COVER)	B X E 1.5 X 2 (1.5 M EARTH COVER)
a1	10 Φ 100 C/C	10 Φ 200 C/C
b1	10 Φ 200 C/C	10 Φ 200 C/C
c1	8 Φ 200 C/C	8 Φ 200 C/C
a2	10 Φ 100 C/C	10 Φ 200 C/C
b2	8 Φ 200 C/C	8 Φ 200 C/C
a3	10 Φ 100 C/C	10 Φ 140 C/C
b3	10 Φ 100 C/C	10 Φ 200 C/C
c3	8 Φ 200 C/C	8 Φ 200 C/C
a4	10 Φ 100 C/C	10 Φ 115 C/C
b4	10 Φ 100 C/C	10 Φ 200 C/C
c4	8 Φ 200 C/C	8 Φ 200 C/C
e	10 Φ 100 C/C EXTRA	10 Φ 200 C/C EXTRA
d	10 Φ - 24 Nos	10 Φ - 24 Nos
m	10 Φ 125 C/C LINKS IN TRANS.& LONG.DIRECT.	10 Φ 200 C/C LINKS IN TRANS.& LONG.DIRECT.

BOX SIZE					
A	B	C	D	E	EARTH COVER
0.30	1.50	0.30	0.25	2.00	0/1.0/1.5/2M



LEGEND

NOTE

- (1) ALL DIMENSIONS ARE IN MILLIMETER.
- (2) DO NOT SCALE THIS DRAWING.
- (3) THIS DRAWING MUST BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.
- (4) Φ INDICATES TMT Fe-500 REINFORCEMENT AND CONFORMING TO IS: 1786 (INCLUDING LATEST AMMENDMENTS.)
- (5) CONCRETE MIX SHALL BE M:30 FOR RCC BOX.
- (6) CLEAR COVER TO ANY REINFORCEMENT SHALL BE 45 MM.
- (7) NUMBER OF BAR SHOULD NOT BE COUNTED BUT NUMBER OF BAR AND SPACING INDICATED SHALL BE ADOPTED.
- (8) FOR GATE REFER SEPERATE DWG.
- (9) LAP LENGTH IS REQUIRED AS PER TABLE.

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER
 CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
 * Multi House *, Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006. in JV with

DHI (India) Water & Environment Pvt. Ltd.
 3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
 DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

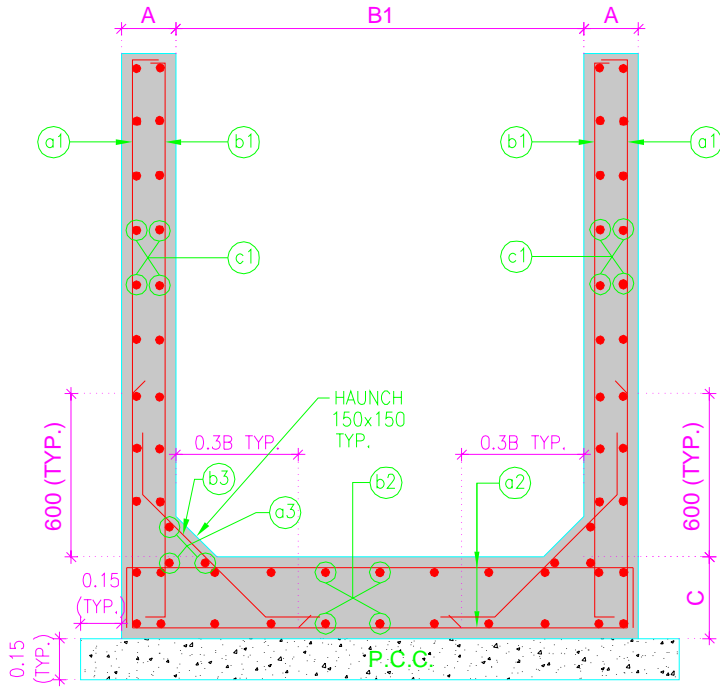
PROJECT CODE
 15-571

TITLE
 R.C. DETAILS OF TWIN CELL BOX

Designed: J. B. PATEL
 Reviewed:

Checked: A. N. P.
 Approved:

