



DIU SMART CITY LIMITED

CIN: U74999DD2018PLC009814
C/o Diu Municipal Council,
Fort Road, Diu 362520
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E – Tender (Online Tender)

TENDER NOTICE NO. 57/2021–22/DSCL-Diu

DMC/DIU/CONST/SMARTCITY/2021-22/252

Date: 20/09/2021

The Chief Executive Officer, DSCL, Diu, invites online lump sum bid for the following works through E procurement from eligible contractors registered in appropriate class eligible for executing the work of this estimated cost with, Central /State Govt. Departments /CPSU /CPSE/State PSU's/Autonomous Bodies, and also invariably with VAT / GST Department of U.T. of Daman & Diu (Lowest bidder must obtain local VAT/GST Registration within 45 days) for the below mentioned works, under Smart City Mission.

Sr. No	Name of work and location	Estimated cost	EMD	Tender Fee	Time Limit
1.	Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu including Operation & Maintenance in Defects Liability Period of Five (05) Years on Engineering, Procurement, Construction ("EPC") basis-4 th Call	INR. 319.10 Crores/-	INR.6.40 Crores/-	INR. 25,000/- Plus 18 % GST (Non-refundable)	730 Days

Event Description	Date
Details of each works i.e. name of work, estimate cost, amount of EMD, tender fees, time limit etc. is available on	https://ddtenders.gov.in
*Last date receiving Pre bid Meeting queries	27/ 09 / 2021, 17.00 hrs.
* Pre bid Meeting	29/ 09 / 2021 15:30 hours at Office of DSCL, C/o 2 nd Floor, Diu Municipal Council, Fort Road, Diu or Meeting link will be shared to Bidders who submitted queries prior to pre-bid meeting)
* Closing date for Online downloading of tender documents	18/ 10 / 2021, 11:00 hrs.
* Closing date & time for Receipt of Bid/Uploading Bid	18/ 10 / 2021, 17:00 hrs.
* Last date & time for Receipt of Physical Bid	23 / 10/ 2021, 17:00 hrs.

Event Description	Date
* Online Opening of Technical Bid	23/ 10/ 2021 up to 17:30 hrs.
* Online Opening of Price Bid	To be communicated later

Bidders have to submit price bid in electronic format only on (<https://ddtenders.gov.in> website till the last date and time for submission. Price Bid in physical shall not be accepted in any case.

- All the agencies are hereby directed to scan their tender fees and EMD online only. It is mandatory to submit tender fees and EMD online failing which the price bid of that agency will not be opened online and Physical submission of such scanned documents shall reach to office of the Chief Technical Officer DSCL DIU after closing of online bidding.
 - The Tender Inviting Authority reserves the right to accept or reject any or all the tender to be received without assigning any reasons thereof
- Bidder shall have to post their Pre -Bid queries on E-mail Address: - diudscl@gmail.com on or before dated **27/09/2021**. Queries received after that shall not be entertained.

- All the Contractors are directed to submit the scanned documents of the following: -
- VAT/GST Registration.
 - Latest Solvency Certificate 40% of Estimate cost within one year from the last date of tender Uploading.
 - PAN Card.
 - Tender EMD in form of FDR (Jointly) valid for 6 months i.e. (180 days) from the last date of Tender uploading.
 - Tender Fee in form of Demand Draft. (Non-Refundable)
 - Experience certificate.
 - Registration Certificate.
 - Labour License Registration.
 - The documents prescribed in the NIT to be submitted along with bid. Bid document is not submitted with duly signed by contractor, shall not allowed for the bid selection

Dated: 20/09/2021


 20/9/2021
 CTO, DSCL, Diu
 Email: diudscl@gmail.com
 Phone:- 02875 – 252126



Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu Under Smart Cities Mission (4th Call)

on

EPC Mode with Operation and Maintenance for 5 Years

Volume 1 - Request for Proposal (RFP)

September 2021

Issued by

Chief Executive Officer

Diu Smart City Limited

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DIU SMART CITY LIMITED**Notice Inviting Bid****National Competitive Bidding**

Tender Notice No. - 57/2021-22/ DSCL - Diu

Dated: September 20, 2021

Diu Smart City Limited (hereinafter referred to as **DSCL** in this document), Diu, invites **online lump sum bid** for the following works through E procurement from eligible contractors registered in appropriate class eligible for executing the work of this estimated cost with, Central /State Govt. Departments /CPSU /CPSE/State PSU's/Autonomous Bodies of repute for the following work.

Location	Name of Work	Completion Period	DLP & Maintenance period	Estimated Cost in INR
Diu U.T. Administration of Dadra and Nagar Haveli and Daman & Diu, Government of India	Design, Construction, including Operation and Maintenance for a period of 5 years a) Coastal promenade Diu Ghoghla Bridge to Diu Fort (1.525 Km) and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple (Total length 3.426 Km) with Night Lighting and Landscaping & Beautification of Summer House Garden and b) Urban Design of street i) Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla (9.570 KM.) ii) Development of Portuguese Street (2.529 KM) in Diu Under "SMART CITY MISSION	730 days from the date of Signing of the Agreement (date of Issue of Work Order) (Including Design and Monsoon Period)	5 years from the date of issue of Construction completion certificate	INR 319.10 Crore (Indian Rupees Three Hundred and Nineteen Crores Ten lakhs Only)

The bid document consisting of indicative drawings, specifications of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents can be viewed and downloaded from <https://ddtenders.gov.in>, www.diu.gov.in from 20th September, 2021 to 18th October, 2021 upto 11.00 hours IST. Bid must be submitted online only at <https://ddtenders.gov.in> by 18th October, 2021 at 17.00 hours IST

Chief Technical Officer**Diu Smart City Limited**

Instructions to Bidder for e-Tendering

1. Accessing/Purchasing of BID documents

- (i) It is mandatory for all the Bidders to have class-III Digital Signature Certificate (DSC) (with both DSC components, i.e. signing and encryption in the name of authorized signatory who will sign the BID) from any of the licensed Certifying Agency (Bidders can see the list of licensed CAs from the link www.cca.gov.in) to participate in e-tendering of the Authority. DSC should be in the name of the authorized signatory as authorized in Appendix III of the submitted BID. It should be in corporate capacity (that is in Bidder capacity / in case of JV in the Lead Member capacity, as applicable). Please ensure that the submission of document certifies the class III of the DSC.
- (ii) To participate in the Bidding, it is mandatory for the Bidders to get registered their firm / Joint Venture with e-tendering portal of the Authority, to have user ID & password which shall be obtained by submitting the applicable fee & necessary documents. Validity of online registration is one year.

The following points may kindly be noted:

- a. Registration should be valid at least up to the date of submission of BID.
 - b. BIDs can be submitted only with valid registration.
 - c. The amendments / clarifications to the BID document, if any, will be hosted on the Authority's website. <https://ddtenders.gov.in> , www.diu.gov.in.
 - d. If the firm / Joint Venture is already registered with e-tendering portal of Authority and validity of registration has not expired the firm / Joint Venture is not required to apply for a fresh registration.
- (iii) The complete BID document can be viewed / downloaded from e-tender portal of Diu Smart City limited , from the date & time mentioned in the "Important Information" section under **Clause 1.3**.
 - (iv) To participate in Bidding, Bidders have to pay **INR.25,000 (Indian Rupees Twenty Five Thousand Only)** plus 18% GST towards processing fee for BID (non- refundable) to be paid through online only on DSCL website, along with a BID Security is also to be furnished by the Bidder for the amount of **INR. 6.40 Crore (Indian Rupees Six Crores Forty Lakhs Only)** in the form of Bank Guarantee (BG) as per the format mentioned in **Appendix-VI, issued from a scheduled Bank in the name of the Authority (Diu Smart City Limited)**.

2. Preparation & Submission of BIDs:

The Bidder may submit his BID online following the instruction appearing on the screen. A buyer manual containing the detailed guidelines for e-procurement is available on e-procurement portal.

- (i) The documents listed at **clause 2.11** shall be prepared and scanned in different files (in PDF or RAR format such that each file size is not more than 20 MB) and uploaded during the on-line submission of BID.

- (ii) BID must be submitted **online only** through e-procurement portal of the Authority, using the digital signature of authorized representative of the Bidder on or before October 18, 2021 (up to **17:00 Hours IST**).

3. Modification / Substitution / Withdrawal of BIDs:

- (i) The Bidder may modify, substitute or withdraw its e- BID after submission prior to the BID Due Date. No BID shall be modified, substituted or withdrawn by the Bidder on or after the BID Due Date & Time.
- (ii) Any alteration / modification in the BID or additional information supplied subsequent to the BID Due Date, unless the same has been expressly sought for by the Authority shall be disregarded.
- (iii) For modification of e-BID, Bidder has to detach its old BID from e-tendering portal and upload / resubmit digitally signed modified BID.
- (iv) For withdrawal of the BID, the Bidder has to click on withdrawal icon at e-tendering portal and can withdraw its e-BID.
- (v) It may be specifically noted that after withdrawal of a BID for any reason, Bidder cannot re-submit the e-BID.

4. Opening & Evaluation of BIDs.

- (i) Opening and Evaluation of BIDs will be done through online process.
- (ii) The Authority shall open Technical BIDs received on-line at **17:30 hours IST** on October 23, 2021 in the presence of the Bidders, who choose to attend. Technical BID of those Bidders only shall be opened online whose documents as listed in **clause 2.11** of the RFP have been physically received. The Authority will subsequently examine and evaluate the BIDs in accordance with the provisions of **Section 3** of RFP.
- (iii) Prior to evaluation of the BIDs, the Authority shall determine whether each BID is responsive as per **clause 2.19** of the Instruction to Bidders as per e-tendering process.
- (iv) The online payment facility for the submission of registration Fee and Tender Processing Fee, which is payable to e-tender service provider, has been enabled on e - Tender Portal <https://ddtenders.gov.in> the Bidders can pay the Registration Charges as applicable and Tender Processing Fees on-line.

DISCLAIMER

The information contained in this Request for Proposal (“RFP”) document or subsequently provided to bidders, verbally or in documentary or any other form by or on behalf of the DSCL or any of its employees or advisers, is provided to bidders on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is provided.

This RFP is not an agreement and is not an invitation by the Authority to the prospective Consultants or any other person. The purpose of this RFP is to provide interested bidders with information that may be useful to them in the formulation of their Proposals pursuant to this RFP. This RFP includes statements, which reflect various assumptions and assessments arrived at by the Authority in relation to the Consultancy. Such assumptions, assessments and statements do not purport to contain all the information that each bidder may require.

This RFP may not be appropriate for all persons, and it is not possible for the Authority, its employees or advisers to consider the objectives, technical expertise and particular needs of each party who reads or uses this RFP. The assumptions, assessments, statements and information contained in this RFP, may not be complete, accurate, adequate or correct. Each bidder should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments and information contained in this RFP and obtain independent advice from appropriate sources. Information provided in this RFP to the bidder (consultant / contractor / developer / Manufacturer / Supplier etc.) is on a wide range of matters, some of which depends upon interpretation of law. The information given is not an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Authority accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on the law expressed herein.

The DSCL and its employees and advisers make no representation or warranty and shall have no liability to any person including any bidder under any law, statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this RFP or otherwise, including the accuracy, adequacy, correctness, reliability or completeness of the RFP and any assessment, assumption, statement or information contained therein or deemed to form part of this RFP or arising in any way in this Selection Process.

The DSCL also accepts no liability of any nature whether resulting from negligence or otherwise however caused arising from reliance of any bidder upon the statements contained in this RFP. The DSCL may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumption contained in this RFP. The issue of this RFP does not imply that the Authority is bound to select a bidder or to appoint the selected bidder, as the case may be, for the Consultancy and the DSCL reserves the right to reject all or any of the Proposals without assigning any reasons whatsoever.

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 DSCL or any other costs incurred in connection with or relating to its Proposal.

All such costs and expenses will remain with the bidder and the DSCL shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a bidder in preparation or submission of the Proposal, regardless of the conduct or outcome of the Selection Process.

Chief Executive Officer

Diu Smart City Limited

GLOSSARY

Agreement	As defined in Clause 1.1.4
Authority	As defined in Clause 1.1.1
Bank Guarantee	As defined in Clause 2.20.1
BID(s)	As defined in Clause 1.2.2
Bidders	As defined in Clause 1.2.1
Bidding Documents	As defined in Clause 1.1.5
BID Due Date	As defined in Clause 1.1.5
Bidding Process	As defined in Clause 1.2.1
BID Securing Declaration	As defined in Clause 1.2.4
BID Price or BID	As defined in Clause 1.2.6
Contractor	As defined in Clause 1.1.2
Construction Period	As defined in Clause 1.2.6
Conflict of Interest	As defined in Clause 2.2.1(c)
Defect Liability Period	As defined in Clause 1.2.6
Bid Capacity	As defined in Clause 2.2.2.1
Technical Capacity	As defined in Clause 2.2.2.2
EPC	As defined in Clause 1.1.1
EPC Contract	As defined in Clause 1.1.2
Estimated Project Cost	As defined in Clause 1.1.3
Financial Capacity	As defined in Clause 2.2.2.3
Government	Government of India
Joint Venture	As defined in Clause 2.2.1
Jt. Bidding Agreement	As defined in Clause 2.1.11 (f)
Lead Member	As defined in Clause 2.1.11 (c)
Lowest Bidder	As defined in Clause 1.2.6
LOA	As defined in Clause 3.3.4
Performance Security	As defined in Clause 2.21.1
Additional Performance Security	As defined in Clause 2.21.1
Project	defined in Clause 1.1.1
Re. or Rs. or INR	Indian Rupee
RFP or Request for Proposals	As defined in the Disclaimer
Selected Bidder	As defined in Clause 3.3.1
Tie BIDs	As defined in Clause 3.3.2

The words and expressions beginning with capital letters and defined in this document shall, unless repugnant to the context, have the meaning ascribed thereto herein.

SECTION 1

1 INTRODUCTION

1.1 Background

1.1.1 DSCL (through Chief Executive Officer –“ **Authority** “) is now engaged in the development of DIU into smart city under Smart City Mission of Government of India and as a part of this endeavour, DSCL has decided to undertake development of Coastal Promenade, Urban Streets comprising of upgradation of existing roads, retaining wall on the sea side, storm water network, utilities duct, public amenities, bus shelters, road intersections, landscaping and horticulture works including operation and maintenance during the defect liability period which shall be 5 years (“**Project**”) through Engineering Procurement and Construction (the,“**EPC**”) Contract and decided to carry out the Bidding process for selection of a Bidder to whom the project may be awarded. A brief description of the project may be seen at Schedules. Brief particulars of the Project are as follows:

S No.	Name of the Works	Length (meter)	Average Width available (meter)		Estimated Project Cost (Rs. Crore)	No of Years for completion of work
			Existing	Proposed		
i.	Development of Coastal Promenade - Diu Ghoghla bridge to Diu fort	1545.00	9.00m to 5.70m	16.50 m	INR 319.10 Crore (Indian Rupees Three Hundred and Nineteen Crores Ten lakhs Only)	730 Days including design and Monsoon Period
ii.	Development of Coastal Promenade - Summer House to Fudam Ghousala and extended to Gangeshwar Temple including Night Lighting	3426.00	5.50m to 6.50m	25.00m – 30.00m		Operation and Maintenance and Defect Liability Period– 60 Months
iii.	Landscaping & Beautification of Summer House garden	Development activities as provided in the Schedule B				
iv.	Urban Design of Selected Streets and Public Areas in walled City Diu	Development activities as provided in the Schedule B				

S No.	Name of the Works	Length (meter)	Average Width available (meter)		Estimated Project Cost (Rs. Crore)	No of Years for completion of work
			Existing	Proposed		
	& Ghoghla					
v.	Development of Portuguese Street	Development activities as provided in the Schedule B				

- 1.1.2 The selected Bidder (the "Contractor") shall be responsible for Designing, Engineering, Procurement and Construction of the Project in accordance with the provisions of an Engineering, Procurement and Construction contract (the "EPC Agreement") to be entered into between the Contractor and The Authority in the form provided by The Authority as a part of the Bidding Documents pursuant hereto. The Contractor shall also be responsible for the Operation & maintenance of the project during the Defect Liability Period of 5 (Five) years. The scope of work will broadly include upgradation and augmentation of the existing carriageway to [with/without paved shoulders] standards with construction of new pavement of existing roads, culverts, road intersections, interchanges, drains, etc as defined in the Schedule B of this RFP and Operation & maintenance of the Project during the Defect Liability Period, which shall be 5 years.
- 1.1.3 The estimated cost of the Project (the "Estimated Project Cost") has been specified in the clause 1.1.1 above. The assessment of actual costs, however, will have to be made by the Bidders.
- 1.1.4 The Agreement sets forth the detailed terms and conditions for award of the project to the Contractor, including the scope of the Contractor's services and obligations.
- 1.1.5 The Authority shall receive BIDs pursuant to this RFP in accordance with the terms set forth in this RFP and other documents to be provided by The Authority pursuant to this RFP, as modified, altered, amended and clarified from time to time by the Authority (collectively the "Bidding Documents"), and all BIDs shall be prepared and submitted in accordance with such terms on or before the BID Due Date as specified in Clause 1.3 for submission of BIDs (the "BID Due Date")

1.1.6 The Statements and explanations contained in this RFP are intended to provide a better understanding to the Bidders about the subject matter of this RFP and should not be construed or interpreted as limiting in any way or manner the scope of work and obligations of the Contractor set forth in the Agreement or The Authority's rights to amend, alter, change, supplement or clarify the scope of work, the work to be awarded pursuant to this RFP or the terms thereof or herein contained. Consequently, any omissions, conflicts or contradictions in the Bidding Documents including this RFP are to be noted, interpreted and applied appropriately to give effect to this intent, and no claims on that account shall be entertained by the Authority.

1.2 Brief description of Bidding Process

1.2.1 The Authority has adopted a single stage two part process (collectively referred to as the "Bidding Process") for selection of the Bidder for award of the Project. Under this process, the BID shall be invited under two parts. Eligibility and qualification of the Bidder will be first examined based on the details submitted under first part (Technical Bid) with respect to eligibility and qualifications criteria prescribed in this RFP. (The "Bidder", which expression shall, unless repugnant to the context, include all members of the Joint Venture). Prior to making an Application, the Bidder shall pay to the Authority a sum of **INR. 25,000 (Indian Rupees Twenty Five Thousands only)** plus 18% GST as the cost of Tender Fee. The Financial BID under the second part shall be opened only for those Bidders whose Technical BIDs are responsive as per the eligibility and qualifications requirements set forth in this RFP.

Government of India has issued guidelines (see Appendix-IA – Annexure VII) for qualification of Bidders seeking to acquire stakes in any public sector enterprise through the process of disinvestment. The guidelines shall apply *mutatis mutandis* to this Bidding Process. The Authority shall be entitled to disqualify a Bidder in accordance with the aforesaid guidelines at any stage of the Bidding Process. Bidders must satisfy themselves that they are qualified to BID, and should give an undertaking to this effect in the form at **Appendix-I**.

1.2.2 In the BID Stage, the aforesaid Bidders, including their successors (**the "Bidders"**), are being called upon to submit their Technical & Financial offers (**the "BIDs"**) in accordance with the terms specified in the Bidding Documents. The BID shall be valid for a period of not less than 180 days from the date specified in Clause 1.3 for submission of BIDs (the "BID Due Date").

1.2.3 The Bidding Documents include the draft Agreement for the Project. The Preliminary Design detailing scope of the Project as prepared by the Authority/ consultants of the Authority is also provided to the Bidders. The aforesaid documents and any addenda issued subsequent to this Document will be deemed to form part of the Bidding Documents.

1.2.4 A Bidder is required to deposit, along with its BID, a BID security for **INR 6.40 Crore (Indian Rupees Six Crore Forty Lakh Only)** (the "BID Security"), refundable after signing of contract with successful Bidder or after 180 days from BID Due Date whichever is earlier. In the case of the Selected Bidder, the BID Security shall be retained till the Bidder has provided a Performance Security under the Agreement. The Bidders will have to

provide BID Security in the form of a Bank Guarantee issued by any Nationalised / Public Sector Bank or Scheduled Bank in India and having a minimum net worth of Rs. 1000 Crore or any other bank acceptable to the Authority, and in such event, the validity period of the Bank Guarantee, shall not be less than 240 (Two hundred and forty) days from the BID Due Date, inclusive of a claim period of 60 (sixty) days, and may be extended as may be mutually agreed between the Authority and the Bidder from time to time. The BID shall be summarily rejected if it is not accompanied by the BID Security.

