Project: *Gopalpur Palm Resort –*

Swosti Group

Request for Proposal:

Supply, Installation, Testing & Commissioning of Plumbing System [Sanitary Fixtures & Fittings, Water Supply (External & Internal) and Drainage System (External & Internal) at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam, on Item Rate Contract Basis

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INTRODUCTION

Background

Swosti Premium Ltd., a leading hospitality group in Odisha, the owner and developer of a hospitality project titled Gopalpur Palm Resort located at Gopalpur, Odisha(hereafter referred to as "The Client") is undertaking the development of a world-class hospitality destination under the brand **"Gopalpur Palm Resort"** at Gopalpur-on-Sea, District Ganjam, Odisha. The project envisions a premium coastal resort comprising a luxury hotel of B+G+9 storied building with 124+ keys, banquet and MICE facilities, restaurants, landscaped areas, spa & wellness, swimming pools, and associated amenities.

In pursuit of delivering a high-standard facility within a fixed timeframe, Swosti Premium Ltd. intends to select a reputed Contracting Firms for Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of All Plumbing-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam, on Item Rate Contract Basis.-

Project Summary

Pkg. No.	Name of Work	Estimated Cost	Construction Period	Maintenance Period
04	Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of All Plumbing-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,	₹370 Lakhs*	9 (Nine) Months	1 Year (DLP)+ 5 (Five) Years Paid

*Estimated Cost is exclusive of GST and based on current project planning and scope.

Scope of Work

The selected Bidder (hereafter referred to as the **"Contractor"**) shall be responsible for the following deliverables as per the terms of the Item Rate Basis contract:

- **Supply, Execution, Testing & Commissioning** based on issued GFC drawings
- **Procurement & Execution** of materials, manpower, equipment, and tools
- **MEP related facilitation with Civil Contractor in Coordination** with PMC as per client-appointed agencie's requirement.

PREAMBLE

1 The work shall be carried out strictly in compliance with this tender and design requirement. The onus of demonstrating satisfactory performance of entire system shall be sole responsibility of the contractor and supplied material shall be as per specifications and approved shop drawings. Relevant Indian Standards shall be adhered. It is to be understood that all liabilities and risks arising out of the stated conditions of contract shall be covered by contractor and Owner/Consultant shall be indemnified.

2 The unit rate for all items in the BOQ shall be quoted in Indian Rupees (INR) and include cost of equipment, wastage, accessories, tools, appliances, labour, installation, testing & commissioning upto satisfactory handover.

3 The contractor shall ensure that unit price of each item includes cost of Equipment, materials, fixing accessories, appliances, tools, plants, transport, labour and incidentals required in preparation for and in the full and entire execution, testing, balancing, commissioning and completion of work called for in the item and as per Specifications and Drawings.

4 The contractor to ensure that all waste and debris is collected and satisfactorily disposed off from site.

5 The contractor shall ensure that unit price of each item includes loading, transporting, unloading, handling/double handling, hoisting to all levels, setting, fixing in position and insurance upto satisfactory handover including security.

6 The specifications and drawings shall be read in conjunction to the Bill of Quantities. In case of conflict between Bill of Quantities and other documents including the specifications, the most stringent shall apply. The interpretation of the Architect / Consultant /Project Manager shall be final and binding

7 The quantities mentioned in the BOQ are for contractor guidance only.The actual procurement of material shall be done only after written approval of shop drawings & technical submittals. This shall also apply to the Contractor's requisition for Owner supplied materials. The contractor shall be solely responsible for material supplied at site.

9 The contractor shall ensure work is carried out in conformity with the approved shop drawings and taking cognizance of latest architectural and other displine drawings. The execution at site should be based on coordinated shop drawings or after obtaiing written approval of Project Manager/Architect/Consultant.

10 The progress of work shall be in accordance with approved pert chart which will be prepared by Contractor at the time of award of work and duly revised from time to time.

11 All shop drawings will be made on Autocad or Revit as per Project Manager requirement. Coloured prints shall be provided for site work. The shop drawings will clearly indicate requirement of hangars, supports, quantities and instructions for installation.

12 The information contained in this bid document, or any other information subsequently provided to Bidders—whether verbally, in documentary form, or by any other means—by or on behalf of the Client or any of its employees or advisers, is provided to the Bidders on the terms and conditions set out in this bid and such other terms and conditions subject to which such information is provided.

13 This bid document is not an agreement, nor is it an offer or invitation by the Client to any prospective Bidder or any other person. The purpose of this bid is to provide interested Bidders with information that may be useful in formulating their Proposals pursuant to this bid process.• This document includes statements that reflect various assumptions and assessments made by the Client in relation to the Services. Such assumptions, assessments, and statements do not purport to contain all the information that each Bidder may require. This bid may not be appropriate for all persons, and it is not possible for the Client, its employees, or advisers to consider the objectives, technical expertise, and particular needs of each party who reads or uses this bid.

14 The assumptions, assessments, statements, and information contained in this document may not be complete, accurate, adequate, or correct. Each Bidder should therefore conduct its own investigations, analysis, and due diligenG.M(B D),Swosti Premium Ltd and should check the accuracy, adequacy, correctness, reliability, and completeness of the information contained in this

bid and obtain independent advice from appropriate sources. Information provided in this bid to Bidders covers a wide range of matters, some of which depend on interpretations of law. The information provided is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Client accepts no responsibility for the accuracy or otherwise of any interpretation or opinion on the law expressed herein.

15 The Client, its employees, and advisers make no representation or warranty and shall have no liability to any person, including any Bidder, under any law, statute, rule or regulation, or under the principles of tort, restitution, or unjust enrichment, for any loss, damage, cost, or expense which may arise from or be incurred or suffered on account of anything contained in this bid or otherwise, including the accuracy, adequacy, correctness, reliability, or completeness of this document, or any assumption, statement, or information contained in or deemed to form part of this bid, or arising in any way in this selection process.

16 The issuance of this bid document does not imply that the Client is bound to select any Bidder for the provision of the Services, and the Client reserves the right to reject all or any of the Proposals without assigning any reasons whatsoever. •The Client may, in its absolute discretion—but without being under any obligation to do so—update, amend, or supplement the information, assessment, or assumptions contained in this bid.

17 The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Proposal, including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by the Client, or any other costs incurred in connection with or relating to its Proposal. All such costs and expenses shall remain with the Bidder, and the Client shall not be liable in any manner whatsoever for the same or for any other costs or expenses incurred by a Bidder in the preparation or submission of the Proposal, regardless of the conduct or outcome of the selection process.

Swosti Hotels
(A Unit of Swosti Premium Ltd.)
Corporate Office: Swosti Premium,
Jaydev Vihar, Bhubaneswar – 751013, Odisha
Email: info@swostihotels.com
Website: www.swostihotels.com

File No.: PMC/SPL/GPR/2025/01
Letter No.: 002 / Gopalpur, Date: 10th March 2026

LETTER OF INVITATION

Swosti Premium Ltd, on behalf of Gopalpur Palm Resort (A Unit of Swosti Premium Ltd), invites sealed bids for the Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of All Plumbing-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,, on a Item Rate Contract Basis for selection of a qualified agency to whom the project may be awarded.

The bid documents will be made available from 07.04.2026 10.00 am IST to 28.04.2026 5 pm IST at designated link or upon request physically from Swosti Corporate Office, Bhubaneswar or through official mail ID .Bid document can be downloaded from the website - https://www.swostihotels.com/tenders.html

The completed proposals shall be submitted in hard copy (physical submission) at the address specified in the bid document no later than 3:00 PM on 29.04.2026.

Three days before the scheduled Pre-Bid Meeting the intending bidders are requested to visit the site for accessing bid document and submit their queries in written form via their official mail ids or through registered postal service addressed to Swosti corporate office.

The Pre-Bid Meeting will be held on 18.04.2025 at 11.00 AM via Zoom/Physical mode. Meeting link/Venue shall be shared subsequently.

All received proposals will be opened at 5:00 PM on 29.04.2026 in the presence of authorized representatives of the bidders (not mandatory), at the venue communicated via email.

Swosti Premium Ltd reserves the right to reject any or all bids without assigning any reason thereto and shall not be liable for any costs incurred by bidders in the preparation or submission of proposals.

All subsequent corrigenda, clarifications, or updates (if any) will be circulated through official communication only via:

gm.communications@swostihotels.com

pmc.swosti@arkitechno.com

Gopalpur Palm Resort

(A Unit of Swosti Hotels)

gm.communications@swostihotels.com

Swosti Premium Ltd. Gopalpur Palm Resort Project,Gopalpur,Ganjam

DATED: 10.04.2026

DETAILED TENDER NOTICE

1. Last Date & Time of issue of tender documents from 10.04.2026 to 28.04.2026
2. Last Date & Time of receipt of tender 29.04.2026 upto 3.00 p.m.

G.M(B D),SWOSTI PREMIUM LTD Swosti Premium Ltd ,Bhubaneswar on behalf of Swosti Premium Ltd invites sealed item rate tenders from eligible contractors for similar works.

Name of work: **Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of All Plumbing-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,**

Estimated cost of work put to tender : Rs. 370 Lacs
Time of completion : 9 Months

Earnest Money Deposit: **Rs. 3,70,000/- (Rupees Three Lacs Seventy Thousand only)** is to be submitted with tender document as earnest money. The above payment shall be made in the shape of deposit at pay order/demand draft of a scheduled bank issued in favour of **Swosti Premium Ltd payable** at New Delhi.

Works to be completed in coordination with the main Civil & MEP Interior works contractor. No extra for non-availability of fronts or coordination with main agency shall be payable on account of the same.

Tender documents can be downloaded from SWOSTI PREMIUM LTD website (www.Swosti Premium Ltd .ac.in) and submitted with non-refundable DD of **Rs. 11800/-** in favour of **Swosti Premium Ltd** as cost of tender.

1) The tenders shall be placed in sealed envelopes with a name of work and due date written on the envelope and addressed to the G.M(B D),SWOSTI PREMIUM LTD SWOSTI PREMIUM LTD. Complete tender documents shall be submitted by the approved contractors in **two envelopes**. **1st envelope** shall contain the earnest money in the shape of Demand Draft / Pay Order of a scheduled Bank requisite shape as per condition & eligibility criteria and cost of tender as stated above along with "Technical Bid " and supporting documents . The 2nd sealed envelop shall contain the "Financial Bid" . Both the sealed envelops shall be contained in another envelop , sealed and super scribed with the "Name of the Work", the name and detailed address of the bidder as well as contact phone number & e-mail id. This sealed envelop has to be submitted at designated place as indicated in the bid document.

2) The eligible contractors who have carried out similar works in Reputed

Private Hotel Chain/Govt Deptts/PSU/Reputed Pvt sector /MNCs are to submit the experience certificates for the works and registration certificates with Govt. Depts. if any. The said certificates along with the EMD be enclosed in Envelope-1.

3) Experience of having successfully completed similar works during last seven years ending on the 31.12.2025. **The Similar works shall mean works of Minimum 600 TR capacity Water/Air cooled screw chiller.** The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum calculated from date of completion to last date of receipt of tenders.

Three similar works not less than 40 % of est.cost	Rs 150.00 lacs each Or
Two similar works not less than 60 % of est cost	Rs 225.00 lacs each Or
One similar work not less than 90 % of est cost	Rs 350.00 lacs each

The work of similar nature should have been executed under Central/State/Autonomous/Central PSU/State PSU/local authority/Reputed Hotelier Group formed under any Act in Central/State .

4) **The bidder should be experienced Plumbing work executing Contracting Agency with essential demonstrated experience and certificate/corroborative documentary evidences are required be submitted along with the bid.**

5) The applications not supported with requisite experience certificates, GST registration certificate and ITCC in Envelope-1 shall not be entertained

6) Solvency certificate for Rs. 180 lacs from any nationalized /scheduled bank. The applicant shall submit the solvency certificate, not older than six months prior to 30th September 2025, issued by any scheduled bank, in original.

7) Average Annual Turnover over HVAC works should be at least Rs 600 lacs during immediate last 3 consecutive financial years ending 31st Mar 2025.

8) Should not have incurred any loss in the more than two years in the last five years ending 31st Mar 2025.

9) Company should not have been barred / blacklisted for taking up similar work in any organization- A certification to this effect on the letter head of the bidder.

10) Performance certificates issued by past employers must be submitted by the vendors for the works, in support of their experience.

11) Bidder shall furnish list of the supervisory persons and other technical persons he wishes to deploy in this job along with their experience details.

12) Letter of Authority for signing and negotiation of bid.

13) The 2nd **envelope** shall contain the financial bids including Priced Schedule of Quantities sealed,

14) The 1st envelop should contain Form of Tender, Conditions of Tender, Articles of Agreement, Brief Specifications, Condition of contract, Drawings all duly signed by the authorized signatory of the firms.

1st and 2nd envelopes are to be put in a single envelope duly super-scribed the name of work, and addressed to G.M(B D),SWOSTI PREMIUM LTD and with their address. Incase the tenderer does not fulfill the laid down eligibility criteria or fails to deposit the earnest money in prescribed form, financial bid shall not be opened.

Tenderers shall seal the tender after affixing their initials and put stamp on each and every page of tender document before submission. The tender of the contractor, who submits in-complete tender document or submits more than one tender for one work, shall not be considered at all.

Tenders will be received by the **G.M(B D),SWOSTI PREMIUM LTD up to 3.00 P.M on 29.04.2026** and will be opened by him or his authorized representative in the office of Registrar, SWOSTI PREMIUM LTD on the same day at **5.00 P.M.**

First the Technical Bids will be opened and screened. The bids shall be examined whether the EMD is in order and the bidder meets the minimum eligibility criteria specified above. . Those bidders whose EMD is in order, meets the minimum eligibility criteria, has submitted all the required documents and meet the technical requirements shall be considered for opening of financial bid. Conditional tenders would not be accepted. Financial bids in respect of contractors who do not fulfill above criterion shall not be opened.

15) No Xerox / certified copies of tenders shall be accepted, if submitted these tenders shall be rejected.

16) **Pre- bid meeting** - A pre bid meeting will be held as on **18th April 2026** at 12.00 Noon - Any doubts or queries of the potential bidders will be addressed during the hybrid meeting. Venue: Hotel SWOSTI PREMIUM LTD /Zoom Link.

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SECTION-1 INSTRUCTION TO BIDDERS (ITB)

1. The time allowed for carrying out the construction work will be 6 months from the 7th day after the date of written orders to commence the work.

2. The site for the work is available.

3. During execution of works, because of some unforeseen circumstances to enable him to complete the work as per terms of the contract, shall not relieve the contractor from any liability or obligations under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor, his agents or workmen as fully as if they were the acts, defaults or neglects of the contractor, his agents or workmen.

4. The Contractor shall be required to deposit an amount equal to 3% of the tendered value of the work as performance guarantee in the form of an irrevocable bank guarantee bond of any scheduled bank or State Bank of India in accordance with the form prescribed or in the form of fixed deposit receipt etc. within 15 days of the issue of letter of acceptance. The performance guarantee shall have the validity up to 31st Jan 2027.

5. Tenderers are advised to inspect and examine the site and its surrounding at their own cost and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risk, contingencies and other circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed. The tenderer shall be responsible for arranging and maintaining at own cost all materials, tools and plants, water, electricity, access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contact documents. Submission of a tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specification of the work to be done, local condition and other factors having a bearing on the execution of the work.

6. The Accepting Authority -SWOSTI PREMIUM LTD does not bind himself to accept the lowest or any other tender and reserves to him/herself the authority to reject in whole or part, any or all of the tenders received without the assignment of any reason. All tenders in which any of the prescribed conditions are not fulfilled or for any condition including that of conditional rebate is put forth by the tenderer shall be summarily rejected.

7. Canvassing, whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the contractor who resort to canvassing will be liable to rejection.

8. The Accepting Authority reserves to himself the right of accepting the whole or any part of the tender and the tender shall be bound to perform the same at the rates quoted.

9. Tenders shall remain open for acceptance for a period of 60 days from the date of opening of the tenders. If any tenderer withdraws his tender before the said period for issue of letter of acceptance, whichever is earlier or makes any modification in the terms and condition of the tender which are not acceptable to the SWOSTI PREMIUM LTD , then SWOSTI PREMIUM LTD shall, without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely besides black listing of the tenderer.

10. The notice-inviting tender shall form a part of the contract document. The successful tenderer/contractor shall, sign the necessary contract documents consisting of the notice inviting tender, all the documents including additional conditions, specification and drawings, if any forming the tender as issued at the time of invitation of tender and acceptance thereof with any correspondence leading thereto within the time specified in the letter communicating the acceptance of the tender. In case of delay, the earnest money may be forfeited and the tender cancelled or the contract enforced as per the terms of the tender and the invitation to tender and the tenderer shall thus be bound by the condition of contract even though the formal agreement has not been executed and signed within the specified time by the tenderer.

11. The work shall be carried out as per general of conditions of contract (Tender Contract) and form part of the agreement/document.

12. Contract is liable to be terminated by the SWOSTI PREMIUM LTD without payment of any compensation, if subsequent to the acceptance of tender the contractor is black- listed by, or enters into partnership of any black listed contractor of the SWOSTI PREMIUM LTD or any other department, or Govt. or its, undertakings.

13. Cost of Bidding

    13.1 The bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will in no case be responsible and liable for those costs.

14. Clarification of Bidding Documents

    14.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing/mail at the Employer's address indicated in the invitation to bid not later than 7 days before the Date of Submission of Tenders. Email- **admin-project@Swosti Premium Ltd .ac.in**

15. Currencies of Bid and Payment

15.1 The unit rates and the prices shall be quoted by the bidder entirely in Indian Rupees. All payments will be invariably made in Indian Currency (Indian Rupees.)

16. PROTECTION OF ENVIRONMENT AND OTHER LAWS:

The contractor shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and other local Acts/ Laws/ rules made there under, regulations, notifications and bye-laws of local authorities or any other law, bye-laws, regulations that may be passed or notification that may be issued in this respect in future by the State/ Local authority.

17. Evaluation of Bids Received : Detailed at following section

For and on behalf of the
Swosti Group of Hotels, Resorts, Travels & Educations
GM Corporate Communications.
Cell- 9938244538
Email: gm.communications@swostihotels.com

Bid Data Sheet

Bid Identification No.: SWOSTI/GPR/TENDER/CCW/04/2026-27

The Swosti Premium Ltd., invites sealed, offline bids from reputed and experienced civil construction firms for the following work on lumpsum basis contract. Project details are as under:

Tender Summary

Pkg. No.	Particulars	Details
04	Name of Work	**Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of All Plumbing-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,on Item Rate Contract Basis**
2	Project Location	Plot No. 182/552/617 & 184/618, Khata No. 102 (AJA), Gopalpur-on-Sea, Ganjam District, Odisha
3	Nature of Contract	Item Rate Contract
4	Estimated Project Cost	₹370 Lakhs (Three Hundred Seventy Lakhs Only)
5	Time for Completion	09(Nine) Calendar Months from date of LOA
6	Number of Packages	01 (One)
7	Eligibility	Reputed private sector entities having successfully completed similar scale works. **Relevant Project Experience must include**: •Hotel/Office Buildings •Commercial or Hospitality Projects
8	Cost of Tender Document	₹11,800/- (Including GST)(Non-refundable, to be paid via Demand Draft(DD) in favor of "Swosti Premium Ltd.")- Including GST
9	Availability of Tender Documents	From 10.04.2025 to 28.04.2025 up to 5.00 PM –. a) From the Swosti Hotels website - https://www.swostihotels.com/tenders.html
10	Seeking Queries on RFP Document(Through email/Letter)	18.04.2025 upto 3:00 PM a) E-mail id. manoj@arkitechno.com b) Address : Swosti Hotels Corporate Office: Swosti Premium, Jaydev Vihar, Bhubaneswar – 751013, Odisha
11	Pre-Bid Meeting	18.04.2025 at 12:00 Noon at Swosti Corporate Office, Bhubaneswar/Zoom Link in virtual mode
12	Last Date of Submission of Bids	29.04.2025 up to 3:00 PM (Sealed Envelopes at Swosti Corporate)

Pkg. No.	Particulars	Details
13	Opening of Technical Bids	29.04.2025 at 5:00 PM in presence of PMC & Client
14	Technical Presentation (By technically qualified bidders)	Not Applicable
15	Opening of Financial Bids	Exact date and time shall be informed to qualified bidders atleast 48 hours of date of opening.
16	Mode of Tender	Offline, Physical Submission – Two Envelope System (Technical + Financial)
17	Bid Validity	90 Days from Last Date of Submission of Bids
18	Communication Email	manoj@arkitechno.com pmc.swosti@arkitechno.com

The bids must be submitted in hard copy (manual mode) in two separate sealed envelopes contained in another sealed envelope, marked clearly as “Technical Bid” and “Financial Bid”, mentioning the name and address of bidder, superscribed with title of work put to bids, along with all documents as prescribed in the bid document hereunder.

The client reserves the right to cancel the bidding process and/or reject any or all bids without assigning any reason there to. Corrigendum to bidding process/bid document if issued, subsequent to pre-bid meeting, shall be shared directly with bidders seeking clarification on or before pre-bid meeting/ participating in pre-bid meeting via email provided by them.

Authorized Signatory
Mr. Nihar Ranjan Sahoo, GM Corporate Communications.

Swosti Group of Hotels, Resorts, Travels & Educations

Cell- 9938244538

Email: gm.communications@swostihotels.com

Gopalpur Palm Resort Project
On behalf of Swosti Premium Ltd.

Evaluation Criteria

(Clause 1.1 of Instructions to Bidders – Gopalpur Palm Resort Project)

INTRODUCTION

- This Evaluation Criteria outlines the method by which bidders for the bids received will be evaluated based on their technical and financial qualifications, experience, project-specific understanding, organizational setup, and resource readiness.
- The evaluation will be conducted in accordance with the Instructions to Bidders (ITB) and is applicable to **Cover-I: Technical Bid**. Only those bidders who qualify under the technical evaluation will be considered for the opening and evaluation of their **Cover-II: Financial Bid**.

EVALUATION OF TECHNICAL BID (COVER-I)

The Technical Bid will be evaluated based on the following five main criteria:

Sl. No	Evaluation Criteria	Maximum Marks
A	Financial Strength	25
B	Experience in Similar Nature of Work	25
C	Working Methodology and execution of similar nature of work(DBR)	25
D	Key Personnel	25
	Total	**100**

Criteria/Sub-Criteria of TECHNICAL EVALUATION

Financial Strength – 25 Marks

Component	Max. Marks	Evaluation Basis
(i) Annual Financial Turnover (as per Bid Data Sheet)	20	70% marks for minimum eligibility criteria; 100% for twice the minimum. In between – on pro-rata basis.
(ii) Liquid Assets (as per Clause of Bid Data Sheet)	5	70% marks for minimum eligibility criteria; 100% for twice the minimum. In between – on pro-rata basis.

Experience in Similar Nature of Work – 25 Marks

Description	Max. Marks	Evaluation Basis
Completion of Similar Projects of Bid Data Sheet)	25	70% marks for minimum eligibility; 100% for twice the minimum. In between – on pro-rata basis.

Methodology and Work Program – 25 Marks

Bidder shall submit a detailed Design Basis Report covering approach to execution of civil works.

Assessment will be based on content, specificity, and alignment to project needs.

Component	Marks
Technical Specifications for Materials & Workmanship	10
Project Execution Schedule / Work Programme	10
Approach & Methodology (project-specific)	5
Total	**25**

Key Personnel – 25 Marks

The following key personnel must be proposed and CVs submitted:

Position	Qualifications & Experience	Max. Marks	Evaluation Basis
Project Manager(1 No)	B.E./B.Tech Mech with 10+ years	13	Graduation (5), Experience (Exp. 10 yrs-5 , Higher - 8)
Site Engineer-(1 No)	B.E. with 3 yrs/Diploma with 7+ years in Mech	7	Graduation (3),Dip- (2), Experience (Exp. 7 yrs-3 , Higher - 4)
Site Engineer-Mech (1 No)	Diploma with 7+ years in Elect	5	Dip- (1),Higher-(2) Experience (Exp. 7 yrs-2 , Higher - 3)

GENERAL NOTES

- Bidders must furnish all necessary supporting documentation for substantiating the information.
- Only those bidders who score **70 marks or more (out of 100)** in Technical Evaluation shall be considered for opening of their “Financial Proposal”

Enhancement Factors for Past Financial Years (for Turnover/Experience Updating):

Year Before	Enhancement Factor
One	1.10
Two	1.21
Three	1.33
Four	1.46
Five	1.61

SECTION-2-FORMS & FORMATS

DOCUMENTS TO BE FURNISHED BY BIDDER

1. Documents as specified in Section 1, must be submitted by the Bidder in the Formats mentioned in Section 2 along with the BID.

2. Any other document, if asked by Employer for clarification during evaluation, shall be submitted by the bidder.

CHECKLIST OF DOCUMENTS TO BE SUBMITTED IN TECHNICAL BID

	Criteria	**Document to be submitted**	**Submitted (Yes/No)**
1	Cost Of Bid Document	DD/BC	
2	EMD/ Bid Security -	In the form of BG/Bid Security fee deposit details.	
3	Written power of attorney of the signatory of the Bid to commit the Bidder(If any)	Copy of power of attorney	
4	Whether Indian firms (Y/N)	Certificate of Incorporation	
5	OEM firms with proven track record of execution of similar HVAC Projects in IT buildings, commercial complexes, hospitality projects, or high-rise structures (G+9 or above).	Relevant Certificate	
6	Constitution or legal status of Bidder	Incorporation Certificate, Partnership Deed, Trade License, MoA, AoA	
7	Place of registration	Qualification Information	
8	Principal place of business	Qualification Information	
9	Major items of construction equipment proposed to carry out the Contract	Invoices of equipment / Lease agreement/Letter of Commitment	
10	Qualifications and experience of key site management and technical personnel proposed for the Contract	Detailed CV	
11	Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five financial years	CA Certificate along with Audited Financial report for the relevant Financial Years	
12	Evidence of adequacy of working capital for this contract [access to line (s) of credit and availability of other financial resources]; Liquid assets and / or availability of credit facilities	Banker's certificate	
13	Authority to seek references from the Bidder's bankers	Bankers Details	

14	Information regarding any litigation or arbitration resulting from contracts executed by the bidder in the last five years or currently under execution	List of Litigation, if any	
15	Methodology & Programme.	To be submitted	
16	Bids from Joint venture - Bids from Joint ventures / Consortiums / Association of Parties are not acceptable	NA	
17	Annual minimum turnover	Turnover from HVAC Construction works certified by chartered Accountant	
18	The Firm should demonstrate making profit	CA/ Statutory auditor certificate	
19	Should have valid PAN and GSTIN	Scan copy of valid PAN and GSTIN	
20	Experience of successful completion of works / substantial completion of works (90% of the value of the contract to be considered as substantial completion) as referred in Bid Data Sheet C l.2.3).	Completion Certificate from Competent Authority mentioning all the details as per Bid Data Sheet/TDS Certificate for Pvt Sector Project	
21	Bid Validity Undertaking	Undertaking	
22	Affidavit	Affidavit by the bidder duly signed by the Notary Public and as specified in Section 2,	
23	Design Basis Report	NA	
24	Certificate of No Relationships	As per format given in Section-2 of the tender document	
25	Information Regarding Any Conflicting Activities and Declaration Thereof	As per format given in Section-2 of the tender document	
26	Proposal for Sub-Contract	To be mentioned	

Undertaking by Tenderer

I/We have read and examined and understood the notice inviting tender, schedules, Specifications applicable, drawings & Designs, General Rules and Directions, Conditions of Contract, clauses of contract, special conditions, & all other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I / We hereby tender for the execution of the work specified for the SWOSTI PREMIUM LTD within the time specified in schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in General Rules and Directions and Conditions of contract and with such materials as are provided for, by, and in respect in accordance with, such conditions so far as applicable.
We agree to keep the tender open for Ninety (90) days from the due date of its opening and not to make any modifications in its terms and condition.
A sum of Rs.....……Rupees…… ……..)
has been deposited in demand draft of a scheduled bank issued by a scheduled bank as earnest money. If I / we, fail to furnish the prescribed performance guarantee within prescribed period, l / we agree that the said G.M.(BD), SWOSTI PREMIUM LTD or his successors in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if l / we fail to commence work as specified, I / we agree that Director, SWOSTI PREMIUM LTD or his successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, up to maximum of the 25 percentage and those in excess of that limit at the rates to be determined in accordance with the terms of contract. Further, I / We agree that in case of forfeiture of earnest money or both Earnest Money & Performance Guarantee as aforesaid, I / We shall be debarred for participation in the re-tendering process of the work.

I / We hereby declare that I / we shall treat the tender documents drawings and other records connected with the work as secret / confidential documents and shall no communicate information / derived there from to any person other than a person to whom I / we am / are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

Dated. . . . .
Witness: Signatures of Contractor
Address: Postal Address
Occupation:

LETTER OF SUBMISSION

The GM Corporate Communications.
Swosti Group of Hotels, Resorts, Travels & Educations
Cell- 9938244538
Email: gm.communications@swostihotels.com
Gopalpur Palm Resort Project
On behalf of Swosti Premium Ltd

Sir,

.I/We, the undersigned, have read and examined in detail, the specifications and all bidding documents and hereby declare that:

Price and Validity

1. All the rates quoted in our proposal are in accordance with the terms and conditions as specified in the bid document. All the prices and other terms and conditions of this proposal are valid for a period of 90 calendar days from the date of opening of bid.
2. We do hereby confirm that our bid prices include all taxes/levies. GST indicated separately.
3. We hereby declare that if any tax law is altered, we shall pay the same.
4. The quoted rates are inclusive of ESI , PF and Green Tax no extra on such heads would be payable on such account.

Earnest Money

We have enclosed EMD in the form of demand draft no…..... , dated……..favoring Swosti Premium Ltd. payable at Bhubaneswar issued / drawn on … Bank for Rs.__/- (Rupees ___Thousand only), as desired.

Deviations

We declare that all the works shall be performed strictly in accordance with the technical specifications and other tender conditions with no deviations.

Qualifying Data

We confirm that all information/data have been submitted as required in tender document.

We hereby declare that our proposal is made in good faith, without collusion for fraud and the information contained in the proposal is true and correct to the best of our knowledge and belief. I/We agree that in case any information is found to be incorrect the tender is liable to be rejected at any point of tendering process.

Bid submitted by us is properly sealed and prepared so as to prevent any subsequent alteration and replacement.

We understand that you are not bound to accept the lowest or any bid you may receive.

Thanking you,
Yours faithfully,
(Signature and seal of Tenderer with name, designation and contact no.)

NON-BLACK LISTING DECLARATION

FORMAT OF UNDERTAKING, TO BE FURNISHED ON COMPANY LETTER HEAD WITH REGARD TO BLACKLISTING/ NON- DEBARMENT, BY ORGANISATION

UNDERTAKING REGARDING BLACKLISTING / NON – DEBARMENT

To,
SWOSTI
PREMIUM LTD
Bhubaneswar

We hereby confirm and declare that we, M/s ----------, is not blacklisted/ De-registered/ debarred by any Government department/ Public Sector Undertaking/ Private Sector/ or any other agency for which we have Executed/ Undertaken the works/ Services during the last 5 years.

Signature of Contractor

With stamp

.

GENERAL INSTRUCTIONS FOR SITE *VISIT*

I, , aged years, son/daughter of , presently residing at and authorized by (name of tenderer) ("Tenderer") to solemn this affidavit on behalf of the Tenderer, solemnly affirm on oath as hereunder:

The Tenderer confirms that the Tenderer has duly undertaken the visit of the proposed project site of SWOSTI PREMIUM LTD located at Gopalpur ,Ganjam

The Tenderer has inspected and examined its surroundings and has satisfied itself about the site conditions and site logistics. The Tenderer confirms that it is aware of the ground conditions and nature of the site, means of access to the site and the accommodation area required for establishing the labour camp. The Tenderer agrees and confirms it shall be solely responsible for arranging and maintaining the afore- mentioned at its own cost including all materials, tools & plants, water, electricity, access, facilities for workers and all other services required for executing the Work unless otherwise specifically provided for in the contract documents.

The Tenderer confirms and agrees that the submission of the tender implies that the requisite site visit has already been undertaken and that the Tenderer has acquainted itself with the local conditions and other factors having a bearing on the execution of the Work.

DEPONENT VERIFICATION

I, , aged years, son/daughter of , presently residing at and authorized by Tenderer verify that the information mentioned above is true and correct to the best of my knowledge and belief.

DEPONE

LETTER OF ACCEPTANCE

(To be issued to the successful bidder on the letterhead of Swosti Premium Ltd.)

[Date: _____]

To,
[Name and Address of the Contractor]

Subject: Letter of Acceptance for Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of All Plumbing-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam, on a Item Rate Contract Basis)

Dear Sir(s),

This is to notify you that your Bid dated _____ for execution of the following work on a Lumpsum basis:

"Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of All Plumbing-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,, on a Item Rate Contract Basis)"

for the Contract Price of Rs. _____ (Rupees _____ only), as corrected and modified[1] in accordance with the Instructions to Bidders, is hereby accepted by Swosti Premium Ltd.

We note that as per your bid,
☐ You do not intend to subcontract any component of work
or
☐ You propose to employ [Insert Name of Sub-Contractor] as sub-contractor for executing [Insert Work Component]
(*Delete whichever is not applicable*)

You are hereby requested to furnish a detailed Work Programme along with milestone-wise activity chart and cash flow forecast (S-curve) as per the Bid Data Sheet within 14 (fourteen) days from the issue of this Letter of Acceptance (LoA).

Further, you are required to furnish the Performance Security as specified in the Bidding Documents for an amount of Rs. _____, in the form prescribed, within 21 (twenty-one) days of receipt of this Letter of Acceptance.

Failure to comply with the above conditions may result in actions as specified in Clause 23 and 24 of the Bid Data Sheet.

We look forward to the successful execution of the project.

Yours faithfully,

_____
Authorized Signatory
Swosti Premium Ltd.
Bhubaneswar

NOTICE TO PROCEED WITH THE WORK

(To be issued on Letterhead of Swosti Premium Ltd.)

[Date: _____]

To,
[Name and Address of the Contractor]

Subject: Notice to Proceed – Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of All Plumbing-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam,, on a Item Rate Contract Basis)

Dear Sir(s),

Pursuant to your furnishing of the required Performance Security in accordance with Clause of Bid Data Sheet, and the execution of the Contract Agreement for the work titled:

"Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of Supply, Installation, Testing & Commissioning of All Plumbing-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd.,Gopalpur, Ganjam, on a Item Rate Contract Basis"

at a Bid Price of Rs. _____ (Rupees _____ only), you are hereby instructed to proceed with the execution of the said works effective immediately, in strict accordance with the terms and conditions of the contract documents.

We trust that you will mobilize your resources promptly and commence the work at site without delay as per the agreed programme and milestones.

Wishing you a successful execution.

Yours faithfully,

_____
Authorized Signatory
Swosti Premium Ltd.
Bhubaneswar

PERFORMANCE BANK GUARANTEE

To
_____[name of Client]
_____[address of Client]

WHEREAS_____[name and address of Contractor] (hereafter called "the Contractor") has undertaken, in pursuance of Contract No.___ dated _____to execute _____[name of Contract and brief description of Works] (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 obligation 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]*_____(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] 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 your 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 also be operatable at our Branch at Bhubaneswar, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

The guarantor/bank hereby confirms that it is on the SFMS (Structural Finance Messaging System) platform & shall invariably send an advice of this Bank Guarantee to the designated bank of Odisha Bridge & Construction Corporation Ltd details of which is as under:

Sl No.	Particulars	Details
1	Name of Beneficiary	Swosti Premium Ltd
2	Name of Bank	Union Bank Of India
3	Account No	128713100000061
4	IFSC Code	UBIN0578827

This guarantee shall be valid until 28 days from the date of expiry of the Defect Liability Period. Signature and Seal of the guarantor
Name of Bank _____ Address_____ Date _

* An amount shall be inserted by the Guarantor, representing the percentage the Contract Price specified in the Contract including additional security for unbalanced Bids, if any and denominated in Indian Rupees.

BID SECURITY– Cover-IV

Bid Security (EMD): 8,50,000.00 INR

Affidavit (on Non-Judicial Stamp, attested by Notary Public)

Declaring authenticity of all submitted information and non-involvement in any corrupt or fraudulent practice.

Authorized Signature: _____
Name & Title: _____
Name of the Bidder: _____
Company Stamp/Seal

BANK CERTIFICATE

(To be issued by the Bidder's Bank on official letterhead and submitted by the Bidder in Cover-IV)

TO WHOMSOEVER IT MAY CONCERN

This is to certify that M/s. [Insert Name of Bidder] is a reputed company with good financial standing and banking conduct.

If the contract for the work, namely:

"Construction of Gopalpur Palm Resort – Core Civil Works (Lumpsum Package)"

is awarded to the above-mentioned firm, we confirm that we shall be in a position to provide overdraft / cash credit / fund-based credit facilities to the extent of:

₹ [Insert Amount in Figures and Words]

to meet their working capital requirements for executing the said contract.

Sl No.	Particulars	Details
1	Name of Beneficiary	Swosti Premium Ltd
2	Name of Bank	Union Bank Of India
3	Account No	128713100000061
4	IFSC Code	UBIN0578827

INFORMATION REGARDING ANY CONFLICTING ACTIVITIES AND DECLARATION THEREOF

(To be submitted on Bidder's Letterhead)

To,
The G M (B.D)

Swosti Premium Ltd.
Bhubaneswar

Subject: Declaration Regarding Conflicting Activities

Dear Sir,

I, the undersigned, hereby declare that our firm/company is not engaged in any activities that can be termed as conflicting in nature with respect to this tender for the project titled:

"Supply, Installation, Testing & Commissioning of Water Cooled Screw Chillers and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd., Gopalpur, Ganjam, on a Lump sum Contract Basis)"

I also acknowledge that in case of any misrepresentation or concealment of facts related to this declaration, our proposal and/or contract shall be liable for rejection/termination by the Client, and the decision shall be binding upon us without any claim whatsoever.

Authorized Signatory: _____
Name & Designation: _____
Name of the Bidder: _____
Stamp/Seal: _____
Date: _____
Communication Address: _____

Note:
Conflicting activities refer to any potential conflict of interest arising from prior, current, or proposed agreements, engagements, or affiliations with the Client that may impair the bidder's objectivity, integrity, or impartiality in the execution of the project.

AFFIDAVIT

[To be submitted by the bidder in a non-judicial stamp paper duly signed by the Notary Public]

1. I, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct.

2. The undersigned also hereby certifies that neither our firm M/s…… … .....have abandoned any work on building in India nor any contract awarded to us by the State of Odisha for such works have been rescinded, during last five years prior to the date of this bid.

3. The undersigned hereby authorize(s) and request(s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by the Department to verify this statement or regarding my (our) competence and general reputation.

4. The undersigned understand and agrees that further qualifying information may be requested and agrees to furnish any such information at the request of the Department/ project implementing agency.

_____

Authorized Signature: Name & Title of Signatory:
Name of Bidder :

SECTION-3

BOQ,SPECIFICATIONS& TENDER DRAWINGS :

These Particular are to be read in conjunction with other documents issued along with tender. In case of any discrepancy between Design drawings, General conditions or Bill of quantity, Following order of preference shall be applicable.

- BOQ
- Specification
- Tender drawings

The contractor shall refer the tender drawings attached at end of this section.

The contractor shall refer the following annexure while bidding and will read them in conjunction with specifications as well as bill of quantity

Annexure - I	:	Design Criterion
Annexure -II	:	List of approved makes
Annexure -III	:	Codes and Standards
Annexure -IV	:	Technical Specifications
Annexure -V	:	Technical Data Sheets

ANNEXURE-I

DESIGN CRITERION

1.0 DESIGN CRITERION

Following shall be basis for developing the design:

Site Location	:	Gopalpur, Odisha
Geographical Data	:	20°15’ N, 85°49’ E
Altitude	:	46 m above the sea level

1. WORK DESCRIPTION

The work shall be strictly carried out as per the scope listed in this document and in accordance with the specifications. The equipment & material supplied at site will also be selected out of the list of approved makes. Bill of quantity provided with the document is for contractor guidance. It is expected that after award of work, contractor shall prepare shop drawings for approval by the Consultant & Client representative and also submit Technical documentation duly identifying shortlisted make of material/equipment along with its data sheets. Actual ordering shall be based on approved

shop drawings & documents.

The work at site shall comply with the approved shop drawings and will meet the satisfaction of Client representative. The contractor shall be required to demonstrate satisfactory operation of entire system (including client supplied equipment installed by contractor) and furnish the required labour, material & tools to install & commission the system. The broad scope of work for proposed plumbing system covered under this contract shall include supply, installation, testing & commissioning of the following:

- Sanitary fixtures and accessories.
- C.P. bathroom fittings and accessories.
- Soil, waste and vent pipes with fittings
- Rain water disposal pipes with fittings
- Water supply pipes with fittings
- External Drainage system
- External water supply system
- Basement Sump Pump
- Connection to and from municipal mains in case of water, sewer and drain connection including coordination with all other agencies
- Any minor chasing/chipping/civil masonry.
- Balancing, testing & commissioning of the entire plumbing system.

Besides above, contractor shall also be required to undertake following:

- Obtain approval from Local Authorities prior & post installation for operation of system.
- Minor civil works which include making openings in walls & slabs and making good of the same.
- Commissioning of the plant including test reports to demonstrate satisfactory working prior to handing over.
- Provide as-built drawings and handing over document Test reports, list of recommended spares, operation & maintenance manual for the entire plumbing system.
- Training of Client's staff.

2. SITE MANAGEMENT

The Contractor shall be required to provide following staffing for the project:

- Design Engineer who will work with Consultant for getting shop drawings, technical submittal and variation in quantity statement approved.

- Procurement team.
- Full time dedicated Engineer (minimum 10 year experience) & one supervisor posted at site.

The contractor shall submit organization chart and CV prior to starting work at site. The Contractor shall have required stores, tools & plant, security and facility to transport materials to place of installation for speedy execution of work.

3. REGULATIONS & PERMITS

Prior to starting work at site, the contractor shall obtain required permits/ licenses required for satisfactory execution and operation of the installation. All receipted amounts shall be reimbursed by Client on production of proof of payment by the contractor.

The executed work shall strictly confirm to applicable laws, regulations and Indian Standards which become applicable. In case the specifications and drawings contained in this document call for higher standard than those required by prevailing regulations, then these specifications & drawings shall become applicable. However, in case of any conflict or violation between the document/drawings and prevailing laws, then the applicable laws & regulations shall be governing & binding.

4. SHOP DRAWINGS

A set of design drawings listed in this document are available at Consultant office and may be issued with the tender document. These design drawings are for reference of the contractor and indicate proposed arrangement and the extent of work covered in the contract. The data given in the drawings and specifications is as exact as could be procured, but its accuracy is not guaranteed. The contractor cannot execute work or scale these drawings for reference.

Following shall be the procedure followed by contractor while preparation of shop drawings:

- The contractor shall refer the design drawings for understanding the scope and proposed routes to be followed during execution.

- Collate latest architectural backgrounds from the Client representative / Architect / Consultant.
- Examine all related services drawings but not limited to structural, plumbing, electrical, HVAC, Interior, landscape and others including as-built works before starting the work. Any discrepancy must be report to the Client's site representative in writing and obtain approval for go-ahead.

- Within one week of award of work, the Contractor shall prepare a list of shop drawing along with submission schedule for approval of Client representative/Consultant. The list of drawings must include layouts for Plant room, Pump room, Typical drawings showing exact location of supports, flanges, bends, tee connections, reducers, detailed piping drawings showing exact location and type of supports, valves, fittings etc.; electrical panels inside/outside views, power and control wiring schematics, cable trays, supports and terminations.
Maximum headroom shall be maintained at all points and in case the same is inadequate, then written approval from Client representative must be obtained prior to execution at site.

These shop drawings shall depict information required to complete the Project as per specifications and as required by the Consultant / Client representative. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each shop drawing shall contain tabulation of all measurable items of equipment/materials/works and progressive cumulative totals from other related drawings to arrive at a variation-in-quantity statement at the completion of all shop drawings.

Where the work under this contract is proposed to be installed in close proximity or is interfering with other trades, then based on client representative/consultant directions, the contractor shall prepare all services coordinated working drawings and sections at a suitable scale (not less than 1:50), clearly showing proposed installed in relation to the work of other trades.

- The contractor shall thereafter furnish 2 sets of detailed shop drawings to Client representative/Consultant for obtaining comments/approval. The Contractor will make unlimited number of re-submissions of shop drawings unless Client representative / Consultant / Architect approval is obtained.
- The Contractor will thereafter submit six sets of final shop drawings to the Client representative for their exclusive use and all other agencies.

- No material or equipment may be delivered or installed at the job site until the contractor has in his possession, the approved shop drawing for the particular material/equipment/installation.
- In case installation is carried out without following above process or obtaining a waiver to follow the procedure from Client representative, the work shall be rejected and contractor shall rectify the same at their own cost.

- Shop drawings shall be submitted for approval minimum four weeks in advance of planned delivery and installation of any material to allow Client representative/Consultant ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved program.

Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contract.

5. TECHNICAL DOCUMENTATION

The contractor prior to supplying material at site will submit the following documentation to Consultant/Client representative for approval:

- Manufacturers drawings, catalogues, pamphlets and other documents in triplicate. Each item shall be properly labeled, indicating the specific services for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.
- Samples of all materials shall be submitted to the Client's site representative prior to procurement. These will be submitted in two sets for approval and retention by Client's representative and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed, a mockup or sample installation shall be carried out for approval before proceeding for further installation.

- Where the contractor proposes to use an alternate make or model of equipment other than that specified, all new

drawings and detailing required thereafter shall be prepared by the contractor at his own expense including any re-design required for another discipline/trade. Any delay on such account shall also be at the cost of and consequence of the Contractor.
Contractor to refer Annexure – I for a list of approved makes & materials for this project.

6. VARIATION IN QUANTITY STATEMENT

After approval of major & relevant shop drawings, the contractor shall submit four copies of a comprehensive variation in quantity statement. This statement must be submitted prior to completing ordering of equipment and should identify imported/local materials in this contract as well as proposed spares/tools. The Consultant shall provide recommendation to Client representative for acceptance of anticipated variation in contract amounts and also advise Client to initiate action for procurement of spare parts and tools at the completion of project.

7. QUALITY ASSURANCE

The contractor to ensure that all materials and equipment supplied shall be new and of best available quality conforming to the relevant Indian Standard Specifications and to these specifications. Makes shall be strictly in conformity with list of approved manufacturers as per Annexure - I. Owners reserve the right to reject any item which in their assessment is second hand

Any deviations from above shall be clearly highlighted prior to supply and shall be brought to the notice of the Client representative/Consultant for further instructions in the matter.

Prior to starting execution work at site, the Contractor shall verify the sufficiency of the size of the shaft openings, clearances and ceiling spaces for proper installation. Failure to communicate insufficiency of any of the above shall constitute Contractor acceptance of the same. The Contractor shall locate all equipment in fully accessible locations which can be easily serviced, operated or maintained. Valve or other devices requiring attendance shall be finalized and communicated in sufficient time. Failing this, the Contractor shall make all the necessary repairs and changes at own expense. Access panel shall be marked.

8. WORKS NOT COVERED UNDER THIS CONTRACT

Following works are excluded from the scope under this contract. These shall be executed by respective contractor in accordance with approved shop drawings where these details must be highlighted. However, contractor shall be responsible for providing details and thereafter supervision to ensure satisfactory & timely execution of these associated items as they have a bearing on this contract.

Civil Works

- RCC/PCC Foundations for major equipment only.

- Construction of UGT, OH tanks with manhole covers & sumps including water proofing.
- Masonry drains channels and sumps in plant room.

- Core cutting in slabs / floors and wall work.
- Any major chasing / chipping / civil masonry work.

9. INTEGRATION WITH BUILDING AUTOMATION SYSTEM

The scope of Plumbing Contractor shall include the following for the interface to Building Automation System and no additional cost shall be paid for providing the interface feasibility.

- Stop/Manual/ Auto switches along with potential free contacts for monitoring the manual operation status, to be provided for those equipment whose start / stop is controlled by Building Automation System.
- Potential free ‘NO’ contacts for monitoring ‘Run’ status of equipment wherever required.

