JICA ASSISTED GUWAHATI WATER SUPPLY PROJECT

Loan Agreement No. ID P-201

IFB No. GWSP/LB/5C-5R9/2018-19/Date: 19.08.2019

Contract Package No. C#5C

Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone

Bid Document for Contract Package No. C#5C

Limited Bidding

Bid Document For Contract Package No. C#5C

Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone

CONTENTS

Office of the Project Director
Project Implementation Unit
JICA Assisted Guwahati Water Supply Project
Saikia Commercial Complex, Christian Basti
G.S. Road, Guwahati – 781 005
Tele-Fax - +91-361-2340132; Email: md.gjb@nic.in
www. gmdwsb.assam.gov.in

Invitation for Bids under Limited Bidding

IFB No.: GWSP/LB/5C-5R9/2018-19/ **Date: 19.08.2019**

JICA Loan No. and Title: ID P-201 Guwahati Water Supply Project.

Government of India has received loan from the Japan International Cooperation Agency (JICA) towards the cost of Guwahati Water Supply Project and it intends to apply part of the proceeds of this loan to payments under the contract for Procurement of Works (Item rate) for the works under DMA no. 5R9 in Package No. C# 5C.

Project Director, JICA Assisted Guwahati Water Supply Project, Guwahati invites sealed Bids for construction and completion of the work as detailed below:

Sl. No.	Item	IFB No.: GWSP/LB/ 5C-5R9/2018-19/ Date: 19.08.2019
1	Work Description	**Contract Package No. C#5C-** Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone
2	Time for Completion	Execution: 90 days & Testing, Trial run & Commissioning: 90 days
3	Duration for obtaining the Bid documents from the Employer or for downloading from the designated websites: www. gmdwsb.assam.gov.in	19.08.2019 to 02.09.2019
4	Bid document fee	If downloaded, it is free cost. Rs. 1,000 for purchase from the Employer and if required through post additional cost of INR 250.
5	Bid Security	Rs. 1.11 lakhs
6	Joint Site Visit	26.08.2019 at 10.00 Hours. Place: Office of the Project Director, JICA Assisted Guwahati Water Supply Project, 2nd Floor, Saikia Commercial Complex, Christian Basti, Guwahati-781 005.
7	Pre-Bid Meeting	26.08.2019; Time: 15.00 Hours Place: Office of the Project Director, JICA Assisted Guwahati Water Supply Project, 2nd Floor, Saikia Commercial Complex, Christian Basti, Guwahati-

		781 005.
8	Last Date & Time for Physical Submission of Bids	03.09.2019; Time:15.00 Hours
9	Date & Time for Opening Technical Bids	03.09.2019; Time:16.00 Hours

Bidding will be conducted through the Limited Bidding procedures specified in the Section 30 of Assam Public Procurement Act 2017, are open to eligible bidders. Single-Stage-Two-Envelope Bidding will be adopted.

Interested eligible Bidders may obtain further information from the Project Director, JICA assisted Guwahati Water Supply Project, Guwahati and inspect the Bidding documents on the working days during 10 AM to 5 PM or seen on the website: www. gmdwsb.assam.gov.in

The payment towards the Bid document will be through demand draft in favour of "The Project Director, JICA Assisted Guwahati Water Supply Project" payable at Guwahati, Assam.

The Bid security shall be paid in favour of "The Project Director, JICA Assisted Guwahati Water Supply Project" either through the Demand Draft or Bank Guarantee.

Bids received without Bid Security shall be rejected out rightly. Bids delivered after the time and date noted above will be rejected.

The Employer will not be responsible for any costs or expenses incurred by Bidders relating to the preparation or delivery of Bids.

The Employer reserves the right to accept any bid, or reject any or all bids, without assigning any reason thereof and without thereby incurring any liability to the Bidder or Bidders.

(Sri Paul Barua)
Project Director,
JICA Assisted Guwahati Water Supply Project
Guwahati- 781 005.

Section. I: Instructions to Bidders

1. Scope of Works

The Project Director, JICA Assisted Guwahati Water Supply Project, Guwahati (Employer) invites quotations for the works as detailed below:

Brief Description of the Works	Period of Completion
Contract Package No. C#5C: Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone.	Period of Completion: Execution: 90 days. & Testing, Trial run & Commissioning: 90 days

The successful Bidder will be expected to complete the works by the intended completion date specified above.

2. Qualification of the Bidder:

2.1. Qualification Information to be provided by the Bidder: the Bidder shall provide information on his qualification which shall include:-

a) Total monetary value of works executed by him for each year of the last 3 years;
b) List of works (similar to the works described in Para 1) completed satisfactorily as a prime contractor or sub-contractor during the last 3 years, enclosing evidences from the respective Employers in support of experience claimed or sufficient documentary proof;
c) Report on his financial standing, along with last 3 years' financial statements/Profit and Loss Statements; and
d) Details of any litigation, during the last 3 years in which the bidder is involved, the parties concerned, and disputed amount or award in each case (Give details of both completed and pending cases).

2.2. **Qualification Criteria**: to qualify for award of the contract the bidder:-

(a) Should be a registered Civil Contractor with Assam PHED, Assam PWD, AUWSSB, GMC or GMDA.
(b) Should have satisfactorily executed as a prime contractor or sub-contractor, at least one similar work of value not less than **Rs. 30 lakhs** between 1st April 2016 and Bid submission deadline;
(c) Should have average Annual turnover of **Rs. 55 lakhs**, calculated as total certified payments received for contracts in progress or completed during the past 3 years, ie., starting from 1st April 2016;
(d) The Bidder must demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet: Minimum cash-flow requirement: **Rs. 20 lakhs** during the duration of Contract.
(e) Work Experience:

A Civil contractor working for Assam Public Health Engineering Department [PHED], Assam Water Supply and Sewerage Board [AUWSSB], Guwahati Municipal Corporation [GMC], Guwahati Metropolitan Development Authority [GMDA], Assam Public Works Department and having experience in Laying & jointing of DI pipelines of at least **2 km** between 1st April 2016 and Bid submission deadline, for which the Bidder shall submit the credentials from the Employer,

Or

A Subcontractor, if he had worked under any Main Contractor for the ongoing JICA/JnNURM/ADB funded Water Supply Projects for Guwahati and having Experience in Laying & jointing of DI pipelines of at least **2 km** between 1st April 2016 and Bid submission deadline, for which the Bidder shall submit the appropriate/required proof, such as the Work order, Contract and Proof of payment given by the main contractor.

3. **Eligibility – Conflict of Interest**: A Bidder (a) shall not have conflict of interest as defined in the JICA's Procurement Guidelines; and (b) should not have been (i) temporarily suspended or debarred by the World Bank Group in compliance with the Bank's Anti-Corruption Guidelines and its Sanctions Framework; or (ii) blacklisted or suspended by Central or any State Government Departments in India.

4. **Clarifications & Amendments**: If the Employer receives any request for clarification of this Bid document, it will upload its response together with any amendment to this document, on the www. gmdwsb.assam.gov.in for information of all Bidders.

5. **Bid Prices:**

a) The Bid shall be for construction of the whole works as described in the Bill of quantities, drawings and technical specifications.

b) All duties, taxes and other levies payable by the contractor under the contract shall be included in the total price.

c) The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.

d) The rates should be quoted in Indian Rupees only.

6. Preparation of Bid:

6.1 The Bidder is advised to visit the site of works at his own expense and obtain all information that may be necessary for preparing the Bid.

6.2 Each Bidder shall submit only one Bid. Bidders shall not contact other Bidders on matters relating to this Bid.

6.3 The Bid shall comprise two Parts, namely the Technical Bid and the Financial Bid. Both Parts shall be submitted simultaneously.

6.4 The Technical Bid shall comprise the following:

(a) **Letter of Technical Bid** as per Format given;
(b) **Authorization**: Power of Attorney of signatory of Bid;
(c) Copy of registration as the Civil Contractor with Assam PHED, Assam PWD, AUWSSB, GMC or GMDA. [ITB Clause 2.1 (a)];
(d) **Annual Turnover:** Confirmation showing Annual Turnover in civil Engineering construction works of similar nature in the last three financial years. [ITB Clause 2.1 (c) and 2.2 (c)];
(e) Qualifications:

(i) Qualification information and supporting documents relating to similar nature of works executed and payments received. [ITB Clause 2.1 (b) and 2.2 (b)];

(ii) Documents to support cash flow details [ITB Clause 2.2 (d)];

(iii) Documents to support the claim for Work Experience [ITB Clause 2.2 (e)];

(f) Complete address and contact details of the Bidder having the following information:

Name of the Bidder

Address for communication

Telephone No(s): Office

Mobile No.

Facsimile (FAX) No.

Electronic Mail Identification (E-mail ID)

(g) The Technical Bid shall not include any financial information related to the Bid price. Where material financial information related to the Bid price is contained in the Technical Bid, the Bid shall be declared non-responsive.

6.5 The Financial Bid shall comprise the following:

(a) Letter of Financial Bid;

(b) Priced Bill of Quantities.

6.6 Signing of Bid: The name and position held by the person signing the Bid and related documents must be typed or printed below the signature.

6.7 Deadline for Submission of Bid: Bids must be submitted no later than the deadline for submission of Bids viz. time **15.00 hours and date 03.09.2019**. A Bidder may modify its Bids any number of times, before the deadline for submission of Bids.

6.8 Validity of Bid: Bid shall remain valid for a period not less than **45 days** after the deadline date specified for submission.

7. Bid Submission:

The Technical Bid and Financial Bid shall be filled, signed and shall be placed in separate envelopes, which shall bear the Bid Invitation Number and specify whether, Technical Bid or Financial Bid.

Then, both the sealed envelopes shall be placed in a single bigger envelope, sealed and shall bear the Bid Invitation Number.

Both inner and outer envelopes shall bear the Bidder's name and address.

8. Opening and Evaluation of Technical Bids: The 'Technical Bids' will be opened on the specified date and time, in presence of the Bidders' representatives, who choose to be present.

The Financial Bids shall remain unopened, until the subsequent opening, following the evaluation of the Technical Bids.

(a) The Employer shall examine the technical Bid to determine whether the Bid (a) has been properly signed; (b) meets the eligibility criteria; (c) is substantially responsive to the requirements of the Bid document; and (d) meets the qualification criteria specified in ITB Clause 2.

(b) Only the Bids that are both substantially responsive to the Bid requirement and meet all Qualification Criteria shall qualify for opening of the Financial Bid.

(c) Employer shall notify in writing those Bidders who have failed to meet the Qualification Criteria or whose Bids were considered non-responsive to the requirements in the Bid document, advising them that their Technical Bid failed to meet the requirements and that their Financial Bid shall not be opened and return their Bid Security.

(d) Simultaneously Employer shall notify in writing those Bidders whose Technical Bids have been evaluated as substantially responsive and meeting the Qualification Criteria that their Bid has been evaluated as substantially responsive to the Bid document and that their Financial Bid will be opened on the date and time to be specified.

9. Opening and Evaluation of Financial Bids: The 'Financial Bid' will be opened on the specified date and time, in presence of the Bidders' representatives, who choose to be present.

(a) The Employer shall examine and confirm that the Letter of Financial Bid and Priced Bill of Quantities are in accordance with the requirements specified in the Bid document. If any of these documents or information is missing, the offer shall be rejected.

(b) During the evaluation of Financial Bid, the substantial responsiveness of the Bids will be further determined with respect to those Bid conditions that were not examined in evaluation of Technical Bids.

(c) During the Evaluation of Price Bids, the Employer shall correct arithmetical errors on the following basis:

(i) where there are errors between the total of the amounts given under the column for the price breakdown and the amount given under the Total Price, the former shall prevail and the latter will be corrected accordingly;

(ii) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and

(iii) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (i) and (ii) above.

(d) Bidders shall be requested to accept correction of arithmetical errors. Failure to accept the correction, shall result in the rejection of the Bid.

10. Confidentiality

Information relating to the evaluation of Bids and recommendation of Contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on Contract award is communicated to all Bidders.

Any attempt by a Bidder to influence the Employer in the evaluation of the Bids or Contract award decisions may result in the rejection of its bid.

From the time of Bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it shall do so in writing.

11. Award of contract

The Employer will award the contract to the Bidder, whose Bid has been determined to be substantially responsive and who has offered the lowest evaluated Bid price and who meets the specified qualification criteria.

11.1 Notwithstanding the above, the Employer reserves the right to accept or reject any Bids and to cancel the bidding process and reject all Bids at any time prior to the award of contract.

11.2 The Bidder whose Bid is accepted will be notified of the award of contract by the Employer prior to expiration of the Bid validity period.

12. Performance Security

Within 14 days of receiving letter of acceptance, the successful Bidder shall deliver to the Project Director, JICA Assisted Guwahati Water Supply Project, Guwahati (Employer), the performance

security (either a Bank guarantee or a Bank draft in favour of the Employer) for an amount equivalent of 10 % of the contract price.

The Performance Security shall be valid till the expiry of the period of the Contract, specified in Clause 12. Failure of the successful Bidder to furnish performance security and to sign the agreement within the period stipulated shall constitute sufficient grounds for annulment of award and debarring the Bidder from participation in bidding for works by the Employer for a period of one year, in which case the Employer may make the award to the next lowest evaluated bidder or seek Bids afresh.

12. Period of Testing, Trial Run & Commissioning

After execution of the works in all respect, the Contractor shall do testing, trial run of the entire Distribution system network in the DMA for a period of 90 days. If required by the Employer, the period may be extended at the rates quoted in the contract, as a variation.

During the above period of testing & trial run, the contractor will be responsible for rectifying any defects in the works done by him; and for the rectification if any required in the lines laid earlier by the previous contractor, the required material, labour and equipment will be provided from the Day works or Provisional Sums in the Contract. .

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IFB No. GWSP/LB/5C-5R9/2018-19/Date: 19.08.2019

Contract Package No. C#5C

Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone

SECTION II: BIDDING FORMS- TECHNICAL

Letter of Technical Bid

Bidder must prepare the Letter of Technical Bid with its letterhead showing the Bidder's name & address.

Date: *[insert date of Bid submission]*

Loan Agreement No.: *ID-P-201*

IFB No.: GWSP/LB/5C-5R9/2018-19/Date: 19.08.2019

To

Project Director,
Project Implementation Unit,
Saikia Commercial Complex, 2nd Floor, Christian Basti,
GS Road, Guwahati-781 005

Sir,

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including addenda issued.

[Insert the number and issuing date of each addendum];

(b) We, meet the eligibility requirements of the Tender and We, have no conflict of interest.

(c) We are not participating in more than one Bid in this bidding process, and we have not been temporarily suspended or debarred by the World Bank or blacklisted or suspended the Central or any State Government;

(d) We have no conflict of interest in accordance with ITB 3;

(e) We have experience and financial capabilities and hence, we are capable and offer to execute in conformity with the Bidding Documents the following Works:

Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone.

(f) Our Bid shall be valid for a period of **forty-five (45) days** from the date fixed for the Bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(g) If our Bid is accepted, we commit to obtain a Performance Security in accordance with the Bidding Documents;

(h) We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;

(i) We understand that you are not bound to accept the lowest evaluated Bid or any other bid that you may receive; and

(j) We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in any type of fraud, corrupt, collusive, coercive, or obstructive practices; and will be strictly observe the laws against fraud and corruption in force in India, namely, "Prevention of Corruption Act 1988"

Name of the Bidder**:** *[insert complete name of person signing the Bid]*

Name of the person duly authorized to sign the Bid on behalf of the Bidder***** *[insert complete name of person duly authorized to sign the Bid]*

Title of the person signing the Bid *[insert complete title of the person signing the Bid]*

Signature of the person named above *[insert signature of person whose name and capacity are shown above]*

Date signed *[insert date of signing]* day of *[insert month], [insert year]*

*: Person signing the Bid shall have the power of attorney given by the Bidder to be attached with Bid.

QUALIFICATION INFORMATION

1) IFB No.: GWSP/LB/5C-5R9/2018-19/Date: 19.08.2019

2) Name & Address of the Bidder:

Bidder's legal name:
Bidder's actual or intended year of incorporation:
Bidder's legal address: *[insert street/ number/ town or city]*
Bidder's authorized representative information Name Address: Telephone/Fax numbers: E-mail address:
Attach copies of original documents of: ☐ Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above.

1 For Individual Bidders

1.1 Principal place of business: _____

Power of attorney of signatory of Bid. ***[Attach copy]***

1.2 Registered Civil Contractor with Assam PHED/ Assam PWD/ AUWSSB/ GMC/GMDA: _____ ***[Attach copy]***

1.3. Average Annual Turnover during the past 3 years [Bid requirement: Should have Minimum average Annual turnover of Rs. 55 lakhs, calculated as total certified payments received for contracts in progress or completed during the past 3 years, ie., from 1st April 2016.

Total value of Civil Engineering Construction work performed in the last Three years (in Rs. Lakhs).To support your claim also submit the Audited Balance Sheets and Auditor/Charted Accountant's certificate.

Financial Year	Annual Turnover- Rs. in crore
	Single Entity
2016-17	
2017-18	
2018-19	
Average Annual Turnover	

1.4. Work performed as a prime contractor or sub-contractor, between 1st April 2016 and Bid submission deadline:

Project Name	Name of Employer	Description of work	Prime contractor **or** Sub-contractor	Contract No. & Date and Value of contract (Rs. Lakhs)	Stipulated period of completion	Actual date of completion*	Reasons for delay and work completed

* *Enclose a certificate from the Engineer concerned for completion. If the Bidder is a Subcontractor, the Bidder shall submit the appropriate/required proof, such as the Work order, Contract and Proof of payment given by the main contractor*.

1.5. Existing Commitments*:*

Description of Work	Contract No. & Date and Value of Contract (Rs. Lakhs)	Name of Employer	Stipulated period of completion	Value of works remaining to be completed (Rs. Lakhs)	Anticipated date of completion

1.6. Should have satisfactorily executed as a prime contractor or sub-contractor, at least **one similar work** of value not less than Rs. 30 lakhs between 1st April 2016 and Bid submission deadline;

Project Name	Name of Employer	Description of work	Prime contractor **or** Sub-contractor	Contract No. & Date	and Value of contract (Rs. Lakhs)	Stipulated period of completion	Actual date of completion*

**Enclose a certificate from the Engineer concerned for completion. If the Bidder is a Subcontractor, the Bidder shall submit the appropriate/required proof, such as the Work order, Contract and Proof of payment given by the main contractor*.

1.7. Work Experience:

A Civil contractor working for Assam Public Health Engineering Department [PHED], Assam Water Supply and Sewerage Board [AUWSSB], Guwahati Municipal Corporation [GMC], Guwahati Metropolitan Development Authority [GMDA], Assam Public Works Department and having experience between 1st April 2016 and Bid submission deadline, in Laying & jointing of DI pipelines of at least **2 km,** for which the Bidder shall submit the credentials from the Employer, **or**

A Subcontractor, if he had worked under any Main Contractor for the ongoing JICA/JnNURM/ADB funded Water Supply Projects for Guwahati and having Experience in Laying & jointing of DI pipelines of at least **2 km** between 1st April 2016 and Bid submission deadline**,** for which the Bidder shall submit the appropriate/required proof, such as the Work order, Contract and Proof of payment given by the main contractor.

Project Name	Name of Employer	Description of work- Diameter & Length of DI Pipes	Prime contractor **or** Sub-contractor	Contract No. & Date	Value of contract (Rs. Lakhs)	Stipulated period of completion	Actual date of completion*

* *Enclose a certificate from the Engineer concerned for completion. If the Bidder is a Subcontractor, the Bidder shall submit the appropriate/required proof, such as the Work order, Contract and Proof of payment given by the main contractor.*

1.8. Minimum cash-flow: Demonstrate that you have access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, other than any contractual advance payments to meet: Rs……..Lakhs. *[Minimum cash-flow requirement: INR 20 lakhs].*

To support your claim also submit the Banker's letter and other documents certified by the Company Auditor/ Charted Accountant.

Evidence of access to financial resources to meet the requirements of working capital: cash in hand, lines of credit, etc. List them below and attach copies of support documents.

Name, address, and telephone, telex, and fax numbers of the Bidders' bankers who may provide references if contacted by the Employer.

1.9. Information on litigation history in which the Bidder is involved.

Name of the work	Agreement number/date	Name & address of Employer	Contract Value in Rs	Cause of dispute	Amount Disputed	Remarks showing present status

Signature of the Bidder

IFB No. GWSP/LB/5C-5R9/2018-19/Date: 19.08.2019

Contract Package No. C#5C

Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone

SECTION III: BIDDING FORMS - FINANCIAL

Letter of Financial Bid

The Bidder must prepare the Letter of Financial Bid on its letterhead clearly showing the Bidder's complete name and address.

Date: *[insert date of Bid submission]*

Loan Agreement No.: *ID-P-201*

IFB No.: GWSP/LB/5C-5R9/2018-19/Date19.08.2019

To

Project Director,
Project Implementation Unit,
Saikia Commercial Complex, 2nd Floor, Christian Basti,
GS Road, Guwahati-781 005

Name of work: Contract Package No. C#5C- Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone.

Sir,

We, the undersigned, hereby submit the Financial Bid including the Priced Bill of Quantities. In submitting our Financial Part we make the following additional declarations:

1) **Validity**: Our Bid shall be valid for the period of **45 days** from the deadline fixed for the Quotation submission;

2) We have examined the Instructions to Bidders, Scope of Works, Specifications, Drawings, Schedules, Conditions of Contract, Contract forms, Site Conditions and the attached Appendices and Addenda Nos. _____ for the above-named Contract.