Tender Fee and EMD/Bid Security are exempted for MSEs (Micro and Small Enterprises) registered with MSE Udyam. Bidder must submit registration document of **MSE Udyam** along with Technical Bid. Further Bidder is also requested to submit '**Bid Security Declaration**' and should be kept with Bid Documents. If Bidder withdraw or modify their bids during period of validity, they will be suspended for the time specified in the tender document.

The Format for Bid Security Declaration shall be furnished in the format as per **Appendix-X**

Bank Details of Authority (DSCL) required for Bid Security Bank Guarantee:

Beneficiary Name	Drawn in favor of Chief Executive Officer, DIU SMART CITY LTD, Diu, in the form of Fixed Deposit Receipt (FDR)/ Draft/Bank Guarantee
Name of the Bank	Bank of India, Diu Branch
Account No.	339710110006808
Branch Address	Diu, Daman & Diu- 362520
IFSC CODE	BKID0003397

1.2.5 Bidders are advised to examine the Project in greater detail, and to carry out, at their cost, such studies as may be required for submitting their respective BIDs for award of the contract including implementation of the Project.

1.2.6 BIDs are invited for the Project on the basis of the lowest quoted price by a Bidder for implementing the Project (the "BID Price"). The total time allowed for completion of construction under the Agreement (the "Construction Period") and the period during which the Contractor shall be liable for Operation & Maintenance and rectification of any defect or deficiency in the Project (the "Defects Liability Period") after '**issue of Construction completion certificate**' shall be pre-determined, and is as specified in the draft Agreement forming part of the Bidding Documents.

In this RFP, the term "Lowest Bidder" shall mean the Bidder who is quoting the lowest BID price.

1.2.7 Generally, the Lowest Bidder shall be the selected Bidder. The remaining Bidders shall be kept in reserve and may, in accordance with the process specified in the RFP, be invited to match the BID submitted by the Lowest Bidder in case such Lowest Bidder withdraws or

is not selected for any reason. In the event that none of the other Bidders match the BID of the Lowest Bidder, the Authority may, in its discretion, invite fresh BIDs from the remaining Bidders or annul the Bidding Process, as the case may be.

1.2.8 Other details of the process to be followed under this bidding process and the terms thereof are spelt out in this RFP.

1.2.9 Any queries or request for additional information concerning this RFP shall be submitted in writing by e-mail to the officer designated in clause 2.11.4 below with identification title "Design, Construction, Operation & Maintenance of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Gaushala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden including Operation and Maintenance for a period of 5 years"

1.3 Schedule of Bidding Process

The Authority shall endeavour to adhere to the following schedule:

S. No.	Event Description	Date
1.	Invitation of RFP (NIT)	20.09.2021
2.	Last date for receiving queries	27.09.2021
3.	Pre-BID meeting at venue 2.11.4 (or Virtual Pre Bid meeting will be arranged. Meeting link will be shared to Bidders who submitted queries prior to pre-bid meeting)	29.09.2021, 15:30 Hrs
4.	Last date of Request for BID Document	18.10.2021 upto 11.00 Hrs.
5.	BID Due Date	18.10.2021 upto 17.00 Hrs.
6.	Physical Submission of Bid Security/POA	23.10.2021 upto 17.00 Hrs.
7.	Opening of Technical BIDs at venue	23.10.2021 at 17.30 Hrs.
8.	Declaration of Eligible/ Qualified Bidders	To be communicated
9.	Opening of Financial BID	To be communicated
10.	Issue of Letter of Acceptance (LoA)	To be communicated
11.	Return of the signed duplicate copy of the LOA by the selected Bidder	To be communicated
12.	Validity of BID	180 days from BID Due date

S. No.	Event Description	Date
13.	Submission of Performance Security (PS) and Additional Performance Security (APS), if Any	Within 15 days of receipt of LOA. (The bidder has the option to provide 50% of PS and APS, if any within 15 days of receipt of LOA and the remaining PS and APS, if any to be provided within 15 days of signing of agreement)
14.	Signing of Agreement	Within 10 days from the receipt of 50% of Performance Security and 50% of Additional Performance Security, if any

SECTION 2

2 INSTRUCTIONS TO BIDDERS

A. GENERAL

2.1 General Terms of the Bidding

- 2.1.1 No Bidder shall submit more than one BID for the Project. A Bidder bidding individually or as a member of a Joint Venture shall not be entitled to submit another BID either individually or as a member of any Joint Venture, as the case may be.
- 2.1.2 Deleted.
- 2.1.3 Notwithstanding anything to the contrary contained in this RFP, the detailed terms specified in the draft Agreement shall have overriding effect; provided, however, that any conditions or obligations imposed on the Bidder hereunder shall continue to have effect in addition to its obligations under the Agreement. Further, the statements and explanations contained in this RFP are intended to provide a better understanding to the Bidders about the subject matter of this RFP and should not be construed or interpreted as limiting in any way or manner the scope of services and obligations of the Contractor set forth in the Agreement or the Authority's rights to amend, alter, change, supplement or clarify the scope of work, the work to be awarded pursuant to this RFP or the terms thereof or herein contained. Consequently, any omissions, conflicts or contradictions in the Bidding Documents including this RFP are to be noted, interpreted and applied appropriately to give effect to this intent, and no claims on that account shall be entertained by the Authority.
- 2.1.4 After opening of the Technical bids, Chief Executive Officer, DSCL shall prepare a list of deficiencies noticed in the bids of each bidder vis-a-vis requirements as per RFP and the respective bidders will be communicated by email with a request to furnish required documents within 7 days of receipt, failing which it will be presumed that they do not have any further documents to furnish and decision on bids will be taken accordingly.
- 2.1.5 The BID shall be furnished in the format exactly as per **Appendix-I** i.e. Technical Bid as per Appendix IA and Financial Bid as per Appendix IB. BID amount shall be indicated clearly in both figures and words, in Indian Rupees in prescribed format of Financial Bid and it will be signed by the Bidder's authorised signatory. In the event of any difference between figures and words, the amount indicated in words shall be taken into account.
- 2.1.6 The Bidder should submit a **Power of Attorney** as per the format at **Appendix-III**, authorising the signatory of the BID to commit the Bidder.
- 2.1.7 In case the Bidder is a Joint Venture, the Members thereof should furnish a Power of Attorney in favour of the Lead Member in the format at **Appendix-IV**. And joint bidding agreement in the format at **Appendix-V**
- 2.1.8 Any condition or qualification or any other stipulation contained in the BID shall render the BID liable to rejection as a non-responsive BID.
- 2.1.9 The BID and all communications in relation to or concerning the Bidding Documents and the BID shall be in English language.

2.1.10 This RFP is not transferable.

2.1.11 Any award of Project pursuant to this RFP shall be subject to the terms of Bidding Documents and also fulfilling the criterion as mentioned in clause 2.2.

2.1.12 In case the Bidder is a Joint Venture, it shall comply with the following additional requirements:

- i. Number of members in a Joint Venture shall not exceed 3 (Three);
- ii. Subject to the provisions of clause (a) above, the Bid should contain the information required for each Member of the Joint Venture;
- iii. Members of the Joint Venture shall nominate one member as the lead member (the "Lead Member"). Lead Member shall meet at least 60% requirement of Bid Capacity, Technical and Financial Capacity, required as per Clause 2.2.2.1, 2.2.2.2 & 2.2.2.3. The nomination(s) shall be supported by a Power of Attorney, as per the format at Appendix-III, signed by all the other Members of the Joint Venture. Other Member(s) shall meet at least 20% requirement of Bid Capacity, Technical and Financial Capacity required as per Clause 2.2.2.1, 2.2.2.2 & 2.2.2.3 and the JV as a whole shall cumulatively/collectively fulfil the 100% requirement. The work experience of the JV partners shall be considered as the work experience of the Lead partner only;
- iv. The Bid should include a brief description of the roles and responsibilities of individual members, particularly with reference to financial, technical and defect liability obligations;
- v. The Lead Member shall itself undertake and perform at least 60 (Sixty) per cent of the Project,
- vi. Members of the Joint Venture shall have entered into a binding Joint Bidding Agreement, substantially in the form specified at **Appendix V** (the "Joint Bidding Agreement") for the purpose of the Application and submitting the BID in the event of being prequalified. The bidding agreement, to be submitted along with the Application shall inter alia:
 - I. Convey the commitment(s) of the Lead Member in accordance with this RFP, in case the contractor undertake the Project is awarded to the Joint Venture and clearly outline the proposed role and responsibilities of each member if any
 - II. Commit the approximate share of work to be undertaken by each member confirming to the sub clause 2.1.11(e) mentioned above
 - III. Include a statement to the effect that all members of the Joint Venture shall be liable jointly and severally for all obligations of the contractor in relation to the project until the Defect Liability Period is achieved in accordance with the EPC contract; and
- vii. Except as provided under this RFP, there shall not be any amendment to the Jt. Bidding Agreement.
- viii. Deleted

2.1.13 Deleted

2.1.14 Deleted

2.1.15 Notwithstanding anything to the contrary contained herein, in the event that the Bid Due Date falls within three months of the closing of the latest financial year of a Bidder, it shall ignore such financial year for the purposes of its Bid and furnish all its information and certification with reference to the 5 (five) years or 1 (one) year, as the case may be, preceding the latest financial year. For the avoidance of doubt, Financial year shall, for the purposes of a Bid hereunder, means the accounting year followed by the Bidder in the course of its normal business.

2.1.16 The Bidder, including an individual or any of its Joint Venture members, should not be a non-performing party on the bid submission date. The Bidder, including any Joint Venture Member, shall be deemed to be a non-performing party (not applicable to the project whose contract is terminated by the Authority) if it attracts any or more of the following parameters:

- I. Fails to complete or has missed Project completion milestones in already awarded two or more projects, unless Extension of Time has been allowed on the recommendations of the Authority Engineer due to Authority's default;
- II. Punch List Items in respect of any project are pending due to Bidder's default in two or more Projects even after lapse of the prescribed time for completion of such items;
- III. Fails to fulfil its obligations to maintain a Project in a satisfactory condition in spite of two rectification notices issued in this behalf;
- IV. Fails to attend to Non Conformity Reports (NCRs) issued by the Independent/ Authority's Engineer on the designs/ works constructed by the Bidder pending for more than one year in two or more projects.
- V. Damages/ Penalties recommended by the Authority's Engineer on the Bidder during O&M period and the remedial works are not taken up in two or more projects.
- VI. Fails to submit the Performance Security within the permissible period in more than one project(s).
- VII. Rated as an unsatisfactory performing entity/ non-performing entity by an independent third party agency and so notified on the website of the Authority.
- VIII. Has Failed to perform for the works in the last 2(two) years, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitral award against the Bidder, including individual or any of its Joint Venture Member, as the case may be
- IX. Has been expelled or the contract terminated for breach by such Bidder, including individual or any of its Joint Venture Member; Provided that any such decision of expulsion or termination of contract leading to debarring of the Bidder from further participation in bids for the prescribed period should have been ordered after affording an opportunity of hearing to such party

2.1.17 The Bidder, including individual or each member of Joint Venture, shall give the list of the projects and the status of above issues in each project as on the bid submission date and undertake that they do not attract any of the above categories (Ref. Sr. No.6, Annex-I of Appendix – IA).

The Bidder including individual or any of its Joint Venture Member may provide

- (i) Details of all their on-going projects along with updated stage of litigation, if so, against the Authority / Governments;
- (ii) The Sole Bidder or any member of the consortium should not be black listed by Central Government/any State Government/ Public Sector undertaking entity in India or similar agencies globally for unsatisfactory, Past performance, corrupt, fraudulent or any other unethical business practices as on date of submission of the proposal.
- (iii) Details of all their ongoing projects in the format at Annexure-VIII of Appendix IA.

The Authority reserves the right to reject an otherwise eligible Bidder on the basis of the information provided under this clause 2.1.16; the decision of the Authority in this case shall be final and binding.

2.2 Eligibility and Qualification Requirements of the Bidder

2.2.1 For determining the eligibility of Bidders and their qualification, the following shall apply:

- a. The Bidder may be a single entity or a group of entities (the "Joint Venture"), coming together to implement the Project. The term Bidder used herein would apply to both a single entity and a Joint Venture.
- b. Bidder may be a natural person, private entity, an existing company incorporated under the Indian Companies Act, 1956/ 2013, Limited Liability Partnership, Partnership firms, Proprietor or any combination of them with a formal intent to enter into a Joint Venture agreement or under an existing agreement to form a Joint Venture. A Joint Venture shall be eligible for consideration subject to the conditions set out in Clause 2.1.11 above.
- c. A Bidder shall not have a conflict of interest (the "Conflict of Interest") that affects the Bidding Process. Any Bidder found to have a Conflict of Interest shall be disqualified. Bidder shall be deemed to have a Conflict of Interest affecting the Bidding Process, if:
 - I. the Bidder, its Joint Venture Member (or any constituent thereof) and any other Bidder, its Member or any Member of its Joint Venture thereof (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this disqualification shall not apply in cases where the direct or indirect shareholding of a Bidder, or its Joint Venture Member thereof (or any shareholder thereof having a shareholding of more than 5% (five percent) of the paid up and subscribed share capital of such Bidder, or its Joint Venture Member, as the case may be), in the other Bidder, its Joint Venture Member is less than 5% (five percent) of the subscribed and paid up equity share capital thereof; provided further that this disqualification shall not apply to any ownership by a bank, insurance company, pension fund or a public financial institution referred to in section 4A of the Companies Act 1956. For the purposes of this Clause 2.2.1(c), indirect shareholding held through one or more intermediate persons shall be computed as follows:

(aa) where any intermediary is controlled by a person through management control or otherwise, the entire shareholding held by such controlled intermediary in any other person (**the “Subject Person”**) shall be taken into account for computing the shareholding of such controlling person in the Subject Person; and (bb) subject always to sub-clause (aa) above, where a person does not exercise control over an intermediary, which has shareholding in the Subject Person, the computation of indirect shareholding of such person in the Subject Person shall be undertaken on a proportionate basis; provided, however, that no such shareholding shall be reckoned under this sub-clause (bb) if the shareholding of such person in the intermediary is less than 26% of the subscribed and paid up equity shareholding of such intermediary; or

- II. a constituent of such Bidder is also a constituent of another Bidder; or
- III. such Bidder, or any of its Joint Venture Member thereof receives or has received any direct or indirect subsidy, grant, concessional loan or subordinated debt from any other Bidder, or any of its Joint Venture Member thereof or has provided any such subsidy, grant, concessional loan or subordinated debt to any other Bidder, its Member or any of its Joint Venture Member thereof; or
- IV. such Bidder has the same legal representative for purposes of this BID as any other Bidder; or
- V. such Bidder, or any of its Joint Venture Member thereof has a relationship with another Bidder, or any of its Joint Venture Member thereof, directly or through common third party/ parties, that puts either or both of them in a position to have access to each other's' information about, or to influence the BID of either or each other; or
- VI. such Bidder, or any of its Joint Venture Member thereof has participated as a consultant to the Authority in the preparation of any documents, Design or technical specifications of the Project.

2.2.2 Qualification Requirement of Bidders

2.2.2.1 BID Capacity

Bidders who *interalia* meet the minimum qualification criteria will be qualified only if their **available BID capacity is more than the total BID value** (estimated Cost of Project as per Clause 1.1.1). The available BID capacity will be calculated as per following, based on information mentioned at Annexure-VI of Appendix-IA:

Assessed Available BID capacity = (A*N*2.5 – B+C); where

N= Number of years prescribed for completion of work for which Bid is invited.

A = Maximum value of civil engineering works excluding the amount of bonus received, if any, in respect of EPC Projects executed in any one year during the last five years (updated to the price level of the year indicated in table at Note-3 below) taking into account the completed as well as works in progress. The **EPC projects** include turnkey project/ Item rate contract/ EPC projects.

B = Value (updated to the price level of the year indicated in table at Note - 3 below) of existing commitments, works for which Appointed Date/ Commencement Date has been declared or on-going works to be completed during the period of completion of the works for which BID is invited. For the sake of clarification, it is mentioned that works for which LOA has been issued but Appointed Date/ Commencement Date not declared as on Bid Due Date shall not be considered while calculating value of B.

C = the amount of bonus received, if any, in EPC Projects during the last 5 years (updated to the price level of the year indicated in table at Note-3 below).

Note:

1. The Statement showing the value of all existing commitments, works for which Appointed Date/ Commencement Date has been declared and on-going works as we last the stipulated period of completion remaining for each of the works listed should be countersigned by the Client or its Engineer-in-charge not below the rank of Executive Engineer or equivalent in respect of EPC Projects **or** Concessionaire / Authorised Signatory of SPV in respect of BOT Projects or Competent authority.
2. The amount of bonus received if any in EPC Projects should be counter signed by the Client or its Engineer in charge not below the rank of Executive Engineer or Equivalent in respect of EPC Projects
3. The factor for the year for updating to the price level indicated as under

Year	2019-2020	2018-19	2017-18	2016-17	2015-16
Updation factor	1.0	1.07	1.14	1.21	1.28

2.2.2.2 Technical Capacity

- I. Should have satisfactorily completed the works as mentioned below during the last Seven years ending previous day of last date of submission of tender.

Three similar completed works each of value not less than the amount equal to 40% of the Estimated Project Cost (Amount INR 127.64 Crores)

or

Two similar completed works each of value not less than the amount equal to 50% of the Estimated Project Cost (Amount INR 159.55 Crores)

or

One similar completed work of aggregate cost not less than the amount equal to 80% of the Estimated Project Cost (Amount INR 255.28 Crores).

with Central Government Department / State Government Department / Central Autonomous Body / Central Public Sector undertaking / State Autonomous Body / State Public Sector undertaking / City Development authority / Municipal Corporation of city formed under any act by central / state Government and published in Central / State Gazette / PPP Concessionaire .

Note: TDS (Tax deducted at Source) certificate for Private works shall be enclosed other than Govt. works for above mentioned criteria

II. **Similar Nature of Work:**

- A. The Bidder(s), shall have required experience in executing the works related to Design and Construction/Construction experience of Roads (Highways or Urban or Streets)/ Waterfront Development (Marine/River, etc.) / Airport / Township projects/ Building projects with development services provided the criteria of key activities are fulfilled as per 2.2.2.2 (II) (B).
- B. **Construction Experience in Key Activities:** The bidder must have executed of similar items of work in the completed projects during the last 10 financial years.
1. The Bidder must have the construction experience of minimum 20% of the Estimated Cost i.e. Amount INR 64.00 Crores for the Bituminous Road work, Cement Concrete Road Work and Flooring paving of cement concrete/stone slabs/tiles etc. under Roads (Highways or Urban or Streets) or Waterfront Development (Marine/River, etc.) or Similar Development works and the combined value of activity executed by the bidder in all up to 5 completed works and the completed works for which the Completion Certificates Submitted under Clause 2.2.2.2(I) during the last 10 years.

2. Retaining Wall works in water front condition

The Bidder must have the relevant experience in the Design and Construction / Construction of the Retaining wall works in the water front of minimum 5% of the Estimated Cost i.e. Amount INR 16.00 Crores.

OR

A MoU can be done by the Bidder with another agency that has the required experience of Design and Construction / construction of the Retaining wall works in the water front of minimum 5% of the Estimated Cost i.e. Amount INR 16.00 Crores & the Bidder shall have to ensure that the execution shall be done by the same agency with whom the MoU has been signed.

OR

The Bidder may engage a PMC who had the required experience of Design and Construction / Supervision of the Retaining wall works in the water front of minimum 5% of the Estimated Cost i.e. Amount INR 16.00 Crores.

The Bidder has to clearly mention through an Undertaking on his letter pad at the time of Bidding about the details of the MOU/ PMC and Contract document of MOU/PMC must be submitted before the last date of opening of Financial Bid.

Diaphragm wall structure shall also be considered as Retaining wall structure.