- Necessary contactor with potential free contacts and Stop/Manual/ Auto switches to be provided for all equipment wherever the starter is not provided and which requires starting / stopping through Building Automation System.
- Sockets /Nipples including shut-off valve for mounting sensors/transmitters on pipe lines.

- The space provision in all the equipment panel (MCC) for mounting Current/ Potential transformers & transducers and power supply to the transducer shall be provided by the Plumbing contractor. Separate current transformers shall be provided by Plumbing contractor for monitoring current / KWH (wherever required) through BAS.

- The installation of current transformer & Transducer along with wiring between Current Transformer & Transducer up to the terminal block shall be provided by the Plumbing contractor. All transducers shall be supplied by BAS contractor.
- The low voltage BAS Cables shall be brought up to the electric panel by BAS contractor and all terminations into the electrical panels shall be made by Plumbing contractor after satisfying himself of the wiring system. It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirements, of the Plumbing system, lies solely with the contractor.

- All necessary Hardware/ Software shall be made available by the Plumbing and Contractor on the Microprocessor based panel for the integration of such panel to Building Automation System for remote monitoring / controlling of marking / equipment thru BAS.

10. TESTING, ADJUSTING AND BALANCING

Balancing of all water systems and all tests as called for the Specifications shall be carried out by the contractor through a specialist group, in accordance with the Specifications and ASPE / ASHRAE Guide lines and Standards. Performance test shall consist of three days of 10 hour each operation of system for each season. Cost of performance witness test of major equipment such as pumps, equipment, panels etc. at factory with two personnel from Owners / Consultant shall be included.
The installation shall be tested again after removal of defects and shall be commissioned only after approval by the Owner's site representative. All tests shall be carried out in the presence of the representatives of the Architect / Consultant and Owner's site representative.

11. COMPLETION CERTIFICATE

On completion of the installation, a certificate shall be furnished by the contractor, counter signed by the licensed supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local authority.

The contractor shall be responsible for getting the entire installation duly approved by the local authorities concerned, and shall bear expenses if any, in connection with the same.

12. AS-BUILT DRAWINGS

Contractor shall submit following as-built drawings as and when work is completed:

- Six set of hard copies of all as-built drawings duly corrected and incorporating any modifications during execution.
- Two set of pen drive containing the drawings.

- Position of all sanitary fixtures.

- Runs of all water lines with diameters on all floors and vertical risers / drops.
- Runs of all soil, waste, vent & rain water piping with diameters on all floors and vertical stacks.

- Position and sizes of all type of control valves and all other plant and equipment.

- Position of cleaning eye / access doors and opening panels in soil/waste disposal system.
- Original installation and Maintenance manual of all types of equipment.

- Location of all mechanical equipment with layout and piping connections.

13. MAINTENANCE MANUAL

Upon completion and commissioning of works, the contractor shall submit a draft copy of comprehensive operating instructions, maintenance schedule and log sheets for all systems and equipment included in this contract. This shall be supplementary to manufacturer's operating and maintenance manuals. Upon approval of the draft, the contractor shall submit four (4) complete bound sets of typewritten operating instructions and maintenance manuals; one each for retention by Consultant and Client's site representative and two for Clients Operating Personnel. These manuals shall also include basis of design, detailed technical data for each piece of equipment as installed, spare parts manual and recommended spares for 4 year period of maintenance of each equipment. The manuals shall include:

- Description of the work carried out / installed.
- Operating instructions.
- Maintenance instructions including procedures for preventive maintenance.

- Manufacturers catalogues.
- Spare parts list.
- Trouble shooting charts.
- Drawings
- Type and routine test certificates of major items.

Details of the entire bought out item should be part of this maintenance manual.

14. ON SITE TRAINING

Upon completion of all work and all tests, the Contractor shall furnish necessary operators, labor and helpers for operating the entire installation for such periods so as to enable the Client's staff to get acquainted with the operation of the system. During this period, the contractor shall train the Client's personnel in the operation, adjustment and maintenance of all equipment installed.

15. DEFECTS LIABILITY PERIOD

Complaints

The Contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 10 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

Repairs

All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of-charge to the Client.

16. UPTIME GUARANTEE

The contractor shall guarantee for the installed system an uptime of 98%. In case of shortfall in any month during the defects liability period, the Defects Liability period shall get extended by a month for every month having shortfall and no reimbursement shall be made for the extended period.

17. OPERATION & MAINTENACE CONTRACT

Contractor may be required to carry out the operation of the installation during and after the defects liability period. Further, it may also be required to carry out all-inclusive maintenance of the entire system for a period of four years beyond the defects liability period.

Operation Contract:

It will involve round the clock operation for24 hours a day wherein work will include but not limited to operation of installation, maintaining log books, complain register and summary of operation.

The terms of payment shall be monthly at the end of each month on pro-rata basis.

All Inclusive Maintenance Contract:

The work will involve routine preventive maintenance with monthly status report. Entire installation shall be painted every two years. 98% uptime of all systems is expected under this contract wherein up time shall be assessed every month and in case of shortfall during any month the contract shall be extended by a month. No reimbursement shall be payable for the extended period.

Adequate number of persons to the satisfaction of the Client representative shall be provided including relievers wherein statutory compliances such as of EPF, ESIC and other applicable labour legislations shall be to contractor account. No overtime shall be payable. Routine shut downs shall be permitted with prior permission of the Owner.

Payment shall be Quarterly at the beginning of each quarter on pro-rata basis.

18. GREEN BUILDING COMPLIANCE

Actions required by Contractor:

- Contractor will provide full support in complying to Green Building requirements for the desired level of Green Building Rating in the project.
- Contractor shall implement the recommendations provided by Green Building Consultant and provide support during the site inspections.

- Contractor shall provide respective documentation including but not limited to specification sheets, manufacturer

cutsheets, Test Certificates, Brochures, purchase records, manufacturer declarations, calculations, site photographs, commissioning reports.

- Contractor is encouraged to designate an individual in their existing team who will be responsible for regular coordination with respective site people to ensure implementation of required green building measures and ultimately provide the required documentation for aspired Green Building Rating.
- In case of any deviations in implementing recommended green building measures and/ or using specified material/ equipment/ system, contractor will have to inform Owners/ Services Consultant/ Green Building Consultant/ Architect as applicable for their formal approval.

In case of any additional requirement to comply with Green Building rating as identified during construction/ installation/ commissioning based on the actual site conditions/ construction activities, Contractor shall implement

ANNEXURE – I
List of Approved Makes of Plumbing

S. No.	Description	Manufacturer's name
1.	Sanitary Wares/ CP Fitting	Jaquar / Hindware / Cera/ Parryware
2.	WC Pan Connector	Astral / Ashirwad / Supreme
3.	C.I / S.S. Floor Grating / Floor Clean Out	ACO / Chilly / Neer / GMGR / Jaina
4.	Centrifugally cast spun cast iron pipes	Neco / SKF / Hepco
5.	uPVC Drainage Pipes and Fittings	Astral / Finolex / HIL/ Supreme/ Prince
6.	CPVC Water Supply Pipes, valves, And Fittings	Astral / Finolex / HIL/ Wavin / Prince
7.	Upvc Agriculture pipes & Fittings	Jain Irrigation / Oriplast / Georg Fischer
8.	HDPE pipe & Fittings	Geberit /Jain Irrigation / Oriplast / Georg fischer
9.	Insulation for Hot Water Pipes	Aflex / Armacell – Armaflex / Eurobatex – Union Foam / K-Flex ST / Thermaflex
10.	PERT – AL – PERT Pipes	Kantherm / Geberit / Huliot
11.	MS / G.I. Pipes - IS: 1239	Jindal (Hissar) / Tata / Prakash Surya
12.	MS / G.I. Fittings - IS: 1239	DRP / R Brand / Unik / Zoloto
13.	Fasteners	Hira Wal raven / Hilti / Mupro / Fischer
14.	Pipe clamp & supports	Hira Wal raven / Mupro / Gripple/ Hitech/ Chilli
15.	CI Strainer/NRV/Check Valve	Kirloskar / Leader / Zoloto/ AIP /SKS
16.	Ball Valves	Zoloto / Castle / SKS / AIP
17.	Butterfly Valves	Zoloto / Castle / SKS / AIP
18.	Motorized Valve	Zoloto / Castle / SKS / AIP
19.	Pressure Reducing Valve	Zoloto / RB / Audco / Advance / AIP/SKS
20.	Water Level Indicator / Level Controller	Tecnika / Techrol / Auto Pump / cirrus
21.	Pressure Gauge / Thermometer	Emerald / H Guru / Firbig
22.	Paints	Asian Paints / Berger
23.	Air Release Valve	Zoloto / Advance / SKS / RB
24.	Water Meter	Kranti / Cirrus / Kaycee / Kent
25.	Welding Rods	ADOR / Cosmos / ESAB
26.	C.I / D.I Pipes, Manhole covers & Frames	Neco / RIF / SKF
27.	SFRC	KK / Hindustan
28.	RCC Pipes	KK/ Indian Hume Pipe/ Pranali / Jindal Concrete
29.	Globe/Gate Valves	Sant / Rapid / Honeywell / Leader
30.	GI / Upvc / Cpvc pipe sealant	Henkel - Loctite 55 / Holdtite
31.	Teflon Tape	Approved local
32.	Foot rests	KGM / Patel / Pranali Industries
33.	Modular Harvesting Pit	Retas / Atlanits / Frankische
34.	Submersible Pump	Wilo / Grundfos / Ebara / Lubi
35.	Water Cooler	Bluestar/Voltas/Usha
36.	Any Other Items	On Approval of Architect / Consultant Or Engineer-In-Charge

Note: The choice of the Final makes shall be made by the owner / consultant / as specified in electrical tender

ANNEXURE – II
PART LIST OF CODES & STANDARDS
List of Bureau of Indian Standards

All equipment, supply, erection, testing and commissioning shall comply with the requirements of Indian Standards and code of practices given below. All equipment and material being supplied by the contractor shall meet the requirements of IS and other specified.
Tariff advisory committee's regulation (fire insurance), electrical inspectorate and Indian Electricity rules and other Codes / Publications as given below:

1 Pipes and Fittings

IS : 458 Specification for precast concrete pipes (with and without reinforcement)
IS : 651 Salat glazed stone ware pipes and fittings.
IS : 1239 (Part 1) Mild steel, tubes, tubulars and other wrought steel fittings: Part 1 Mild Steel tubes.
IS : 1239 (Part 2) Mild Steel tubes, tubulars and other wrought steel fittings: Part 2 Mild Steel tubulars and other wrought steel pipe fittings.
IS : 1536 Centrifugally cast (spun) iron pressure pipes for water, gas and sewage.
IS : 1537 Vertically cast iron pressure pipes for water, gas and sewage.
IS : 1538 Cast Iron fittings for pressure pipes for water, gas and sewage.
IS : 1729 Sand Cast iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
IS : 1879 Malleable cast iron pipe fittings.
IS : 1978 Line pipe
IS : 1979 High test line pipe.
IS : 2501 Copper tubes for general engineering purposes
IS : 2643 (Part 1) Dimensions for pipe threads for fastening purposes: Part 1 Basic profile and dimensions.
IS : 2643 (Part 2) Dimensions for pipe threads for fastening purposes: Part 2 Tolerances.
IS : 2643 (Part 3) Dimensions for pipe threads for fastening purposes: Part 3 Limits of sizes.
IS : 3468 Pipe nuts.
IS : 3589 Seamless or electrically welded steel pipes for water, gas and sewage (168.3 mm to 2032 mm outside diameter).
IS : 3989 Centrifugally cast (sun) iron spigot and socket soil, waste and ventilating pipes, fittings and accessories.
IS : 4346 Specifications for washers for use with fittings for water services.
IS : 4711 Methods for sampling steel pipes, tubes and fittings.
IS : 6392 Steel pipe flanges
IS : 6418 Cast iron and malleable cast iron flanges for general engineering purposes.
IS : 7181 Specification for horizontally cast iron double flanged pipe for water, gas and sewage.
IS:782 Specification for caulking lead (3rd rev.)
IS:6163 Cast Iron Low Pressure Pipes
IS:13592 PVC Pipes

IS:4989 HDPE Pipes for Potable water supply, Sewage and Ind. Effluent
I.S:985 UPVC Pipes for Potable water supply
IS:110221 Code of Practice for coating and wrapping of U.G M.S Pipelines
IS:3114 Code of Practice for laying C.I Pipes (2nd rev.)
(Amendment 2)

2 Valves

IS : 778 Specification for copper alloy gage, globe and check valves for water works purposes.
IS : 780 Specification for sluice valves for water works purposes (50 mm to 300 mm size).
IS : 1703 Specification copper alloy float valves (horizontal plunger type) for water supply fittings.
IS : 2906 Specification for sluice valves for water works purposes (350 mm to 1200 mm size)
IS : 3950 Specification for surface boxes for sluice valves.
IS : 5312 (Part 1) Specification for swing check type reflux (non-return) valves: part 2 Multi door pattern.
IS : 5312 (Part 2) Specification for swing check type reflux (non-return) valves: part 2 Multi door pattern.
IS : 12992 (Part 1) Safety relief valves, spring loaded : Design
IS : 13095 Butterfly valves for general purposes.

3 Sanitary Fittings

IS : 771 (Part 1 to 3) Specification for glazed fire clay sanitary appliances.
IS : 774 Specification for flushing cistern for water closets and urinals (other than plastic cistern)
IS : 775 Specification for cast iron brackets and supports for wash basins and sinks
IS : 781 Specification for cast copper alloy screw down bib taps and stops valves for water services.
IS : 1700 Specification for drinking fountains.

IS : 2548 (Part 2) Specification for plastic seats and covers for water closets: Part 1 Thermoset seats and covers.

IS : 2556 (Part 1) Specification for vitreous sanitary appliances (Vitreous China) : Part 1 General requirement.

IS : 2556 (Part 2) Specification for vitreous sanitary appliances (vitreous china): Part 2 Specific requirements of wash-down water closets.

IS : 2556 (Part 3) Specification for vitreous sanitary appliances (vitreous China): Part 3 Specific requirements of squatting pans.

IS : 2556 (Part 4) Specification for vitreous sanitary appliances (vitreous china): part 4 specific requirements of wash basins.

IS : 2556 (Part 6 Sec 2) Specification for vitreous sanitary appliances (vitreous china): part 6 Specific requirements of urinals, section 2 half stall urinals.

IS : 2556 (Part 6 Sec 4) Specification for vitreous sanitary appliances (vitreous china): Part 6 specific requirements of urinals, section 4 partition slabs.

IS : 2556 (Part 6 Sec 5) Specification for vitreous sanitary appliances (vitreous china): Part 6 Specific requirements of urinals, section 5 waste fittings.

IS : 2556 (Part 6 Sec 6) Specification for vitreous sanitary appliances (vitreous china): Part 6 Specific requirements of urinals, section 6 water spreaders for half stall urinals.

IS : 2556 (Part 7) Specification for vitreous sanitary appliances (vitreous china): Part 7 Specific requirements of half round channels.

IS : 2556 (Part 8) Specification for vitreous sanitary appliances (vitreous china): Part 8 Specific requirements of siphoning wash down water closets.

IS : 2556 (Part 11) Specification for vitreous sanitary appliances (vitreous china): Part 11 Specific requirements for shower rose.

IS : 2556 (Part 12) Specification for vitreous sanitary appliances (vitreous china): Part 12 Specific requirements of floor traps.

IS : 2556 (Part 15) Specification for vitreous sanitary appliances (vitreous china): Part 15 Specific requirements of universal water closets.

IS : 2692 Specification for ferrule for water services

IS : 2717 Glossary of terms relating to vitreous enamelware and ceramic metal systems

IS : 2963 Specifications for waste plug and its accessories for sinks and wash basins.

IS : 3311 Specification for waste plug and its accessories for sinks and wash basins.

IS : 5961 Specification for cast iron gratings for drainage purposes.

IS : 6249 Specification for gel-coated glass fiber reinforced polyester resin bath tubs.

IS : 6411 Specification for gel-coated glass fiber reinforced polyester resin bath tubes.

IS : 8931 Specification for copper alloy fancy single taps, combination tap assembly and stop valves for water services.

IS : 9758 Specification for flush valves and fitting for water closets and urinals.

4 Water Quality Tolerance

IS : 3025 (Parts 1 to 44) Method of sampling and test (physical and chemical) for water and waste water.

IS : 4764 Tolerance limits for sewage effluents discharged into inland surface waters.

IS : 10500 Drinking Water

5 Pumps & Vessels

IS : 1520 Specification for horizontal centrifugal pumps for clear cold fresh water.

IS : 2002 Steel plates for pressure vessels for intermediate and high- temperature service including boilers.

IS : 2825 Code for unfired pressure vessels.

IS : 4648 (Part 1) Code of practice for lining of vessels and equipment for chemical processes Part 1: Rubber lining.

IS : 5600 Specification for sewage and drainage pumps

IS : 8034 Specification for submersible pump sets for clear, cold, fresh water.

IS : 8418 Specification for horizontal centrifugal self-priming pumps.

6 General

National Building Code of India 2016 Part IV and Part IX

Uniform Plumbing Code of India

SP : 6 (1) Structural Steel Sections

IS : 325 Three Phase Induction Motors

IS: 456 Code of practice for plain and reinforced concrete (3rd rev.) (Amendment 2)

IS : 554 Dimensions for pipe threads where pressure tight joints are required on the threads.
IS : 694 PVC insulated cables for working voltages up to & including 1100 V.
IS : 779 Specification for water meters (domestic type).
IS : 782 Specification for caulking load.
IS : 800 Code of practice for general construction in steel
IS : 1068 Electroplated coatings of nickel plus chromium and copper plus nickel plus chromium.
IS : 1172 Code of Basic requirements for water supply drainage and sanitation
IS : 1367 (Part 1) Technical supply conditions for threaded steel fasteners: Part 1 introduction and general information.
IS : 1367 (Part 2) Technical supply conditions for threaded steel fasteners: Part 2 product grades and tolerances.
IS : 1554 (Part 1) PVC insulated (heavy duty) electric cables : Part 1 for working voltages upto and including 1100 V.
IS : 1554 (Part 2) PVC insulated (heavy duty) electric cables: Part 2 for working voltages from 3.3 KV upto and including 11 KV.
IS : 1726 Specification for cast iron manhole covers and frames.
IS : 1742 Code of practice for building drainage.
IS : 2064 Selection, installation and maintenance of sanitary appliance code of practice.
IS : 2065 Code of practice for water supply in buildings.
IS : 2104 Specification for water meter for boxes (domestic type)
IS : 2373 Specification for eater meter (bulk type)
IS : 2379 Color code for identification of pipe lines.
IS : 2527 Code of practice for fixing rainwater gutters and down pipes for roof drainage.

IS : 2629 Recommended practice for hot dip galvanizing on iron and Steel.
IS : 3114 Code of practice for laying of cast iron pipes
IS : 4111 (Part 1) Code of practice for ancillary structures in sewerage system: Part 1 manholes.
IS : 4127 Code of practice for laying glazed stoneware pipes.
IS : 4853 Recommended practice for radiographic inspection of fusion welded butt joints in steel pipes.
IS : 5329 Code of practice for sanitary pipe work above ground for buildings.
IS : 5455 Cast iron steps for manholes.
IS : 6159 Recommended practice for design and fabrication of material, prior to galvanizing.
IS : 7558 Code of practice for domestic hot water installations.
IS : 8321 Glossary of terms applicable to plumbing work.
IS : 8419 (Part 1) Requirements for water filtration equipment: Part 1 Filtration medium sand and gravel.
IS : 8419 (Part 2) Requirements for water filtration equipment: Part 2 under drainage system.
IS : 9668 Code of practice for provision and maintenance of water supplies and firefighting.
IS : 9842 Preformed fibrous pipe insulation.
IS : 9912 Coal tar based coating materials and suitable primers for protecting iron and steel pipe lines.
IS : 10221 Code of practice for coating and wrapping of underground mild steel pipelines.
IS : 10446 Glossary of terms relating to water supply and sanitation.
IS : 11149 Rubber Gaskets
IS : 11790 Code of practice for preparation of butt-welding ends for pipes, valves, flanges and fittings.
IS : 12183 (Part 1) Code of practice for plumbing in multistoried buildings: Part 1 water supply.
IS : 12251 Code of practice for drainage of building basements.
IS : 5572 Code of practice for sanitary pipe work.
BS : 6700 Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilages.
BS : 8301 Code of practice for building drainage.
BSEN : 274 Sanitary tap were, waste fittings for basins, bidets and baths. General technical specifications.

TECHNICAL SPECIFICATIONS FOR PLUMBING WORKS
Sanitary Fixtures & CP Fittings SCOPE
The scope of this section consists supply, installation, testing and commissioning of following items.

- Sanitary appliances and fixtures for toilets.
- Chromium-plated brass fittings

- Stainless steel sinks in cafeteria / kitchen area

- Accessories e.g. towel rods, toilet paper holders, soap dish, towel rails, coat hooks etc.

Whether specifically mentioned or not the Contractor shall provide for all appliances and fixtures all fixing devices, nuts, bolts, screws, hangers as required.
All exposed pipes (if any) within toilets and near appliances/fixtures shall be of chromium plated brass or copper unless otherwise specified.
Note:

- The supply of sanitary fixtures and bathroom fittings shall be made by the owner. The contractor has to receive, store, transport and handle the goods in proper manner. Any breakage & wastage will be in contractor's account.
- The model and make of sanitary fixtures and C P Fittings will be as approved by the architect / consultant / owner, the catalogue reference given in the item is purely indicative.

GENERAL REQUIREMENTS

a) All glazed Vitreous China Sanitary Ware fixtures shall conform to Bureau of Indian Standards IS: 2556. The details make and type of the fixtures shall be as provided in the Bill of Quantities. The Vitreous China Sanitary ware shall be of one of the makes specified in the document. They shall be of non-porous and fully vitreous, with all the visible portions perfectly glazed and shall absolutely be free from hairline cracks pinholes and local depressions. It shall be perfectly symmetrical, uniform and with smooth curves. All sanitary fixtures and fittings shall be stored under covered roof and handled carefully to prevent any damage.

b) All materials shall be new and of quality conforming to specifications and subject to the approval of the Engineer. Wherever particular makes are mentioned, the choice of selection shall remain with the Architect/Consultant.

c) All appliances, fixtures and fittings shall be provided with all such accessories as are required to complete the item in working condition whether specifically mentioned or not in the Bill of Quantities, specifications, and drawings. Accessories shall include proper fixing arrangements, brackets, nuts, bolts, washers, screws and required connection pieces.

d) The sanitary fixtures and fittings shall be installed at the correct assigned position as shown on the drawings and as directed by the Engineer and shall fully meet with the aesthetic and symmetrical requirements as demanded by the Engineer.

e) All fixtures and accessories shall be fixed in accordance with a set pattern matching the tiles or interior finish as per Architect requirements. Wherever necessary, the fittings shall be centered to dimensions and pattern as called for.

f) Fixing screws shall be half round head chromium plated (CP) brass screws, with CP brass washers unless otherwise specified. Chromium plated fittings shall be cast brass chromium plated of the best quality as detailed in the Bill of Quantities and shall be approved by Engineer prior to installation.

g) Fixtures shall be installed by skilled workman with appropriate tools according to the best trade practice. Manufacturer's instructions shall be followed for the installation of fixtures. Fixtures in all toilets shall be standard height mounting as called for on the drawings. Fixtures shall be mounted rigid, plumb and true to alignment.

h) All appliances, fittings and fixtures shall be fixed in a neat workmanlike manner true to level and to heights shown on the drawings and in accordance with the manufacturers' recommendations. Care shall be taken to

fix all inlet and outlet pipes at correct positions. Faulty locations shall be made good and any damage to the finished floor; tiling, plaster, paint, insulation or terrace shall be made good by the Contractor at his own cost.

i) All materials shall be rust proofed; materials in direct or indirect contact shall be compatible to prevent electrolytic or chemical (bimetallic) corrosion.

j) Wall flanges shall be provided on all walls, floors, columns etc. wherever supply and disposal pipes pierce through them. These wall caps shall be or chromium plated brass snugly fittings and the receiving pipes and shall be large enough to cover the punctures properly.

k) Sanitary appliances, subject to the type of appliance and specific requirements, shall be fixed in accordance with the relevant standards and the following:

l) Contractor shall, during the entire period of installation and afterwards, protect the appliances by providing suitable cover or any other protection so as to absolutely prevent any damage to the appliances until handing over (The original protective wrapping shall be left in position for as long as possible)

m) The appliances shall be placed in correct position or marked out in order that pipe work can be fixed or partially fixed first.

n) The appliance shall be fixed in a manner such that it will facilitate subsequent removal if necessary.

o) The appliance shall be securely fixed. Manufacturer's brackets and fixing methods shall be used wherever possible. Compatible rust proofed fixings shall be used. Fixing shall be done in a manner that minimize noise transmission.

p) Appliances shall not be bedded (e.g. WC pans, pedestal units) in thick strong mortar that could crack the unit (e.g. ceramic unit)

q) Pipe connections shall be made with demountable unions. Pipe work shall not be fixed in a manner that it supports or partially supports and appliance.

r) Appliances shall be fixed true to level firmly fixed to anchor or supports provided by the manufacturer and additional anchors or supports where necessary.

s) Sizes of sanitary fixtures given in the Specifications or in the Bill of Quantities are for identification with reference to the catalogues of make considered. Dimensions of similar models of other makes may very within +_ 10% and the same shall be provided and no claim for extra payment shall be entertained no shall any payment be deducted on this account.

t) Samples of Sanitary appliances and fixtures for toilets, chromium plated brass fittings, stainless steel sinks, accessories like towel rods, toilet paper holders, soap dish, liquid soap dispensers, towel rails coat hooks, hand driers, drinking water fountains etc.as listed in the relevant items in the Bill of Quantities shall be approved by the Architect /Consultant / Engineer prior to installation. The Contractor shall quote his rates for the items in the Bill of Quantities accordingly. The rates shall be inclusive of accessories (in such case) required for installation. Bottle traps (for wash basins, sinks, urinals etc.) shall be deep seal (Min. 6 cm seal) cast brass bottle traps, heavy chromium plated. All bottle traps shall be two piece constructions to enable removal of the bottom portion for cleaning purpose.

VITREOUS CHINA SANITARY WARE

Indian Type Water Closet

Squatting pans shall be of white vitreous China conforming to IS: 2556 Part – I for General Requirements and relevant I.S. codes for each pattern as described below:

a) Long pattern – conforming to IS: 2556 (Part – III).

b) Orissa pattern – conforming to IS: 2556 (Part – III).

The flushing rim and inlet shall be of the self-draining type. It shall have weep hole at the flushing inlet to the pan. The flushing inlet shall be in the front, unless otherwise specified or ordered by the Engineer-in-charge. The inside of the bottom of the pan shall have sufficient slope from the front towards the outlet and the surface shall be uniform and smooth to enable easy and quick disposal while flushing. The exterior surface of the outlet below the flange shall be an unglazed surface which shall have grooves at right angles to the axis of the outlet. In all cases a pan shall be provided with a (100 mm) S.C.I. trap ‘P’ or ‘S’ type with approximately 50 mm water seal and 50 mm dia. vent horn, where required by the Engineer-in-charge or 110 mm dia. UPVC WC Connector.

European Type Water Closet

Water closets shall be of white vitreous China conforming to IS: 2556 (Part-I) and 2556 (Part-II). The closets shall be of one piece construction. Water Closet shall be siphonic wash down type floor or wall mounted set, as per bill of quantities or as shown in the drawings. Wall hung WC shall be supported by C. l. floor mounted chair, which shall be fixed in a manner as approved by the Engineer.

Each WC set shall be provided with approved quality of seat, rubber buffers and chromium-plated hinges. Seat shall be so fixed that it remains absolutely stationary in vertical position without falling down on the WC.

The WC for the disabled toilet shall be complete with grab rail and other accessories as required and directed.

Urinals

Urinals shall be lipped type half stall with glazed vitreous China of size as called for in the Bill of Quantities.

Half stall urinals shall be provided with 15mm dia. CP spreader, CP domical waste and CP cast brass bottle trap with pipe and wall flange and shall be fixed to wall by Cl brackets, Cl wall clips and CP brass screws as recommended by manufacturer complete as directed by the Engineer.

Flush pipes shall be Gl pipes concealed in wall chase but with chromium-plated bends at inlet and outlet.
Gl / PVC waste pipes shall be provided for urinals. Waste pipes may be exposed on wall or concealed in chase as directed by the Engineer.

Urinal Partitions

Urinal partitions shall be white glazed vitreous china of size specified in the Bill of Quantities or as specified by the Architect in the Architectural drawings.
Porcelain partitions shall be fixed at proper heights with CP brass bolts, anchor fasteners and MS clips as recommended by the manufacturer and directed by the Engineer.

Wash Hand Basin

Washbasins shall be white glazed vitreous china of size, shape and type specified in the Bill of Quantities.
Each basin shall be provided with painted MS angle or Cl brackets and clips and the basin securely fixed to wall/counter slab. Placing of basins over the brackets without secure fixing shall not be accepted. The MS angle shall be provided with two coats of red oxide primer and two coats of synthetic enamel paint of make, brand and colour as approved by the Engineer.
Each basin shall be provided with 32mm dia. CP waste with overflow, pop-up waste or rubber plug and CP brass chain as specified in the Bill of Quantities, 32mm dia. CP brass bottle trap with CP pipe to wall flange. Basins shall be fixed at proper heights as shown on drawings. If heights are not specified, the rim level shall be 800 mm from finished floor level or as directed by the Engineer.

Where oval shape or round shape wash basins are required to be fixed these shall be fixed preferably in RCC platform with local available stone topping either fully sunk in stone top or flush with the stone topping as directed by Engineer-in-charge.

White glazed pedestals for wash basins, where specified shall be provided. The quality of the glazing of the pedestal shall be exactly the same as that of the basin along with which it is to be installed. It shall be completely recessed at the back to accommodate supply and waste pipes and fittings. It shall be capable of supporting the basin rigidly and adequately and shall be so designed as to make the height from the floor to top of the rim of basin 75 to 85 cm.

Sinks

Sinks shall be stainless or any other material as specified in the Bill of Quantities.
Each sink shall be provided with painted MS or Cl brackets and clips and securely fixed.
Counter top sinks shall be fixed with suitable painted angle iron brackets or clips as recommended by the manufacturer.
Each sink shall be provided with 40mm dia. CP waste and rubber plug with CP brass chain as given in the Bill of Quantities.
The MS angle shall be provided with two coats of red oxide primer and two coats of synthetic enamel paint of make, brand and color as approved by the Engineer.
Supply fittings for sinks shall be deck mounted or wall mounted CP swivel faucets with or without hot and cold water mixing fittings as specified in the Bill of Quantities. These shall be measured and paid for separately.

Toilet Paper Holder

Toilet paper holder shall be glazed vitreous China (Color of the unit shall match with the other fixtures or wall tile) or chrome plated of size, shape and type specified in the Bill of Quantities.
Porcelain toilet paper holder shall be fixed in walls and set in cement mortar 1:2 (1 cement: 2 coarse sand) and fixed in relation to the tiling work.
In case of chrome plated ones the same shall be fixed by means of screws/capping having finish similar to the sanitary fixtures or wall/partitions. When fixed on timber partition, it shall be fixed on a solid wooden base member provided by the Project Manager.

Towel Rail

Tower rail shall be chromium plated brass or of stainless steel or powder coated brass of size, shape and type specified in the Bill of Quantities.
Tower rail shall be fixed with screws/capping having finish similar to the towel rail in wall with rawl plugs or nylon sleeves and shall include cutting and making good as required or directed by the Engineer.

Accessories

Porcelain accessories shall be fixed in walls and set in cement mortar 1:2 (1 cement: 2 coarse sand) and fixed in relation to the tiling work.
Joints/gaps between all sanitary appliances/fixtures and the floor/walls shall be caulked with an approved mildew resistant sealant, having ant fungal properties, of colour and shade to match that of the appliances/fixture and the floor/wall to the extent possible.

Fittings

All C P bathroom fittings and accessories will be supplied as per the make and model number specified in the BOQ / or specified in CPWD specifications.

INSTALLATION OF SANITARY FIXTURES AND FITTINGS

(Note: The contractor has to receive the goods and store them in proper condition, install & erect them as required and as per the specifications and manufacturer's guidelines upto the satisfaction of Engg-in-charge. The work involves fixing and testing in position of all items including threading the pipes, cutting and making good the walls and floors where required, painting of any exposed part where ever required, supply and fixing of minor accessories such as C P screws, nuts, washers, extension pieces, brackets, wooden cleats, rawl plugs etc. to complete the work. Any breakage & wastage will be in contractor's account)

General
All setting and bedding of sanitary fittings shall be done carefully to suit the required levels. Mortar drops, paint splashes etc. shall be removed from fittings, walls and floors immediately before these get dry.

Fixing Water Closet Squatting Pan (Indian Type W.C. pan)

The pan shall be sunk into the floor and embedded in a cushion of average 15 cm cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate/ brick aggregate 40 mm nominal size) as specified. This concrete shall be left 115 mm below the top level of the pan so as to allow for flooring and its bed concrete. The floor should be suitably sloped so that the wastewater is drained into the pan. The pan shall be provided with a 100 mm `p' or s trap as required in the item with an approximately 50 mm seal. The joint between the pan and the trap shall be made leak proof with cement mortar 1:1 (1 cement :1 fine sand).
Fixing Wash down Water Closet (European Type W.C. pan)

The closet shall be fixed to the floor by means of 75 mm long 6.5 mm diameter counter sunk bolts and nuts embedded in the floor concrete using rubber or fiber washers so as not to allow any lateral displacement. The joint between the trap of W.C. and soil pipe shall be made with cement mortar 1:1 (1cement : 1 fine sand).

Fixing flushing Cistern

The cistern shall be fixed on two C.I. or mild steel brackets which shall be firmly embedded in the wall in cement mortar 1 : 4 (1 cement : 4 fine sand).
The height of the bottom of the cistern from the top of the pan shall be 2 meters for high level and 30cm. for low level cistern.

Fixing flush pipe and its connection Low level flushing cistern
In case of low level flushing cistern it shall be connected to the closet by means of 40mm dia white porcelain enameled flush bend using Indian rubber adapters joint. The other specification shall be the same as described at (i) above.
Fixing plastic seat and cover

The seat shall be fixed to the pan by means of two 8mm dia. corrosion resistant hinge bolts with a minimum length of shank of 65mm and threaded to within 15mm of the head. Each bolt shall be provided with two suitably shaped washers of rubber or other similar material for adjusting the level of the seat while fixing it to the closet. In addition one 8mm nonferrous metal or stainless steel washer shall be provided with each bolt. The maximum diameter of the washers fixed on the underside of the pan shall not be greater than 25mm. One arm of the hinge in each bolt shall be fixed to the under site of the seal by three nos. 20mm long No.6 gauge wood screws. The other arm of the hinge shall be fixed to the underside of the cover flush with the surface by means of 3 nos. 10mm long No. 6 gauge wood screws.
Fixing bowl pattern urinals (As per Arch / Interior Selection)

Urinals shall be fixed in position by using wooden plugs and screws, and shall be at a height of 65cm. From the floor level to the top of the lip of urinal, unless otherwise directed. The wooden plugs shall be fixed in the wall in cement mortar 1:3 (1 cement : 3 fine sand).
Fixing wash basins and kitchen sink

The basin shall be supported on a pair of R.S. or C.I. brackets fixed in cement mortar 1:3 (1 cement : 3 coarse sand). The R.S. or C.I. brackets shall conform to IS 775-1962. The wall plaster on the rear shall be cut to rest over the top edge of the basin. After fixing the basin plaster shall be made good and surface finished to match with the existing one.
The C.P. brass trap and unions shall be connected to 32mm dia. waste pipe which shall be suitably bent towards the wall and which shall discharge into an open drain leading to a gully trap or direct into the gully trap, on the ground floor and shall be connected to a waste pipe stack through a floor trap on the upper floors.
C.P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged in to it vertically.

Fixing Mirror
The mirror shall be mounted on asbestos sheet or plywood sheet and shall be fixed in position by means of 4 C.P. brass screws and C.P. brass washers over rubber washers and wooden plugs firmly embedded in the wall.

The height of the bottom edge of the mirror shall generally be 120cm above the floor level unless otherwise specified or shown in drawing. Unless otherwise specified the longer sides shall be fixed horizontally.
Fixing glass shelf unit

The bracket of the unit shall be fixed with C.P. brass screws to wooden plugs firmly embedded in the wall with cement mortar 1 : 3 (1 cement : 3 coarse sand).
The height of the glass shelf above the floor level shall 115cm unless otherwise specified or shown in drawings.

Fixing towel rail

The brackets of the wall rail shall be fixed by means of C.P. brass screws to wooden plugs firmly embedded in the wall with cement 1 : 3 (1 cement : 3 coarse sand).
The height of the towel rail above the floor level shall be 75cm unless otherwise specified or shown in drawings.
Fixing toilet paper holders

It shall be fixed in a position by means of screws and wooden plugs embedded in the wall with cement mortar 1:3 (1 cement : 3 coarse sand).
Fitting
Contractor shall install all chromium plated, stainless steel or powder coated brass fittings as shown on the drawings or as directed by the Engineer and given in the Bill of Quantities.
All CP accessories shall be fixed with CP brass half round head screws and cup washers if required in wall with rawl plugs or nylon sleeves and shall include cutting and making good as required or as directed by the Engineer.
The fittings shall be supplied complete with chromium plated matching flanges, wall cover plates, nuts and extension pieces of required lengths. Metallic washers where required shall also be of chromium plated brass. All bib cocks and stopcocks shall conform to Indian Standard IS: 781. Brass screw down pillar taps shall conform to IS: 1701 and all other fittings shall match the supply fitting in construction and appearance. All fixing accessories and screws shall be similar to fittings. All washers shall conform to Indian Standard IS: 4346.
All waste fittings (Waste, Chain, Overflow, Spreader Caps etc.) shall be of brass / copper heavy chromium plated of the make and design specified and match the supply fittings. They shall conform to Indian Standard IS:2963.
The flushing system of the EWC shall be with 32 mm control cock and elbow set complete with adjustable sleeves and wall flanges. The flush valve for EWC shall be in conformity with IS: 6249.
Testing
All appliances, fixtures and fittings shall be tested before and after installation. Water seals of all appliances shall be tested.
Mockup and Trial Assembly
The installation of the Sanitary fixtures and fittings shall be as per the shop drawings approved by the Engineer.
The contractor shall make a mock up toilet in consultation with the Engineer. The sanitary fixtures and fittings shall be got approved by the Engineer prior to the procurement. On completion of the mock up, changes if any required shall be carried out to the satisfaction of the Engineer. Relevant instructions from manufacturers shall be followed as applicable. This trial assembly shall be developed to determine the location of cut outs in the building structure, holding devices etc. which will be required for final installation of all sanitary fixtures and fittings.

The fixtures in the trial assembly can be re-used for final installation without any additional payments for fixing or dismantling of the fixtures.
The contractor shall provide all the necessary supporting and fixing devices to install the sanitary fixtures and fittings securely in position. The fixing devices shall be rigidly anchored into the building structure. The devices shall be rust resistant and shall be so fixed that they do not present an unsightly appearance in the final assembly. Where the location demands, the Engineer may instruct the contractor to provide chromium plated or other similarly finished fixing devices. In such circumstances the contractor shall arrange to supply the fixing devices and shall be installed complete with appropriate vibration isolating pads, washers and gaskets.
Final Installation
The contractor shall install all sanitary fixtures and fittings in their final position in accordance with approved trial assemblies and as shown on drawings. The installation shall be complete with all supply and waste connections. The connection between building and piping system and the sanitary fixtures shall be through

proper unions and flanges to facilitate removal/replacement of sanitary fixtures without disturbing the built in piping system. All unions and flanges shall match in appearance with other exposed fittings.
Fixtures shall be mounted rigid, plumb and to alignment. The outlets of water closet pans and similar appliances shall be examined to ensure that outlet ends are butting on the receiving pipes before making the joints. It shall be ensured that the receiving pipes are clear of obstruction. When fixtures are being mounted, attention shall be paid to the possibility of movement and settlement by other causes. Overflows shall be made to ensure that necessary anchoring devices have been provided for supporting water closets, washbasins, sinks and other appliances.
Protection Against Damage
The contractor shall take every precaution to protect all sanitary fixtures against damage, misuse, cracking, staining, breakage and pilferage by providing proper wrapping and locking arrangement till the completion of the installation. At the time of handing over, the contractor shall clean, disinfect and polish all the fixtures and fittings. Any fixtures and fittings found damaged, cracked chipped stained or scratched shall be removed and new fixtures and fittings free from defects shall be installed at his own cost to complete the work.
Measurement and Rates
Sanitary fixtures (Vitreous China ware and CP fittings) shall be measured by numbers.
Rate of providing and fixing of sanitary fixtures, accessories, shall be include all items, and operations stated in the respective specifications and Bill of Quantities and nothing extra is payable.
Rates of all items under specification clauses above shall be inclusive of cutting holes and chases and making good the same, CP brass screws, nuts, bolts and any other fixing arrangements required and recommended by manufacturers, testing and commissioning etc. complete.

WATER SUPPLY
GENERAL REQUIREMENTS
a) Any damage caused to the building, or to electric, sanitary water supply or other installations etc. therein either due to negligence on the part of the contractor, or due to actual requirements of the work, shall be made good and the building or the installations shall be restored to its original condition by the contractor.
b) Nothing extra shall be paid for it, except where otherwise specified.

c) All water supply installation work shall be carried out through licensed plumbers.

d) It is most important to ensure that wholesome water supply provided for drinking and culinary purposes, is in no way liable to contamination from any less satisfactory water. There shall, therefore, be no cross connection whatsoever between a pipe or fitting for conveying or containing wholesome water and a pipe or fitting for conveying or containing impure water or water liable to contamination or of uncertain quality of water which has been used for any purpose. The provision of reflux or non-return valves or closed and sealed valves shall not be construed a permissible substitute for complete absence of cross-connection.
e) No piping shall be laid or fixed so as to pass into, through or adjoining any sewer, scour outlet or drain or any manhole connected therewith nor through any ash pit or manure-pit or any material of such nature that would be likely to cause undue deterioration of the pipe.

f) Where the laying of any pipe through fouled soil or previous material is unavoidable, the piping shall be properly protected from contact with such soil or material by being carried through an exterior cast iron tube or by some other suitable means. Any piping or fitting laid or fixed, which does not comply with the above requirements, shall be removed and re-laid in conformity with the above requirements.

g) All pipes shall be so laid and fixed and maintained as to be and to remain completely water tight, thereby avoiding waste of water, damage to the property and the risk of contamination of the water conveyed.
h) The change in diameter and in direction shall preferably be gradual rather than abrupt to avoid undue loss of head. No bend or curve in piping shall be made so as to alter the cross section.

i) UV unit shall be complete with reactor, cabinet housing, cabinet cooling, treatment chamber, electrical panel, temperature safety control, lamp out alert, UV radiometer along with UV monitoring system and UV monitoring readout panel. The UV Dosage should be > 30,000 uW – Sec / sq.cm. The lamps should be selected based upon the flow requirement of respective unit. It will be either localized or centralized.

LAYING AND JOINTING OF WATER SUPPLY PIPES AND FITTINGS
General Specifications Of Under Ground Works Unloading
a) The pipes shall be unloaded where they are required.

b) Unloading (except where mechanical handling facilities are available) – pipes weighing up to 60 kg shall be

handled by two persons by hand passing. Heavier pipes shall be unloaded from the lorry or wagon by holding them in loops, formed with ropes and sliding over planks set not steeper than 45 degree. The planks shall be sufficiently rigid and two ropes shall always be used to roll the pipes down the planks. The ropes should be tied on the side opposite the unloading. Only one pipe shall be unloaded at a time.

c) Under no circumstances shall be the pipes be thrown down from the carriers or be dragged or rolled along hard surfaces.

d) The pipes shall be checked for any visible damage (such as broken edges, cracking or spalling of pipe) while unloading and shall be sorted out for reclamation. Any pipe which shows sufficient damage to preclude it from being used shall be discarded.

STORING

a) The pipes and specials shall be handled with sufficient care to avoid damage to them. These shall be lined up on one side of the alignment of the trench socket facing upgrade when line runs uphill and upstream when lines run on level ground.

b) Each stack shall contain pipes of same class and size, consignment or batch number and particulars of the suppliers, wherever possible, shall be marked on the stack.

c) Storage shall be done on firm, level and clean ground. Wedges shall be provided at the bottom layer to keep the stack stable.

CUTTING

a) Cutting of pipes may be necessary when pipes are to be laid in lengths shorter than the lengths supplied, such as while replacing accessories like tees, bends, etc. at fixed position in the pipe lines.

b) A line shall be marked around the pipe with a chalk piece at the point where it is to be cut. The line shall be so marked that the cut is truly at right angle to the longitudinal axis of the pipe.

TRENCHES

a) The trenches shall be so dug that the pipes may be laid to the required alignment and at required depth.

b) Cover shall be measured from top of pipe to the surface of the ground. In general the cover should be 1000 mm unless specified in drawings.

c) The minimum width of the trench should be “D + 400 mm”, where, D is outer diameter of the pipe.

d) For pipes with diameter less than 1200 mm, the bed of the trench shall be excavated to the pipe grades so that uniform support is assured for the full length of the pipe.

e) The bed of the trench, if in soft or made up earth, shall be well watered and rammed before laying the pipes and the depressions, if any, shall be properly filled with earth and consolidated in 20 cm layer.

f) If the trench bottom is extremely hard or rocky or loose stony soil, the trench shall be excavated at least 150 mm below the trench grade. Rocks, stone or other hard substances from the bottom of the trench shall be removed and the trench brought back to the required grade by filling with selected fine earth or sand (or fine moorum if fine soil or sand is not available locally) and compacted so as to provide a smooth bedding for the pipe or provide lean cement concrete as required and specified..

g) After the excavation of the trench is completed, hollows shall be cut at the required position to receive the socket of the pipes and these hollows shall be of sufficient depth to ensure that the barrels of the pipes shall rest throughout their entire length on the solid ground and that sufficient spaces left for jointing the underside of the pipe joint. These socket holes shall be refilled with sand after jointing the pipe.

h) Roots of trees within a distance of about 0.5 meter from the side of the pipe line shall be removed or killed.

i) The excavated materials shall not be placed within 1 meter or half of the depth of the trench, whichever is greater, from the edge of the trench. The materials excavated shall be separated and stacked so that in refilling that may be re-laid and compacted in the same order to the satisfaction of the Engineer-in-charge.

j) The trench shall be kept free from water. Shoring and timbering shall be provided wherever required. Excavation below water table shall be done after dewatering the trenches.

k) Where the pipe line or drain crosses an existing road, the road crossing shall be excavated half at a time, the 2nd half being commenced after the pipes have been laid in the first half and the trench refilled. Necessary safety measures for traffic as directed shall be adopted. All types, water main cables, etc. met within the course of excavation shall be

carefully protected and supported. Care shall be taken not to disturb the electrical and communication cable met with during course of excavation, removal of which, if necessary, shall be arranged by the Engineer-in-charge.

l) When pipes are laid under road and pavements, subjected to heavy traffic loads, the trench may be covered with RCC slabs of suitable dimensions.

LAYING

a) The pipes shall be lowered into the trench by means of suitably pulley blocks, sheer legs chains ropes etc. In no case the pipes shall be rolled and dropped into the trench. One end of each rope may be tied to a wooden or steel peg driven into the ground and the other end held by men which when slowly released will lower the pipe into the trench. After lowering, the pipes shall be arranged so that the spigot of one pipe is carefully centered into the socket of the next pipe, and pushed to the full distance that it can go. The pipe line shall be laid to the levels required. Specials shall also be laid in their proper position as stated above.

b) Where so directed, the pipes and specials may be laid on masonry or concrete pillars. The pipe laid on the level ground, shall be laid with socket facing the direction of flow of water.

c) In unstable soils, such as soft soils and dry lumpy soils it shall be checked whether the soils can support the pipe lines and if required suitable special foundation shall be provided.