3) We have understood and checked these documents and have ascertained that they contain no errors or other defects except as identified in our Tender. We accordingly offer to execute and complete the Works and to do testing, trial run and commission the facility for the period and in conformity with the terms and conditions contained in the Contract is for the total amount of:

Rs. _____ [in figures]

Rs. _____ [in words];

Yours faithfully,

Authorized Signature

Name & Title of Signatory _____

In the capacity of *[insert legal capacity of person signing the Letter of Quotation]*

Name of Bidder _____

Address _____

Dated on _____ day of _____, _____ *[insert date of signing]*

PREAMBLE TO PRICE SCHEDULE

Bill of Quantities for Procurement of Works (Item rate) for Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone under the Contract Package No. C#5C

1. This Contract is for Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network, installation of valves & construction of chambers, hydro testing the laid pipeline, road restoration, wherever necessary, etc., The DI Pipes and available Valves & DI fittings will be provided by the Employer and the balance requirement of Valves & DI fittings are to be procured and supplied by the Contractor.
2. The Bill of quantities shall be read in conjunction with the Scope of Works, Technical Specifications, Conditions of contract and Drawings.
3. The Bidder is advised to examine all instructions, terms, specifications and other information in the Bid documents and consider and evaluate fully the price implications therein contained before filling the contract amount.
4. The Bidder should acquaint himself with the site conditions including the access to Work site.
5. There are, however, several minor items not specifically mentioned in the break-up (BOQ items), but shall be required to complete the job as per scope and specification of works stipulated in the tender document. The cost of such items shall deem to be distributed among the rates and prices entered for the related items.
6. The quoted rates in the Bill of Quantities shall, except insofar as it is otherwise provided under the Contract, include all Construction, labour, supervision, materials, erection, maintenance, insurance, profit, taxes and duties together with all general risks, liabilities and obligations set out or implied in the contract.
7. It shall be deemed that Bidder has included likely expenditure in his quoted price i.e., provision for field investigations, site clearance and final removal of all temporary works of whatsoever nature required for construction including, dewatering and availability of material of required quality etc., for the proper execution of works. The rates shall also be deemed to include any works and setting out that may be required to be carried out for all the works involved.
8. However, while hydro stating and trial run of the already laid pipelines, if any defects are noticed, cost of its rectification will be paid from either Day works or Provisional sum.
9. A rate shall be entered against each item in the Bill of Quantities, whether quantities are stated or not. The cost of items against which the contractor has failed to enter a rate shall be deemed to be covered under other rates and prices entered in the Bill of Quantities.
10. The quantities given in the Bill of Quantities are estimated and provisional and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Engineer (accepted by contractor) and valued at the rates and prices quoted in the priced bill of quantities.
11. All costs associated with testing, commissioning, inspection (except the Pre-delivery Inspection at the manufacturers' works by a Third Party) shall be deemed to be included in the items for the works, supply and installation. However, the available DI Pipes & fittings and valves will be supplied by the Employer and the Bidders' scope is limited to installation only. The balance quantity of materials to be supplied by the Bidder are included in this Bill of Quantities.

12. The rates entered by the Bidder under the “Rate” and “Amount” columns in the Price Schedule, shall be the Bidder’s estimated rates for the item, inclusive of taxes and duties. The amount quoted by the Bidder including the taxes and duties will be considered for evaluation.
13. Incomplete Bids shall be summarily rejected.

JICA ASSISTED GUWAHATI WATER SUPPLY PROJECT

Loan Agreement No. ID P-201

IFB No. GWSP/LB/5C-5R9/2018-19/Date: 19.08.2019

Contract Package No. C#5C

Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone

Bid Document for Contract Package No. C#5C

Bill of Quantities

Limited Bidding

Package No. C#5C

Supply, Installation and Commissioning of Employer furnished D.I Pipes for the Balance works under the Distribution Network in the DMA: 5R9 of Ramsa Hill of South Central Zone.

Bill of Quantities

Item No.	Description	Units	Quantity	Rate (Rs)		Amount		
				Basic	Taxes	Basic	Taxes	Total
			(1)	(2)	(3)	(4) = (1) x (2)	(5) = (1) x (3)	(6) = (4) + (5)
1	**EARTHWORK**							
1.1	Earth work for excavation of foundations, pipe trenches, valve chambers, thrust blocks, etc. in all kinds of **ordinary rock,** Excavation shall include the removal of asphalt and concrete road surfacing, including dressing, compaction of the bottoms, shoring and strutting wherever required, dewatering whenever required, removal of the excavated rock, stockpiling and disposal of surplus excavated rock off-site as directed by the Employer's Representative.							
(a)	0 to 1.5 m from GL	Cum	1227.40					
(b)	Providing and backfilling excavated pipeline trench with **crusher dust** including watering, ramming, consolidating using portable vibratory compactor and dressing complete as per drawing, specifications around pipe and as well as above pipe and as per the instructions of the Employer's representative .	Cum	471.81					
Subtotal Item No. 1								
2	**PIPELINES, SPECIALS AND APPURTENANCES**							
2.1	**Supplying DI Specials and fittings** with plain, double socket, socket & flanged and double flanged end connections as required, with lining and coating as per the specification, and IS 9523 with EPDM rubber gaskets as per IS 5382 as required for successful completion of the work. This item includes third party inspection, transportation, freight, loading and unloading, stacking etc. all complete for various sizes of DI specials and fittings as noted with the following end connections.							
(a)	Tee's, Socket, collar, tail pieces, flanged tapers, socketed tapers, flanged spigot short pipes, flanged socket short piece, all bends, end caps, barrel piece, dismantling joints etc. required for suitable completion of the works.	MT	1.00					
(b)	Double flanged pipe pieces, required for suitable completion of works.	MT	0.60					

Item No.	Description	Units	Quantity	Rate (Rs)		Amount		
				Basic	Taxes	Basic	Taxes	Total
			(1)	(2)	(3)	(4) = (1) x (2)	(5) = (1) x (3)	(6) = (4) + (5)
2.2	Handling, aligning, laying and jointing of Employer furnished K-9 DI pipe to other pipe and to Contractor furnished fittings and specials, with EPDM rubber O-rings (as per IS 5382) and flange gaskets (as per IS 12288) and the specifications. This item includes transportation of pipes, specials and fittings from the store yard to the project site, stacking of pipe and fittings as per BIS requirements, loading, unloading, hoisting, lowering, marginal cutting and grinding wherever necessary, assembling, jointing, providing temporary supports etc., all complete with approved equipment, for pipe of the following diameters.							
(a)	100 mm ID DI - K9 pipe	m	659.00					
(b)	150 mm ID DI - K9 pipe	m	81.00					
(c)	200 mm ID DI - K9 pipe	m	38.00					
(d)	250 mm ID DI - K9 pipe	m	22.00					
Subtotal Item No. 2			**800.00**					
3	**VALVES AND APPURTENANCES**							
3.1	Handling, aligning and installing in true to line and level cast iron PN 1.6 rated double flanged Sluice Valves (IS 14864) of the following diameters. This item includes transportation of valves and accessories from the store yard to the project site, loading, unloading, hoisting, lowering, assembling and jointing including the cost of all jointing materials such as rubber gaskets, nuts, bolts, etc., and providing temporary supports, as per the specifications and drawings.							
(a)	100 mm dia	Nos.	18					
Subtotal Item No. 3								
4	**VALVE CHAMBERS**							
4.1	Construction of RCC and Brick masonry chambers for valves* hydrants, flow meters etc. including cost of PCC and RCC work, cost of supply and bending and binding of steel with required shuttering, cost of brick work with plaster from inside and outside, precast slabs and supply and installation of SFRC frame and coves wherever required, including all the miscellaneous items of work, but excluding the supply and installation of pipes and specials, valves etc. The item shall be as per specification, drawing and as directed.							

Item No.	Description	Units	Quantity	Rate (Rs)		Amount		
				Basic	Taxes	Basic	Taxes	Total
			(1)	(2)	(3)	(4) = (1) x (2)	(5) = (1) x (3)	(6) = (4) + (5)
(a)	Chamber for Sluice valve TYPE S1	Nos.	9					
(b)	Chamber for Wash out valve TYPE W1	Nos.	7					
(c)	Chamber for Wash out valve TYPE W2	Nos.	2					
Subtotal Item No. 4								
5	**ROAD RESTORATION**							
5.1	**Reconstruction of WBM Roads**							
(a)	Providing and laying of **Granular sub base (GSB),** as per specification drawing and as directed	Cum	136.38					
(b)	Providing , laying .spreading and compacting stone aggregates of specific sizes as per specification and drawing to **water bound macadam** including spreading in uniform thickness, hand packing, rolling with vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of stone screenings & binding material, and completer as per specification drawing and as directed by Employer's Representative.	Cum	242.53					
5.2	**Reconstruction of Bituminous Asphalt Roads**							
a)	Prime coat-Providing and applying primer coat with bitumen emilsion on prepared surface of granular base including clearing of road surface and spraying primer at the rate of 0.6kb/sqm using mechanical means including cost of testing of materials at site and laboratory as directed by the department.	Sqmt.	1,242.00					
b)	Providing and laying of **Bituminous macadam (BM),** as per specification drawing and as directed	Cum	62.10					
c)	Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor at the rate of 0.2kg/sqm on the prepared bituminous/granular surface cleaned with mechanical broom including cost of testing of materials at site and laboratory as directed by the department.	Sqmt.	1,242.00					

Item No.	Description	Units	Quantity	Rate (Rs)		Amount		
				Basic	Taxes	Basic	Taxes	Total
			(1)	(2)	(3)	(4) = (1) x (2)	(5) = (1) x (3)	(6) = (4) + (5)
d)	Premix chip carpet-Providing , laying and rolling of close graded premix chip surfacing of 20mm thickness composed of 11.2mm to 0.09mm(Type A)or 13.2mm to 0.09mm(TypeB) aggregates either using penetration grade bitumen to required line, grade and level to serve as wearing coarse on previously prepared base including mixing in a suitable plant laying , rolling with smooth wheeled roller 8 -10 Tonne capacity to the required level and grade including carriage of materials up to 10km initial lead from the mixing plant and including cost of testing of materials at site and laboratory as directed by the department.	Sqmt.	1,242.00					
5.3	Removal/dismantling of existing Interlocking Paver Block pavement using manual/ mechanical means and stacking properly on the road side, without, affecting the traffic and Relaying including all required material after work completion during road restoration and Providing the wastage and loss quantity from the PWD approved vendors, all complete, as per specification and drawings.	Sqmt.	722.40					
5.4	**Reinforced Cement Concrete Work**							
a)	Reinforced Cement Concrete Work for thrust / anchor blocks - Providing and placing reinforced cement concrete (RCC) of one of the following grades with 10-20 mm stone aggregate (crusher broken) including shuttering and staging, curing etc. as per the specifications and drawings and as directed by the Employer's Representative.							
	Grade M20 concrete	Cum	5.76					
	Subtotal Item No. 5							
6	**TESTING, TRIAL RUNS AND COMMISSIONING**							
6.1	Hydraulic testing of the distribution system piping of the following diameters in segments at the required test pressures. This item includes the costs of water, labour, pumping, etc. all complete, as per the specifications and as directed by the Employer's Representative.							
(a)	80 mm - 200mm internal diameter	km	2.85					
6.2	Disinfectioning pipeline including flushing complete as per specification.							
(a)	80 mm - 200mm internal diameter	km	10.69					
(b)	Above 200 mm - 300 mm internal diameter	km	0.40					

Item No.	Description	Units	Quantity	Rate (Rs)		Amount		
				Basic	Taxes	Basic	Taxes	Total
			(1)	(2)	(3)	(4) = (1) x (2)	(5) = (1) x (3)	(6) = (4) + (5)
6.3	Trial Runs and Commissioning including the cost of labour, electricity, etc., all complete as per specification and as directed by the Employer's Representative.	km	11.08					
Subtotal Item No. 6		km						
	TOTAL (1-6)							
7	Daywork - Labour							
7.01	Skilled Labour	Man days	175.00					
7.02	Unskilled Labour	Man days	130.00					
7.03	Carpenter	Man days	10.00					
7.04	Mason	Man days	110.00					
7.05	Pipelayer / Fitter	Man days	70.00					
7.06	Welder	Man days	60.00					
Subtotal Item No. 7								
8	Daywork - Material							
8.01	Cement - ordinary Portland type (43 Grade) in 50 kg bags	bags	73.00					
8.02	Provide Fe 415 steel reinforcing bars up to 20 mm diameter as per the specification	kg	900.00					
8.03	Fine aggregate for concrete as per the specification	Cum	12.00					
8.04	Coarse aggregate for concrete as per the specification	Cum	20.00					
8.05	First class bricks as per the specification	Nos.	1,200.00					
8.06	Welding rods	packs	10.00					
Subtotal Item No. 8								
9	Day work - Equipment							
9.01	Dump Truck (min capacity 4 m^3)	days	16.00					
9.02	Water tank truck (min capacity 11,000 liters)	days	16.00					
9.03	Mobile crane (up to 10 ton capacity)	days	14.00					
9.04	Wheeled bucket excavator (min capacity 0.45 m^3)	days	63.00					
9.05	Wheeled front-end loader (min capacity 0.75 m^3)	days	5.00					
9.06	Compressor (at least 3.2 m^3/minute capacity)	days	15.00					
9.07	Generator (at least 15 kw capacity)	days	15.00					

Item No.	Description	Units	Quantity	Rate (Rs)		Amount		
				Basic	Taxes	Basic	Taxes	Total
			(1)	(2)	(3)	(4) = (1) x (2)	(5) = (1) x (3)	(6) = (4) + (5)
9.08	Dewatering Pump (at least 60 m^3/hour capacity and 100 mm diameter discharge) with piping and valving	days	10.00					
9.09	Concrete Mixer (at least 0.25 m^3 capacity)	days	16.00					
9.10	Portable vibratory plate or ramming compactor	days	8.00					
Subtotal Item No. 9								
10	Provisional Sum - For each Provisional Sum, the Engineer may instruct: Supply of DI Pipes, Fittings, Specials, Valves required for the pipe network laid by the previous contractor for rectification during the hydro testing and trial run, Third Party Inspection fee, etc.	LS				2,95,000.00		2,95,000.00
Subtotal Item No. 10								
	Sub total (7-10)							
	TOTAL							

Amount in words..... **Seal & Signature**

Section IV: Employer Requirements
Project Brief and Scope of Works

Project Background

The Guwahati Metropolitan Area has been divided into four distribution zones for water supply, namely (1) South East, (2) South Central, (3) South West, all located south of the Brahmaputra River and (4) North Guwahati on the northern bank of the Brahmaputra River.

At present, there are three agencies which provide water supply in the City of Guwahati, namely the Guwahati Municipal Corporation, Public Health and Engineering Department (PHED), and Assam Urban Water Supply & Sewerage Board (AUWSSB). Of the three agencies the GMC covers about 30% of the population in this city. Most of the water treatment and supply facilities have outlived their lives as a result of a budget deficiency for repair or replacement.

The Master Plan for the Guwahati Metropolitan Area 2025 sets the target of "100% houses will be supplied with piped filtered water by the year 2025". The on-going water supply project for the South West Zone is being taken up under Jawaharlal Nehru National Urban Renewal Mission (JNNURM) funding. The water supply for South East Zone is being planned under the Asian Development Bank's (ADB's) assistance.

The water supply zones under the Japanese International Cooperation Agency (JICA) funding for this Contract (ID-P 201) are the South Central and North Zones. The South Central Zone is the center of the city with the highest population among the four zones. This project will receive a loan assistance of 29,453 million Japanese Yen. The loan will fund civil works for constructing water supply facilities, procurement of machinery and equipment, and consulting services.

This Guwahati Water Supply Project (GWSP) aims to construct water treatment, conveyance and storage facilities in the South Central and Northern parts of the city to activate a potable water supply system with 100% coverage of the citizens within the above areas and thus leading to upgrading the citizen's living standard.

Project Objectives

This project intends to improve living conditions in the rapidly growing Guwahati area, by providing new water supply facilities.

The main objective of Japanese loan assistance is to support India in establishing physical infrastructure to boost and sustain economic growth. At the same time, Japanese assistance seeks to support India's efforts to alleviate poverty. In keeping with these goals, the loan package strategically covers this water supply project.

Project Description

The Guwahati Water Supply Project, (ICA Loan No.ID-P 201) has been structured to progressively develop the water supply facilities in a phased manner in order to meet the ever increasing water demands of the South Central and North Zones. The GWSP has been planned to be implemented in two (2) phases. Phase 1 will be designed to accommodate the projected year 2025 water demands and Phase 2 the projected year 2040 water demands. The transmission and distribution piping works under Phase I will be implemented to accommodate the demand of Phase 2.

Works under Contract Package C-1 and C-03 include: Intake, Water Treatment Plant and Clear Water Reservoir cum Pumping Station for North zone and South Central zone respectively.

Works under the Contract Package (C-04) for the South Central Zone facilities include: the construction of a main and seven service reservoirs, service buildings with booster chlorination

facilities at all of the reservoir sites, the construction of booster pump stations, the supply and installation of MS and DI transmission mains etc.

Distribution networks installation works are included under Contract Packages: 2, 5, 6 & 7

The DI pipes to be installed under these Contracts (C- 02, 05, 06, 07) will be supplied by the PIU.

Location of the present work and Distribution Zone under the Scope

District Monitoring Area (DMA): 5R9 is included in the Partial commissioning programme, wherein many gaps have been left out in the distribution system by the previous Contractor, including fixing of valves, construction of chambers and hydro testing, trial run and commissioning. Now, it is being intended to complete the remaining works in DMA 5R9 in view of partial commissioning as planned.

Accordingly, left out works under DMA: 5R9 have been grouped in to one Contract Package named as 5C-5R9 under Ramsahill of South Central Zone for execution.

Distribution system of DMA: 5R9 under the command of Ramsahill main reservoir of the Guwahati Water Supply Project is on the southern side of the Brahmaputra River in South-Central Guwahati and covers areas like Cotton College Road, Motilal Nehru Road, Saraswati Road, SS Road, H B Road, Fancy Market, Col. J Ali Road, Danish Road & Jaswanta road.

Scope of Works

This is a single–point responsibility Item rate type Contract for the supply of remaining DI specials & fittings including Air valves and laying and jointing, testing, commissioning of a water supply distribution system including installation of valves, construction of chambers, restoration of damaged roads to its original condition and hydraulic testing, defects rectification, flushing, disinfection of the distribution network in the DMA 5R9 of Contract Package:5C of Ramsahill of South –Central Zone. Supply of DI K9 pipes and gaskets and the available fittings, specials, valves shall be supplied by the employer. All other procurements including the balance requirement of fittings, specials, valves are included under this Contact, Package 5C.

Works under DMA 5R6:

This DMA includes the Distribution network of 11.08 km length of DI Pipes. Out of this, pipes have been laid by the previous Contractor for 10.28 km length, leaving gaps, which require laying of DI Pipes for 0.800 km length, installation of valves & construction of chambers, hydro testing of the laid pipeline [including left out length to be laid by the previous contractor], road restoration, wherever necessary, etc.,

Pipes to be laid for the Gap works:

Details of the diameter wise length of the pipes proposed in the network are as given below.

Sl. No	Material & Diameter (ID)	Unit	Length in m
1	100 mm ID Dl - K9 pipe	m	659.00
2	150 mm ID Dl - K9 pipe	m	81.00
3	200 mm ID Dl - K9 pipe	m	38.00
4	250 mm ID Dl - K9 pipe	m	22.00
	Total	m	800.00

Installation of Valves:

Sluice valves:

Sl. No	Diameter (ID) & Rating	Unit	Qty
1	100 mm - PN1.6	No’s	18

Valve Chambers

According to the standard drawings for various types of valves, the type of chambers to be constructed shall be as specified below.

Sl. No	Type of Chambers	Unit	Qty
1	Chamber for Sluice valve TYPE S1	Nos.	9
2	Chamber for Wash out valve TYPE W1	Nos.	7
3	Chamber for Wash out valve TYPE W2	Nos.	2

Hydro Testing

Hydraulic testing of the pipeline shall be carried out in sections as specified in Technical specifications

Sl. No	Descriptions	Unit	Length in KMs
1	80 mm - 200mm internal diameter	km	2.85

Disinfecting pipeline including flushing and Trail run in Distribution pipe line complete

Sl. No	Descriptions	Unit	Length in KMs
1	80 mm - 200mm internal diameter	km	10.69
2	Above 200 mm - 300 mm internal diameter	km	0.40
	Total		11.08

Road Restoration

Restoration of surface with Asphalt road is to be done for 800m.

It is the intent of the Employer to have a project constructed which utilizes the highest standards for construction and supply of plant and equipment to enable a sustained, reliable system for performance over the next 50 years.

The Employer has performed a water supply network design and detailed designs of the system components. The basic alignments of the proposed pipelines have been shown on the drawings, to be supplied to the Contractor. The technical specifications for such have been presented in the subsequent subsections.

The parameters and specifications delineated in these Contract Documents shall form the framework of the Contractor's execution of the work. The Contractor shall be responsible for ensuring that the Project fulfills the objectives for which it has been designed.

Scope of Work shall be read in conjunction to General Requirements and other Subsections of the document.

General Scope of Work

The Scope of Work under this Contract includes the supply and construction of all facilities for the water supply system in the District Metering Area (DMA): 5R9 of Ramsahill of South Central Zone as described in subsequent paragraphs. Except for the supply of DI pipes and the available fittings, valves and specials, which will be furnished by the Employer, this Contract will consist of the works listed herein and any other work necessary to achieve the above objective and complete the system as per the specifications and Employer's Requirements.

Generally the following activities shall be carried out by the Contractor for each component of this Contract.

Pre-construction Submittals:

The contractor is required to submit and obtain the approval of the Engineer for Quality Assurance Plan before procuring any materials under the Contract

Submittals of samples for Materials:

Samples of materials requiring prior approval such as cement, aggregates, Asphalt, cement and back fill materials shall be furnished by the Contractor to the Employer's representative with description of data in required quantity. Samples shall be submitted at least 14 days before their usage in the work to permit inspection and testing. Only upon approval by the Employer's representative, shall be the materials be brought to the Project Site.