3. Key Activities criteria

Activity No.	Criteria	Minimum Requirement in terms of Value of work
1	Storm Water Drain	Should have 5% of the estimated cost of the project i.e. Amount INR 16.00 Crores
2	Water Supply Pipe Network	Should have 3% of the estimated cost of the project i.e. Amount INR 10.00 Crores
3	Landscaping works	Should have 5% of the estimated cost of the project i.e. Amount INR 16.00 Crores
4	External Electrification and Street Lighting works for Illumination	Should have 10% of estimated cost of the project i.e. Amount INR 32.00 Crores
<p>i. The Bidder must have executed similar items of work in the completed projects during the last 10 financial years and the combined value of activities executed by the bidder in all up to 5 completed works and the completed works for which the Completion Certificates Submitted under Clause 2.2.2.2(I) should be of the value of the respective percentages and value for the above 4 Key Activities.</p> <p>ii. For the above Key Activities maximum 2 numbers of MOUs shall be permitted if the Bidder does not have the experience for the above Key Activities. The MOU Partner must have the experience in Design and construction / Construction as per the above minimum requirement.</p> <p>iii. Subcontract up to 30% of Estimated Cost is permitted as per the Clause 3.2 of Article 3 of Volume 2. In case the Bidder does not have the experience in the above Key Activities the work can be taken up for maximum of 2 Key Activities by the approved Sub Contractor provided the Subcontractor has the experience as per the above mentioned requirement.</p> <p>iv. The Bidder has to clearly mention through an Undertaking on his letter pad at the</p>		

Activity No.	Criteria	Minimum Requirement in terms of Value of work
		time of Bidding about the details of the MOU/ Subcontractor and Contract document of MOU/Sub Contract must be submitted before the last date of opening of Financial Bid.

C. Eligible Experience on Eligible Projects

- (i) For a project to qualify as an Eligible Project
 - a. It should have been undertaken as an EPC Project as defined under the Clause 2.2.2.1, The **EPC projects** include turnkey project/ Item rate contract/ EPC projects for a Central Government Department / State Government Department / Central Autonomous Body / Central Public Sector undertaking / State Autonomous Body / State Public Sector undertaking / City Development authority / Municipal Corporation of city formed under any act by central / state Government and published in Central / State Gazette / PPP Concessionaire and
 - b. The entity claiming experience should have held, in the company owning the Eligible Project, a minimum of 26% (twenty six per cent) equity during the entire year for which Eligible Experience is being claimed;
 - (i) The Bidder shall quote experience in respect of a particular Eligible Project, even though the Bidder (either individually or along with a member of the Joint Venture) may have played multiple roles in the cited project. Double counting for a particular Eligible Project shall not be permitted in any form.
 - (ii) Experience for any activity relating to an Eligible Project shall not be claimed by two or more Members of the Joint Venture. In other words, no double counting by a Joint Venture in respect of the same experience shall be permitted in any manner whatsoever
- III. Deleted
- IV. The value of executed work shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to last date of receipt of application for tender

2.2.2.3 Financial Capacity

- I. The bidder should have a **Solvency** of the amount equal to **INR 127.64 Crores (Indian Rupees One Hundred and Twenty Seven Crores Sixty Four Lakhs Only)** certified by his Banker and which not older than six months as on the date of submission of the bid.
- II. The bidder should have had **Average Annual Financial Turnover** of **INR 159.55 Crores (Indian Rupees One Hundred and Fifty Nine Crores Fifty Five Lakhs only)** on Civil/Electrical construction work during the last three consecutive years Balance sheets duly audited by Chartered Accountant (Scanned copy of Certificate from CA to be uploaded). Year in which no turnover is shown would also be considered for working out the average.

2.2.2.4 In case of a Joint Venture

- I. The Bid Capacity, Technical Capacity and Financial Capacity of all the Members of Joint Venture would be taken into account for satisfying the above conditions of eligibility Further, Lead Member shall meet at least 60% requirement of Bid Capacity, Technical and Financial Capacity as per Clause 2.2.2.1, 2.2.2.2(i) and 2.2.2.3 and each of other JV members shall meet at least 20% requirement of Bid Capacity, Technical and Financial Capacity individually as per Clause 2.2.2.1, 2.2.2.2(i) and 2.2.2.3. For avoidance of doubt it is further clarified that the Joint Venture must collectively and individually satisfy the above qualification criteria i.e. JV shall cumulatively/collectively fulfil the 100% requirement. The work experience of the JV partners shall be considered as the work experience of the Lead partner only.

2.2.2.5 Deleted

2.2.2.6 Deleted

2.2.2.7 Submission in support of Technical Capacity

- I. The Bidder should furnish the details of Eligible Experience for the last 7 (Seven) financial years immediately preceding the Bid Due Date.
- II. The Bidder must provide the necessary information relating to Technical Capacity as per format at Annex-II of Appendix-IA.
- III. The Bidder should furnish the required Project-specific information and evidence in support of its claim of Technical Capacity, as per format at Annex-IV of Appendix-IA.

2.2.2.8 Submission in support of Financial Capacity

- I. The Technical Bid must be accompanied by the Audited Annual Reports of the Bidder (of each Member in case of a Joint Venture) for the last 5 (five) financial Years, preceding the year in which the bid is submitted.
- II. In case the annual accounts for the latest financial year are not audited and therefore the Bidder cannot make it available, the Bidder shall give an undertaking to this effect and the statutory auditor shall certify the same. In such a case, the Bidder shall provide the Audited Annual Reports for 5 (five) years preceding the year for which the Audited Annual Report is not being provided.
- III. The Bidder must submit the solvency certificate in (Annex III-B”) as specified in Clause 2.2.2.3 (I), and provide details as per format at Annex-III B of Appendix-IA.

2.2.2.9 The Bidder shall enclose with its Technical Bid, to be submitted as per the format at Appendix-IA, complete with its Annexes, the following:

- I. Certificate(s) from its statutory auditors or the concerned client(s) stating the payments received or in case of a PPP project, the construction carried out by itself, during the past 5 years, in respect of the Eligible Projects. In case a particular job/ contract has been jointly executed by the Bidder (as part of a Joint Venture), it should further support it

claim for the payments received or construction carried out by itself in PPP Projects a applicable the share in work done for that particular job/ contract by producing a certificate from its statutory auditor or the client; and

II. Deleted.

2.2.2.10 Deleted.

2.3 Proprietary Data

All documents and other information supplied by the Authority or submitted by a Bidder to the Authority shall remain or becomes the property of the Authority and are transmitted to the Bidders solely for the purpose of preparation and the submission of a BID in accordance herewith. Bidders shall treat all information as strictly confidential and shall not use it for any purpose other than for preparation and submission of their Bid. The provisions of this Clause 2.3 shall also apply *mutatis mutandis* to BIDs and all other documents submitted by the Bidders, and the Authority will not return to the Bidders any BID document or any information provided along therewith.

2.4 Cost of Bidding

The Bidders shall be responsible for all of the costs associated with the preparation of their BIDs and their participation in the Bidding Process. The Authority will not be responsible or in any way liable for such costs, regardless of the conduct or outcome of the Bidding Process.

2.5 Site visit and Verification of information

2.5.1 Bidders are encouraged to submit their respective BIDs after visiting the Project site and ascertaining for themselves the site conditions, traffic, location, surroundings, climate, availability of power, water and other utilities for construction, access to site, handling and storage of materials, weather data, applicable laws and regulations, and any other matter considered relevant by them. Bidders are advised to visit the site and familiarise themselves with the Project with in the stipulated time of submission of the Bid. No extension of time is likely to be considered for submission of Bids

2.5.2 It shall be deemed that by submitting a BID, the Bidder has:

- a. Made a complete and careful examination of the EPC Bidding Documents;
- b. Received all relevant information requested from the Authority
- c. Accepted the risk of inadequacy, error or mistake in the information provided in the Bidding Documents or furnished by or on behalf of the Authority relating to any of the matters referred to in Clause 2.5.1 above. No claim shall be admissible at any stage on this account
- d. satisfied itself about all matters, things and information including matters referred to in **Clause 2.5.1** hereinabove necessary and required for submitting an informed BID, execution of the Project in accordance with the Bidding Documents and performance of all of its obligations there under;
- e. acknowledged and agreed that inadequacy, lack of completeness or incorrectness of information provided in the Bidding Documents or ignorance of any of the matters referred

to in **Clause 2.5.1** herein above shall not be a basis for any claim for compensation, damages, extension of time for performance of its obligations, loss of profits etc. from the Authority, or a ground for termination of the Agreement by the Contractor;

- f. Acknowledged that it does not have a Conflict of Interest; and
- g. Agreed to be bound by the undertakings provided by it under and in terms hereof.

2.5.3 The Authority shall not be liable for any omission, mistake or error in respect of any of the above or on account of any matter or thing arising out of or concerning or relating to RFP, the Bidding Documents or the Bidding Process, including any error or mistake therein or in any information or data given by the Authority.

2.6 Verification and Disqualification

2.6.1 The Authority reserves the right to verify all statements, information and documents submitted by the Bidder in response to the RFP and the Bidder shall, when so required by the Authority, make available all such information, evidence and documents as may be necessary for such verification. Any such verification or lack of such verification, by the Authority shall not relieve the Bidder of its obligations or liabilities hereunder nor will it affect any rights of the Authority thereunder.

2.6.2 The Authority reserves the right to reject any BID and appropriate the BID Security if:

- a. at any time, a material misrepresentation is made or uncovered, or
- b. The Bidder does not provide, within the time specified by the Authority, the supplemental information sought by the Authority for evaluation of the BID.

Such misrepresentation/ improper response shall lead to the disqualification of the Bidder. If the Bidder is a Joint Venture, then the entire Joint Venture and each Member of the Joint Venture may be disqualified/ rejected. If such disqualification/rejection occurs after the BIDs have been opened and the lowest Bidder gets disqualified / rejected, then the Authority reserves the right to annul the Bidding Process and invite fresh BIDs.

2.6.3 In case it is found during the evaluation or at any time before signing of the Agreement thereof, that one or more of the eligibility and /or qualification requirements have not been met by the Bidder, or the Bidder has made material misrepresentation or has given any materially incorrect or false information, the Bidder shall be disqualified forthwith if not yet appointed as the contractor either by issue of the LOA or entering into of the Agreement, and if the Selected Bidder has already been issued the LOA or has entered into the Agreement, as the case may be, the same shall, notwithstanding anything to the contrary contained therein or in this RFP, be liable to be terminated, by a communication in writing by the Authority to the Selected Bidder or the Contractor, as the case may be without the Authority being liable in any manner whatsoever to the Selected Bidder or the Contractor. In such an event, the Authority shall be entitled to forfeit and appropriate the BID Security or Performance Security, as the case may be, as Damages, without prejudice to any other right or remedy that may be available to the Authority under the Bidding Documents and / or the Agreement, or otherwise.

2.6.4 A Bidder shall be liable for disqualification and forfeiture of BID Security, if any legal, financial or technical adviser of the Authority in relation to the Project is engaged by the

Bidder, its Member or any Associate thereof, as the case may be, in any manner for matters related to or incidental to such Project during the Bidding Process or subsequent to the (i) issue of the LOA or (ii) execution of the Agreement. In the event any such adviser is engaged by the selected Bidder or Contractor, as the case may be, after issue of the LOA or execution of the Agreement for matters related or incidental to the project, then notwithstanding anything to the contrary contained herein or in the LOA or the Agreement and without Prejudice to any other right or remedy or the Authority, including the forfeiture and appropriation of the BID Security or Performance Security, as the case may be, which the Authority may have there under or otherwise, the LOA or the Agreement, as the case may be, shall be liable to be terminated without the Authority being liable in any manner whatsoever to the Selected Bidder or Contractor for the same. For the avoidance or doubt, this disqualification shall not apply where such adviser was engaged by the Bidder, its Member or Associate in the past but its assignment expired or was terminated 6 (six) months prior to the date of issue of this RFP. Nor will this disqualification apply where such adviser is engaged after a period of 3 (three) years from the date of commercial operation of the project.

B. DOCUMENTS

2.7 Contents of the RFP

2.7.1 This RFP comprises the Disclaimer set forth hereinabove, the contents as listed below, and will additionally include any Addenda issued in accordance with Clause 2.9.

Volume I	Invitation for Bids	<u>Sections</u>
		<ul style="list-style-type: none"> • Section 1. Introduction • Section 2. Instructions to Bidders • Section 3. Criteria for Evaluation • Section 4. Fraud and Corrupt Practices • Section 5. Pre-BID Conference • Section 6. Miscellaneous
		<u>Appendices</u>
		<ul style="list-style-type: none"> • IA Letter comprising the Technical BID including Annexure I to VII • IB Letter comprising the Financial BID • II Bank Guarantee for BID Security • III. Power of Attorney for signing of BID • IV. Power of Attorney for Lead Member of Joint Venture • V. Joint Bidding Agreement for Joint Venture • VI. Integrity Pact Format • VII. Form of Bank Guarantee (For Performance Security)

		<ul style="list-style-type: none">• VIII. Format of LOA
Volume II	Draft EPC agreement with Schedules and Drawings	

2.7.2 The Draft EPC Agreement provided by the Authority as part of the BID Document shall be deemed to be part of this RFP.

2.8 Clarifications

2.8.1 Bidders requiring any clarification on the RFP may notify the Authority in writing or by e-mail in accordance with Clause 1.2.9. They should send in their queries on or before the date mentioned in the Schedule of Bidding Process specified in Clause 1.3. The Authority shall endeavour to respond to the queries within the period specified therein, but no later than 7 (Seven) days prior to the BID Due Date. The responses will be hosted on the DSCL tendering portal and also will be sent by e-mail to the bidders who have submitted the queries in accordance with clause 1.2.9. The Authority will forward all the queries and its responses thereto, to all Bidders without identifying the source of queries.

2.8.2 The Authority shall endeavour to respond to the questions raised or clarifications sought by the Bidders. However, the Authority reserves the right not to respond to any question or provide any clarification, in its sole discretion, and nothing in this Clause shall be taken or read as compelling or requiring the Authority to respond to any question or to provide any clarification.

2.8.3 The Authority may also on its own motion, if deemed necessary, issue interpretations and clarifications to all Bidders. All clarifications and interpretations issued by the Authority shall be deemed to be part of the Bidding Documents. Verbal clarifications and information given by The Authority or its employees or representatives shall not in any way or manner be binding on the Authority.

2.9 Amendment of RFP

2.9.1 At any time prior to the BID Due Date, the Authority may, for any reason, whether at its own initiative or in response to clarifications requested by a Bidder, modify the RFP by the issuance of Addenda.

2.9.2 Any Addendum issued hereunder will be hosted on DSCL Tendering Portal (<https://ddtenders.gov.in>)

2.9.3 In order to afford the Bidders a reasonable time for taking an Addendum into account, or for any other reason, the Authority may, in its sole discretion, extend the BID Due Date.

C. PREPARATION AND SUBMISSION OF BIDS

2.10 Format and Signing of BID

2.10.1 The Bidder shall provide all the information sought under this RFP. The Authority will evaluate only those BIDs that are received online in the required formats and complete in all respects and BID Security, processing fee, POA and Joint Bidding Agreement are received in hard copies.

2.10.2 The BID shall be typed or written in indelible ink and signed by the authorized signatory of the Bidder who shall also initial each page, in blue ink. All the alterations, omissions, additions or any of their amendments made to the BID shall be initialled by the person(s) signing the BID.

2.11 Documents Comprising of Technical and Financial Bids

2.11.1 The Bidder shall first upload all the project details, Solvency certificate details, turnover details and all other details required in this RFP for technical qualification. The Bidder shall ensure that all the details are updated as on the due date of submission of this bid.

The Bidder shall then apply for the RFP on the website (<https://ddtenders.gov.in>) by submitting the documents mentioned below along with the supporting documents which shall comprise of the Technical BID on the website.

Technical Bid

- a. Appendix – IA (Letter comprising the Technical BID) including Annexure I to VI and supporting documents and certificates,
- b. Power of Attorney for signing the BID as per the format at Appendix-III;
- c. if applicable, Power of Attorney for Lead Member of Joint Venture as per the format at Appendix-IV;
- d. if applicable, Joint Bidding Agreement for Joint Venture as per the format at Appendix-V
- e. BID Security of Amount as per NIT in the form of Bank Guarantee in the format at Appendix-II from the Scheduled Bank/ Nationalized Bank(to be submitted physically as well) ;
- f. Cost of Original Demand Draft towards payment of cost of Bid Document of amount as mentioned in the NIT towards cost of Bid document. The Draft shall be in the favour of Chief Executive Officer, Diu Smart City Limited payable at DIU.
- g. Bidder shall submit Integrity Pact (IP) duly signed by Authorized signatory shall be submitted by the Bidder with the RFP Bid & shall be part of the Contract Agreement(Appendix-VI);
- h. An undertaking from the person having PoA referred to in Sub. Clause-(b) above that they agree and abide by the Bid documents uploaded by DSCL and amendments uploaded, if any; and
- i. Annexure-VIII of Appendix – IA showing details of all ongoing projects works.
- j. Copy of Memorandum and Articles of Association, if the Bidder is a body corporate, and if a partnership then a copy of its partnership deed.
- k. Copies of duly audited complete annual accounts of the Bidder or of each member (in case of Joint Venture) for preceding 5 years.
- l. Approach and Methodology with special emphasis on Construction method planning
- m. Work Plan and Resource Deployment Schedule
- n. MoUs with the agency for Specialised work if any

Financial BID

- o. Appendix-IB (Letter comprising the Financial Bid).

2.11.2 The Bidder shall submit the following documents physically:

- a. Original Power of Attorney for signing the BID as per format at Appendix-III.
- b. if applicable, original Power of Attorney for Lead Member of Joint Venture as per the format at Appendix-IV.
- c. if applicable, Original Joint Bidding Agreement for Joint Venture as per the format at Appendix-V.
- d. BID Security of Amount as per NIT in the form of Bank Guarantee in the format at Appendix-II from the Scheduled Bank/ Nationalized Bank
- e. Copy of the Original Demand Draft towards payment of cost of Bid Document of amount as mentioned in the NIT. The Demand Draft shall be in the favour of Chief Executive Officer, Diu Smart City Limited payable at DIU.
- f. An undertaking from the person having PoA referred to in Sub. Clause-(b) above that they agree and abide by the Bid documents uploaded by DSCL and amendments uploaded, if any; and
- g. Solvency Certificate

2.11.3 The documents listed in Clause 2.11.2 shall be placed in an envelope which shall be sealed. The Envelope shall clearly bear the Identification Bid for "Design, Construction, Operation & Maintenance of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Gaushala and extended to Gageshwar temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu including operation and maintenance period of 5 Years on Engineering, Procurement, Construction ("EPC") basis"

2.11.4 The envelope shall be addressed to the following and shall be submitted at the

Chief Executive Officer

Diu Smart City Limited

DIU

2.11.5 If the envelope is not sealed and marked as instructed above, the Authority assumes no responsibility for the misplacement or premature opening of the contents of the BID submitted and consequent losses, if any, suffered by the Bidder.

2.11.6 BIDs submitted by fax, telex, telegram or e-mail shall not be entertained and shall be rejected.

2.12 BID Due Date

2.12.1 Technical and Financial BID comprising of the document listed at Clause 2.11 of the RFP shall be submitted online through e-procurement portal on or before 1700 hours IST on the BID Due Date. Documents listed at Clause 2.11.2 of the RFP shall be physically submitted on or before 1700 hours IST as per the date mentioned in schedule of Bidding process, at the address provided in Clause 2.11.3 in the manner and form as detailed in RFP. A receipt thereof should be obtained from the person specified in Clause 2.11.4.

2.13 Late BIDs

E-Procurement portal (<https://ddtenders.gov.in>) will not allow submission of any Bid after the prescribed date and time at clause 2.12. Physical receipt of documents listed at clause 2.11.2 of the RFP after the prescribed date and time at clause 2.12 shall not be considered and the bid shall be summarily rejected.

2.14 Procedure for E Tendering

2.14.1 Accessing/ Purchasing of BID documents

2.14.1.1 It is mandatory for all the Bidders to have class-III Digital Signature Certificate (DSC)(in the name of Authorized Signatory / Firm or Organization / Owner of the Firm or Organization) from any of the licensed Certifying Agency (Bidders can see the list of licensed CAs from the link www.cca.gov.in).

DSC should be in the name of the authorized signatory as authorized in Appendix III of this RFP or person executing/delegating such Appendix III in favour of Authorized Signatory. It should be in corporate capacity (that is in Bidder capacity / in case of JV in the Lead Member capacity, as applicable). **The Bidder shall submit document in support of the class III DSC. In other cases, the bid shall be considered Non-responsive.**

2.14.1.2 To participate in the bidding, it is mandatory for the Bidders to get registered their firm/Joint Venture with e-procurement portal <https://ddtenders.gov.in>

Have user ID & password which has to be obtained free of cost. Following may kindly be noted

- a. Registration with e-procurement portal should be valid at least up to the date of submission of BID.
- b. BIDs can be submitted only during the validity of registration.

It is also mandatory for the Bidders to get their firms registered with e-tendering portal. The Bidders shall update their project and other details on the portal on a regular basis and apply to the tenders via the portal

2.14.1.3 If the firm / Joint Venture is already registered with e-tendering service provider, and validity of registration is not expired, then the firm / Joint Venture is not required a fresh registration.