THRUST BLOCKS

a) Thrust blocks are required to transfer the resulting hydraulic thrust from the fitting of pipe on to a larger load bearing soil section.

b) Thrust blocks shall be installed wherever there is a change in the direction / size of the pipe line or the pressure line diagram, or when the pipe line ends at a dead end. If necessary, thrust blocks may be constructed at valves also.

c) Thrust blocks shall be constructed taking into account the pipe size, water pressure, type of fitting, gravity component shell when laid on slopes and the type of soil.

BACK FILLING AND TAMPING

a) Back filling shall follow pipe installation as closely as possible to protect pipe from falling boulders, eliminating possibility of lifting of the pipe due to flooding of open trench and shifting pipe out of line by caved in soil.

b) The initial back fill material used shall be free of large stones and dry lumps.

c) The initial back fill shall be placed evenly in a layer of about 100 mm thick. This shall be properly consolidated and this shall be continued till there is a cushion of at least 300 mm of cover over the pipe.

d) If it is desired to observe the joint or coupling during the testing of mains they shall be left exposed. Sufficient back fill shall be placed on the pipe to resist the movement due to pressure while testing.

HYDROSTATIC TESTS

a) After a new pipe has been laid, jointed and back filled (or any valued section thereof), it shall be subjected to the following two tests :

o Pressure test : At a pressure of at least 1.5 times the maximum working pressure-pipe and joints shall be absolutely water tight under the test.

o Leakage test : (To be conducted after the satisfactory completion of the pressure test) at a pressure to be specified by the authority for a duration of two hours.

b) Hydrostatic Tests : The portions of the line shall be tested by subjecting to pressure test as the laying progresses before the entire line is completed. In this way any error of workmanship will be found immediately and can be corrected at a minimum cost. Usually the length of the section to be tested shall not exceed 500m.

c) Where any section of a main is provided with concrete thrust blocks or anchorages, the pressure test shall not be made until at least five days have elapsed after the concrete is cast. If rapid hardening cement has been used in these blocks or anchorages, test shall not be made until at least two days have elapsed.

d) Prior to testing, enough back fill shall be placed over the pipe line to resist upward thrust. All thrust blocks forming part of the finished line shall have been sufficiently cured and no temporary bracing shall be used.

e) The open end of the section shall be sealed temporarily with an end cap having an outlet which can serve as an air relief vent or for filling the line, as may be required. The blind face of the end cap shall be properly braced during testing by screw jacks and wooden planks or steel plate.

f) The section of the line to be tested shall be filled with water manually or by a low pressure pump. Air shall be vented from all high spots in the pipe line before making the pressure strength test because entrapped air gets compressed

and caused difficulty in raising the required pressure for the pressure strength test.

PROCEDURE FOR PRESSURE TEST

1. Each valve section of the pipe shall be slowly filled with water and all air shall be expelled from the pipe through hydrants and blow offs. If these are not available at high places, necessary tapping may be made at points of highest elevation before the test is made and plugs inserted after the tests have been completed.

2. If the trench has been partially back-filled the specified pressure based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer-in-charge. The duration of the test shall not be less than 5 minutes.

3. Examination under Pressure : All exposed pipes, fittings, valves, hydrants and joints should be carefully examined during the open-trench test. When the joints are made with lead, all such joints showing visible leaks shall be recalked until tight. When the joints are made with cement and show seepage or slight leakage, such joints shall be cut out and replaced as directed by the authority. Any cracked or defective pipes, fittings, valves or hydrants discovered in consequence of this pressure test shall be removed and replaced by sound material and the test shall be repeated until satisfactory to the Engineer-in-charge.

4. If the trench has been back-filled to the top, the section shall be first subjected to water pressure normal to the area and the exposed parts shall be carefully examined. If any defects are found, they shall be repaired and the pressure test repeated until no defects are found. The duration of the final pressure tests shall be at least one hour.

PROCEDURE FOR LEAKAGE TEST

1. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valued section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled the water and the air expelled. No pipe installation shall be accepted until the leakage is less than the number of cm3/h determined by the formula :

ql = ND□P / 3.3

Where ql = the allowable leakage in cm3/h.
N = number of joints in the length of the pipe line.
D = diameter in mm, and
P = the average test pressure during the leakage testing kg/cm2.

2. Variation from Permissible Leakage : Should any test of pipe laid in position discloses leakage greater than the specified in para 5 the defective joints shall be repaired until the leakage is within the specified allowance.

CPVC PIPES FOR WATER SUPPLY DISTRIBUTION NETWORK

The scope of these specifications cover pipes & fittings using CPVC Compound. The CPVC compound shall confirm to NSF certification for use in drinking / portable water. It also covers general & technical properties of the CPVC pipes, fittings, the basic compound, installation procedures, cement solvent details , special fittings, Concealed & external plumbing etc.

STANDARDS & SPECIFICATIONS

IS : 15778 : 2007 - Specification for Chlorinated Poly Vinyl Chloride (CPVC) Pipes for Potable Hot & Cold water distribution systems.

ASTM D1784 - Standard Specification for Rigid Poly Vinyl Chloride (PVC) and Chlorinated Poly Vinyl Chloride (CPVC) Compounds.

ASTM D2846 - Specification for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Hot & Cold water distribution systems.

ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe & Fittings.

Technical Details Of CPVC

{Abbreviations: OD Outer Dia., ID Inner Dia., WT Wall Thickness.}

General Properties:

Specific Gravity	ASTM D 792	23oC	1.55
Specific Volume	ASTM D 570	23oC	0.645cm2/g
Water Absorption	ASTM D 785	23oC	+0.03%

	100OC	+0.55%	
Mechanical			
Izod Impact	ASTM D 256	23oC	80J/mo.n
Tensile Strength	ASTM D 638	23oC	55N/mm2
Flexural Strength	ASTM D 790	23OC	104N/mm2
Compressive Strength	ASTM D 695	23OC	70N/mm2

Outside Diameter and Wall Thickness for CPVC SDR 11 as per ASTM D-2846 Plastic Pipe

Nominal Size (MM)	Avg. OD MM (SDR 11)	Tolerance (MM)	Min. Wall Thickness MM (SDR 11)	Tolerance (MM)
15	15.90	+/- 0.08	1.70	+ 0.51
20	22.20	+/- 0.08	2.00	+ 0.51
25	28.60	+/- 0.08	2.59	+ 0.51
32	34.90	+/- 0.08	3.18	+ 0.51
40	41.30	+/- 0.10	3.76	+ 0.51
50	54.00	+/- 0.10	4.90	+ 0.58

CPVC SDR 11 Pipe Pressure Rating vs Temperature Table

Operating Temperature	Working Pressure Rating (kg/cm2) SDR II 15 TO 50 MM DIA
23°C	28.10
27°C	28.10
32°C	25.57
38°C	23.05
43°C	21.64
49°C	18.27
54°C	17.42
60°C	14.05
66°C	13.21
71°C	11.24
77°C	8.99
82°C	7.03
93°C	5.62

Outside Diameter and Wall Thickness for CPVC Schedule 80 as per ASTM F 441 Plastic Pipe

Nominal Size (MM)	Avg. OD MM (Sch 80)	Tolerance (MM)	Min. Wall Thickness MM (Sch 80)	Tolerance (MM)
65	73.0	+/- 0.18	7.01	+ 0.84
80	88.9	+/- 0.20	7.62	+ 0.91
100	114.3	+/- 0.23	8.56	+ 1.02
150	168.3	+/- 0.28	10.97	+ 1.32
200	219.1	+/- 0.38	12.70	+ 1.52
250	273.1	+/- 0.38	15.06	+ 1.80

CPVC Sch 80 Pipe Pressure Rating vs Temperature Table

Nominal Size (mm)	Working Pressure Rating (kg/cm2) Sch 80 (23°C)
65	29.53
80	26.01
100	22.50
150	19.69
200	17.57
250	16.17

Cutting –

In order to make a proper and neat joint, measure the pipe length accurately and make a small mark. Ensure that the pipe and fittings are size compatible. Cut the pipe with a plastic pipe cutter or hacksaw blade. Cutting tubing as squarely as possible provides optimal bonding area within a joint.

Deburring / Beveling –

Burrs and fillings can prevent proper contact between tube and fitting during assembly and should be removed from the outside and inside of the pipe. Debarking tool, pocket knife or file is suitable for this. A slight bevel on the end of the tubing will ease entry of the tubing into the fitting socket.

Fitting Preparation -

Using a clean, dry rag, wipe dirt and moisture from the fitting sockets and tubing end. The tubing should make contact with the socket wall 1/3 to 2/3 of the way into the fitting socket.

Solvent Cement Application –

Use only CPVC cement or an all – purpose cement conforming to ASTM F 493 or joint failure may result. When making a joint, apply a heavy, even coat of coat of cement to the pipe end. Use the same applicator without additional cement to apply a thin coat inside the fitting socket. Too much cement can cause clogged water ways.

Assembly –

Immediately insert the tubing into the fitting socket, rotate the tube ¼ to ½ turn while inserting. This motion ensures and even distribution of cement within the joint. Properly align the fittings. Hold the assembly for approximately 10 seconds, allowing the joint to set-up.

Set And Cure Times –

Solvent cement set and cure times are a function of pipe size, temperature and relative humidity. Curing time is shorter for drier environments, smaller sizes and higher temperatures. It requires 10 to 20 minutes for perfect joint.

MINIMUM CURE TIME PRIOR TO PRESSURE TESTING AT 150 PSI (10 BAR)

Ambient Temperature During Cure Period	Pipe Sizes	
	15 to 25 mm dia.	32 to 50 mm dia.
Above 15°C	1 Hour	2 Hours
4 - 15°C	2 Hours	4 Hours
Below 4°C	4 Hours	8 Hours

Testing

Once an installation is completed and cured as per these recommendations. The system should be hydrostatically pressure tested at 1.25 times the working pressure or 10 bar for one hour (whichever is more) is recommended. When pressure testing, the system should be filled with water and all air bled from the highest and farthest points in the run. If a leak is found, the joint must be cut out and discarded. A new section can be installed using couplings. During sub-freezing temperatures, water should be blown out of the lines after testing to eliminate potential damage from freezing. Air testing is not recommended.

Handling And Storage

Reasonable care should be exercised in handling CPVC tubing and fittings. They should not be dropped, stepped on, or have objects thrown on them. If improper handling or heavy impact results in cracks, splits or gouges, the damaged section should be discarded. CPVC tubing should be covered with a non-transparent material when stored outdoors for long periods of time. When installing CPVC pipe and fitting in an area that is exposed to direct sunlight for an extended period of time, protect the pipe with insulation or an acrylic water based white paint.

Hanger And Supports

For vertical / horizontal runs, support at maximum of 1.5 meter intervals for all diameter is desired. Piping should not be anchored tightly to supports, but rather secured with smooth straps or hangers that allow for movement caused by expansion and contraction.

Safe Handling Of Solvent Cement

When using solvent cements, primers and cleaners there are some basic safety measures all users should keep in mind.

- Avoid prolonged breathing of solvent vapors. When pipe and fittings are being joined in enclosed areas, the uses of ventilating devices are advised.
- Keep cements, primers and cleaners away from all sources of ignition, heat, sparks and open flame.
- Keep containers of cements, primers and cleaners tightly closed except when the product is being used.
- Dispose of all rags used with solvents in a proper outdoor waste receptacle.
- Avoid eye and skin contact. In case of eye contact, flush with plenty of water for 15 minutes and call a physician.

Installation procedure
All parameters pertaining to the installation of CPVC plumbing system such as cutting, joining, support spacing, expansion loops, insulation, type of support, special connections, etc. shall be as per the manufacturer's specifications.

INSULATION :
Care shall be taken to remove any burr from the end of the pipes after cutting. Only fittings of the size suitable to the pipe shall be used. The ends of the tube shall be cut to the correct size using a tube cutter. Care shall be taken to ensure that the ends of the tube are cut perpendicular to the axis of the tube and that the ends remain undamaged and free of burrs. Any burrs remaining shall be removed. Clean the outside surface of the tube that shall go into the fitting.

As a rule of thumb - thicker insulation = less heat loss from pipes and greater protection from freezing temperatures. For outdoor pipework, we recommend a minimum insulation thickness of 19mm.

Star Bond Plus Plaster
is specifically produced to provide you the excellent POP bonding, ready made cement plaster and mix plaster for your walls and roofs. It is manufactured from the premium grade raw materials under assistance of our skilled professionals who ensure its maximum purity and quality as per defined standards. This Star Asia Bond Plus Plaster is moisture proof and adaptable to all weather conditions. It gets hard after drying and serves a durable life span. Customers can avail this plaster from us at cost efficient rates.

PERT (Poly Ethylene for Raised Temperature) pipes, fittings & valves
All pipes inside the buildings and where specified, outside the building shall be PERT pipes tubes conforming to ISO 10508.

All special fittings and accessories like internally or externally threaded brass adaptors, ball valves, globe valves, unions, diaphragm valves, butterfly valves, etc shall be made of PERT/ As specified in BOQ.
The jointing machine used for the pipe and fitting jointing shall be approved/provided by the pipe manufacturer. The procedure for making joints should be strictly followed as per the recommendation of pipe manufacturer.

Concealed Piping
All internal concealed plumbing for water supply shall be done with PERT pipes. The pipes & fittings shall conform to CTS (copper tube size).

Installation procedure:
All parameters pertaining to the installation of PERT plumbing system such as cutting, joining, support spacing, expansion loops, insulation, type of support, special connections, etc. shall be as per the manufacturer's specifications.
Jointing shall be done with Fusion Technology and below process shall be followed:
Mark the pipe for depth of penetration into the heater bush and fitting, during heating and jointing mark should be visible.

Push the pipe and fitting into the heating tool. Once the pipe and fitting are hot pull out pipe and fitting slowly.
Joint the pipe & fitting and push the pipe until it reaches the mark. During the jointing time the welded part of pipe and fittingmust remain fix, without any rotation. During the cooling time, the welded part of pipe & fitting can be adjusted until cold.

Finally the fusion joint seam shall be inspected and it should be present all around the pipe.
Clamps

PERT Pipes in shafts and other locations shall be supported by galvanized M.S. clamps of design approved by Project Manager. Pipes in wall chases shall be anchored by G.I. hooks. Pipes at ceiling level shall be supported on structural

clamps fabricated from M.S. structures. Pipes in typical shafts shall be supported on slotted angles/channels as per standard drawings.

Spacing of clamps, hooks etc. shall be as per good engineering practice approved by the Project Manager.

Unions
Contractor shall provide adequate number of unions on pipes 50 mm and below to enable easy dismantling later when required. Unions shall be provided near each valve, stop cock, or check valve and on straight runs as necessary at appropriate locations as required and/or directed by Project Manager.

Testing:
All pipes, fittings and valves, after fixing at site, shall be tested by hydrostatic pressure of 1.5 times the working pressure or 10 kg / sqcm whichever is more. Pressure shall be maintained for a period of at least 12 hour without any drop.

The pipes shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock or water hammer. The draw of taps and stop cocks shall then be closed and specified hydraulic pressure shall be applied gradually. Pressure gauge must be accurate and preferably should have been recalibrated before the test. The test pump having been stopped, the test pressure should be maintained without loss for at least two hours.

A test register shall be prepared and all entries shall be maintained date wise by Contractor and jointly signed by Contractor(s) and Project Manager.
In addition to the sectional testing carried out during the construction, Contractor shall test the entire installation after connections to the overhead tanks or pumping system or mains. Any joint found leaking shall be redone and all leaking pipes removed and replaced without extra cost. Use of any compound or stop leak compound will not permitted. Any damage done due to carelessness, open or burst pipes or failure of fittings, to the building, furniture and fixtures shall be made good by the Contractor during the defects liability period without any cost.

After commissioning of the water supply system, Contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves which do not effectively operate shall be replaced by new ones at no extra cost and the same shall be tested as above.
Measurements:

The length above ground shall be measured in running meter correct to a cm for the finished work, which shall include PERT pipe and PERT fittings such as bends, tees, elbows, reducers, crosses, plugs, sockets, nipples and nuts, unions etc.. Deductions for length of valves shall be made. Rate quoted shall be inclusive of all fittings, clamps, cutting holes chased and making good the same and all items mentioned in the specifications and Bill of Quantities.

Valve Chambers

Provision of suitable brick masonry chambers in cement mortar 1:5 (1 cement : 5 coarse sand) on cement concrete foundations 150 mm thick 1:5:10 mix (1 cement:5 fine sand : 10 graded stone aggregate 20 mm nominal size) with 15 mm thick cement plaster inside and outside finished with a plaster inside and outside finished with a floated coat of neat cement inside with cast iron surface box approved by fire brigade including excavation, back-filling complete shall be made.

Valves

All valves (gate, globe, check, safety) shall be of gun metal suitable for the particular service as specified. All valves shall be of the particular duty and design as specified. Valves shall either be of screwed type or flanged type, as specified, with suitable flanges and non-corrosive bolts and gaskets. Tail pieces as required shall be supplied along with valves. Gate, globe and check valves shall conform to Indian Standard IS:776 and non- return valves and swing check type reflux to IS:5312.

Sluice valves

Sluice valves, where specified shall be flanged sluice valves of cast iron body. The spindle, valve seat and wedge nuts shall be gunmetal. They shall generally have non-rising spindle and shall be of the particular duty and design as specified. The valves shall be supplied with suitable flanges, non-corrosive bolts and asbestos fiber gaskets. Sluice valves shall conform to Indian standard IS:780 and IS:2906.

Butterfly valve

The butterfly valve shall be suitable for waterworks and rated Pressure requirement as mentioned in the Schedule of quantities.
The body shall be of cast iron to IS:210 in circular shape and of high strength to take the water pressure. The disc shall be heavy duty cast iron with anti-corrosive epoxy or nickel coating.

The valve seat shall be of high grade elastomer or nitrile rubber. The valve is closed position shall have complete contact between the seat and the disc throughout the perimeter. The elastomer rubber shall have a long life and shall not give away on continuous applied water pressure. The shaft shall be EN 8 grade carbon steel.

The valve shall be fitted between two flanges on either side of pipe flanges. The valve edge rubber shall be projected outside such that they are wedged within the pipe flanges to prevent leakages.
Ball valve

The ball valve shall be made forged brass and suitable for test pressure of pipe line. The valve shall be internally threaded to receive pipe connections.

The ball shall be made from brass and machined to perfect round shape and subsequently chrome plated. The seat of the valve body-bonnet gasket and gland packing shall be of Teflon.
The handle shall be provided with PVC jacket. The handle shall also indicate the direction of ‘open’ and ‘closed’ situations. The gap between the ball and the Teflon packing shall be sealed to prevent water seeping.

The handle shall also be provided with a lug to keep the movement of the ball valve within 90°. The lever shall be operated smoothly and without application of any unnecessary force.
Ball float valve

Ball valves with floats to be fixed in storage tanks shall consist of cast brass lever arm having copper balls (26 SWG) screwed to the arm integrally. The copper ball shall have bronze welded seams. The closing/opening mechanism incorporating the piston and cylinder shall be non-corrosive metal and include washers. The size and construction of ball valves and float shall be suitable for desired working pressure operating the supply system. Where called for brass valves shall be supplied with brass hexagonal back nuts to secure them to the tanks and a socket to connect to supply pipe.

Globe valves on Hot-water line shall be union bonnet with stem/disc and body seat ring of SS. Suitable for temperature up to 80° C.

S. No	Type of Valve	Size	Construction	Ends
a.	Isolating Valve	15 mm to 50 mm 65 mm and above	Gun Metal Gun Metal	Screwed Flanged
b.	Sluice Valve & Butterfly Valve	65 mm and above	Cast Iron	Flanged
c.	G.M. non return valve	15 mm to 50 mm 65 mm above	Gun Metal Gun Metal	Screwed Flanged
d.	Flap Type – Non return valve	65 mm and above	Cast Iron	Flanged

All valves shall be suitable for the working pressure involved.
Motorized Butterfly Valve

The ON/OFF motorized Butterfly valve shall be of wafer type design and shall be rated for PN-16 pressure . The Actuator shall be rotary ON/OFF type with an actuator Protection class IP65 or better. The valve from 32mm to 300mm shall be made of Cast Iron IS:210 Gr.260 (min). For sizes 350mm and above, the valve body shall be made of SG Iron IS:1865 Gr.400/15. The disc shall be made out of Stainless Steel Gr.304. The Seat made out of Nitrile rubber for tight shut-off application. The stem shall be SS-410 without any mechanical rivets or bolts

Gun metal valve

Gun metal Valves shall be used for smaller dia. pipes, and for threaded connections. The Valves shall bear certification as per IS : 778.
The body and bonnet shall be of gun metal to IS : 318. The stem gland and gland nut shall be of forged brass to IS : 6912. The hand wheel shall be of cast iron to IS : 210.

The Hand wheel shall be of high quality finish to avoid hand abrasions. Movement shall also be easy. The spindle shall be non-rising type.

Non-return valve

Non-Return valves shall be cast iron double flanged with cast iron body and gunmetal internal parts conforming to IS : 5312.

Pressure Gauge

The pressure gauge shall be constructed of die cast aluminium and stove enamelled. It shall be weather proof with an IP 55 enclosure. It shall be a stainless steel Burden tube type pressure gauge with a scale range from 0 to 16 Kg / cm square and shall be constructed as per IS:3524. Each pressure gauge shall have a siphon tube connection. The shut off arrangement shall be by Ball Valve.

Calibration certificate shall be obtained and submitted for each pressure gauge.

Water Fittings

Unless otherwise specified all Gunmetal fittings such as gate, globe, check & safety valves shall be fitted in pipe line in workman like manner. Necessary unions shall be provided on both ends of the valves for easy replacement. The joints between fittings and pipes shall be leak-proof when tested to desired pressure rating. The defective fittings and joints shall be replaced or redone.

Paint:

Used paints and coatings that comply with the following limits for VOC content and the following chemical restrictions:

- Non-Flat Paints and Coatings: VOC not more than 150 g/L.

- Anti-Corrosive Coatings VOC not more than 250 g/L.

Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

Paints and coatings shall not contain any of the following:

- Acrolein
- Acrylonitrile
- Antimony
- Benzene
- Butyl benzyl phthalate
- Cadmium
- Di (2-ethylheyl) phthalate
- Di-n-butyl phthalate
- Di-n-octyl phthalate
- 1, 2-dichlorobenzene
- Diethyl phthalate
- Dimethyl phthalate
- Ethyl benzene

Painting:

Water supply pipes in exposed, in shafts shall be painted with two or more coats of ready mix Low-VOC oil paint to give an even shade before painting all dust and extraneous matter shall be removed.
Paint shall be of approved quality and shade. Where directed by the Owner’s site representative pipes shall be painted in accordance with approved pipe color code.

Pipe in chase shall be painted with two coats of bitumen paint, covered with polythene tape and a final coat of bitumen paint. Exposed pipes shall be painted with synthetic enamel paint after removing dust and extraneous matter.
Water supply pipes below ground and covered in cement concrete shall not be painted.

Connections To Various Mechanical Equipment Supplied By Other Agencies

All inlets, outlets, valves, piping and other incidental work connected with installation of mechanical equipment supplied by other agencies all be carried out by the contractor in accordance with the drawings, requirements for proper performance of equipment, manufacturer’s instructions and the directions of the Owner’s site representative / Architect. The equipment’s to be supplied by the other agencies consist mainly for Kitchen, Back-of-the-House area and other similar areas. The work of connections to the various equipment’s shall be effected through proper unions and isolating valves. The work of effecting connections shall be executed in consultation with and according to the requirement of equipment suppliers, under the directions of the Owner’s site representative / Architect. The various aspects of connection work shall be executed in a similar way to the work of respective trade mentioned elsewhere in these specifications.

Connections To RCC Water Tanks

The contractor shall provide all inlets, outlets, washouts, vents, ball cocks, overflows control valves and all such other piping connections including level indicator to water storage tanks as called for. All pipes crossing through RCC work shall have puddle flanges fabricated from MS/GI pipes of required size and length and welded to 6/8 mm thick MS plate. All puddle flanges must be fixed in true alignment and level to ensure further connection in proper order. Full way gate valves of an approved make shall be provided as near the tank as practicable on every outlet pipe from the storage tank except the overflow pipe. Overflow and vent pipes shall terminate with mosquito proof grating.

The overflow pipe shall be so placed to allow the discharge of water being readily seen. The overflow pipe shall be of size as indicated. A stop valve shall also be provided in the inlet water connection to the tank. The outlet pipes shall be fixed approximately 75mm above the bottom of the tank towards which the floor of the tank is sloping to enable the tank to be emptied for cleaning. The floor and the walls of the tank shall be tiled with glazed tiles up to the overflow level. Alternatively food grade epoxy to be applied.

Tiling of Walls

The floor and the walls of the tanks shall be tiled with glazed tiles up to the overflow level. Alternatively food grade epoxy to be applied to the floor and the walls of the tanks.

Measurements

The length above ground shall be measured in running meter correct to a cm for the finished work, which shall include pipe and fittings such as coupling, bends, tees, elbows, reducers, crosses, plugs, sockets, nipples and nuts, unions. Deductions for length of valves shall be made. Rate quoted shall be inclusive of all

fittings, clamps, cutting holes chased and making good the same and all items mentioned in the specifications and Bill of Quantities.

All pipes below ground shall be measured per linear meters (to the nearest cm) and shall be inclusive of all fittings e.g. coupling, tees, bends, elbows, unions, deduction for valves shall be made rate quoted shall be inclusive of all fittings, excavation, back filling and disposal of surplus earth, cutting holes and chase and making good all item mentioned in Bill of Quantities.

Lawn Hydrants

Lawn hydrants shall be of 25mm size unless otherwise indicated. All hydrants shall be provided with gate valves and threaded nipple to receive hose pipes. Lawn hydrant valves shall be of approved make and design. Where called for lawn hydrants shall be located in masonry chambers of appropriate size.

Pipe Protection (For Water Pipes Buried In Trenches / Ground / Earth)

All buried pipes shall be cleaned with zinc chromate primer and bitumen paint, wrapped with three layers of fiber glass tissue, each layer laid in bitumen and placed on concrete blocks with PUF saddles dipped in bitumen at every 2 meters. The pipes where laid under floor shall be encased with 100 mm thick good quality, river sand all around in addition to protective coating as described above. Alternatively pypcoat / coatek insulation for protection of pipe would also be acceptable as per final approval of project engineer / consultant.

Thrust Blocks

In case of bigger pipes (80 mm dia. and above), thrust blocks of cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate of 20 mm nominal size) shall be constructed on all bends as directed by the Owner’s site representative.

Masonry Chamber

- All masonry chambers for stop cocks, sluice valves and meter etc. shall be built as per supplied drawings.

- The excavation for chambers shall be done true to dimension and level indicated on plans or as directed by the Owner’s site representative.

- Concrete shall be having cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 graded stone aggregate 40 mm nominal size.

- Brick shall be of class designation 75 in cement mortar 1:5 (1 cement: 5 fine sand)

 Inside Plastering not less than 12 mm thick shall be done in cement mortar 1:3 (1 cement : 3 fine sand) finished with a floating coat of neat cement.

Shifting Of Excavated Surplus Material

Contractor shall make his own arrangement to shift the surplus excavated material within the site limits as directed by Owner's site representative at free of cost within time limit.

Soil, Waste, Vent And Rain Water Pipes And Fittings

(PVC PIPES)

1 SCOPE OF WORK

The scope of this section comprises the supply, installation, testing and commissioning of internal soil, waste, vent and rain water disposal pipes.

2 BASIC PIPING SYSTEM

Soil, waste, vent and rain water pipes of 75 / 90 / 110 / 160 mm dia in shafts, ducts, suspended and in concealed areas i.e. sunken slab etc. shall consist of UV stabilized uPVC SWR pipes as per type B of IS:13592 & fittings as per IS:14735. The pipes and fittings shall be suitable for rubber ring joint for vertical pipes and solvent cement joint for horizontal pipe work in toilets. All fittings shall be of injection moulded type. The rubber rings shall confirm to IS: 5382. The waste pipes of 65 mm and smaller dia shall be of rigid uPVC as per IS: 4985 of min 6 kg / sq. cm, suitable for solvent cement joints.

The wall thickness of Pipes shall be as follows –

75 mm diameter - wall thickness 3.2 to 3.8 mm 90 mm diameter - wall thickness 3.2 to 3.8 mm
110 mm diameter - wall thickness 3.2 to 3.8 mm 160 mm diameter - wall thickness 4.0 to 4.6 mm

Pipes shall be fixed by means of clamps in two sections, bolted together, built into the walls, wedged and neatly jointed as directed and approved by the Engineer. All bends, branches, swan neck and other parts shall conform to the requirement and standards as described for the pipes. Pipes shall be rested against the walls on suitable wooden cradles. Local authority regulations applicable to the installations shall be strictly followed.

Where indicated, the soil pipes shall be continued upwards without any diminution in its diameter, without any bend or angle to the height shown in the drawings. The soil / waste pipes shall be covered on top with cowl as directed and approved. All vertical soil pipes shall be firmly fixed to the walls with properly fixed clamps, and shall as far as possible is kept 50mm clear of wall.

Every waste pipe shall connected to the floor trap / P trap through the PVC hopper pipe / Tee / height raiser and branch saddle strip or to a multi floor trap. No waste pipe shall be discharged over the grating. The contractor will ensure that this requirement is adequately met with. Wherever floor traps are provided, it shall be ensured that at least one wash is connected to such floor traps to avoid drying of water seal in the trap. Ventilating pipes shall be of UPVC SWR pipes, conforming to the requirements laid down earlier.

Where soil, waste and ventilating pipes are accommodated in shafts ducts, adequate access to cleaning eyes shall be provided.

The internal and external pipe surfaces shall be smooth and clean. They shall be free from grooves, obstructions or other defects. All pipe ends shall be cut cleanly and shall be perpendicular to the axis of pipes.

All fittings used in UPVC piping systems shall be of similar characteristic and same make as those of the pipes. All uPVC fittings shall be factory fabricated suitable for jointing to pipes with rubber rings for 75 / 90 / 110 / 160 mm dia and with solvent cement for 65 mm dia and below. Appropriate solvents as recommended by the pipe manufacturer shall be used for installing the pipes at site. Solvents shall be supplied to site in original manufacturer's container.

All Water closets shall be connected through WC connectors of suitable type as per site requirements.

The water seal of all floor traps which are connected into the pipe and manholes shall be minimum 50 mm as per IS: 5329. For other traps used as branch connections may have lesser water seal.

All pipes and fittings shall be stored, handled, cut, laid and installed in position strictly as per manufacturer's recommendations.

As soon as uPVC pipes and fittings are received at site, they shall be examined for their wall thickness and pressure rating. Only pipes and fittings and solvents of approved manufacture shall be used.

UPVC pipes require supports at close intervals. Recommended support spacing for PVC pipes is maximum 1400 mm for pipes 50 mm dia and above. Pipes shall be aligned properly before fixing them on the wooden plugs with clamps. Even if the wooden plugs are fixed using a plumb line, pipe shall also be checked for its alignment before clamping, piping shall be properly supported on or suspended from clamps, hangers as specified and as required. The Contractor shall adequately design all the brackets, saddles, anchors, clamps and hangers and be responsible for their structural

sufficiency. Pipe supports shall be primer coated with rust preventive paint.

3 INSTALLATION OF SOIL, WASTE & VENT PIPES

All Horizontal pipes running below the slab and along the ceiling shall be fixed on structural adjustable clamps, sturdy hangers of the design as called for. The pipes shall be laid in uniform slope and proper levels. The Pipes will be supported by either rubber lined G.I. U strap clamps on 50x50x5 mm MS slotted angle duly painted (for a group of pipes) or G.I. rubber lined split clamp (for independent pipes). The branch pipes shall be connected to the stack at the same angle as that of fittings. All connections between soil, waste and ventilating pipes and branch pipes shall be made by using pipe fittings with inspection doors for cleaning. Pipes shall be fixed in a manner as to provide easy accessibility for repair and

maintenance and shall not cause obstruction in shafts. Where the horizontal run off the pipe is long or where the pipes cross over building expansion joints etc.

Use WC connectors for the connection of WC to the soil pipes. Apply rubber lubricant on WC connector ring as well as on the outer side of WC pan.

4 JOINTING

(a) Make sure the spigot end and inside of socket is clean and the sealing ring is placed evenly in the socket.

(b) When cutting pipes, make sure they are cut square. Chamfer the end cut to angle of 15° with a medium file.

(c) A correct depth of entry of the spigot into the socket is required to allow thermal movement. To achieve this, push spigot fully into the socket (remove sealing ring at this time) and make a mark on the spigot. Withdraw the spigot by 10 mm & mark the spigot with a bold line. This bold mark indicates the correct depth of entry to allow the necessary expansion gap.

(d) Smear rubber lubricant evenly on the chamfered spigot and the sealing ring. Then insert the spigot into socket with light twisting motion. Pull out the pipe to allow 10 mm expansion gap.

(e) The joint is now complete and required no additional mastics, tape or cement or any other jointing sealants.

5 CUTTING AND MAKING GOOD

Pipes shall be fixed and tested as building proceeds. The client / civil contractor shall provide all necessary holes, cutouts and chases in structural members as building work proceeds.

Since, the toilets are not sunken; hence, all pipes will be suspended from the toilet floor and will be taken out to the plumbing shaft below the beam. The cut out in toilet floor will be made through core cutting after marking exact dimensions of fixtures and type of WC. The core cutting is suggested to be done at a later stage during plumbing works. Or, the necessary cutouts should be left in RCC slab during the casting.

For Sunk Toilets and Kitchens, 110 / 125 / 160 mm dia PVC sleeve should be left in beams before its casting for passing of soil / waste pipe. The contractor should prepare shop drawing for the exact location of sleeve and get it approved from the consultant. Cutting of structural member will not be permitted at later stage

For Sunk Kitchens, a 160 / 125 mm dia PVC sleeve (as per the drawings) will be provided for crossing of waste pipe before the casting of beam (wherever required).

6 PIPE PROTECTION

Where pipes are embedded in floors, slabs, columns, beams etc., they shall be given a protection by encasing them with 75 mm thick 1:2:4 cement concrete all-round the pipes and fittings as specified in Bill of Quantity.

Accessories Floor Traps

Floor traps where specified shall be siphon type full bore PP (WHITE), having a minimum 50 mm deep seal. All traps are under slung from the slab and shall be adequately supported.

Urinal Traps

Urinal traps shall be siphon type full bore PP (WHITE), having a minimum 50 mm deep seal. All traps are under slung from the slab and shall be adequately supported.

Floor Trap Inlet

Bath room traps and connections shall ensure free and silent flow of discharging water. Where specified, Contractor shall provide a special type of floor or manhole inlet fitting fabricated from PP without, with one, two or three inlet sockets welded on side to connect the waste pipe or joint between waste and inlet socket shall be with sealant compound/push-fit as per requirement of the system. Inlet shall be connected to a P or S trap, floor trap inlet and the traps shall be set in cement concrete blocks where varied in floors as specified without extra charge.

Cleanout Plugs Floor Clean Out Plug

Clean out plug for soil, waste or rain water pipes laid under floors shall be provided near pipe junctions bends, tees, “Y” and on straight runs at such intervals as required as per site conditions. Cleanout plugs shall terminate flush with the floor level. They shall be threaded and provided with key holes for opening. Cleanout plugs shall be cast brass suitable for the

pipe dia. With screwed to a GI socket. The socket shall be drip seal joined/ Lead Caulked to the drain pipes.

Cleanout on Drainage Pipes

Cleanout plugs shall be provided on head of each drain and in between at locations indicated on plans or directed by Owner's site representative. Cleanout plugs shall be of size matching the full bore of the pipe but no exceeding 150 mm dia CO plugs on drains of greater diameters shall be 150 mm dia. Fixed with a suitable reducing adapter.
Floor cleanout plugs shall be cast brass.

Cleanouts provided at ceiling level pipe shall be fixed to a UPVC flanged tail piece. The cleanout doors shall be specially fabricated from light weight galvanized sheets and angles with hinged type doors with fly nuts, gasket etc. as per drawing.
Socket Pipes
3-layered reinforced polypropylene (PP) sewage pipes, halogen and lead free, with integral push-fit socket and factory-fitted lip ring, tested and monitored according to the Product Standard EN 1852 – 1, having internal layer of PP in light grey color, intermediate layer of PP in grey/titanium-grey color, external layer of PP in copper brown color.

Fittings
3-layered reinforced polypropylene (PP) sewage pipes, halogen and lead free, with integral push-fit socket and factory-fitted lip ring, tested and monitored according to the Product Standard EN 1852 –
1. Fittings up to dimension DN/OD 200 are manufactured by injection molding (1-layer), above DN/OD 200 (250 and above)the fittings are butt or extrusion welded by the manufacturer. Fabrication of fittings at site shall not be permitted.
Pipe Joints

Field-proven push-fit connection with improved and modified lip ring of high ageing-resistant shall be provided with the pipes and fittings for easy push-fit installation, installation procedure as given in clause 3.10 above shall be followed.
Floor Trap Grating

Floor and urinal traps shall be provided with 100 – 150 mm square or round stainless steel gratings, with frame and rim of approved design and shape or as specified in the schedule of quantities approved by the Owner's site representative.
Pipes hangers, supports, clamps etc.

All vertical pipes shall be fixed by galvanized clamps and galvanized angle brackets truly vertical. Branch pipes shall be connected to the stack at the same angle as that of the fittings. No collars shall be used on vertical stacks. Each stack shall be terminated at top with a cowl (terminal guard).
Horizontal pipes running along ceiling shall be fixed on galvanized structural adjustable clamps of special design shown on the drawings or as directed. Horizontal pipes shall be laid to uniform slope and the clamps adjusted to the proper levels so that the pipes fully reset on them.
Contractor shall provide all sleeves, openings, hangers, inserts during the construction. He shall provide all necessary information to the building contractor for making such provisions in the structure as necessary. All damages shall be made good to restore the surfaces.

All pipes clamps, supports and hangers shall be galvanized. Factory made prefabricated clamps shall be preferred. Contractor may fabricate the clamps of special nature and galvanize them after

fabrication but before installation. All nuts, bolts, washers and other fasteners shall be factory galvanized.
Clamps shall be of approved design and fabricated from MS flats (which shall be galvanized after fabrication) of thickness and sizes as per drawings or contractor's shop drawings. Clamps shall be fixed in accordance to manufacturer's details/shop drawings to be submitted by the contractors.

When required to be fixed on RCC columns, walls or beam they shall be fixed with approved type of galvanized expansion anchor fasteners (Dash fasteners) of approved design and size according to load.
Structural clamps e.g.. trapeze or cluster hangers shall be fabricated by electro-welding from MS structural members e.g. rods, angles, channels flats as per contractors shop drawings shall be galvanized after fabrication. All nuts, bolts and washers shall be galvanized.
Galvanized slotted angle/channel of approved sizes supports on walls shall be provided wherever shown on shop drawings. Angles/channels shall be fixed to brick walls with bolts embedded in cement concrete blocks and to RCC walls with anchor fasteners mentioned above. The spacing of support bolts on support members fixed horizontally shall not exceed 1 m.
CAST IRON PIPES AND FITTINGS :

General

Centrifugally cast (Spun) iron hub soil, waste and ventilating pipes, fittings and accessories shall conform to IS : 15905-2011.
The fittings shall conform to the same I.S. specifications to which the pipe itself conforms in which they are connected.

The pipes shall have hub ends. The pipes and fittings shall be true to shape, smooth and cylindrical, their inner and outer surface being as nearly as practicable concentric. They shall be sound and shall be free from cracks, taps, pinholes and other imperfections and shall be neatly dressed and carefully fitted. All pipes and fittings shall ring clearly when struck with a light hand hammer.

All pipes and fittings shall be coated internally and externally with the same material at the factory, the fitting being preheated prior to total immersion in a bath containing a uniformly heated composition having a tar or other suitable base. The coating material shall have good adherence and shall not scale off. In all instances where the coating material has tar or similar base it shall be smooth and tenacious and hard enough not to flow when exposed to a temperature to 77 degree centigrade but not so brittle at a temperature of 0 degree centigrade as to chip off when scribed lightly with a pen knife. The thickness of fittings shall conform to the thickness and dimensions specified for the corresponding sizes of straight pipes.

The access door fittings shall be designed so as to avoid dead spaces in which filth may accumulate. Doors shall be provided with 3 mm rubber insertion packing and when closed and bolted, these shall be water tight.
FLOOR TRAP:

Floor trap or Nahani trap shall be ‘P’ or ‘S’ type with minimum 50 mm seal. The traps shall be of self- cleansing design and shall have exit of same size as that of waste pipe.
Properties
i) Mechanical Properties

1. Specific Wt. 7.15 kg/dm3
2 Tensile Strength 150 N/mm2
3. Hardness 230 BHN
4. Co-efficient of expansion 11x10-6/deg. C
5. Crushing Strength 600 N/mm2
6. Modulus of elasticity 10x105 to 12x105 N/mm2
7. Temperature resistance 400 deg. C (without significant reduction in mechanical reduction)

ii) Hydraulic Test Pressure : 0.5 bar
iii) Coating
o Inside : Black Bitumen paint
o Outside : Red oxide Paint / Black Bitumen paint
iv) Sizes v)

Nominal Size (mm)	External Diameter (mm)	Tolerance (mm)
75	83	+2 / -1
100	110	+2 / -1
150	160	+2 / -1
200	210	+2.5 / -2.5

Jointing :
Cast iron pipes and fittings should be joined by Stainless Steel Coupling with EPDM rubber.

JOINT PROCEDURE:

Jointing of pipes & fitting with Coupling joints:
It should be ensured that the surface in which jointing is to be carried out, should be dry and free from any loose material , dust, dirt, cement , oil grease or any other foreign material . If required the surface may be wire brushed.
Pipe and Fittings should be joined by Stainless Steel Coupling having EPDM rubber insertion and coupling should be screwed.

Testing
All cast iron (Spun) pipes and fittings including joint shall be tested by smoke test to the satisfaction of the Engineer-in-charge and left in working order after completion. The smoke test shall be carried out as under :

Smoke shall be pumped into the pipe at the lowest end from a smoke machine, which consist of bellow and a burner. The materials usually burnt is greasy cotton based which gives but a clear pungent smoke which is easily detectable by sight as well as by smell if there is leaking at any point of the drain.

GI Pipes & Fittings

The pipes shall be galvanized mild steel class C conforming to the requirements of IS:1239. Pipe and fittings shall be joined with grooved or threaded joints, after cutting a pipe with a hacksaw or a cutting machine care shall be taken to remove burr from the end of the pipe after reaming with a proper file.
Pipe threaded joints will be made by applying suitable grade of TEFLON tape used.(Use of red and white lead will not be permitted for screwed joints)
Fittings shall be malleable iron galvanized of approved make. Each fitting shall have manufacturer's trade mark stamped on it. Fittings for GI pipe shall include flanges, bends tees, reducers, nipples, union and bushes. Fittings shall conform to IS:1239
All pipes shall be fixed in accordance with approved layout and alignment. Care shall be taken to avoid air pockets. G.I. pipes inside shall be fixed in wall chases well above the floor. No floor shall be run inside a sunken floor as far as possible. Pipes may be run under the ceiling or floors and other areas as per approved drawings.
Unions :
Contractor shall provide adequate number of unions on pipes 50mm and below to enable easy dismantling later when required. Unions shall be provided near each gunmetal valve , stop clock , or check valve and go on straight runs as necessary at appropriate locations as required and /or direct by Engineer-In-Charge.

Flanges :
Flanged connections shall be provided on pipes 65 mm and above as required
Flanged connections shall be made by the correct number and size of the bolts and made with 3 mm thick insertion neoprene gaskets Bolt hole dia. for flanges shall conform to match the specification for C.I. sluice valve to I.S. 780 and C.I. butterfly valve to IS: 13095.
Painting :
All pipes above ground shall be painted with one coat Zinc with each coating and two coats of synthetic enamel paint of approved shade and quality. Pipes shall be painted to standard colour code specified by Engineer-in-charge.
Pipe Protection :
All pipes in chase or below floor shall be protected against corrosion by the application of two coats of bitumen paint covered with bitumen tape and a final coat of bitumen paint before covering up the pipe.
All G.I. pipes below ground shall be protected against corrosion by applying one layer of 4 mm thick multilayer anticorrosive polymeric mix tape applied over a coat of primer as per recommendations of the manufacturers. (Pypkote)

EXTERNAL WATER SUPPLY WORKS
Application :

Application :

Domestic Water (Non-Potable) Water Supply Distribution System from Plumbing Pump Room (WTP) located at Lower Ground floor to supply the Domestic water requirement to various buildings.

Flushing water supply distribution from Sewage Treatment Plant to Building Infrastructure to fill the flushing water requirement to various buildings.

HDPE

Indian Standard lays down requirements for high polyethylene pipes from 16 mm to 1000 mm diameter of pressure rating from 0.25 MPa to 1.60 MPa in material graders of PE 63, PE80 and PE 100 for buried water mains.

References

Indian Standards listed below are necessary to standard IS: 4984-1995 for specification for high density Polyethylene Pipe for Potable Water Supply –

To	Title

963	Methods of test for polyethylene molding materials and polyethylene compounds.
968	Methods for random sampling.
992	High density polyethylene materials for molding and extrusion (first revision)
986	Method of analysis for the determination of specific and /or overall migration of constituents of plastics materials and articles intended to come into contact with food stuffs (first revision)
1982	Positive list of constituents of polyethylene in contact with foodstuffs, pharmaceuticals and drinking water.
1982	Polyethylene for its safe use in contact with foodstuff, pharmaceutical and drinking water.

Dimension and Pressure Rating Chart for HDPE Pipe (PE 80) as per IS : 4984

OD	**PN 2.5**		**PN 4**		**PN 6**		**PN 8**		**PN 10**		**PN 12.5**		**PN 16**	
DN	**Min.**	**Max**	**Min.**	**Max**	**Min.**	**Max**	**Min.**	**Max**	**Min.**	**Max**	**Min.**	**Max**	**Min.**	**Max**
20	-	-	-	-	-	-	-	-	-	-	2.3	2.8	2.8	3.3
25	-	-	-	-	-	-	-	-	2.3	2.8	2.8	3.3	3.5	4.1
32	-	-	-	-	-	-	2.4	2.9	3.0	3.5	3.6	4.2	4.5	5.2
40	-	-	-	-	2.3	2.8	3.0	3.5	3.7	4.3	4.5	5.2	5.6	6.4
50	-	-	2.3	2.8	2.9	3.4	3.8	4.4	4.6	5.3	5.6	6.4	6.9	7.8
63	-	-	2.5	3.0	3.6	4.2	4.7	5.4	5.8	6.6	7.0	7.9	8.9	9.8
75	-	-	2.9	3.4	4.3	5.0	5.6	6.4	6.9	7.8	8.4	9.5	10.4	11.7
90	2.3	2.8	3.5	4.1	5.1	5.9	6.7	7.6	8.2	9.3	10.0	11.2	12.5	14.0
110	2.7	3.2	4.3	5.0	6.3	7.2	8.2	9.0	10.0	11.2	12.3	13.8	15.2	17.0
125	3.1	3.7	4.9	5.6	7.1	8.1	9.3	10.5	11.4	12.8	13.9	15.5	17.3	19.3
140	3.5	4.1	5.4	6.2	8.0	9.0	10.4	11.7	12.8	14.3	15.6	17.4	19.4	21.6
160	4.0	4.6	6.2	7.1	9.1	10.3	11.9	13.3	14.6	16.3	17.8	19.8	22.1	24.6
180	4.4	5.1	7.0	7.9	10.2	11.5	13.4	15.0	16.4	18.3	20.0	22.2	24.9	27.6

200	4.9	5.6	7.7	8.7	11.4	12.8	14.9	16.6	18.2	20.3	22.3	24.8	27.6	30.6
225	5.5	6.3	8.7	9.8	12.8	14.3	16.7	18.6	20.5	22.8	25.0	27.7	31.1	34.5
250	6.1	7.0	9.7	10.9	14.2	15.9	18.6	20.7	22.8	25.3	27.8	30.8	34.5	38.2
280	6.9	7.8	10.8	12.1	15.9	17.7	20.8	23.1	25.5	28.3	31.2	34.6	38.7	42.5

315	7.7	8.7	12.2	13.7	17.9	19.9	23.4	26.0	28.7	31.8	35.0	38.7	43.5	48.1
355	8.7	9.8	13.7	15.3	20.1	22.4	26.3	29.2	32.3	35.8	39.5	43.7	49.0	54.1
400	9.8	11.5	15.4	18.0	22.7	26.4	29.7	34.4	36.4	42.1	44.5	51.4	55.2	63.7
450	11.0	12.9	17.4	20.3	25.5	29.6	33.4	38.7	41.0	47.4	50.0	27.7	-	-
500	12.2	14.3	19.3	22.4	28.4	32.9	37.1	42.9	45.5	52.6	55.6	64.2	-	-
560	13.7	16.0	21.6	25.1	31.7	36.7	41.5	48.0	51.0	58.9	-	-	-	-
630	15.4	18.0	24.3	28.2	35.7	41.3	46.7	54.0	57.3	66.1	-	-	-	-
710	17.4	20.3	27.4	31.8	40.2	46.5	52.6	60.7	-	-	-	-	-	-
800	19.6	22.8	30.8	35.7	45.3	52.3	-	-	-	-	-	-	-	-

Fittings

All fittings shall be of the Electro Welded Type. For nom. Diameters of 100 mm and above Butt Fusion Jointing using a Hydraulic Pipe Jointing Machine is also allowed. The welding equipment shall be approved by the manufacturer of the pipe material.