Project Implementation

(a) Development of suitable storage spaces, for construction materials, piping, specials, appurtenances and equipment for the work.

(b) Identification of suitable quarries and other sources for construction materials and have them approved by the Employer's Representative.

(c) Making arrangements for equipment and materials required for maintaining the safety of the sites and the workmen at the sites (helmets, boots, jackets, safety belts, gloves, scaffolding, barricading, etc.),as described elsewhere in the document.

(d) Submittal of an initial work program and schedule and updating the same every month for approval by the Employer's Representative.

(e) Development and submittal of a Traffic Control Plan prior to the start of pipeline installation along any rote. This plan shall identify detour routes for roads that will be closed where there is not a second traffic lane and the means of access of residences where the access to them has been blocked by construction activities.

(f) Site clearance and leveling of the work sites. Layout of the works shall be as per the drawings.

(g) Disposal of surplus soil and construction waste as directed by Employer's Representative, and maintaining the construction sites in orderly manner.

(h) Performing tests on materials received and for the finished works and maintaining complete records and registers required on site as per the QA/QC Manual.

(i) Participating in weekly progress meetings with the Employer and Employer's Representative to review the schedule and other pertinent issues.

(j) Remedying any defects identified during the Contract period.

(k) Site clearance and restoration of the premises after completion of the work.

Water Distribution System

The scope of work is broadly listed below and shall include, but not be limited to:

(a) Supply of DI fittings, specials and Air valves.

(b) Site clearing.

(c) Earthwork (including road cutting).

(d) Laying, jointing, of DI(K9) pipes, fittings, specials.

(e) Installation of Sluice valves and washout valves.

(f) Installation of pipes across drains,

(g) Construction of Valve chambers.

(h) Backfilling and compaction of trenches.

(i) Hydro test and rectification of leakage.

(j) Construction of PCC thrust blocks, anchor blocks, pipe encasing, etc.

(k) Hydraulic testing of the pipelines to the specified test pressures.

(l) Rectification of leakages if any during hydraulic testing.

(m) Restoration of roads to its original condition.

(n) Trial run and rectification defects in distribution network.

(o) Flushing and disinfection of Distribution system.

(p) Commissioning and Handing over of Distribution system.

Safety Assurance

The Contractor will take all measures required to maintain the highest industry recognized safety standards on the project site. The measures taken shall include all but not be limited to the relevant provisions of the Indian Standards (IS).

The Contractor shall be responsible for the safety of all workmen and other persons entering or in the work areas and shall take all measures necessary to ensure their safety at his own expense. Such measures shall include the provisions of helmets (hardhats), the provision of gum-boots to workers engaged in cement concrete, and eye protection (goggles). Scaffolding or other measures required for working at a height shall be load rated and rigid and be provided with suitable and convenient access. Shoring required for deep excavation must be adequate and rigidly braced and strutted. Other safety measures that the Employer's Representative may direct, depending on the exigencies of the location and nature of work and other relevant factors, shall be provided by the Contractor. The Contractor is responsible for all security, watch and ward arrangements at site till handing over of the system.

Hydro testing of Distribution System:

The Contractor is responsible for conducting hydro testing of distribution pipeline including pipelines laid by the earlier Contractor at required sections as per the instructions of the Engineer. The Contractor's scope includes mobilization and fixing of dummy, pressure gauges, filling water and rising pressure in the pipeline to the required test pressure and carryout the hydraulic test as per standard specifications and directions of the Engineer. Contractor quoted rate should include cost of providing and fixing dummies, filling water, arrangement of necessary equipment for rising pressure in the pipeline and measurement of pressure including labourers. Any failure of hydraulic test in any particular section due to leakage in the laid distribution pipeline by the earlier Contractor, cost of rectification of such leakages shall be paid under Provisional Sum and Day works for the materials and Labour & equipment respectively.

Trail Run and Defects Rectification

The Contractor is responsible for Trial Run and rectification of defects in the distribution system upon successful completion of the hydro test and Gap closing in the distribution network. For Trial Run and Commissioning, water shall be provided at the entry point of DMA by the Employer. During Trial run, distribution system will be flushed and cleaned to remove all the debris and mud from the distribution system. Upon cleaning and closing the end caps of dead end of the pipelines, the contractor would fill up the distribution system by opening the outlet valve and checkup the system for any cross connections left to be done, operate the online valves to ascertain proper opening and closing, remove the observed leakages in the system and ascertain that the water reaches all the pipelines and

pipeline dead ends at full system pressure. System shall be allowed to stabilize for a minimum period of 15 days keenly observed for visible leakages in the distribution system; any defects found during this process shall be rectified by the Contractor. Any rectification is required in the pipelines laid earlier by the previous Contractor, the required materials like DI pipes, specials & fittings etc., and unforeseen items cost will be met from provisional sum and labour and equipment cost will be paid from the Day works. Upon satisfactory completion of stabilization period, distribution line to be disinfected and disinfected water to be disposed safely with all care. House service connections should be given only after successful completion of stabilization period and disinfection of distribution system. The trial run and commissioning period shall be for period of 90 days. In the event that any system or facilities do not satisfactorily achieve the required performance standards during this period, with a continuous run, the trial run period shall be extended until such time as the Contractor has satisfactorily rectified any deficiencies as may be necessary to satisfy the performance requirements, at the risk and cost to the Contractor.

During trial run period, Contractor shall co-operate and facilitate with the House service connection contractor in providing house service connections. If any delay on the part of the house service connection activities, in such case, trial run period shall be extended beyond 90 days, allowing payment at the rate quoted by the Contractor for trial run, as a variation to the Contract. The contractor can give the trial run in sections / bits by isolating the network area wise based on the topography and system isolation facilities.

The costs associated for the Contractor's and other operating non-Employer personnel during the period of the trial run, along with costs of tools etc., which are required for operation and maintenance of the distribution system during the trial run period shall also be borne by the Contractor and shall be included in the Contract Price.

Commissioning and Handing Over of System

After the successful completion of the trial run, the network shall be treated as commissioned and a Certificate in that respect will be issued by the Engineer to the Contractor. Upon Commissioning the Employer will take over control of the facilities.

When the water supply facilities are commissioned, the Employer may begin supplying treated water to the public.

Completion Certificate:

Completion certificate for the DMA will be issued by the Employer to the Contractor upon taking over the works completed in all respect, subject to the Compliance of the requirements mentioned below:

(a) Rectification of the deficiencies pointed out in the "Punch List" have been carried out satisfactorily

(b) All the test records including works tests and field tests are submitted as per the requirements specified elsewhere.

Section V: Technical Specifications

Subsection 1 – General Requirements

1. General Requirements

Contract Scope

Left out distribution works in the District Metering area (DMA) No: 5R9 of Ramsahill of South central Zone of Contract Package:5 under JICA assisted Guwahati Water Supply Project is being grouped and termed it as Package No: 5C. Works involves supply and execution of pipe laying works, fixing of valves & fittings, Construction of Valves chambers, Hydraulic testing of pipeline, Restoration of road to original condition, trial run and commissioning of distribution network in DMA: 5R9.

Details and Data Available to the Contractor

The Employer has collected the details and data listed below and has used these in the formulation of the bid elements. They are listed below and are enclosed in the relevant subsections of these specifications.

Network drawing showing Gap closing details etc.,

Pipe Materials Available to the Contractor

Employer will provide DI K9 pipes, fittings, specials, bends, tees, reducers, socket and flanged tail pieces, duck foot bends, collars, mechanical joints, dead end caps, blank flanges etc. of diameters 100mm to 600mm as per IS 8239 including rubber gaskets, 5% extra over number of pipes. Contractor has to procure required socketed and flanged specials conforming to IS: 9523 including various types as per requirement including EPDM rubber gaskets suitable for tyton joints and 'O" rings required for the jointing of specials with the pipes, nuts and bolts with packing gaskets, and all that required for distribution system.

The DI pipes will be issued to the Contractor from the Employer's store yard/yards. The Contractor at his cost will arrange for carting of the DI pipes and make arrangement for storage wherever required by him for laying and jointing work.

Submittal of Samples of Materials

Samples of materials requiring prior approval, such as cement, aggregates, asphalt cement, building specialties and backfill materials shall be furnished by the Contractor to the Employer's Representative in large enough quantities (at least 0.1cum each) with descriptive data. Samples shall be submitted at least 14 days before their proposed usage in the work to permit inspection and testing. The samples shall be properly marked to show the name of the material, name of the manufacturer, applicable Specification Subsection, place of origin and application for which it is to be used.

Only upon approval by the Employer's Representative, shall be the materials be brought to the Project Site. Samples once approved shall be on an exhibition at all times, properly stored and prevented from deterioration for the purpose of comparison with the materials brought to site of work from time to time for use in the work.

Project Work Schedule

Within the first 7 days after issuance of the Notice to Proceed the Contractor shall submit his proposed work schedule to complete all of the required items of work within the time frame as set forth in the Time of Completion. Adequate time shall be allocated for testing, the Trial Runs and other pre-commissioning activities.

The Contractor shall update this Project Work Schedule monthly, reporting progress through a set date such as the last workday of the month or the last Saturday of the month. The update Project Work Schedule shall be submitted to the Employer's Representative by the 7th of the following month. A brief report shall accompany this submittal highlighting the following:

Planned work for the following month

Items of work that fell behind the planned Schedule for the preceding month, and reasons for their delay

Alerts as to potential problems the Contractor may have in meeting the planned Schedule

Items the Contractor requires from the Employer in order to meet the planned Schedule

Any Change orders the Contractor views as being required to meet the planned Schedule

Alerts as to potential for the assessment of Liquidated Damages

The Employer's Representative will review the Contractor's submitted Project Work Schedule on a monthly basis and will provide the Contractor with comments as to any portions of the Schedule which he or the Employer views as being unachievable.

Quality Assurance

The Guwahati Water Supply Project stresses to achieve the highest standards for the works (construction, equipment supply and erection). The Employer's Representative will issue, prior to the issuance of the Letter to Proceed, a Quality Assurance/Quality Control (QA/QC) Manual which will detail the minimum level of resting and control to be exercised for ensuring the quality of the completed works. The minimum measures taken by the Contractor shall be as per the QA/QC Manual and these specifications but not limited to it. All other measures that the Contractor may feel necessary he may add with the approval of the Employer's Representative or as may be directed by the Employer's Representative shall also be implemented.

The following subsections give details of the proposed Quality Assurance and Quality Control scheme to be followed in this Project. It covers the inspections of construction material, manufacture and supply of equipment, specials and of the works to be carried out.

Pre-shipment Inspections Outside of the Employer's State

In the event the Contractor proposes to procure materials which requires pre-shipment (factory) inspection by the Employer's Representative from outside of the Employer's State (Assam),The Contractor shall arrange for inspection by Third Party Inspection Agency already approved by the employer. Third Party inspection charges should be included into the tendered cost and no additional payments will be made afterwards.

Safety Assurance

The Contractor shall be responsible for the safety of all workmen and other persons entering or in the work areas and shall take all measures necessary to ensure their safety at his own expense. Such measures shall include the provisions of helmets (hardhats), the provision of gum-boots to workers engaged in cement concrete, and eye protection (goggles). Scaffolding or other measures required for working at a height shall be load rated and rigid and be provided with suitable and convenient access. Shoring required for deep excavation must be adequate and rigidly braced and strutted. Other safety measures that the Employer's Representative may direct, depending on the exigencies of the location and nature of work and other relevant factors, shall be provided by the Contractor.

First-Aid

The Contractor shall arrange for medical services to be promptly available when necessary. He shall provide First-Aid stations at suitable locations within easy reach of the workmen and other staff engaged in the work. Each First-Aid station shall be properly equipped and shall be the charge of a suitably qualified supervisory staff member. The Contractor shall also provide for transport of serious cases to the nearest hospital.

Relocation of Existing Utilities

The Contractor shall identify, or have identified by the particular utility agency, any utilities which will inhibit or prevent his work from proceeding. Utilities shall include either buried or overhead services, some of which may be owned by the Employer. Utilities shall include, but not be limited to, electrical services, telecommunications services, water services and drainage services.

The Contractor shall contact the local utility agencies prior to performing any work on a Project Site or along a pipeline route. The Contractor shall have the local utility agencies identify and locate their utilities within the path of the Contractor's work. The utility agency shall either relocate their utilities around the perimeter of the Contractor's work area or shall authorize the Contractor to do so. For pipeline installation this may require the utility agency to remove their system from service in a particular area while the Contractor's pipeline or other work passes by the utility.

The Contractor shall plan his overall work schedule to provide the particular utility at least 14 calendar days to relocate their utility once they are contacted to do so.

The payment for the construction work involved for utility installation shall be paid to the Contractor out of a Provision Sum/Day work item. Any construction work to be performed by the utility agency shall be negotiated between the Contractor, the utility agency and the Employer's Representative. Identification of utilities, contacting the particular utility agency and negotiating payment for and the scheduling of their

work shall be included in the Contractor's unit price for pipeline installation or site work and he will not receive any additional payment for such from the Provisional Sum/Day work.

Traffic Control for Pipeline Installation and Road Reinstatement

Existing Signage

The Contractor shall move any existing street signs and markers and route markers out of the construction limits of the project and install the street signs and markers and route markers so that they will be visible to the traveling public if there is sufficient right of way for these signs and markers outside of the construction limits.

Near the completion of the project and when so directed by the Employer's Representative, the Contractor shall move the signs and markers and install them in their proper location in regard to the finished pavement of the project.

Any signs or markers which cannot be relocated due to lack of right-of-way, or any signs and markers which will no longer be applicable after the construction of the project, shall be stockpiled at locations directed by the Employer's Representative for removal by others.

The Contractor shall be responsible to the Employer for any damage to any street signs and markers or route markers during the construction period.

No additional payment will be made for relocating, reinstalling, and/or stockpiling the street signs and markers and route markers as such work will be considered incidental.

Construction Traffic Control Devices

The work covered by this Section consists of furnishing, erecting, maintaining, relocating, and removing traffic control devices in accordance with the Specifications or as directed by the Employer's Representative. All traffic control devices furnished by the Contractor shall remain the property of the Contractor. Traffic control devices shall include, but not be limited to signs, non-metallic drums, barricades, cones, delineators, temporary guardrail, temporary pavement marking, raised reflective pavement markers, flaggers and pilot vehicles, as required.

Unless otherwise required, materials used in the fabrication and installation of construction traffic control devices shall be in accordance with acceptable standards and quality When traffic control devices are no longer required for traffic handling in the initial phase of construction requiring their use, they may be reused at various locations throughout the project provided the device is not defaced, is structurally sound, clean, and otherwise conforms to the above requirements.

The Contractor may submit for the Employer's Representative's consideration a method for handling traffic. The traffic handling plans submitted by the Contractor shall not be used until they are approved by the Employer's Representative in writing. Weeds, brush, trees, construction materials, equipment, etc., shall not be allowed to obscure any traffic control device in use.

If cones are used for delineation at night, each cone shall have any appropriate white reflectorized cone collar or something equivalent or as directed by the Employer's Representative.

Competent and properly trained flaggers, properly attired and equipped, shall be provided when directed by the Employer's Representative, or when the Contractor deems it necessary to safely handle traffic through the construction area.

The Contractor shall continuously review and maintain all traffic handling measures to assure that adequate provisions have been made for the safety of the public and workers.

Flaggers

Any time there is only a single lane of traffic passing a construction zone, two (2) flaggers shall be provided by the Contractor to direct only one-way traffic in either direction at phased intervals. Each flagger shall be equipped with an orange safety vest, which will be reflectorized if working in low lighting conditions, orange flags mounted on wooden staffs

Payment

No extra payment shall be made for traffic control. The cost of the same shall be considered incidental to works.

Facilities and Services to be Provided by the Contractor

Storage Facilities for the Contractor

The Contractor shall provide at least one (1) storage shed of adequate capacity for storing materials. The shed shall be of such construction to adequately protect the materials against deterioration. A raised platform well above the highest flood level shall be constructed for stacking cement and other consumables. Cement and other consumables shall be organized so the first items received are used first so as to avoid deterioration due to prolonged storage. PVC piping, gaskets, O-rings and other items which will deteriorate from exposure to sunlight (ultraviolet radiation) shall be stored in this facility after being delivered to Guwahati and waiting installation.

The storage shed(s) may be located off of the Project Sites, as determined by the Contractor, but the contents must be available for inspection by the Employer's Representative at any time. If the storage units are located on one of the Project Sites, they shall be removed prior to the end of the Contract period and shall not interfere with any of the water supply operations. The cost for the storage facilities shall be included in the Contractors Contract Price.

Temporary Water and Electricity Provisions

The Contractor shall make his own arrangement for the supply of water for construction and hydro testing of pipeline and electrical power that will be required for his operations. The cost for the temporary water and electricity services shall be included in the Contractors Contract Price.

The supply of piped water will not be available. The Contractor shall make arrangements for supply of drinking water and non-potable water required for construction work by trucking it in or by sinking tube wells or other suitable alternatives. The Bidder shall investigate this matter before the submission of Tenders.

Electrical power from the Assam State Electricity Board (ASEB) or Assam Power Distribution Company Ltd (APDC) may not be continuously available due to various reasons including load shedding and may not be available in the voltages requested by the Contractor. In case of non-availability of electrical power the Contractor will have to arrange for generator for his own power services. The Contractor must include such features in his Bid Price. When drawing power from the ASEB's/APDC's connection point, the Contractor shall have to have the electricity metered and bear the cost of his electricity usage. The route of conveyance shall be subject to approval by the Employer's Representative. No overhead lines shall be permitted in areas to be occupied by overhead machinery, such as cranes.

Supervisory Staff for Contractor

The Contractor is required to ensure deployment of qualified and experienced staff in sufficient numbers on site to ensure quality and adhere to the schedule.

Minimum Construction Equipment to be brought by Contractor at Site

The Contractor is required to assign at least a minimum amount of equipment on site for ensuring quality and timely progress of works.

Handing Over of Project Site to Contractor

The sites will be made available on the date of the issuance of the Letter to Proceed and the Contractor can plan his work accordingly.

The Employer will make the individual work sites available to the Contractor so that he will have space available for him to carry out his work for at least the next three (3) months unhindered as per the approved work plan. Employer is responsible for obtaining road cutting permission from Road Cutting Permission Committee

In the event that some local obstruction/objection arises which would impede the progress of the Contractor's work in any one area, the Contractor will be required to redeploy his resources to other unaffected areas in order to maintain the progress of work so that the overall completion of the whole Project is not affected.

Completeness of the Work

The Contractor shall be fully responsible to ensure that the whole Project including each individual component/stretch, is constructed in a manner so that the system as a whole operates as a fully integrated system which is capable of achieving the required output in an efficient and economical manner, and includes all plant, equipment and accessories required for the safe and satisfactory operation of the facilities.

To achieve this, the Contractor shall ensure that each individual component performs in a manner which is complementary to that of all other components. Any accessories which are not specifically mentioned in the specifications, but which are usual or necessary for completion of the Works and successful performance of the overall system and facilities shall be provided by the Contractor within the Contract Price.

Time for Completion

The whole of the Work, including mobilization, reconnaissance and survey (if any), manufacturing, transportation, construction, installation, trial runs, testing and commissioning is to be completed within the scheduled Time for Completion as set out in the tender document. The duration of the Trial Run and testing period is 90 days which is included within the scheduled time for completion.

The physical completion of the System and facilities shall be achieved before commissioning. Commissioning of the overall system will be deemed to be completed after the system trial run period of 90 days as per relevant subsection. Any intervening breakdown period will not be considered as a part of this period and the elapsed time shall be restarted.

Clarification

If the bidder/contractor feels lack of transparency or ambiguity in the document, he shall request clarification and it will be resolved by the Employer’s Representative prior to proceeding with the specific work/purpose.

Technical Specifications

Subsection 2 – Civil and General Works

2. Civil and General Works

Standard Specifications

In the event of any discrepancy between the provisions of the Standard Specifications and the technical specifications contained herein, the provisions of these technical specifications shall take precedence.

General Requirements

Design Standards

All the designs of structures and associated facilities shall generally conform to the recommendations made in the publications (latest versions) of the Bureau of Indian Standards, some of which are listed below:

IS 456: Code of Practice for plain and reinforced concrete

IS: 3764: Safety code for excavation work.

IS: 3385: Code of practice for measurement of Civil Engineering Works.

Indian Roads Congress (IRC) 6 Part II: Standard Specification and Code of Practice for road bridges loads and stresses

Standard Practice (SP) 34: Handbook on concrete reinforcement and detailing

Approval of Materials

Approval of all sources of material for Works shall be obtained in writing from the Employer's Representative before their use on the project.

Quality assurance plan (Data sheet) of the material such as pipe, pipe fittings, valves etc. shall be submitted before the procurement/dispatch of the material from the works for the approval of the Employer's Representative for third party inspection.

Cement, sand, aggregate, bricks, steel, steel frame etc. samples to be used shall be submitted for the approval of the Employer's Representative.

Use of Equipment on the Work

The following conditions regarding use of equipment's on works shall be followed:

1. The Contractor shall be required to give list of equipment to be used during execution of works and a trial run of the equipment(s) before commencement of the work.
2. All equipment's provided shall be of proven efficiency and shall be operated and maintained at all times in a manner acceptable to the Employer's Representative.
3. No equipment or personnel will be removed from site without permission of Employer's Representative.

Earthwork - General

The specification is to be read in conjunction to Standard Specification.