2.14.1.4 The complete BID document can be viewed / downloaded by the Bidder from e - procurement portal <https://ddtenders.gov.in>

2.14.1.5 Deleted

2.14.2 Preparation & Submission of BIDs:

2.14.2.1 The Bidder may submit his Bid online following the instructions appearing on the screen. The detailed guidelines for e-procurement is also available on e - procurement portal.

2.14.2.2 The documents listed at clause 2.11.1 shall be prepared and scanned in different files (in PDF or RAR format such that file size is not more than 20 MB) and uploaded during the on-line submission of BID.

2.14.2.3 Bid must be submitted online only through e-procurement portal <https://ddtenders.gov.in>. Using the digital signature of authorised representative of the Bidder on or before time mentioned in NIT.

2.14.3 Modifications/ Substitution/ Withdrawal of BIDs

2.14.3.1 The Bidder may modify, substitute or withdraw its BID after submission, prior to BID Due Date. No BID shall be modified, substituted or withdrawn by the Bidder on or after the BID **Due Date & Time**.

2.14.3.2 For modification of e-BID, Bidder has to detach its old BID from e-procurement portal and upload / resubmit digitally signed modified BID. For withdrawal of BID, Bidder has to click on withdrawal icon at e-procurement portal and can withdraw its e-BID. Before withdrawal of a BID, it may specifically be noted that after withdrawal of a BID for any reasons, Bidder cannot re-submit e-BID again.

2.15 Online Opening of BIDs

2.15.1.1 Opening of BIDS will be done through Online Process

2.15.1.2 The Authority shall on-line open Technical BIDs on time mentioned in the NIT, in the presence of the authorized representatives of the Bidders, who choose to attend. Technical BID of only those Bidders shall be online opened whose documents listed at clause 2.11.2 of the RFP have been physically received. The Authority will subsequently examine and evaluate the BIDs in accordance with the provisions of Section 3 of RFP

2.16 Rejection of BIDs

2.16.1 Notwithstanding anything contained in this RFP, the Authority reserves the right to reject any BID and to annul the Bidding Process and reject all BIDs at any time without any liability or any obligation for such acceptance, rejection or annulment, and without

assigning any reasons thereof. In the event that the Authority rejects or annuls all the BIDs, it may, in its discretion, invite all eligible Bidders to submit fresh BIDs hereunder.

2.16.2 The Authority reserves the right not to proceed with the Bidding Process at any time, without notice or liability, and to reject any BID without assigning any reasons.

2.17 Validity of BIDs

The BIDs shall be valid for a period of not less than 180 (one hundred and Eighty) days from the BID Due Date. The validity of BIDs may be extended by mutual consent of the respective Bidders and the Authority

2.18 Confidentiality

Information relating to the examination, clarification, evaluation, and recommendation for the qualified Bidders shall not be disclosed to any person who is not officially concerned with the process or is not a retained professional advisor advising the Authority in relation to, or matters arising out of, or concerning the Bidding Process. The Authority will treat all information, submitted as part of BID, in confidence and will require all those who have access to such material to treat the same in confidence. The Authority may not divulge any such information unless it is directed to do so by any statutory entity that has the power under law to require its disclosure or is to enforce or assert any right or privilege of the statutory entity and/ or the Authority or as may be required by law or in connection with any legal process.

2.19 Correspondence with the Bidder

Save and except as provided in this RFP, the Authority shall not entertain any correspondence with any Bidder in relation to the acceptance or rejection of any BID. However, the Authority would display the result of technical evaluation on the web portal for 7 days including reasons for non-responsiveness, if any, and the financial bid will be opened thereafter.

D. BID SECURING DECLARATION

2.20 BID Security

2.20.1 The Bidder shall furnish as part of its BID, a BID Security referred to in Clause 1.2. hereinabove in the form of a Bank Guarantee issued by a Nationalized Bank, or a Scheduled Bank in India, having a net worth of at least Rs 1000 Cr(One Thousand Crores), in favour of the Authority in the format at Appendix-II (the "Bank Guarantee") and having a validity period of not less than 180 days(One Hundred and Eighty days) from the BID Due Date, inclusive of a claim period of 60 (Sixty) days, and may be extended as may be mutually agreed between the Authority and the Bidder from time to time

This Bank Guarantee shall be transmitted through SFMS Gateway to [Authority's Bank. In case the Bank Guarantee is issued by a foreign bank outside India, confirmation of the same by any nationalised bank in India is required. For the avoidance of doubt, Scheduled Bank shall mean a bank as defined under Section 2(e) of the Reserve Bank of India Act, 1934. A scanned copy of the Bank Guarantee shall be uploaded on e- procurement portal while applying to the tender

2.20.2 Any BID not accompanied by the BID Security shall be rejected by the Authority as non-responsive.

2.20.3 The Selected Bidder's BID Security will be returned, without any interest, upon the Bidder signing the EPC Contract and furnishing the Performance Security in accordance with the provisions thereof. The Authority may, at the Selected Bidder's option, adjust the amount of BID Security in the amount of Performance Security to be provided by him in accordance with the provisions of the Agreement.

2.20.4 The Authority shall be entitled to forfeit and appropriate the BID Security as Damages inter alia in any of the events specified in Clause 2.20.5 herein below. The Bidder by submitting its BID pursuant to this RFP, shall be deemed to have acknowledged and confirmed that the Authority will suffer loss and damage on account of withdrawal of its BID or for any other default by the Bidder during the period of BID validity as specified in this RFP. No relaxation of any kind on BID Security shall be given to any Bidder.

2.20.5 The BID Security shall be forfeited and appropriated by the Authority as damages payable to the Authority for, inter alia, time, cost and effort of the Authority without prejudice to any other right or remedy that may be available to the Authority under the Bidding Documents and/or under the Agreement or otherwise, under the following conditions:

- a. Deleted
- b. If a Bidder engages in a corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice as specified in Section 4 of this RFP;
- c. If a Bidder withdraws its BID during the period of BID validity as specified in this RFP and as extended by mutual consent of the respective Bidder(s) and the Authority ;
- d. In the case of Selected Bidder, if it fails within the specified /extended time limit by Authority
 - i. To sign and return the duplicate copy of LOA;
 - ii. To furnish the Performance Security / Additional Performance Security (if any) as per clause 2.21; or
 - iii. To sign the Agreement

2.21 Performance Security

2.21.1 Within 15 (Fifteen) days of receipt of Letter of Acceptance, the selected Bidder shall furnish to the Authority an irrevocable and unconditional guarantee from a Bank in the form set forth in Appendix-VII (the "Performance Security") for an amount equal to 3% (Three percent) of its Bid Price. In case of bids mentioned below, the Selected Bidder, along with the Performance Security, shall also furnish to the Authority an irrevocable and unconditional guarantee from a Bank in the same form given at Appendix-VII towards an Additional Performance Security (the "Additional Performance Security") for an amount calculated as under:

- i. If the Bid Price offered by the Selected Bidder is lower than 10% but up to 20% of the estimated Project Cost, then the Additional Performance Security shall be calculated

@20% of the difference in the (i) 90% of the Estimated Project Cost and (ii) the Bid Price offered by the selected Bidder.

- ii. If the Bid Price offered by the Selected Bidder is lower than 20% of the Estimated Project Cost, then the Additional Performance Security shall be calculated @ 30% of the difference in the (i) 90% of the Estimated Project Cost and (ii) the Bid Price offered by the Selected Bidder.
- iii. This Additional Performance Security shall be treated as part of the Performance Security.

2.21.2 The Performance Security shall be valid until 60(sixty) days after the Defects Liability Period. The Additional Performance Security shall be valid until 28 (twenty eight) days after Project Completion Date.

2.21.3 The Selected Bidder has the option to provide 50% of the Performance Security and 50% of the Additional Performance Security, if any, within 15 (fifteen) days of receipt of Letter of Acceptance in any case before signing of the Contract Agreement and the remaining Performance Security and Additional Performance Security, if any, shall be submitted within 15 days of signing of the agreement

2.21.4 In the event the Selected Bidder fails to provide the Performance Security and Additional Performance Security, if any, as prescribed herein, it may seek extension of time for a further period up to 15 days by paying the Damages upfront along with the request letter seeking the extension. The Damages shall be the sum calculated at the rate of 0.05% (zero point zero Five per cent) of the Bid Price offered by the Selected Bidder for each day until the Performance Security and Additional Performance Security, if any, is provided in full as prescribed herein. The damages at full rate as given above shall be applicable even if a part of the Performance Security and the Additional Performance Security is provided.

2.21.5 For avoidance of any doubt, in case of failure of submission of Performance Security and Additional Performance Security, if any, within the additional 15 days' time period, the award shall be deemed to be cancelled/ withdrawn and the Bid Security shall be encashed and the proceeds thereof shall be appropriated by the Authority. Thereupon all rights, privileges, claims and entitlements of the Contractor under or arising out of the Award shall be deemed to have been waived by, and to have ceased with the concurrence of the Contractor, and the Award shall be deemed to have been withdrawn by the Authority

2.21.6 The agreement will be executed within 10 days of receipt of 50% Performance Security and 50% of Additional Performance Security, if any, as per sub-clause 2.21 above

SECTION 3

3 EVALUATION OF TECHNICAL BIDS AND OPENING & EVALUATION OF FINANCIAL BIDS

3.1 Evaluation of Technical BIDs

- 3.1.1 The Authority shall open the BIDs received physically & online at the time mentioned in the NIT at the place specified in Clause 2.11.4; and in the presence of the Bidders who choose to attend. Technical BID of only those Bidders shall be online opened whose documents listed at clause 2.11.1 of the RFP have been received physically. The Authority shall prepare minutes of the BID opening, including information disclosed to those present at the time of BID opening.
- 3.1.2 Technical Bids of those Bidders, who have not submitted their Bid online, shall not be considered for opening and evaluation.
- 3.1.3 If any information furnished by the Bidder is found to be incomplete, or contained in formats other than those specified herein, the Authority may, in its sole discretion, exclude the relevant information for consideration of eligibility and qualification of the Bidder.
- 3.1.4 To facilitate evaluation of Technical BIDs, the Authority may, at its sole discretion, seek clarifications in writing from any Bidder regarding its Technical BID. Such clarification(s) shall be provided within the time specified by the Authority for this purpose. Any request for clarification(s) and all clarification(s) in response thereto shall be in writing. The bids will be examined and evaluated in accordance with the provisions set out in this Section 3. The Authority will subsequently flag issues, if any with the data updated by the Bidders.
- 3.1.5 If a Bidder does not provide clarifications sought under Clause 3.1.4 above within the prescribed time, its Bid may be liable to be rejected. In case the Bid is not rejected, the Authority may proceed to evaluate the Bid by construing the particulars requiring clarification to the best of its understanding, and the Bidder shall be barred from subsequently questioning such interpretation of the Authority
- 3.1.6 Tests of responsiveness
- 3.1.6.1 As a first step towards evaluation of Technical BIDs, the Authority shall determine whether each Technical BID is responsive to the requirements of this RFP. A Technical BID shall be considered responsive only if:
- Technical BID is received online as per the format at Appendix-IA including Annexure I, IV, V and VI (Bid Capacity format);
- a. Documents listed at clause 2.11.2 are received physically as mentioned;
 - b. Technical Bid is accompanied by the BID Security as specified in Clause 1.2.4 and 2.20;

- c. The Power of Attorney is uploaded on e-procurement portal as specified in Clauses 2.1.5;
 - d. Technical Bid is accompanied by Power of Attorney for Lead Member of Joint Venture and the Joint Bidding Agreement as specified in Clause 2.1.6, if so required
 - e. Technical Bid contains all the information (complete in all aspects)
 - f. Technical Bid does not contain any condition or qualification; and
 - g. Copy of original Demand Draft towards payment of cost of Bid document of amount mentioned in the NIT (The demand draft shall be in favour of Chief Executive Officer, DIU Smart City Limited and payable at DIU) is received.
- 3.1.6.2 The Authority reserves the right to reject any Technical BID which is non-responsive and no request for alteration, modification, substitution or withdrawal shall be entertained by the Authority in respect of such BID.
- 3.1.7 In the event that a Bidder claims credit for an Eligible Project, and such claim is determined by the Authority as incorrect or erroneous, the Authority may reject / correct such claim for the purpose of qualification requirements.
- 3.1.8 The Authority will get the BID security verified from the issuing authority and after due verification, the Authority will evaluate the Technical BIDs for their compliance to the eligibility and qualification requirements pursuant to clause 2.2.1 & 2.2.2 of this RFP.
- 3.1.9 After evaluation of Technical Bids, the Authority will publish a list of Technically Responsive Bidders whose financial bids shall be opened. The Authority shall notify other Bidders that they have not been technically responsive. The Authority will not entertain any query or clarification from Applicants who fail to qualify.
- 3.1.10 Evaluation Criteria**
- 3.1.10.1 The details submitted by the bidder will be evaluated for eligibility by the Employers Competent Authority or a Committee constituted by him. The details submitted by the bidders will be generally evaluated in the following manner:
- 3.1.10.2 The criteria prescribed under Clause 2.2.2 above in respect of experience of similar nature of works completed, construction experience in key activities bidding capacity, Solvency and financial turn over etc. will first be scrutinized and the bidder's eligibility for the work shall be determined.
- 3.1.10.3 The bidders qualifying the criteria as set out in Clause 2.2.2 above will be evaluated for further selection.
- 3.1.10.4 Even though any bidder may satisfy the above requirements, he would be liable to disqualification if he has:
- a. **Made misleading or false representation or deliberately suppressed the information** in the forms, statements and enclosures required in the eligibility criteria document,

- b. Record of poor performance such as abandoning work, not properly completing the contract, or financial failures / weaknesses etc.

3.2 Opening and Evaluation of Financial BIDs

The Authority shall open the online Financial Bids of the technically responsive Bidders only on scheduled date and time in the presence of the authorised representatives of the Bidders who may choose to attend. The Authority shall publicly announce the Bid Prices quoted by the technically responsive Bidder. Thereafter, the Authority shall prepare a record of opening of Financial Bids.

3.3 Selection of BIDDER

- 3.3.1 Subject to the provisions of Clause 2.16.1, the Bidder whose BID is adjudged as responsive in terms of Clause 3.1.6 and who quotes lowest price shall be declared as the selected Bidder (the "Selected Bidder").
- 3.3.2 In case lowest quote is made by more than one bidder, then the bidder who has successfully completed and attached completion certificate while submitting online bid for more number of similar projects in the last 7 years would be awarded the work. In case of Joint Venture although the qualifying criteria is satisfied collectively by the joint venture for which the number of similar works attributed to each member of the joint venture is added; the computation for similar projects for award of work to the joint venture in case of lowest quote would be computed on pro-rata basis of their participation in the JV and not by simply summing arithmetically, the number of similar projects. Still, if there is a tie, lottery system will be followed to award the contract. If the revised tendered amount (worked out on the basis of quoted rate of individual items) of two or more contractors received in revised offer is again found to be equal, then the lowest tender, among such contractors, shall be decided by draw of lots in the presence of Engineer- in-charge/ Authority and the lowest contractors those have quoted equal amount of their tenders.
- 3.3.3 In the event that the Lowest Bidder is not selected for any reason, the Authority shall annul the Bidding Process and invite fresh BIDs. In the event that the Authority rejects or annuls all the BIDs, it may, in its discretion, invite fresh BIDs hereunder
- 3.3.4 After selection, a Letter of Acceptance (the "LOA") shall be issued in the format set forth in Appendix-VIII, in duplicate, by the Authority to the Selected Bidder and the Selected Bidder shall, within 7(seven) days of the receipt of the LOA, sign and return the duplicate copy of the LOA in acknowledgement thereof. In the event the duplicate copy of the LOA duly signed by the Selected Bidder is not received by the stipulated date, the Authority may, unless it consents to extension of time for submission thereof, appropriate the BID Security of such Bidder as Damages on account of failure of the Selected Bidder to acknowledge the LOA.

- 3.3.5 After acknowledgement of the LOA as aforesaid by the Selected Bidder, it shall cause the Bidder to submit Performance Security and Additional Performance Security (if any) within the period prescribed/extended by Authority and then execute the Agreement within the period prescribed in Clause 1.3. The Selected Bidder shall not be entitled to seek any deviation, modification or amendment in the Agreement.
- 3.3.6 Authority shall return Bid Security of all bidders except L-1 and L -2 within 21 working days from opening of financial Bid. The bid security of L-2 bidder shall be returned within 21 working days of issue of LOA to L-1. The Authority shall be responsible to return the Bid Security, as above, and the bidders shall not be required to ask for the same.

3.4 Contacts during BID Evaluation

BIDs shall be deemed to be under consideration immediately after they are opened and until such time the Authority makes official intimation of award/ rejection to the Bidders. While the BIDs are under consideration, Bidders and/ or their representatives or other interested parties are advised to refrain, save and except as required under the Bidding Documents, from contacting by any means, the Authority and/ or their employees/ representatives on matters related to the BIDs under consideration.

3.5 Correspondence with Bidder

Save and except as provided in this RFP, the Authority shall not entertain any correspondence with any Bidder in relation to the acceptance or rejection of any Bid

3.6 Any information contained in the Bid shall not in any way be construed as binding on the Authority, its agents, successors or assigns, but shall be binding against the Bidder if the Project is subsequently awarded to it on the basis of such information

SECTION 4

4 Fraud and Corrupt Practices

- 4.1 The Bidders and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the Bidding Process and subsequent to the issue of the LOA and during the subsistence of the Agreement. Notwithstanding anything to the contrary contained herein, or in the LOA or the Agreement, the Authority may reject a BID, withdraw the LOA, or terminate the Agreement, as the case may be, without being liable in any manner whatsoever to the Bidder, if it determines that the Bidder or the Contractor, as the case may be, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice in the Bidding Process. In such an event, the Authority shall be entitled to forfeit and appropriate the BID Security or Performance Security, as the case may be, as Damages, without prejudice to any other right or remedy that may be available to the Authority under the Bidding Documents and/ or the Agreement, or otherwise.
- 4.2 Without prejudice to the rights of the Authority under **Clause 4.1** hereinabove and the rights and remedies which the Authority may have under the LOA or the Agreement, or otherwise if a Bidder or Contractor, as the case may be, is found by the Authority to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Bidding Process, or after the issue of the LOA or the execution of the Agreement, such Bidder or Contractor shall not be eligible to participate in any tender or RFP issued by the Authority during a period of **2** (two) years from the date such Bidder, or Contractor, as the case may be, is found by the Authority to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practices, as the case may be.
- 4.3 For the purposes of this **Section 4**, the following terms shall have the meaning hereinafter respectively assigned to them:
- (a) **“corrupt practice”** means the offering, giving, receiving or soliciting of anything of value, pressurizing to influence the action of a public official in the process of tendering and execution of the project;
 - (b) **“Fraudulent practice”** means a misrepresentation or omission of facts or suppression of facts or disclosure of incomplete facts, in order to influence the Bidding Process;
 - (c) **“Coercive practice”** means impairing or harming, or threatening to impair or harm, directly or indirectly, any person or property to influence any person's participation or action in the Bidding Process;
 - (d) **“Undesirable practice”** means (i) establishing contact with any person connected with or employed or engaged by the Authority with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Bidding Process; or (ii) having a Conflict of Interest;

- (e) “**Restrictive practice**” means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating a full and fair competition in the Bidding Process.

SECTION 5

5 Pre-BID Conference

- 5.1 Pre-BID conference of the Bidders shall be convened at the designated date, time and place. A maximum of two representatives of each prospective Bidder shall be allowed to participate on production of authority letter from the Bidder.
- 5.2 During the course of Pre-BID conference, the Bidders will be free to seek clarifications and make suggestions for consideration of the Authority. The Authority shall endeavour to provide clarifications and such further information as it may, in its sole discretion, consider appropriate for facilitating a fair, transparent and competitive Bidding Process.

SECTION 6

6 Miscellaneous

- 6.1 The Bidding Process shall be governed by, and construed in accordance with, the laws of India and the Courts at Diu District (UT), India shall have exclusive jurisdiction over all disputes arising under, pursuant to and/ or in connection with the Bidding Process.
- 6.2 The Authority , in its sole discretion and without incurring any obligation or liability, reserves the right, at any time, to;
- (a) Suspend and/ or cancel the Bidding Process and/ or amend and/ or supplement the Bidding Process or modify the dates or other terms and conditions relating thereto;
 - (b) Consult with any Bidder in order to receive clarification or further information;
 - (c) Retain any information and/ or evidence submitted to the Authority by, on behalf of, and/ or in relation to any Bidder; and/ or
 - (d) Independently verify, disqualify, reject and/ or accept any and all submissions or other information and/ or evidence submitted by or on behalf of any Bidder.
- 6.3 It shall be deemed that by submitting the BID, the Bidder agrees and releases the Authority, its employees, agents and advisers, irrevocably, unconditionally, fully and finally from any and all liability for claims, losses, damages, costs, expenses or liabilities in any way related to or arising from the exercise of any rights and/ or performance of any obligations hereunder and the Bidding Documents, pursuant hereto, and/ or in connection with the Bidding Process, to the fullest extent permitted by applicable law, and waives any and all rights and/ or claims it may have in this respect, whether actual or contingent, whether present or in future.