Excavation and Preparation of Trench

a. Open trenches only as for in advance of pipe laying in order to maintain continuity of operations. Keep trench and other excavation dry at all times, and lead drainage to natural drainage channel.

b. The width of the trench at the crown of the pipe should be as narrow as practicable but not less than the outside diameter of the pipe plus 300 mm to allow proper compaction of the side fills and at a height of 225 mm above the crown of the pipe the trench may be of any convenient width.

c. Depth of trench plays an important role and depend on the diameter of the pipe and cover required, depth of beam and slope of pipes.

d. The minimum depth should be width plus outer diameter of pipe or 0.75 m above the crown of pipe, whichever is more.

e. The excavated material should be deposited at a sufficient distance away from the edge of the trench to avoid damage to the pipes through falling stories or debris.

f. As with pipe of other materials, it is necessary to ensure with PVC pipes, that sharp edged objects such as large flints do not bear directly upon the pipes, and also that they are not placed in a way where they may come in contact with such tough objects with the passage of times.

g. Trench Bottom: The trench bottom should comply with limiting width set out in the following table:

S. No.	Nominal Pipe Size (mm)	Trench width (mm) Min.	Max.
1	110	450	600
2	160	450	600
3	200	600	700

4	225	600	700
5	250	600	700
6	315	700	850
7	355	750	900
8	400	800	950
9	450	850	1000

Depth of cover

Normally, pipes should be laid with cover measured from the top of pipe to the surface of the ground, of not less than:

a. 1.2 M under roads
b. 1.0 M in agriculture land
c. 0.5 M in garden with boundaries of dwelling

Pipe Laying

a. Pipes should be lowered into the trench with tackle suitable for the weight of the pipes using suitable lifting slings preferably flat. On no account should chains or wire ropes be used.

b. When unstable trench walls are encountered, this condition must be stabilized before laying the pipe. To obtain the desired lateral support for pipe laid, the trench width should be a maximum of 5 pipe diameter, otherwise sheeting, trench box or any other method would be used to control such condition. In some severe cases, well points or under drain may be used to control excessive ground water conditions.

Bedding and Side filing

a. The bedding should be thoroughly compacted in layers not more than 150 mm thick to give a uniform bed, true to gradient on which the pipe may be laid so that they maintain substantially continuous contact with the bed. Excavation should be made under the bell of each pipe so that the entire length of the pipe, except the bell, will be supported on the bottom of the trench. If due to steep gradient or waterlogged conditions, the bedding tends to act as a drain for subsoil water, the insertion of water stops by means of puddle clay dams across the trench may be necessary to resist the passage of water.

b. Provide concrete encasement to pipeline where indicated to dimensions and lengths specified on the drawings. Concrete for encasement shall have compressive strength of not less than 21.0 MPa. Protect pipeline from damage or displacement by the encasement operations. Provide appropriate concrete saddles to support pipes prior to encasement. Concrete encasement shall be discontinued for a length of 150 mm each side of the center line of each pipe joint, to maintain flexibility of the pipeline.

c. The prepared under-bed should consist of bedding material laid to the correct gradient and depth over the full width of the trench as excavated and should give uniform support to the pipe over its entire length. In normal clay excavation, the thickness of the bedding under the barrel of the pipe should not be less than 1/3rd of the diameter, and a minimum of 100mm. in rock, a thickness of a least 150 mm should be provided. With flexible pipes it is of great importance that the side fill should be firmly compacted between the sides of the pipe and the soil sides of the trench. The bedding should be thoroughly compacted in layers not more than 150 mm thick to give a uniform bed, true to gradient, on which the pipe may be laid. Pipes should be laid directly on this bedding. Bricks or other hard materials must not be placed under the pipes for temporary support. Further bedding material should be placed around the pipe and be thoroughly compacted in 75 mm layers by careful tamping up to the crown of the pipe, eliminating all cavities under the two lower quadrants of the pipe.

d. The same material should then be placed over the crown of the pipe for not less than 2/3rd of the diameter, with a minimum height of 300 mm and be thoroughly compacted. The process of filling and tamping should proceed equally on either side of the pipe, so as to maintain equal pressure on both sides.

Backfilling

a. For protection of the pipe, the side filling and initial backfilling operations should be carried out as soon as possible, after the pipes have been laid and tested.
b. The entire pipe work outside the building shall be covered with wooden box and shall be provided with proper identification tags/wires to avoid damage of pipes due to Heavy vehicle movement or any further excavation work in that area.
c. The material should be placed and compacted minimum 95% by hand in layers not more than 100 mm thick and should extend over the crown of the pipe to a depth of 100 mm for 110 mm pipe and 150 mm for pipes of larger diameter. It should extend over the full width of the trench as excavated. If 'as –dug' material contains stones larger than 40mm, or the pipe is deeper than 2 meter in poor ground, extend the processed granular material for at least 100 mm above the pipe crown,. In both cases, hand tamps the material fully at the sides

of the pipe simultaneously, while tamping lightly over the crown. Continue hand tamping until a finished layer of 300 mm has been placed over the pipe. Mechanical compactors, other than hand vibrators, should not be used until the total depth of backfill Over the pipe is 450mm.

Anchor Thrust Blocks

a. Contractor shall provide suitably designed anchor blocks in cement concrete to encounter excess thrust due to water hammer & high pressure.
b. Thrust blocks shall be provided at all bends & tees & such other location as determined by the Authorized Representative.
c. Exact location, design, size and mix of the concrete block shall be approved by the Authorized Representative prior to execution of work.

Pipe Protection

1. All pipes above ground and in exposed locations shall be with suitable treatment for protection like painting etc.

GARDEN IRRIGATION

Garden Irrigation System Scope of Work

Work under this section consists of furnishing all labor, materials equipment, and appliances necessary and required to install garden hydrants and sprinklers, and drip
Irrigation water supply system as required by the drawings specified hereinafter and as given in the Schedule of Quantities (BOQ).
Without restricting to the generality of the foregoing, the water supply system shall include the following:-

a) Connections from the water supply system to all hydrants, sprinklers and drip irrigation points.
b) Garden hydrants, surface sprinklers & pipe emitters.
c) Excavation and refilling of pipes trenches.
d) Control valves, masonry chambers and other appurtenances.
e) Connections to all pumps & appliances.

The System

The garden hydrant and sprinkler irrigation system will be new and fully working system in the complex.
System components shall be pipes, valves, controllers, various types of sprinklers and drip irrigation lines with emitters as approved by the Project Manager.

General requirements

All materials shall be new of the best quality conforming to specifications. All works executed shall be to the satisfaction of the Project Manager. Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner. Short or long bends shall be used on all main pipe lines as far as possible. Use of elbows shall be restricted fur short connections. Pipes shall be laid in a manner as to provide as far as possible easy accessibility for repair and maintenance. Pipes under roads shall be laid in RCC pipe sleeves. Valves and other appurtenances shall be so located as to provide easy accessibility for operations, maintenance and repairs.

UPVC ASTM Pipes and Fittings For Irrigation.

Garden hydrant mains & agriculture shall be uPVC pipes conforming to IS: 4985 of class specified. If class is not mentioned in the schedule of quantities the same shall be Material Grade PF100, unless other materials like uPVC schedule 40 or uPVC as per IS 4985 in accordance to specifications given above are specified in the BOQ.

Fittings for UPVC pipes shall be injection molded fitting suitable for solvent cement joints. Fittings must have suitable provision for expansion and shall be rated for the same working pressure as the pipeline, unless other materials like uPVC schedule 40 or uPVC as per IS 4985 in accordance to specifications given above are specified in the BOQ.
Thermal Joints shall be made in an approved manner as recommended by the manufacturer. Provide flanges at intervals of 20-25 m. for all pipes 65 mm dia. and above. Provide suitable adapters for connection between pipes & valves. Provide cement concrete supports and anchor blocks at all bends, tees and other locations as directed by the Project Manager. Connections at garden hydrant outlet, near valves must also be anchored.
HANGER AND SUPPORTS

For vertical / horizontal runs for all pipe including for potable, non-potable, Hot Water , Condensate drain pipe Sewerage, drainage system .
Piping should not be anchored tightly to support, but rather secured with smooth straps or hangers that allow for movement caused by expansion & contraction
Piping shall be properly supported on, or suspended from, on stands, clamps, hangers as specified and as required. The Contractor shall adequately design all the brackets, saddles, anchor, clamps and hangers, and be responsible for their structural stability.

Pipe work and fittings shall be supported by hangers or brackets to permit free expansion and contraction. Risers shall be supported at each floor with Galvanized steel clamps. To permit free movement of common piping support shall be from a common hanger bar fabricated from Galvanized steel sections.
Pipe hangers shall be provided at the following maximum spacings or based on final seismic support

Pipe Dia (mm)	Hanger Rod Dia (mm)	Spacing between Supports (m)
Up to 25	6	2
32 to 50	6	2.5
65 to 80	8	2.5
80 to 100	10	2.5
125 to 150	10	3.0
200 to 300	12	3.5

The end of the steel rods shall be threaded and not welded to the threaded bolt.

All pipe work shall be carried out in a proper workman like manner, causing minimum disturbance to the existing services, buildings, roads and structure. The entire piping work shall be organized in consultation with other agencies work, so that area can be carried out in one stretch.
Cut-outs in the slab for installing the various pipes area are indicated in the drawings. Contractor shall carefully examine the cut-outs provided and clearly point out wherever the cut-outs shown in the drawings, do not meet with the requirements.
Pipe sleeves, larger diameter than pipes, shall be provided wherever pipes pass through walls and slab and annular space filled with fiber glass and finished with retainer rings.

The contractor shall make sure that the clamps, brackets, saddles and hangers provided for pipe supports are adequate.
Piping layout shall take due care for expansion and contraction in pipes and include expansion joints where required.
All pipes shall be accurately cut to the required sizes in accordance with relevant BIS codes and burrs removed before laying. Open ends of the piping shall be closed as the pipe is installed to avoid entrance of foreign matter. Where reducers are to be made in horizontal runs, eccentric reduces shall be used for the piping to drain freely. In other locations, concentric reduces may be used.
Automatic air valves shall be provided at all high points in the piping system for venting. All valves shall be of 15mm pipe size and shall be associated with an equal size gate valves.

Discharge from the air valves shall be piped through a pipe to the nearest drain or sump. All pipes shall be pitched towards drain points.

Pressure gauges shall be provided. Care shall be taken to protect pressure gauges during pressure testing.

EXTERNAL DRAINAGE SYSTEM

General Specifications Unloading :

1. The pipes shall be unloaded where they are required.
2. Unloading (except where mechanical handling facilities are available) – pipes weighing up to 60 kg shall be handled by two persons by hand passing. Heavier pipes shall be unloaded from the lorry or wagon by holding them in loops, formed with ropes and sliding over planks set not steeper than 45 degree. The planks shall be sufficiently rigid and two ropes shall always be used to roll the pipes down the planks. The ropes should be tied on the side opposite the unloading. Only one pipe shall be unloaded at a time.

3. Under no circumstances shall be the pipes be thrown down from the carriers or be dragged or rolled along hard surfaces.

4. The pipes shall be checked for any visible damage (such as broken edges, cracking or spalling of pipe) while unloading and shall be sorted out for reclamation. Any pipe which shows sufficient damage to preclude it from being used shall be discarded.

Storing :

1. The pipes and specials shall be handled with sufficient care to avoid damage to them. These shall be lined up on one side of the alignment of the trench socket facing upgrade when line runs uphill and upstream when lines run on level ground.
2. Each stack shall contain pipes of same class and size, consignment or batch number and particulars of the suppliers, wherever possible, shall be marked on the stack.

3. Storage shall be done on firm, level and clean ground. Wedges shall be provided at the bottom layer to keep the stack stable.
4. Cutting : Cutting of pipes may be necessary when pipes are to be laid in lengths shorter than the lengths supplied, such as while replacing accessories like tees, bends, etc. at fixed position in the pipe lines.

5. A line shall be marked around the pipe with a chalk piece at the point where it is to be cut. The line shall be so marked that the cut is truly at right angle to the longitudinal axis of the pipe.

Trenches :

1. The trenches shall be so dug that the pipes may be laid to the required alignment and at required depth.
2. The minimum width of the trench should be “D + 400 mm”, where, D is outer diameter of the pipe.

3. The bed of the trench, if in soft or made up earth, shall be well watered and rammed before laying the pipes and the depressions, if any, shall be properly filled with earth and consolidated in 20 cm layer.
4. If the trench bottom is extremely hard or rocky or loose stony soil, the trench shall be excavated at least 150 mm below the trench grade. Rocks, stone or other hard substances from the bottom of the trench shall be removed and the trench brought back to the required grade by filling with selected fine earth or sand (or fine moorum if fine soil or sand is not available locally) and compacted so as to provide a smooth bedding for the pipe or provide lean cement concrete as required and specified.

5. After the excavation of the trench is completed, hollows shall be cut at the required position to receive the socket of the pipes and these hollows shall be of sufficient depth to ensure that the barrels of the pipes shall rest throughout their entire length on the solid ground and that sufficient spaces left for jointing the underside of the pipe joint. These socket holes shall be refilled with sand after jointing the pipe.

6. Roots of trees within a distance of about 0.5 meter from the side of the pipe line shall be removed or killed.
7. The excavated materials shall not be placed within 1 meter or half of the depth of the trench, whichever is greater, from the edge of the trench. The materials excavated shall be separated and stacked so that in refilling that may be re-laid and compacted in the same order to the satisfaction of the Engineer-in-charge.

8. The trench shall be kept free from water. Shoring and timbering shall be provided wherever required. Excavation below water table shall be done after dewatering the trenches.
9. Where the pipe line or drain crosses an existing road, the road crossing shall be excavated half at a time, the 2nd half being commenced after the pipes have been laid in the first half and the trench refilled. Necessary safety measures for traffic as directed shall be adopted. All types, water main cables, etc. met within the course of excavation shall be carefully protected and supported. Care shall be taken not to disturb the electrical and communication cable met with during course of excavation, removal of which, if necessary, shall be arranged by the Engineer-in-charge.

10. When pipes are laid under road and pavements, subjected to heavy traffic loads, the trench may be covered with RCC slabs of suitable dimensions.

Laying :
1. The pipes shall be lowered into the trench by means of suitably pulley blocks, sheer legs chains ropes etc. In no case the pipes shall be rolled and dropped into the trench. One end of each rope may be tied to a wooden or steel peg driven into the ground and the other end held by men which when slowly released will lower the pipe into the trench. After lowering, the pipes shall be arranged so that the spigot of one pipe is carefully centered into the socket of the next pipe, and pushed to the full distance that it can go. The pipe line shall be laid to the levels required. Specials shall also be laid in their proper position as stated above.

2. Where so directed, the pipes and specials may be laid on masonry or concrete pillars. The pipe laid on the level ground, shall be laid with socket facing the direction of flow of water.
3. In unstable soils, such as soft soils and dry lumpy soils it shall be checked whether the soils can support the pipe lines and if required suitable special foundation shall be provided.

Back filling and tamping :

1. Back filling shall follow pipe installation as closely as possible to protect pipe from falling boulders, eliminating possibility of lifting of the pipe due to flooding of open trench and shifting pipe out of line by caved in soil.
2. The initial back fill material used shall be free of large stones and dry lumps.

3. The initial back fill shall be placed evenly in a layer of about 100 mm thick. This shall be properly consolidated and this shall be continued till there is a cushion of at least 300 mm of cover over the pipe.
4. If it is desired to observe the joint or coupling during the testing of mains they shall be left exposed. Sufficient back fill shall be placed on the pipe to resist the movement due to pressure while testing.

Reinforced Cement Concrete Pipes :
All underground storm water drainage pipes and sewer lines where specified (Other than those specified cast iron) shall be centrifugally spun RCC pipes of specified class. Pipes shall be true and straight with uniform bore. Throughout cracked, warped pipes shall not be used on the work. All pipes shall be tested by the manufacturer and the contractor shall produce, when directed a certificate to that effect from the manufacturer.
Laying

R.C.C. spun pipes shall be paid on cement concrete bed or cradles as specified and shown on the detailed drawings the cradles may be precast and sufficiently cured to prevent cracks and breakage in handling. The invert of the cradles shall be left 12mm below the invert level of the pipe properly placed on the soil to prevent any disturbance. The pipe shall than be placed on the bed concrete or cradles and set for the line and gradient by means of sight rails and bonding rods etc. cradles or concrete bed may be omitted, if directed by the Architect.
Jointing

After setting out the pipes the collars shall be centered over the joint and filled in with tarred gaskin, so that sufficient space is left on either side of the collar to receive the mortar. The space shall then be filled with cement mortar 1:2 (1 cement : 2 fine sand) and caulked by means of proper tools all joints shall be finished at an angle of 45 degree to the longitudinal axis of the pipe on both side of the collars neatly.

Testing

All pipes shall be tested to a Hydraulic test of 1.5m head for at least 50 minutes at the highest point in the section under test. Test shall also be carried out similar to those for stoneware pipes given above. The smoke test shall be carried out by the contractor, if directed by the Architect, at the expense and charges of the contractor. A test register shall be maintained which shall be signed and dated by contractor / Architect and representative of Architect.

Manholes

General :

Manholes of different types and sizes specified shall be constructed in the sewer line at such places and to such levels and dimensions as shown in the drawing or as directed by the Engineer-in-charge. The size specified shall indicate the inside dimensions (between wall faces) of the manholes. The branch sewer should deliver sewage in the manhole in direction of main flow and the junction must be made with case so that flow in the main is not impeded.

No drain from house fitting i.e. gully taps or soil pipes etc. to manholes shall normally exceed a length of 6 meter unless it is unavoidable.

At every change of alignment, gradient or diameter of a drain, there shall be a manhole or inspection chamber. Bends and junctions in the drains shall be grouped together in manhole as far as possible. The maximum distance between manholes shall be 45 m for up to 300 mm Dia, 75 meter for 350 to 500 mm Dia and 90 meter for 600 mm Dia and above.

Where the diameter of the drain is increased, the crown of the pipe shall be fixed at the same level and necessary slope given in the invert of the manhole chamber. Manholes shall be built to the following specifications :-

Bed concrete :

The manhole shall be built on a bed of cement concrete 1:4:8 (1 cement : 4 coarse sand: 8 graded stone aggregate 40 mm nominal size) The thickness of Bed Concrete shall be 150 mm upto 0.90 meter depth, 200 mm thick for manholes from 0.90 meter to 2.25 meter depth and 30 mm for manholes of above 2.25 meter depth.

Walls :

The walls of the manholes shall be of brick masonry. The brick masonry shall be with bricks in cement mortar 1:4 (1 cement : 4 coarse sand) of brick work shall be carefully built in English bond. The jointing face of each brick being well buttered with cement mortar before laying so as to ensure a full joint. The thickness of wall shall not be less than 230mm upto 2.25 meter in depth, 345 mm thick for depth 2.25 to 3.0 meter, 460 mm thick for depths 3.0 m to 5.0 meter and 575 mm thick for 5.0 to 8.0 meter depth. For greater depths and for subsoil water conditions the exact thickness of wall shall be governed by the structural design & site conditions.

Plaster :

The inside of wall shall be plastered by 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) and finished with a floating coat of neat cement. All angle shall be rounded to 7.5 cm. radius and all rendered internal surfaces shall have impervious finish obtained by using a steel trowel.

Where the saturated soil is met with, also the external surface of the walls of the manhole shall be plastered with 12 mm thick cement plaster 1:3 (1 cement : 3 coarse sand) finished smooth upto 30 cm above the highest sub-soil water level with the approval of the Engineer-in-charge. The plaster shall further be water proofed with addition of approved water proofing compound in a quantity as per manufacturer’s specifications.

Channels and benching :

Channels shall be semicircular in the bottom half and of diameter equal to the sewer. Above the horizontal diameter, the sides shall be extended vertically to the same level as the crown of the outgoing pipe and the top edge shall be suitably rounded off. The branch channels shall also be similarly constructed with respect to the benching but at their junction with the main channel on appropriate shall suitably rounded off in the direction of flow in the main channel shall be given.

The channels and benching shall be done in cement concrete 1:2:4 (1cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) rising at a slope of 1 in 6 from the edges of channel. The channels of the bottom of the chamber shall be finished with the floating coat of neat cement.

Foot Rests :
All manholes deeper than 0.8 m shall be provided with C. I. foot rests. These shall be embedded 20 cm deep in 20 x 20 x 10 cm blocks of cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size). The concrete block with C.I. foot rest placed in its center shall be cast in situ along with the masonry and surface finished with 12 mm thick cement plaster 1:3 (1 cement : 3 coarse sand) finished smooth.

Foot rests which shall be of 20 x 20 sq. C.I. bars shall be fixed 30 cm apart vertically and staggered laterally and shall project 10 cm beyond the surface of the wall. The top foot rest shall be 45 cm below the manhole cover.
Foot rests shall be painted with coal tar, the portion embedded in the cement concrete block being painted with thick cement slurry before fixing.
Cover slabs :
These shall be of R.C.C. 1:1.5:3 (1 cement :1.5 coarse sand : 3 graded stone aggregate 20 mm nominal size) 15 cm thick with surface and edge finished fair. Full bearing equal to the width of the wall shall be given to the slab on all sides. The frame of the man hole cover shall be embedded firmly in the R.C.C. slab so that the top of the frame remains flush with the top of the R.C.C. slab. Where the opening of manhole is only 560 mm dia. the MH cover shall be fixed in 150 mm thick PCC (1:2:4).

Testing :
Manholes shall be tested by filling with water to a depth not exceeding 1.2 meter as directed by the Engineer- in-charge. After completion of the work manhole covers shall be sealed by means of thick grease.
Connection to Existing Sewer :
The connection to an existing sewer shall, as far as possible, be done at the manholes. Where it is unavoidable to make connection in between two manholes, the work of breaking into the existing sewer and forming the connection shall be carried out under the supervision Administrative Authority.

Breaking of sewer shall be effected by the cautions enlargement of sewer hole and every precaution shall be taken to prevent any material from entering the sewer. No connection shall be former in such a way so as to constitute a projection into the sewer or to cause any diminutions in its effective size.
Drop Connections :
Where it is uneconomic or impracticable to arrange the connection within 600 mm height above the invert of the manhole, the connection shall be made by constructing a vertical shaft outside the manholes chamber. If the difference in the levels between the incoming drain and the sewer does not exceed 600 mm and there is sufficient room in the manhole, the connection pipe may be directly brought through the manhole wall and the fall accommodated by constructing a ramp in the benching of the manhole.
Precast Concrete Manhole Covers & Frames :
Precast reinforced cement concrete manhole covers intended for use in sewerage (if any), drainage and water works shall generally conform to IS : 12592 - 2002. Detailed specification are as under :

i. Grades : Types & Uses
Manhole covers and frames shall be of the following four grades and types :

Grades	Grade Designation	Type/shape of cover
Light Duty	LD – 2.5	Rectangular, Square, Circular
Medium Duty	MD – 10	Rectangular, Circular
Heavy Duty	HD – 20	Circular-Square, Rectangular,
Extra Heavy Duty	EHD – 35	Circular, Square, Rectangular,

ii. The Different Grades and Types of Manhole Covers May be Used as Follows :

a) LD – 2.5 Rectangular, Square or Circular types : These are suitable for use within residential and institutional complexes / areas with pedestrian but occasional LMV traffic. These covers may also be used for inspection chambers.
b) MD – 10 : These are suitable for use in service lanes / roads, car parking areas etc.

c) MD – 20 : Suitable for use in institutional/commercial areas / carriage ways with heavy duty vehicular traffic like buses, trucks, etc. for a wheel load between 50 to 100 KN.
d) EHD – 35 : Circular, square, or rectangular (scrapper manhole) types - These are suitable for use on carriage way in commercial industrial / port areas / near warehouses / god owns where frequent loading and unloading of trucks / trailers are common, with slow to fast moving vehicular traffic of the types having wheel loads upto 115 KN, irrespective of the location of the manhole chambers.
iii. Materials :

a) Cement : Cement used for the manufacture of precast concrete manhole covers shall conform to IS : 269 or 455 or 1489 or 6909 or IS : 8041 or IS : 8043 or IS : 8112.

b) Aggregates : The aggregates used shall be clean and free from deleterious matter and shall conform to the requirements of IS: 383–1970.The aggregates shall be well graded and the nominal maximum size of coarse aggregate shall not exceed 20 mm.

c) Concrete :The mix proportions of concrete shall be determined by the manufacturer and shall be such as will produce a dense concrete without voids, honey combing etc. (IS : 456) The minimum cement content in the concrete shall be 360 kg/m3 with a maximum water cement ratio of 0.45. Concrete weaker than grade M-30 (design mix) shall not be used. Compaction of concrete shall be done by machine vibration.
d) Reinforcement :The reinforcement steel shall conform to Grade A of IS : 2062 or IS 432 (Part I) or IS : 432 (Part 2) or IS : 1786 as appropriate.
Reinforcement shall be clean and free from loose mills scale, loose rust, and mud, oil, grease or any other coating which may reduce or destroy the bond between the concrete and steel. A light film of rust may not be regarded as harmful but steel shall not be visibly pitted by rust.

Fibers steel : In association with in the main steel bars reinforcement steel fibers of appropriate types and forms may also be used as secondary reinforcement (up to 0.5% by volume).
iv. Shapes and dimensions :

a) Shapes :The shapes of precast concrete manhole covers shall be square, rectangular or circular as specified.
b) Dimensions : Dimensions of precast concrete manhole covers shall be as given in Table below, the minimum clearance at top between the frame and cover shall be 5 mm.

TABLE

S. No. Description Heavy / Extra Heavy duty HD / EHD Medium duty
M.D. Light duty L.D.
1. Clear opening matching the top opening of manhole 560 mm dia or 600 mm dia or Square or 560 mm450 mm dia.
480 mm dia.
500 mm dia or square 600 x 450 mm (rectangular) 450 mm dia or 350 mm dia or square
2. Precast slab with integral frame (D/T) 900 mm dia x 180 mm or square corners cut
1000 mm dia x 200 mm or square corner cut 800 mm. dia
x 130 mm
800 mm dia
x 150 mm 850mmx700mmx100mm 625mm dia x 100 mm or 575 mm dia x 100 mm or square
3. Thickness of cover depth of frame (T1) 100 mm or
110 / 120 mm 70 / 80 mm 50 mm
4. Matching Manhole Cover (B)

5. Edge protection of covers/lifting facility Precast manhole covers are designed and provided with MS rims of 2.5 mm thickness welded around with provision of two lifting hooks welded at appropriate locations.
6. Chequered pattern on operative surface The MS rims along with the edges of precast manhole covers and

their operative surface are suitably coated/finished using corrosion resistant paint.
7. Marking on the covers Precast manhole covers/precast slabs are suitably marked on the operative surface with the following letters, unless specified otherwise
Name of the Department/Sewer or SWD/Grade/Date of MFR/Trade Name etc.
8. Performance requirements

Test load When tested for ULTIMATE breaking load using 300 mm dia block as per the method described in IS : 12592 (Part I) manhole covers shall be within the following range :
Light duty - 2.5 tones (L.D. – 2.5) Heavy duty – 20 tones (HD – 20)
Medium duty - 10 tones (MD – 10) Extra heavy duty - 35 tones (EHD – 35).
v. Lifting device :

The minimum diameter of mild steel rod used as lifting device shall be 10 mm for light and 12 mm for medium duty covers and 16 mm for heavy and extra heavy duty covers. The lifting device shall be protected from corrosion by not galvanizing or epoxy coating or any other suitable.
vi. Finishing and coating :

To prevent any possible damage from corrosion of steel the underside of the covers shall be treated with anticorrosive paint. The top surface of the covers shall be given a chequered finish.
In order to protect the edges of the covers from possible damage at the time of lifting and handling it is necessary that the manhole covers shall be cast with a protective mild steel sheet of minimum 2.5 mm thickness around the periphery of the covers. Exposed surface of mild steel sheet shall be given suitable treatment with anticorrosive paint or coating.

vii. Physical requirements :

a) General : All units shall be sound and free from cracks and other defects which interface with the proper placing of the unit or impair the strength or performance of the units. Minor chipping at the edge / surface resulting from the customary methods of handling during delivery shall not be deemed for rejecting.
b) Load test : The breaking load of individual units when tested in accordance with the method described in IS : 12592 shall be not less than the values specified in Table below:

TABLE

Grade of cover	Type	Load in Tonnes	Diameter of Blocks in mm
EHD – 35	Circular, Square or Rectangular	35	300
HD – 20	Circular, Square or Rectangular	20	300
MD – 10	Circular, or Rectangular	10	300
LD – 2.5	Rectangular, Square or Circular	2.5	300

viii. FIXING :
The frames of manhole shall be firmly embedded to correct alignment and level in RCC slab or plain concrete as the case may be on the top of masonry which shall be paid as extra unless specified otherwise.

SCHEDULE OF TECHNICAL DATA
I. Drainage Sump Pump
1 Pump
a Make
b Type & Model
c Discharge in LPS/ GPM
d Head (Meters of WC)
e Shut off head (Meters of WC)

f	Efficiency (%)
g	No. of stages
h	Suction end I.D.
i	Delivery end I.D.
j	Details of N.P.S.H.
k	Solid Handling size.
l	Vibration Isolation Detail
2	Skid Details
a	Operating Weight
b	Overall Dimension
c	Mechanical Seal Detail
3	Material
a	Body
b	Impeller
c	Shaft
d	Type of Impeller
e	Is it suitable for direct coupling
4	Motor
a	Make
b	Model
c	Power Requirement (HP/KW)
d	R.P.M.
e	Rating
f	Over Load Capacity
g	Class of Insulation
h	Details of additional protection in winding
i	Motor efficiency
j	If it suitable for direct coupling to pump?
k	Type of rotary movement
l	Method of starting
m	Size and type of cable for connections

SCHEDULE OF TECHNICAL DATA

I.	Rain Water Pump
1	Pump
a	Make
b	Type & Model
c	Discharge in LPS/ GPM
d	Head (Meters of WC)
e	Shut off head (Meters of WC)
f	Efficiency (%)
g	No. of stages
h	Suction end I.D.
i	Delivery end I.D.
j	Details of N.P.S.H.
k	Solid Handling size.
l	Vibration Isolation Detail
2	Skid Details

a	Operating Weight
b	Overall Dimension
c	Mechanical Seal Detail
3	Material
a	Body
b	Impeller
c	Shaft
d	Type of Impeller
e	Is it suitable for direct coupling
4	Motor
a	Make
b	Model
c	Power Requirement (HP/KW)
d	R.P.M.
e	Rating
f	Over Load Capacity
g	Class of Insulation
h	Details of additional protection in winding
i	Motor efficiency
j	If it suitable for direct coupling to pump?
k	Type of rotary movement
l	Method of starting
m	Size and type of cable for connections

Rain Water Harvesting Pit Modules :-
Supply and installation of a 100% recycled polypropylene modular tank system (non-plate and non- hyperboloid design) engineered for underground applications. The system shall be based on a mat raft foundation with a single-column base structure and unidirectional assembly of modular units. Each module measures 600 mm × 600 mm × 250 mm and offers an effective water holding capacity of 85 litres, with a void ratio of 94.5% for maximum runoff storage. The design allows tool-free stacking up to 6 meters, making it ideal for deep cavity installations. Made from high-quality recycled PPCP, the structure is resistant to chemicals and high temperatures and offers a minimum service life of 20 years. It is designed to withstand vehicle loads up to SLW 60 (HGV class) with appropriate backfilling and features a double-lock connection mechanism for enhanced stability. The vertical column structure is engineered to distribute loads evenly, with column spacing not exceeding 75–80 mm and a minimum column density of 75–80 columns per square meter. Systems using more than four components per module shall not be permitted.

Recommended Make: Retas (Approved Makes: Retas, Rehau, ACO, Graf) Unit: Cubic Meter (CUM)

Geotextile:-
Supply and installation of high-strength, non-woven polypropylene (PP) geotextile fabric, minimum 400 GSM, used for wrapping modular tanks to enhance filtration and prevent silt ingress.

- Tear Strength: ≥ 250 N (ASTM D4533)
- Width-wise Strength: ≥ 215 N (ASTM D4533)
- Puncture Resistance: ≥ 1550 N (ASTM D6241)
- Elongation at Break: ≥ 57% (ASTM D4595)

Fabric is needle-punched, heat-welded, and made from long synthetic fibers ensuring high porosity, effective filtration, and seamless percolation. Includes all necessary activities such as cutting, sizing, seaming, and wrapping around tank modules.
Application: Essential for proper tank functioning, sediment control, and structural reinforcement. Unit: Square Meter (SQM)

Filtration Unit: -

Supply and installation of FRP-based Rainwater Harvesting Microfilter with 750mm diameter and 1000mm height, equipped with dual 6” inlet and outlet ports. The filter includes an internal SS 304 mesh for effective primary filtration.

- Flow Rate Capacity: Minimum 40–45 KL/hr
- Constructed from UV-resistant, corrosion-proof FRP body for long life
- Suitable for rooftop and stormwater collection
- Must be GRIHA and SVAGRIHA Certified (GRIHA Criteria 18 & 21, SVAGRIHA Criterion 9) with valid certification on date of installation
- Compatible with modular tank systems for both recharge and reuse applications.

Recommended Make: Retas, Aco, Rehau, Atharva Unit: 3 Number (Nos.)
Size: Length - 3M
Width - 2.5
Height - 2.5
\

DRAWINGS

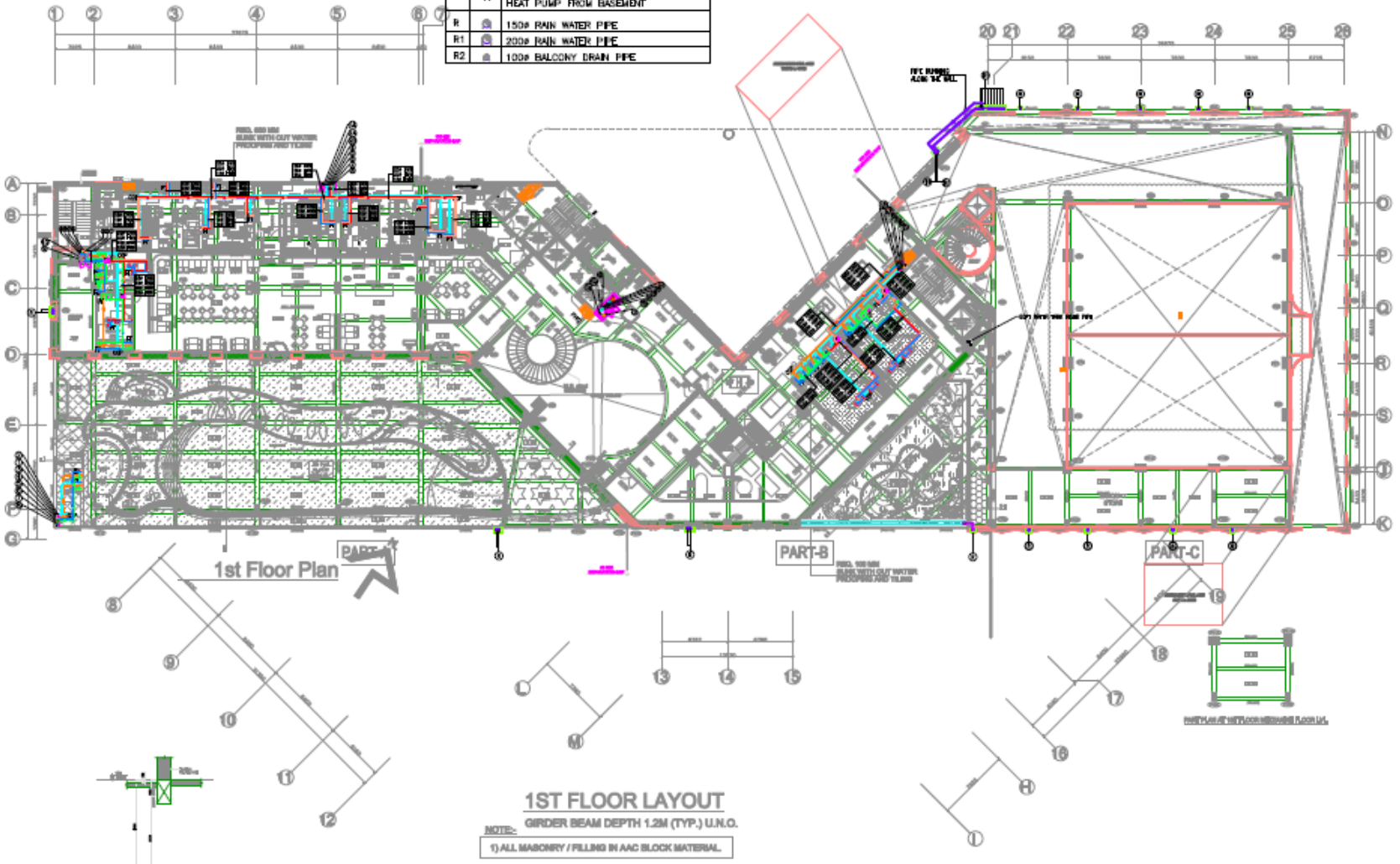
The contractor shall refer the tender drawings attached in this section.

A. 1ST FLOOR PLAN PLUMBING LAYOUT
B, 2ND FLOOR PLAN PLUMBING LAYOUT
C. 3RD FLOOR PLAN PLUMBING LAYOUT
D. 4TH FLOOR PLAN PLUMBING LAYOUT
E. 5TH FLOOR PLAN PLUMBING LAYOUT
F. 6TH FLOOR PLAN PLUMBING LAYOUT
G. 7TH FLOOR PLAN PLUMBING LAYOUT
H. 8TH FLOOR PLAN PLUMBING LAYOUT
I. 9TH FLOOR PLAN PLUMBING LAYOUT
J. DUCT FLOOR PLAN PLUMBING LAYOUT
K. GROUND FLOOR PLAN PLUMBING LAYOUT
L. LOWER GROUND CEILING PLAN PLUMBING LAYOUT
M. LOWER GROUND FLOOR PLAN PLUMBING LAYOUT
N. SCMATIC PLUMBING LAYOUT
O. TERACE PLAN PLUMBING LAYOUT
P. TYPICAL DETAIL

PLUMBING LEGEND:-		
1	100ø SOIL PIPE FLOOR LEVEL	
2	100ø SOIL PIPE CEILING LEVEL	
3	100ø WASTE PIPE FLOOR LEVEL	
4	100ø WASTE PIPE CEILING LEVEL	
5	75ø VENT PIPE	
6	DOMESTIC WATER PIPE	
7	FLUSHING WATER SUPPLY	
8	HOT WATER SUPPLY PIPE	
9	HOT WATER RETURN PIPE	
10	RO WATER SUPPLY PIPE	

PLUMBING VERTICAL PIPES SCHEDULES:-		
1		100ø SOIL PIPE
1A		150ø SOIL PIPE
2		100ø WASTE PIPE
2A		150ø WASTE PIPE
2B		100ø WASTE PIPE (KITCHEN)
1B		150ø WASTE PIPE (KITCHEN)
3		75ø VENT PIPE
4		DOMESTIC WATER SUPPLY MAIN PIPE
5		FLUSHING WATER SUPPLY MAIN PIPE
6		HOT WATER SUPPLY
7		HOT WATER RETURN
8		RO WATER SUPPLY
9		HOT WATER SUPPLY TO BASEMENT FROM TERRACE HEAT PUMP
10		HOT WATER RETURN PIPE TO TERRACE HEAT PUMP FROM BASEMENT
R		150ø RAIN WATER PIPE
R1		200ø RAIN WATER PIPE
R2		100ø BALCONY DRAIN PIPE

PIPE CONNECTION DIA :-	
WC TO STACK	100ø SOIL PIPE
URINAL TO UT	40ø SOIL PIPE
UT TO STACK	100ø SOIL PIPE
SINK TO FT	40ø WASTE PIPE
FD TO FT	50ø WASTE PIPE
WASH BASIN TO FT	32ø WASTE PIPE
FT TO STACK	100ø WASTE PIPE



1ST FLOOR LAYOUT

GIRDER BEAM DEPTH 1.2M (TYP.) U.N.O.

NOTE:-

1) ALL MASONRY / FILLING IN AAC BLOCK MATERIAL.