Scope

This specification covers the general requirements for earthwork excavation in different materials for the construction of the Works includes water supply distribution lines, structures, roadways, side drains, pipe/river crossing and railway crossing, in accordance with the lines, grades and cross-sections shown in the Drawings or as indicated by the specifications or as directed by the Employer's Representative.

Excavation shall consist of the removal of material for the construction of foundations for all components related to pipelines, in accordance with the requirements of these Specifications and the lines and dimensions shown on the Drawings or as indicated by the Employer's Representative.

This Specification includes site grading, excavation, backfilling, conveyance and disposal of surplus spoils as and where directed by the Employer's Representative and all operations covered within the intent and purpose of this Specification. It shall also include the hauling and stacking of or hauling to sites of

embankment and subgrade construction, suitable cut materials as required, as also the disposal of unsuitable cut materials in specified manner, trimming and finishing to specified dimensions or as directed by the Employer's Representative.

The work shall include construction of the necessary cofferdams and cribs and their subsequent removal, all necessary sheeting, shoring, bracing, draining and pumping; the removal of all logs, stumps, grubs and other deleterious matter and obstructions necessary for placing the foundations; trimming bottoms of excavations; backfilling and clearing up the site and the disposal of all surplus material.

The work shall include dismantling of road surfacing.

The following Indian Standard Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest revision of the Codes shall take precedence.

IS 1498 Classification and identification of soils for general engineering

IS 3764 Safety code for excavation work

IS 4081 Safety code for blasting and related drilling operations

Classification of Excavated Material

The classification of excavation material shall be decided on by the Employer's Representative and his decision shall be final and binding on the Contractor. The use of explosives for excavation work will not be considered as a reason for a higher (cost) classification unless blasting is clearly necessary in the opinion of the Employer's Representative.

All materials involved in excavation will be classified by the Employer's Representative in the following manner:

Soil

This classification shall comprise all kinds of soil, turf, sand, silt, loam, clay, mud, peat, black cotton soil, soft shale or loose murum, a mixture of these and similar materials. All soils covered in ordinary and hard soils shall be covered in this category. Removal of gravel or any other nodular material having dimension in any one direction not exceeding 75 mm occurring in such strata shall be deemed to be covered under this category.

Ordinary Rock (not requiring blasting)

This classification shall include rock types such as laterites, shales and conglomerates, varieties of limestone and sandstone etc., which may be quarried or split with crow bars or pneumatic rams. This classification also includes any rock which in the dry state may be hard and requires blasting, but which when wet becomes soft and can be excavated by a means other than blasting.

Macadam surfaces such as water bound and bitumen bound road surfaces, paths etc. and hard core compact murum or stabilized soil requiring a grafting tool or pick to excavate them will be considered in this category. Gravel and cobble stone having a maximum dimension in any one direction between 75 and 300 mm shall also be included.

Lime concrete, stone masonry in lime mortar and brick work in lime/cement mortar below ground level, reinforced cement concrete which may be broken up with crow bars or picks and stone masonry in cement mortar below ground level shall be included in this category.

Boulders which do not require blasting having a maximum dimension in any direction of more than 300 mm, found lying loose on the surface or embedded and terrace material of dissimilar origin shall be included in this category.

Hard Rock (Blasting Prohibited)

Hard rock requiring blasting as described above but where blasting is prohibited for any reason and excavation has to be carried out by chiseling, wedging or any other agreed upon method.

Note: Any surplus material or stone excavated shall be the property of the Contractor. He shall be responsible for its off-site disposal.

The Contractor shall not consider the usage of explosives will be permissible when preparing his Bid. The permitting process for getting the use of explosives approved will be very arduous, so the Contractor should not place any reliance on any approvals being given by the regulatory agencies involved.

Foundations

The minimum depth of foundations for pipeline trenches is given in relevant section of the document.

Care shall be taken to avoid the interference of the foundations or any other component of the new building or structure with the foundations of adjacent buildings or structures. Suitable adjustments in the depth, location and size of foundations may have to be made depending on the site conditions. The Employer's Representative shall accept no extra claims for such adjustments. Special attention shall be drawn to the danger of uplift being caused by a high ground water table. The foundation raft or mat shall be designed for uplift forces that are likely to be developed.

Safety arrangement

The activity shall include proper safety arrangement. Cost for this arrangement is deemed to be included under the respective item of works.

General Requirements for Concrete Work

The following are the design requirements for all reinforced or plain concrete structures:

i. All blinding and leveling concrete shall be a minimum 100 mm thick with minimum concrete grade of Class M15 (15 N/mm^{2}minimum compressive strength at 28 days).

ii. All structural reinforced concrete other than for water retaining structures shall at least be of Class M20 having a minimum cement content of 300 kg/m^3 with 20 mm size downgraded coarse aggregates, for all structural members.

iii. The minimum grade of concrete for water retaining structures shall be Class M25 having a minimum cement content of 300 kg/m^3 with 20 mm size downgraded coarse aggregates.

iv. All design for water retaining structures including roofing shall be based upon limiting the crack width to 0.2 mm as per BS 8007.

v. The minimum clear cover over all reinforcement including stirrups and links shall be 40 mm for all water retaining structures including the bottom of the roof. For other non-water bearing structures the minimum clear cover shall be as specified in IS 456.

vi. For the walls of liquid retaining structures, the following shall be applied:

- The minimum reinforcement shall be in accordance with BS 8007 and or IS: 456.
- The maximum length of a panel to be concreted considering any partial construction joints shall be 7.5 m. The adjacent panels shall be poured with a minimum time lapse of 4 days. The Height of each pour shall not exceed 2.0 m.

Note: The classes of concrete referred to in this Subsection are based upon a minimum compressive strength at 28 days expressed in N/mm^2. The classes of concrete referred to in the Standard Specifications (Civil Works) are based upon a minimum compressive strength at 28 days expressed in kg/cm^2. Therefore a Class M20 referred to this Part of the tender Documents will be equivalent to a Class M200 referred to in the Standard Specifications (Civil Works). The Contractor shall make this distinction when working with these Contract Documents.

The following minimum thicknesses shall be used for the different reinforced concrete members, irrespective of the required design thickness:

a.	Walls	150 mm
b.	Roof slabs	150 mm
c.	Bottom slabs	150 mm
d.	Floor slabs including roof slabs, walkways, canopy slabs	150 mm
e.	Walls of cables / pipe trenches, underground pits etc.	150 mm
f.	Column footings	300 mm
g.	Parapets	100 mm
h.	Precast trench covers	150 mm

Concrete Reinforcement

All structural components to be constructed in this Contract shall be TMT (thermo-mechanical treatment) Fe 415 as defined in IS 1786 and as procured from TISCO/ SAIL /RINL or equivalent as approved by the Employer's Representative for concrete reinforcement. The minimum yield stress of the bars shall be 415 N/mm^2.

Valve Chambers

All valve chambers shall be constructed according to the standard chamber drawings enclosed with the bid document. Brick masonry Chambers shall be plastered internally and externally with cement mortar (1:4) 20mm thick with water proof compound and RCC chambers shall have form finish with fine rendering. RCC chambers shall be of M20 concrete. No plaster is required, unless otherwise directed by the Employer's Representative.

Each valve chamber shall be considered as a composite item and they measured in numbers.

Other Accessories for Pipeline Works

Anchor Bolts

Anchor bolts shall be of MS as per specification and drawing.

Lifting Hooks

Lifting hook shall be of MS as per specification and drawing.

Ladders with MS Rungs

The rung shall be of MS rod as per specification and drawing. The exposed surface shall be painted with primer.

Dismantling and Demolition

This item shall be read in conjunction to Standard Specification.

Scope

This work shall consist of removing & dismantling worn out pipes, valves, specials etc. and which are in place but interfere with the new construction or are not suitable to remain in place, and of salvaging and disposing/carrying of the pipes, pipe fittings, valves, and back filling the resulting trenches and pits.

Dismantling and removal operations of worn out pipes or other obstacles coming in the execution of the work shall be carried out with such equipment and in such a manner as to leave undisturbed any other work to be left in place.

Dismantling/demolishing of valve chamber, thrust block etc., stacking of useful material and disposal of surplus material/debris/rubbish.

All operations necessary for the removal of any existing worn out pipes, fittings and valves which might endanger new construction shall be completed prior to the start of new work.

This item shall be executed as per direction of the Employer's Representative.

Terminology

The term 'Dismantling' implies carefully separating the parts without damage and removing. This may consist of dismantling one or more parts of the pipe works as specified.

The term 'Demolition' implies breaking up. This shall consist of demolishing whole or part of work including all relevant items as specified.

Dismantling items

- Dismantling of Cement concrete, RCC, Brick work in mortar in cum within 50m lead.
- Dismantling & stacking of pipes valves, steel items and other useful items (serviceable) to GMDA Store as directed by Employer's Representative.
- Dismantling of RCC pipes and stacking within a lead of 50m.
- Disposal of building/construction rubbish by mechanical transport up to 1 Km. including loading and unloading complete work.

- Disposal of steel items and other useful items (serviceable) to GMDA Store as directed by Employer's Representative.

Pipes and Specials

Water pipe lines with clamps and specials etc. shall be described by their diameter.

If the joints, special and fittings etc. are required to be separated, it shall be so stated and enumerated.

Transporting of useful material such as pipes, valves, steel items to the GMDA stores.

Measurements for Payment and Rate

There shall be no separate payment for this item. Cost for this item is deemed to be included in other items.

Public Utilities

Drawings scheduling the affected services like water pipes, sewers, cables ducts etc. owned by various authorities including Public Undertakings and Local Authorities included in the Contract Documents shall be collected by the Contractor for information prior to the commencement of any work.

No clearance or alterations to the utility shall be carried out unless specially ordered by the Employer's Representative.

Any services affected by the Works must be temporarily supported by the Contractor who must also take all measures reasonably required by the various bodies to protect their services and property during the progress of the Works.

The Contractor may be required to carry out certain Works for and on behalf of the various bodies and he shall also provide, with the prior approval of the Employer's Representative, such assistance to the various bodies as may be authorized by the Employer's Representative.

The work of temporarily supporting and protecting the public utility services during execution of the Works shall be deemed to be part of the Contract and no extra payment shall be made for the same.

The Contractor may be required to carry out the removal or shifting of certain services/utilities on specific orders from the Employer's Representative for which payment shall be made to him. Such works shall be taken up by the Contractor only after obtaining clearance from the Employer's Representative and ensuring adequate safety measures.

Avoidance of Existing Services

As far as possible, the pipelines shall be laid below existing services, such as cables, cable ducts and small drains nallahs but not below sewer lines, nallahs carrying polluted water. If it is unavoidable, pipelines should be suitably protected.

Adequate arrangements shall be made by Contractor to protect and support other services during all phases of the work. The pipeline shall be so laid as not to obstruct access to the other services/nearby properties for inspection, repair and replacement. When such utilities are met with during excavation, the authority concerned shall be informed and arrangements should be made to protect the utilities in consultation with them. If the Contractor fails to call before digging and any damage occurs to any underground utility, Contractor shall reinstate such utilities to existing conditions at his own cost or pay for the rectification of damages so caused.

Measurements for Payment and Rates

There shall be no separate payment for this item. Cost for this item shall be deemed to be included in other items.

Temporary Diversion of Drains

All arrangement for providing temporary cross drainage structures including maintenance, dismantling and cleaning debris where necessary, shall be considered as incidental to the works. There shall be no separate payment for this item. Cost for this item shall be deemed to be included in other items.

Access to Abutting Properties

For the duration of the works the contractor shall at all times provide convenient access to paths, steps, bridges or drives for all entrances to property abutting the site and maintain them clear, tidy, and free from mud and objectionable matter.

In addition to the above, in order to ensure uninterrupted traffic flow in the cross roads, the contractor has to provide and maintain suitable crossing arrangement for the existing traffic to move across the construction work for all categories of roads crossing the roads where the work is in progress during the entire period of execution or till such time that alternative arrangement for the traffic is made.

There shall be no separate payment for this item. Cost for this item shall be deemed to be included in other items.

Nameplates, Signboards and Nomenclature

Each equipment item in the plant shall have permanently attached to it in a conspicuous position a nameplate, on which shall be engraved or stamped the manufacturer's name, type and serial number, year of manufacture, details of the design capacity etc. Such labels shall be of non-hygroscopic material to be approved by the Employer's Representative.

Adjacent to or on each equipment item in the plant, shall be fixed a plate with the name and nomenclature (code) of the item according to the Project nomenclature. It shall be visible from a distance of several meters.

The Contractor shall also provide bilingual signboards and instruction tables of durable material, throughout the plant, for the purposes of operation, maintenance and security:

i. Danger and caution signs (English and Assamese)

ii. Preventive maintenance schedules (English and Assamese)

iii. Operating instructions (English and Assamese)

iv. Unit names (English and Assamese)

v. Nameplates at the doors to the buildings (English and Assamese)

Signboards and nameplates shall be appropriately sized in relation to the relevant item and its surroundings. Details of the proposed inscription, size, material and colors shall be submitted to the Employer's Representative for approval before any signboards or plates are manufactured. They shall be compatible with the instructions in the O&M Manual.

All cables shall be provided with clip-on identification numbers on both ends and at all terminations in between, for identification. The nomenclature shall correspond to the electrical as-built drawings.

The nomenclature and labeling of the plant shall be coordinated with the Employer's Representative.

There shall be no separate payment for this item. Cost for this item shall be deemed to be included in other items.

First Aid Kits

Each first aid kit shall include all materials and medicine necessary for the treatment of cuts, wounds, burns, effects on skin due to contact of chemicals, acids, etc.

The following materials in sufficient quantities shall be provided:

a. Medical cotton, sterile cotton pads

b. Cotton Bandages, elastic bandages

c. A pair of scissors

d. A packet of new shaving blades

e. Sticking plaster for medical use.

f. Band aid stripes (25 minimum count)

g. The following chemicals and medicines shall be provided in sufficient quantities:

- Tinctures iodine and mercury chrome
- Burnol ointment

- Bottles of spirit and of Dettol
- Disinfectant soap
- Skin lotions and ointments for burns, acid effects
- Eye drops for soothing effects

Contract shall arrange for the above items and any others as required for the purpose. This is incidental to work and there will be no separate payment for the same. Cost involving for the purpose shall be deemed to be included in other items.

Safety Arrangements

Contractor has to arrange for all safety measures involved in executing the Contract. Safety procedures shall be as described elsewhere in the document, and shall conform to SP70 (Handbook on Construction Safety Practices). There shall be no separate payment for this item. Cost for this item shall be deemed to be included in other items.

Technical Specifications

Subsection 3 – Pipes and Specials

3. Pipes and Specials

The details and specifications of the various types of piping materials to be used in this Contract are contained in this subsection.

General

All distribution network piping consists of mild steel (MS), DI Pipe K9 and HDPE- PE 80 pipes as shown on the Data & Drawings. Piping proposed up to and including 600 mm in diameter shall be ductile iron (DI) class K-9 pipes. MS pipes are proposed for diameters greater than 600 mm. For some specific stretches on hills and some specific crossings, HDPE pipes are proposed.

The work of installing piping shall be carried out carefully so as not to damage it during handling, storage, installation and back filling. The work shall be executed in a safe and efficient manner under the direction of the Employer's Representative.

Supply of DI pipe K9 pipes is outside the scope of this Contract. Contractor's responsibility begins from lifting and transporting DI K9 pipes from the Employer's Store yard.

Measurement and Payment

Pipe lengths will be measured (along the centerline) at site after laying and successful testing. The measurement will be in linear meters and will be rounded off to two decimal places and will include the lengths of pipe, bends, tees, etc. but exclude lengths for valves, fire hydrants, etc. The quoted rate shall include the cost of all pipe, specials, etc. including the cost of labor, jointing, conducting hydraulic testing at the site and commissioning.

General Requirements for Piping

Piping systems shall be manufactured and installed in accordance with internationally recognized standards. Piping, joint details, coatings and linings for buried and exposed laying conditions shall be in accordance with the specification schedule, unless modifications are approved by the Employer's Representative. Lengths of MS pipes shall vary from 9 to 12m. Lengths ranging from 4 to 9 m may be accepted by the Employer's Representative. Lengths of DI pipes being supplied by the Employer shall be 5.5 m or 6 m. shorter lengths shall only be used for transitioning to structures, valves, meters, etc.

All connections to valves shall be flanged for exposed or buried piping systems.

Ductile Iron Pipes and Fittings

General

All ductile iron pipe being supplied by the Employer will be of class K9 conforming to IS 8329 with socket & spigot (S&S) ends. DI pipe to be buried shall be of socket & spigot (S&S) type. Flanged end connections shall be used for connecting to valves, meters and other fittings and for exposed portions. All components (flanges, valves, etc.) in the piping system shall have a pressure rating of PN1.6 (operating pressure 1.6 MPa or 16 kg/cm^2).

Ductile Iron Fittings / Specials

DI fittings shall be supplied by the Contractor conforming to IS: 9523 or its international equivalent standard and shall be marked as such. Fittings and accessories for this type of pipes shall be in accordance with the same standards and Codes of Practice. Iron used in fittings shall have graphite primarily in the spheroid form. AII DI fittings shall be Class K12.

Types of Specials

The following types of DI fittings shall be manufactured and tested in accordance with IS: 9523 or BS: 4772. All the fittings shall be of PN 1.6 pressure rating.

- flanged socket pieces
- flanged spigot pieces
- double socket bends (90^o, 45^o, 22$^1/_2{}^o$, 11$^1/_4{}^o$)
- flanged bends (90^o, 45^o, 22$^1/_2{}^o$, 11$^1/_4{}^o$)

- double socket branch flanged tees
- all socket tees
- all flanged tees
- double socket tapers
- double flanged and flanged and socket tapers
- end caps or blind flanges
- collars
- double flanged pipe pieces
- dismantling joints

Gaskets

Gaskets used with push-on joints for DI pipes shall be provided by the Employer along with pipes at 5% in excess of number of pipes. Additional gaskets for jointing of specials, mechanical joints and extra quantity required for cut pipes etc. over and above that provided by the Employer, shall be supplied by the contractor under this contract along with specials.

Rubber gaskets used with push-on joints and mechanical joints shall conform to IS: 5382. Rubber gaskets for use with flange joints shall conform to IS: 638. While conveying potable water the gaskets should not deteriorate the quality of water and should not impart any bad test or foul odor.

Lubricant for Ductile Iron Pipe and Specials

The lubricant used for the assembly of Ductile Iron pipes and specials suitable for push-on rubber ring joint shall have the following characteristics:

- must have a paste like consistency and be ready for use
- has to adhere to wet and dry surfaces of DI pipe and rubber rings
- to be applied in hot and cold weather; ambient temperature 0 - 50 °C, temperature of exposed pipes up to 70 °C
- must be non-toxic
- must be water soluble
- must not affect the properties of the drinking water carried in the pipes
- must not have an objectionable odor
- has to inhibit bacterial growth
- must not be harmful to the skin
- must have a shelf live not less than 2 years

Technical Specifications

Subsection 4 – Valves and Appurtenances

4. Valves and Appurtenances

The details and specifications of the various types of valves and appurtenances to be used in the distribution system are contained in this subsection.

General

Throughout erection, the valves shall be supported properly on wooden sleepers, etc. and shall be concreted immediately thereafter, as directed. Before the valves are actually fixed, they shall be cleaned and greased and it shall be verified that all parts are in perfect working condition. In the case of air valves, the Contractor shall take special care of the dexine joints and the ebonite and /or vulcanite balls until they are fixed in position. They shall be kept immersed in water in suitable containers.

The work of installing valves shall be carried out carefully so as not to damage them during handling, erection and fixing. The work shall be executed in a workman like manner under the direction of Employer's Representative.

General Requirements for Valves

Valves shall be manufactured and installed in accordance with internationally recognized standards / Indian Standards. In-line valves shall be double flanged with the faces parallel to each other and at right angles to the valve centerline. Backside of valve flanges shall be machined or spot faced for proper seating of the head and nut. Valves to be buried or installed in underground chambers, where access to a hand wheel would be impractical, shall be operated by means of an extension spindle and/or keys. Valves shall be suitable for frequent operation as well as operation after long periods of idleness in either the open or closed position.

All the valves shall be manually operated. For butterfly valves the gearbox shall be provided with self-locking devices. A locking facility shall be provided for the valve in either the fully open, fully closed or intermediate position.

Gate (sluice) valves and butterfly valves shall be provided with position indicators, to show whether the valve is in the open, closed or an intermediate position.

Sluice and Scour valves shall be provided with an extension spindle for operation from operating level / ground level.

Gaskets

Gaskets and O-rings for water service shall be made of Nitrile rubber and readymade matching with respective flanges. Gaskets and O-rings for chemical service including chlorine shall be made of EPDM or Viton. Gaskets cut out from rubber sheets are not acceptable.

Butterfly Valves

Features of Construction

The valves shall be manufactured with integral body seats, suitable for open-closed and throttling service. Each valve shall be capable of withstanding the rated pressure from either side. Leakage rates shall not exceed 3.6cc/hr/cm of nominal valve diameter. The valves shall be furnished with double flanged ends.

The valves, where specified or shown on the Drawings, shall be manually operated with gear box and hand wheel and shall be furnished with extension spindles. The extension spindle shall be furnished with a universal coupling and intermediate supports.

Butterfly Valves to be installed shall be of the metal seated type generally as per BS EN 593. Valves shall be suitable for mounting in any position. The valve seat shall be of integrally cast and of replaceable design. When the valve is fully closed, the seal shall seat firmly. The seat surfaces shall be machined smooth to provide a long life for the seal. All fasteners shall be set flush so as to offer the least possible resistance to the flow through the valve. All valves shall be suitable for throttling purpose.