Appendix – IA Letter Comprising the Technical Bid

(Refer Clauses 2.1.4, 2.11 and 3.1.6)

To

Chief Executive Officer

Diu Smart City Limited

Diu, UT Daman DiU

India

Sub: BID for Design, “**Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu including Operation & Maintenance in Defects Liability Period of Five (05) Years on Engineering, Procurement, Construction (“EPC”) basis**”

Dear Sir,

1. With reference to your RFP document dated we, having examined the document and understood its contents, hereby submit our BID for the aforesaid Project. The BID is unconditional and unqualified.
2. I / We acknowledge that the Authority will be relying on the information provided in the BID and the documents accompanying such BID for selection of the Bidders for the aforesaid Project, and we certify that all information provided in the BID and in **Annexes I to VI along with supporting documents are true and correct**; nothing has been omitted which renders such information misleading; and all documents accompanying such BID are true copies of their respective originals.
3. This Statement is made for the express purpose of our selection as EPC Contractor for Design, Construction and Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu of the aforesaid Project and Operation & Maintenance of the Project during the **Defects Liability Period (5 Years)**.
4. I/ We shall make available to the Authority any additional information it may find necessary or require to supplement or authenticate the BID
5. I/ We acknowledge the right of the Authority to reject our BID without assigning any reason or otherwise and hereby waive, to the fullest extent permitted by applicable law, our right to challenge the same on any account whatsoever.

6. I/We certify that in the last three years, any of the Joint Venture Members have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial Authority or a judicial pronouncement or arbitration award, nor been expelled from any Project or contract by any public Authority nor have had any contract terminated by any public Authority for breach on our part.
7. I/ We declare that:
 - (a) I/ We have examined and have no reservations to the Bidding Documents, including any Addendum issued by the Authority and.
 - (b) I/ We do not have any conflict of interest in accordance with **Clauses 2.6. 4** of RFP document; and
 - (c) I/ We have not directly or indirectly or through an agent engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as defined in **Clause 4.3** of the RFP document, of any tender or request for proposal issued by or any agreement entered into with the Authority or any other public sector enterprise or any Government, Central or State; and
 - (d) I/ We hereby certify that we have taken steps to ensure that in conformity with the provisions of **Section 4** of the RFP document, no person acting for us or on our behalf has engaged or will engage in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.
 - (e) the undertakings given by us along with the Application in response to the RFP for the Project and information mentioned for the evaluation of the BID Capacity in Annexure VI were true and correct as on the date of making the Application and are also true and correct as on the BID Due Date and I/we shall continue to abide by them.
8. I/ We understand that you may cancel the Bidding Process at any time and that you are neither bound to accept any BID that you may receive nor to invite the Bidders to BID for the Project, without incurring any liability to the Bidders, in accordance with Clause 2.16.2 of the RFP document.
9. I/ We believe that we/ our Joint Venture/ proposed Joint Venture satisfy (s) the Threshold Technical Capacity, Solvency criteria and meet(s) all the requirements as specified in the RFP document.
10. I/ We declare that we/ any Member of the Joint Venture are not a Member of a/ any other Joint Venture applying for BID.
11. I/ We certify that in regard to matters other than security and integrity of the country, we/ any Member of the Joint Venture have not been convicted by a Court of Law or indicted or adverse orders passed by a regulatory Authority which could cast a doubt on our ability to undertake the Project or which relates to a grave offence that outrages the moral sense of the community.

12. I/ We further certify that in regard to matters relating to security and integrity of the country, we/ any Member of the Joint Venture have not been charge-sheeted by any agency of the Government or convicted by a Court of Law.
13. I/ We further certify that no investigation by a regulatory Authority is pending either against us/ any Member of the Joint Venture or against our CEO or any of our directors/ managers/ employees.
14. I/ We further certify that we are not disqualified in terms of the additional criteria specified by Department of Disinvestment **OM No. 6/4/2001-DD-II** dated **13th July, 2001** which guidelines apply mutatis mutandis to the Bidding Process. A copy of the aforesaid guidelines forms part of the RFP at Annexure VII of Appendix-IA thereof.
15. I /We undertake that in case due to any change in facts or circumstances during the Bidding Process, we are attracted by the provisions of disqualification in terms of the provisions of this RFP; we shall intimate the Authority of the same immediately.
16. I /We further acknowledge and agree that in the event of change in control occurs after signing of the Agreement up to its validity, it would not withstand anything to the contrary contained in the Agreement, be deemed a breach thereof, and the Agreement shall be liable to be terminated without the Authority being liable to us in any manner whatsoever
17. I/ We hereby irrevocably waive any right or remedy which we may have at any stage at law or howsoever otherwise arising to challenge or question any decision taken the Authority in connection with the selection of the Bidder, or in connect with the Bidding Process itself, in respect of the above mentioned Project and the terms and implementation thereof.
18. In the event of my / our being declared as the Select Bidder , I / We agree to enter into Agreement in accordance with the draft that has been provided to us prior to the BID Due date . We agree not to seek any changes in the aforesaid draft and agree to abide by the same.
19. I/ We have studied all the Bidding Documents carefully and also surveyed the project area. We understand that except to the extent as expressly set forth in the Agreement, we shall have no claim, right or title arising out of any documents or information provided to us by the Authority or in respect of any matter arising out of or relating to the Bidding process including aware of the Agreement
20. I/We offer a BID Security of Rs.----- (Rupees ----- only) to the Authority in accordance with RFP Document.
21. The BID Security in the form of a Bank Guarantee is attached.
22. The documents accompanying the Technical BID as specified in clause 2.11.1 of the RFP have been submitted in separate file.
23. I/We understand that the BID is subject to the provisions of the Bidding Documents. In no case I/ We, shall have any claim or right of whatsoever nature if the project / contract is not awarded to me / us or our BID is not opened or rejected.

24. The BID price has been quoted by me / us or after taking into consideration all the terms and conditions stated in the RFP, Draft Agreement, our own estimate of costs and after a careful assessment of the site and all the conditions that may affect the project cost and implementation of the project.
25. I / We agree and undertake to abide by all the terms and condition of the RFP document
26. {We the Joint Venture agree and undertake to be jointly and severally liable for all the obligations of the EPC Contractor under the contract agreement}
27. I / We shall keep this offer valid for **180** (one hundred and Eighty days from the BID Due Date specified in the RFP.
28. I / We hereby submit our BID and offer a BID Price as indicated in Financial BID for undertaking the aforesaid Project in accordance with the Bidding Documents and the Agreement.

In witness thereof, I / we submit this BID under and in accordance with the terms of the RFP document.

Yours faithfully,

Place: (Signature, name and designation of the Authorised Signatory)

Date: Name and seal of the Bidder/ Lead Member

Note: Paragraphs in square parenthesis may be omitted by the Bidder, if not applicable it and "Deleted "may be indicated there,

Appendix – IB Letter Comprising the Financial Bid

(Refer Clauses 2.1.4, 2.11 and 3.1.6)

To

Chief Executive Officer

Diu Smart City Limited

Diu, UT Daman DiU

India

Sub: **BID for Design, Construction, Operation & Maintenance of Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu Under Smart Cities Mission including Operation and Maintenance for a period of 5 years”**

1. With reference to your RFP document dated we, having examined the document and understood its contents, hereby submit our BID for the aforesaid Project. The BID is unconditional and unqualified.
2. I /We acknowledge that the Authority will be relying on the information provided in the BID and the documents accompanying such BID for selection of the Bidders for the aforesaid Project, and we certify that all information provided in the BID and in **Annexes I to VI along with supporting documents are true and correct**; nothing has been omitted which renders such information misleading; and all documents accompanying such BID are true copies of their respective originals.
3. The BID price has been quoted by me / us or after taking into consideration all the terms and conditions stated in the RFP , Draft Agreement , our own estimate of costs and after a careful assessment of the site and all the conditions that may affect the project cost and implementation of the project .
4. I/ We acknowledge the right of the Authority to reject our BID without assigning any reason or otherwise and hereby waive, to the fullest extent permitted by applicable law, our right to challenge the same on any account whatsoever.
5. In the event of my / our being declared as the Select Bidder , I / We agree to enter into Agreement in accordance with the draft that has been provided to us prior to the BID Due date . We agree not to seek any changes in the aforesaid draft and agree to abide by the same.
6. I / We shall keep this offer valid for **180** (one hundred and eighty days) from the BID Due Date specified in the RFP.
7. I/ We hereby submit our BID and offer a BID Price Rs.....

(Rs..... in words) **including all applicable Taxes** for undertaking the aforesaid Project in accordance with the Bidding Documents and the Agreement.

Yours faithfully,

Place: (Signature, name and designation of the Authorised Signatory)

Date: Name and seal of the Bidder/ Lead Member

Appendix IA - Annex-I Details of Bidder

1. (a) Name
- (b) Country of incorporation
- (c) Address of the corporate headquarters and its branch office(s), if any, in India:
- (d) Date of incorporation and/ or commencement of business
2. Brief description of the Company including details of its main lines of business and proposed role and responsibilities in this Project:
3. Details of individual(s) who will serve as the point of contact/ communication for the Authority:
 - a) Name
 - b) Designation
 - c) Company
 - d) Address
 - e) Telephone number
 - f) E-mail address
 - g) Fax Number
4. Particulars of the Authorised Signatory of the Bidder
 - a) Name
 - b) Designation
 - c) Address
 - d) Telephone number
 - e) Fax Number
5. In case of a Joint Venture
 - a) The information above (1-4) should be provided for all the Members of the Joint Venture.
 - b) A copy of the Jt. Bidding Agreement, as envisaged in **Clause 2.1.11. (f)** should be attached to the BID.
 - c) Information regarding the role of each Member should be provided as per table below:

S No	Name of Member	Role* {Refer Clause 2.1.11 (d) }\$	Share of work in the Project {Refer Clauses 2.1.11. (a) (f) & (g)}
1			
2			
3			

* The role of each Member, as may be determined by the Bidder, should be indicated in accordance with instruction 4 at **Annex-IV**

d) The following information shall also be provided for each Member of the Joint Venture: as per para 2.1.14 for each Member of the Joint Venture:

Name of Applicant / member of Joint Venture:

S.No.	Criteria	Yes	No
1.	Has the Bidder/ constituent of the Joint Venture been barred by the [Central/ State] Government, or any entity controlled by it, from participating in any Project (BOT, EPC or otherwise).		
2.	If the answer to 1 is yes, does the bar subsist as on the due date of BID.		

6(a) I/ We certify that in the last two years, we/ any of the JV partners have neither failed to perform for the works of Coastal Roads or Seafront Development Projects, Urban Roads/Highway projects, ISC&EI works, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitral award against us, nor been expelled or terminated by Ministry of Road Transport & Highways or its implementing agencies for breach on our part.

(b) I/ We certify that we/ any of the JV partners do not fall in any of the categories of being a Non-Performing entity given at Clause 2.1.15 of Instructions to Bidders in the projects of Coastal Roads or Seafront Development Projects, Urban Roads/Highway projects, ISC and EI works of Ministry of Road Transport & Highways or its implementing agencies or other Government /Government undertaking and furnished the complete details.

7(a) I/ We further certify that no investigation by a regulatory authority is pending either against us/any member of Joint Venture or our sister concern or against our CEO or any of our directors/managers/employees.

- (b) I/ We further certify that no investigation by any investigating agency in India or outside is pending either against us/ any member of Joint Venture or our sister concern or against our CEO or any of our directors/managers/employees.

A statement by the Bidder and each of the Members of its Joint Venture (where applicable) disclosing material non-performance or contractual non-compliance in current projects, as on bid due date is given below (attach extra sheets, if necessary) w.r.t. para 2.1.15

Name of Bidder/ member of Joint Venture:

S.No	Categories of Non Performer	Yes	No
i.	Fails to complete or has missed Project completion milestones in already awarded two or more projects, unless Extension of Time has been allowed on the recommendations of the Authority Engineer due to Authority's default		
ii.	Punch List Items in respect of any project are pending due to Bidder's default in two or more Projects even after lapse of the prescribed time for completion of such items;		
iii.	Fails to fulfil its obligations to maintain a satisfactory condition in spite of two rectification notices issued in this behalf;		
iv.	Fails to attend to Non Conformity Reports (NCRs) issued by the Independent/ Authority's Engineer on the designs/ works constructed by the Bidder pending for more than one year in two or more projects.		
v.	Damages/Penalties recommended by the Independent/ Authority's Engineer on the Bidder during O&M period and the remedial works are not taken up in two or more projects.		
vi.	Fails to submit the Performance Security within the permissible period in more than one project(s).		
vii.	Rated as an unsatisfactory performing entity/ non- performing entity by an independent third party agency and so notified on the website of the Authority.		
viii.	Has Failed to perform for the works in the last 2(two) years, as evidenced by imposition of a penalty by an arbitral or judicial		

S.No	Categories of Non Performer	Yes	No
	authority or a judicial pronouncement or arbitral award against the Bidder, including individual or any of its Joint Venture Member, as the case may be		
ix.	Has been expelled or the contract terminated for breach by such Bidder, including individual or any of its Joint Venture Member; Provided that any such decision of expulsion or termination of contract leading to debarring of the Bidder from further participation in bids for the prescribed period should have been ordered after affording an opportunity of hearing to such party		

I/ We certify that the list is complete and covers all the projects executed for Government / Government Undertakings implementing agencies and that we/ any of the JV partners do not fall in any of the above categories of being a Non-Performing entity.

(Signature, name and designation of the authorised signatory)

For and on behalf of.....

Appendix IA - Annex-II - Technical Capacity of the Bidder

ANNEXURE II - A - DETAILS OF WORKS OF SIMILAR NATURE COMPLETED DURING THE LAST SEVEN YEARS ENDING PREVIOUS DAY OF THE LAST DATE SUBMISSION OF TENDERS

S. No.	Name of work/project and location	Owner or sponsoring organization	Cost of work in crores of rupees	Date of commencement as per contract	Stipulated date of completion	Actual date of completion	Litigation/ arbitration cases pending/ in progress with	Name and address/ telephone number of officer to whom	Whether the work was done on back to back basis Yes/ No
1	2	3	4	5	6	7	8	9	10

* Indicate gross amount claimed and amount awarded by the Arbitrator.

Signature of Bidder(s)

ANNEXURE II - B - PERFORMANCE REPORT OF WORKS REFERRED TO IN ANNEXURE II - A

1.	Name of work / project & location	:	
2.	Agreement No.	:	
3.	Estimated cost	:	
4.	Tendered cost	:	
5.	Date of start	:	
6.	Date of completion (i) Stipulated date of completion (ii) Actual date of completion	: : :	
7.	Amount of compensation levied for delayed completion, if any	:	Yes/No
	(a) Whether case of levy of compensation For delay has been decided or not		
	(b) If decided, amount of compensation levied for delayed completion if any	:	
8.	Performance report: 1) Quality of work 2) Financial soundness 3) Technical Proficiency 4) Resourcefulness 5) General Behaviour	: : : : :	Outstanding/Very Good / Good / Fair / Poor Outstanding/Very Good / Good / Fair / Poor Outstanding/Very Good / Good / Fair / Poor Outstanding/Very Good / Good / Fair / Poor Outstanding/Very Good / Good / Fair / Poor

Dated:**Bidder**

NOTE:

1. In case of a Joint Venture, information in Annex-II Appendix-I shall be provided separately for other Members so as to establish that each such Member has 20 percent or more of the Bid Capacity. (*Refer Clause 2.2.2.4*).
2. The bidder has to attach the copy of the Completion Certificates issue by the Executive Engineer or Equivalent for the information submitted in Annexure- IIA & IIB of Appendix IA.

Appendix IA- Annex-III Financial Capacity of the Bidder**ANNEXURE III - A - FINANCIAL INFORMATION**

- I. Financial Analysis: - Details to be furnished duly supported by figures in balance sheet / profit & loss account for the **last five years** duly certified by the Chartered Accountant, as submitted by the bidder to the Income Tax Department (Copies to be attached).

Year	Gross Annual turnover on construction works	Profit / Loss
2015-16		
2016-17		
2017-18		
2018-19		
2018-19		

II. Financial arrangements for carrying out the proposed work.

III. Solvency Certificate from Bankers of the bidder in prescribed ANNEXURE III- B.

Signature of Chartered Accountant with seal

Signature of Bidder(s).

ANNEXURE III - B - FORM OF BANKERS' CERTIFICATE FROM A SCHEDULED BANK

This is to certify that to the best of our knowledge and information that M/s..... having marginally noted address, a customer of our bank are / is respectable and can be treated as good for any engagement up to a limit of Rs..... (Rupees only).

This certificate is issued without any guarantee or responsibility on the Bank or any of the officers.

(Signature)

For the Bank

Note:-

1. Bankers certificates should be on letter head of the Bank, sealed in cover addressed to tendering authority.
2. In case of partnership firm, certificate should include names of all partners as recorded with the Bank.

Instructions:

1. The Bidder shall attach copies of the balance sheets, financial Statements and Annual Reports for **5** (five) years preceding the BID Due Date. The financial Statements shall:
 - a. reflect the financial situation of the Bidder;
 - b. be audited by a statutory auditor;
 - c. be complete, including all notes to the financial Statements; and
 - d. Correspond to accounting periods already completed and audited (no Statements for partial periods shall be requested or accepted).
2. Solvency Certificate from a Scheduled bank not older than six months as on the date of submission of the bid.
3. Year 1 will be the latest completed financial year, preceding the Bidding. Year 2 shall be the year immediately preceding Year 1 and so on. In case the BID Due Date falls within 3 (three) months of the close of the latest financial year.
4. In the case of a Joint Venture, a copy of the Jt. Bidding Agreement shall be submitted in accordance with Clause 2.1.11 (f) of the RFP document.
5. The Bidder shall also provide the name and address of the Bankers to the Bidder.
6. The Bidder shall provide an Auditor's Certificate

Appendix IA - Annex-IV Details of Key Activities in Eligible Projects

(Refer to Clauses 2.2.2.2 and 2.2.2.7 of the RFP)

Annexure IV – A - Construction Experience in Key Activities

S.No	Name of work	Particulars of item	Cost of work (in Rs Lakhs)	Work completed
1		Bituminous Road Works		
		Cement Concrete Road Works		
		Flooring / paving of cement concrete/ stone slabs/ tiles / inter paver		
2		Retaining Wall works		
3		Storm Water Drain		
4		Water Supply Pipe Network		
5		Landscaping works		
6		External Electrification and Street Lighting works for Illumination		

For each Key Activities Annexure IV – A shall be submitted by the contractor duly signed by the employer.

Annexure IV – A shall clearly mention the particulars of required Key Activities and should be duly authenticated/certified by an officer not below the rank of EE or equivalent

If partner in a Joint Venture, specify participation of total contract amount

Signature of Bidder(s)

Annexure IV – B - Statement showing the details of Construction Experience in Key Activities

S.No	Name of Department / Client with Address	Name of work	Estimated cost of work put to tender	Tendered Amount	Date of award of contract	Target date of completion of work as per contract and date of completion of work if completed		Actual Amount of Work completed	Time limit in year and months		Percentage rate and amount of Penalty	Reasons for delay in completion of work	Remarks
						Target Date	Completion Date		Original Y M	Extended Y M			
1	2	3	4	5	6	7a	7b	8	9a	9b	10	11	12

Note : -

1. Attested Copies of Work Order and Completion Certificates from issuing authority have to be attached.
2. It is mandatory to furnish details in this format only.
3. Bidders are expected to provide information in respect of Key Activities in each Eligible Projects in this Annex. The Projects cited must comply with the eligibility criteria specified in 2.2.2.2 (i) and 2.2.2.2 (ii) of the RFP, as the case may be. Information provided in this section is intended to serve as a backup for information provided in the Application. Applicants should also refer to the Instructions below.
4. A separate sheet should be filled for each Eligible Project.
5. In case the Eligible Project relates to other Members, write "Member".
6. In the case of Projects under construction, the likely date of completion or commissioning, as the case may be, shall be indicated.