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PROJECT GOPALPUR PALM RESORT

Uddyapur, Gopalpur-on-Sea,Ganjam Odisha

OWNER / PROMOTER

SWOSTI PREMIUM LIMITED

P-1, JAYDEV VIHAR BHUBANESWAR, ODISHA – 751013

DRAWING TITLE

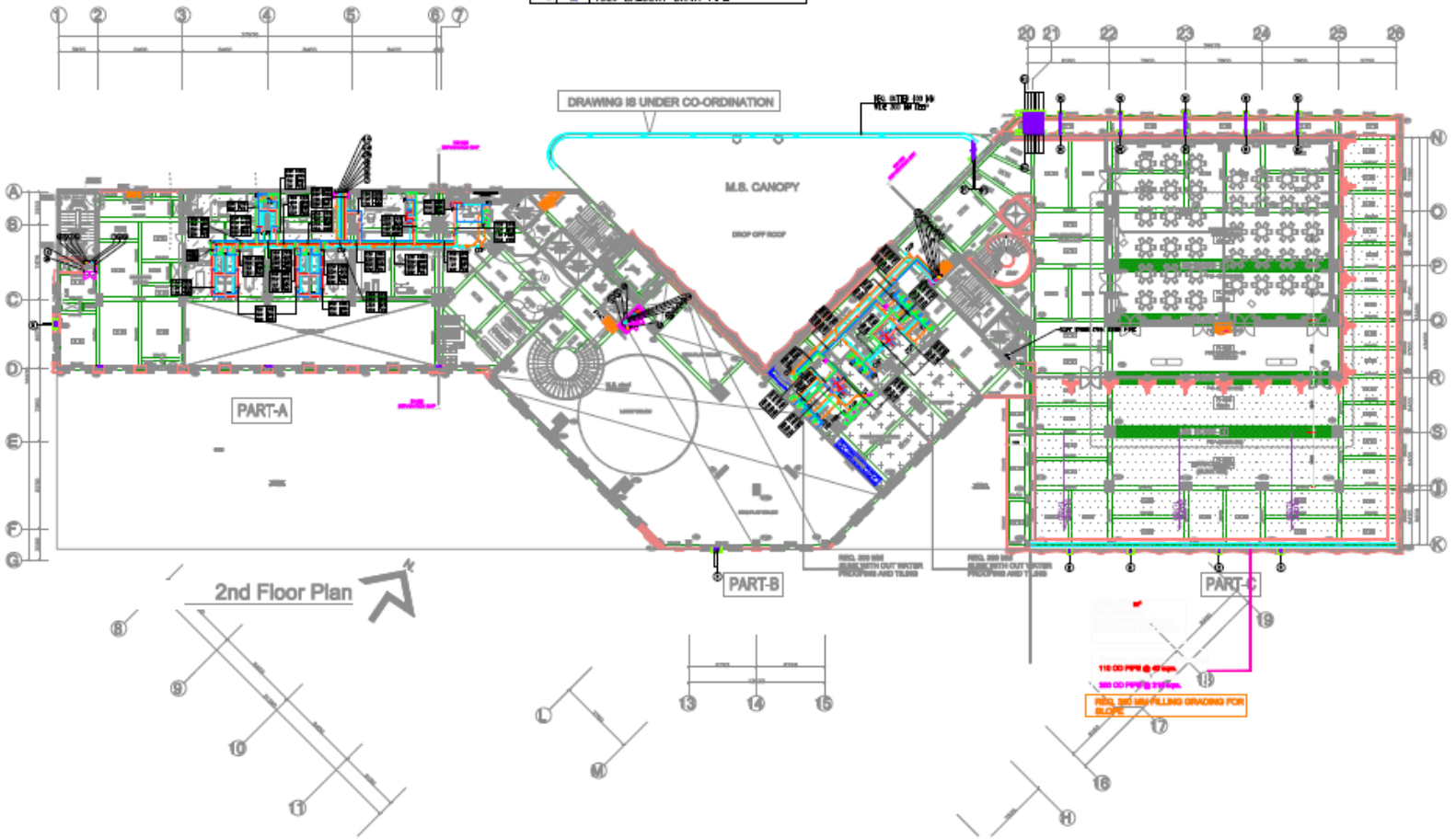
FIRST FLOOR PLAN PLUMBING LAYOUT

FOR TENDER

PLUMBING LEGEND:-		
1	100ø SOIL PIPE FLOOR LEVEL	
2	100ø SOIL PIPE CEILING LEVEL	
3	100ø WASTE PIPE FLOOR LEVEL	
4	100ø WASTE PIPE CEILING LEVEL	
5	75ø VENT PIPE	
6	DOMESTIC WATER PIPE	
7	FLUSHING WATER SUPPLY	
8	HOT WATER SUPPLY PIPE	
9	HOT WATER RETURN PIPE	
10	RO WATER SUPPLY PIPE	

PLUMBING VERTICAL PIPES SCHEDULES:-		
1		100ø SOIL PIPE
1A		150ø SOIL PIPE
2		100ø WASTE PIPE
2A		150ø WASTE PIPE
2B		100ø WASTE PIPE (KITCHEN)
1B		150ø WASTE PIPE (KITCHEN)
3		75ø VENT PIPE
4		DOMESTIC WATER SUPPLY MAIN PIPE
5		FLUSHING WATER SUPPLY MAIN PIPE
6		HOT WATER SUPPLY
7		HOT WATER RETURN
8		RO WATER SUPPLY
9		HOT WATER SUPPLY TO BASEMENT FROM TERRACE HEAT PUMP
10		HOT WATER RETURN PIPE TO TERRACE HEAT PUMP FROM BASEMENT
R		150ø RAIN WATER PIPE
R1		200ø RAIN WATER PIPE
R2		100ø BALCONY DRAIN PIPE

PIPE CONNECTION DIA :-	
WC TO STACK	100ø SOIL PIPE
URINAL TO UT	40ø SOIL PIPE
UT TO STACK	100ø SOIL PIPE
SINK TO FT	40ø WASTE PIPE
FD TO FT	50ø WASTE PIPE
WASH BASIN TO FT	32ø WASTE PIPE
FT TO STACK	100ø WASTE PIPE



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SWOSTI PREMIUM LIMITED
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BHUBANESWAR, ODISHA – 751013

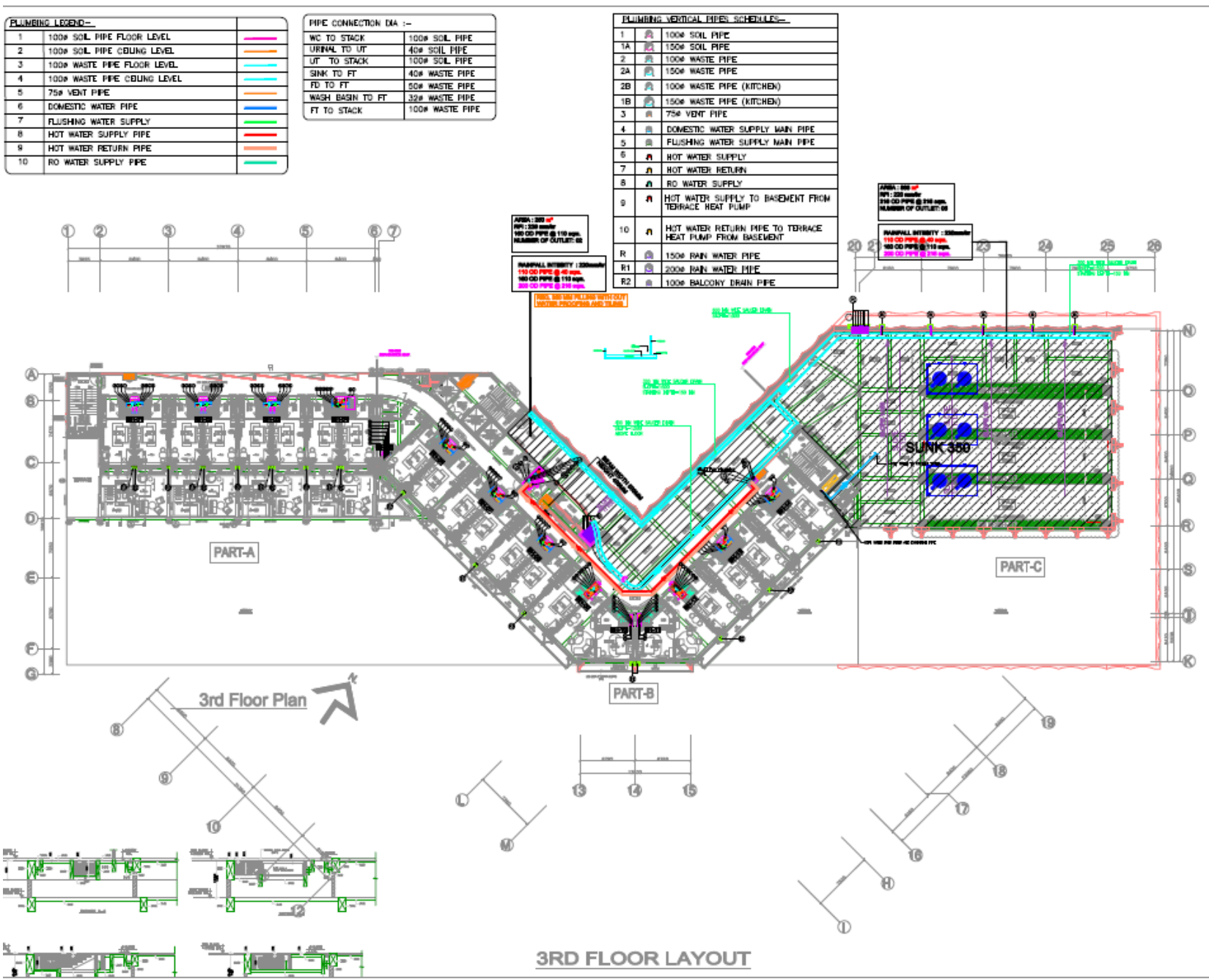
SECOND FLOOR PLAN
PLUMBING LAYOUT

FOR TENDER

PLUMBING LEGEND:-	
1	100ø SOIL PIPE FLOOR LEVEL
2	100ø SOIL PIPE CEILING LEVEL
3	100ø WASTE PIPE FLOOR LEVEL
4	100ø WASTE PIPE CEILING LEVEL
5	75ø VENT PIPE
6	DOMESTIC WATER PIPE
7	FLUSHING WATER SUPPLY
8	HOT WATER SUPPLY PIPE
9	HOT WATER RETURN PIPE
10	RO WATER SUPPLY PIPE

PIPE CONNECTION DIA :-	
WC TO STACK	100ø SOIL PIPE
URINAL TO UT	40ø SOIL PIPE
UT TO STACK	100ø SOIL PIPE
SINK TO FT	40ø WASTE PIPE
FD TO FT	50ø WASTE PIPE
WASH BASIN TO FT	32ø WASTE PIPE
FT TO STACK	100ø WASTE PIPE

PLUMBING VERTICAL PIPES SCHEDULES:-	
1	100ø SOIL PIPE
1A	150ø SOIL PIPE
2	100ø WASTE PIPE
2A	150ø WASTE PIPE
2B	100ø WASTE PIPE (KITCHEN)
1B	150ø WASTE PIPE (KITCHEN)
3	75ø VENT PIPE
4	DOMESTIC WATER SUPPLY MAIN PIPE
5	FLUSHING WATER SUPPLY MAIN PIPE
6	HOT WATER SUPPLY
7	HOT WATER RETURN
8	RO WATER SUPPLY
9	HOT WATER SUPPLY TO BASEMENT FROM TERRACE HEAT PUMP
10	HOT WATER RETURN PIPE TO TERRACE HEAT PUMP FROM BASEMENT
R	150ø RAIN WATER PIPE
R1	200ø RAIN WATER PIPE
R2	100ø BALCONY DRAIN PIPE



3RD FLOOR LAYOUT

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Uddayapur, Gopalpur-on-Sea,Ganjam
Odisha

SWOSTI PREMIUM LIMITED
P-4, JAYDEV VIHAR
BHUBANESWAR, ODISHA — 751013

THIRD FLOOR PLAN
PLUMBING LAYOUT

FOR TENDER

PLUMBING LEGEND :-		
1	100ø SOIL PIPE FLOOR LEVEL	
2	100ø SOIL PIPE CEILING LEVEL	
3	100ø WASTE PIPE FLOOR LEVEL	
4	100ø WASTE PIPE CEILING LEVEL	
5	75ø VENT PIPE	
6	DOMESTIC WATER PIPE	
7	FLUSHING WATER SUPPLY	
8	HOT WATER SUPPLY PIPE	
9	HOT WATER RETURN PIPE	
10	RO WATER SUPPLY PIPE	

PLUMBING VERTICAL PIPES SCHEDULES :-		
1		100ø SOIL PIPE
1A		150ø SOIL PIPE
2		100ø WASTE PIPE
2A		150ø WASTE PIPE
2B		100ø WASTE PIPE (KITCHEN)
1B		150ø WASTE PIPE (KITCHEN)
3		75ø VENT PIPE
4		DOMESTIC WATER SUPPLY MAIN PIPE
5		FLUSHING WATER SUPPLY MAIN PIPE
6		HOT WATER SUPPLY
7		HOT WATER RETURN
8		RO WATER SUPPLY
9		HOT WATER SUPPLY TO BASEMENT FROM TERRACE HEAT PUMP
10		HOT WATER RETURN PIPE TO TERRACE HEAT PUMP FROM BASEMENT
R		150ø RAIN WATER PIPE
R1		200ø RAIN WATER PIPE
R2		100ø BALCONY DRAIN PIPE

PIPE CONNECTION DIA :-	
WC TO STACK	100ø SOIL PIPE
URINAL TO UT	40ø SOIL PIPE
UT TO STACK	100ø SOIL PIPE
SINK TO FT	40ø WASTE PIPE
FD TO FT	50ø WASTE PIPE
WASH BASIN TO FT	32ø WASTE PIPE
FT TO STACK	100ø WASTE PIPE

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BANGALORE

PROJECT MANAGEMENT
ARKITECHNO

MEP CONSULTANTS

STRUCTURE CONSULTANTS
SACPL

ARCHITECTS
DELCITY

PROJECT
GOPALPUR PALM RESORT
Udayapur, Gopalpur-on-Sea,Ganjam, Odisha

OWNER / PROMOTER
SWOSTI PREMIUM LIMITED
Plot, JAYDEV VIHAR
BHUBANESWAR, ODISHA – 751013

DRAWING TITLE
4TH FLOOR PLAN
PLUMBING LAYOUT

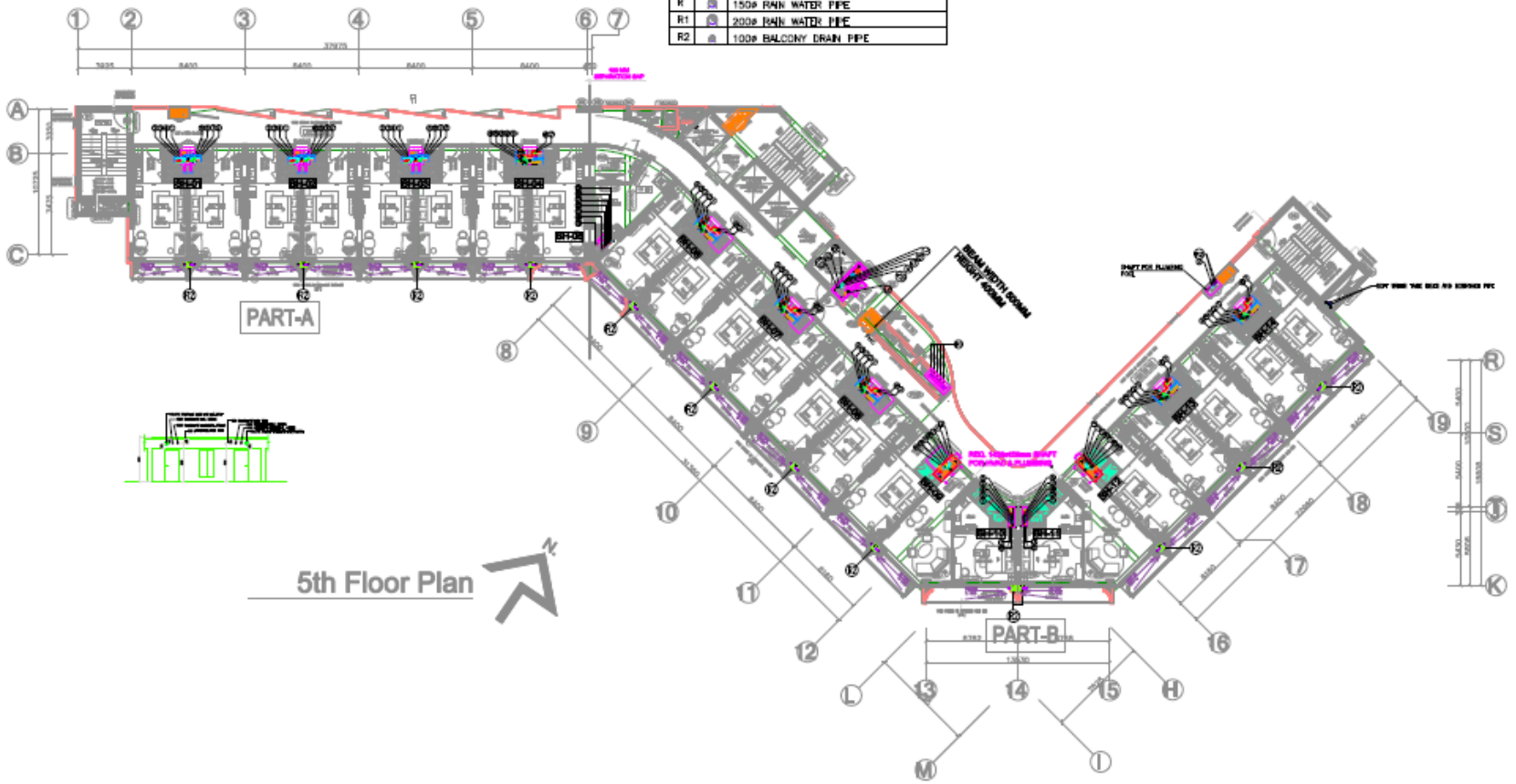
FOR TENDER

REV. NO.	DATE	REMARKS	BY

PLUMBING LEGEND :-	
1	100ø SOIL PIPE FLOOR LEVEL
2	100ø SOIL PIPE CEILING LEVEL
3	100ø WASTE PIPE FLOOR LEVEL
4	100ø WASTE PIPE CEILING LEVEL
5	75ø VENT PIPE
6	DOMESTIC WATER PIPE
7	FLUSHING WATER SUPPLY
8	HOT WATER SUPPLY PIPE
9	HOT WATER RETURN PIPE
10	RO WATER SUPPLY PIPE

PIPE CONNECTION DIA :-	
WC TO STACK	100ø SOIL PIPE
URINAL TO UT	40ø SOIL PIPE
UT TO STACK	100ø SOIL PIPE
SINK TO FT	40ø WASTE PIPE
FD TO FT	50ø WASTE PIPE
WASH BASIN TO FT	32ø WASTE PIPE
FT TO STACK	100ø WASTE PIPE

PLUMBING VERTICAL PIPES SCHEDULE:-		
1		100ø SOIL PIPE
1A		150ø SOIL PIPE
2		100ø WASTE PIPE
2A		150ø WASTE PIPE
2B		100ø WASTE PIPE (KITCHEN)
1B		150ø WASTE PIPE (KITCHEN)
3		75ø VENT PIPE
4		DOMESTIC WATER SUPPLY MAIN PIPE
5		FLUSHING WATER SUPPLY MAIN PIPE
6		HOT WATER SUPPLY
7		HOT WATER RETURN
8		RO WATER SUPPLY
9		HOT WATER SUPPLY TO BASEMENT FROM TERRACE HEAT PUMP
10		HOT WATER RETURN PIPE TO TERRACE HEAT PUMP FROM BASEMENT
R		150ø RAIN WATER PIPE
R1		200ø RAIN WATER PIPE
R2		100ø BALCONY DRAIN PIPE



5th Floor Plan

NPAAE BANGALORE

PROJECT MANAGEMENT
ARKITECHNO

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PROJECT
GOPALPUR PALM RESORT
Uddyapur, Gopalpur-on-Sea,Ganjam, Odisha

OWNER / PROMOTER
SWOSTI PREMIUM LIMITED
P-I, JAYDEV VIHAR
BHUBANESWAR, ODISHA – 751013

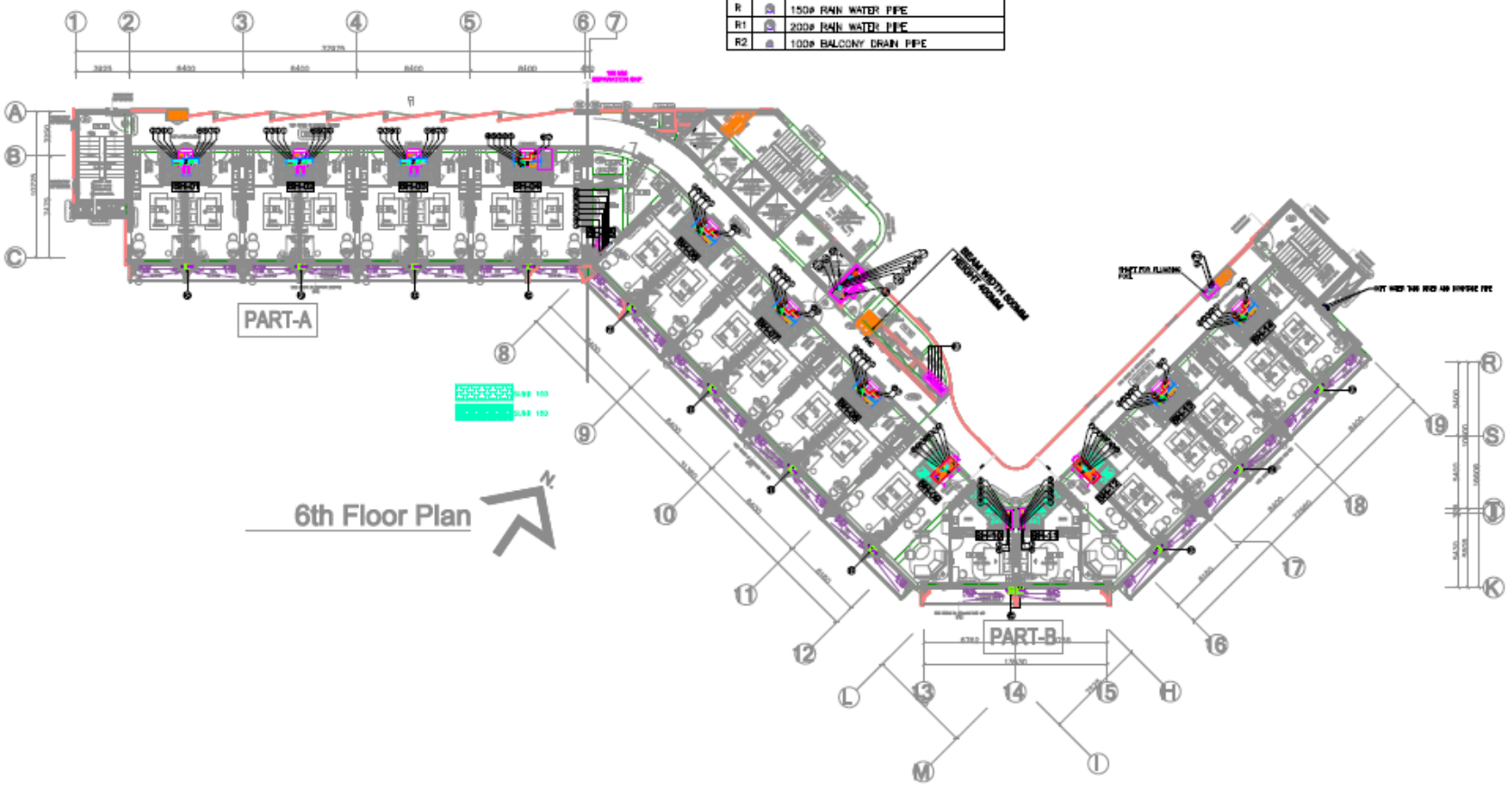
DRAWING TITLE
5TH FLOOR PLAN
PLUMBING LAYOUT

FOR TENDER

PLUMBING LEGEND :-		
1	100ø SOIL PIPE FLOOR LEVEL	
2	100ø SOIL PIPE CEILING LEVEL	
3	100ø WASTE PIPE FLOOR LEVEL	
4	100ø WASTE PIPE CEILING LEVEL	
5	75ø VENT PIPE	
6	DOMESTIC WATER PIPE	
7	FLUSHING WATER SUPPLY	
8	HOT WATER SUPPLY PIPE	
9	HOT WATER RETURN PIPE	
10	RO WATER SUPPLY PIPE	

PIPE CONNECTION DIA :-	
WC TO STACK	100ø SOIL PIPE
URINAL TO UT	40ø SOIL PIPE
UT TO STACK	100ø SOIL PIPE
SINK TO FT	40ø WASTE PIPE
FD TO FT	50ø WASTE PIPE
WASH BASIN TO FT	32ø WASTE PIPE
FT TO STACK	100ø WASTE PIPE

PLUMBING VERTICAL PIPES SCHEDULE :-		
1		100ø SOIL PIPE
1A		150ø SOIL PIPE
2		100ø WASTE PIPE
2A		150ø WASTE PIPE
2B		100ø WASTE PIPE (KITCHEN)
1B		150ø WASTE PIPE (KITCHEN)
3		75ø VENT PIPE
4		DOMESTIC WATER SUPPLY MAIN PIPE
5		FLUSHING WATER SUPPLY MAIN PIPE
6		HOT WATER SUPPLY
7		HOT WATER RETURN
8		RO WATER SUPPLY
9		HOT WATER SUPPLY TO BASEMENT FROM TERRACE HEAT PUMP
10		HOT WATER RETURN PIPE TO TERRACE HEAT PUMP FROM BASEMENT
R		150ø RAIN WATER PIPE
R1		200ø RAIN WATER PIPE
R2		100ø BALCONY DRAIN PIPE



6th Floor Plan

NPAAE
BANGALORE

ARKITECHNO

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DELCITY

GOPALPUR PALM RESORT
Udayapur, Gopalpur-on-Sea, Ganjam, Odisha

SWOSTI PREMIUM LIMITED
P-1, JAYDEV VIHAR
BHUBANESWAR, ODISHA – 751013

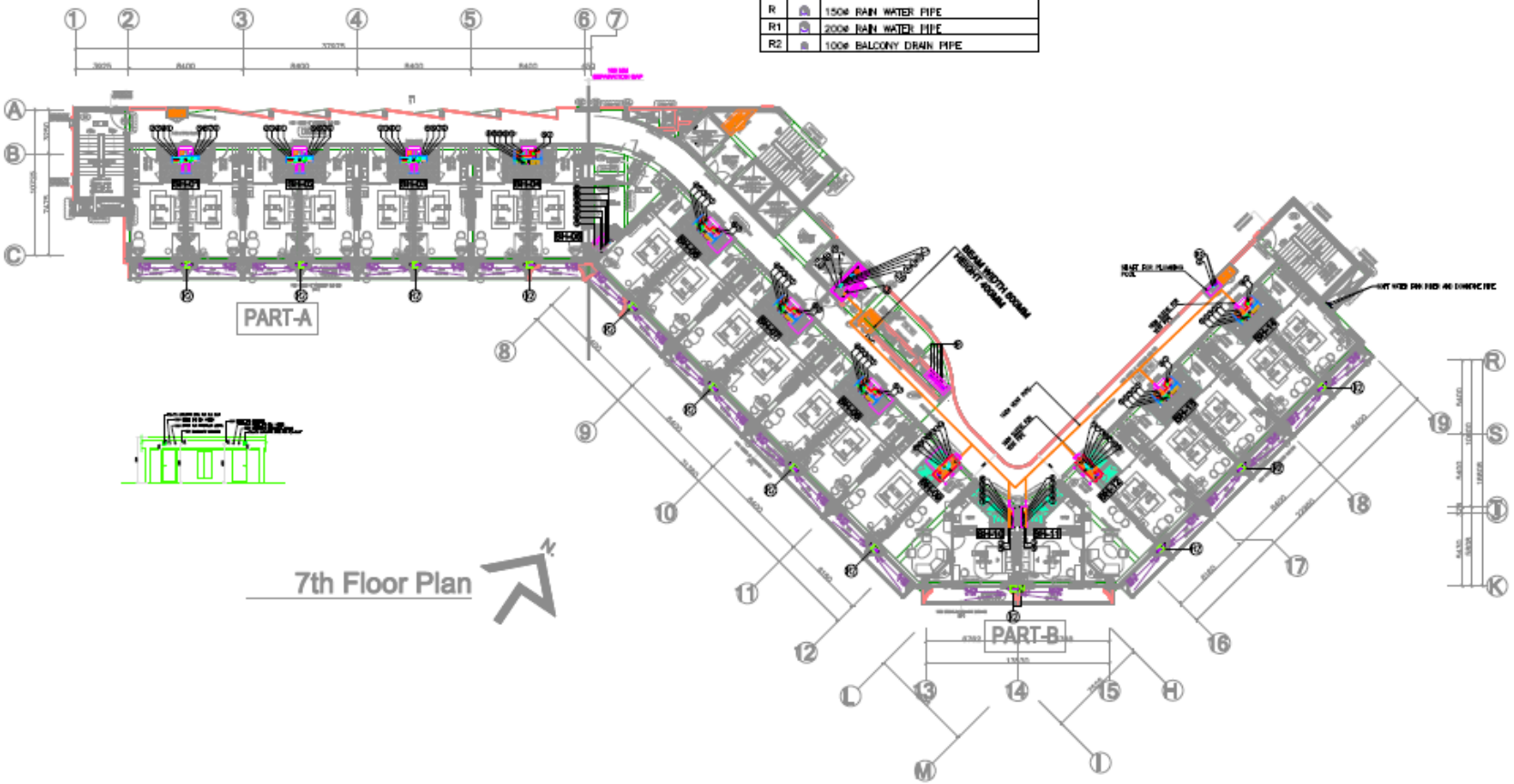
6TH FLOOR PLAN
PLUMBING LAYOUT

FOR TENDER

PLUMBING LEGEND:-		
1	100ø SOIL PIPE FLOOR LEVEL	
2	100ø SOIL PIPE CEILING LEVEL	
3	100ø WASTE PIPE FLOOR LEVEL	
4	100ø WASTE PIPE CEILING LEVEL	
5	75ø VENT PIPE	
6	DOMESTIC WATER PIPE	
7	FLUSHING WATER SUPPLY	
8	HOT WATER SUPPLY PIPE	
9	HOT WATER RETURN PIPE	
10	RO WATER SUPPLY PIPE	

PIPE CONNECTION DIA :-	
WC TO STACK	100ø SOIL PIPE
URINAL TO UT	40ø SOIL PIPE
UT TO STACK	100ø SOIL PIPE
SINK TO FT	40ø WASTE PIPE
FD TO FT	50ø WASTE PIPE
WASH BASIN TO FT	32ø WASTE PIPE
FT TO STACK	100ø WASTE PIPE

PLUMBING VERTICAL PIPES SCHEDULES:-		
1		100ø SOIL PIPE
1A		150ø SOIL PIPE
2		100ø WASTE PIPE
2A		150ø WASTE PIPE
2B		100ø WASTE PIPE (KITCHEN)
1B		150ø WASTE PIPE (KITCHEN)
3		75ø VENT PIPE
4		DOMESTIC WATER SUPPLY MAIN PIPE
5		FLUSHING WATER SUPPLY MAIN PIPE
6		HOT WATER SUPPLY
7		HOT WATER RETURN
8		RO WATER SUPPLY
9		HOT WATER SUPPLY TO BASEMENT FROM TERRACE HEAT PUMP
10		HOT WATER RETURN PIPE TO TERRACE HEAT PUMP FROM BASEMENT
R		150ø RAIN WATER PIPE
R1		200ø RAIN WATER PIPE
R2		100ø BALCONY DRAIN PIPE



7th Floor Plan

NPAAE BANGKOK

ARKITECHNO

SACPL

DEN CITY

GOPALPUR PALM RESORT

Udayapur, Gopalpur-on-Sea,Ganjam Odisha

SWOSTI PREMIUM LIMITED

P-4, JAYDEV VIHAR BHUBANESWAR, ODISHA – 751013

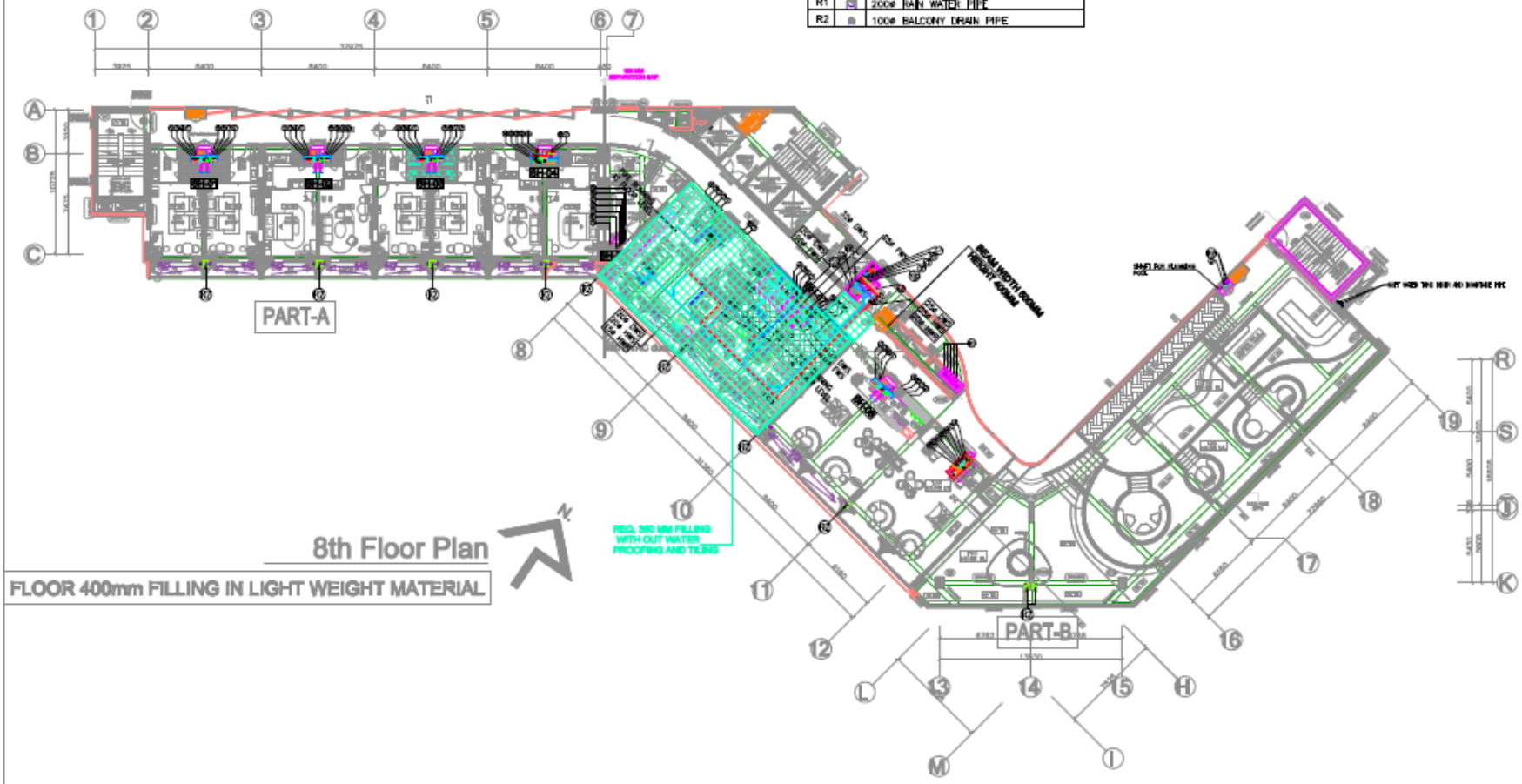
7TH FLOOR PLAN PLUMBING LAYOUT

FOR TENDER

PLUMBING LEGEND–		
1	100ø SOIL PIPE FLOOR LEVEL	
2	100ø SOIL PIPE CEILING LEVEL	
3	100ø WASTE PIPE FLOOR LEVEL	
4	100ø WASTE PIPE CEILING LEVEL	
5	75ø VENT PIPE	
6	DOMESTIC WATER PIPE	
7	FLUSHING WATER SUPPLY	
8	HOT WATER SUPPLY PIPE	
9	HOT WATER RETURN PIPE	
10	RO WATER SUPPLY PIPE	

PIPE CONNECTION DIA :–	
WC TO STACK	100ø SOIL PIPE
URINAL TO UT	40ø SOIL PIPE
UT TO STACK	100ø SOIL PIPE
SINK TO FT	40ø WASTE PIPE
FD TO FT	50ø WASTE PIPE
WASH BASIN TO FT	32ø WASTE PIPE
FT TO STACK	100ø WASTE PIPE

PLUMBING VERTICAL PIPES SCHEDULES–		
1		100ø SOIL PIPE
1A		150ø SOIL PIPE
2		100ø WASTE PIPE
2A		150ø WASTE PIPE
2B		100ø WASTE PIPE (KITCHEN)
1B		150ø WASTE PIPE (KITCHEN)
3		75ø VENT PIPE
4		DOMESTIC WATER SUPPLY MAIN PIPE
5		FLUSHING WATER SUPPLY MAIN PIPE
6		HOT WATER SUPPLY
7		HOT WATER RETURN
8		RO WATER SUPPLY
9		HOT WATER SUPPLY TO BASEMENT FROM TERRACE HEAT PUMP
10		HOT WATER RETURN PIPE TO TERRACE HEAT PUMP FROM BASEMENT
R		150ø RAIN WATER PIPE
R1		200ø RAIN WATER PIPE
R2		100ø BALCONY DRAIN PIPE



8th Floor Plan

FLOOR 400mm FILLING IN LIGHT WEIGHT MATERIAL

NPAAE BANGKOK

ARKITECHNO

SACPL

DEN CITY

GOPALPUR PALM RESORT

Jdayapur, Gopalpur–on–Sea,Ganjam Odisha

SWOSTI PREMIUM LIMITED

P–I, JAYDEV VIHAR BHUBANESWAR, ODISHA – 751013

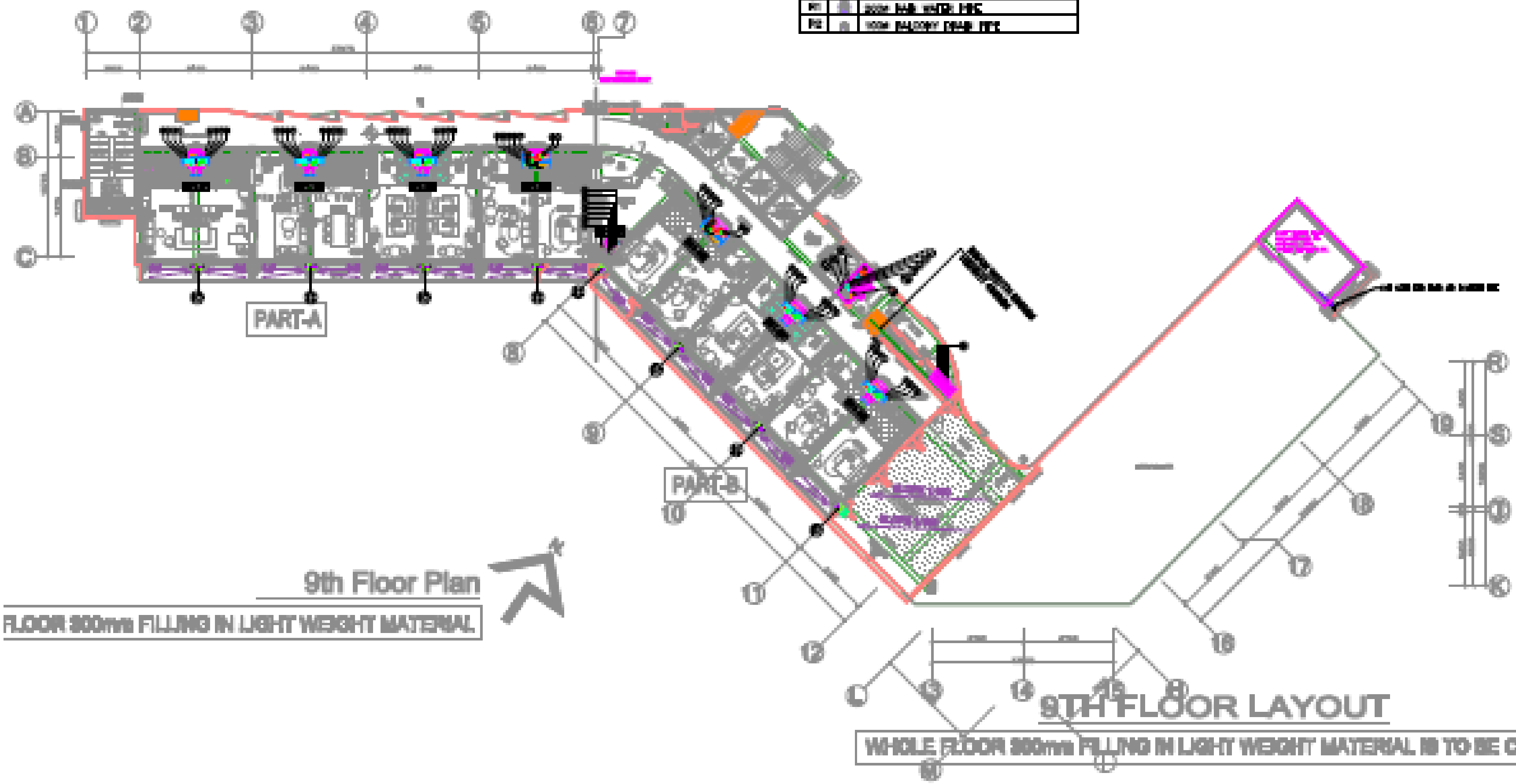
8TH FLOOR PLAN PLUMBING LAYOUT

FOR TENDER

PLUMBING LEGEND:-	
1	100Ø SOIL PIPE FLOOR LEVEL
2	100Ø SOIL PIPE CEILING LEVEL
3	100Ø WASTE PIPE FLOOR LEVEL
4	100Ø WASTE PIPE CEILING LEVEL
5	75Ø VENT PIPE
6	DOMESTIC WATER PIPE
7	FLUSHING WATER SUPPLY
8	HOT WATER SUPPLY PIPE
9	HOT WATER RETURN PIPE
10	RO WATER SUPPLY PIPE

PIPE CONNECTION DIA :-	
WC TO STACK	100Ø SOIL PIPE
URINAL TO UT	40Ø SOIL PIPE
UT TO STACK	100Ø SOIL PIPE
SINK TO FT	40Ø WASTE PIPE
FD TO FT	50Ø WASTE PIPE
WASH BASIN TO FT	32Ø WASTE PIPE
FT TO STACK	100Ø WASTE PIPE

PLUMBING VERTICAL PIPES SCHEDULE:-		
1		100Ø SOIL PIPE
1A		150Ø SOIL PIPE
2		100Ø WASTE PIPE
2A		150Ø WASTE PIPE
2B		100Ø WASTE PIPE (KITCHEN)
1B		150Ø WASTE PIPE (KITCHEN)
3		75Ø VENT PIPE
4		DOMESTIC WATER SUPPLY MAIN PIPE
5		FLUSHING WATER SUPPLY MAIN PIPE
6		HOT WATER SUPPLY
7		HOT WATER RETURN
8		RO WATER SUPPLY
9		HOT WATER SUPPLY TO BASEMENT FROM TERRACE HEAT PUMP
10		HOT WATER RETURN PIPE TO TERRACE HEAT PUMP FROM BASEMENT
R		150Ø RAIN WATER PIPE
R1		200Ø RAIN WATER PIPE
R2		100Ø BALCONY DRAIN PIPE



NPAAE

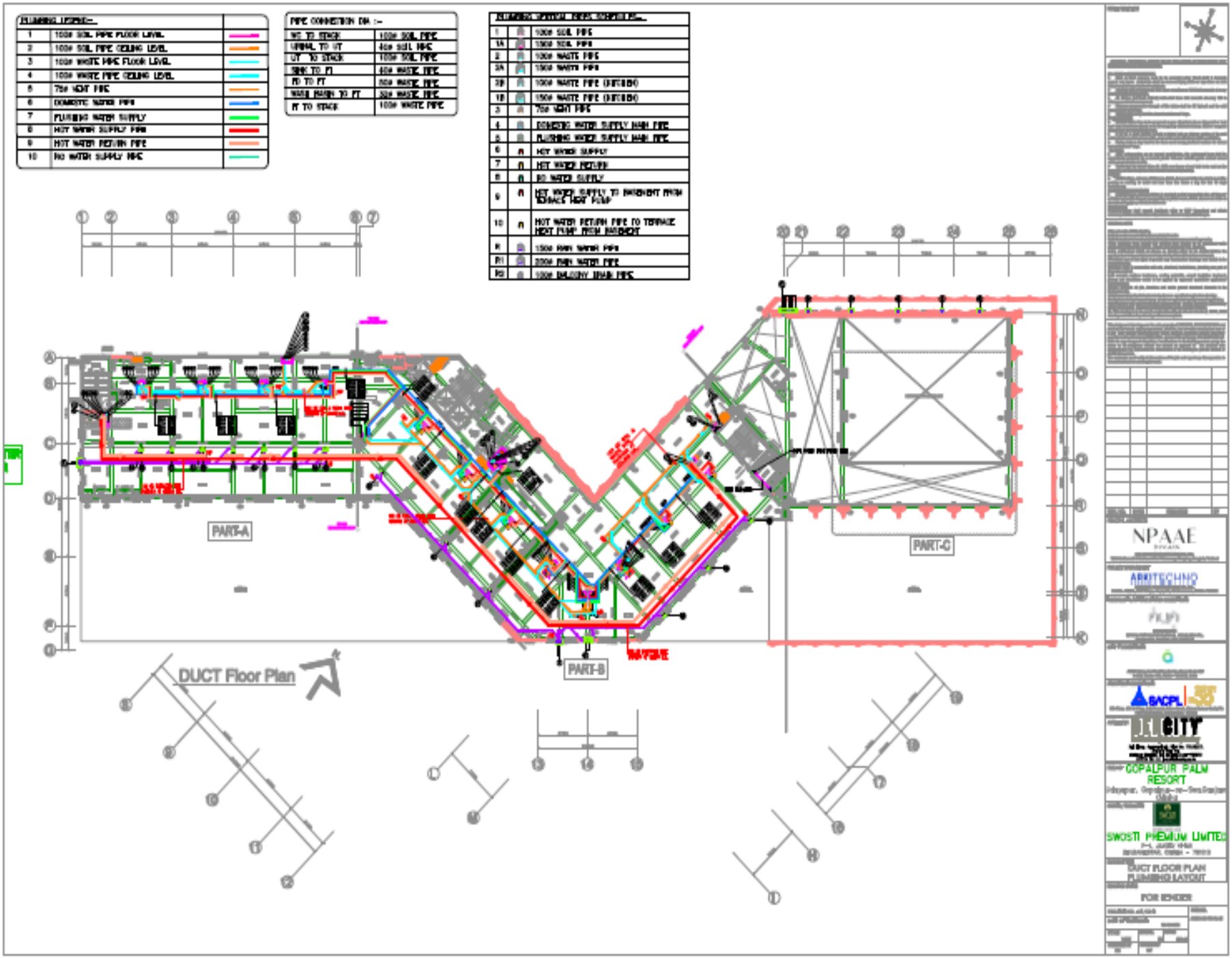
ARCHITECHNO

GOPALPUR PALM RESORT

SWOSTI PREMIUM LIMITED

9TH FLOOR PLAN PLUMBING LAYOUT

FOR TENDER

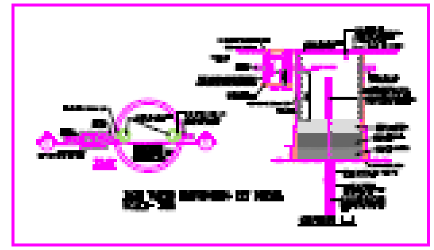

PART-A
PART-B
PART-C
DUCT Floor Plan
NPAAE
ARKITECHNO
BACPL
DLF CITY
GOPALPUR PALM RESORT
SWOSTI PREMIUM LIMITED
DUCT FLOOR PLAN
PLUMBING LAYOUT
FOR TENDER

PLUMBING LEGENDS:-		
1	100Ø SOIL PIPE FLOOR LEVEL	
2	100Ø SOIL PIPE CEILING LEVEL	
3	100Ø WASTE PIPE FLOOR LEVEL	
4	100Ø WASTE PIPE CEILING LEVEL	
5	75Ø VENT PIPE	
6	DOMESTIC WATER PIPE	
7	FLUSHING WATER SUPPLY	
8	HOT WATER SUPPLY PIPE	
9	HOT WATER RETURN PIPE	
10	RO WATER SUPPLY PIPE	

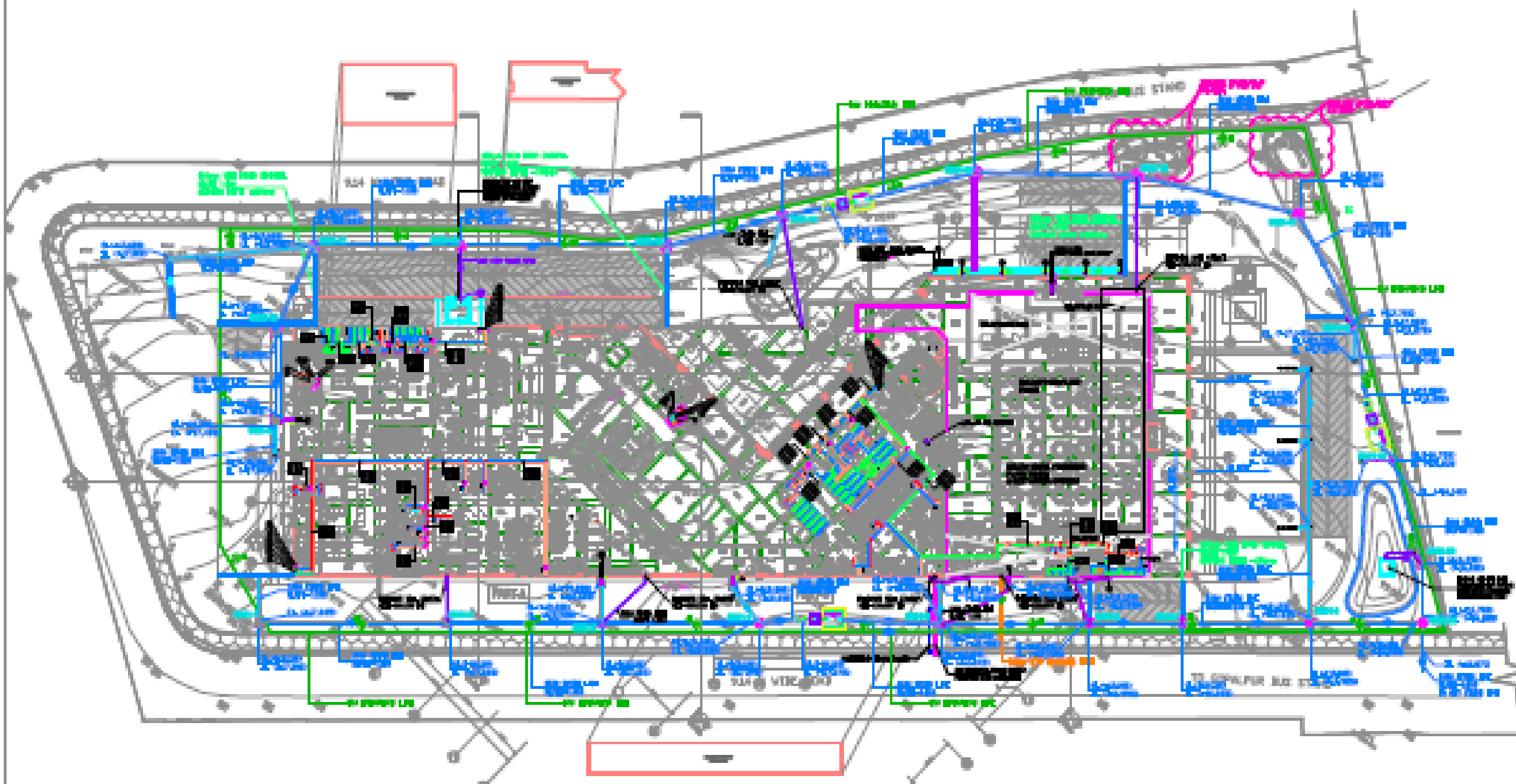
PIPE CONNECTION DIA :-	
WC TO STACK	100Ø SOIL PIPE
URINAL TO IT	40Ø SOIL PIPE
IT TO STACK	100Ø SOIL PIPE
SINK TO FT	40Ø WASTE PIPE
FD TO FT	50Ø WASTE PIPE
WASH BASIN TO FT	32Ø WASTE PIPE
FT TO STACK	100Ø WASTE PIPE

PLUMBING VERTICAL PIPE SCHEDULE:-		
1		100Ø SOIL PIPE
1A		100Ø SOIL PIPE
2		100Ø WASTE PIPE
2A		100Ø WASTE PIPE
2B		100Ø WASTE PIPE (KITCHEN)
1B		100Ø WASTE PIPE (KITCHEN)
3		75Ø VENT PIPE
4		DOMESTIC WATER SUPPLY MAIN PIPE
5		FLUSHING WATER SUPPLY MAIN PIPE
6		HOT WATER SUPPLY
7		HOT WATER RETURN
8		RO WATER SUPPLY
9		HOT WATER SUPPLY TO BASEMENT FROM TERRACE HEAT PUMP
10		HOT WATER RETURN PIPE TO TERRACE HEAT PUMP FROM BASEMENT
R		100Ø RAIN WATER PIPE
R1		200Ø RAIN WATER PIPE
R2		100Ø BALCONY DRAIN PIPE

S.N.	STORM LEGENDS:-	
01	100X100 CUTOUT & 75mm DRAIN PIPE	
02	STORM LINE	
03	TERRACE STROM WATER LINE	
04	CATCH BASIN	
05	STORM MANHOLE	
06	TERRACE RAIN WATER MANHOLE	
07	DESILTING CHAMBER	