SCALE: NTS
 Project Drawing No: DICDL/ADHIYA/BOX-01
 REV. R0



REINFORCEMENT DETAILS OF SINGLE & TWIN CELL BOX RETURN

REINFORCEMENT DETAILS

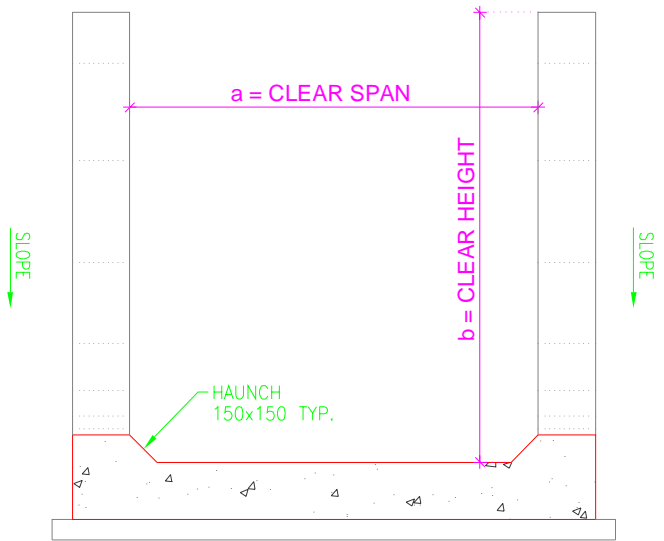
BOX SIZE	TWIN BOX	
	B X D 1.5 X 2	
a1	10 Φ @ 150 C/C	
b1	10 Φ @ 200 C/C	
c1	8 Φ @ 200 C/C	
a2	10 Φ @ 150 C/C	
b2	8 Φ @ 200 C/C	
a3	10 Φ - 6 Nos	
b3	10 Φ @ 150 C/C EXTRA	

TABLE SHOWING LAP LENGTH

% OF STEEL LAPPED	M:30 CONC.
<= 25%	68 x DIA.
> 25% TO <= 40%	77 x DIA.
> 40% TO <= 50%	87 x DIA.

TWIN BOX

BOX SIZE	A	B1	C
1.5X 2 (TWIN BOX)	0.20	3.90	0.20



SECTION

LEGEND

NOTE

- (1) ALL DIMENSIONS ARE IN MILLIMETER.
- (2) DO NOT SCALE THIS DRAWING.
- (3) THIS DRAWING MUST BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS.
- (4) Φ INDICATES TMT Fe-500 REINFORCEMENT AND CONFORMING TO IS: 1786 (INCLUDING LATEST AMMENDMENTS.)
- (5) CONCRETE MIX SHALL BE M:30 FOR RCC BOX.
- (6) CLEAR COVER TO ANY REINFORCEMENT SHALL BE 45 MM.
- (7) NUMBER OF BAR SHOULD NOT BE COUNTED BUT NUMBER OF BAR AND SPACING INDICATED SHALL BE ADOPTED.
- (8) FOR GATE REFER SEPERATE DWG.
- (9) LAP LENGTH IS REQUIRED AS PER TABLE.

REV.	Date	Revision Description	Checked	Appr
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PURPOSE :

TENDER
 CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
 * Multi House *, Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006 in JV with

DHI **DHI (India) Water & Environment Pvt. L**
 3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
 DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

PROJECT CODE
 15-571

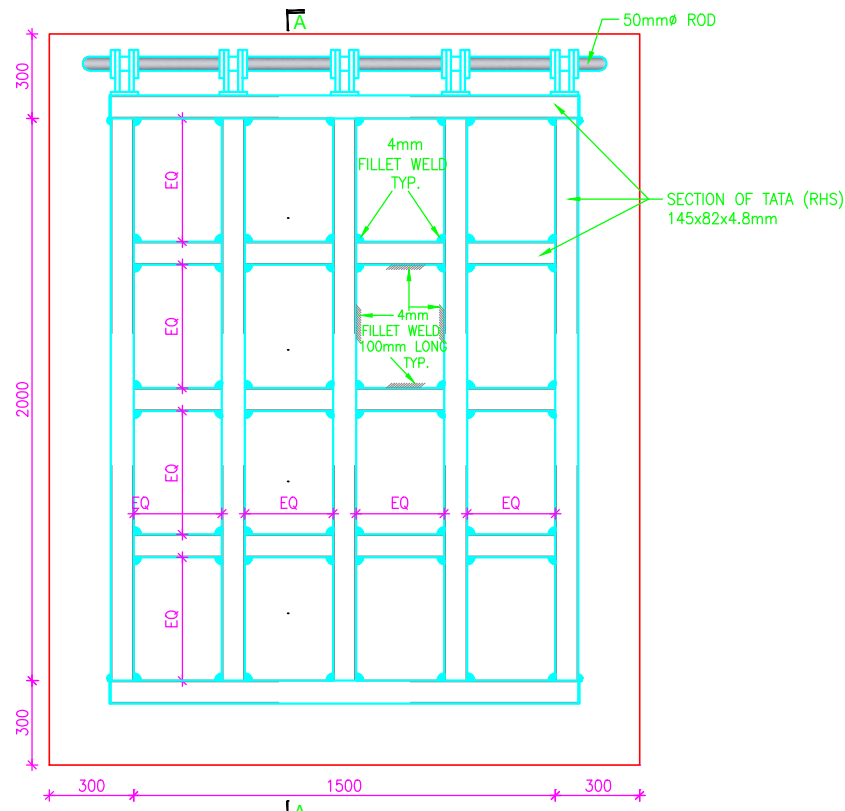
TITLE
 R.C. DETAILS OF U WALL FOR TWIN CELL BOX