7. Equity shareholding of the Bidder, in the company owning the Eligible Project, held continuously during the period for which Eligible Experience is claimed, needs to be given (Refer Clause 2.2.2.2(II) (C) (b)).
8. Experience for any activity relating to an Eligible Project shall not be claimed twice. In other words, no double counting in respect of the same experience shall be permitted in any manner whatsoever.
9. Certificate from the Bidder's statutory auditor or its respective clients must be furnished for each Eligible Project. In jurisdictions that do not have statutory auditors, the auditors who audit the annual accounts of the Bidder may provide the requisite certification. Attach Explanatory Notes to the Certificate, if necessary.
10. It may be noted that in the absence of any detail, the information would be considered inadequate and could lead to exclusion of the relevant Project in computation of Experience.

Appendix IA - Annex-V Statement of Legal Capacity

Statement of Legal Capacity

(To be forwarded on the letterhead of the Bidder/ Lead Member of Joint Venture)

Ref.

Date:

To,

Dear Sir,

We hereby confirm that we/ our members in the Joint Venture (constitution of which has been described in the application) satisfy the terms and conditions laid out in the RFP document.

We have agreed that (insert member's name) will act as the Lead Member of our Joint Venture.*

We have agreed that (insert individual's name) will act as our representative/ will act as the representative of the Joint Venture on its behalf* and has been duly authorized to submit the RFP. Further, the authorized signatory is vested with requisite powers to furnish such letter and authenticate the same.

Thanking you,

Yours faithfully,

(Signature, name and designation of the authorized signatory)

For and on behalf of.....

**Please strike out whichever is not applicable.*

Appendix IA - Annex-VI Information required to evaluate the BID Capacity

Information required to evaluate the BID Capacity under clause 2.2.2.1:

To calculate the value of "A" and "C"

1. A table containing value of Civil Engineering Works in respect to Projects (EPC Contract / Item Rate Contract / Construction works) undertaken by the Bidder during the last 5 years is as follows:

S.No	Year	Value of Civil Engg. Works undertaken including Bonus, If any (Rs. In Crores)	Amount of bonus (Rs. in Crores)	Net Value excluding bonus (Rs. in Crores)
1	2019-20			
2	2018-19			
3	2017-18			
4	2016-17			
5	2015-16			

2. Maximum value of Projects that have been undertaken during the **F.Y.....** out of the last **5** years and value thereof is Rs. _____ Crores (Rupees). Further, value updated to the price level of the year indicated in Appendix is as follows:

Rs. Crores x _____ (Updation Factor as per Appendix) = Rs. _____ Crores (Rupees)

3. Amount of bonus received, if any, in EPC Projects during the last 5 years (updated to the price level of the year indicated in Appendix):

S. No.	F.Y. / Calendar Year	Amount of Bonus (Rs. in Crores)	Updation Factor	Updated Amount of Bonus (Rs. in Crores)
1	2019-20		1.00	
2	2018-19		1.07	
3	2017-18		1.14	
4	2016-17		1.21	

S. No.	F.Y. / Calendar Year	Amount of Bonus (Rs. in Crores)	Updation Factor	Updated Amount of Bonus (Rs. in Crores)
5	2015-16		1.28	
			Total (C)=	

Name of the Chartered Accountant: (Signature, name and designation and Membership No. of authorised signatory) :	Signature, name and designation of Authorised Signatory For and on behalf of(Name of
--	--

To calculate the value of "B"

A table containing value of all the existing commitments and on-going works to be completed during the next ** years is as follows:

S. No.	Name Of Project/ Work	Percentage of participation of Bidder in the project	Dater of start / appointed date of project	Construction period as per Agreement/ LOA	Value of contract as per Agreement / LOA ^B	Value of work completed	Balance value of work to be completed	Anticipated date of completion	Balance value of work at 2019- 20/2018 price level
					Rs. In Crore	Rs. In Crore	Rs. in Crore		Rs. in Crore
1	2	3	4	5	6	7	8= (6-7)	9	10(3x8x #)

#Updation Factor as given below

For Year	F.Y. / Calendar Year	Updation Factor
1	2019-20/2019	1.00
2	2018-19/2018	1.07
3	2017-18/2017	1.14
4	2016-17/2016	1.21
5	2015-16/2015	1.28

The Statement showing the value of all existing commitments, anticipated value of work to be completed in the period of construction of the project for which bid is invited and ongoing works as well as the stipulated period of completion remaining for each of the works mentioned above is verified from the certificate issued that has been countersigned by the Client or its Engineer-in-charge not below the rank of Executive Engineer or equivalent in respect of EPC Projects or Concessionaire / Authorised Signatory of SPV in respect of BOT Projects. No awarded / ongoing works has been left in the aforesaid statement which has been awarded to M/s.....individually / and other member M/s and M/s

....., as on bid due date of this RFP

<p>.....</p> <p>Signature, name and designation of Authorised Signatory</p> <p>For and on behalf of..... (Name of the Bidder)</p>	<p>.....</p> <p>Name of the Statutory Auditor's firm;</p> <p>Seal of the audit firm:(Signature, name and designation and Membership</p> <p>No. of authorised signatory</p>
---	--

1

⁸In case balance period of construction is less than the value of period of construction of the project for which bid is invited, then full value of contract as per Agreement/LOA to be mentioned, else, anticipated value of work to be completed in the period of construction of the project for which bid is invited is to be mentioned. In the absence of the anticipated value of work to be completed, the proportionate value shall be considered while evaluating the Assessed Available Bid Capacity.

Appendix IA - Annex-VII Guidelines of the Department of Disinvestment

Guidelines of the Department of Disinvestment

(Refer Clause 1.2.1)

No. 6/4/2001 -DD-II

Government of India

Department of Disinvestment

Block 14, CGO Complex New Delhi.

Dated 13th July, 2001.

OFFICE MEMORANDUM

Sub: Guidelines for qualification of Bidders seeking to acquire stakes in Public Sector Enterprises through the process of disinvestment.

Government has examined the issue of framing comprehensive and transparent guidelines defining the criteria for Bidders interested in PSE-disinvestment so that the parties selected through competitive bidding could inspire public confidence. Earlier, criteria like net worth, experience etc. used to be prescribed. Based on experience and in consultation with concerned departments, Government has decided to prescribe the following additional criteria for the qualification/ disqualification of the parties seeking to acquire stakes in public sector enterprises through disinvestment:

- (a) In regard to matters other than the security and integrity of the country, any conviction by a Court of Law or indictment/ adverse order by a regulatory authority that casts a doubt on the ability of the Bidder to manage the public sector unit when it is disinvested, or which relates to a grave offence would constitute disqualification. Grave offence is defined to be of such a nature that it outrages the moral sense of the community. The decision in regard to the nature of the offence would be taken on case to case basis after considering the facts of the case and relevant legal principles, by the Government of India.
- (b) In regard to matters relating to the security and integrity of the country, any charge-sheet by an agency of the Government/ conviction by a Court of Law for an offence committed by the bidding party or by any sister concern of the bidding party would result in disqualification. The decision in regard to the relationship between the sister concerns would be taken, based on the relevant facts and after examining whether the two concerns are substantially controlled by the same person/ persons.
- (c) In both (a) and (b), disqualification shall continue for a period that Government deems appropriate.
- (d) Any entity, which is disqualified from participating in the disinvestment process, would not be allowed to remain associated with it or get associated merely because it has preferred an appeal against the order based on which it has been disqualified. The mere pendency of appeal will have no effect on the disqualification.
- (e) The disqualification criteria would come into effect immediately and would apply to all

Bidders for various disinvestment transactions, which have not been completed as yet.

- (f) Before disqualifying a concern, a Show Cause Notice why it should not be disqualified would be issued to it and it would be given an opportunity to explain its position.
- (g) Henceforth, these criteria will be prescribed in the advertisements seeking Expression of Interest (EOI) from the interested parties. The interested parties would be required to provide the information on the above criteria, along with their Expressions of Interest (EOI). The Bidders shall be required to provide with their EOI an undertaking to the effect that no investigation by a regulatory authority is pending against them. In case any investigation is pending against the concern or its sister concern or against its CEO or any of its Directors/ Managers/ employees, full details of such investigation including the name of the investigating agency, the charge/ offence for which the investigation has been launched, name and designation of persons against whom the investigation has been launched and other relevant information should be disclosed, to the satisfaction of the Government. For other criteria also, a similar undertaking shall be obtained along with EOI.

Under Secretary to the Government of India

Appendix IA - Annex-VIII Details of Ongoing Works

S. No.	Name of the work	Contract Price (INR Cr)	Appointed Date	Original Scheduled Completion	Likely Date of Completion	Reason for Delay [#]
1						
2						
3						
4						

#To be supported with valid certificate issued from Independent Engineer / Authority's Engineer / Supervision Consultant / Engineer-in-charge

I / We certify that all the information furnished above is true in all respects

..... Name of the Bidder

Signature of the authorized signatory: _____

Name of the Authorised Signatory: _____

Date: _____

Place: _____

APPENDIX –II Bank Guarantee for BID Security

Bank Guarantee for BID Security (Refer Clauses 2.20)

B.G. No. Dated:

- 1 In consideration of you, ****, having its office at ****, (hereinafter referred to as the “Authority”, which expression shall unless it be repugnant to the subject or context thereof include its, successors and assigns) having agreed to receive the BID of and having its registered office at (and acting on behalf of its JV) (hereinafter referred to as the “Bidder” which expression shall unless it be repugnant to the subject or context thereof include its/their executors, administrators, successors and assigns), for the**** ** Project on EPC basis (hereinafter referred to as “the Project”) pursuant to the RFP Document dated issued in respect of the Project and other related documents including without limitation the draft contract Agreement (hereinafter collectively referred to as “Bidding Documents”), we (Name of the Bank) having our registered office at and one of its Branches at (hereinafter referred to as the “Bank”), at the request of the Bidder, do hereby in terms of Clause 1.2.4 read with Clause 2.20 of the RFP Document, irrevocably, unconditionally and without reservation guarantee the due and faithful fulfilment and compliance of the terms and conditions of the Bidding Documents (including the RFP Document) by the said Bidder and unconditionally and irrevocably undertake to pay forthwith to th Authority an amount of Rs. *** ** (Rupees *** ** only) (hereinafter referred to as the “Guarantee”) as our primary obligation without any demur, reservation recourse, contest or protest and without reference to the Bidder if the Bidder sha fail to fulfil or comply with all or any of the terms and conditions contained in th said Bidding Documents.
- 2 Any such written demand made by the Authority stating that the Bidder is in default of the due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents shall be final, conclusive and binding on the Bank.
- 3 We, the Bank, do hereby unconditionally undertake to pay the amounts due and payable under this Guarantee without any demur, reservation, recourse, contest or protest and without any reference to the Bidder or any other person and irrespective of whether the claim of the Authority is disputed by the Bidder or not, merely on the first demand from the Authority stating that the amount claimed is due to the Authority by reason of failure of the Bidder to fulfil and comply with the terms and conditions contained in the Bidding Documents including failure of the said Bidder to keep its BID open during the BID validity period as set forth in the said Bidding Documents for any reason whatsoever. Any such demand made on the Bank shall be conclusive as regards amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs. *** ** (Rupees *** ** only).
- 4 This Guarantee shall be irrevocable and remain in full force for a period of 240 (Two hundred and Forty) days from the BID Due Date inclusive of a claim period of 60 (sixty) days or for such extended period as may be mutually agreed between the Authority and

- the Bidder, and agreed to by the Bank, and shall continue to be enforceable till all amounts under this Guarantee have been paid.
- 5 We, the Bank, further agree that the Authority shall be the sole judge to decide a to whether the Bidder is in default of due and faithful fulfilment and com with the terms and conditions contained in the Bidding Documents in inter alia, the failure of the Bidder to keep its BID en op during the BID validity period forth in the said Bidding Documents, and the decision of the Authority that the Bi in default as aforesaid shall be final and binding on us, notwithstanding differences between the Authority and the Bidder or any dispute pending before Court, Tribunal, Arbitrator or any other Authority.
 - 6 The Guarantee shall not be affected by any change in the constitution or winding up of the Bidder or the Bank or any absorption, merger or amalgamation of the Bidder or the Bank with any other person.
 - 7 In order to give full effect to this Guarantee, the Authority shall be entitled to treat the Bank as the principal debtor. The Authority shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee from time to time to vary any of the terms and conditions contained in the said Bidding Documents or to extend time for submission of the BIDs or the BID validity period or the period for conveying acceptance of Letter of Award by the Bidder or the period for fulfilment and compliance with all or any of the terms and conditions contained in the said Bidding Documents by the said Bidder or to postpone for any time and from time to time any of the powers exercisable by it against the said Bidder and either to enforce or forbear from enforcing any of the terms and conditions contained in the said Bidding Documents or the securities available to the Authority, and the Bank shall not be r e l e a s e d from its liability under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the said Bidder or any other forbearance, act or omission on the part of the Authority or any indulgence by the Authority to the said Bidder or by any change in the constitution of the Authority or its absorption, merger or amalgamation with any other person or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of releasing the Bank from its such liability.
 - 8 Any notice by way of request, demand or otherwise hereunder shall be sufficiently given or made if addressed to the Bank and sent by courier or by registered mail to the Bank at the address set forth herein.
 - 9 We undertake to make the payment on receipt of your notice of claim on us addressed to [name of Bank along with branch address] and delivered at our above branch which shall be deemed to have been duly authorised to receive said notice of claim
 - 10 It shall not be necessary for the Authority to proceed against the said Bidder before proceeding against the Bank and the guarantee herein contained shall be enforceable against the Bank, notwithstanding any other security which the Authority may have obtained from the said Bidder or any other person and which shall, at the time when proceedings are taken against the Bank hereunder, be outstanding or unrealised.
 - 11 We, the Bank, further undertake not to revoke this Guarantee during its currency except with the previous express consent of the Authority in writing.

- 12 The Bank declares that it has power to issue this Guarantee and discharge the obligations contemplated herein, the undersigned is duly authorised and has full power to execute this Guarantee for and on behalf of the Bank.
- 13 For the avoidance of doubt, the Bank's liability under this Guarantee shall be restricted to Rs. *** crore (Rupees *** ** crore only). The Bank shall be liable to pay the said amount or any part thereof only if the Authority serves a written claim on the Bank in accordance with paragraph 9 hereof, on or before [*** (indicate date falling 180 days after the BID Due Date)].
- 14 This guarantee shall also be operatable at our..... Branch at Diu, 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.
- 15 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 Diu Smart City Limited in the shape of Fixed Deposit Receipt (FDR)/ Bank Guarantee and the details of which is as under:

S. No.	Particulars	Details
1.	Name of Beneficiary	Chief Executive Officer, DIU SMART CITY LTD, Diu
2.	Name of Bank	Bank of India
3.	Account No.	339710110006808
4.	IFSC Code	BKID0003397

Signed and Delivered by Bank

By the hand of Mr./Ms, its and authorised official.

(Signature of the Authorised Signatory) (Official-Seal)

Appendix III Format for Power of Attorney for signing of BID

Format for Power of Attorney for signing of BID

(Refer Clause 2.1.5)

Know all men by these presents, We..... (name of the firm and address of the registered office) do hereby irrevocably constitute, nominate, appoint and authorize Mr./ Ms (name), son/daughter/wife of and presently residing at, who is presently employed with us/ the Lead Member of our Joint Venture and holding the position of, as our true and lawful attorney (hereinafter referred to as the "Attorney") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our BID for the Project proposed or being developed by the Diu Smart City Limited (the "Authority") including but not limited to signing and submission of all applications, BIDs and other documents and writings, participate in Pre-BID and other conferences and providing information/ responses to the Authority, representing us in all matters before the Authority, signing and execution of all contracts including the agreement and undertakings consequent to acceptance of our BID, and generally dealing with the Authority in all matters in connection with or relating to or arising out of our BID for the said Project and/ or upon award thereof to us and/or until the entering into of the EPC Contract with the Authority.

AND we hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE,, THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF 2.....

For
.....

(Signature, name, designation and address) of person authorized by Board Resolution (in case of Firm/ Company)/ partner in case of Partnership firm

Witnesses:

- 1.
- 2.

Accepted

.....

(Signature)

(Name, Title and Address of the Attorney)

(Notarised)

Person identified by me/ personally appeared before me/Attested/ Authenticated*

(*Notary to specify as applicable)

(Signature Name and Address of the Notary)

Seal of the Notary

Registration No. of the Notary

Date:.....

Notes:

- 1 *The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.*
- 2 *Wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/ power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.*

APPENDIX-IV Format for Power of Attorney for Lead Member of Joint Venture

Format for Power of Attorney for Lead Member of Joint Venture

(Refer clause 2.1.6)

Whereas the Diu Smart City Limited (“the Authority”) has invited BIDs for the ***** Project (the “Project”).

Whereas,,, and (collectively the “Joint Venture”) being Members of the Joint Venture are interested in bidding for the Project in accordance with the terms and conditions of the Request for Proposal (RFP) and other BID documents including agreement in respect of the Project, and

Whereas, it is necessary for the Members of the Joint Venture to designate one of them as the Lead Member with all necessary power and authority to do for and on behalf of the Joint Venture, all acts, deeds and things as may be necessary in connection with the Joint Venture’s BID for the Project and its execution.

NOW THEREFORE KNOW ALL MEN BY THESE PRESENTS

We, having our registered office at, M/s. having our registered office at ..., M/s. ... having our registered office at, and having our registered office at..... (hereinafter collectively referred to as the “Principals”) do hereby irrevocably designate,

nominate, constitute, appoint and authorize M/S having its registered office at being one of the Members of the Joint Venture, as the Lead Member and true and lawful attorney of the Joint Venture (hereinafter referred to as the “Attorney”). We hereby irrevocably authorize the Attorney (with power to sub-delegate) to conduct all business for and on behalf of the Joint Venture and any one of us during the bidding process and, in the event the Joint Venture is awarded the contract, during the execution of the Project and in this regard, to do on our behalf and on behalf of the Joint Venture, all or any of such acts, deeds or things as are necessary or required or incidental to the pre-qualification of the Joint Venture and submission of its BID for the Project, including but not limited to signing and submission of all applications, BIDs and other documents and writings, participate in pre BID and other conferences, respond to queries, submit information/ documents, sign and execute contracts and undertakings consequent to acceptance of the BID of the Joint Venture and generally to represent the Joint Venture in all its dealings with the Authority, and/ or any other Government Agency or any person, in all matters in connection with or relating to or arising out of the Joint Venture’s BID for the in all respect Project and/ or upon award thereof till the EPC Contract is entered into with the Authority & Compelled.

AND hereby agree to ratify and confirm and do hereby ratify and confirm all acts, deeds and things done or caused to be done by our said Attorney pursuant to and in exercise of the powers conferred by this Power of Attorney and that all acts, deeds and things done by our said Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us/ Joint Venture

IN WITNESS WHEREOF WE THE PRINCIPALS ABOVE NAMED HAVE EXECUTED
THIS POWER OF ATTORNEY ON THIS DAY OF 2.....

For	For	For
(Signature)	(Signature)	(Signature)
.....
(Name & Title)	(Name & Title)	(Name & Title)

Executants

To be executed by all the Members of the Joint Venture)

Witness

1

2

1. *The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.*
2. *Also, wherever required, the Bidder should submit for verification the extract of the charter documents and documents such as a board or shareholders' resolution/power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Bidder.*

APPENDIX V Format for Joint Bidding Agreement for Joint Venture

Format for Joint Bidding Agreement for Joint Venture

(Refer Clause 2.1.11)

(To be executed on Stamp paper of appropriate value)

THIS JOINT BIDDING AGREEMENT is entered into on this the day of 20...

AMONGST

1. {..... Limited, and having its registered office at } (hereinafter referred to as the "First Part" which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

2. {..... Limited, having its registered office at } and (hereinafter referred to as the "Second Part" which expression shall, unless repugnant to the context include its successors and permitted assigns)

AND

3. {..... Limited, and having its registered office at } (hereinafter referred to as the "Third Part" which expression shall, unless repugnant to the context include its successors and permitted assigns)

The above mentioned parties of the FIRST, { SECOND and THIRD } PART are collectively referred to as the "Parties" and each is individually referred to as a "Party"

WHEREAS,

(A) Diu Smart City Limited (hereinafter referred to as the " Authority" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns) has invited bids (the Bids") by its Request for Proposal No. dated (the "RFP") for award of contract for (Name of Project) of***** Project (the " Project") through an EPC Contract.