All valve spindles and hand wheels shall be positioned to give good access for operational personnel. Valve of diameter 400 mm and above shall be provided with an enclosed gear arrangement for ease of operation. The gearing shall be such that the valve can be opened and closed by one man against an

unbalanced head of 1.15 times the specified rating. Valve and gearing shall be such as to permit manual operation in a reasonable time and not exceed a required rim pull of 80 N. All hand wheels shall be arranged to turn in a clockwise direction to close the valve, the direction of rotation for opening and closing being indicated on the hand wheels.

Butterfly valves conforming to IS 13095 or equivalent International standard are acceptable. Pressure rating for the butterfly valves to be installed in the distribution network shall be as specified in Table 5-1.

Table 5-1 Pressure Ratings for Butterfly Valves

Service	Pressure Rating	Operating Pressure (MPa)	Body Test Pressure (MPa)
Distribution lines	PN 1.6	1.6	2.4

Materials of Construction

The materials of construction for butterfly valves shall be in accordance with Table 5-2.

Table 5-2 Materials of Construction for Butterfly Valves

Item	PN 1.6 Rated Valves	PN 1.0 Rated Valves
Body	SGI IS 1865 Grade 500/7	CI IS 210 Grade FG 260
Disc	SGI IS 1865 Grade 500/7	CI IS 210 Grade FG 260
Shaft	Stainless Steel BS 970, *Grade 431 S29*	Stainless Steel BS 970, *Grade 431 S29*
Body and Disc Seat	Stainless Steel AISI 316	Stainless Steel AISI 316
Bearing	Steel backed PTFE (Teflon)	Steel backed PTFE (Teflon)
Internal Fasteners	Stainless Steel SS316	Stainless steel SS316

The butterfly valves can alternatively be supplied in fabricated steel with material components of Body and Disc confirming to IS 2062 Gr. B / IS 2002. A minimum corrosion allowance of 3 mm shall be added. Butterfly valves conforming to IS 13095 will also be accepted.

Gearboxes for Butterfly Valves

Gearboxes shall be of the self-locking type, with a continuous indicator. Traveling nut and screw type of gearboxes shall not be acceptable.

Each gearbox must conform to the provisions of AWWA C504. The rated torque capability of each operator shall be sufficient to seat, unseat and rigidly hold in any intermediate position the valve disc it controls under the operating conditions specified. Operating torque must be as per requirements given in AWWA C504.

The operator shall be of worm and worm wheel design, self-locking type with or without an additional spur gear arrangement to ensure that the effort on the hand wheel is limited to the pull specified.

All valve operators shall be equipped with adjustable mechanical stop-limiting devices to prevent over-travel of the valve disc in the open and closed positions. Either end of the worm shaft must be provided with a needle roller bearing to take the lateral thrust.

The housing for the gearing must be enclosed and sealed in such a way that there is no leakage of oil / grease even after long period of idleness and there shall be no ingress of rainwater. Operator for valves, which are likely to be submerged in water for any period of time, shall be watertight.

The hand wheel may be provided with an extension for easy grip. The hand wheels must have a provision for locking with a chain and pad lock. All operators when fitted to the valve shaft shall ensure

clockwise closing and this shall be indicated on the housing. A mechanical indicator is to be provided to show disc position and end of travel.

Sluice Valves

Features of Construction

Sluice valve shall generally conform to BS: 5150 / IS 14846. They shall be of non-rising spindle type. The gate face rings shall be securely pegged over the full circumference of the valve.

Valves shall have two positions marked at the closed end of the scale. The first position corresponding to the position of the gate tangential to the bore of the seating and the second position below the first, corresponding to the position of the gate as it sits on the seat after moving a further distance equal to the depth of the seating.

Valves in buried service or in vaults shall be furnished with extension spindles. Each extension spindle shall be furnished with a universal coupling and intermediate supports.

Pressure rating for the sluice valves to be installed in the distribution network shall be as specified in Table 5-3.

Table 5-3 Pressure Ratings for Sluice Valves

Service	Pressure Rating	Operating Pressure (MPa)	Body Test Pressure (MPa)
Distribution Lines	PN 1.6	1.6	2.4

Materials of Construction

The materials of construction for sluice valves shall be in accordance with Table 5-4.

Table 5-4 Materials of Construction for Sluice Valves

Item	Material
Body, Wedge, Dome	For PN 1.0 - CI IS 210 Grade FG 260 For PN 1.6 - SG Iron IS 1865 Grade 500/7
Hand Wheel	Cast Iron IS 210 Grade FG 200
Stem	IS 6603, SS 4Cr17 Ni12 Mo2 / AISI 316
Body Seat Ring and Wedge Ring	IS 318 Grade LTB 2
Shoe Channel and Stem Nut	IS 318 Grade LTB 2
Back Seat Bush	IS 318 Grade LTB 2

Pressure Reducing Valves

Scope

Diaphragm controlled pressure reducing valves, suitable for automatic reduction of downstream pressure shall be provided and installed. The downstream pressure shall remain constant to the set value, independently of flow variations or upstream pressure variations. The pressure rating of the valves shall be PN 1.6 (16 kg / cm^2 operating pressure).

Product features

Product features shall be as specified below.

a. Straight-through valve of the Globe type.

b. Single chamber diaphragm control with soft seal.

c. Variation of volume in the chamber shall cause regulation of the valve disc.

d. Capable of setting the opening and closing speed.

e. Flanges shall be conforming to ISO 7005-2

f. Face-to-face as per ISO 5752 Series 1 (DIN 3202, F1)

Material

Material for valve manufacture shall be as per the manufacturer's specifications. The valves shall be suitable to work at the designed pressure between the temperature range of -10^0C to + 65^0C.

Hydraulic Test at Works

Valve seat shall be tested for a pressure equal to PN rating of the valve and Body for 1.5 x PN rating of the valve. The valves shall be tested by the manufacturer for various downstream set pressures with varying upstream pressures and the contractor shall submit the manufacturer's test certificate giving the observed test data.

Coating

The valve shall be coated internally and externally with electro-statically supplied blue epoxy to WIS4-52-01 class B.

Packing and Shipping

The valves shall be dispatched to work site with suitable and strong packing to avoid any damage during transport.

Installation and Manufacturer's Services

The valves shall be installed at the locations shown on the distribution network drawings. The contractor shall be fully responsible for proper functioning of the pressure reducing valves. He shall arrange for the visits of the manufacturer's representative at his cost during installation, start-up service and necessary adjustments for pressure settings and satisfactory test and trial after commissioning. The manufacturer's visit shall also be arranged by the contractor at his cost, as and when required during the performance guarantee period, if any functioning problem arises.

Acceptable Makes

Acceptable makes for pressure reducing valves shall be VAG, TALLY, GLENFIELD, Armstrong or equivalent as approved by the Employer's Representative.

Payment

The item covers supply of valve including all taxes and duties, transportation up to work site, loading, unloading and installation at the required location with cost of all jointing material and labor. 75% payment shall be allowed on supply with required test certificates from the manufacturer and balance 25% after installation and testing during operation.

Air Valves

Features of Construction

Each Dual chamber air valves with inbuilt sluice valve shall be provided. Air Valve shall be capable of exhausting air from a pipeline when it is being filled with water. Air shall be released at a sufficiently high rate to prevent the restriction of the inflow rate. Similarly the valve shall be capable of ventilating a pipeline automatically when it is being emptied. The air inflow rate should be sufficiently high to prevent the development of vacuum within the pipeline. The valve shall automatically release air accumulating in the pipeline during normal operating conditions.

Air valves shall be double acting type. For double acting type valves, a buoyant rigid ball (float) shall seal the large orifice and the chamber housing shall be designed to avoid premature closing of the valve by the air being discharged. A buoyant ball shall seal the small orifice at all pressures above atmospheric except when air accumulates in the valve chamber. All air valves shall be provided with an inbuilt valve and a flanged end connection.

The aperture of each valve must be properly designed for the proper air release and inlet rates.

All branched outlets including air valve tees shall be provided with one ½" BSP tapped coupling duly plugged for measurement of pressure. The closing plug shall be in Stainless Steel (AISI 304 or equivalent) with a hexagonal head. The head shall be provided with a copper washer for sealing.

Pressure rating of the air valves shall be PN 1.6 (16 kg/cm^2 operating pressure). The valves shall be conforming to IS 14845.

Materials of Construction

The materials of construction for Air Valves shall be in accordance with Table 5-6.

Table 5-6 Materials of Construction for Air Valves

Item	Material
Body, Cover and Cowl	CI IS 210 Grade FG 260
High Pressure Orifice and Plug	Bronze or Stainless Steel
Bush	Bronze
High Pressure Ball	Rubber
Low Pressure Ball	Vulcanite
Low Pressure Seat Ring	Dexine (Nitrile Rubber)

Fire Hydrants

Fire hydrants shall be as per Standard specification.

Dismantling Joints

Dismantling joints shall be a double-ended flanged adapter that allows for longitudinal adjustment in piping systems where flanged end pipe is utilized. This special shall provide flanged end pipe interfaces with valves, meters or other specials and allow for dismantling of the joint without dismantling of the connecting piping.

Dismantling joints shall be fusion bonded epoxy (FBE) coated in the factory prior to shipment to the Project Site.

Dismantling joints shall be installed as shown on the Drawings or as specified. Dismantling joints shall be Style 131 as manufactured by the Dresser Inc., USA, Advance Valves Ltd, Fouress Engineering Ltd, Indian Valve Pvt Ltd, Kirloskar Brothers Ltd, or equivalent.

Drawings and Information to Be Provided By Contractor

For each valve and set of bellows being furnished, the following shall be submitted for approval by the Employer's Representative, prior to shipping any of these items to the project site:

i. Cross-sectional drawings with materials of construction listed

ii. Outline dimensional drawings with valve parameters including the weight

Miscellaneous Accessories

Isolating Cocks

For isolation of small diameter piping for gauges and other instrumentation equipment, isolation cocks (gauge cocks) shall be installed. The cocks shall be made of 316 stainless steel, 1/4 turn ball or plug valve with the operating handle arranged to indicate the open and closed positions. Each isolation cock shall have a spring bottom, and female by female ends.

Nuts, Bolts and Washers

The Contractor shall provide the jointing material such as nuts, bolts, washers, rubber packing, etc. required for the installation of the valves. The Contractor shall supply all hold down, alignment, and leveling bolts complete with anchorages, nuts washers and packing required to fix the equipment to its foundations, bed plates, frames and other structural parts.

Nuts, bolts, screws, studs and washers (fasteners) shall be of the best quality steel, machined on the shank and under the head and nut. Nuts and bolts for connecting pipe flanges shall be of the hex head type, manufactured from MS rounds in accordance with IS 1363 (2002), IS 2389 (1968) and IS 4206 (1987). Nuts and bolts shall be of the high tensile strength classification and shall be not dipped galvanized after fabrication.

Bolts shall be of adequate lengths to extend past the end of the nut, including space for a washer, by at least 6 mm. Flange bolts may be partially threaded as long as the threaded portion extends into the nut side flange.

Washers, locking devices and anti-vibration arrangements shall be provided where necessary.

Bolts, nuts and studs shall be designed so that the maximum stress does not exceed half the yield stress of the material under any conditions. Bolts for joining piping shall be size M16 minimum. Bolts for securing pumps and other equipment shall be size M20 minimum. All studs and screws shall be made of type 304 or 316 stainless steel.

The Contractor shall procure and keep at site, reasonable excess quantities to cover wastage of those materials, which will be normally subject to waste during erection, commissioning and setting to work.

Pressure Gauges

Bourdon or equivalent type pressure gauge of range 0-27 kg/ cm^2 shall be used to record the pressure in the pipe line. A connection of 25 mm dia. G.I. pipe line shall be taken from main pipe line to the adjacent pressure chamber for recording the pressure.

Inspection

During testing there shall be no visible evidence of structural damage to any of the valve components. The testing of valves shall be inspected at the works prior to dispatch by the Employer's representative or third party appointed by the Employer's representative. The contractor shall inform in advance about the testing operation of the valves at works by the manufacturer. The contractor shall arrange for all the expenses for the inspection at works including to and fro charges, halting arrangements etc. The valves shall be accepted only after satisfactory test results are observed. The contractor shall also furnish test certificated signed by the manufacturer for all the tests carried out at works as specified in the relevant Indian Standard for each type of valves. Testing shall be carried out before application of coating.

Testing Protocol

a. Butterfly Valves:
    - Seat leakage test at rated pressure
    - Body test pressure at 1.5 times the rated pressure
    - Disc strength test at body test pressure

b. Sluice Valves:
    - Seat leakage test at rated pressure
    - Body test pressure at 1.5 times the rated pressure

c. Check (non-return) Valves:
    - Seat leakage test at rated pressure
    - Body test pressure at 1.5 times rated pressure

d. Pressure Reducing Valves
    - Seat leakage test at rated pressure

- Body test pressure at 1.5 times rated pressure

e. Air Valves:

- Function and performance tests as specified in clause 12.4 of IS 14845
- Body test pressure at 1.5 times rated pressure

f. Dismantling Joints:

- Body test pressure at 1.5 times rated pressure

Marking

The following information shall be cast on each valve body in raised letters

- Manufacturer's name or trade mark
- The nominal pressure rating of the valve
- Size of the valve in mm
- Year of manufacturer
- Serial number of the valve in punch on top of flanges.

Coating

Coating for the valves and appurtenances shall be as per the relevant Indian Standard or equivalent International standard.

Technical Specifications
Subsection 5 – Pipe line Works

5. Pipeline Works

General

The pipeline work in general shall be carried out according to the specifications. Work under this subsection shall be performed in conjunction with Subsection 3 'Pipes and Specials'.

Preparatory Work

The contractor will inspect the route along which the pipe line is proposed to be laid. He should observe/ find out the existing underground utilities/ construction and propose an alignment along which the pipeline is to be laid. He should make all efforts to keep the pipe as straight as possible with the help of ranging rods. Where ever there is need for deviation; it should be done with the use of necessary specials or by deflection in pipe joints (limited to 3 to 50 where long radius curves are permitted). The alignment as proposed should be marked on ground with a line of white chalk and got approved from Employer's Representative.

Alignment and the L-Sections

The alignments, L-section (depth of laying) and location of specials, valves and chambers may be changed/finalized at site in co-operation with and after approval of the Employer's Representative .

Standards

Except as otherwise specified in this technical specification, the Indian Standards and Codes of Practice in their latest version, National Building code, PWD specification of the state of Assam and Manual on water supply and Treatment of GOI shall be adhered to for the supply, handling, laying, installation, and site testing of all material and works.

Tools and Equipment

The contractor has to provide all the tools and equipment required for the timely, efficient and professional implementation of the work as specified in the various sections of the contract and as specified by the instructions of manufacturers of the pipes and other material to be handled under this contract. On demand he shall provide to the Employer's Representative a detailed list of tools and equipment available. If in the opinion of the Employer's Representative the progress or the quality of the work cannot be guaranteed by the available quantity and type of tools and equipment the contractor has to provide additional ones to the satisfaction of the Employer's Representative .

Handling and Transportation of Pipes and Specials

Transportation of Pipes and Specials

All types of pipes and specials shall be received, transported, stored, installed and handled in accordance with the manufacturer's recommendations subject to this Subsection and the approval of the Employer's Representative. Handling operations shall be carried out with care, with special attention paid to preserving the integrity of the factory applied coatings.

Pipe from Store yard (of Client, if applicable) shall be stacked in tiers at site. To prevent dirt and debris from entering the pipe, the bottom tiers shall be kept 150 mm up off of the ground on timbers, rails, or concrete supports. Pipe on succeeding tiers shall be alternated, spigot next to socket of the adjacent pipe. Wood 100 mm by 100 mm size shall be placed between each tier and chocks nailed at each end to prevent movement of the pipe. Each pipe size shall be stacked separately.

Pipes should be handled with care to avoid damage to the surface and the ends, deformation or bending. Pipes shall not be dragged along the ground or the loading bed of a vehicle. Pipes shall be transported on flat bed vehicles/trailers. The bed shall be smooth and free from any sharp objects. The pipes shall rests uniformly on the vehicle bed in their entire length during transportation. Pipes shall be loaded and un-loaded manually or by suitable mechanical means without causing any damage to the stacked pipes.

During transport, loading and unloading, pipes and specials shall not be allowed to come in contact with any sharp projections which may cause damage. During transit pipe and specials shall be well secured, supported on wooden cradles and protected.

The transportation and handling of pipes shall be made as per IS 12288. All precautions set out shall be taken to prevent damage to the protective coating, damage of the jointing surfaces or the ends of the pipes.

Cranes or chain pulley block or other suitable handling and lifting equipment shall be used for loading and un-loading of heavy pipes. Where using crane hooks at sockets and spigot ends hooks shall be broad and protected by rubber or similar material, in order to avoid damage to pipe ends and lining. Damage to lining must be repaired before pipe laying according to the instructions of the pipe manufacturer. Pipes shall not be thrown directly on the ground.

When using mechanical handling equipment, it is necessary to employ sufficient personnel to carry out the operation efficiently with safety. The pipes should be lifted smoothly without any jerking motion and pipe movement should be controlled by the use of guide ropes in order to prevent damage caused by pipes bumping together or against surrounding objects.

Rolling or dragging pipes along the ground or over other pipes already stacked shall be avoided too.

Pipes and specials shall be delivered to and stacked singly at storage are as arranged by the Contractor and approved by the Employer's Representative. Specials such as nuts and bolts, gaskets and O-rings, taps, supports and straps shall be stored in the Contractor's covered storage facility.

Any storage area used by the Contractor to store pipe shall be prepared in the following manner:

i. Establish firm, well-drained and level are as for pipe stacking, with adequate room for vehicle access and turning
ii. Posting supervisory staff at the site to resister the arrival of deliveries, supervise off-loading and guard the inventory of pipe
iii. Erecting covered storage materials susceptible to damage by the weather.
iv. Installing approved supports for pipes and specials, which shall keep them at least 150 mm clear of the ground and support them securely without damage to their coatings.

Handling of Accessories

Pipe laying accessories such as joint gaskets, O-rings and nuts and bolts shall be delivered securely packed in crates except that the Employer's Representative may approve delivery in sacks or cartons. Storage of small items such as bolts, nuts, washers and small diameter gaskets shall be on shelves. These shall be stored inside of the temporary storage facility described in relevant Subsection. Except for the purposes of inspection, materials shall remain inside the crates, cartons or sacks until required for installation.

Damaged Pipes and Specials

All pipes, specials, valves etc. shall be carefully examined for damage, especially to the joints and factory applied coatings prior to laying, joining or backfilling. If any pipe, specials or accessories is found to be damaged in any way, the Contractor shall notify the Employer's Representative. The damaged item shall be clearly marked and set aside for repair, cutting to a shorter length or removal from the site as the Employer's Representative may direct. All expenses involved in repairing, or replacement of defective or damaged pipe, specials, etc. shall be borne by the Contractor. The Contractor shall be responsible for any delays caused thereby. Only pipes which upon inspection are found to be sound in every respect shall be laid or installed.

Before pipes and specials are laid, all damaged coating and lining shall be removed (cutout) and replaced with new compatible materials as directed by the Employer's Representative. Cracks or pits up to 0.8mm wide in the coatings may be filled with an approved material, provided that the cracks are not fully circumferential. Any fully circumferential cracks in the coating or detached areas on the internal lining that are detected in the pipes and specials, shall dictate that the particular piece of pipe be returned to the factory for relining or the section of pipe with the failed lining be cut off and discarded. Pipe of adequate diameter for a worker to work inside of the pipe may allow the internal liner to be repaired on-site if the repair is minor, as determined by the Employer's Representative.

All pipes, valves and specials shall be examined for rust and loss of paint prior to installation. The ends of pipes and specials shall be wire brushed, if necessary to remove rust, or failed coating and cleaned, primed and painted with two coats of epoxy compatible with the factory applied material.

Pipe Trench

All excavation of pipe trenches shall be done in accordance to this specification and following detail specification are applicable.

Pipe Installed in Trenches

Where pipelines are to be constructed in trench the contractor shall leave open no more than a 200 meter run of pipe trench ahead of the pipe laying operation, at any time, unless otherwise approved by the Employer's Representative.

Pipelines shall be constructed in lengths with a separate full-time gang working on each length. The work on lengths may proceed concurrently. Excavation for the pipeline in any one length shall not at any time proceed more than 1 km beyond the end of a hydraulically tested, completed and backfilled length of pipeline, unless otherwise approved by the Employer's Representative. The exposed joints between tested sections shall be disregarded in the above definition.

MS pipelines shall be laid in accordance with IS 5822 unless otherwise specified herein.

Each trench shall be excavated to the minimum width necessary to ensure an adequate working space. Considering this requirement, trench width for various pipe sizes shall not be more than that specified below:

Pipe Diameter (mm)	Allowable Trench Width (m)
100 to 200	0.80
250 to 400	0.90
500 to 700	1.20
800 to 1,000	1.50

Over-excavation outside the allowable trench widths on account of any reason shall not be allowed for payment. Where bends are made by deflecting pipes at joints the trenches shall be deflected also to permit this operation. The sides of the trenches shall be cut vertical, and shall be protected against caving by timbering, sheeting or shoring, as required without any extra cost.

The formation of trenches of pipelines shall be even and free from rock and other protrusions. Pipes shall be laid in a dry trench. If the formation of the trench lies below the water table the contractor shall install a dewatering system with the approval of the Employer's Representative. Dewatering shall continue until all work below the water table has been completed or as otherwise directed by the Employer's Representative. The quoted rates for pipe laying shall cover the dewatering charges wherever required.

No metal tools or heavy objects shall be permitted to come into contact with the pipes or fittings. External coated pipe shall be handled at all times with wide non-abrasive canvas, rubber or leather straps or other equipment to prevent damage to the coating. The use of chains, wire slings, or any other handling equipment found to be injurious to the coating shall not be permitted. The timber or skids used to support the coated pipe prior to lowering into the trench shall be properly padded with sufficient bags stuffed with sand or straw for the purpose of protecting the coating. Alternatively, the pipe may be supported alongside the trench on mounds of sand.