S.N.	IRRIGATION SUPPLY LEGENDS:-	
01	IRRIGATION LINE	
02	GARDEN HYDRANT	GH



NPAAE

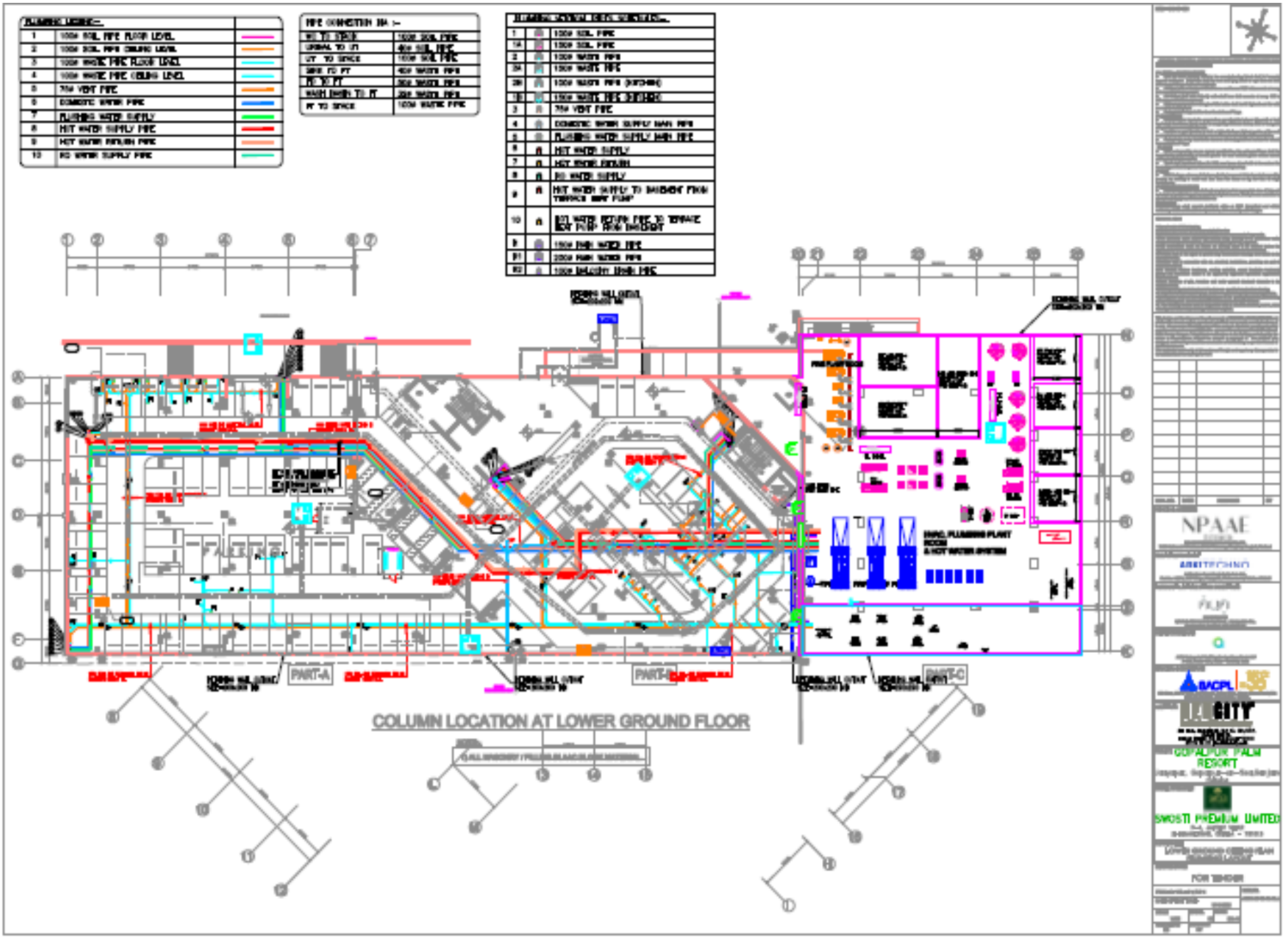
ARKITECHNO

GOPALPUR PALM RESORT

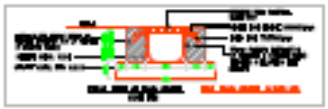
SWOSTI PREMIUM LIMITED

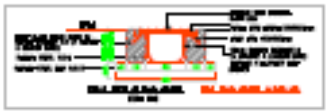
GROUND FLOOR PLAN PLUMBING LAYOUT

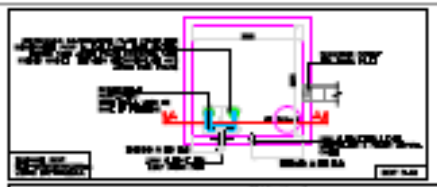
FOR TENDER

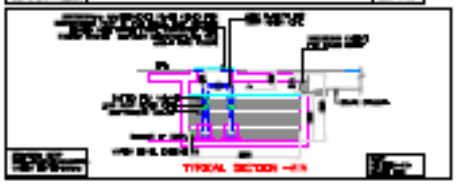

PART-A
PART-B
PART-C
COLUMN LOCATION AT LOWER GROUND FLOOR
NPAAE
GOPALPUR PALM RESORT
SWOSTI PREMIUM LIMITED

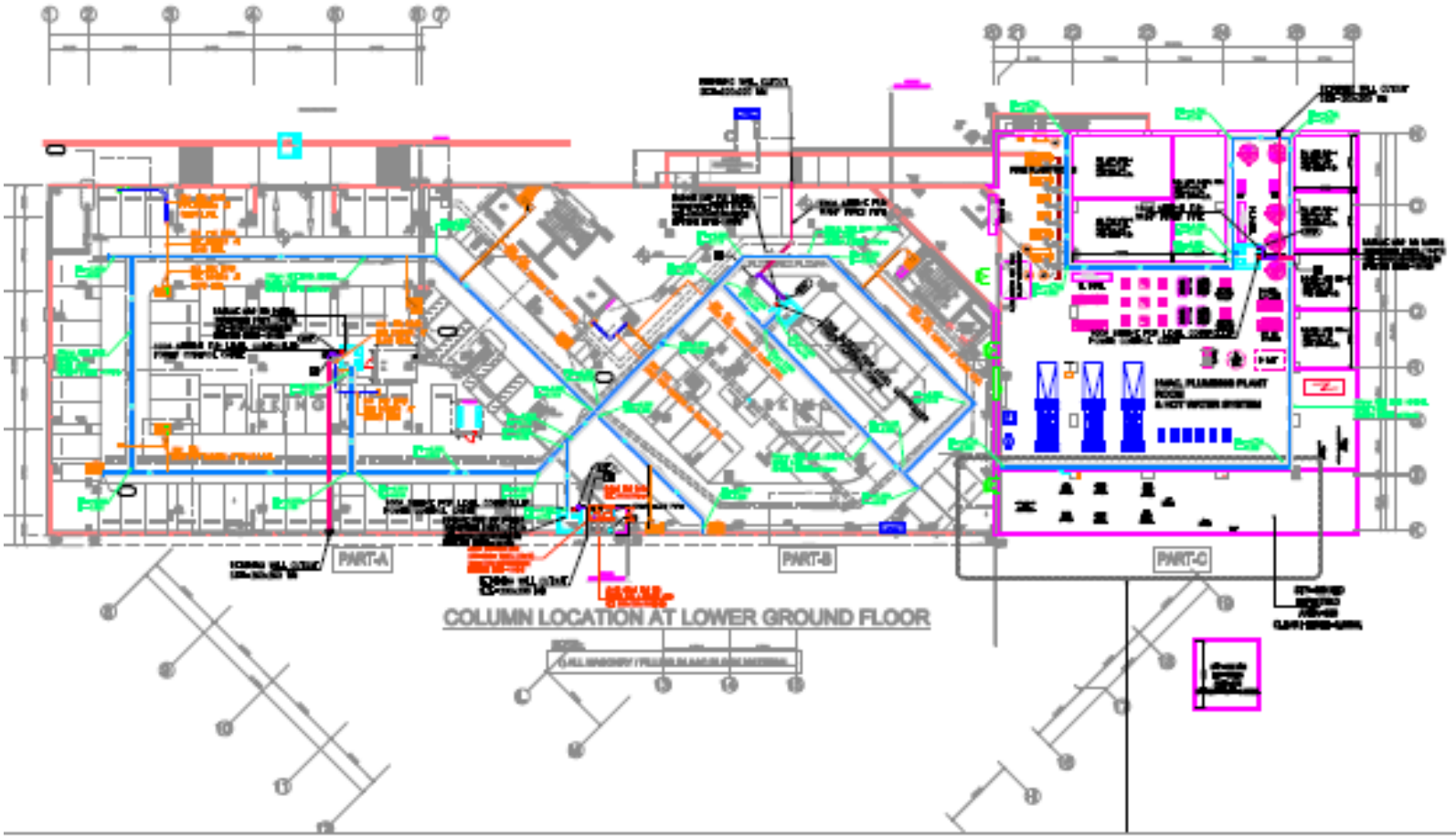
PLUMBING LEGEND:-	
SRP	150ø SLEEVE FOR SUMP RISER PIPE
SRP	150ø VERTICAL SUMP RISER PIPE
CSS	100ø SLEEVE FOR LEVEL CONTROLLER & CABLE



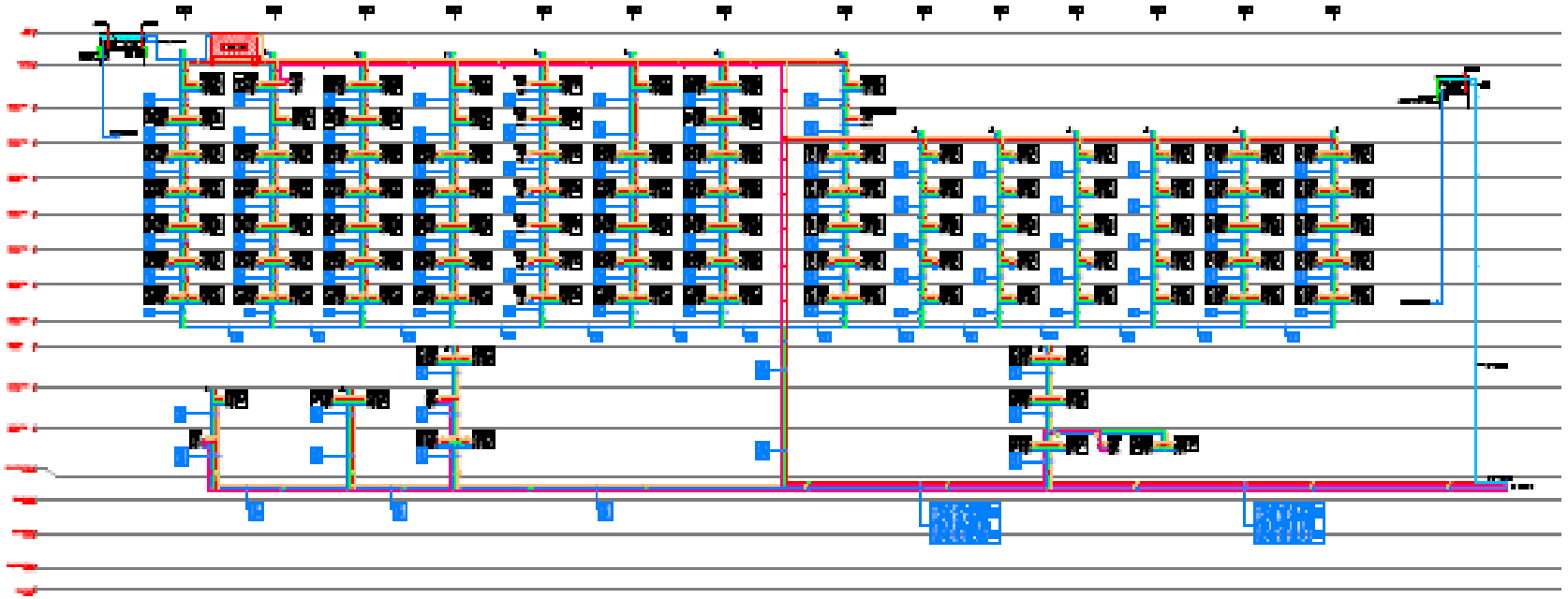


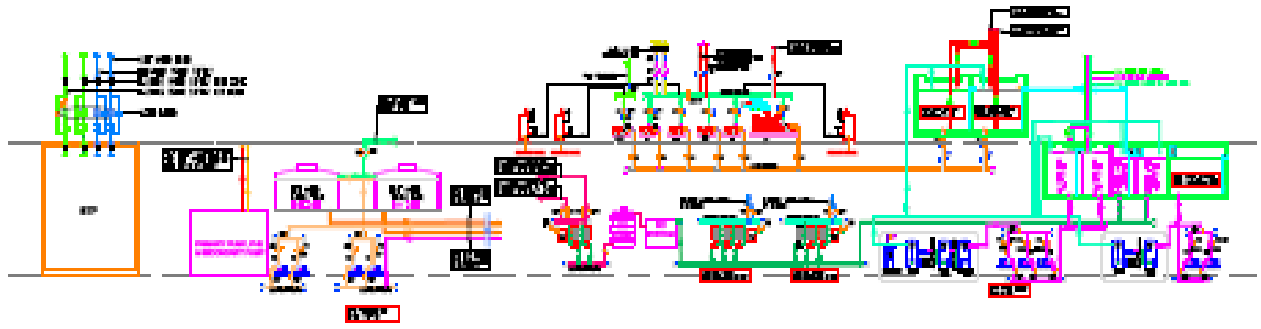


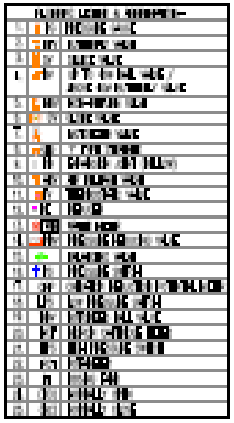


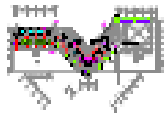


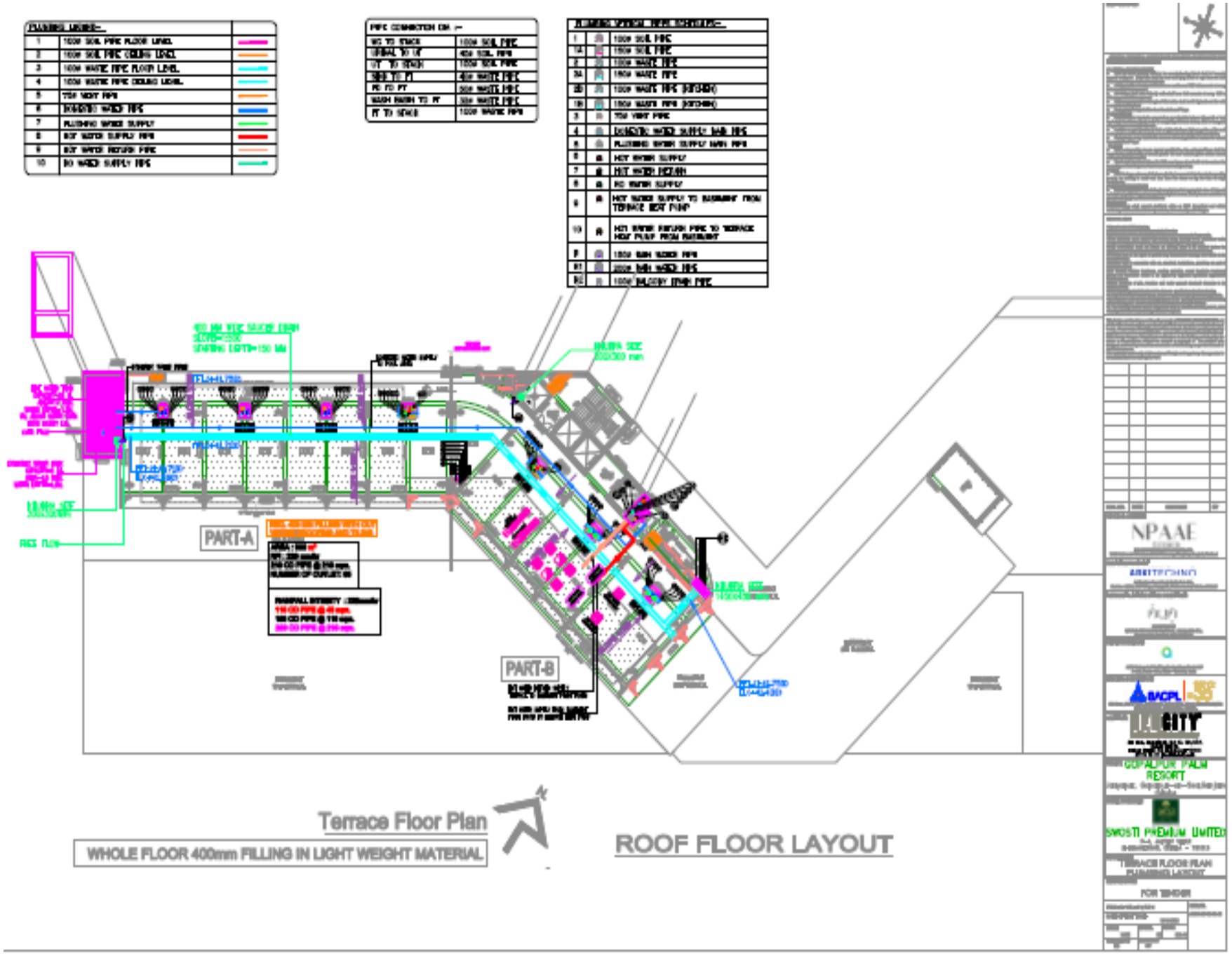
COLUMN LOCATION AT LOWER GROUND FLOOR

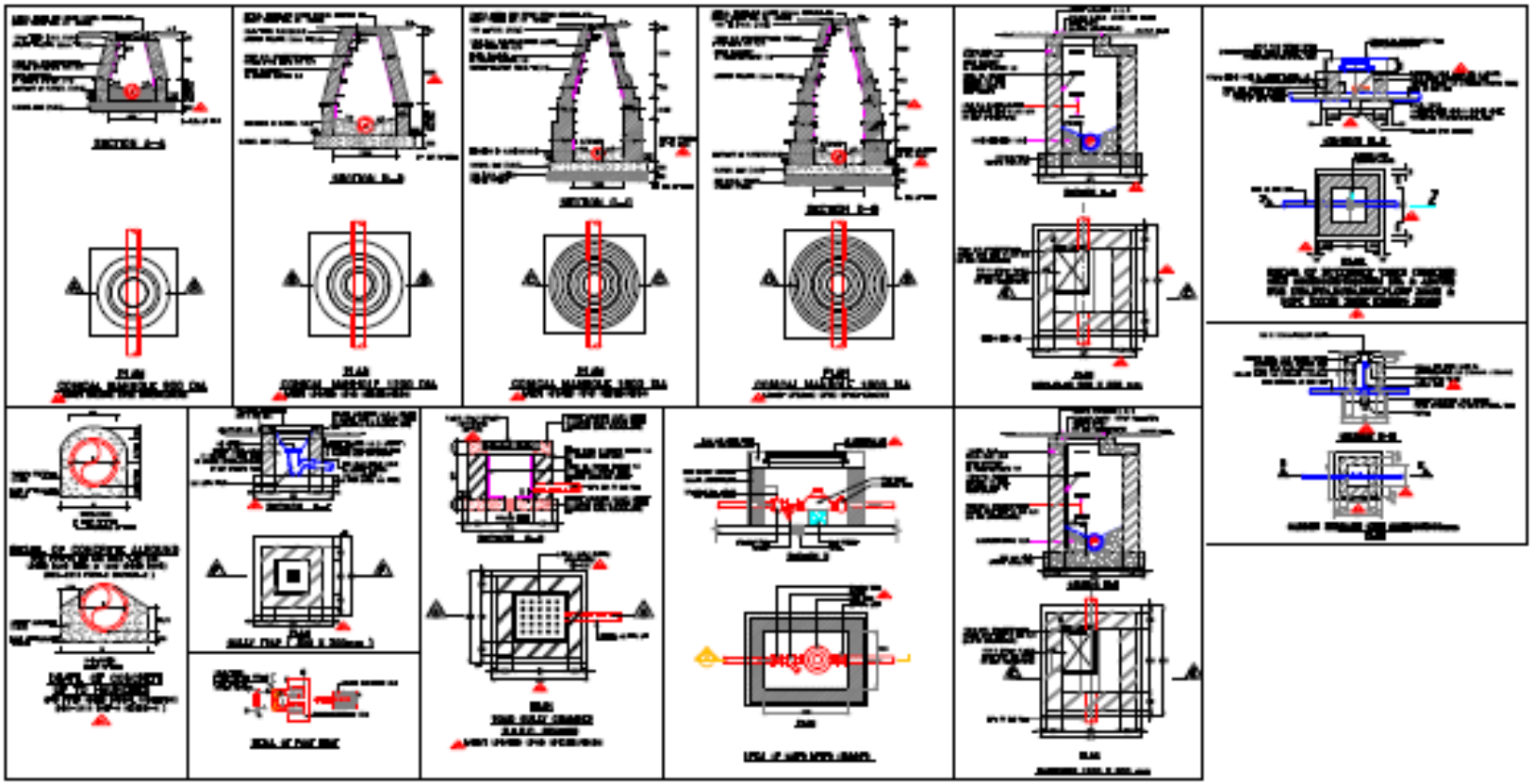


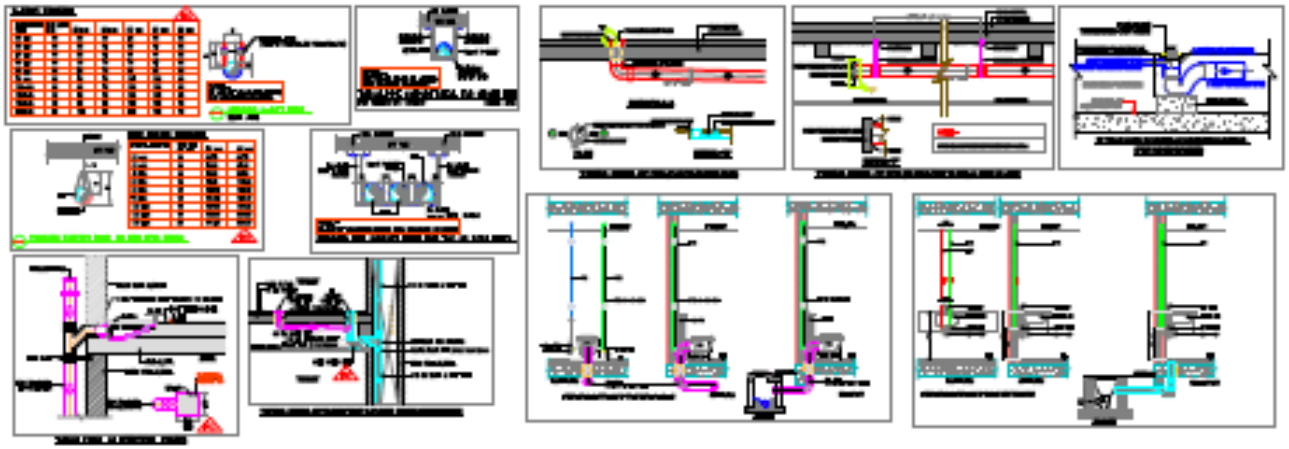







PART-A
PART-B
Terrace Floor Plan
WHOLE FLOOR 400mm FILLING IN LIGHT WEIGHT MATERIAL
ROOF FLOOR LAYOUT
NPAAE
GOPALPUR PALM RESORT
SWOSTI PREMIUM LIMITED
TERRACE FLOOR PLAN
FOR TENDER






NPAAE
SACPL
SWASTI PREMIUM LIMITED
TYPICAL DETAIL
PLUMBING LAYOUT
FOR TENDER

SECTION-4

FINANCIAL PROPOSAL SUBMISSION FORM

(To be submitted in separate sealed Envelop)

{Location, Date}

To

The General Manager (Communications)
Swosti Premium Ltd.
Gopalpur Palm Resort Project
Email: gm.communications@swostihotels.com ear Sirs:

We, the undersigned, offer to provide the services for "Supply, Installation, Testing & Commissioning of Plumbing Works-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd., Gopalpur, Ganjam, on a Item Rate Contract Basis", in accordance with your Request for Proposal dated and our Technical Proposal.

"We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf will engage in bribery. We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act, 1988 (as updated from time to time)."

Our attached Financial Proposal is for the amount of {Indicate the corresponding to the amount(s) currency(ies)}{Insert amount(s) in words and figures}, *"excluding" of all indirect local taxes as in the Data Sheet.* The estimated amount of local indirect taxes is {Insert currency} {Insert amount in words and figures} which shall be confirmed or adjusted, if needed, during negotiations. {Please note that all amounts shall be the same as indicated above.

Our Financial Proposal shall be binding upon us subject to the modifications resulting from Contract negotiations, up to expiration of the validity period of the Proposal, i.e. before the date indicated in the Data Sheet.

We understand you are not bound to accept any Proposal you receive.

We remain,

Yours sincerely,

Authorized Signature {In full and initials}: _____ Name and Title of Signatory: _____

In the capacity of: _____ Address: ___
_____

E-mail:

BOQ FOR SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF PH (LOWER)

Item	Description	Unit	QTY	Rate	Amount
A.	**SANITARY FIXTURES & FITTINGS**				
	Note:				
i.	*Detail of Sanitary fixture are for the information of the Contractor, however model / makes of all sanitary fixture shall be selected by Architect / Interior designer / client and the same shall be binding for execution*				
Ii	*No additional all fixing cost shall be paid for change in type of sanitary fixture or fitting.*				
Iii	*Provision of extension piece, brackets, chair, nuts, bolts and all accessories as required for final connection of CP fitting shall be supplied and installed by the contractor accordingly at no extra cost (as required)*				
1	Fixing, testing and commissioning of **white vitreous China wall / Floor mounting type European water closet** with C.P. bolts, nuts, C.I. chair or other hanging arrangements, Bakelite / poly propylene seat & cover with C.P. including providing & fixing paint with two coats of enamel paint over a coat of primer, hinges & rubber buffers, C.P. brass screw, washer with all accessories. Including cutting & making good the walls, floors, slab wherever required.	Nos.	203		-
2	Fixing **3 Nos. support arms and backrest** to mounted on the track (vertically and laterally) for **for handicap toilets** complete as required	Set	3		-
3	Fixing, testing & commissioning of **concealed type cistern** with dual flush facility comprising of actuator button facia assembly providing including brass / SS screws and washer complete, protection cover over cistern, cutting and making good the walls wherever required.	No.	203		-
4	Fixing, testing and commissioning of C.P. **health faucet** for ablution and flexible hose 1 m long connection with C.P. holder for hand spray complete in all respects.	No.	203		-
5	Fixing water closet squatting pan **(Indian type W.C.pan)** with 100 mm sand cast Iron P or S trap, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever) conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls andfloors wherever required: White Vitreous china Orissa pattern W.C. pan of size 580x440 mm with integral type foot rests.	No.	0		-

6	Fixing, testing & commissioning of **exposed type cistern** with dual flush facility comprising of actuator button facia assembly providing including brass / SS screws and washer complete, cutting and making good the walls wherever required.	No.	0		-
5	Fixing, testing and commissioning of first quality **white vitreous china Wall mounted / oval / round / square wash basin** (size as per architectural drawing) for above counter, under counter mounting, specially fabricated CI / MS brackets, painted with two or three coats of enamel paint of approved shade over a coat of primer, 32 mm CP brass waste and CP brass cast bottle trap and pipe to wall with CP brass flange and rubber adopter for waste connection complete including filling gap between counter and wash basin with approved type silicon sealant, cutting and making good the walls wherever required.	No.	233		-
6	Fixing, testing and commissioning 15 mm dia. C.P.Brass **Single lever wash basin mixer** with accessories in wash basins.	No.	233		-
7	Fixing, testing and commissioning of Stainless **Steel Sink with drain board** plug complete as required.	No.	31		-
8	Fixing, testing and commissioning of C.P. brass wall / counter mounted **sink mixer** with C.P. wall flange, overhead swinging spout complete as required and making good.	No.	31		-
9	FIxing of **waste connection** for wash basin incluind rubber adeptor and all necessary arrangement	No.	259		-
10	Fixing **S.S. toilet paper holder** with top flab , preferably spring loaded along with all required screw complete.	No.	203		-
11	Fixing **C.P. brass twin coat hook / rob hook** with PVC rawl plug & C.P. brass screw complete as required.	No.	203		-
12	Fixing **liquid soap dispenser** with PVC rawl plug & C.P. brass screw complete as required.	No.	25		-
13	Fixing, testing and commissioning of **C.P. brass angle valve** with C.P. wall flange, Nut and Washer etc. complete as required.	No.	768		-
14	Fixing, testing and commissioning of C.P **Copper connection 450 mm long** including nuts and washers and making connection to fixtures and fittings complete **as required.**	No.	565		-
15	Fixing, testing and commissioning of complete **shower assembly** comprising the following, including making cutting and making good the walls wherever required a) Shower **wall mixer with diverter** with provision of spout, C.P overhead shower complete with long bend pipe of 115mm and telephonic hand shower b)Overhead **rain shower** with revolving joint and shower	No.	139		-

	arm with wall flange c) Telephonic **Hand Shower** with flexible 1.5 m flexible hose, hook and all accessories.				
16	Fixing, testing and commissioning of Inbuild **Bath Tub** complete with all accessories including bath tub spout, mixer, flexible connection and waste & overflow assembly with AAV for Bath Tub Etc.complete with all accessories.	No.	6		-
17	Fixing of **S.S. soap dish** with PVC rawl plug & C.P. brass screw complete as required.	No.	145		-
18	Fixing **S.S Towel Ring / towel stand** with PVC rawl plug & C.P. brass screw complete as required.	No.	139		-
19	Fixing **S.S Towel Rail** with PVC rawl plug & C.P. brass screw complete as required.	No.	139		-
20	Fixing and Testing **Pillar Trap** wall flange (as required) and making good as required.				
20.1	Long Body (Janitor Sink)	No.	3		-
21	Fixing, testing and commissioning of solid state, no touch operating, fully **hygienic hand drier** of approved shade with double blower, continuous repeat usage, time delay, summer & winter control 'including providing necessary brackets, cable from drier to Plug, Plug to key and lock etc. complete as required.	No.	14		-
22	Fixing, testing and commissioning of white viterous china **Janitor sink** of size 470 x 370 x 180mm deep supported CI/MS brackets duly painted, C.P. cast brass bottle trap with extension piece, rubber adopter, wall flange, union, C.P. brass chain rubber plug complete as required.	No.	3		-
	_				
23	Fixing, testing and commissioning of **white vitreous china flat back urinal with urinal sensor** comprising of all plumbing, CP brass flush pipe with CP brass elbow, CP brass waste , CP cast brass bottle trap with extension piece, CP brass spreader, CP wall flange and any other item required to provide satisfactory functioning. Including necessary wall cutting / chasing and making good, as required with battery operated automatic urinal flushing systems for urinal flushing complete as mentioned above as per direction of Engineer-Incharge.	No.	34		-
24	Fixing, testing and commissioning of white vitreous china large **urinal partition** including providing & fixing concealed CI bracket, cutting and making good.	No.	26		-
26	Providing and fixing Water cooler (with RO & UV, Cooling capacity 80Ltr./hr.) 120 Ltr Storage Capacity made of pure Stainless steel body, without rusting , without corrosion. including externallly mounted thermostat to make it easy to set water temperature, wth extra large SS wate tray prevent spalashing and ensures fast drainage of water ,	NO.	0		-

	aoto cut facilitie , over load compressor protection, electricl supply internal wiring etc. complete as per directions of Engineer-Incharge				
	TOTAL CARRIED TO SUMMARY				**-**
B.	**WATER SUPPLY (INTERNAL)**				
	-	-			
1	Providing and fixing of **PERT(Polyethylene raised temperature) Pipes** as per PN-16 in accordance with SO 10508,PERT Grade-2 for Hot and Cold water application with corresponding hot fusion welded PERT fittings in PN-16 like Tee's,Elbows, Sockets, Reducers,Unions, brass adaptors (both male female) etc. conforming to ISO 10508 standards. Further all termination points should be brass fittings only for connection with faucets. Installation guidelines should be strictly followed as per the company's technical literature. Further the system should bear a maximum pressure of 16 Bar at 20 Degree centrigrade and a pressure of 5 Bar at 95 degree centrigrade**.(Note :- Concealed pipe Inside the toilets for Domestic, Flsuhing, Hot water supply & return)**				
1.1	15mm	RM	8795		-
1.2	20mm	RM	1505		-
1.3	25mm	RM	400		-
1.3	32mm	RM	85		-
1.3	40mm	RM	20		-
1.3	50mm	RM	0		-
2	Providing, fixing, jointing and testing in position **C-PVC (Chlorinated Poly Vinyl Chloride)** of approved manufacturer for water supply pipes and fittings as per CTS SDR - 11 pipes at a working pressure of of 22.50 kg /sq.cm at 23 deg C and 5.5 kg/sq.cm at 82 deg.C using moulded CPVC fittings e.g Tees, Elbows, Couplers, Unions, Reducers, Adapters, Bushings etc. including transition fittings connection between CPVC & metal pipe / GI with Brass Adaptors (Both Male & Female threaded) conforming to ASTM D-2846 with only CPVC solvent cement conforming to ASTM F-493 with fabricated & subsequently rubber line bracket, hot dip galvanized clamps (2 coats of enamel paint) supports as required / directed at site including cutting and fixing the same with anchor fastners, including painting the exposed pipes with one coat of desired shade of enamel paint. All termination points for installation shall have brass termination fittings. The rates to include for chasing in brick masonry with wire				

	mesh / PCC for internal water supply pipes and making good the same in 1:4 cement mortar, cleaning the debris and carting outside the site premises. **(For :- Domestic, Flsuhing, Hot water supply & return Pipe running on Cieling, Within shaft & Terrace)**				
2.1	15 mm Nominal size / 15.90 mm OD / 12.44 mm ID (min. wall thickness - 1.70 mm)	RM	1515		-
2.2	20 mm Nominal Size / 22.20 mm OD / 18.14 mm ID (min. wall thickness - 2.00 mm)	RM	1182		-
2.3	25 mm Nominal Size / 28.60 mm OD / 23.42 mm ID (min. wall thickness - 2.59 mm)	RM	1250		-
2.4	32 mm Nominal Size / 34.90 mm OD / 28.54 mm ID (min. wall thickness - 3.18 mm)	RM	1006		-
2.5	40 mm Nominal Size / 41.30 mm OD / 33.78 mm ID (min. wall thickness - 3.76 mm)	RM	860		-
2.6	50 mm Nominal Size / 54.00 mm OD / 44.20 mm ID (min. wall thickness - 4.90 mm)	RM	601		-
2.7	65 mm Nominal Size (SCH-40)	RM	562		-
2.8	80 mm Nominal Inner Dia Sch 40 pipes	RM	150		-
2.9	100 mm Nominal Inner Dia Sch 40 pipes & sch 80 fittings	RM	140		-
2.10	150 mm Nominal Inner Dia Sch 40 pipes & sch 80 fittings	RM	50		-
3	Providing and fixing **nitrile rubber insulation on hot water supply** / return pipes. **(Note :- Concealed pipe Inside & Outside the toilets for Hot water supply & return)**				
3.1	15 mm dia (9 mm thickness)	RM	5641		-
3.2	20 mm dia (9 mm thickness)	RM	1242		-
3.3	25 mm dia (13 mm thickness)	RM	683		-
3.4	32 mm dia (13 mm thickness)	RM	565		-
3.5	40 mm dia (13 mm thickness)	RM	285		-
3.6	50 mm dia (13 mm thickness)	RM	225		-
3.7	65 mm dia (19 mm thickness)	RM	170		-
3.8	80 mm dia (19 mm thickness)	RM	80		-
3.9	100 mm dia (19 mm thickness)	RM	0		-

3.10	150 mm dia (19 mm thickness)	RM	QR		-
4	Providing and fixing proprietary polyshield outer mechanical protection on nitrile rubber insulation with aluminium cladding comprising of wrapping with poly glass tape helically wound and subsequently applying 2 coats of polyshield material (resin & hardener) as per manufacturers specification and approved by Project Manager / Consultants **(Note :- Qty considred for ceiling, Vertical shaft & Terrace)**				
4.1	15 mm dia (9 mm thickness)	RM	996		-
4.2	20 mm dia (9 mm thickness)	RM	597		-
4.3	25 mm dia (13 mm thickness)	RM	473		-
4.4	32 mm dia (13 mm thickness)	RM	553		-
4.5	40 mm dia (13 mm thickness)	RM	383		-
4.6	50 mm dia (19 mm thickness)	RM	223		-
4.7	65 mm dia (19 mm thickness)	RM	170		-
4.8	80 mm dia (19 mm thickness)	RM	20		-
4.9	100 mm dia (19 mm thickness)	RM	0		-
4.10	150 mm dia (19 mm thickness)	RM	QR		-
5	Providing, fixing, testing and commissioning of **full way lever operated forged brass ball valve** conforming to IS:1703 of brass body with forged brass hard chrome-plated steel ball tested to a pressure not less than 16 Kg / sqcm with threaded / flanged joints complete with nuts, bolts, gaskets, washers etc.				
5.1	15 mm dia	Nos.	280		-
5.2	20 mm dia	Nos.	294		-
5.3	25 mm dia	Nos.	66		-
5.4	32 mm dia	Nos.	27		-
5.5	40 mm dia	Nos.	31		-
6	Supply & fixing in position ISI marked **cast iron double flanged butterfly valves** (PN 16) as per IS:13095, with SS disc, shaft, seating rings, internal fastening, nitrile rubber lining, nuts, bolts including transporting to worksite, 3 mm thick rubber gaskets etc. including testing, Complete as per drawings & directions of the Engineer-in-charge.				
6.1	50 mm dia	Nos.	11		-

6.2	65 mm dia	Nos.	4		-
6.3	80 mm dia	Nos.	2		-
6.4	100 mm dia	Nos.	1		-
6.5	150 mm dia	Nos.	1		-
7	Providing & fixing **bronze globe valve** with Bronze, body, disc & stem union flanges, washer nuts & bolts rated to a temperature of 85 Deg C & suitable for pressure not less than 16 kg/sqcm including covering with nitrile rubber insulation.				
7.1	15 mm dia	Nos.	279		-
7.2	20 mm dia	Nos.	6		-
7.3	25mm dia	Nos.	12		-
7.4	32mm dia	Nos.	3		-
7.5	40mm dia	Nos.	1		-
7.6	50mm dia	Nos.	1		-
7.7	65mm dia	Nos.	0		-
7.8	80mm dia	Nos.	QR		-
8	Providing ,fixing, testing and commissioning of Forged Brass / Bronze in **pressure reducing valve along with** 1 Nos of butterfly / ball of following dia .The complete system is tested to a pressure not less than 16 kg/cm2 and suitable to reduce the pressure as desired including flanges/unions, nuts, bolts and washers complete as required for application. (horizontal or vertical as applicable).				
8.1	15 mm dia	Nos.	QR		-
8.2	20 mm dia	Nos.	QR		-
8.3	25 mm dia	Nos.	QR		-
9	Providing & fixing gun metal / Bronze **non – return valve** of approved make with union / flange, washer, nuts & bolts. Rated to temperature of 85 Deg C and tested to a pressure not less than 16 Kg/Sq.cm. Including nitrile rubber insulation with proprietary fire proof protective coating against mechanical damage as per manufacturer's specification.				
9.1	15 mm dia	Nos.	279		-

9.2	20 mm dia	Nos.	6		-
9.3	25 mm dia	Nos.	12		-
9.4	32mm dia	Nos.	3		-
9.5	40mm dia	Nos.	1		-
9.6	50mm dia	Nos.	1		-
9.7	65mm dia	Nos.	0		-
9.8	80mm dia	Nos.	QR		-
10	Providing, fixing, testing and commissioning of **brass / bronze single acting air release valve** of approved quality with bolts, nuts, rubber insertion, tail pieces, tapers, with ball valve etc. as required complete.				
10.1	25 mm nominal bore	No.	54		-
11	Providing and fixing **water hammer arrestor** for water supply with isolation valve having screwed connection and tested to a pressure not less than 16 kg/cm2 including flanges/unions, nuts,bolts and washers complete as required for application. (horizontal or vertical as applicable).				
11.1	15 mm nominal bore	No.	QR		-
11.2	20 mm nominal bore	No.	QR		-
11.3	25 mm nominal bore	No.	QR		-
11.4	32 mm nominal bore	No.	QR		-
12	Providing ,fixing, testing and commissioning of IP 67 (Weather Proof /Aluminum casing with positioner to indicate the valve position with key type manual overdrive) **Motorized Butterfly valve / Ball valve** of following dia with limit switch arrangement for filling of over head water tank complete with high and low level float type sensors to control the valve .The sensors shall be installed in over head tanks. The sensors will close the valve when water level is high in over head tank and open the valve when over head water tank level is low. The system should be complete in all respects with control panel indicating the position of valve i.e. open /closed with pressure switches at pump discharge, accessories like wiring / conduting / flanges, nut bolts etc.				
	NOTE :- All the control switchgears, connections, wiring, integration etc. should be included in the quote. No additional payment shall be charge for any work against this item.				

12.1	25 mm dia	No.	1		-
12.2	50 mm dia	No.	1		-
13	Providing & fixing digital type water meter along with direct reading dial in KL in all internal parts in gunmetal or brass, Ball Valve / butterfly valve, strainer, flanged distance piece for easy removal in future, including necessary test certificate for the meter from local municipal authorities.				
13.1	25 mm dia (RO Water Supply High & Low Zone)	Set	2		-
13.2	32 mm dia	Set	QR		-
13.3	40 mm dia (Hot Water Return Low Zone, Irrigation water supply)	Set	2		-
13.4	50 mm dia (Hot Water Supply High Zone,Soft water OHT Filling)	Set	2		-
13.5	65 mm dia (Hot water supply Low Zone, Flushing Water Supply Low & High Zone)	Set	3		-
13.6	80 mm dia (Municipal,Tanker, Hot Water Return High Zone & Domestic Water Supply Low zone)	Set	4		-
13.7	100 mm dia (Domestic water pump outlet High Zone)	Set	1		-
14	Providing manhole cover with DI 80- 120 kg (Double Seal) weight with following the required IS code . (Fot OHT tanks)				
14.1	Heavy duty, HD-20 grade designation - 560 mm Dia	No.	3		-
	TOTAL CARRIED TO SUMMARY				**-**
C.	**INTERNAL DRAINAGE & SEWAGE SYSTEM**				
1	Supply, installation , testing commissioning of **PP Mineral** filled low noise Soil & Waste system as per EN 12056, with density 1.9 g/cm3. PP mineral filled Low noise system should has a B1 fire classification according to EN 4102. Product should have a chemical resistance of pH 2-12 and is a complete sound protection system according to DIN 4109. including with push fit rubber ring sockets all necessary fittings and specials such as Bends, junctions, offsets & vent cowl. Fixing at wall/ceiling level supported by bracket & hangers etc. duly epoxy coated. Cutting, chases/holes in floors / walls / slab.				
	Providing MS pipe sleeves of suitable higher size wherever pipes crossing a fire rated wall / floor slab and sealing of space around pipe and pipe sleeve with glass wool in between and fire proof sealant at either end to the satisfaction of the Project Manager / Consultants and making good the same after pipes have been duly laid and testing complete.				

1.1	160mm Pipe (min. wall thickness - 5.3 mm)	RM	905		-
1.2	110mm Pipe (min. wall thickness - 5.3 mm)	RM	2460		-
1.3	75mm Pipe (min. wall thickness - 4.5 mm)	RM	1240		-
2	Supply, installation , testing commissioning of **PP Mineral filled low noise Soil & Waste system as per EN 13501-1 s2 d3.** PP mineral filled Low noise system should has a B2 fire classification according to EN 4102-2. Product should have a chemical resistance of pH 2-12 and is a complete sound protection system according to DIN 4109. including with push fit rubber ring sockets all necessary fittings and specials such as Bends, junctions, offsets & vent cowl. Fixing at wall/ceiling level supported by bracket & hangers etc. duly epoxy coated. Cutting, chases/holes in floors / walls / slab.				
2.1	32 mm dia.	RM	750		-
2.2	40 mm dia.	RM	85		-
2.3	50mm Pipe	RM	1130		-
3	Providing, fixing, jointing and testing **Low Noise polypropylene trap of self cleansing** design with or without vent, jointing with push fit rubber ring socket fittings complete, cutting chases / hole in floors / slabs and bringing the same in proper condition and shape after placing the trap in right position in case of suspended / open plumbing or setting the trap in 1:2:4 CC in case of concealed plumbing , etc. complete, as required. The trap shall be of following sizes: Temporary airtight PVC cover to be provided to prevent dirt entry.				
	-				
3.1	P-Trap type Floor Trap 110 x 110 mm (50 mm water seal)	No.	220		-
	-				
3.2	S-Trap type Floor Trap 110 x 110 mm (50 mm water seal)	No.	QR		-
	-				
3.3	Multi-Floor Trap 110 x 110 mm (50 mm water seal)	No.	QR		-
4	Providing, fixing, testing & commissioning mineral reinforced **polypropylene inlet fitting** with maximum 3 inlets 32, 40 & 50 OD size, fixed to traps including solvent weld joint/rubber ring joint complete with all civil work. **(Floor Drain)**	No.	433		-
5	Providing & fixing combination of **110 x 110 mm elbow and 110 x 50 mm ecentric reducer Polypropylene waste** with extension piece, elbow & nipple cutting chases, the floor / slab, repairs complete as required and connection to floor trap	No.	220		-
6	Providing and fixing Heavy class **SS grating** of approved design including setting in floor with cement motor to match with floor finish as per architect requirement suitable for waster and FT & FD.				

6.1	Size 100 mm x 100 mm	No.	433		-
6.2	Size 125 mm x 125 mm	No.	626		-
7	Providing and fixing Heavy class **SS grating with cockroach trap** of approved design including setting in floor with cement motor to match with floor finish as per architect requirement.				
7.1	Size 100 mm x 100 mm	No.	QR		-
7.2	Size 125 mm x 125 mm	No.	27		-
8	Providing and fixing **PP access pipe (cleanout plug)** with opening arrangements for soil / waste pipe and other necessary fittings including jointing, all complete as per standard detail.				
8.1	For 160 mm dia pipe	No.	26		-
8.2	For 100 mm dia pipe	No.	54		-
9	Providing and fixing **PP access pipe (Floor cleanout plug)** with opening arrangements for soil / waste pipe and other necessary fittings including jointing, all complete as per standard detail.				
9.1	For 160 mm dia pipe	No.	QR		-
9.2	For 100 mm dia pipe	No.	6		-
10	Providing, fixing, jointing and testing in position of ISI marked UV stabilized **UPVC pipes for rain water,Type-B** as per IS : 13592 suitable for rubber ring joints, including all necessary specials and fittings (confirming to IS:14735) i.e. bends, tees,clean out plug, junctions (with or without doors), reducers, couplers, clamps, hangers, rubber rings, gratings over pipes of bell mouth construction with epoxy painting for terrace and C P Grating for intermediate balcony, fixing at wall / ceiling / floor level supported by clamp & hangers etc. inside duct / suspended from floor under false ceiling. The rubber ring shall confirm to IS:5382.				
	The Pipes will be supported by either rubber lined G.I. U strap clamps on 40x40x3 mm MS slotted angle duly painted (for a group of pipes) or G.I. rubber lined split clamp (for independent pipes). The cost will include all support arrangements with any minor chasing/chopping/civil mansory work. commissioning of all pipes lines as per drawings and specifications and as directed by engg-in-charge at site.(RAIN WATER)				
10.1	200 mm dia (Wall Thickness - 4.0 to 4.6 mm)	RM	370		-
10.2	160 mm dia (Wall Thickness - 4.0 to 4.6 mm)	RM	450		-

10.3	110 mm dia (Wall Thickness - 3.2 to 3.8 mm)	RM	490		-
11	**Rain water 'Khurras'** as required depth with lead flashing around the pipe & 150mm beyond the Khurra with one piece lead sheet of 3 mm thick set in a layer of cold bitumen. Including Heavy duty CI/MS grating as per drawing complete as required.	No.	4		-
12.0	Providing & fixing **CI grating** to the inlet mouth of rain water drainagepipes as per approved data sheet/drawings.				
12.1	210 mm dia/Square	Each	7		-
12.2	160 mm dia/Square	Each	QR		-
13.0	Supply, installation, testing and commissioning of **GI pipes Class 'C' (heavy duty)** of approved make conforming to IS 1239-1982 complete with G.I. fittings heavy class such as tees, crosses, plugs, sockets, elbows, reducers, unions, sleeve pieces, check nuts etc including jointing (wherever required), clamps/structural steel supports as required/directed at site, cutting & making good the walls, floors, R.C.C. work etc. including cutting chases & filling the same. (The rate includes the cost of two coat of primer and two coat of enamel paint and pypcote wrapping for the underground pipe) **(For Sump riser)**				
13.1	100 mm dia	RM	60		-
13.2	80 mm dia	RM	QR		-
14.0	Supply, installation, testing commissioning of **Centrifugally Cast (Spun) Iron Pipes** and Fittings conforming to IS:3989-1984 including with Drip seal sealant jointing sockets, all fittings, i.e. bends, tees, crosses, access pieces, adaptors for connections to other materials, reducers, cowls, offsets, etc. Including providing MS structure of 50 x 50x 5 mm angle and fixing of rubber line bracket ,Fastner & hangers etc. duly painted both pipe and support with Bitumen paint. Cutting, chases/holes in floors / walls / slab complete in all respect. **(For Basement Drainage)**				
14.1	100mm Pipe	RM	40		-
15	Constructing **Grease Trap** of size as mentioned below of 1500 liquid depth in brick work of class 75 with cement mortar (1:6), inside plastering 16 mm thick with cement mortar 1:3 with floating coat ofneat cement and rough plaster on outside. Including aluminium bucket as per detail to collect the grease. RCC top slab with 2 nos. 600 x 600 mm dia medium duty, double seal manhole covers with frame (weight of covers & weight of frame 75 Kg), necessary 150 mm thick foundation concrete (1:2:4).				