(B) The Parties are interested in jointly bidding for the Project as members of a Joint Venture and in accordance with the terms and conditions of the RFP document and other bid documents in respect of the Project, and

(C) It is a necessary condition under the RFP document that the members of the Joint Venture shall enter into a Joint Bidding Agreement and furnish a copy thereof with the Application.

NOW IT IS HEREBY AGREED as follows:

1. Definitions and Interpretations

In this Agreement, the capitalized terms shall, unless the context otherwise requires, have the meaning ascribed thereto under the RFP.

2. Joint Venture

2.1 The Parties do hereby irrevocably constitute a Joint Venture (the “ Joint Venture”) for the purposes of jointly participating in the Bidding Process for the Project.

2.2 The Parties hereby undertake to participate in the Bidding Process only through this Joint Venture and not individually and/ or through any other Joint Venture constituted for this Project, either directly or indirectly.

3. Covenants

The Parties hereby undertake that in the event the Joint Venture is declared the selected Bidder and awarded the Project, it shall enter into an EPC Contract with the Authority for performing all its obligations as the Contractor in terms of the EPC Contract for the Project.

4. Role of the Parties

The Parties hereby undertake to perform the roles and responsibilities as described below:

(a) Party of the First Part shall be the Lead member of the Joint Venture and shall have the power of attorney from all Parties for conducting all business for and on behalf of the Joint Venture during the Bidding Process and for performing all its obligations as the Contractor in terms of the EPC Contract for the Project;

(b) Party of the Second Part shall be {the Member of the Joint Venture; and}

(c) Party of the Third Part shall be { the Member of the Joint Venture. }

5. Joint and Several Liability

The Parties do hereby undertake to be jointly and severally responsible for all obligations and liabilities relating to the Project and in accordance with the terms of the RFP and the EPC Contract, till such time as the completion of the Project is achieved under and in accordance with the EPC Contract.

6. Share of work in the Project

The Parties agree that the proportion of construction in the EPC Contract to be allocated among the members shall be as follows:

First Party:

Second Party:

{Third Party: }

Further, the Lead Member shall itself undertake and perform at least 51 (fifty one) per cent of the total length of the project highway if the Contract is allocated to the Joint Venture.

7. Representation of the Parties

Each Party represents to the other Parties as of the date of this Agreement that:

(a) Such Party is duly organized, validly existing and in good standing under the laws of its incorporation and has all requisite power and authority to enter into this Agreement;

(b) The execution, delivery and performance by such Party of this Agreement has been authorized by all necessary and appropriate corporate or governmental action and a copy of the extract of the charter documents and board resolution/ power of attorney in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of the Joint Venture Member is annexed to this Agreement, and will not, to the best of its knowledge:

(i) Require any consent or approval not already obtained;

(ii) Violate any Applicable Law presently in effect and having applicability to it;

(iii) Violate the memorandum and articles of association, by-laws or other applicable organizational documents thereof;

(iv) Violate any clearance, permit, concession, grant, license or other governmental authorization, approval, judgment, order or decree or any mortgage agreement, indenture or any other instrument to which such Party is a party or by which such Party or any of its properties or assets are bound or that is otherwise applicable to such Party; or

(v) Create or impose any liens, mortgages, pledges, claims, security interests, charges or Encumbrances or obligations to create a lien, charge, pledge, security interest, encumbrances or mortgage in or on the property of such Party, except for encumbrances that would not, individually or in the aggregate, have a material adverse effect on the financial condition or prospects or business of such Party so as to prevent such Party from fulfilling its obligations under this Agreement;

(c) This Agreement is the legal and binding obligation of such Party, enforceable in accordance with its terms against it; and

(d) (d) There is no litigation pending or, to the best of such Party's knowledge threatened to which it or any of its Affiliates is a party that presently affects or which would have a material adverse effect on the financial condition or prospects or business of such Party in the fulfillment of its obligations under this Agreement.

8. Termination

This Agreement shall be effective from the date hereof and shall continue in full force and effect until Project completion (the "Defects Liability Period") is achieved under and in accordance with the EPC Contract, in case the Project is awarded to the Joint Venture.

However, in case the Joint Venture is either not pre-qualified for the Project or does not get selected for award of the Project, the Agreement will stand terminated in case the Applicant is not pre-qualified or upon return of the Bid Security by the Authority to the Bidder, as the case may be.

9. Miscellaneous

9.1 This Joint Bidding Agreement shall be governed by laws of {India}.

9.2 The Parties acknowledge and accept that this Agreement shall not be amended by the Parties without the prior written consent of the Authority.

IN WITNESS WHEREOF THE PARTIES ABOVE NAMED HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DATE FIRST ABOVE WRITTEN.SIGNED, SEALED AND DELIVERED

For and on behalf of

LEAD MEMBER by:	SECOND PART	THIRD PART
(Signature)	(Signature)	(Signature)
(Name)	(Name)	(Name)
(Designation)	(Designation)	(Designation)
(Address)	(Address)	(Address)

In the presence of:

Notes:

1. The mode of the execution of the Joint Bidding Agreement should be in accordance with the procedure, if any, laid down by the Applicable Law and the charter documents of the executant(s) and when it is so required, the same should be under common seal affixed in accordance with the required procedure.

2. Each Joint Bidding Agreement should attach a copy of the extract of the charter documents and documents such as resolution / power of attorney in favour of the person executing this Agreement for the delegation of power and authority to execute this Agreement on behalf of th Joint Venture Member.

3 . For a Joint Bidding Agreement executed and issued overseas, the document shall be legalised by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney has been executed.

APPENDIX VI Blacklisted / Debarred Format

Format for Declaration by the bidder for not being Blacklisted / Debarred

(To be submitted on the Letterhead of the bidder)

Date: dd/mm/yyyy

To

Chief Executive Officer

DIU Smart City Limited

Subject: Declaration for not being debarred/ black-listed by Central Government/ any State Government/ Public Sector Undertaking in India or similar agencies globally as on the date of submission of the bid

RFP Reference No: XX

Dear Sir/ Ma'am,

I, authorized representative of _____, hereby solemnly confirm that the _____ ("Company") is not debarred/ black -listed by Central Government/ any State Government/ Public Sector Undertaking in India or similar agencies globally for unsatisfactory past performance, corrupt, fraudulent or any other unethical business practices or for any other reason as on last date of submission of the bid.

In the event of any deviation from the factual information/ declaration, DIU SMART CITY LIMITED reserves the right to reject the bid or terminate the Contract without any compensation to the Company.

Thanking you,

Yours faithfully,

Signature of Authorized Signatory (with official seal)

Date:

Name:

Designation:

Address:

Telephone & Fax:

E-mail address:

APPENDIX VII Integrity Pact Format

INTEGRITY PACT FORMAT

(To be executed on plain paper and submitted along with Technical Bid/Tender documents for tenders having a value of Rs. 5 cr or above for Consultancy projects and 100 cr. or above of Construction projects. To be signed by the Bidder and same signatory competent/ authorized to sign the relevant contract on behalf of the DSCL.

This integrity Pact is made at on this day of 2021.

BETWEEN

Diu Smart City Limited represented by Chief Executive Officer, Diu – (hereinafter referred to as the “Principal/Owner” which expression shall, unless repugnant to the context or meaning thereof include its administrators, successors and assigns)

AND

{Name and address of the Firm/Company}, (hereinafter referred to as “The

Bidder(s)/Contractor(s)/Concessionaire(s)/Consultant(s)” and which expression shall unless repugnant to be meaning or context thereof include its successors and permitted assigns.)

Preamble

Whereas, the Principal has floated the Tender {NIT No.....dt } (herein after

Referred to as “Tender/Bid”) and intends to award, under laid down organizational procedure, contract/s for {Name of the work} (hereinafter referred to as the “Contract”).

And Whereas the Principal values full compliance with all relevant laws of the land, rules of land, regulations, economic use of resources and of fairness/ transparency in its relations with its Bidder(s) and/ or Contractor(s)/Concessionaire(s)/Consultant(s).

And whereas to meet the purpose aforesaid, both the parties have agreed to enter into this Integrity Pact (hereafter referred to as “Integrity Pact” or “Pact”) the terms and conditions of which shall also be read as integral part and parcel of the Tender documents and contract between the parties.

Now, therefore, in consideration of mutual covenants contained in this pact, the parties hereby agree as follows and this pact witnesses as under:

Article-1: Commitments of the Principal

- (1) The Principal commits itself to take all measures necessary to prevent corruption and to Observe the following principles: -
 - (a) No employee of the Principal, personally or through family members, will in connection with the Tender for, or the execution of a Contract, demand, take a

promise for or accept, for self, or third person, any material or immaterial benefit which the person is not legally entitled to.

- (b) The Principal will, during the Tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the Tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - (c) The Principal will exclude all known prejudiced persons from the process, whose conduct in the past has been of biased nature.
- (2) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the IPC/PC Act or any other Statutory Acts or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can initiate disciplinary actions as per its internal laid down Rules/Regulations.

Article – 2: Commitments of the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s).

The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

- (a) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal' employees involved in the tender processor the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process o during the execution of the contract.
- (b) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal This applies in particular to prices, specifications, certifications, subsidiary contract, submission or non-submission or bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- (c) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will not commit any offence under the relevant IPC/PC Act and other Statutory Acts; further the Bidder(s)/Contractor(s)/Concessionaire(s)/Consultant(s) will not use improperly, for purposes of completion or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans technical proposals and business details, including information contained or transmitted electronically.
- (d) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) of Indian Nationality shall furnish the name and address of the foreign principle, if any.

- (e) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract. He shall also disclose the details of services agreed upon for such payments.
- (f) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- (g) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) will not bring any outside influence through any Govt. bodies/quarters directly or indirectly on the bidding process in furtherance of his bid.

Article - 3 Disqualification from tender process and exclusion from future contracts.

- (1) If the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s), before award or during execution has committed a transgression through a violation of any provision of Article-2, above or in any other form such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s)/ Concessionaire(s) Consultant(s) from the tender process.
- (2) If the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) has committed a transgression through a violation of Article-2 such as to put his reliability or credibility into question, the Principal shall be entitled to exclude including blacklist and put on holiday the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) for any future tenders/ contract award process. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the Principal taking into consideration the full facts and circumstances of each case particularly taking into account the number of transgressions, the position of the transgressors within the company hierarchy of the Bidder(s)/ Contractor(s) Concessionaire(s)/ Consultant(s) and the amount of the damage. The exclusion will be imposed for a maximum of 3 years.
- (3) A transgression is considered to have occurred if the Principal after due consideration of the available evidence concludes that "On the basis of facts available there are no material doubts".
- (4) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) with its free consent and without any influence agrees and undertakes to respect and uphold the Principal's absolute rights to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision to resort to such exclusion is taken. This undertaking is given freely and after obtaining independent legal advice.
- (5) The decision of the Principal to the effect that a breach of the provisions of this Integrity Pact has been committed by the Bidder(s)/ Contractor(s)/ Concessionaire(s) Consultant(s) shall be final and binding on the Bidder(s)/ Contractor(s) Concessionaire(s)/ Consultant(s), however, the Bidder(s)/ Contractor(s)/

Concessionaire(s)/ Consultant(s) can approach IEM(s) appointed for the purpose of this Pact.

- (6) On occurrence of any sanctions/ disqualification etc arising out from violation of integrity pact, the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) shall not be entitled for any compensation on this account.
- (7) Subject to full satisfaction of the Principal, the exclusion of the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) could be revoked by the Principal if the Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) can prove that he has restored/ recouped the damage caused by him and has installed a suitable corruption prevention system in his organization.

Article – 4: Compensation for Damages.

- (1) If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Article-3, the Principal shall be entitled to forfeit the Earnest Money Deposit/ Bid Security or demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security apart from any other legal right that may have accrued to the Principal.
- (2) In addition to 1 above, the Principal shall be entitled to take recourse to the relevant provisions of the contract related to Termination of Contract due to Contractor Concessionaire/Consultant's Default. In such case, the Principal shall be entitled to forfeit the Performance Bank Guarantee of the Contractor/ Concessionaire/ Consultant and/ or demand and recover liquidated and all damages as per the provisions of the contract/concession agreement against Termination.

Article – 5: Previous Transgressions

- (1) The Bidder declares that no previous transgressions occurred in the last 3 years immediately before signing of this Integrity Pact with any other Company in any country conforming to the anticorruption/ Transparency International (TI) approach or with any other Public Sector Enterprise/ Undertaking in India or any Government Department in India that could justify his exclusion from the tender process.
- (2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action for his exclusion can be taken as mentioned under Article-3 above for transgressions of Article-2 and shall be liable for compensation for damage as per Article-4 above.

Article – 6: Equal treatment of all Bidders/ Contractors/ Concessionaires/ Consultants Subcontractors.

- (1) The Bidder(s)/ Contractor(s)/ Concessionaire(s)/ Consultant(s) undertake(s) to demand from all sub-contractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.
- (2) The Principal will enter into agreements with identical conditions as this one with a Bidders/ Contractors/ Concessionaires/ Consultants and subcontractors.

- (3) The Principal will disqualify from the tender process all Bidders who do not sign this Pact or violate its provisions.

Article – 7: Criminal charges against violating Bidder(s)/ Contractor(s) Concessionaire(s)/ Consultant(s)/ Sub-contractor(s).

If the Principal obtains knowledge of conduct of a Bidder/ Contractor/ Concessionaire/ Consultant or subcontractor, or of an employee or a representative or an associate of Bidder/ Contractor/ Concessionaire/ Consultant or Subcontractor, which constitute corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the same to the Chief Vigilance Officer.

Article- 8: Deleted.

Article- 9: Pact Duration

This Pact begins when both parties have legally signed it (in case of EPC i.e. for project funded by Principal and consultancy services). It expires for the Contractor/ Consultant 12 months after his Defect Liability Period is over or 12 months after his last payment under the contract whichever is later and for all other unsuccessful Bidders 6 months after this Contract has been awarded. (In case of BOT Projects) It expires for the concessionaire 24 months after his concession period is over and for all other unsuccessful Bidders 6 months after this Contract has been awarded.

If any claim is made/ lodged during his time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/ determined by Director General (Road Development) & Special Secretary.

Article- 10: Other Provisions

- (1) This pact is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. Diu
- (2) Changes and supplements as well as termination notices need to be made in writing.
- (3) If the Bidder/Contractor/Concessionaire/Consultant is in a partnership or a ~~consortium~~ Joint Venture partner, this pact must be signed by all partners or ~~consortium~~ members.
- (4) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- (5) Any disputes/ differences arising between the parties with regard to term of this pact any action taken by the Principal in accordance with this Pact or interpretation thereof shall not be subject to any Arbitration.
- (6) The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provision of the extent law in force relating to any civil or criminal proceedings.

In witness whereof the parties have signed and executed this Pact at the place and date first mentioned in the presence of following witness:

(For & On behalf of the Principal) (For & On behalf of the Bidder/ Contractor/
Concessionaire/ Consultant)

(Office Seal)

Place

Date

Witness 1 : (Name & Address)

Witness 2 : (Name & Address):

{COUNTERSIGNED and accepted by: JV Partner}

Appendix-VIII Form of Bank Guarantee

(See Clauses 2.21)

FORM OF BANK GUARANTEE

[Performance Security/Additional Performance Security]

To

.....[name of Authority]

.....[address of Authority]

WHEREAS..... [name and address of Contractor] (hereafter called the "Contractor") has undertaken, in pursuance of Letter of Acceptance (LOA) No.....
.....Dated..... for construction of
[name of the Project] (hereinafter called the "Contract").

AND WHEREAS the Contract requires the Contractor to furnish an{Performance Security/ Additional Performance Security} for due and faithful performance of its obligations, under and in accordance with the Contract, during the {Construction Period/ Defects Liability Period and Maintenance Period} in a sum of Rs..... cr. (Rupees crore) (the "Guarantee Amount"3).

AND WHEREAS we,through our branch at (the "Bank") have agreed to furnish this Bank Guarantee (hereinafter called the "Guarantee") by way of Performance Security.

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

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor's obligations during the {Construction Period/ Defects Liability Period and Maintenance Period}under and in accordance with the Contract, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums upto an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under signature of Chief Executive Officer, Diu Smart City Limited, that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Contract shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Contract and its decision at the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them

pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Contract or to extend the time or period for the compliance with, fulfilment and/ or performance of all or any of the obligations of the Contractor contained in the Contract or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Contract and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Contract or for the fulfilment, compliance and/or performance of all or any of the obligations of the Contractor under the Contract.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on ****². Unless a demand or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it

² Insert date at least 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 2.21 of the RFP). The Contractors can submit the BG for periods of two years at one time and keep on renewing the same till the DLP is over if they have problems in getting the BG in one go for the entire DLP.

has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Contract.
12. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by: (Signature)

(Name) (Designation) (Code Number) (Address)

Appendix-IX Format of LOA

(See Clauses 3.3.4)

Format of LOA

Letter No.

Dated,

To,

{Name of selected Bidder}

Subject: {project description}- Letter of Acceptance (LOA)-Reg.

Reference: Your bid for the subject work dated

Sir,

1. This is to notify you that your Bid dated for execution of the {project description}, at your quoted bid price amounting to Rs /- {amount in words} has been determined to be the lowest evaluated bid and is substantially responsive and has been accepted.
2. You are requested to return a duplicate of the LOA as an acknowledgement and sign the Contract Agreement within the period prescribed in Clause 1.3 of the RFP.
3. You are also requested to furnish Performance Security for an amount of { and Additional Performance Security for an amount of} as per Clause 2.21 of the RFP within 15 (Fifteen) days of receipt of this Letter of Acceptance (LOA). In case of delay in submission of Performance Security and Additional Performance Security, if any, you may seek extension of time for a period not exceeding 15 (Fifteen) days in accordance with Clause 2.21 of RFP.
4. In case of failure of submission of Performance Security, Additional Performance Security (if any) and Security against Damages (if any) within the additional 15 (fifteen) days' time period, the award shall be deemed to be cancelled and Bid security shall be encashed by the Authority as per Clause 2.21 of the RFP.

Yours faithfully,

{authorized signatory}

Appendix- X Format of Bid Security Declaration

(See Clauses 1.2.4)

FORMAT OF BID SECURITY DECLARATION FROM BIDDERS IN LIEU OF EMD

(On Bidders Letter head)

I/We, the authorized signatory of M/s,
participating in the subject tender no. for the item /
job of, do hereby declare:

- 1) That I / we have availed the benefit of waiver of EMD while submitting our offer against the subject Tender and no EMD being deposited for the said tender.
- 2) That in the event we withdraw / modify our bid during the period of validity Or I/we fail to execute formal contract agreement within the given timeline OR I/we fail to submit a Performance Security within the given timeline Or I/we commit any breach of Tender Conditions / Contract which attracts penal action of forfeiture of EMD and I/we will be suspended from being eligible for bidding / award of all future contract(s) of Diu Smart City Limited for a period of one year from the date of committing such breach.

Signature and Seal of Authorised Signatory of bidder

Name of Authorized Signatory:

Company Name:



Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu under Smart Cities Mission (4th Call).

On

EPC Mode with Operation and Maintenance for 5 Years

Volume 2 - EPC Agreement & Schedules

September 2021

Issued by

Chief Executive Officer

Diu Smart City Limited

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PART I Preliminary

Engineering, Procurement and Construction Agreement

THIS AGREEMENT¹ is entered into on this the day of, 20.....

BETWEEN

1. “Chief Executive Officer, Diu Smart City Limited (DSCL), Diu

(hereinafter referred to as the “**Authority**” which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns) of One Part;

AND

2. <.....Insert name of party.....>,¹ means the selected bidder² having its registered office at, (hereinafter referred to as the “**Contractor**” which expression shall, unless repugnant to the context or meaning thereof, include its successors and permitted assigns) of the Other Part.

The Authority and Contractor are hereinafter individually referred to as a “Party” and collectively referred to as the “Parties”

WHEREAS:

- (A)** The Authority had resolved to ***Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu including Operation & Maintenance in Defects Liability Period of Five (05) Years on Engineering, Procurement, Construction (“EPC”) basis*** in accordance with the terms and conditions to be set forth in an agreement to be entered into.
- (B)** The Authority accordingly invited the proposals (the “Request for Proposals” or “RFP”) from the eligible bidders as per the technical and commercial terms and conditions prescribed in the RFP for undertaking the Project
- (C)** After evaluation of the bids received, the Authority had accepted the bid of the selected bidder and issued its Letter of Acceptance No. dated (hereinafter called the “LOA”) to the selected bidder for ***Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu including Operation & Maintenance in Defects Liability Period of Five (05) Years***

¹ The provisions in curly brackets are to be retained in the draft EPC Agreement forming part of Bidding Documents and shall be suitably modified by the Bidder after the issue of Letter of Award (LOA)

² Refers to the single entity or the lead member of the joint venture, which is the selected bidder under the RFP.

on Engineering, Procurement, Construction (“EPC”) basis at the Contract Price specified hereinafter, requiring the selected bidder to inter alia:

(i) to give his consent to enter into this Agreement and the enforceability of the provisions thereof, within 10 (ten) days of the date of issue of LOA;

(ii) submit Performance Security and Additional Performance Security (if any) as per RFP requirements, and

(iii) Execute this Agreement within 10 days from the receipt of 50% of Performance Security and 50% of Additional Performance Security, if any.