Any damage to the protective coating from any cause must be repaired before the pipes or fittings are placed in the trench. During laying operations, no debris, tools cloth or other material shall be placed in the pipe. Pipes and fittings shall be lowered into the trench with equipment suitable for the weight of the pipes and fittings, and they shall be carefully cleaned before jointing.

Before any pipe, special or valve is laid in position , ready for jointing, its internal surface shall be thoroughly wiped, clean and free of dirt, stones etc. to ensure that no debris, sticks, stones, rags or other foreign material left in the pipeline. The pipes shall be laid true to alignment and gradient as indicated by the Employer's Representative. Each pipe shall be aligned between sight rails so that, except where otherwise specified or ordered by the Employer's Representative, the finished pipeline shall be in a

straight line both in horizontal and vertical planes.

The Contractor shall provide required man power, labor, material and instruments for giving mark out of the pipeline section/sections, deciding the alignment, taking measurements, taking the ground elevations etc. so as to decide the pipeline grades and depth of excavation. Based on the working lengths and levels, the Engineers employed by the contractor for work supervision shall prepare working drawings and get those approved by the Employer's Representative prior to start of the work in any section.

The Contractor shall as a minimum provide, fix and maintain at such points as may be directed by the Employer's Representative, properly painted sight rails and boning rods of predetermined measurement for the boning in of individual pipes to correct alignment. The sight rails shall be situated vertically above the line of pipes or immediately adjacent thereto and there shall at no time be less than three sight rails in position on each length of pipeline under construction to any one gradient. Consideration will be given by the Employer's Representative to alternative methods of controlling alignment such as laser beam instruments, which are preferable to the sight rails. Pipes shall be laid accurately to the lines and levels shown on the working drawings, within a tolerance of +/-10 mm.

Care shall be exercised to ensure that the barrel of every pipe is evenly bedded throughout its whole length. The pipes shall be gently lowered into the trench by means of a crane or suitable shear legs and chain blocks, with rope or canvas slings. Hooks shall not be used. No pipe shall be rolled and dropped into a trench, or allowed to assume an inclination of more than5 degrees to the horizontal while on the slings.

A "badger" or "bung" about 10 mm smaller than the internal diameter of the pipe shall be kept in the pipe at all times, pulled forward as the work progresses. When pipe laying is not in progress, including overnight, the open ends of the pipeline shall be blanked off with a temporary watertight fitting approved by the Employer's Representative. The pipe shall be suitably held down so that the pipe does not become buoyant in the event of the trench becoming flooded.

To restrict the flow of rain runoff along the trench the Contractor shall plug the trench with backfill material at distances not exceeding 250 m until the pipeline can be filled in. The plugs shall be removed when trench filling is taking place. In granular bedding areas the plugs shall be of clay and shall be left in.

In certain locations, subject to the approval of the Employer's Representative, air valve tees and washout tees may be installed at the pipe joints nearest to the specified position of the special provided that the approach gradients are amended to ensure that the air valve tees and washout tees are installed at the highest and lowest points, respectfully, of the sections of the pipelines concerned.

Trench Excavation

Trenching includes all excavation which is carried out either by hand or by machine and shall be carried out in accordance with all general requirements. In addition to those general requirements, the following requirements shall apply to pipelines.

The width of the trench shall be kept to a minimum consistent with that specified above. The bottom of the trench shall be properly trimmed to permit even bedding of the pipeline. Allowable trench depth shall be as specified below.

a. Depth up to pipe bottom in soft strata or with bottom Clearance of 150 mm, in the case of rock excavation only.

These limits shall be regarded as being the "neat line dimensions" of the trench for payment purposes. The Contractor will be responsible to adhere to these limits, and no extra payment will be made for any over excavation beyond the prescribed limits, or for any additional cost of providing bedding and backfill in the over excavated areas.

The clearance at joints may be increased to allow the joints to be made and inspected; any proposed increase shall be approved by the Employer's Representative.

For all trenches deeper than 2.0 m, proper stable slope shall be provided on both sides of the trench for the excavation above 2.0 m up to ground level. However, payment shall be restricted only to the allowable trench width as specified earlier. If required, contractor may provide shoring and strutting to protect the trench sides, however no extra payment for this purpose will be allowed and the quoted rate shall be deemed to have covered the cost of shoring and strutting as and where required.

The Contractor shall erect temporary fencing around all open excavations and post warning signs in the local language. All fencing shall be at least 1.0 m tall, rigid in nature and strong enough to prevent people,

livestock or other animals from falling into the trench. The Contractor shall also take all other necessary measures to ensure the safety of the public and others.

The maximum length of excavation that may be left open in any length shall be 200 m. The opening of two lengths within 500 m of each other shall require the approval of the Employer's Representative.

The excavation shall be kept free of water to allow placing of bedding, laying of pipes, jointing / welding of pipes, inspection and testing of joints, coating of joints, placing of backfill and other activities within the pipe trench to be carried out in a satisfactory manner.

Pipe laying shall closely follow the progress of trench excavation and the Contractor shall not permit excessive lengths of trench excavation to remain open while awaiting testing of the pipeline. If the Employer's Representative considers that the Contractor is not complying with any of the foregoing requirements, he may prohibit further trench excavation until he is satisfied with the progress of laying and testing of pipes and refilling of trenches.

The trench excavation of pipe line shall be in accordance with IS 12288. Pipe trenches shall be excavated to the lines and levels shown on the drawings or as directed by the Employer's Representative . The depth of the excavated trench shall be as given in the drawings or as directed by the Employer's Representative . The width of the trench at bottom between the faces of sheeting for various pipe sizes shall be as specified under sub-section 4 of Technical specifications. No pipe shall be laid in a trench until the section of trench in which the pipe is to be laid has been approved by the Employer's Representative .

The bottom of the trench shall be trimmed and leveled to permit even bedding of the pipes. It should be free from all extraneous matter which may damage the pipe or the pipe coating. Additional excavation shall be made at the joints of the pipes, so that the pipe is supported along its entire length.

All excavated material shall be stacked in such a distance from the trench edge that it will not endanger the work or workmen and it will avoid obstructing footpaths, roads and drive ways. Hydrants under pressure, surface boxes, fire or other utility controls shall be left unobstructed and accessible during the construction work. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water-courses shall not be obstructed.

To protect persons from injury and to avoid damage to property, adequate barricades, construction signs, torches, red lanterns and guards, as required, shall be placed and maintained during the progress of the work and until it is safe for traffic to use the roadways. All materials, pipe equipment and pipes which may serve as obstruction to traffic shall be enclosed by fences or barricades and shall be protected by illuminating proper lights when the visibility is poor.

As far as possible, the pipe line shall be laid below existing services, like water, cables, cable ducts and drains but not below sewers, which are usually laid at greater depth. Where it is unavoidable, pipe line should be suitably protected. A minimum clearance of 150 mm shall be provided between the pipe line and such other services.

Trees, shrubbery fences, poles, and all other property and surface structures shall be protected. Tree roots shall be cut within a distance of 50 cm from pipe joints in order to prevent roots from entering them. Temporary support, adequate protection and maintenance of all underground and surface structures, drains, sewers and other obstructions encountered in the progress of the work shall be provided. The structures, which will be disturbed, shall be restored after completion of the work.

Where water forms or accumulates in any trench the Contractor shall maintain the trench free of water during pipe laying.

Wherever necessary to prevent caving, trench excavations in soils such as sand, gravel and sandy soil shall be adequately sheeted and braced. Where sheeting and bracing are used, the net trench width after sheeting shall not be less than that specified above. The sides of the excavation shall be adequately supported at all times and, except where described as permitted under the Contract, shall be not battered.

The Employer's Representative in co-operation with the Contractor shall decide about the sheeting/ bracing of the trench according to the soil conditions in a particular stretch and taking into account the safety requirements of the Contractor's and Employer's Representative's staff. Generally, safety measures against caving have to be provided for trenches with vertical walls if they are deeper than 2.0 m.

Trench Excavation to be Commensurate with the Laying Progress

The work of trench excavation should be commensurate with laying and jointing of the pipe line. It should not be dug in advance for a length greater than 500 m ahead of work of laying and jointing of pipeline unless otherwise defined by the Employer's Representative . The Contractor has to ensure the following:

- safety protections as mentioned above have to be incorporated in the work process
- hindrances to the public have to be minimized
- the trench must not be eroded before the pipes are laid
- the trench must not be filled with water when the pipes are laid
- the trench must not be refilled before laying of the pipes

The bed for the laying of the pipes has to be prepared according to the L-Section immediately before laying of the pipes.

Bedding

Bedding for the pipeline shall be of either of two different classes depending on the soil strata and as per the direction of the Employer's Representative.

The bedding shall be constructed as follows:

i. The filling and compaction shall be done up to appropriate depth.

ii. The bedding shall be compacted, at optimum moisture content and by mechanical equipment with suitably shaped tamping feet or plates, to 95% of modified proctor density.

iii. The trench bottom or compacted fill shall as far as possible be in a profile to match the pipe profile to form a "cradle" which will provide a 120 degree uniform support to the pipe.

The profile of pipe in compacted fill for uniform support shall not be made more than 2 days prior to actual laying of pipes.

Bedding in Ordinary Soil

When soil strata in the trench are other than soft or hard rock, the trench shall be properly compacted and no extra bedding shall be provided. The bottom of the trench shall be prepared in such a way that profile of the pipe shall touch the bottom of the trench at 120 degree from the center of the pipe. This profile of pipe at the bottom of trench for uniform support shall not be made more than 2 days prior to actual laying of pipes.

Bedding in Rock

When soil strata in the trench is rocky, or consists of any unsuitable material which is likely in the opinion of the Employer's Representative to cause damage to the pipe, then bedding from the selected excavated material consisting of soft soil, soil mixed with sand shall be provided. If excavated material is not suitable for bedding in the opinion of the Employer's Representative, sand bedding shall be provided. The sand used for bedding shall be clean, well graded and free from topsoil, clay or vegetable matter and to the approval of the Employer's Representative. If the sand supplied is unclean it shall be washed. In no case shall sand containing more than 3.5% by dry volume or 5% by wet volume of clay, loam or silt be accepted. Tests specified for determining silt in sand and organic impurities as described in IS 383 shall apply.

The depth of over-excavation shall be such that after excavating a minimum fill layer of 150 mm of sand bedding material shall remain below the bottom center of the pipe

Backfilling

Backfill Zones

On completion of the pipe laying operations in any section, for a length of about 100 m and while further work is still in progress, backfilling of trenches shall be started by the Contractor with a view to restricting the length of open trenches. For the purpose of backfilling the depth of the trench shall be considered as divided into the following three zones, starting from the bottom of the trench to its top.

Zone A: From the bottom of the pipe to the level of the center line of the pipe.

Zone B: From the level of the center line of the pipeline to a level 300 mm above the top of the pipe.

Zone C: From a level 300 mm above the top of the pipe to the top of the trench.

Special care shall be taken during all backfilling operations to avoid damage to the pipe coating or displacement of the pipe.

Backfilling in Zone A shall be done with selected approved material available from excavation, well graded sand, fine gravel or other approved material placed in layers not exceeding 150 mm. The backfilling material shall be deposited in the trench for its full width on each side of the pipe, fittings and appurtenances simultaneously, and shall be compacted so as to achieve 90 to 95% modified proctor density. Backfill immediately adjacent to the pipe shall be carefully placed and compacted using suitably shaped hand tampers. Backfill in the remaining space up to the sides of the trench shall be compacted by mechanical means.

Backfilling in Zone B shall be done with selected approved material available from excavation, well graded sand, fine gravel or other approved material placed in layers of 150 mm. The back filling material shall be deposited in the trench for its full width of each side of the pipe, fittings and appurtenances simultaneously. The column of backfill along the sides of the pipe shall be compacted by mechanical means to achieve 90 to 95% modified proctor density, while the area immediately above the crown of the pipe shall be compacted by hand to achieve 90% modified proctor density. Care shall be taken to ensure that mechanical compacting equipment is not used in the zone from the top of the pipe up to 300 mm above the crown of the pipe.

Backfilling in Zone C shall be done with excavated material which is suitable for backfilling with the prior approval of the Employer's Representative. The trench shall be backfilled with selected excavated material free from topsoil and vegetation, or boulders, clods of earth or stones larger than 200 mm in size. Filling shall be done in layers not exceeding 200 mm in thickness and mechanically compacted so as to achieve 90% modified proctor density. No stones shall be allowed to touch the pipe directly.

Backfill Material

All backfill material shall be free from cinders, ashes, slag, refuse, rubbish, vegetable or organic materials, lumpy or frozen material, boulders, rocks or stones or other material which in the opinion of the Employer's Representative is unsuitable or deleterious.

Unless otherwise specified or permitted by the Employer's Representative, all backfill material shall be compacted by mechanical means using equipment with suitably shaped feet or plates. At the time of placing the backfill, the Contractor will be responsible to ensure that the optimum moisture content is achieved so that the required degree of compaction is achieved. If necessary, the Contractor shall be required to add water to the backfill material in such a manner so that the moisture content is uniform throughout each layer during compaction.

Backfill Sand: Sand wherever used for backfill material shall be natural sand complying with Clause 8.2.1 of IS 3114, graded from fine to course. The total mass of loam and clay in it shall not exceed 10 percent. All material shall pass through a sieve of an aperture size opening of 20 mm (see IS 2405 Part 2 (1980) and not more than 5 percent shall remain on IS sieve of aperture size opening of 30 mm.

Backfill Gravel: Gravel wherever used for backfill shall be natural gravel, complying with Clause 8.2.2 of IS 3114 and having durable particles graded from fine to course in a reasonably uniform combination with no boulders or stones larger than 50 mm in size. It shall not contain an excessive amount of loam and clay and not more than 15 percent shall remain on a sieve of aperture size opening of 75 microns.

Backfill Stone Dustd: Stone Dust wherever used for backfill material shall be graded from fine to course. The total mass of loam and slit in it shall not exceed 10 percent. As directed by employer representative.

Backfill with Excavated Material

The excavated material can be used for backfill provided that such material consists of loam, clay, sand, fine gravel, or other materials which are suitable for backfilling and is approved by the Employer's Representative. If suitable material for refilling is not available from already excavated material the Contractor shall import material of approved quality as directed by the Employer's Representative.

Encasement at Road and Nalla Crossings

Complete concrete encasement shall be provided to the pipe in cases of road crossings and nalla crossings wherever directed by the Employer's Representative. Concrete used for this shall be of the M15 type. Before placing concrete the pipes shall be supported near each joint with a padding of compressive material on a pre-cast concrete block. Concrete shall not be placed until the pipes have been joined, inspected and passed hydraulic testing.

The concrete shall be placed to ensure full contact with the pipe barrel throughout its length. Nominal reinforcement steel shall be provided in the concrete at the bottom of the pipe as directed by the Employer's Representative. The concrete encasement shall cover the pipeline on all sides by a minimum of 200 mm or as directed by the Employer's Representative.

Stringing of Pipe Along the Alignment

The pipes shall be laid out properly along the proposed alignment in a manner that they do not create any significant hindrance to the public and that they are not damaged.

Stringing of the pipes end to end along the working width should be done in such a manner that the least interference is caused in the land crossed. Gaps should be left at intervals to permit the passing of equipment across the working area. Pipes shall be laid out that they remain safe where placed and that no damage can occur to the pipes and the coating until incorporated in the pipeline. If necessary, pipes shall be wedged to prevent accidental movement. Precautions shall be taken to prevent excessive soil, mud etc. entering the pipe.

Generally, the pipes shall be laid within two weeks from the date of their dispatch from the manufacturer/store.

The joint gaskets shall be kept in wooden boxes or their original packing and stored in cool conditions and not exposed to direct sunlight. Gaskets must not be deformed. They shall be taken out only shortly before they are needed.

Laying and Jointing of Pipe

General

The pipes will be cleaned in the whole length with special care of the spigot and sockets on the inside/ outside to ensure that they are free from dirt and unwarranted projections. The whole of the pipes shall be placed in position singly and shall be laid true to profile and direction of slope indicated on longitudinal sections. The pipes shall be laid without deflection in a straight alignment between bends and between high and low points. Vertical and horizontal deflections between individual pipes need the approval of the Employer's Representative . In no case the deflection shall be more than 75% of those recommended by the manufacturer.

Laying and Jointing of DI Pipe

Pipes should be lowered into the trench with tackle suitable for the weight of pipes. For smaller sizes, up to 250 mm nominal bore, the pipe may be lowered by the use of ropes.

All construction debris should be cleared from the inside of the pipe either before or just after a joint is made. This is done by passing a pull-through in the pipe, or by hand, depending on the size of the pipe. All persons should vacate any section of trench into which the pipe is being lowered

On gradients of 1:15 or steeper, precautions should be taken to ensure that the spigot of the pipe being laid does not move into or out of the socket of the laid pipe during the jointing operations. As soon as the joint assembly has been completed, the pipe should be held firmly in position while the trench is back filled over the barrel of the pipe.

The designed anchorage shall be provided to resist the thrusts developed by internal pressure at bends, tees, etc.

The assembly of the pipes shall be made as recommended by the pipe manufacturer and using the suitable tools.

The socket and spigot ends of the pipes shall be brushed and cleaned. The chamfered surface and the spigot end of the pipe have to be coated with a suitable lubricant recommended by the manufacturer of the pipes. Oil, petroleum bound oils, grease or other material which may damage the rubber gasket shall

not be used as lubricant. The rubber gasket shall be inserted into the cleaned groove of the socket. It has to be checked for correct positioning.

The two pipes shall be aligned properly in the pipe trench and the spigot end shall be pushed axially into the socket either manually or with a suitable tool specially designed for the assembly of pipes and as recommended by the manufacturer. The spigot has to be inserted up to the insertion mark on the pipe spigot. After insertion, the correct position of the socket has to be tested with a feeler blade

Deflection of the pipes -if any- shall be made only after they have fully been assembled. The deflection shall not exceed 75 % of the values indicated by the pipe manufacturer.

Use of Tackle

Pipes should be lowered into the trench with tackle suitable for the weight of pipes. For smaller sizes, up to 200 mm nominal bore, the pipe may be lowered by the use of ropes but for heavier pipes suitable mechanical equipment have to be used.

Cleaning

All construction debris should be cleared from the inside of the pipe either before or just after a joint is made. This is done by passing a pull-through in the pipe, or by hand, depending on the size of the pipe. All persons should vacate any section of trench into which the pipe is being lowered.

Laying on Steep Slopes

On gradients of 1:15 or steeper, precautions should be taken to ensure that the spigot of the pipe being laid does not move into or out of the socket of the laid pipe during the jointing operations. As soon as the joint assembly has been completed, the pipe should be held firmly in position while the trench is back filled over the barrel of the pipe.

The designed anchorage shall be provided to resist the thrusts developed by internal pressure at bends, tees, etc. Anchorage shall also be provided for pipeline on steep grades as specified under IS: 12288 Clause 5.8

The assembly of the pipes shall be made as recommended by the pipe manufacturer and using the suitable tools.

Jointing

The socket and spigot ends of the pipes shall be brushed and cleaned. The chamfered surface and the end of the spigot shall have to be coated with a suitable lubricant recommended by the manufacturer of the pipes. Oil, petroleum bound oils, grease or other material which may damage the rubber gasket shall not be used as lubricant. The rubber gasket shall be inserted into the cleaned groove of the socket. It has to be checked for correct positioning.

The two pipes shall be aligned properly in the pipe trench and the spigot end shall be pushed axially into the socket either manually or with a suitable tool specially designed for the assembly of pipes and as recommended by the manufacturer. The spigot has to be inserted up to the insertion mark on the pipe spigot.

Deflection of the Pipe at the Joints

Deflection of the pipe, if any, shall be made only after the lengths have fully been assembled. The deflection shall not exceed 75 % of the values recommended by the pipe manufacturer.

Anchoring of the Pipeline

Thrust blocks shall be provided at each bend, tee, taper, end piece to prevent undue movements of the pipeline under pressure. They shall be constructed as per design of the Employer’s Representative according to the highest pressure during operation or testing of the pipes, the safe bearing pressure of the surrounding soil and the friction coefficient of the soil. This item shall be separately payable as per the provisions under BOQ.

Measurement and Payment

The net length of pipes as laid or fixed shall be measured in running meters correct to a cm including the length of specials. The portion of the pipe at the joints (inside the joints) shall not be included in the length of pipe work. Payment for supply and laying, jointing shall be on length basis as measured above, and as stated below

Thrust, Anti-floatation and Anchor Blocks

The Contractor shall construct thrust, anti-floatation and anchor blocks, as per the enclosed drawing or as and where directed by the Employer's Representative as an acceptable means of pipe restraint. Plain concrete of Class M 15 shall be used for such blocks.

a. Anchor Blocks

Anchor blocks shall be provided on the DI mains laid on sloping ground as specified under Clause 5.8 of IS 12228 as specified below.

- Slope 1 in 2 and steeper — Spacing 5.50 m
- Slope1 in 2 to 1 in 4 — Spacing 11.00 m
- Slope1 in 4 to 1 in 5 — Spacing 16.50 m
- Slope1 in 5 to 1 in 6 — Spacing 22.00 m
- Flatter than 1 in 6 — Not required

Chambers

RCC Chambers and/or Road Box Chambers, for online valves, meters, pressure reducing valves, washout and air valves, Fire Hydrants etc. shall be constructed according to the standard drawings enclosed with the Bid document. Chambers shall be paid as separate item under BOQ on number basis at composite item cost based on size and type of Chamber, which shall cover execution of all the related sub-items as per the drawing but excluding piping, specials and valves which shall be payable under respective BOQ items .