15.1	2000mm x 1200mm x 1500mm	No.	1		-
	TOTAL CARRIED TO SUMMARY				**-**
D.	**EXTERNAL WATER SUPPLY**				
	-				
1	Providing, fixing, jointing and testing in position the following ISI marked centrifugally casted (spun) **Ductile iron** pressure pipes for water supply services with socket, spigot and flanged ends conforming to IS:8329 / 2000 for classification K9. Suitable for push on joints (rubber gasket D-jointing) and flange connection wherever required with all type of D.I.fittings. The pipes and fitting shall be internally lining with cement mortor and externally coating with zinc and bitumen paint as per IS:8329/2000. Fixing at wall/ceiling level supported by Galvanized angle,chanel,clamps, hangers etc. And G.I. Heavy class pipe sleeve of one size larger diameter shall be provided wherever the pipes are crossing the fire rated walls / floors ,slab and sealing the sleeves with glass wool in between and fire sealant compound at either ends, all as per Project Manager's / Consultant requirement. The item include cutting hole in wall, floor, slab and making good the same with required material. (Cost shall inclusive of excavation upto required depth, filling sand alround, consolidation each deposited layer by ramming, watering etc, backfilling and disposing of surplus excavated soil as directed by engineer in charge complete in all respect) **For Municipal Water and Tanker**				
1.1	80 mm dia	RM	130		-
1.2	100 mm dia	RM	QR		-
2	Providing and fixing uPVC agricultural pipes conforming to IS:4985 class IV (10 kg/cm2) including all fittings, e.g. couplings, tees, bends, reducers and screwed adaptors, solvent welded joint as per manufacturers' recommendations. Cost shall inclusive of excavation upto required depth, filling sand alround, consolidation each deposited layer by ramming, watering etc, backfilling and disposing of surplus excavated soil as directed by engineer in charge complete in all respect. **(For :- Garden Hydrant)**				
2.1	25 mm OD	RM	QR		-
2.2	32 mm OD	RM	QR		-
2.2	40 mm OD	RM	530		-
2.3	50 mm OD	RM	QR		-

3	Constructing **brick masonry Valve Chamber Chamber** with F.P.S. bricks in cement mortar 1 : 4 (1 cement : 4 coarse sand) RCC top slab with 1:1.5:3 mix (1 cement : 1.5 coarse sand : 3 grade stone aggregate 20mm nominal size); foundation concrete 1:4:8 mix (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size) inside plastering 12 mm thick with cement mortar 1:3 (1cement : 3 coarse sand) finished with a floating coat of neat cement and making channels in cement concrete 1:2:4 (1cement : 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement complete with PVC encased 12 mm dia steel bar foot rests fixing with 20x20x10 cm cement concrete blocks 1:2:4, including fixing of SFRC MD-10 MH cover and frame in 150 mm thick cement concrete 1:2:4 (1cement : 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) including centering, shuttering, excavation, refilling and disposal of surplus earth as directed complete in all respects. (The cost of MH cover and frame is included)				
3.1	Inside size 300 x 300 mm & 500 mm deep	No.	19		-
3.2	Inside size 600 x 600 mm & 600 mm deep	No.	2		-
3.2	Inside size 1000 x 1000 mm & 1200 mm deep	No.	QR		-
4	Providing and fixing **ball valve (PN 10)** with hard chrome plated ball inside PTFE (Teflon) seat & ring with chrome plated centre handle withfemale BSP threads complete:in all respects.				
4.1	25mm dia nominal bore	No.	19		-
4.2	32mm dia nominal bore	No.	QR		-
4.3	40 mm dia nominal bore	No.	1		-
5	Providing and fixing cast iron **butterfly valves (PN 10)** nylon coated SG iron disk, stainless steelshaft, black nitrile rubber/EPDM seating 3mm asbestos gasket including nuts and bolts for flanged end connections complete .				
5.1	65mm dia nominal bore	No.	QR		-
5.2	80 mm dia nominal bore	No.	1		-
5.3	100 mm dia nominal bore	No.	1		-
6	Providing, fixing,testing and commissioning **water meter** with direct reading Dial in KL including strainer with all integral parts of Gun metal or brass with necessary fitting such as Threaded Pieces, union pressure gauge and isolation cock, flange piece for future removal, flanges/union complete with all necessary testing charge and obtaining Test Certificate from Municipal Authorities, on following size pipe line with 3 Nos. valve with by pass				

	arragement.				
6.1	40 mm dia for Irrigation Connection	Set	1		-
6.2	80 mm dia for Municipal Connection	Set	1		-
6.2	100 mm dia for Tanker filling connection	Set	1		-
7	Providing, fixing and effecting connection from Existing **Municipal Water** Supply line including necessary excavation & making good the same including cutting, boring and tapping the Existing line by providing and installing ferrule / Tee connections with necessary fittings as required and making good the same. The rate for this item also includes complete services from the contractor for liasoning works such as filing necessary applications, submission of forms for approval to the municipal authorities, depositing the fees / other amounts as required for getting the premises / installations, inspected and approved and all other formalities required till the water connection is obtained. All the expenses incurred in this regard shall be borne by the Contractor except for the official payments to be made for any security deposit etc which will be reimbursed on production of original voucher.	Job	1		-
	TOTAL CARRIED TO SUMMARY				**-**
E.	**EXTERNAL DRAINAGE AND SEWERAGE**				
1	Providing, fixing, jointing, testing and commissioning of **UPVC** conforming to IS : 15328-2000 with all fittings such as bends, tees, elbow. The wall thickness of pipe and technical characteristic conforms to IS : 15328-2000 type **SN 8**. The fitting dimension conforming to BS : EN 1401-1998. The jointing to be completed with rubber ring/solvent weld joint. Including lowering in trenches, laid to correct levels up to required depth including excavation in all kind of soil (hard / soft), dewatering, refilling, watering, ramming and removing the surplus excavated material and making good the same complete as required. testing of joints and connection with the respective manhole complete in all respects as per the direction of engineer incharge.. **(For :Storm Water & Sewerage)**				
1.1	110 mm dia **(STP Bypass)**	RM	15		-
1.1	160 mm dia	RM	25		-
1.2	200 mm dia	RM	170		-
1.3	250 mm dia	RM	195		-
1.3	300 mm dia	RM	0		-
1.4	400 mm dia	RM	0		-
1.4	450 mm dia	RM	230		-

2	**Excavating trenches** in all kind of soil of required width for pipes including excavation for sockets and dressing of sides, ramming of bottoms, including getting out the excavated soil & then returning the soil as required, in layers not exceeding 20 cm in depth including consolidating each deposited layer by ramming, watering, etc & disposing of surplus excavated soil as directed within a lead of 50m.				
2.1	**up to 1.0 m depth**				
	Pipes 150 mm to 400 mm diameter	RM	195		-
2.2	**1.0 to 1.50 m depth**				
	Pipes 150 mm to 400 mm diameter	RM	425		-
3	Providing and laying cement concrete 1:4:8 (1cement : 4 coarse sand : 8 graded stone agg. 40 mm nominal size) in bedding & haunches of PVC SN8 pipes.				
3.1	160 mm diameter	RM	25		-
3.2	200 mm diameter	RM	170		-
3.3	250 mm diameter	RM	195		-
3.4	300 mm diameter	RM	0		-
3.5	450 mm diameter	RM	230		-
4	Constructing **brick masonry manhole / Inspection Chamber** with F.P.S. bricks in cement mortar 1 : 4 (1 cement : 4 coarse sand) RCC top slab with 1:1.5:3 mix (1 cement : 1.5 coarse sand : 3 grade stone aggregate 20mm nominal size); foundation concrete 1:4:8 mix (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size) inside plastering 12 mm thick with cement mortar 1:3 (1cement : 3 coarse sand) finished with a floating coat of neat cement and making channels in cement concrete 1:2:4 (1cement : 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) finishd with a floating coat of neat cement complete with PVC encased 12 mm dia steel bar foot rests fixing with 20x20x10 cm cement concrete blocks 1:2:4, including fixing of DI Recess type Manhole cover and frame in 150 mm thick cement concrete 1:2:4 (1cement : 2 coarse sand : 4 gradded stone aggregate of 20 mm nominal size) including centering, shuttering, excavation, refilling and disposal of surplus earth as directed complete in all respects. (The cost of MH cover and frame shall be seperate)				
4.1	Inside size 600 x 600 mm & 600 mm deep	No.	QR		-
4.2	Inside size 900 x 800 mm & upto 900 mm deep	No.	5		-
4.3	Inside size 1200 x 900 mm & upto 1650 mm deep	No.	0		-
5	**Extra for depth for manhole** with F.P.S. bricks in cement mortar 1 : 4 (1 cement : 4 coarse sand) as per above item.				
5.1	size 600 X 600 mm	RM	QR		-

5.2	size 900 X 800 mm	RM	5		-
6	Constructing **brick masonry Circular manhole / circular catch pit** of 560 mm internal diameter at top with F.P.S. bricks in cement mortar 1:4 (1 cement: 4 coarse sand) inside cement plaster 12 mm thick with cement mortar 1:3 (1 cement: 3 coarse sand) finished with a floating coat of neat cement, foundation concrete 1:4:8 mix (1 cement : 4 coarse sand : 8 graded stone aggregate 40mm nominal size) and making necessary channel in cement concrete 1:2:4 (1 cement:2 coarse sand: 4 graded stone aggregate 20mm nominal size) finished with a floating coat of neat cement all complete as per standard design with PVC encased 12 mm dia steel bar foot rests fixing with 20x20x10 cm cement concrete blocks 1:2:4, including Heavy Duty Double Seal DI MH cover and frame in 150 mm thick cement concrete 1:2:4 (1cement : 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) including centering, shuttering, excavation, refilling and disposal of surplus earth as directed complete in all respects. (The cost of MH cover and frame shall be separate)				
6.1	900 mm internal dia	No.	10		-
6.2	1200 mm internal dia	No.	5		-
6.3	1500 mm internal dia	No.	1		-
7	Extra for depth for manhole with F.P.S. bricks in cement mortar 1 : 4 (1 cement : 4 coarse sand) as per above item.				
7.1	900 mm internal dia	RM	2		-
7.2	1200 mm internal dia	RM	2		-
7.3	1500 mm internal dia	RM	10		-
8	Constructing brick masonry **catch pit** with F.P.S. bricks in cement mortar 1 : 4 (1 cement : 4 coarse sand) RCC top slab with 1:1.5:3 mix (1 cement : 1.5 coarse sand : 3 grade stone aggregate 20mm nominal size); foundation concrete 1:4:8 mix (1 cement : 4 coarse sand : 8 graded stone aggregate 40 mm nominal size) inside plastering 12 mm thick with cement mortar 1:3 (1cement 3 coarse sand) finished with a floating coat of neat cement and making channels in cement concrete 1:2:4 (1cement : 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement complete with PVC encased 12 mm dia steel bar foot rests fixing with 20x20x10 cm cement concrete blocks 1:2:4, including fixing of CI / PCCC / SFRC grating / cover and frame in 150 mm thick cement concrete 1:2:4 (1cement : 2 coarse sand : 4 gradded stone aggregate of 20 mm nominal size) including centering, shuttering, excavation, refilling and disposal of surplus earth as directed complete in all respects. (The cost of				

	grating/cover and frame shall be separate)				
8.1	Inside size 65**0 x 700 mm & 450 mm** deep	No.	13		-
9	Providing DI Recess type Manhole Cover and frame (heavy duty, HD20 grade designation) 560 mm internal diameter conforming to I.S. 12592, total weight of cover and frame to be not less than 182 kg.load bearing capacity to be 60 tons, fixed in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) including centering, shuttering all complete.				
9.1	Heavy duty, HD-20 grade designation - 900 mm Dia	No.	10		-
9.2	Heavy duty, HD-20 grade designation - 1200 mm Dia	No.	5		-
9.3	Heavy duty, HD-20 grade designation - 1500 mm Dia	No.	1		-
10	Providing and fixing orange colour safety **foot rest** provided in all manholes over 0.9m of minimum 6 mm thick plastic encapsulated as per IS:10910 on 12 mm dia steel bar conforming to IS: 1786 having minimum cross section as 23 mm x 25 mm and overall minimum length 263 mm and width as 165 mm with space between protruded legs having 2 mm tread on top surface by ribbing on chequering besides necessary and adequate anchoring projections on tall length on 138 mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufacturer's permanent identification mark to be visible even after fixing, including fixing in manholes with 30x20x15 cm cement concrete block 1:2:4 (1 cement : 2 coarse sand: 4 graded stone aggregate 20 mm nominal size), 300 mm apart horizontally as well as vertically & project 100 mm beyond the wall. Top rung shall be 450 mm below the manhole cover & the lowest not more than 300 mm above the benching or complete as per standard design.	No.	70		0
11	Making connection to existing **sewer / storm water drain** including necessary excavation and breaking the wall of municipal manhole and making good the same with Cement mortar 1:3, finished with a floating coat of neat cement and making drains etc. complete. Removing the excavated surplus material. The rate for this item also includes complete services from the contractor for liasoning works such as filing necessary applications, submission of forms for approval to the municipal authorities, depositing the fees / other amounts as required for getting the premises / installations, inspected and approved and all other formalities required till the water connection is obtained. All the expenses incurred in this regard shall be borne by the Contractor except for the official payments to be made for any security deposit etc. which will be reimbursed on production of original voucher.	Job	2		-
12	**RAIN WATER HARVESTING PIT (Modular Type)**				

	Supply and installation of a 100% recycled polypropylene modular tank system (non-plate and non- hyperboloid design) engineered for underground applications. The system shall be based on a mat raft foundation with a single-column base structure and unidirectional assembly of modular units. Each module measures 600 mm × 600 mm × 250 mm and offers an effective water holding capacity of 85 litres, with a void ratio of 94.5% for maximum runoff storage. The design allows tool-free stacking up to 7 meters, making it ideal for deep cavity installations. Made from high-quality recycled PPCP, the structure is resistant to chemicals and high temperatures and offers a minimum service life of 20 years. It is designed to withstand vehicle loads up to SLW 60 (HGV class) with appropriate backfilling and features a double-lock connection mechanism for enhanced stability. The vertical column structure is engineered to distribute loads evenly, with column spacing not exceeding 75–80 mm and a minimum column density of 75–80 columns per square meter. Systems using more than four components per module shall not be permitted.. The pit shall be wrapped with non-woven geotextile having thickness of 400 GSM, having minimum tear strength of 250 ASTM D4533, Width wise atleast 215 ASTM D4533 having puncture strength of 1550 plus as per ASTM D6241, Having elongation at Break of 57% plus as per ASTM D 4595 in one layers, made out of long fibres to hold the modules including cutting, sizing, Heat welding and needle punched for high porosity and proper percolation. Overlapping and folding cost also included, 35% extra material. Measurement : 2*((L*W)+(W*H)+(L*H))*1.35, as per entire satisfaction of Engineers- in- charge. The cost shall be inclusive of all necessary excavation in all kind of soils, refilling, Boring as per aquifer and disposal of surplus earth with in the site or away from site as directed with out any extra cost, The item is inclusive of FRP based micro filter with diameter of 750 mm and height 1000 mm having minimum 2nos inlet and 2nos outlet of at least 160 mm size with SS 304 mesh. Flow rate of filter should be at-least 80 KL/hr. FRP based RWH filters should be GRIHA and SVAGRIHA certified with valid certification on date.				
	Rate of Desilting chamber and micro filter chamber along with manhole cover are not included in above BOQ For calulation we conisder bore well depth upto 30 meters Upto to 50 cum volume, 1 Bore well in each RWH pit For extra filtration and better output water quality we can incorporate matla mats with SS seive.	cum	56.25		-
	TOTAL CARRIED TO SUMMARY				**-**
F.	**Drainage / Drainage Sump pump**				

1	Submersible Centrifugal pump - Supply, installation, testing and commissioning of continuous duty submersible centrifugal non-clogging drainage pumps CI body, SS impaller, arrangement complete with 3 phase motor with all necessary protection and mechanical seal etc. complete with all ancillaries including float type level controllers, electrical control panels fabricatd from 14 gauge CRCA sheet volt meter ammeter with selector switch, TPMCB, 5 VA CL : CTs, phase indicating lamps protected by 2 amp SP MCB, DOL starter, necessary wiring, cable alleys, earthing, interlocking, starter with Automatic float type level controller, providing of high level alarm, sequence timer, potential free contact to starter for connection to BAS, both pumps may run simultaneously at pre determind level (1 set). Include the cost of G.I piping header, Each Pump shall have NRV / Butterfly Valve, pressure guage etc complete in all respect. Pumps with no welding joints should be supplied nor weldable pipes shall be allowed on site. All headers to be factory fitted else to be supplied with screw threaded connection on site.				
	Vendor to submit proposed pump model with duty curve.				
	Flow rate : 685 LPM @100mm Pipe Dia.				
	Head : 25-30 Mts				
	Location :Lower ground				
	Purpose : Drainage sump pump				
	Type : Cutter Type				
	Pumps per set -1W+1S				
	MOC : CI body; SS Impeller & Shaft	Set	5		
	Flow rate : 1650 LPM @150mm Pipe Dia.				
	Head : 25-30 Mts				
	Location :Lower ground				
	Purpose : Rain Water sump pump				
	Type : Cutter Type				
	Pumps per set -1W+1S				
	MOC : CI body; SS Impeller & Shaft	Set	1		
	TOTAL CARRIED TO SUMMARY				**-**

Item	
A.	**SANITARY FIXTURES & FITTINGS**
	Note:
i.	*Detail of Sanitary fixture are for the information of the Contractor, however model / makes of all sanitary fixture shall be*
ii	*No additional all fixing cost shall be paid for change in type of sanitary fixture or fitting.*

iii	*Provision of extension piece, brackets, chair, nuts, bolts and all accessories as required for final connection of CP fittin*
1	Fixing, testing and commissioning of **white vitreous China wall / Floor mounting type European water closet** with hinges & rubber buffers, C.P. brass screw, washer with all accessories. Including cutting & making good the walls, floo
2	Fixing **3 Nos. support arms and backrest** to mounted on the track (vertically and laterally) for **for handicap toilets** c
3	Fixing, testing & commissioning of **concealed type cistern** with dual flush facility comprising of actuator button facia a
4	Fixing, testing and commissioning of C.P. **health faucet** for ablution and flexible hose 1 m long connection with C.P. h
5	Fixing water closet squatting pan **(Indian type W.C.pan)** with 100 mm sand cast Iron P or S trap, 10 litre low level wh walls andfloors White Vitreous china Orissa pattern W.C. pan of size 580x440 mm with integral type foot rests.
6	Fixing, testing & commissioning of **exposed type cistern** with dual flush facility comprising of actuator button facia ass
5	Fixing, testing and commissioning of first quality **white vitreous china Wall mounted / oval / round / square wash b** coat of primer, 32 mm CP brass waste and CP brass cast bottle trap and pipe to wall with CP brass flange and rubber
6	Fixing, testing and commissioning 15 mm dia. C.P.Brass **Single lever wash basin mixer** with accessories in wash ba
7	Fixing, testing and commissioning of Stainless **Steel Sink with drain board** plug complete as required.
8	Fixing, testing and commissioning of C.P. brass wall / counter mounted **sink mixer** with C.P. wall flange, overhead sw
9	FIxing of **waste connection** for wash basin incluind rubber adeptor and all necessary arrangement

10	Fixing **S.S. toilet paper holder** with top flab , preferably spring loaded along with all required screw complete.
11	Fixing **C.P. brass twin coat hook / rob hook** with PVC rawl plug & C.P. brass screw complete as required.
12	Fixing **liquid soap dispenser** with PVC rawl plug & C.P. brass screw complete as required.
13	Fixing, testing and commissioning of **C.P. brass angle valve** with C.P. wall flange, Nut and Washer etc. complete as
14	Fixing, testing and commissioning of C.P **Copper connection 450 mm long** including nuts and washers and making
15	Fixing, testing and commissioning of complete **shower assembly** a) Shower **wall mixer with diverter** with provision of sp b)Overhead **rain shower** with re c) Telephonic **Hand Shower** with flexible 1.5 m flexible hose, hook and all accessories.
16	Fixing, testing and commissioning of Inbuild **Bath Tub** complete with all accessories including bath tub spout, mixer, fl
17	Fixing of **S.S. soap dish** with PVC rawl plug & C.P. brass screw complete as required.
18	Fixing **S.S Towel Ring / towel stand** with PVC rawl plug & C.P. brass screw complete as required.
19	Fixing **S.S Towel Rail** with PVC rawl plug & C.P. brass screw complete as required.
20	Fixing and Testing **Pillar Trap** wall flange (as required) and making good as required.
20.1	Long Body (Janitor Sink)
21	Fixing, testing and commissioning of solid state, no touch operating, fully **hygienic hand drier** of approved shade wit
22	Fixing, testing and commissioning of white viterous china **Janitor sink** of size 470 x 370 x 180mm deep supported CI/

23	Fixing, testing and commissioning of **white vitreous china flat back urinal with urinal sensor** comprising of all plu satisfactory functioning. Including necessary wall cutting / chasing and making good, as required with battery operated
24	Fixing, testing and commissioning of white vitreous china large **urinal partition** including providing & fixing concealed
26	Providing and fixing Water cooler (with RO & UV, Cooling capacity 80Ltr./hr.) 120 Ltr Storage Capacity made of pure ensures fast drainage of water , aoto cut facilitie , over load compressor protection, electricl supply internal wiring etc. c
	TOTAL CARRIED TO SUMMARY
B.	**WATER SUPPLY (INTERNAL)**
	-
1	Providing and fixing of **PERT(Polyethylene raised temperature) Pipes** as per PN-16 in accordance with SO 10508, etc. conforming to ISO 10508 standards. Further all termination points should be brass fittings only for connection wit a pressure of 5 Bar at 95 degree centrigrade**.(Note :- Concealed pipe Inside the toilets for Domestic, Flsuhing, Ho**
1.1	15mm
1.2	20mm
1.3	25mm
1.3	32mm
1.3	40mm
1.3	50mm

2	Providing, fixing, jointing and testing in position **C-PVC (Chlorinated Poly Vinyl Chloride)** of approved manufacture Elbows, Couplers, Unions, Reducers, Adapters, Bushings etc. including transition fittings connection between CPVC rubber line bracket, hot dip galvanized clamps (2 coats of enamel paint) supports as required / directed at site includ termination fittings. The rates to include for chasing in brick masonry with wire mesh / **(For :- Domestic, Flsuhing, Hot water supply & return Pipe running on Cieling, Within shaft & Terrace)**
2.1	15 mm Nominal size / 15.90 mm OD / 12.44 mm ID (min. wall thickness - 1.70 mm)
2.2	20 mm Nominal Size / 22.20 mm OD / 18.14 mm ID (min. wall thickness - 2.00 mm)
2.3	25 mm Nominal Size / 28.60 mm OD / 23.42 mm ID (min. wall thickness - 2.59 mm)
2.4	32 mm Nominal Size / 34.90 mm OD / 28.54 mm ID (min. wall thickness - 3.18 mm)
2.5	40 mm Nominal Size / 41.30 mm OD / 33.78 mm ID (min. wall thickness - 3.76 mm)
2.6	50 mm Nominal Size / 54.00 mm OD / 44.20 mm ID (min. wall thickness - 4.90 mm)
2.7	65 mm Nominal Size (SCH-40)
2.8	80 mm Nominal Inner Dia Sch 40 pipes
2.9	100 mm Nominal Inner Dia Sch 40 pipes & sch 80 fittings
2.10	150 mm Nominal Inner Dia Sch 40 pipes & sch 80 fittings
3	Providing and fixing **nitrile rubber insulation on hot water supply** / return pipes. **(Note :- Concealed pipe Inside &**
3.1	15 mm dia (9 mm thickness)
3.2	20 mm dia (9 mm thickness)

3.3	25 mm dia (13 mm thickness)
3.4	32 mm dia (13 mm thickness)
3.5	40 mm dia (13 mm thickness)
3.6	50 mm dia (13 mm thickness)
3.7	65 mm dia (19 mm thickness)
3.8	80 mm dia (19 mm thickness)
3.9	100 mm dia (19 mm thickness)
3.10	150 mm dia (19 mm thickness)
4	Providing and fixing proprietary polyshield outer mechanical protection on nitrile rubber insulation with aluminium clad Project Manager / Consultants **(Note :- Qty considred for ceiling, Vertical shaft & Terrace)**
4.1	15 mm dia (9 mm thickness)
4.2	20 mm dia (9 mm thickness)
4.3	25 mm dia (13 mm thickness)
4.4	32 mm dia (13 mm thickness)
4.5	40 mm dia (13 mm thickness)
4.6	50 mm dia (19 mm thickness)
4.7	65 mm dia (19 mm thickness)
4.8	80 mm dia (19 mm thickness)
4.9	100 mm dia (19 mm thickness)

4.10	150 mm dia (19 mm thickness)
5	Providing, fixing, testing and commissioning of **full way lever operated forged brass ball valve** conforming to IS:170
5.1	15 mm dia
5.2	20 mm dia
5.3	25 mm dia
5.4	32 mm dia
5.5	40 mm dia
6	Supply & fixing in position ISI marked **cast iron double flanged butterfly valves** (PN 16) as per IS:13095, with S directions of the Engineer-in-charge.
6.1	50 mm dia
6.2	65 mm dia
6.3	80 mm dia
6.4	100 mm dia
6.5	150 mm dia
7	Providing & fixing **bronze globe valve** with Bronze, body, disc & stem union flanges, washer nuts & bolts rated to a te
7.1	15 mm dia
7.2	20 mm dia
7.3	25mm dia

7.4	32mm dia
7.5	40mm dia
7.6	50mm dia
7.7	65mm dia
7.8	80mm dia
8	Providing ,fixing, testing and commissioning of Forged Brass / Bronze in **pressure reducing valve along with** 1 Nos washers complete as required for application. (horizontal or vertical as applicable).
8.1	15 mm dia
8.2	20 mm dia
8.3	25 mm dia
9	Providing & fixing gun metal / Bronze **non – return valve** of approved make with union / flange, washer, nuts & damage as per manufacturer's specification.
9.1	15 mm dia
9.2	20 mm dia
9.3	25 mm dia
9.4	32mm dia
9.5	40mm dia
9.6	50mm dia
9.7	65mm dia
9.8	80mm dia

10	Providing, fixing, testing and commissioning of **brass / bronze single acting air release valve** of approved quality wit
10.1	25 mm nominal bore
11	Providing and fixing **water hammer arrestor** for water supply with isolation valve having screwed connection and teste
11.1	15 mm nominal bore
11.2	20 mm nominal bore
11.3	25 mm nominal bore
11.4	32 mm nominal bore
12	Providing ,fixing, testing and commissioning of IP 67 (Weather Proof /Aluminum casing with positioner to indicate the level float type sensors to control the valve .The sensors shall be installed in over head tanks. The sensors will close position of valve i.e. open /closed with pressure switches at pump discharge, accessories like wiring / conduting / flang
	NOTE :- All the control switchgears, connections, wiring, integration etc. should be included in the quote. No additional
12.1	25 mm dia
12.2	50 mm dia
13	Providing & fixing digital type water meter along with direct reading dial in KL in all internal parts in gunmetal or brass,
13.1	25 mm dia (RO Water Supply High & Low Zone)
13.2	32 mm dia
13.3	40 mm dia (Hot Water Return Low Zone, Irrigation water supply)
13.4	50 mm dia (Hot Water Supply High Zone,Soft water OHT Filling)

13.5	65 mm dia (Hot water supply Low Zone, Flushing Water Supply Low & High Zone)
13.6	80 mm dia (Municipal,Tanker, Hot Water Return High Zone & Domestic Water Supply Low zone)
13.7	100 mm dia (Domestic water pump outlet High Zone)
14	Providing manhole cover with DI 80- 120 kg (Double Seal) weight with following the required IS code . (Fot OHT tanks)
14.1	Heavy duty, HD-20 grade designation - 560 mm Dia
	TOTAL CARRIED TO SUMMARY
C.	**INTERNAL DRAINAGE & SEWAGE SYSTEM**
1	Supply, installation , testing commissioning of **PP Mineral** filled low noise Soil & Waste system as per EN 12056, with protection system according to DIN 4109. including with push fit rubber ring sockets all necessary fittings and specia
	Providing MS pipe sleeves of suitable higher size wherever pipes crossing a fire rated wall / floor slab and sealing of s have been duly laid and testing complete.
1.1	160mm Pipe (min. wall thickness - 5.3 mm)
1.2	110mm Pipe (min. wall thickness - 5.3 mm)
1.3	75mm Pipe (min. wall thickness - 4.5 mm)
2	Supply, installation , testing commissioning of **PP Mineral filled low noise Soil & Waste system as per EN 13501-1** system according to DIN 4109. including with push fit rubber ring sockets all necessary fittings and specials such as
2.1	32 mm dia.
2.2	40 mm dia.

2.3	50mm Pipe
3	Providing, fixing, jointing and testing **Low Noise polypropylene trap of self cleansing** design with or without vent, jo suspended / open plumbing or setting the trap in 1:2:4 CC in case of concealed plumbing , etc. complete, as required.
	-
3.1	P-Trap type Floor Trap 110 x 110 mm (50 mm water seal)
	-
3.2	S-Trap type Floor Trap 110 x 110 mm (50 mm water seal)
	-
3.3	Multi-Floor Trap 110 x 110 mm (50 mm water seal)
4	Providing, fixing, testing & commissioning mineral reinforced **polypropylene inlet fitting** with maximum 3 inlets 32, 40
5	Providing & fixing combination of **110 x 110 mm elbow and 110 x 50 mm ecentric reducer Polypropylene waste** w
6	Providing and fixing Heavy class **SS grating** of approved design including setting in floor with cement motor to match v
	-
6.1	Size 100 mm x 100 mm
	-
6.2	Size 125 mm x 125 mm
7	Providing and fixing Heavy class **SS grating with cockroach trap** of approved design including setting in floor with ce
	-
7.1	Size 100 mm x 100 mm
	-
7.2	Size 125 mm x 125 mm
8	Providing and fixing **PP access pipe (cleanout plug)** with opening arrangements for soil / waste pipe and other neces
8.1	For 160 mm dia pipe
8.2	For 100 mm dia pipe

9	Providing and fixing **PP access pipe (Floor cleanout plug)** with opening arrangements for soil / waste pipe and other
9.1	For 160 mm dia pipe
9.2	For 100 mm dia pipe
10	Providing, fixing, jointing and testing in position of ISI marked UV stabilized **UPVC pipes for rain water,Type-B** as couplers, clamps, hangers, rubber rings, gratings over pipes of bell mouth construction with epoxy painting for terrace to IS:5382.
	The Pipes will be supported by either rubber lined G.I. U strap clamps on 40x40x3 mm MS slotted angle duly painted of all pipes lines as per drawings and specifications and as directed by engg-in-charge at site.(RAIN WATER)
10.1	200 mm dia (Wall Thickness - 4.0 to 4.6 mm)
10.2	160 mm dia (Wall Thickness - 4.0 to 4.6 mm)
10.3	110 mm dia (Wall Thickness - 3.2 to 3.8 mm)
11	**Rain water 'Khurras'** as required depth with lead flashing around the pipe & 150mm beyond the Khurra with one piece
12.0	Providing & fixing **CI grating** to the inlet mouth of rain water drainagepipes as per approved data sheet/drawings.
12.1	210 mm dia/Square
12.2	160 mm dia/Square

13.0	Supply, installation, testing and commissioning of **GI pipes Class 'C' (heavy duty)** of approved make conforming t clamps/structural steel supports as required/directed at site, cutting & making good the walls, floors, R.C.C. work etc. i
13.1	100 mm dia
13.2	80 mm dia
14.0	Supply, installation, testing commissioning of **Centrifugally Cast (Spun) Iron Pipes** and Fittings conforming to IS:39 providing MS structure of 50 x 50x 5 mm angle and fixing of rubber line bracket ,Fastner & hangers etc. duly painted b
14.1	100mm Pipe
15	Constructing **Grease Trap** of size as mentioned below of 1500 liquid depth in brick work of class 75 with cement mor top slab with 2 nos. 600 x 600 mm dia medium duty, double seal manhole covers with frame (weight of covers & weigh
15.1	2000mm x 1200mm x 1500mm
	TOTAL CARRIED TO SUMMARY
D.	**EXTERNAL WATER SUPPLY**
	-

1	Providing, fixing, jointing and testing in position the following ISI marked centrifugally casted (spun) **Ductile iron** pr connection wherever required with all type of D.I.fittings. The pipes and fitting shall be internally lining with cement r sleeve of one size larger diameter shall be provided wherever the pipes are crossing the fire rated walls / floors ,slab a and making good the same with required material. (Cost shall inclusive of excavation upto required depth, filling sand **Water and Tanker**
1.1	80 mm dia
1.2	100 mm dia
2	Providing and fixing uPVC agricultural pipes conforming to IS:4985 class IV (10 kg/cm2) including all fittings, e.g. co consolidation each deposited layer by ramming, watering etc, backfilling and disposing of surplus excavated soil as dir
2.1	25 mm OD
2.2	32 mm OD
2.2	40 mm OD
2.3	50 mm OD
3	Constructing **brick masonry Valve Chamber Chamber** with F.P.S. bricks in cement mortar 1 : 4 (1 cement : 4 coar aggregate 40 mm nominal size) inside plastering 12 mm thick with cement mortar 1:3 (1cement : 3 coarse sand) fi of neat cement complete with PVC encased 12 mm dia steel bar foot rests fixing with 20x20x10 cm cement conc including centering, shuttering, excavation, refilling and disposal of surplus earth as directed complete in all respects. (
3.1	Inside size 300 x 300 mm & 500 mm deep
3.2	Inside size 600 x 600 mm & 600 mm deep

3.2	Inside size 1000 x 1000 mm & 1200 mm deep
4	Providing and fixing **ball valve (PN 10)** with hard chrome plated ball inside PTFE (Teflon) seat & ring with chrome plat
4.1	25mm dia nominal bore
4.2	32mm dia nominal bore
4.3	40 mm dia nominal bore
5	Providing and fixing cast iron **butterfly valves (PN 10)** nylon coated SG iron disk, stainless steelshaft, black nitrile rubl
5.1	65mm dia nominal bore
5.2	80 mm dia nominal bore
5.3	100 mm dia nominal bore
6	Providing, fixing,testing and commissioning **water meter** with direct reading Dial in KL including strainer with all integra testing charge and obtaining Test Certificate from Municipal Authorities, on following size pipe line with 3 Nos. valve wi
6.1	40 mm dia for Irrigation Connection
6.2	80 mm dia for Municipal Connection
6.2	100 mm dia for Tanker filling connection
7	Providing, fixing and effecting connection from Existing **Municipal Water** Supply line including necessary excavation & The rate for this item also includes complete services from the contractor for liasoning works such as filing necessary other formalities required till the water connection is obtained. All the expenses incurred in this regard shall be borne b
	TOTAL CARRIED TO SUMMARY

E.	**EXTERNAL DRAINAGE AND SEWERAGE**
1	Providing, fixing, jointing, testing and commissioning of **UPVC** conforming to IS : 15328-2000 with all fittings such as completed with rubber ring/solvent weld joint. Including lowering in trenches, laid to correct levels up to required depth of joints and connection with the respective manhole complete in all respects as per the direction of engineer incharge.
1.1	110 mm dia **(STP Bypass)**
1.1	160 mm dia
1.2	200 mm dia
1.3	250 mm dia
1.3	300 mm dia
1.4	400 mm dia
1.4	450 mm dia
2	**Excavating trenches** in all kind of soil of required width for pipes including excavation for sockets and dressing of s ramming, watering, etc & disposing of surplus excavated soil as directed within a lead of 50m.
2.1	**up to 1.0 m depth**
	Pipes 150 mm to 400 mm diameter
2.2	**1.0 to 1.50 m depth**
	Pipes 150 mm to 400 mm diameter
3	Providing and laying cement concrete 1:4:8 (1cement : 4 coarse sand : 8 graded stone agg. 40 mm nominal size) in
3.1	160 mm diameter
3.2	200 mm diameter
3.3	250 mm diameter
3.4	300 mm diameter
3.5	450 mm diameter

4	Constructing **brick masonry manhole / Inspection Chamber** with F.P.S. bricks in cement mortar 1 : 4 (1 cement : stone aggregate 40 mm nominal size) inside plastering 12 mm thick with cement mortar 1:3 (1cement : 3 coarse sa coat of neat cement complete with PVC encased 12 mm dia steel bar foot rests fixing with 20x20x10 cm cement co size) including centering, shuttering, excavation, refilling and disposal of surplus earth as directed complete in all respe
4.1	Inside size 600 x 600 mm & 600 mm deep
4.2	Inside size 900 x 800 mm & upto 900 mm deep
4.3	Inside size 1200 x 900 mm & upto 1650 mm deep
5	**Extra for depth for manhole** with F.P.S. bricks in cement mortar 1 : 4 (1 cement : 4 coarse sand) as per above item.
5.1	size 600 X 600 mm
5.2	size 900 X 800 mm
6	Constructing **brick masonry Circular manhole / circular catch pit** of 560 mm internal diameter at top with F.P.S. b concrete 1:4:8 mix (1 cement : 4 coarse sand : 8 graded stone aggregate 40mm nominal size) and making necessa PVC encased 12 mm dia steel bar foot rests fixing with 20x20x10 cm cement concrete blocks 1:2:4, including Hea excavation, refilling and disposal of surplus earth as directed complete in all respects. (The cost of MH cover and frame
6.1	900 mm internal dia
6.2	1200 mm internal dia
6.3	1500 mm internal dia
7	Extra for depth for manhole with F.P.S. bricks in cement mortar 1 : 4 (1 cement : 4 coarse sand) as per above item.

7.1	900 mm internal dia
7.2	1200 mm internal dia
7.3	1500 mm internal dia
8	Constructing brick masonry **catch pit** with F.P.S. bricks in cement mortar 1 : 4 (1 cement : 4 coarse sand) RCC top s nominal size) inside plastering 12 mm thick with cement mortar 1:3 (1cement 3 coarse sand) finished with a floati complete with PVC encased 12 mm dia steel bar foot rests fixing with 20x20x10 cm cement concrete blocks 1:2:4, centering, shuttering, excavation, refilling and disposal of surplus earth as directed complete in all respects. (The cost
8.1	Inside size 65**0 x 700 mm & 450 mm** deep
9	Providing DI Recess type Manhole Cover and frame (heavy duty, HD20 grade designation) 560 mm internal diameter aggregate 20 mm nominal size) including centering, shuttering all complete.
9.1	Heavy duty, HD-20 grade designation - 900 mm Dia
9.2	Heavy duty, HD-20 grade designation - 1200 mm Dia
9.3	Heavy duty, HD-20 grade designation - 1500 mm Dia
10	Providing and fixing orange colour safety **foot rest** provided in all manholes over 0.9m of minimum 6 mm thick plastic space between protruded legs having 2 mm tread on top surface by ribbing on chequering besides necessary an manufacturer's permanent identification mark to be visible even after fixing, including fixing in manholes with 30x20x1 Top rung shall be 450 mm below the manhole cover & the lowest not more than 300 mm above the benching or compl

11	Making connection to existing **sewer / storm water drain** including necessary excavation and breaking the wall of mu rate for this item also includes complete services from the contractor for liasoning works such as filing necessary appli formalities required till the water connection is obtained. All the expenses incurred in this regard shall be borne by the C
12	**RAIN WATER HARVESTING PIT (Modular Type)**
	Supply and installation of a 100% recycled polypropylene modular tank system (non-plate and non- hyperboloid desig measures 600 mm × 600 mm × 250 mm and offers an effective water holding capacity of 85 litres, with a void ratio resistant to chemicals and high temperatures and offers a minimum service life of 20 years. It is designed to withsta distribute loads evenly, with column spacing not exceeding 75–80 mm and a minimum column density of 75–80 colur minimum tear strength of 250 ASTM D4533, Width wise atleast 215 ASTM D4533 having puncture strength of 1550 pl punched for high porosity and proper percolation. Overlapping and folding cost also included, 35% extra material. M aquifer and disposal of surplus earth with in the site or away from site as directed with out any extra cost, The item is in at-least 80 KL/hr. FRP based RWH filters should be GRIHA and SVAGRIHA certified with valid certification on date.
	Rate of Desilting chamber and micro filter For calulation we conisder Upto to 50 cum volume. For extra filtration and better output water quality we can incorporate matla mats with SS seive.
	TOTAL CARRIED TO SUMMARY
F.	**Drainage / Drainage Sump pump**

1	Submersible Centrifugal pump - Supply, installation, testing and commissioning of continuous duty submersible centri float type level controllers, electrical control panels fabricatd from 14 gauge CRCA sheet volt meter ammeter with sele controller, providing of high level alarm, sequence timer, potential free contact to starter for connection to BAS, both pu with no welding joints should be supplied nor weldable pipes shall be allowed on site. All headers to be factory fitted el
	Vendor to submit proposed pump model with duty curve.
	Flow rate : 685 LPM @100mm Pipe Dia.
	Head : 25-30 Mts
	Location :Lower ground
	Purpose : Drainage sump pump
	Type : Cutter Type
	Pumps per set -1W+1S
	MOC : CI body; SS Impeller & Shaft
	Flow rate : 1650 LPM @150mm Pipe Dia.
	Head : 25-30 Mts
	Location :Lower ground
	Purpose : Rain Water sump pump
	Type : Cutter Type
	Pumps per set -1W+1S
	MOC : CI body; SS Impeller & Shaft
	TOTAL CARRIED TO SUMMARY

SUMMARY OF COSTS			
S. No.	**Description**	**Amount (Rs.)**	
	Plumbing System		
A.	SANITARY FIXTURES & FITTINGS	RS.	-

B.	WATER SUPPLY (INTERNAL)	RS.	-
C.	INTERNAL DRAINAGE & SEWAGE SYSTEM	RS.	-
D.	EXTERNAL WATER SUPPLY	RS.	-
E.	EXTERNAL DRAINAGE AND SEWERAGE	RS.	-
F.	DRAINAGE / DRAINAGE SUMP PUMP		RS. -
	Total	**RS.**	**-**

OPERATION & MAINTENANCE		
YEAR	**OPERATION**	**MAINTENANCE**
First Year		PART OF DLP
Second Year		
Third Year		
Forth Year		
Fifth Year		

Note:-

1. Above Prices will not be part of Tender Evaluation
2. It will not be binding on SWOSTI PREMIUM LTD for entering into above Comprehensive Annual Maintenance Contract
3. If SWOSTI PREMIUM LTD decides to enter into the above Comprehensive Annual Maintenance Contract, a separate Contract Agreement shall be made, which will not be part of this Contract
4. Tenderers are expected to quote Reasonable Prices.

PAYMENT TERMS:

Mobilization Advance:

- Contractor will be paid any mobilization advance as indicated in contract data.

PAYMENT SCHEDULE

The stage-wise payment to the Contractor shall be released based on the items of work executed as contained in the Bills of Quantities and rates agreed to thereto. Upon completion that item of work. Detail procedure are as below :

Preparation of R/A Bills :

- After satisfactory completion of each item of work, the bill shall be submitted with detailed measurements and invoice.
- Final bill along with no claim certificate should be submitted within 2 months from date of completion of work.
- Upon clearing the site of all debris, materials, temporary structures and machinery.
- Payments for supply/work done will be made in R/A bill based on monthly progress or work, verified with measurement by PMC/Authorised Engineer.
- R/A bills will be certified against final amounts as in contract.

Withholding of Payments:

- Payment may be withheld if contractor fails to meet contractual obligations.
- Failure to pay workers' wages or bills of contractor.

SECURED ADVANCE :

Any request for a secured advance may be requested for by Contractor along with invoice/ original shipping document copy of invoice and duly signed payment invoice. This may be considered by the Employer(Client) upon assessment by PMC/Engineer-in-Charge for items of non-perishable, non-fragile & non-consumable in nature and required for the work and in accordance with contract (Conditions & Technical Specifications), which have been brought to the site in connection with execution (having reference to an item of work in BOQ) and are adequately stored and/or protected against damage by weather or other causes and have not been incorporated in the work earlier. The amount of such advance shall be deducted from next/final payment. However, any secured advance for any material/equipment lying unutilized after 3 months/completion of work shall be recovered fully from the next/final bill.

Note:

Each payment shall be certified by the Engineer based on physical progress at site against the approved GFC drawings.

No advance payment shall be made unless specifically agreed in the contract data or special conditions.

All payments are subject to retention, tax deduction at source, and recoveries as per the contract.

. SECTION 5: CONTRACT DATA,CONTRACT FORM

&

CONDITIONS OF CONTRACT

CONTRACT DATA

Clause	Description
1. Name of Work	SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF services for "Supply, Installation, Testing & Commissioning of Plumbing Works-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd., Gopalpur, Ganjam, on a Item Rate Contract Basis
2. Name of the Client	Swosti Group
3. Client's Representative	Project Management Consultant (PMC) – [Insert PMC Firm Name]
4. PMC Contact Details	Name: Designation: Project Manager – PMC Email: [Insert] Phone: [Insert]
5. Site Location	Gopalpur-on-Sea, Ganjam District, Odisha – 761002
6. Scope of Work	SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF services for "Supply, Installation, Testing & Commissioning of Plumbing Works-Low Side and Allied Works at Gopalpur Palm Resort for Swosti Premium Ltd., Gopalpur, Ganjam, on a Item Rate Contract Basis as per drawings and specifications.
7. Estimated Contract Value	₹ [Insert Amount] (Inclusive of all costs except GST)
8. Tender Type	Item Rate-Fixed Price Contract
9. Contract Type	Item Rate
10. Time for Completion	[Insert duration – e.g., 9 months] from the date of Letter of Acceptance (LoA)
11. Date of Commencement	Within 7 (seven) days from issuance of LoA or handing over of site, whichever is later
12. Defects Liability Period (DLP)	12 months from the date of issuance of Completion Certificate
13. Performance Security	2% of Contract Value in the form of Bank Guarantee to be submitted within 7 days of LoA
14. Retention Money	3% of Running Account Bills; to be released after successful completion of the Defects Liability Period
15. Mobilisation Advance	No
16. Schedule of Payments	Item-based payments linked to actual progress of works (Refer to Section – Payment Terms)
17. Liquidated Damages (LD)	0.2 % **per day** of the value of balance work delayed **beyond the stipulated date of completion**, subject to a **maximum of 10% of Contract Value**
18. Arbitration	In accordance with the Arbitration and Conciliation Act, 1996; sole arbitrator to be mutually appointed
19. Governing Law and Jurisdiction	Laws of India; jurisdiction: Bhubaneswar, Odisha
20. Insurance	Contractor to provide insurance for Works, Workmen Compensation, Equipment, and Third-Party Liability to indemnify the Client from damage/Claims arising out all

Clause	Description
	such items including loss arising out of natural calamity.
21. Taxes and Duties	Quoted price is inclusive of all taxes and duties except GST; GST shall be paid extra as applicable
22. Sub-contracting	Permitted only with prior written approval of the Client / PMC
23. Safety & Compliance	Contractor to comply with safety regulations, labor laws, and site protocols
24. Force Majeure	As per General Conditions of Contract
25. Advance Payment	10% of Contract Value, against submission of Bank Guarantee of 100% of amount; recoverable in equal instalments from running bills
26.Secured Advance	To be considered on request

AGREEMENT

AN AGREEMENT is made this----------BETWEEN the SWOSTI PREMIUM LTD ,Bhubaneswar, which expression shall include its successor, unless repugnant to or Excluded by the contract here of and assignees of and represented by its ……(the first party (hereinafter called the Authority) and by…… its sole proprietor/partners/Director and having registered office at (which expression shall be including his / its successor's heirs executors, representative and or assignees of the second party (hereinafter called the contractor}.