Designed: J. B. PATEL Reviewed:

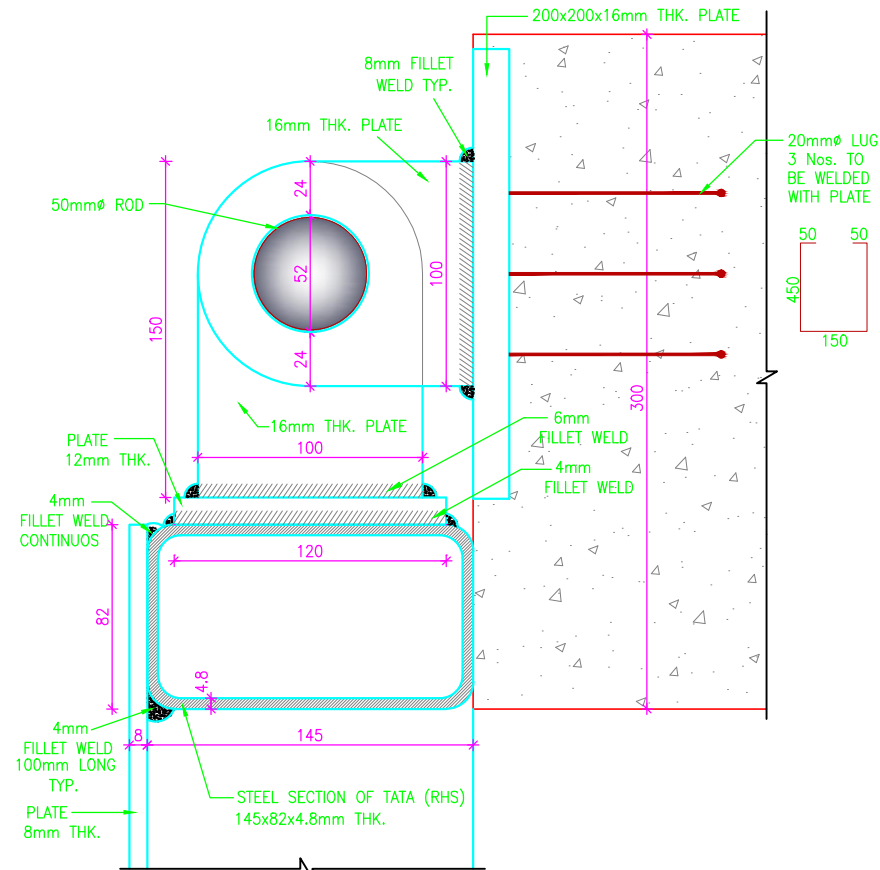
Checked: A. N. P. Approved:

SCALE: NTS

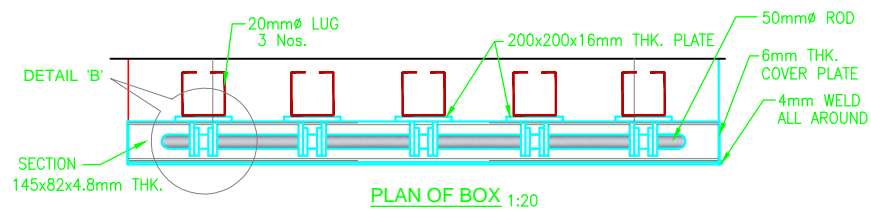
Project Drawing No: DICDL/ADHIYA/BOX-02 REV. R0