Assembling Flanged Joints

Flanged joints shall be properly laid true to line and level before bolting and on no account shall drifts or dodgers be used in the bolt holes. Flange bolts shall be carefully and evenly tightened in such sequence that diametrically opposite nuts are tightened together to ensure even pressure on the joint ring.

For tightening of all bolts in pipe joints, the Contractor shall provide and use torque wrenches of the "break back" type set to give the tightening torque recommended by the manufacturer.

Washers shall be included below all bolt heads and nuts. Joint O-rings and gaskets shall be stored until needed in a cool place free from direct sunlight.

Hydraulic Testing

Pipeline Testing – Sectional Test

All pipelines shall be hydraulically tested in the presence of Employer's Representative in lengths between valve stations or in such shorter lengths as the Employer's Representative may direct or permit. Fittings required for temporarily closing the openings in pipelines to be tested shall be properly designed for this purpose and shall be adequately strutted to withstand the test pressure specified.

Each pipeline shall be tested after completion of installation with the exception of any back filling in case reinstallation of segments will be required after testing. Permanent valves shall be tested along with the pipelines.

The protocol for testing a pipeline shall include provision for the purging of air from the pipeline prior to a water test. Testing shall be with water only and air testing shall not be allowed.

The Contractor shall keep a record of all tests and their results, which shall be available for inspection at any time and shall be submitted to the Employer's Representative periodically.

The water required for testing shall be arranged by the contractor himself. The Contractor shall fill the pipe and compensate the leakage during testing. The Contractor shall provide and maintain all requisite facilities, instruments, reciprocating pumps, pressure gauges, water tankers etc. for the field testing of the pipelines. The testing of the pipelines generally consists in three phases: preparation, pre-test/saturation and test, immediately following the pre-test. Generally, the following steps are required which shall be monitored and recorded in a test protocol:

i. Complete setting of the thrust blocks.

ii. Partial backfilling and compaction to hold the pipes in position while leaving the joints exposed for leakage control

iii. Opening of all intermediate valves (if any)

iv. Fixing the end pieces for tests and after temporarily anchoring them against the soil (not against the preceding pipe stretch)

- at the lower end with a precision pressure gauge and the connection to the reciprocating pump for establishing the test pressure
- at the higher end with a valve for air outlet

v. If the pressure gauge cannot be installed at the lowest point of the pipeline, an allowance in the test pressure to be read at the position of the gauge has to be made accordingly

vi. Slowly filling the pipe from the lowest point(s).

vii. The water for this purpose shall be reasonably clear and free of solids and suspended matter

viii. Complete removal of air through air valves along the line.

ix. Closing all air valves and scour valves.

x. Slowly raising the pressure to the test pressure while inspecting the thrust blocks and the temporary anchoring.

xi. Keeping the pipeline under pressure for the duration of the pre-test by adding make-up water to maintain the pressure at the desired test level. Make up water to be arranged by Contractor himself at his own cost.

xii. Start the test by maintaining the test pressure at the desired level by adding more make-up water; record the water added carefully and the pressure in intervals of 15 minutes at the beginning and 30 minutes at the end of the test period.

xiii. Water used for testing shall not be carelessly disposed of on land which would ultimately find its way to trenches.

xiv. The testing conditions for the pipelines shall be as per the test pressures and condition laid out in IS 8329 for DI pipes.

The pipeline stretch will pass the test if the water added during the test period is not exceeding the admissible limits. No section of the pipe work shall be accepted by the Employer's Representative until all requirements of the test have been obtained.

The pipeline stretches shall be tested to the pressures equal to 1.5 times the maximum operating pressure in the pipeline stretch under test, subject to a maximum of 200 m of water head or 20 kg/cm^2. Operating pressure shall be equal to static pressure on the pipeline invert level with respect to zonal supply reservoir full tank level.

Test Requirements for DI Pipelines

The testing conditions for the pipelines shall be as described in IS 8329.

The testing conditions for the DI pipelines are summarized as follows:

a. Pretest and Saturation Period with addition of make-up water:

- Test Pressure Duration: 24 hrs for DI pipes with cement mortar lining

b. Pressure Test with addition of make-up water:

- Test Pressure Duration: 3 hrs

c. Testing Criteria for DI pipes:

- Q = 1.0 liter per km per 10mm of pipe diameter per each 30 m of test pressure per 24 hrs.

No pipe installation shall be accepted until the leakage is less than the amount 'Q', as determined by the above formula.

Road Reinstatement

The Contractor shall be responsible to ensure that all existing asphalt roads, brick roads, concrete roads, WBM roads are reinstated as stated in Road Subsection, immediately after hydraulic testing of the pipeline and backfilling has been completed. The finished levels of the completed reinstatement shall conform to the adjoining carriageway surface. Reinstated road shall match as nearly as practicable to the characteristics of the existing road. .

Railway Crossing

Pipeline crossings beneath railroad tracks shall be constructed as a part of this Contract, as detailed on the Drawings.

Laying and jointing of the distribution pipes, providing and fixing of the valves, Manhole covers and construction of the chambers on both sides of the crossings shall be included in this work.

The Contractor shall obtain all necessary permits to construct, from Indian Railways and the local representative of the Ministry of Railways of the Government of India, before proceeding with any work at the specific crossing site.

Pipe jacking where required shall be in accordance with Subsection 6.9.8.

RCC valve chambers shall be constructed at each end of the pipe or casing pipe, if shown, as per the structural drawings. Sluice valves, washout valves, air valves and dismantling joints, wherever applicable, shall be placed in valve chambers as shown on the relevant drawing.

Work Sequence

The work of laying or jacking of the distribution pipeline or casing pipe beneath the railway tracks, including construction of the RCC chambers, shall be undertaken prior to installation of the distribution mains on either side of the railway in the vicinity of the railway crossing.

All work shall be carried out under the supervision of the representative from the Railway Authority and Employer’s Representative.

Technical Specifications

Subsection 6 – Road Works

6. Road Works

The road works is basically the Road Reinstatement work. The Contractor shall be responsible to ensure that all existing roads are reinstated to their proposed condition, as listed below, immediately after hydraulic testing of the pipeline and backfilling has been completed, as per specification. The finished levels of the completed reinstatement shall conform to the adjoining carriageway or road surface. Reinstated road shall match the levels of the existing road.

Existing Road Surface	Proposed Road Surface
Bituminous or Asphalt	Same as Existing
Concrete	Bituminous or Concrete (as per direction of Employer's Representative)
Water Bound Macadam (WBM)	Same as Existing
Brick	Same as Existing or Bituminous (as per direction of the Employer's Representative)
Earthen	Same as Existing

The work shall be carried as per the Road Work Specifications (latest) of the Public Works Department (PWD), Government of Assam. The item shall be complete in all respect as per specification and as directed, including all lead and lift. The materials shall be tested at site and laboratory, as directed.

Other details shall conform to the Standard Specification. Material grading shall be as per the latest Assam PWD schedule.

Asphalt (Bituminous) Road

The roads to be reinstate as asphalt or bituminous roads. Types of roads are Type I, Type II, Type III, whose specification is described below. Type I shall be applicable for heavy traffic roads (5 MSA[1]), Type II for medium traffic roads (3 MSA[1]) and Type III for low traffic roads (1 MSA[1]). The base earth strata shall achieve 7% CBR value, before application of road reinstatement activity. Type of road restoration work shall be decided by the Employer's Representative.

Granular Sub Base (GSB)

Construction of Granular Sub base (GSB) shall be done by providing close graded material and spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC and compacting with vibratory roller to achieve the desired density, complete as per clause 401 of MoSRT&H including testing of materials at the site and in the laboratory.

Water Bound Macadam Road

This work shall consist of providing clean and crushed aggregates, laying & compacting of WBM sub-base / base course by rolling and bonding together with screening, binding material where necessary and watering, including preparation and compaction of sub-base & spreading of crushed aggregate to proper grade and camber including application of screenings for interlocking, sprinkling of water & rolling with power roller as per instructions of the Employer's Representative, shall be as specified below.

a. Grading No.1 material 75 to 45 mm size with stone screenings & binding material,
b. Grading No.2 material 63 to 45 mm size with stone screenings & binding material,
c. Grading No.3 material 53 to 22.4 mm size with stone screenings & binding material.

Thickness of Sub-base is according to the standard drawing of road restoration attached for different types of roads

Prime Coat

Providing and applying a prime coat at 0.60 Kg/Sq.m with bitumen emulsion CSS-1 (IS 8887-2004) on prepared surface of WBM including cleaning of road surface and spraying primer at the rate specified using mechanical means

Tack Coat

Providing and applying tack coat with bitumen emulsion, using emulsion pressure distributor at 0.2 Kg/Sq.m on the prepared surface, after cleaning with a mechanical broom. The bitumen emulsion shall be of CSS-1h for a normal bituminous surface. The materials shall be tested at the site and in a laboratory.

Bituminous Macadam

Providing, laying and rolling of bituminous macadam 50 mm thick from a 100-120 TPH hot mix plant producing an average output of 75 T/hr. using crushed aggregates of Grading II (19 mm nominal size) premixed with bituminous binder, transported to the site and laid over a prepared surface.

Premix Carpet

Providing, laying and rolling of close graded premix surfacing (by mechanical means from a HMP of appropriate capacity not less than 75 T/hr) at a thickness of 20mm comprised of 11.2 mm to 0.09mm (Type A) aggregate, using penetration grade bitumen to serve as a wearing coarse on a previously prepared base, including mixing in a suitable plant laying and rolling with a smooth wheeled roller of 8 to 10 T capacity to the required level and grade, with anti-stripping agent as per IS 14982.

Cement Concrete Road

The concrete road shall be of M20 plain concrete of 200 mm thick. This work, if applicable anywhere as per direction of Employer's Representative, shall conform to Standard specification – Cement concrete pavement under Road Section.

Brick Road

Material shall be as stipulated in Standard specification. Brick shall be laid as brick-on-edge, and match with existing brick road. The work shall include providing and laying of bricks on edge for road restoration on earth subgrade. The bricks shall be on edge, diagonally placed, and gap filled up with sand, all complete, as per specification, drawing and as directed.

Paver Block

General

The construction of block pavement involves preparation of subgrade, sub-base and base course layers, bedding sand and finally the laying of blocks. The block paving can be done entirely by manual labour. However, for efficient construction work, the work force has to be properly trained for this specialized job. Paving can also be done by mechanical means. Interlocking CC Paver block should be of minimum M40 grade concrete and 80mm thick

Preparation of Subgrade

This is the foundation layer on which the block pavement is constructed. Like in conventional pavements the water table should be at a minimum depth of 600 mm below the subgrade. Subgrade should be compacted in layers of 150 or 100 mm thickness as per 1RC:36-1970. The prepared subgrade should be graded and trimmed to a tolerance of ± 20 mm of the design levels, and its surface evenness should have a tolerance of within 15 mm under a 3 m straight edge.

Base and Sub-base Course

Interlocking Paver block should be placed above properly compacted Base and Sub-base, according to the site type of roads, for medium traffic roads, 150mm thick GSB and 100mm thick WBM is minimum requirement.

Placing and Screeding of Bedding Sand

The thickness of the sand bed after compaction should be in the range of 20-40 mm, whereas, in the loose form it can be 25 to 50 mm. It is preferable to restrict the compacted thickness to 20-25 mm to reduce the risk of any localized pre compaction, which would affect the final block surface level. Bedding sand should not be used to fill-up local depressions on the surface of a base or subbase. The depressions should be repaired in advance before placing sand.

Laying of Blocks

Blocks can be laid generally by manual labour but mechanical aids like hand-pushed trolleys can expedite the work. Normally, laying should commence from the edge strip and proceed towards the inner side.

When dented blocks are used, the laying done at two fronts will create problem for matching joints in the middle. Hence, as far as possible, laying should proceed in one direction only, along the entire width of the area to be paved.

While locating the starting line, the following should be considered:

On a sloping site, start from the lowest point and proceed uphill on a continuous basis, to avoid downhill creep in incomplete areas.

Bonds or Patterns of Laying Blocks

The blocks can be placed to different bonds or patterns depending upon requirement. Some Popular bonds commonly adopted for block paving are:

(i) Stretcher or running bond

(ii) HeiTingbone bond

(iii) Basket weave or parquet bond

Section VII: Contract Forms

LETTER OF ACCEPTANCE
CUM NOTICE TO PROCEED WITH THE WORK

Dated: _____

To: _____ [Name and address of the Contractor]
_____
_____
_____
_____

Dear Sir,

This is to notify you that your Bid dated_____ for execution of the Contract Package No. C#5C- Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone for the contract price of Rupees_____ _____ [amount in words and figures], is hereby accepted by us.

You are hereby requested to furnish performance security for an amount of Rs. _____ (equivalent to 10% of the contract price) within 14 days of the receipt of the letter. The Performance Security in the form of Bank guarantee or a Bank draft in favour of "The Project Director, JICA Assisted Guwahati Water Supply Project, Guwahati" (Employer) shall be valid till the expiry of the period of contract and till taking over. Failure to furnish the Performance Security will entail cancellation of the award of contract.

You are also requested to sign the agreement form and proceed with the work not later than _____ under the instructions of the Employer, Project Director, JICA Assisted Guwahati Water Supply Project, Guwahati and ensure its completion within the contract period.

With the issuance of this acceptance letter and your furnishing the required Performance Security, the contract, for the above said work, stands concluded.

Authorized Signature
Name and title of Signatory of Employer

ARTICLES OF CONTRACT AGREEMENT

1. This deed of agreement is made in the form of agreement on _____ day _____ month _____ 20 ___, between the Project Director, JICA Assisted Guwahati Water Supply Project, Guwahati (Employer) or his authorized representative (hereinafter referred to as the first party) and _____ (Name of the Contractor), resident of _____ (hereinafter referred to as the second party), to execute the work of: "Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone under Contract Package No. C#5C" (hereinafter referred to as works) on the following terms and conditions.

2. Contract Price

The total Contract Price for the works (hereinafter referred to as the "total price") is Rs. _____ as reflected in Annexure - 1.

3.1 Payments under its contract:

Payments to the second party for the work will be released by the first party in the following manner:-

On signing of agreement and Mobilization	**:**	10% of total cost, as interest free mobilization advance against receipt of an unconditional Bank Guarantee from the Contractor for an equivalent amount valid up to the Intended Completion Date, in the format attached.
Minimum Amount of Interim Payment Certificates	:	10% of the Contract Value
Final payment Certificate	**:**	Upon completion & commissioning and handing over.

3.2 Payments at each stage will be made by the first party:

(a) on the second party submitting an invoice for an equivalent amount;

(b) on certification of the invoice (except for the first installment) by the Engineer nominated by the first party with respect to quality/quantity of works executed; and

(c) Payments shall be adjusted for deductions for advance payments, recoveries if any in terms of the contract, and taxes at source, as applicable under the law.

(d) The advance (if availed by the contractor) shall be repaid with percentage deductions from the interim payments, commencing with the next Interim Payment at the rate of 20 percent of the amounts of all Interim Payment Certificates until the advance has been repaid, provided that the advance shall be completely repaid prior to the expiry of the Intended Completion Date. The Bank Guarantee shall remain effective until the advance payment has been fully repaid.

4. Notice by the Contractor to Engineer

The second party, on the works reaching full completion including trial run & commissioning, issue a notice to the first party or the Engineer nominated by the first party (who is responsible for supervising the contractor, administering the contract, certifying the payments due to the contractor, issuing and valuing variations to the contract, awarding extensions of time etc.), to

visit the site for certification of completion. Within 15 days of the receipt of such notice, the first party or the Engineer nominated by it, will ensure issue of completion certificate after due verification.

Upon issuing the completion certificate, the first party will take over the works.

5. Completion time

The works should be completed in 6 months [including trial run & commissioning] from the date of this Agreement. In exceptional circumstances, the time period stated in this clause may be extended in writing by mutual consent of both the parties.

6. If any of the compensation events mentioned below would prevent the work being completed by the intended completion date, the first party will decide on the intended completion date being extended by a suitable period:

a) The first party does not give access to the site or a part thereof by the agreed period.

b) The first party orders a delay or does not issue completed drawings, specifications or instructions for execution of the work on time.

c) Ground conditions are substantially more adverse than could reasonably have been assumed before issue of letter of acceptance and from information provided to second party or from visual inspection of the site.

d) Payments due to the second party are delayed without reason.

e) Certification for stage completion of the work is delayed unreasonably.

7. Any willful delay on the part of the second party in completing the construction [45 days] within the stipulated period will render him liable to pay liquidated damages @ 0.10% of the contract value per day which will be deducted from payments due to him. The first party may cancel the contract and take recourse to such other action as deemed appropriate once the total amount of liquidated damages exceeds 3 % of the contract amount.

8. Duties and responsibilities of the first party

8.1 The first party shall be responsible for providing regular and frequent supervision and guidance to the second party for carrying out the works as per specifications. This will include written guidelines and regular site visit of the authorized personnel of the first party, for checking quality of material and construction to ensure that it is as per the norms.

8.2 The first party shall supply one set of drawings, specifications and guidelines to the second party for the proposed works.

8.3 Possession of the site will be handed over to the second party within 14 days of signing of the agreement.

8.4 The Engineer or such other person as may be authorized by the first party shall hold meeting once in a week, where the second party or his representative at site will submit the latest information including progress report and difficulties if any, in the execution of the work. The whole team may jointly inspect the site on a particular day to take stock of activities.

8.5 The Engineer shall record his observations/instructions at the time of his site visit in a site register maintained by the second party. The second party will carry out the instructions and promptly rectify any deviations pointed out by the engineer. If the deviations are not rectified, within the time specified in the Engineer's notice, the first party as well as the engineer

nominated by it, may instruct stoppage or suspension of the construction. It shall thereupon be open to the first party or the Engineer to have the deviations rectified at the cost of the second party.

8.6. The first party will provide water at the entry point to the DMA during the trial run and commissioning period.

8.7. During the testing & trial run of the Distribution network, while the contractor will be responsible for rectifying any defects in the works done by him; and for the rectification if any required in the lines laid earlier by the previous contractor, the required material, labour and equipment will be provided from the Day works or Provisional Sums in the Contract. .

9. Duties and responsibilities of the second party:

9.1 The second party shall:

a) take up the works and arrange for its completion within the time period stipulated in Clause 5;

b) employ suitable skilled persons to carry out the works;

c) regularly supervise and monitor the progress of work;

d) abide by the technical suggestions/ direction of supervisory personnel including Engineers etc.;

e) be responsible for bringing any discrepancy to the notice of the representative of the first party and seek necessary clarification:

f) ensure that the work is carried out in accordance with specifications, drawings and within the total of the contract amount without any cost escalation;

g) keep the first party informed about the progress of work;

h) be responsible for all security and watch and ward arrangements at site till handing over of the building to the first party; and

i) be responsible for the safety of the men working at site. All safe practices shall be strictly adhered to by the workmen of the contractor like wearing helmets, safety belts when working at heights, gloves when handling sharp objects and reinforcement, eye shields, safety shoes, etc. He shall provide first aid boxes at site. In spite of following safe methods, in case of any unfortunate accident, the contractor shall indemnify the employer against any expenses or claims towards treatment or compensation.

j) maintain necessary insurance against loss of materials/cash, etc. or workman disability compensation claims of the personnel deployed on the works as well as third party claims.

k) Pay all duties, taxes and other levies payable by construction agencies as per law under the contract (First party will effect deduction (TDS) from running bills in respect of such taxes as may be imposed under the law). Also deduct 5% as Retention money from the interim payments, which will be released on completion and commissioning of the works.

l) shall not directly or indirectly sublet the work to other party without written permission from the Employer.

m) shall carry out the entire work having full regard for the safety of the men working at site. All safe practices shall be strictly adhered to by the workmen of the contractor like wearing

helmets, safety belts when working at heights, gloves when handling sharp objects and reinforcement, eye shields, safety shoes, etc. He shall provide first aid boxes at site. In spite of following safe methods, in case of any unfortunate accident, the contractor shall indemnify the employer against any expenses or claims towards treatment or compensation.

n) shall be responsible for all injury to persons / animals, any damage to building, building structure, roads, streets and footpaths etc., by his act / during the execution of work and the same shall be rectified at his own cost.

o) shall maintain all the inventory supplied by him including the equipment if any supplied by the Employer.

p) After execution of the works in all respect, the Contractor shall do testing, trial run of the entire Distribution system network in the DMA for a period of 90 days. If required by the Employer, the period may be extended at the rates quoted in the contract, as a variation.

q) During the testing & trial run, the contractor will be responsible for rectifying any defects in the works done by him; and for the rectification if any required in the lines laid earlier by the previous contractor, the required material, labour and equipment will be provided from the Day works or Provisional Sums in the Contract. .

10. Variations / Extra Items

The works shall be carried out by the second party in accordance with the approved drawings and specifications. However, if, on account of site conditions or any other factors, variations are considered necessary, the following procedure shall be followed:-

a) The second party shall provide the Engineer with a quotation for carrying out the Variation when requested to do so by the Engineer. The Engineer shall assess the quotation, which shall be given within seven days of the request before the Variation is ordered.

b) If the quotation given by the second party is unreasonable, the Engineer may order the Variation and recommend a change to the Contract Price, which shall be based on Engineer's own forecast of the effects of the Variation on the Contractor's costs.

c) The second party shall not be entitled to additional payment for costs which could have been avoided by giving early warning.

11. Securities

The Performance Security (Bank Guarantee from a Nationalized or Scheduled Bank in India in the format attached) shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a Bank or surety acceptable to the Employer. The Performance Security shall be valid until a date 28 days from the date of issue of the Certificate of Completion in the case of a Bank Guarantee.