WHEREAS the Authority has, under tender Notification No. ----------

WHEREAS the contractor has submitted tender for carrying out the work as above as per the tender document page ---- to ----- and has represented that in conformity with his / its obligation contained in the tender as modified by the correction slips and corrigendum contained he / it shall carryout the same truly, faithfully and honestly.

THE SAME has been accepted by both the parties on the terms and conditions, corrections, corrigendum contained in the tender as modified as well as the letter of acceptance , at a total Contract Price of Rs. Crores (Rupees Crores) excluding GST (To be paid extra as applicable) as Issued party No.1 annexed here to as.

The same shall be binding on both the parties.

IN WITNESS WHEREOF, the parties have signed the deed of agreement on the date, month and year referred to above.

Date: At

New Delhi.

Signed by

Party No.1 Party No.2

WITNESS

1. Party No.1

2. Party No.2

Conditions of Contract

Conditions of Contract

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GENERAL

Terms,which are defined in the Contract Data and not defined in the Conditions of Contract shall keep their defined meanings. Capital initials are used to identify defined terms.

Bill of Quantities means the priced and completed Bill of Quantities;

Compensation Events are those defined in Document;

The **Completion Date** is the date of completion of the Works as certified by the Engineer.

The **Contract** is the contract between the Client and the Contractor to execute, complete and maintain the Works.

The **Contract Data** defines the documents and other information, which comprise the Contract;

The **Contractor** is a person or corporate body whose Bid to carry out the Works has been accepted by the Client [obligations of the Contractor mentioned in the Contract Data].;

The **Contractor's Bid** is the completed Bidding document submitted by the Contractor to the Client and includes Technical and Financial bids;

The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract;

Days are calendar days; months are calendar months;

A **Defect** is any part of the Works not completed in accordance with the Contract;

The **Defects Liability Period** is the period named in the Contract Data and calculated from the Completion Date;

The **Client** is the party who will employ the Contractor to carry out the Works; [As mentioned in the Contract Data].

The Engineer is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Engineer) who is responsible for supervising the Contractor’s work, administering the Contract, certifying payments due to the Contractor, issuing and valuing Variations to the Contract, recommending extensions of time, and valuing the Compensation Events;

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works;

Initial Contract Price is the Contract Price listed in the Client's Letter of Acceptance;

Intended Completion Date is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Client by issuing an extension of time;

Materials are all supplies, including consumables, used by the contractor for incorporation in the Works;

Plant is any integral part of the Works, which is to have a mechanical, electrical, electronic or chemical or biological function;The **Site** is the area defined as such in the Contract Data;

Site Investigation Reports are those, which were included in the Bidding documents and are factual interpretative reports about the surface and sub-surface conditions at the site;

Specification means the Specification of the works included in the Contract and any modification or addition made or approved by the Client;

The **Start Date / Date of Commencement** is given in. the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates;

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site;

Temporary Works are works designed, constructed, installed, and removed by the Contractor, which are needed for construction or installation of the Works;

A **Variation or Change in Scope** is an instruction given by the Client, which varies and change the scope of Works;

Works are what the Contract requires the Contractor to construct, install, and turn over to the Client, as defined in the Contract Data;

Year may be understood as financial year;

"Approved Make" means makes of items as specified in the "List of Approved Makes/Approved Manufacturers" in this RFP. However, a higher or equivalent make can be utilized after obtaining prior approval of "Engineer-In-Charge" in writing.

Interpretation

In interpreting the Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their general meaning under the language of the Contract unless specifically defined. The Client will provide instructions clarifying queries about the Conditions of Contract.

If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion date for the whole of the Works).

The documents forming the Contract shall be interpreted in the following order of priority:

(a) Agreement

(b) Letter of Acceptance, notice to proceed with the works

(c) Contractor's Bid

(d) Contract Data

(e) Conditions of Contract including Additional & Special Conditions of Contract

(f) Specifications

(g) Drawings

(h) Bill of quantities (optional) and

(i) Any other document listed in the Contract Data as forming part of the Contract.

Languages and Law

The language of the Contract and the law governing the Contract are stated in the Contract Data.

Engineer's Decisions:

Except where otherwise specifically stated, the Engineer will decide contractual matters between the Client and the Contractor in the role representing the Client as per the provision of the contract.

Delegation:

The Engineer may delegate any of his duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.

Communications:

Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

Sub-contracting:

The Contractor may sub-contract any portion of work, up to a limit of 10% of contact value, with the approval of the Engineer but may not assign the Contract without the approval of the Client in writing. Sub-contracting does not alter the Contractor's obligations.

Other Contractors:

The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Client between the dates given in the Schedule of other Contractors. The Contractor shall as refer to in the Contract Data, also provide facilities and services for them as described in the Schedule. The Client may modify the schedule of other contractors and shall notify the contractor of any such modification.

Personnel:

The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data besides those as listed to carry out the functions stated in the Schedule or other personnel approved by the Engineer. The Engineer will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.

If the Engineer asks the Contractor to remove a person who is a member of the Contractor's staff or his work force stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

Client's and Contractor's Risks:

The Client carries the risks which this Contract states are Client's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.

Client's Risks:

The Client is responsible for the excepted risks which are in so far as they directly affect the execution of the Works in India, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor's employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive.

Contractor's Risks:

All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

Insurance:

The Contractor shall provide, in the joint names of the Client and the Contractor, insurance cover ***for the period as stated below against the events and*** in the amounts and deductibles stated in the Contract Data for the following events, which are due to the Contractor's risks:

A) From the starting date to the end of defect liability period:

(a) Loss of or damage to the works

B) From the start date till completion of the work as per agreement:

(a) Loss of or damage to plant, materials and equipment,

(b) Loss of or damage of property (except the works, plant, materials and equipment) in connection with the contract, and

(c) Personal injury or death.

If all the items as listed above can be combined / grouped under one insurance cover like Contractor's, All Risks (CAR) Policy **covering all-natural calamities as per local conditions.**

Prior to seven days before the start date, the Contractor shall furnish to the Engineer notarized true copies of the certificates of insurance, copies of insurance policies and premia payment receipts in respect of such insurance for the Client's approval. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

If the contractor does not provide any of the policies and certificates required, the Client may affect the insurance which the contractor should have provided and recover the premiums the Client has paid from payments otherwise due to the contractor or, if no payment is due, the payment of the premiums shall be a debt due.

Alterations to the terms of insurance shall not be made without the approval of the Client.

Both parties shall comply with any conditions of the insurance policies.

Site Investigation Reports:

The Contractor, in preparing the Bid, may rely on any site Investigation Reports referred to in the Contract Data, which are indicative and not exhaustive. The Client shall provide all available details to the Contractor (Bidder) for his information, if requested by him at least one week prior to the bid submission date. The bidder shall be responsible for interpreting all such data. After award of work, the Contractor shall carryout detail survey and investigation for preparation of detail designs as per the scope of work and time period stipulated.

To the extent which was practicable (taking account of cost and time), the Contractor (Bidder) shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Tender or Works. To the same extent, the Contractor (Bidder) shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation):

(a) the form and nature of the Site, including sub-surface conditions,

(b) the climatic conditions,

(c) the extent and nature of the work and Goods necessary for the execution and completion of the Works and the remedying of any defects,

(d) the Laws, procedures and labour practices of the Country, and

(e) the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.

(f) availability of required materials

Queries about the Contract Data:

The Client will clarify queries on the Contract Data if any during the Pre-bid references.

Contractor to Construct the Works:

The Contractor shall construct and install the Works in accordance with the approved specification and drawings. All designs, drawings and specifications to be furnished by the contractor shall be approved by the Client before execution.

The Works to be completed by the Intended Completion Date:

The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the programme submitted by the Contractor, as updated with the approval of the Engineer, and complete them by the Intended Completion Date.

Approval by the Engineer:

The Contractor shall be provided Specifications and Drawings showing the proposed Temporary Works by the Engineer.

The Contractor shall be responsible for design of Temporary Works.

The Engineer's approval shall not alter the Contractor's responsibility for design of the Temporary Works.

The Contractor shall be provided approved design, drawings and specifications of all components of the building and all allied infrastructure works, except those for the temporary works.

Safety:

The Contractor shall be responsible for the safety of all activities on the Site.

Possession of the Site:

The Client shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Client is deemed to have delayed the start of the relevant activities and this will be Compensation Event.

Access to the Site:

The Contractor shall allow the Client and any person authorized by the Client access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plant are being manufactured / fabricated / assembled for the works.

Instructions:

The Contractor shall carry out all instructions of the Engineer pertaining to works, which comply with the applicable laws where the Site is located.

The Contractor shall permit the Client to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Client, if so, required by the Client.

Disputes:

That for the purpose of jurisdiction in the event of disputes if any of the Contract would be deemed to have been entered in to within the State of Odisha and it is agreed that neither party to the Contract will be competent to bring a suit in regard to the matter by this Contract at any place outside the State of Odisha.

Procedure for Settlement of Disputes:

In case of Dispute or difference arising between the Client and the contractor relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled mutually.

TIME CONTROL

Programme:

Within **7 days of issue of letter of award**, the successful bidder shall submit to the Client detail work programme for approval showing the general methods, arrangements, order and timing for all the activities in the Works along with monthly cash flow forecast. The agreed work programme / milestones during such contract negotiation shall form part of the agreement.

An update of the Programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.

The contractor shall submit to the Client, for approval, an updated Programme at intervals no longer than 15days. If the Contractor does not submit an updated Programme within this period, the Engineer may withhold the amount stated in the Contract Data from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue programme has been submitted.

The Client's approval of the Programme shall not alter the Contractor's obligations. The Contractor may revise the Programme and submit it to the Client again at any time. A revised Programme is to show the effect of Variations and Compensation Events.

Extension of the Intended Completion Date:

The Client shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost.

The Client shall decide whether and by how much to extend the Intended Completion Date within 15 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

The Engineer shall within 7 days of receiving full justification from the contractor for extension of Intended Completion Date refer to the Client his recommendation. The Client shall in not more than 15 days communicate to the Engineer the Client's decision.

Delays Ordered by the Engineer:

The Client may instruct the Contractor to delay the start or progress of any activity within the Works.

Management Meetings:

Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.

The Engineer shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Client. The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

Early Warning:

The Contractor is to warn the Client/Engineer at the earliest opportunity of specific likely future events or circumstances that may adversely affect the work resulting delay in the execution. The Engineer may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Completion Date.

The Contractor shall cooperate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer.

QUALITY CONTROL

Identifying Defects:

The Engineer shall check the Contractor's work regularly and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Engineer may instruct the Contractor to search for defects and to uncover and test any work that the Engineer considers may have a Defect

Tests:

If the Engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect the test shall be a Compensation Event.

Correction of Defects:

The Engineer shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at Completion and is defined in the Contract Data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

Every time notice of a Defect is given; the Contractor shall correct the notified Defect within the length of time specified by the Engineer's notice.

Uncorrected Defects:

If the Contractor has not corrected a Defect within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

COST CONTROL

Changes in the Quantities:(OPTIONAL)

Change of Scope (Variations) and Procedure for change of Scope:

The Client may, require the Contractor to make modifications/alterations to the works before the issue of the completion certificate either by giving an instruction or by requesting the contractor to submit a proposal for change of scope involving additional cost or reduction in cost. Any such change of scope shall be made and valued in accordance with the provisions of this contract and the contractor, in that event, will have no further claim on the ground that had it been known / disclosed earlier he would have made such charges in other connected work in their design, construction which would have saved him some cost and given him other consequential benefits.

Change in scope may include;

(a) Change in specifications of any item of works

(b) omission/ deletion of any item of work from the scope of work

(c) any additional work (such as addition of extra plinth area) which are not included in the scope of work including any additional test on completion

In the event of the Client determining that a change of scope is necessary, it shall issue notice to the contractor a notice specifying in reasonable detail the works contemplated there under (“Change in scope notice”)

Upon receipt of change in scope notice, the contractor shall with due diligence, provide to the Client through the Engineer within seven days time such information as is necessary together with documentation in support of;

(a) the impact, of any, which the change in scope is likely to have on the completion of the work

(b) the options for implementing the proposed change of scope and the effect, if any, each on the cost and time thereof including the following details;

i. break down of quantities, unit rates and cost for different items of work

ii. proposed design for the change of scope

iii. proposed modifications, if any, to the construction period with updated work programmes (all

Variations shall be included in updated programmes produced by the Contractor).

Any change in scope shall be calculated on the basis of the following priority:

The total value of all change of scope of work shall not exceed 10% of total contract price for the construction work.

Payments for Change of Scope (Variations):

The Client shall assess the change in scope proposal and Contractor's quotation at the time of bidding in financial form and upon reaching an agreement; the Client shall issue the Change of Scope Order requiring the contractor to proceed with the performance thereof.

If the Contractor's quotation is unreasonable, the Client may order the Variation and make a change to the Contract Price which shall be based on Client's own forecast of the effects of the Variation on the Contractor's costs.

If the Client decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event, subject to condition that such variation shall not exceed 10% of the total contract price for the contract work.

The Contractor shall not be entitled to additional payment for costs, which could have been avoided by giving early warning.

Payment Certificates:

The Contractor shall submit to the Engineer statements of the value of the work completed.

The Engineer shall check the Contractor's statement within 15 days and certify the amount to be paid to the Contractor as per contract payment schedule after taking into account any credit or - debit for the month in question in respect of materials for the works in the relevant amounts and under conditions set forth, including adjustment of advance.

The value of work executed shall be determined by the Engineer.

The value of work executed shall comprise the value of the quantities of the items as per the BoQ and work programme attached to the contract.

The value of work executed shall include the valuation of Change in Scope (Variation) and Compensation Events, if any.

The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.

Payments:

Payments shall be adjusted for deductions for retention, other recoveries in terms of the contract and taxes at source, as applicable under the law. The Engineer shall pay the Contractor the amounts as per the items of work executed and agreed rates thereto as well as payment schedule attached to the contract.

Tax:

The rates quoted by the Contractor shall be deemed to be exclusive of the GST and inclusive of Royalty, Income Tax, Labour CESS and all other statutory taxes that the Contractor will have to pay for the performance of this Contract. The Client will perform such duties in regard to the deduction of such taxes at source as per applicable law.

Currencies:

All payments shall be made-in Indian Rupees.

Retention:

The Client shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the works or settlement of final payment.

On completion of the whole of the works and issue of the completion certificate the performance security shall be repaid to the contractor. The retention amount shall be paid after the Defects Liability Period has passed and the Engineer has certified that all defects notified by the Engineer to the contractor before the end of the period have been corrected.

Liquidated Damages:

The Contractor shall pay liquidated damages to the Client at the rate as stated in the Contract Data that the Completion Date is later than the Intended Completion Date (for the whole of the works or the milestone as stated in the contract data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Client may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not relieve the contractor from his / her / their obligation to complete the works or from any other duties, obligations or responsibilities which he / she / they may have under the contract.

If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate.

Bonus Payment:

Deleted

Advance Payment:

The Client may make advance payment to the Contractor for mobilization and cash flow support of the amounts stated in the Contract Data by the date stated in the Contract Data, only against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a Bank acceptable to the Engineer in amounts and currencies equal to 110% of the advance payment.

The Advance Payment shall not be released until the camp setup, mobilisation of key personnel, equipment and labour at site.

The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. The contractor shall ensure that the Bank Guarantee remain enforceable until the advance payment has been fully repaid and accordingly renew it, from time to time, until the advance payment has been fully repaid.

If the terms of guarantee specify its expiry date, and the advance payment has not been re-paid by the date then 28 days prior to the expiry date, the contractor shall extend the validity of the guarantee until the advance payment has been fully repaid.

The advance payment shall be repaid through percentage deductions from the interim payments as follows:

Securities:

The Performance Security shall be provided to the Client 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 Employee

The performance security shall be denominated in Indian Rupees. The Performance Security shall remain valid up to the period as defined in the Contract Data.

Cost of Repairs:

Loss or damage to the Works or Materials to be incorporated in the Works between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions including the situation as stipulated in the RFP.

FINISHING THE CONTRACT

Completion:

The Contractor shall request the Engineer to issue a Certificate of Completion of the Works and the Engineer will do so upon deciding that the Work is completed.

Taking Over:

The Client shall take over the Site and the Works within seven days of the Engineer issuing a certificate of Completion.

Final Account:

The Contractor shall supply to the Engineer a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Engineer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 30 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer shall issue within 30 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Client shall decide on the amount payable to the Contractor and issue a payment certificate, within 30 days of receiving the Contractor's revised account.

Termination:

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

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

(a) the Contractor stops work for 15 days when no stoppage of work is shown on the current Programme and the stoppage has not been authorized by the Engineer;

(b) the Contractor is made 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 works by the number of days for which the maximum number of liquidated damages can be paid as defined in the Contract data; and

(f) if the Contractor, in the judgment of the Client has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

For the purpose of this paragraph: "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition."

When either party to the Contract gives notice of a breach of contract to the Engineer for a cause other than those listed under Sub Clause 54.2 above, the Engineer shall decide whether the breach is fundamental or not.

Notwithstanding the above, the Client may terminate the Contract for convenience.

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.

Payment upon Termination:

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 fewer 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 and less the percentage to apply to the work not completed as indicated in the Contract Data. Additional Liquidated Damages shall not apply. If the total amount due to the Client exceeds any payment due to the Contractor, the difference shall be a debt payable to the Client.

If the Contract is terminated at the Client's convenience, the Engineer shall issue a certificate for the value of the work done, 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. No extra cost will be paid by the Client for expenditure towards 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.

Property:

All materials on the Site, Plant, Equipment, Temporary Works and Works are deemed to be the property of the Client, if the Contract is terminated because of a contractor’s default.

Release from Performance:

If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Client or the Contractor, the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

ADDITIONAL CONDITIONS OF CONTRACT

1.WORK DESCRIPTION

The work shall be strictly carried out as per the scope listed in this document and in accordance with the specifications. The equipment & material supplied at site will also be selected out of the list of approved makes. Bill of quantity provided with the document is for contractor guidance. It is expected that after award of work, contractor shall prepare shop drawings for approval by the Consultant & Client representative and also submit Technical documentation duly identifying shortlisted make of material/equipment along with its data sheets. Actual ordering shall be based on approved shop drawings & documents.

The work at site shall comply with the approved shop drawings and will meet the satisfaction of Client representative. The contractor shall be required to demonstrate satisfactory operation of entire system (including client supplied equipment installed by contractor) and furnish the required labour, material & tools to install & commission the system.

The broad scope of work for proposed HVAC system covered under this contract shall include supply, installation, testing & commissioning of the following:

Water cooled chiller (free supply)
Constant primary & Variable secondary Pumping system.
Smart Air handling units (AHU's).
FRP Cooling towers.
VFD's.
Dedicated outdoor air system including heat recovery wheel.
Mechanical ventilation systems.
Chilled, Condenser and Drain piping with associated fittings, valves etc.
Air distribution system.
Associated electrical works.
Kitchen ventilation.
Basement car parking ventilation.
Testing Adjusting & Balancing of the entire HVAC and mechanical ventilation installation.

Besides above, contractor shall also be required to undertake following:

Obtain fire approval from Local Authorities prior & post installation for operation of system by the land owner. Coordination for submission of required documents & demonstration of systems to obtain the Approval by the Contractor.
Minor civil works which include making openings in walls & slabs and making good of the same.
Commissioning of the plant including test reports to demonstrate satisfactory working prior to handing over.
Provide as-built drawings and handing over document comprising of list of recommended spares, catalogues and service schedule for each equipment/material.
Training of Client's staff.
Documents related LEED requirement

2.SITE MANAGEMENT

The Contractor shall be required to provide following staffing for the project:

Design Engineer who will work with Consultant for getting shop drawings, technical submittal and variation in quantity statement approved.

Procurement team.

Full time dedicated 1 manager (minimum 15 year experience) and Engineer (minimum 10 year experience) & one supervisor posted at site.

The contractor shall submit organization chart and CV prior to starting work at site.

The Contractor shall have required stores, tools & plant, security and facility to transport materials to place of installation for speedy execution of work.

3.REGULATIONS & PERMITS

Prior to starting work at site, the contractor shall obtain required permits/ licenses required for satisfactory execution and operation of the installation. All receipted amounts shall be reimbursed by Client on production of proof of payment by the contractor.

The executed work shall strictly confirm to applicable laws, regulations and Indian Standards which become applicable. In case the specifications and drawings contained in this document call for higher standard than those required by prevailing regulations, then these specifications & drawings shall become applicable. However, in case of any conflict or violation between the document/drawings and prevailing laws, then the applicable laws & regulations shall be governing & binding.

4.SHOP DRAWINGS

A set of design drawings listed in this document are available at Consultant office and may be issued with the tender document. These design drawings are for reference of the contractor and indicate proposed arrangement and the extent of work covered in the contract. The data given in the drawings and specifications is as exact as could be procured, but its accuracy is not guaranteed. The contractor cannot execute work or scale these drawings for reference.

Following shall be the procedure followed by contractor while preparation of shop drawings:

The contractor shall refer the design drawings for understanding the scope and proposed routes to be followed during execution.

Collate latest architectural backgrounds from the Client representative / Architect / Consultant.

Examine all related services drawings but not limited to structural, plumbing, electrical, HVAC, Interior, landscape and others including as-built works before starting the work. Any discrepancy must be report to the Client's site representative in writing and obtain approval for go-ahead.

Within one week of award of work, the Contractor shall prepare a list of shop drawing along with submission schedule for approval of Client representative/Consultant. The list of drawings must include layouts for Plant room, Pump room, Typical drawings showing exact location of supports, flanges, bends, tee connections, reducers, detailed piping drawings showing exact location and type of supports, valves, fittings etc; electrical panels inside/outside views, power and control wiring schematics, cable trays, supports and terminations.

Maximum headroom shall be maintained at all points and in case the same is inadequate, then written approval from Client representative must be obtained prior to execution at site.

These shop drawings shall depict information required to complete the Project as per specifications and as required by the Consultant/Client representative. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each shop drawing shall contain tabulation of all measurable items of equipment/materials/works and progressive cumulative totals from other related drawings to arrive at a variation-in-quantity statement at the completion of all shop drawings.

Where the work under this contract is proposed to be installed in close proximity or is interfering with other trades, then based on client representative/consultant directions, the contractor shall prepare all services coordinated working drawings and sections at a suitable scale (not less than 1:50), clearly showing proposed installed in relation to the work of other trades.

The contractor shall thereafter furnish 6 sets of detailed shop drawings to Client representative/Consultant for obtaining comments/approval. The Contractor will make unlimited number of re-submissions of shop drawings unless Client representative/Consultant/Architect approval is obtained.

The Contractor will thereafter submit 6 sets of final shop drawings to the Client representative for their exclusive use and all other agencies.

No material or equipment may be delivered or installed at the job site until the contractor has in his possession, the approved shop drawing for the particular material/equipment/installation.

In case installation is carried out without following above process or obtaining a waiver to follow the procedure from Client representative, the work shall be rejected and contractor shall rectify the same at their own cost.

Shop drawings shall be submitted for approval minimum four weeks in advance of planned

delivery and installation of any material to allow Client representative/Consultant ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved program.

Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contract.

5.TECHNICAL DOCUMENTATION

The contractor prior to supplying material at site, will submit the following documentation to Consultant/Client representative for approval:

Manufacturers drawings, catalogues, pamphlets and other documents in triplicate. Each item shall be properly labeled, indicating the specific services for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.

Samples of all materials shall be submitted to the Client's site representative prior to procurement. These will be submitted in two sets for approval and retention by Client's representative and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed, a mockup or sample installation shall be carried out for approval before proceeding for further installation.

Where the contractor proposes to use an alternate make or model of equipment other than that specified, all new drawings and detailing required thereafter shall be prepared by the contractor at his own expense including any re-design required for other discipline/trade. Any delay on such account shall also be at the cost of and consequence of the Contractor.

Contractor to refer Annexure –II for list of approved makes & materials for this project.

6.VARIATION IN QUANTITY STATEMENT

After approval of major & relevant shop drawings, the contractor shall submit four copies of a comprehensive variation in quantity statement. This statement must be submitted prior to completing ordering of equipment and should identify imported/local materials in this contract as well as proposed spares/tools. The Consultant shall provide recommendation to Client representative for acceptance of anticipated variation in contract amounts and also advise Client to initiate action for procurement of spare parts and tools at the completion of project.

7. QUALITY ASSURANCE

The contractor to ensure that all materials and equipment supplied shall be new and of best available quality conforming to the relevant Indian Standard Specifications and to these specifications. Makes shall be strictly in conformity with list of approved manufacturers as per Annexure -II. Owners reserve the right to reject any item which in their assessment is second hand

Any deviations from above shall be clearly highlighted prior to supply and shall be brought to the notice of the Client representative/Consultant for further instructions in the matter.

Prior to starting execution work at site, the Contractor shall verify the sufficiency of the size of the shaft openings, clearances and ceiling spaces for proper installation. Failure to communicate insufficiency of any of the above, shall constitute Contractor acceptance of the same. The Contractor shall locate all equipment in fully accessible locations which can be easily serviced, operated or maintained. The exact location and size of access panels, required for each concealed, valve or other devices requiring attendance shall be finalized and communicated in sufficient time.

Failing this, the Contractor shall make all the necessary repairs and changes at own expense. Access panel shall be marked.

8. WORKS NOT COVERED UNDER THIS CONTRACT

Following works are excluded from the scope under this contract. These shall be executed by respective contractor in accordance with approved shop drawings where these details must be highlighted. However, contractor shall be responsible for providing details and thereafter supervision to ensure satisfactory & timely execution of these associated items as they have a bearing on this contract.

9. EXCLUDED FROM SCOPE OF WORK

ASSOCIATED CIVIL WORKS

Following civil works associated with HVAC installation are excluded from the scope of this contract. These shall be executed by other agencies in accordance with approved shop drawings of and under direct supervision of the air conditioning contractor.

i. RCC foundation for water chilling machine's pumps & centrifugal fans with angle iron frame work at the edges to protect these from damage.

ii. RCC basin & supports & MS Joists for cooling towers.

iii. PCC foundation blocks with angle iron frame work edging for all motor control center.

iv. PCC foundation for pot strainers.

v. PCC foundation blocks for all air handling units.

vi. Air-tight fire doors with minimum one hour fire rating for plant room, AHU rooms, fan rooms and other equipment rooms.

vii. Water proofing of floors of AHU rooms, air washer rooms and fan rooms.

viii. Masonry drain channels and sumps with CI gratings in AC plant room including provision for sump pump and disposal.

ix. Supply and fixing of G.I./wooden frame for mounting of grilles in masonary walls.

x. Supply and fixing of GSS frame for mounting of grilles / diffusers in false ceiling / boxing.

xi. Thermal insulation of terraces above air-conditioned areas exposed to sun.

xii. Making of trenches and back filling the same after laying / pressure testing etc. of pipes.

ELECTRICAL SERVICES WORKS

All associated ELECTRICAL WORKS listed below are excluded from the scope of this contract. These shall be installed by other agencies in accordance with approved shop drawings of, and under direct supervision of the air conditioning contractor.

Providing power supply with earthing at the incoming of control panel in A/C plant room.

ii. Providing power supply and earthing at the incoming MCCB in each air handling unit room.

iii. Providing power and earthing at the incoming MCCB in each centrifugal fan panel and pump panel at locations called for on air conditioning Contractor's shop drawings.

iv. Providing 15 amps power outlet within 2 meter reach of each fan coil unit and VAV boxes at locations called for on air conditioning Contractor's shop drawings.

v. Providing 15 amps power outlet within 2 meter reach of each single phase propeller fan/inline fan at locations called for on air conditioning contractor's shop drawings.

vi. Providing wiring and earthing for sump pumps in air conditioning plant room.

PLUMBING SERVICES WORKS

All associated PLUMBING WORKS listed below are excluded from the scope of this contract. These shall be installed by other agencies, in accordance with approved shop drawings of, and under direct supervision, of the air conditioning contractor.

Providing soft water (Commercial hardness 0 ppm and PH 7+1) at air washers, humidifiers and at chilled water expansion tank.

Providing make up water for cooling tower as per RO water quality

iii. Disposal of condensate drain from fan coil units / ceiling suspended units beyond the condensate drain riser.

Providing sump pumps and necessary piping for drainage of air conditioning plant room and other machine rooms located below ground level.

Providing floor drains in cooling tower area and in air handling unit rooms.

Note : Preparation of shop drawings defining the Foundation details to civil contractor will be under HVAC Contractor scope of work.

10. INTEGRATION WITH BUILDING AUTOMATION SYSTEM

The scope shall include providing following for the interface to Building Automation System.

Sockets /Nipples including shut-off valve for mounting sensors/transmitters on pipe lines.
Space in electrical panel for running of LV cables.
CT of 15 VA burden with potential free taps.
Auto/manual changeover switch with potential free contact at manual position.
Installation of motorized control valves with provision of counter flanges
Installation of current transformer & Transducer along with wiring between Current Transformer & Transducer up to the terminal block
Provision for mounting BAS sensors.
15 Amps. Power supply with MCB in all AHU panels and 32 Amps MCB on HVAC plant room panel for power supply to DDC Panel.

It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirements lies solely with the contractor.

11. TESTING, ADJUSTING AND BALANCING

Air and water balancing shall be carried out by the contractor through a specialist team (different than erection team) as per Specifications and ASHRAE Guidelines. Performance test shall consist of three days of 10 hour each operation of system for each season. The results for each season shall be submitted to Client representative/Consultant. The submittal shall include operational parameters marked on performance curves for each equipment along with test certificates and safety/control settings.

The installation shall be tested again after removal of defects and shall be commissioned only after approval by the Client's site representative. All tests shall be carried out in the presence of the

representatives of the Construction Manager/Architect /Consultant and Client's site representative. After commissioning, the results shall be submitted for scrutiny in quadruplicate.

All equipment installation shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Client's site representative. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed, or annoyingly noticeable inside its own room, shall be considered objectionable. Such conditions shall be corrected by the Contractor at his own expense. The contractor shall guarantee that the equipment installed shall maintain the specified Noise Control levels.

12. COMPLETION CERTIFICATE

On completion of the installation, a certificate shall be furnished by the contractor, counter signed by the licensed supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local authority engineer in-charge.

The contractor shall be responsible for getting the entire installation duly approved by the local authorities Engineer in Charge concerned, and shall bear expenses if any, in connection with the same.

13. AS-BUILT DRAWINGS

Contractor shall submit following as-built drawings as and when work is completed:
6 set of hard copies of all as-built drawings duly corrected and incorporating any modifications during execution.
Two set of pen drive containing the drawings.

The drawings shall provide plant room layouts, piping layouts, location of all concealed accessories/piping, wiring diagram, control diagram, Single line diagram, control schematic with detailed bill of materials, showing makes, types & description of all components & accessories and sequencing of automatic controls and other services.

14. MAINTENANCE MANUAL

Upon completion and commissioning of works, the contractor shall submit a draft copy of comprehensive operating instructions, maintenance schedule and log sheets for all systems and equipment included in this contract. This shall be supplementary to manufacturer's operating and maintenance manuals. Upon approval of the draft, the contractor shall submit four (4) complete bound sets of typewritten operating instructions and maintenance manuals; one each for retention by Consultant and Client's site representative and two for Clients Operating Personnel. These manuals shall also include basis of design, detailed technical data for each piece of equipment as installed, spare parts manual and recommended spares for 4 year period of maintenance of each equipment. The manuals shall include:

i. Description of the work carried out / installed.
ii. Operating instructions.
iii. Maintenance instructions including procedures for preventive maintenance.
iv. Manufacturers catalogues.
v. Spare parts list.
vi. Trouble shooting charts.
vii. Drawings
viii. Type and routine test certificates of major items.

Details of all the bought out item should be part of this maintenance manual.

15. ON SITE TRAINING

Upon completion of all work and all tests, the Contractor shall furnish necessary operators, labor

and helpers for operating the entire installation for such periods so as to enable the Client's staff to get acquainted with the operation of the system. During this period, the contractor shall train the Client's personnel in the operation, adjustment and maintenance of all equipment installed.

16. DEFECTS LIABILITY PERIOD

Complaints

The Contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 10 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

Repairs

All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of-charge to the Client.

17. UPTIME GUARANTEE

The contractor shall guarantee for the installed system an uptime of 98%. In case of shortfall in any month during the defects liability period, the Defects Liability period shall get extended by a month for every month having shortfall and no reimbursement shall be made for the extended period.

18. OPERATION & MAINTENACE CONTRACT

Contractor may be required to carry out the operation of the installation during and after the defects liability period. Further, it may also be required to carry out all-inclusive maintenance of the entire system for a period of four years beyond the defects liability period.

Operation Contract:

It will involve round the clock operation for 24 hours a day wherein work will include but not limited to operation of installation, maintaining log books, complain register and summary of operation.

The terms of payment shall be monthly at the end of each month on pro-rata basis.

All Inclusive Maintenance Contract:

The work will involve routine preventive maintenance with monthly status report. Entire installation shall be painted every two years. 98% uptime of all systems is expected under this contract wherein up time shall be assessed every month and in case of shortfall during any month the contract shall be extended by a month. No reimbursement shall be payable for the extended period.

Adequate number of persons to the satisfaction of the Client representative shall be provided including relievers wherein statutory compliances such as of EPF, ESIC and other applicable labour legislations shall be to contractor account. No overtime shall be payable. Routine shut downs shall be permitted with prior permission of the Owner.
Payment shall be Quarterly at the beginning of each quarter on pro-rata basis.

19 BIM Implementation

It is expected that Contractor, if required shall prepare all shop drawings in latest version of Revit

only and coordinate with other contractors to provide a clash free model. Thereafter, all shop drawings shall be provided in PDF, 2D CAD plans and critical sections in 3D. The drawings shall be submitted in hard copy in A0/A1 size at 1:100 scale including all annotations, heights, bottom of duct/pipe/tray etc complete in all respect as required.

20. GREEN BUILDING COMPLIANCE

Actions required by Contractor:

Contractor will provide full support in complying to Green Building requirements for the desired level of Green Building Rating in the project.
Contractor shall implement the recommendations provided by Green Building Consultant and provide support during the site inspections.
Contractor shall provide respective documentation including but not limited to specification sheets, manufacturer cutsheets, Test Certificates, Brochures, purchase records, manufacturer declarations, calculations, site photographs, commissioning reports.
Contractor is encouraged to designate an individual in their existing team who will be responsible for regular coordination with respective site people to ensure implementation of required green building measures and ultimately provide the required documentation for aspired Green Building Rating.
In case of any deviations in implementing recommended green building measures and/ or using specified material/ equipment/ system, contractor will have to inform Owners/ Services Consultant/ Green Building Consultant/ Architect as applicable for their formal approval.

In case of any additional requirement to comply with Green Building rating as identified during construction/ installation/ commissioning based on the actual site conditions/ construction activities, Contractor shall implement

21 PERFORMANCE GUARANTEE

The contractor shall carry out the work in accordance with the Approved shop drawings, Specifications, Schedule of Quantities and other documents forming part of the Contract. Contractor shall carry out heat load calculation, Ventilation calculation & Smoke calculation & submit the same for client / consultants approvals. The contractor shall be fully responsible for the performance of the selected equipment (installed by him) at the specified parameters and for the efficiency of the installation to deliver the required end result.

The contractor shall guarantee that the HVAC system as installed shall maintain the inside conditions in the air-conditioned spaces as described under “Basis of Design” in the specifications.

Complete set of architectural drawings is available in the Architect/Consultant’s office and reference may be made to same for any details or information. The contractor shall also guarantee that the performance of various equipment individually, shall not be less than the quoted capacity; also actual power consumption shall not exceed the quoted rating, during testing and commissioning, handing over and guarantee period.

LABOUR:

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment, housing, feeding and transport.

The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the Site and such other information as the Engineer may require.

COMPLIANCE WITH LABOUR REGULATIONS:

During continuance of the contract, the Contractor and his sub-contractors shall abide at all times by all existing labour enactments and rules made there under, regulations, notifications and bye laws of the State or Central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notification that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to the construction industry are given below. The Contractor shall keep the Client indemnified in case any action is taken against the Client by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments. If the Client is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for non-observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/Client shall have the right to deduct any money due to the Contractor including his amount of performance security. The Client/Engineer shall also have right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Client.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Client at any point of time.

SPECIAL CONDITIONs OF CONTRACT

SALIENT FEATURES OF SOME MAJOR LABOUR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTION WORK.

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

b) Payment of Gratuity Act 1972: Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more or on death the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

c) Employees P.F. and Miscellaneous Provision Act 1952: - The Act Provides for monthly contributions by the Client plus workers @ 10% or 8.33%. The benefits payable under the Act are:

(i) Pension or family pension on retirement or death, as the case may be.

(ii) Deposit linked insurance on the death in harness of the worker.

(iii) Payment of P.F. accumulation on retirement/death etc.

d) Maternity Benefit Act 1951: -The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

e) Contract Labour (Regulation & Abolition) Act 1970: - The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the

Contractor fails to provide, the same are required to be provided, by the Principal Client by Law. The Principal Client is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Client if they employ 20 or more contract labour.

f) The Code on Wages, 2019: This code consolidates the Laws relating to Wages and Bonus and matters connected therewith or incidental thereto.

g) Industrial Disputes Act 1947: - The Act lays down the machinery and procedure for resolution of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

h) Industrial Employment (Standing Orders) Act 1946: - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Client on matters provided in the Act and get the same certified by the designated Authority.

i) Trade Unions Act 1926: - The Act lays down the procedure for registration of trade unions of workmen and Clients. The Trade Unions registered under the Act have been given certain immunities from civil and criminal liabilities.

j) Child Labour (Prohibition & Regulation) Act 1986: - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of Child Labour is prohibited in Building and Construction Industry.

k) Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act 1979: - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The Inter- State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home up to the establishment and back, etc.

l) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act 1996 and the Cess Act of 1996: - All the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the Government. The Client of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as Canteens, First-Aid facilities, Ambulance, Housing accommodations for workers near the work place etc. The Client to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

m) Factories Act 1948: -The Act lays down the procedure for approval at plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in manufacturing process.

SPECIAL CONDITIONS

1.It must be understood that the work has to be completed as per the time provided in the contract and as such time is the essence of the contract.

2.The quantities furnished in the bills of quantities are only probable quantities liable to alternation by omission, deduction or addition, and it would be clearly understood that the contract is not a lump sum contract and the SWOSTI PREMIUM LTD do not, in any way, assure the tenderer or guarantee that the said probable quantities are correct or that the work would correspond thereto. Payments will be regulated on the actual quantities of work authorizedly done and measured at the accepted rates. No claims due to change in quantities (+ or -) will be entertained. The drawings, forming parts of complementary installations work specifications and the bills of quantities, of the contract, are explanatory of and are to one another, representing together the works / to be carried out. If neither the drawings nor the specifications nor the accepted bills of quantities include any part/parts the intention to include which is nevertheless clearly inferred and which are obviously necessary for the proper completion of the works/ installations, all such parts shall be supplied and executed by the contractor at no extra charge. Anything contained in one or another of (a) the drawings, (b) the specifications and (c) the accepted bills of quantities and not found in the others will be equally binding as if it were contained in each of them.

3.No alterations, that might have been made by the tenderer in the drawings, specifications, conditions or probable quantities accompanying this notice will be recognized and if any such alterations are made the tender, will be invalid. Conditional tenders will however be liable for rejection.

4.The tenderer must obtain for himself on his own responsibility and at his own expense all the information necessary, including risks, contingencies and other circumstances to enable him to make a proper tender and to enter into a contract with the SWOSTI PREMIUM LTD . He must examine the drawings, specifications, conditions and so on and must inspect the site of work, examine the nature of the ground and the subsoil (so far as is practicable) and acquaint himself with local conditions, means of access to the work, storage facilities or areas for staff colony, the nature of the work, in fact all matters pertaining thereto before he submits his tender.

5.The tender accepted shall not be entitled to make any claim for increase in the rates quoted and accepted excepting in pursuance of any specific provision in the contract.

6.Only approved agencies/ skilled workers shall be deployed to carry out requisite specialized items of work. The Officer/ Engineer in charge’s decision in consultation with Architect's/ in this regard shall be binding to all the parties concerned.

7. The rates shall be firm and not be subject to any variations in exchange rates, in taxes, duties etc. in railway freight and the like including labour conditions, etc. The rates are not subject to escalation.

8.It will be the sole responsibility of the contractor to procure all the equipments/ materials and other materials required for the work.

9.The SWOSTI PREMIUM LTD further reserves the right to delete or reduce at any time, any section of the bills of quantities with out assigning any reasons whatsoever there for and no claim will be entertained in this regard.

10.The tenderer whose tender is accepted is bound to execute formal agreement with the SWOSTI PREMIUM LTD within one week of the date of intimation of award of work in

accordance with the draft agreement which will include conditions of tender, form of tender (general conditions of contract & Special Condition of Contract), Articles of Agreement, Bills of quantities, Conditions of contract, Special conditions if any, the drawings and specifications, but his liability under the contract shall commence from the date of written order to commence work whether the formal agreement is drawn or not.

The Contractor shall bear all expenses in connection with the execution of the said agreement including fees for stamping and registration of documents as required.

11.The Security Deposit will bear no interest what so ever until the date of release.

12.

(a)The contractor, upon award of work, shall submit a memorandum of procedure giving the outline of his general scheme, programme and time table, in the form of a chart that shall be scrutinized and approved (with modifications as necessary), which shall become the approved programme for execution. The approved programme shall be the basis for assessment of comparative progress under the relevant conditions of contract.

(b). Over and above, the contractor has to supply programme chalked out showing important milestones to be achieved and the progress actually achieved compared with, the target of the same in the programme and shortfall, if any planned for being made up in the programme for next month.

13.The work in general shall conform to the Specifications provided.

(a)In case items not covered by the general specifications referred above, reference shall be made to the appropriate I.S. Code.

(b)Should there be any difference in the particular specifications of individual item of work and the description of item as given in the Schedule of quantity, the latter shall prevail, which will be as per the relevant drawing.

(c)In case of any work for which there is no specification in I.S. specifications or in the specifications forming part of tender documents or in case there is any variation, such work shall be carried out in all respects in accordance with the instructions to be issued by the Engineer in charge.

14.The work of any part of it shall not be transferred, assigned or sublet without the written consent of the SWOSTI PREMIUM LTD .

15.The Contractor shall be required to co-operate and work in co-ordination with and afford reasonable facilities for such other agencies / specialists / interior designers/ consultants as may be employed by the Architects / Project Management Consultant/ Officer in Charge on other works / sub-works in connection with the project/scheme of which this work forms a part.

16.The Contractor shall get the necessary insurance done for their personal employed/ Swosti Premium Ltd third party insurance in name of G.M(B D),Swosti Premium Ltd and for all other risk insurance or any other insurance as required.

17.The Contractor shall make arrangements of carrying water and electricity .

18.The Contractor is required to comply with all Acts of Government relating to labour, safety, environment and other Rules and Regulations made there under from time to time

and to submit at the proper times all particulars and statements required to be furnished to the appropriate Authorities.

19.Contractor shall not in any way interrupt or do any act, matter or thing to prevent or hinder such other Contractor or other person or persons employed for completing and finishing or using the materials and plant for the Work. When the Work shall be completed or as soon thereafter as convenient the Architect shall give a notice in writing to the Contractor to remove his surplus materials and plant, and should the Contractor fail to do so within a period of 14 days after receipt thereof by him, Owner shall sell the same, and shall give credit to the Contractor for the amount realized. The Architect shall thereafter ascertain and certify in writing what (if anything) shall be due or payable to or by the Owner for the value of the said plant and materials so taken possession of by the Owner and the expense or loss which the Owner shall have been put to in procuring the works to be completed, and the amount, if any, owing to the Contractor and the amount which shall be so certified shall thereupon be paid by the Owner to the Contractor or by the Contractor to the Owner, as the case may be, and the certificate of the Architect shall be final and conclusive between the parties.

20.If at any time after the commencement of the work the Owner shall for any reason whatsoever not require the whole thereof, as specified in the tender, to be carried out, but need to abridge the Contract, the Owner shall give notice in writing of the fact to the Contractor who shall have no claim to any payment or compensation which he might have derived from the execution of the work in full, but which he did not derive in consequence of the whole amount of the work not having been carried out. The Contractor shall in this case, however, be entitled to payment for the work already executed by him in accordance with the agreed rates. The Owner shall also take over all building materials as might have been ordered for the work, but orders for which cannot be canceled, if delivered within a reasonable time, and shall pay for them at cost price. The Contractor shall also be allowed to remove his tools and plants from the site.

Contractor Responsibility Matrix

Work Element / Activity	Contractor	Client (Swosti)	PMC (You)	Architect / Consultants
1. Mobilisation & Site Establishment	**R**	A	C	-
2. Setting Out and Site Survey	**R**	C	C	C
3. Site Safety & Housekeeping	**R**	C	C	-
4. Approvals from Local Authorities (as applicable)	**C**	A	R	C
5. Scaffolding, Centering, and Shuttering	**R**	I	C	-
6. Quality Control & Testing	**R**	I	C	C
7. Coordination with MEP teams	C	I	C	C
8. Materials Procurement (Cement, Steel, Bricks, etc.)	**R**	I	C	-
9. Submission of Progress Reports & MIS	**R**	I	A	-
10. Adherence to Timeline / Work Schedule	**R**	I	C	-
11. Rectification of Defects During DLP	**R**	A	C	-
11. Final Handover & Completion Report	**R**	A	C	-

Legend:

- **R = Responsible** – Main executor.
- **A = Accountable** – Final decision-maker or owner.
- **C = Consultative** – Provides input and coordination.
- **I = Informed** – Kept in the loop, but not involved in execution.

Management Meetings

- Either the Engineer or the Contractor may call for a management meeting.
- These meetings are held to review progress plans and handle issues flagged under the early warning system.
- The Engineer shall record meeting proceedings and circulate to attendees and the Client.
- Action items shall be assigned and communicated in writing.

Quality Control

- The Engineer shall regularly inspect the Contractor's work and identify any defects. Instructions may be issued to uncover or test work suspected to be defective.
- **Tests** If the Engineer instructs tests not specified in the specifications, and the work is found defective, the Contractor shall bear the cost of tests. If no defect is found, it will be treated as a Compensation Event.

Payments & Liquidated Damages Payments

- Payments shall be adjusted for deductions for retention, other recoveries in terms of the contract and taxes at source, as applicable under the law.
- The Engineer shall pay the Contractor the amounts as per the payment schedule attached to the contract.

Retention

- The performance security obtained at the time of signing of contract shall be retained till successful conclusion of project completion and issue of completion certificate.
- The Client shall retain from each payment due to the Contractor the proportion stated in the Contract Data until Completion of the whole of the works or settlement of final payment.
- On completion of the whole of the works half the total amount retained is repaid to the contractor and half when the Defects Liability Period has passed, and the Engineer has certified that all defects notified by the Engineer to the contractor before the end of the period have been corrected.

Milestone

Milestone No.	To be Achieved	Timeline
Milestone 1-	**60 % of value of contract**	**Upto 120 Days**
Milestone 2-	**100 % of value of contract**	**Upto 180 Days**

Liquidated Damages

- The Contractor shall pay liquidated damages to the Client at the rate 0.2%/day on the value of balance work beyond stipulated date of completion as per following milestones of execution subject to a maximum of 10% of contract value.
  a) Up to end of 120 days of signing of contract – 60 % of value of contract
  b) Up to end of 180 days of signing of contract –100 % of value of contract