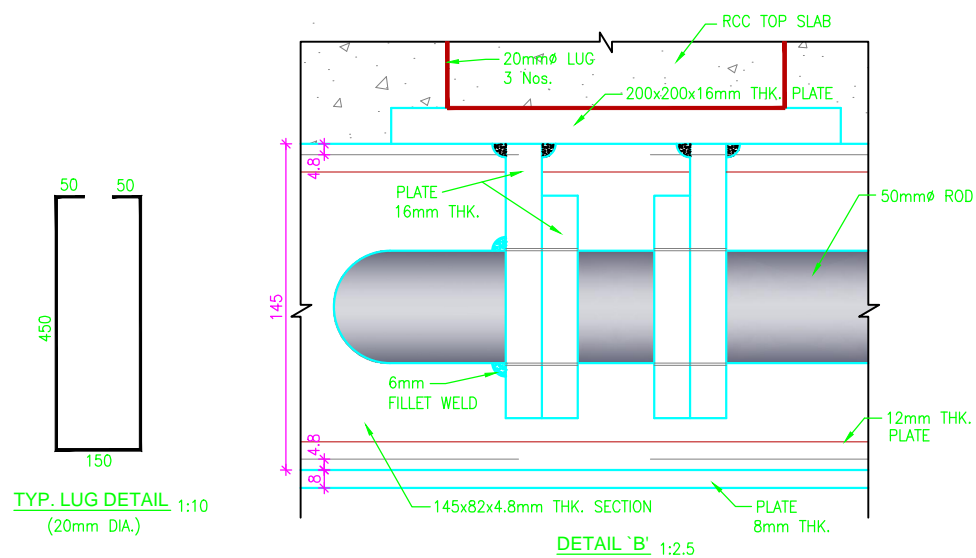
ELEVATION OF BOX 1:20



DETAIL 'C' 1:2.5

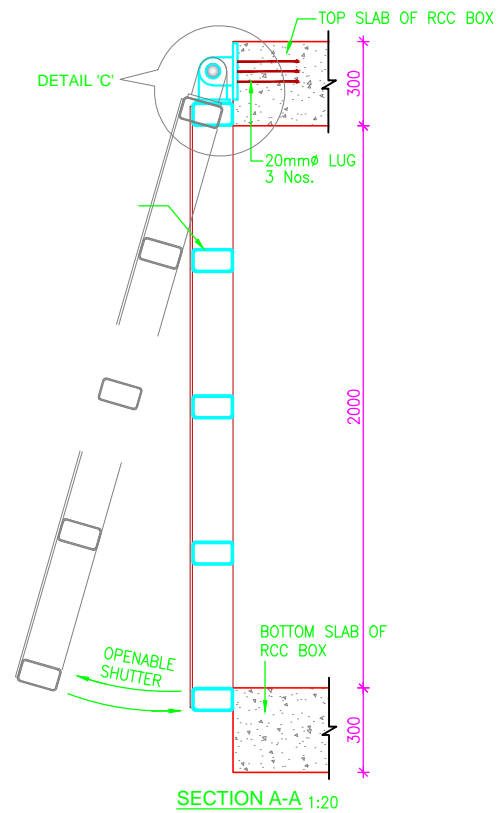


PLAN OF BOX 1:20



DETAIL 'B' 1:2.5

TYP. LUG DETAIL 1:10 (20mm DIA.)



LEGEND

NOTE

1. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. FIGURED DIMENSIONS TO BE USED IN PREFERENCE TO SCALING.
4. ALL FABRICATION SHALL BE DONE IN ACCORDANCE WITH IS:800 AND IS:1915
5. ALL DIMENSIONS SHOULD BE VERIFIED AND CHECKED AT SITE ON FULL SCALE SHOP LAY OUT BEFORE COMMENCING FABRICATION.
6. ALL STEEL WORK TO BEAR THEIR RESPECTIVE ERECTION MARKS BEFORE DISPATCH.
7. ALL STEEL WORK TO BE PAINTED WITH ONE SHOP COAT OF RED OXIDE AND TWO COATS OF APPROVED SYNTHETIC ENAMEL PAINT IN COMPLIANCE WITH IS 1477 PART (I & II)

REV.	Date	Revision Description	Checked	Approved

PURPOSE :

TENDER CONSTRUCTION

CLIENT
DICDL DHOLERA INDUSTRIAL CITY DEVELOPMENT LIMITED

CONSULTANT : **Multi Media Consultants Pvt. Ltd.**
" Multi House ", Lane Next to C.N. Vidhyalaya, Bh. Reliance Petrol Pump, Ambawadi, Ahmedabad - 380 006. in JV with

DHI (India) Water & Environment Pvt. Ltd.
3rd Floor, NSIC - STP Complex, NSIC Bhavan, Okhla Industrial Estate, New Delhi - 110 020

PROGRAMME MANAGER
AECOM AECOM ASIA COMPANY LTD.

PROJECT
DESIGN OF FLOOD PROTECTION WORK ALONG ADHIYA RIVER IN DHOLERA SPECIAL INVESTMENT REGION.

PROJECT CODE
15-571

TITLE
R.C. DETAILS OF TWIN CELL BOX

Designed: J. B. PATEL Reviewed:

Checked: A. N. P. Approved:

SCALE: 50m 25 0 50 100m

Project Drawing No: DICDL/ADHIYA/FG-01 REV. R0