12. Termination

12.1 The Employer may terminate the Contract if the other party causes a fundamental breach of the Contract.

12.2 Fundamental breaches of Contract include, but shall not be limited to the following:

(a) the contractor stops work for 7 days and the stoppage has not been authorized by the Engineer;

(b) the Contractor has become bankrupt or goes into liquidation other than for a reconstruction or amalgamation;

(c) the Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;

(d) the Contractor does not maintain a security which is required;

(e) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, as defined in the Clause 7 of this agreement

12.3 Notwithstanding the above, the Employer may terminate the Contract for convenience.

12.4 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.

13. Payment upon Termination

13.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a certificate for the value of the work done less advance payments received up to the date of the issue of the certificate, less other recoveries due in terms of the contract, less taxes due to be deducted at source as per applicable law.

13.2 If the Contract is terminated at the Employer's convenience, the Engineer shall issue a certificate for the value of the work done, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the Works and less advance payments received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to be deducted at source as per applicable law.

14. Dispute settlement

If over the works, any dispute arises between the two parties, relating to any aspects of this Agreement, the parties shall first attempt to settle the dispute through mutual and amicable consultation.

In the event of agreement not being reached, the matter will be referred for arbitration by a Sole Arbitrator not below the level of retired Superintending Engineer, Assam PHED/AUWSSB to be appointed by the first party. The Arbitration will be conducted in accordance with the Arbitration and Conciliation Act, 1996. The decision of the Arbitrator shall be final and binding on both the parties. The Arbitrator shall give his award/decision within 60 days of start of proceedings.

The Priced Bill of Quantities (Annexure 1), Format of Certificate (Annexure 2) and Specification and Drawings (Annexure 3) are attached.

Signed and delivered by Mr._____ _____ for and on behalf of the Contractor

In the presence of the Witness:

i)

ii)

SIGNATURE

Signed and delivered by Mr. _____ Project Director, JICA Assisted Guwahati Water Supply Project, Guwahati.

In the presence of the Witness:
i)

ii)

SIGNATURE

PERFORMANCE BANK GUARANTEE

(*To be given from a nationalized or scheduled bank in India)*

To
Project Director,
Project Implementation Unit,
JICA Assisted Guwahati Water Supply Project,
II Floor, Saikia Commercial Complex
Christian Basti, G.S Road, Guwahati – 781 005

WHEREAS _____ *[name and address of Contractor]* (hereinafter called "the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute "Contract Package No. C#5C: Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone", (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____ *[amount of guarantee]*[1]_____ *[in words]*, such sum being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of _____ *[amount of guarantee]*[1] as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until 28 days from the date of expiry of the Defects Liability Period.

Signature and seal of the guarantor _____
Name of Bank _____
Address _____
Date _____

BANK GUARANTEE FOR ADVANCE PAYMENT

To
Project Director,
Project Implementation Unit,
JICA Assisted Guwahati Water Supply Project,
II Floor, Saikia Commercial Complex
Christian Basti, G.S Road, Guwahati – 781 005

Name of Contract: Contract Package No. C#5C: Procurement of Works (Item rate) for Supply, Installation & Commissioning of Employer furnished D.I Pipes for the balance works under the Distribution Network in the DMA No. 5R9 of Ramsahill of South- Central Zone

---

Gentlemen:

In accordance with the provisions of the Conditions of Contract, sub-clause 3.1 of the above-mentioned Contract, _____ *[name and address of Contractor]* (hereinafter called "the Contractor") shall deposit with _____ *[name of Employer]* a bank guarantee to guarantee his proper and faithful performance under the said Clause of the Contract in an amount of _____ *[amount of guarantee]* [1] _____ *[in words]*.

We, the _____ *[bank or financial institution]*, as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to Project Director, JICA Assisted Guwahati Water Supply Project, Guwahati – 781 005 [*Employer]* on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding _____ [amount of guarantee][1] _____ *[in words]*.

We further agree that no change or addition to or other modification of the terms of the Contract or of Works to be performed thereunder or of any of the Contract documents which may be made between Project Director, JICA Assisted Guwahati Water Supply Project, Guwahati – 781 005 *[Employer]* and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

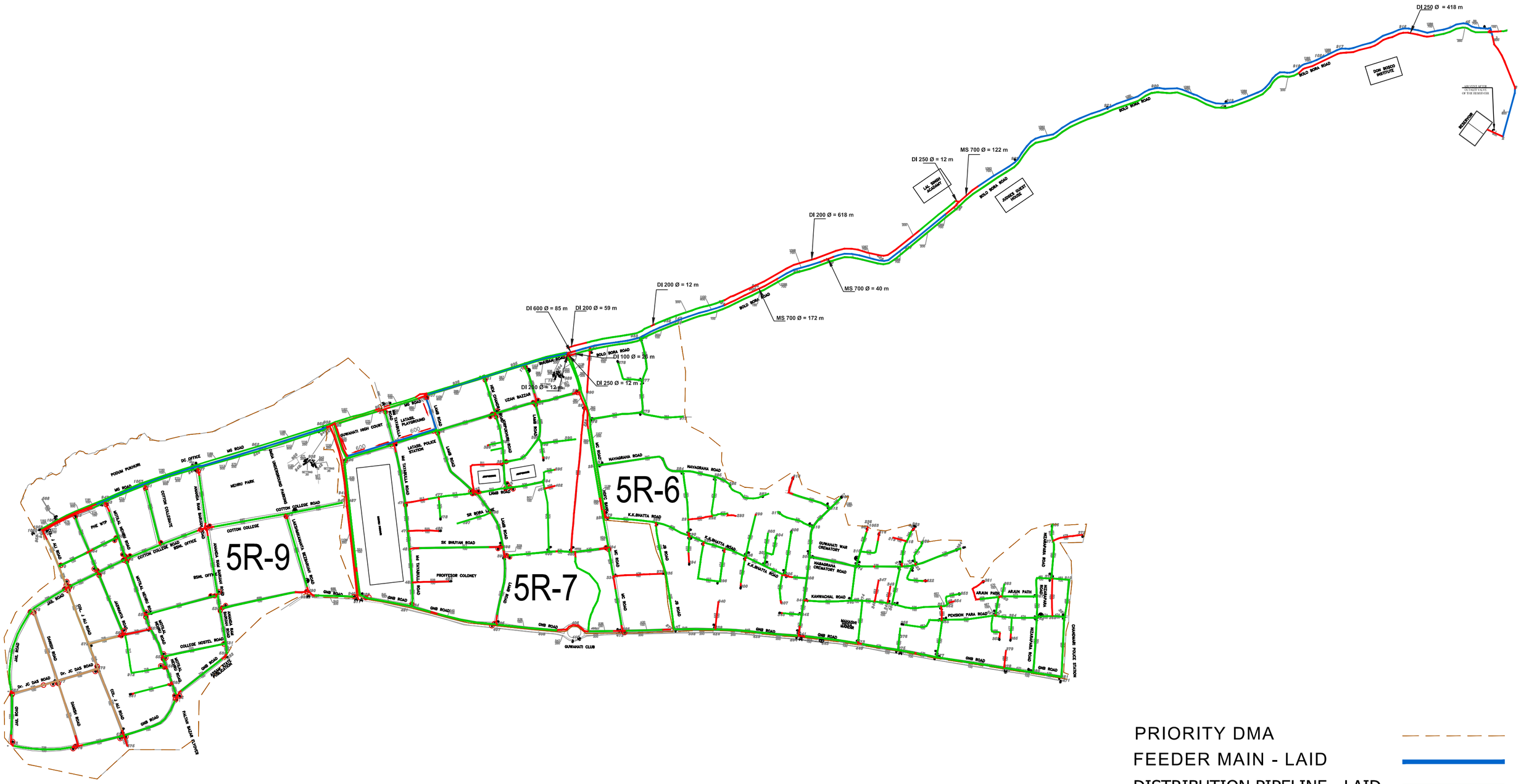
This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____ *[name of Employer]* receives full repayment of the same amount from the Contractor.

Yours truly,

Signature and seal: _____
Name of Bank/Financial Institution: _____
Address: _____
Date: _____

[1] An amount shall be inserted by the bank or financial institution representing the amount of the Advance Payment, and denominated in Indian Rupees.

WATER DISTRIBUTION NETWORK OF RAMSAHILL ZONE, PKG#05



PRIORITY DMA

FEEDER MAIN - LAID

DISTRIBUTION PIPELINE - LAID

- GAP

Consultants:
PROJECT MANAGEMENT CONSULTANT (PMC)
NJS Consultants Co.,Limited
Saikia Commercial Complex,
3rd Floor,
Christian Basti,
G.S.Road
Guwahati - 781005

Project:
GUWAHATI WATER SUPPLY PROJECT (GWSP)
(JICA ODA LOAN PROJECT: ID P-201)

Client:
GUWAHATI METROPOLITAN DEVELOPMENT AUTHORITY (GMDA)
STATFED Building, Bhangagarh, GMCH Road,
Guwahati-5, Assam

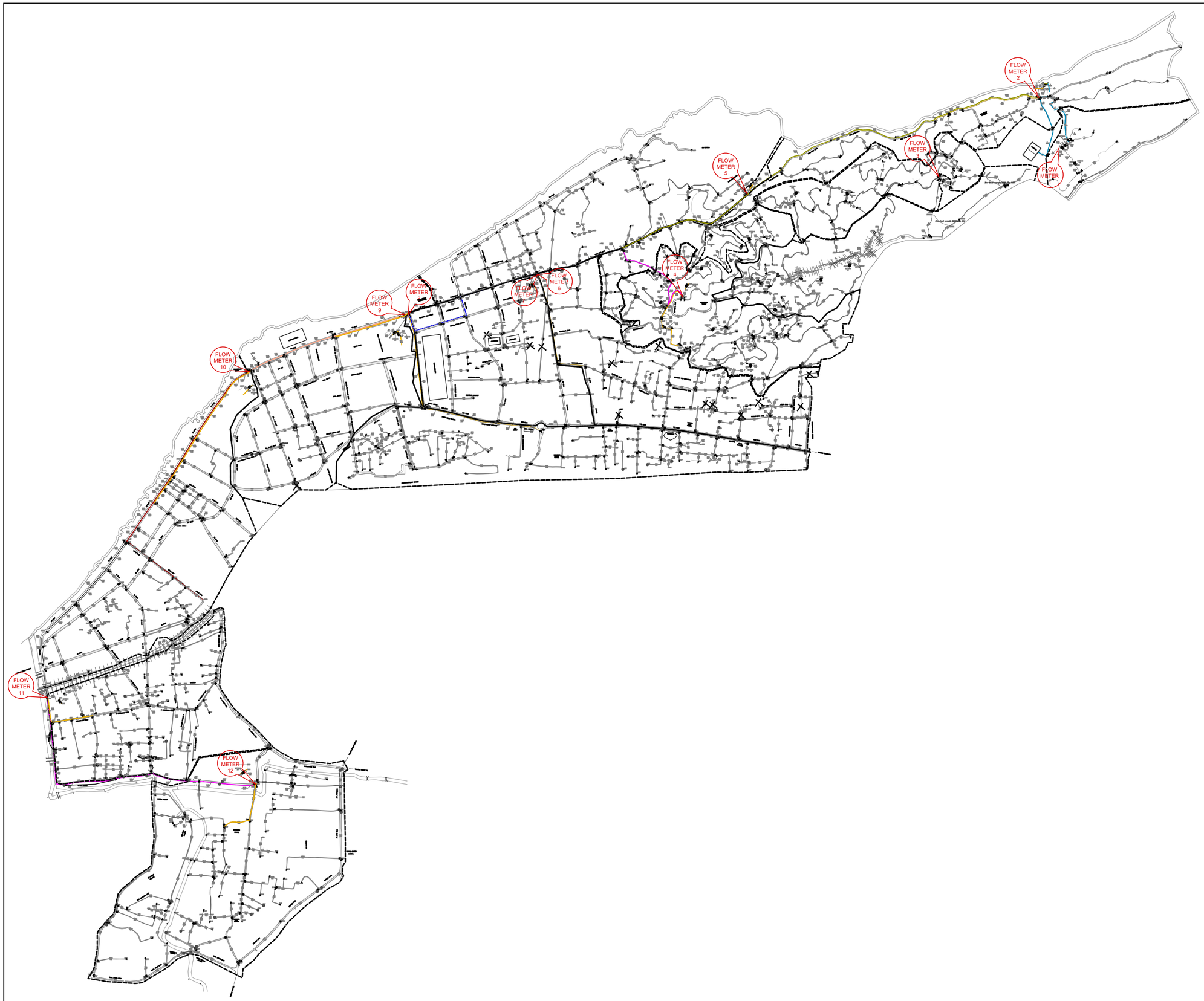
REV NO.	DATE	REMARKS
3		
2		
1		
0	02.01.2019	Final - For Tendering Purpose

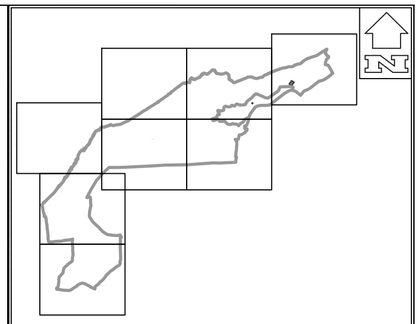
Approved by:	
Checked by:	
Drawn by:	
Design by:	
Scale: **NTS**	Rev:

Title:
GAP DETAILS OF PRIORITY 3 DMA's & FEEDER MAIN

Drawing No. **GWSP/C-5/R/GAP-01**

Sheet No: **01 of 01**





LEGEND

SL.NO.	DESCRIPTION	SYMBOL
1	DISTRIBUTION ZONE BOUNDARY	
2	SUB-ZONE BOUNDARY	
3	ROAD	
4	BRIDGE	
5	RAILWAY TRACK	
6	CULVERT	
7	CROSS-DRAIN	
8	COVERED-DRAIN	
9	RIVER/CANAL/DRAIN	
10	PARK/PLAY GROUND	
11	WATER BODY	
12	FLY-OVER	
13	WATER DISTRIBUTION PIPE LINE WITH DIA.	NODE ID — LINK ID / LINK DIAMETER — NODE ID
14	DISTRIBUTION LINE COLOR CODE	
	A) 100 ID DI K9	
	B) 110 MM OD PE-80, 6KG/CM^2	
	C) 150 ID DI K9	
	D) 160 MM OD	
	E) 200 ID DI K9	
	F) 250 ID DI K9	
	G) 300 ID DI K9	
	H) 400 ID DI K9	
	I) 500 ID DI K9	
	J) 600 ID 6MM THICK MS PIPE	
	K) 700 ID 6MM THICK MS PIPE	
	L) 800 ID 6MM THICK MS PIPE	
15	LAND MARK	
16	SLUICE VALVE	
17	BUTTERFLY VALVE	
18	PRESSURE REDUCING VALVE	
19	WASHOUT VALVE	
20	FIRE HYDRANT	
21	FLOW METER	
22	AIR VALVE	
23		
24	FLOW DIRECTION AIR VENT	
25)	Flow Meter Location	FM01

NOTES:

01. PIPE DIAMETERS ARE IN MM UNLESS OTHERWISE STATED.
02. THIS DRAWING TO BE READ IN CONJUNCTION TO STANDARD DETAIL DRAWING.
03. ALL THE VALVES IN THE DISTRIBUTION NETWORK INCLUDING SLUICE VALVES, WASHOUT VALVES, BUTTERFLY VALVES, PRESSURE REDUCING VALVES, AIR VALVES, FIRE HYDRANTS ETC. SHALL BE OF PRESSURE RATINGS PN-1.6(1.6mpa or 16kg/cm^2)
04. AIR VENT DETAILS SHALL BE AS SHOWN ON RAMSAHILL PUMPING MAIN DRAWING.

Consultants :
PROJECT MANAGEMENT CONSULTANT (PMC)
NJS Consultants Co.,Limited
Saikia Commercial Complex,
3rd Floor,
Christian Basti,
G.S.Road
Guwahati - 781005

Project :
GUWAHATI WATER SUPPLY PROJECT (GWSP)
(JICA ODA LOAN PROJECT : ID P-201)

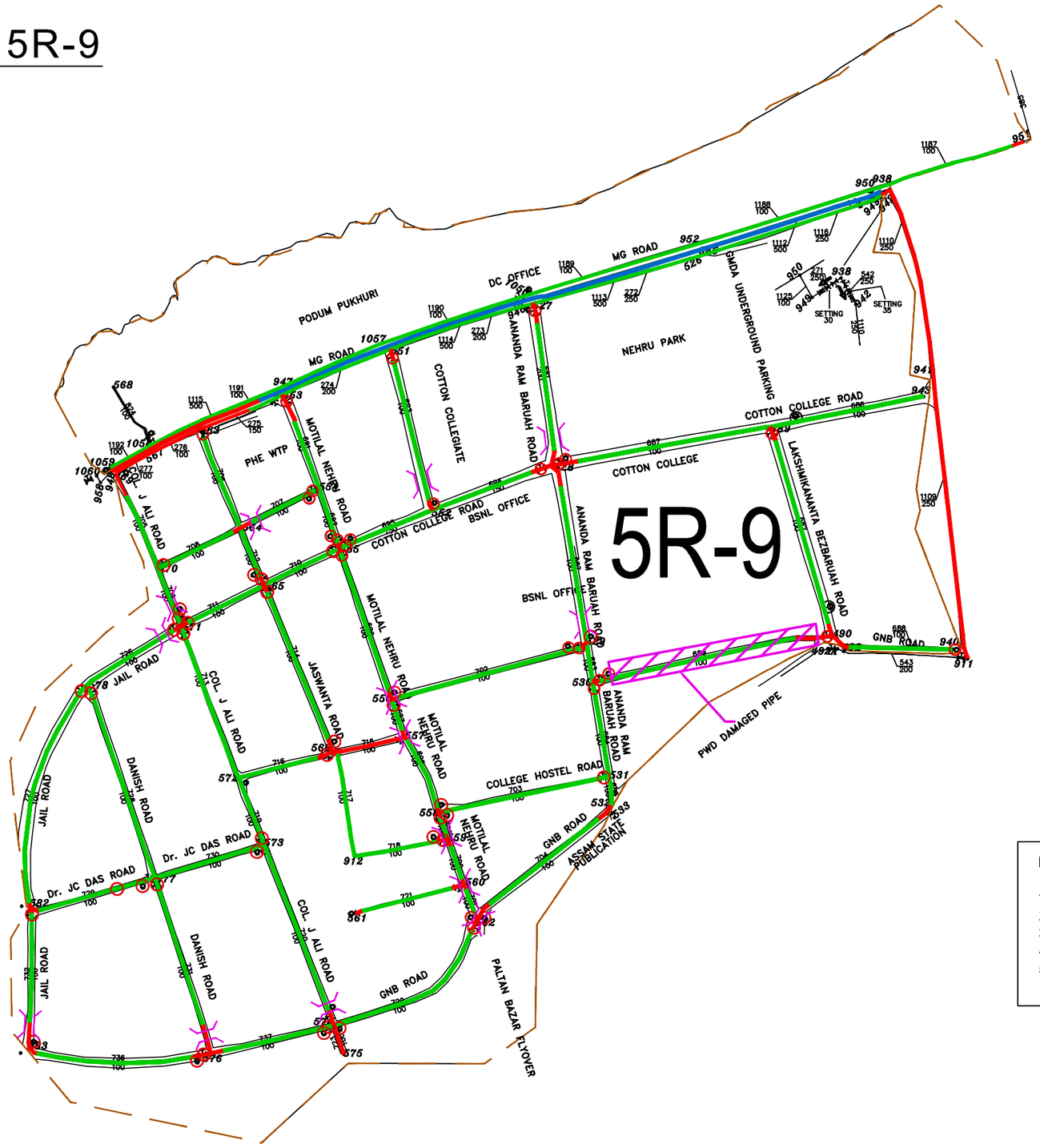
Client :
GUWAHATI METROPOLITAN DEVELOPEMENT AUTHORITY (GMDA)
STATFED building , bhangagarh, GMCH Road,
Guwahati -5 , Assam

Approved by :		3		
Checked by :		2		
Drawn by :		1		
Design by :		0	02.01.2019	Final for tender purpose
Scale :	Rev: 0	Rev. No.	DATE	REMARKS

Title :
FLOW METER LOCATION OF RAMSAHILL ZONE C#05

Drawing No. **GWSP/C#05/NETWORK REVISED-RH/FM/01**
Sheet No. 01

DMA 5R-9



NOTE:-

1. TOTAL SCOPE = 11084.04 m
2. LAID = 10495.54 m
3. BALANCE = 588.50 m
4. NO OF RECOGNIZED GAPS = 28 Nos.
5. BALANCE VALVE CHAMBER = 17 Nos.

FEEDER MAIN - LAID
DISTRIBUTION PIPELINE - LAID
- GAP
VALVE CHAMBER COMPLETED
DRAIN CROSSING

Consultants:
PROJECT MANAGEMENT CONSULTANT (PMC)
NJS Consultants Co.,Limited
PMC Project Office,
Saikia Commercial Complex,
3rd Floor,
Christian Basti,
G.S.Road
Guwahati - 781005

Project:
GUWAHATI WATER SUPPLY PROJECT (GWSP)
(JICA ODA LOAN PROJECT: ID P-201)

Client:
PROJECT DIRECTOR PROJECT IMPLEMENTATION UNIT JICA ASSISTED GWSP
2nd floor Saikia Commercial Complex,Christian Basti,G.S.Road
Guwahati-5, Assam

REV NO.	DATE	REMARKS
3		
2		
1		
0		

Approved by:	
Checked by:	
Drawn by:	
Design by:	
Scale:	Rev: 0

Title:
DMA DISTRIBUTION NETWORK, PIPE LAID AND GAPS DONE BY IVRCL

Drawing No. **GWSP/NJS/C#05/R/LAID/004**
Sheet No: **01 of 01**