(D) The Contractor has fulfilled the requirements specified in Recital (C) above;

NOW THEREFORE in consideration of the foregoing and the respective covenants and agreements set forth in this Agreement, the sufficiency and adequacy of which is hereby acknowledged, the Authority hereby covenants to pay the Contractor, in consideration of the obligations specified herein, the Contract Price or such other sum as may become payable under the provisions of the Agreement at the times and in the manner specified by the Agreement and intending to be legally bound hereby, the Parties agree as follows:

ARTICLE 1

1 Definitions and Interpretation

1.1 Definitions

The words and expressions beginning with capital letters and defined in this Agreement (including those in Article 28) shall, unless the context otherwise requires, have the meaning ascribed thereto herein, and the words and expressions defined in the Schedules and used therein shall have the meaning ascribed thereto in the Schedules.

1.2 Interpretation

1.2.1 In this Agreement, unless the context otherwise requires,

- a. references to any legislation or any provision thereof shall include amendment or re-enactment or consolidation of such legislation or any provision thereof so far as such amendment or re-enactment or consolidation applies or is capable of applying to any transaction entered into hereunder;
- b. references to laws of India or Indian law or regulation having the force of law shall include the laws, acts, ordinances, rules, regulations, bye laws or notifications which have the force of law in the territory of India and as from time to time may be amended, modified, supplemented, extended or re-enacted;
- c. references to a “**person**” and words denoting a natural person shall be construed as a reference to any individual, firm, LLP, company, corporation, society, trust, government, state or agency of a state or any association or partnership (whether or not having separate legal personality) of two or more of the above and shall include successors and assigns;
- d. the table of contents, headings or sub-headings in this Agreement are for convenience of reference only and shall not be used in, and shall not affect, the construction or interpretation of this Agreement;
- e. the words “**include**” and “**including**” are to be construed without limitation and shall be deemed to be followed by “without limitation” or “but not limited to” whether or not they are followed by such phrases;
- f. references to “**construction**” or “**building**” include, unless the context otherwise requires, survey and investigation, design, developing, engineering, procurement, supply of plant, materials, equipment, labour, delivery, transportation, installation, processing, fabrication, testing, and commissioning of the Project, including maintenance during the Construction Period, removing of defects, if any, and other activities incidental to the construction and “construct” or “build” shall be construed accordingly;
- g. references to “**development**” include, unless the context otherwise requires, construction, renovation, refurbishing, augmentation, up-gradation and other activities incidental thereto during the Construction Period, and “develop” shall be construed accordingly;

- h. any reference to any period of time shall mean a reference to that according to Indian standard time
- i. any reference to day shall mean a reference to a calendar day;
- j. reference to a “**business day**” shall be construed as reference to a day (other than a Sunday) on which banks in the State are generally open for business;
- k. any reference to month shall mean a reference to a calendar month as per the Gregorian calendar;
- l. references to any date, period or Project Milestone shall mean and include such date, period or Project Milestone as may be extended pursuant to this Agreement;
- m. any reference to any period commencing “from” a specified day or date and “till” or “until” a specified day or date shall include both such days or dates; provided that if the last day of any period computed under this Agreement is not a business day, then the period shall run until the end of the next business day;
- n. the words importing singular shall include plural and vice versa;
- o. references to any gender shall include the other and the neutral gender;
- p. “**lakh**” means a hundred thousand (100,000) and “**crore**” means ten million (10,000,000);
- q. “**indebtedness**” shall be construed so as to include any obligation (whether incurred as principal or surety) for the payment or repayment of money, whether present or future, actual or contingent;
- r. references to the “**winding-up**”, “**dissolution**”, “**insolvency**”, or “**reorganisation**” of a company or corporation shall be construed so as to include any equivalent or analogous proceedings under the law of the jurisdiction in which such company or corporation is incorporated or any jurisdiction in which such company or corporation carries on business including the seeking of liquidation, winding-up, reorganisation, dissolution, arrangement, protection or relief of debtors;
- s. save and except as otherwise provided in this Agreement, any reference, at any time, to any agreement, deed, instrument, licence or document of any description shall be construed as reference to that agreement, deed, instrument, licence or other document as amended, varied, supplemented, modified or suspended at the time of such reference; provided that this Sub- clause (s) shall not operate so as to increase liabilities or obligations of the Authority hereunder or pursuant hereto in any manner whatsoever;
- t. any agreement, consent, approval, authorisation, notice, communication, information or report required under or pursuant to this Agreement from or by any Party or the Authority’s Engineer shall be valid and effective only if it is in writing under the hand of a duly authorised representative of such Party or the Authority’s Engineer, as the case may be, in this behalf and not otherwise;

- u. the Schedules and Recitals to this Agreement form an integral part of this Agreement and will be in full force and effect as though they were expressly set out in the body of this Agreement;
 - v. references to Recitals, Articles, Clauses, Sub-clauses, Provisos or Schedules in this Agreement shall, except where the context otherwise requires, mean references to Recitals, Articles, Clauses, Sub-clauses, Provisos and Schedules of or to this Agreement; reference to an Annex shall, subject to anything to the contrary specified therein, be construed as a reference to an Annex to the Schedule in which such reference occurs; and reference to a Paragraph shall, subject to anything to the contrary specified therein, be construed as a reference to a Paragraph of the Schedule or Annex, as the case may be, in which such reference appear;
 - w. the damages payable by either Party to the other of them, as set forth in this Agreement, whether on per diem basis or otherwise, are mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by the Party entitled to receive the same and are not by way of penalty (the “**Damages**”); and
 - x. time shall be of the essence in the performance of the Parties’ respective obligations. If any time period specified herein is extended for the reasons specified in the Agreement, such extended time shall also be of the essence.
- 1.2.2 Unless expressly provided otherwise in this Agreement, any documentation required to be provided or furnished by the Contractor to the Authority shall be provided free of cost and in three copies, and if the Authority is required to return any such Documentation with its comments and/or approval, it shall be entitled to retain two copies thereof.
- 1.2.3 The rule of construction, if any, that a contract should be interpreted against the parties responsible for the drafting and preparation thereof, shall not apply.
- 1.2.4 Any word or expression used in this Agreement shall, unless otherwise defined or construed in this Agreement, bear its ordinary English meaning and, for these purposes, the General Clauses Act, 1897 shall not apply.

1.3 Measurements and Arithmetic Conventions

All measurements and calculations shall be in the metric system and calculations done to 2 (two) decimal places, with the third digit of 5 (five) or above being rounded up and below 5 (five) being rounded down.

1.4 Priority of Agreements and Errors/Discrepancies

1.4.1 This Agreement, and all other agreements and documents forming part of or referred to in this Agreement are to be taken as mutually explanatory and, unless otherwise expressly provided elsewhere in this Agreement, the priority of this Agreement and other documents and agreements forming part hereof or referred to herein shall, in the event of any conflict between them, be in the following order:

- a. this Agreement; and

- b. all other agreements and documents forming part hereof or referred to herein;
 - i.e. this Agreement at (a) above shall prevail over the agreements and documents at (b).

1.4.2 Subject to the provisions of Clause 1.4.1 of Article 1, in case of ambiguities or discrepancies within this Agreement, the following shall apply:

- a. between two or more Clauses of this Agreement, the provisions of a specific Clause relevant to the issue under consideration shall prevail over those in other Clauses;
- b. between the Clauses of this Agreement and the Schedules, the Clauses shall prevail and between Schedules and Annexes, the Schedules shall prevail;
- c. between any two Schedules, the Schedule relevant to the issue shall prevail;
- d. between the written description on the Drawings and the Specifications and Standards, the latter shall prevail;
- e. between the dimension scaled from the Drawing and its specific written dimension, the latter shall prevail; and
- f. Between any value written in numerals and that in words, the latter shall prevail.

1.5 Joint and Several Liability

1.5.1 If the Contractor has formed a Joint Venture of two or more persons for implementing the Project:

- a. these persons shall, without prejudice to the provisions of this Agreement, be deemed to be jointly and severally liable to the Authority for the performance of the Agreement; and
- b. the Contractor shall ensure that no change in the composition of the Joint Venture is effected without the prior consent of the Authority.

1.5.2 Without prejudice to the joint and several liability of all the members of the Joint Venture, the Lead Member shall represent all the members of the Joint Venture and shall at all times be liable and responsible for discharging the functions and obligations of the Contractor. The Contractor shall ensure that each member of the Joint Venture shall be bound by any decision, communication, notice, action or inaction of the Lead Member on any matter related to this Agreement and the Authority shall be entitled to rely upon any such action, decision or communication of the Lead Member. The Authority shall have the right to release payments solely to the Lead Member and shall not in any manner be responsible or liable for the *inter se* allocation of payments among members of the Joint Venture.³

³ This Clause 1.5 may be omitted if the Contractor is not a Joint Venture.

PART II Scope of the Project

ARTICLE 2

2 Scope of the Project

2.1 Scope of the Project

Under this Agreement, the scope of the Project (the “Scope of the Project”) shall mean and include:

- a. Construction of the Project on the Site set forth in **Schedule-A** and as specified in **Schedule-B** together with provision of Project Facilities as specified in **Schedule-C**, and in conformity with the Specifications and Standards set forth in **Schedule-D**; and
- b. Performance and fulfilment of all other obligations of the Contractor in accordance with the provisions of this Agreement and matters incidental thereto or necessary for the performance of any or all of the obligations of the Contractor under this Agreement.

ARTICLE 3

3 Obligations of the Contractor

3.1 Obligations of the Contractor

- 3.1.1 Subject to and on the terms and conditions of this Agreement, the Contractor shall undertake the survey, investigation, design, engineering, procurement, and construction of the Project and observe, fulfil, comply with and perform all its obligations set out in this Agreement or arising hereunder.
- 3.1.2 The Contractor shall comply with all Applicable Laws and Applicable Permits (including renewals as required) in the performance of its obligations under this Agreement.
- 3.1.3 Save and except as otherwise provided in this Agreement or Applicable Laws, as the case may be, the Contractor shall, in discharge of all its obligations under this Agreement, conform with and adhere to Good Industry Practice at all times.
- 3.1.4 The Contractor shall remedy any and all loss or damage to the Project, occurring on or after the Appointed Date and until the date of Provisional Certificate, with respect to the Works completed prior to the issuance of the Provisional Certificate and/or Completion Certificate, with respect to the Works referred to in the Punch List, at its own cost, save and except to the extent that any such loss or damage shall have arisen from any default of the Authority or on account of a Force Majeure Event in which case the provisions of Article 19 shall apply.
- 3.1.5 The Contractor shall remedy any and all loss or damage to the Project during the Defects Liability Period at its own cost, to the extent that such loss or damage shall have arisen out of the reasons specified in Clause 15.3 of Article 15.
- 3.1.6 The Contractor shall, at its own cost and expense, in addition to and not in derogation of its obligations elsewhere set out in this Agreement:
- a. make, or cause to be made, necessary applications to the relevant Government Instrumentalities with such particulars and details as may be required for obtaining Applicable Permits set forth in Schedule-E and obtain and keep in force and effect such Applicable Permits in conformity with Applicable Laws;
 - b. procure, as required, the appropriate proprietary rights, licences, agreements and permissions for Materials, methods, processes, know-how and systems used or incorporated into the Project;
 - c. make reasonable efforts to maintain harmony and good industrial relations among the personnel employed by it or its Sub-contractors in connection with the performance of its obligations under this Agreement;
 - d. ensure and procure that its Sub-contractors comply with all Applicable Permits and Applicable Laws in the performance by them of any of the Contractor's obligations under this Agreement;

- e. always act in a manner consistent with the provisions of this Agreement and not cause or fail to do any act, deed or thing, whether intentionally or otherwise, which may in any manner be violative of any of the provisions of this Agreement;
- f. support, cooperate with and facilitate the Authority in the implementation and operation of the Project in accordance with the provisions of this Agreement;
- g. ensure that the Contractor and its Sub-contractors comply with the safety and welfare measures for labour in accordance with Applicable Laws and Good Industry Practice;
- h. keep at the Site, a copy of this Agreement, publications named in this Agreement, the Drawings, Documents relating to the Project, and Change of Scope Orders and other communications sent under this Agreement, and provide access to all these documents at all reasonable times to the Authority's Engineer and its authorised personnel;
- i. cooperate with other contractors employed by the Authority and personnel of any other public authority; and
- j. not interfere unnecessarily or improperly with the convenience of the public, or the access to and use and occupation of all the existing facilities within the Right of Way , irrespective of whether they are public or in the possession of the Authority or of others

3.1.7 The Contractor shall undertake all necessary superintendence to plan, arrange, direct, manage, inspect and test the Works.

3.2 Obligations relating to sub-contracts and any other agreements

3.2.1 The Contractor shall not sub-contract Works comprising more than 30% (Thirty percent) of the Contract Price and shall carry out Works for at least 70% (Seventy percent) of the total Contract Price directly under its own supervision and through its own personnel. The Parties expressly agree that for the purposes of computing the value of sub-contracts under this Clause 3.2.1, the Contract Price shall exclude any sub-contract for the procurement of goods and equipment such as [bitumen, cement, steel and equipment]. {The Parties agree that the obligation of the Contractor to carry out Works corresponding to at least 60% (Sixty per cent) the Contract Price shall be discharged solely by the Lead Member.⁴}

3.2.2 In the event any sub-contract for Works, the Contractor shall communicate the name and particulars, including the relevant experience of the sub-contractor, to the Authority/Authority's Representative prior to entering into any such sub-contract. The requirement of Sub contractors along with nature of work assigned to them shall be submitted with proper justification. The Authority/ Authority's Representative shall examine the particulars of the sub-contractor from the national security and public interest perspective and may require the Contractor, no later than 15 (fifteen) business days from the date of receiving the communication from the Contractor, not to proceed with the sub-contract, and the Contractor shall comply therewith.

3.2.3 Without prejudice to the provisions of Clause 3.2.2, in the event any sub- contract referred to in Clause 3.2.2 relates to a sub-contractor who has, over the preceding 3 (three) years, not

⁴ May be deleted if the Contractor is not a Joint Venture.

undertaken at least one work of a similar nature with a contract value exceeding 40% (forty per cent) of the value of the sub-contract to be awarded hereunder and received payments in respect thereof for an amount equal to at least 80% (eighty per cent) of such contract, the Authority may, no later than 15 (fifteen) business days from the date of receiving the communication from the Contractor, require the Contractor not to proceed with such sub-contract, and the Contractor shall comply therewith.

- 3.2.4 It is expressly agreed that the Contractor shall, at all times, be responsible and liable for all its obligations under this Agreement notwithstanding anything contained in the agreements with its Sub-contractors or any other agreement that may be entered into by the Contractor, and no default under any such agreement shall excuse the Contractor from its obligations or liability hereunder.

3.3 Obligations relating to Employment of Foreign Nationals

The Contractor acknowledges, agrees and undertakes that employment of foreign personnel by the Contractor and/or its Sub-contractors and their sub-contractors shall be subject to grant of requisite regulatory permits and approvals including employment/residential visas and work permits, if any required, and the obligation to apply for and obtain the same shall and will always be of the Contractor. Notwithstanding anything to the contrary contained in this Agreement, refusal of or inability to obtain any such permits and approvals by the Contractor or any of its Sub-contractors or their sub-contractors shall not constitute Force Majeure Event, and shall not in any manner excuse the Contractor from the performance and discharge of its obligations and liabilities under this Agreement.

3.4 Obligations relating to Contractor's personnel

- 3.4.1 The Contractor shall ensure and procure that the personnel engaged by it or by its Sub-contractors for performance of its obligations under this Agreement are at all times appropriately qualified, skilled and experienced in their respective functions in conformity with Applicable Laws and Good Industry Practice.
- 3.4.2 The Authority's Engineer may, for reasons to be specified in writing with prior approval of Engineer-in-Charge/Authority, direct the Contractor to remove any member of the Contractor's or Sub-contractor's personnel from the Project. Provided that any such direction issued by the Authority's Engineer shall specify the reasons for the removal of such person.
- 3.4.3 The Contractor shall, on receiving a direction from the Authority's Engineer under the provisions of Clause 3.4.2, ensure and procure the removal of such person or persons from the Project with immediate effect. The Contractor shall further ensure that such persons have no further connection with the Project.

3.5 Obligations relating to advertisement on Project

The Contractor shall not use the Project or any part thereof in any manner for branding or advertising purposes including for advertising any commercial product or services or companies.

3.6 Obligations relating to Contractor's care of the Works

The Contractor shall bear full risk in and take full responsibility for the care of Works, and of Materials, goods and equipment for incorporation therein, on and from the Appointed Date and until the date of Provisional Certificate, with respect to the Works completed prior to the issuance of the Provisional Certificate, and/or Completion Certificate, with respect to the Works referred to in the Punch List, save and except to the extent that any such loss or damage shall have arisen from any default or neglect of the Authority and / or due to Force Majeure .

3.7 Obligations relating to electricity, water and other services

The Contractor shall be responsible for procuring and maintaining including payment of all charges associated with it for all power, water and other services that it may require for the Project.

Connection points till the project site shall be provided by Authorities. Charges towards consumption of power during Operation & Maintenance shall be paid by the Authority.

3.8 Unforeseeable difficulties

Except as otherwise specified in the Agreement:

- a. the Contractor accepts complete responsibility for having foreseen all difficulties and costs of successfully completing the Works;
- b. the Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs; and
- c. the Scheduled Completion Date shall not be adjusted to take account of any unforeseen difficulties or costs.

For the purposes of this Clause, unforeseeable difficulties include physical conditions like man-made or natural physical conditions including sub- surface and hydrological conditions which the Contractor encounters at the Site during execution of the Works.

3.9 Technical Manpower proposed to be deployed for the project

Below mentioned manpower are minimum requirement for the project and Authority may decide to increase the manpower as per requirement.

Sr. No	Minimum Qualification of Technical Representative	Discipline	Designation (Principal Technical / Technical Representative)	Minimum Experience (In Years)	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision (per Person).	
						Figures (in INR)	Words
1	Graduate Engineer	Civil Engineer	Project Manager	15 (and having experience of one similar	1	INR 50000/- per Month	Fifty Thousand per Month Only

Sr. No	Minimum Qualification of Technical Representative	Discipline	Designation (Principal Technical / Technical Representative)	Minimum Experience (In Years)	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision (per Person).	
						Figures (in INR)	Words
				nature of work			
2	Graduate Engineer	Civil Engineer	Project Engineer	12	1	INR 40000/- per Month	Forty Thousand per Month Only
3	Graduate Engineer	Civil Engineer	Planning Engineer	12	1	INR 40000/- per Month	Forty Thousand per Month Only
4	Graduate Engineer	Architect	Project Architect	12	1	INR 40000/- per Month	Forty Thousand per Month Only
5	Graduate Engineer	Civil Engineer	Site Engineer	5	2	INR 25000/- per Month	Twenty Five Thousand per Month Only
6	Graduate Engineer	Civil Engineer	Material Engineer	5	1	INR 25000/- per Month	Twenty Five Thousand per Month Only
7	Graduate Engineer	Electrical Engineer	Site Engineer	5	1	INR 25000/- per Month	Twenty Five Thousand per Month Only
8	Graduate Engineer	Civil Engineer	Quantity Surveyor	6	2	INR 20000/- per Month	Twenty Thousand per Month Only
9	Diploma Engineer	Civil Engineer	Site Engineer	10	2	INR 25000/- per Month	Twenty Five Thousand per Month Only
10	Diploma Engineer	Civil Engineer	Surveyor	8	1	INR 15000/- per Month	Fifteen Thousand per Month Only
11	Diploma Engineer	Civil Engineer	Lab Technician	8	2	INR 15000/- per Month	Fifteen Thousand per Month Only

Sr. No	Minimum Qualification of Technical Representative	Discipline	Designation (Principal Technical / Technical Representative)	Minimum Experience (In Years)	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision (per Person).	
						Figures (in INR)	Words
12	Diploma Engineer	Civil Engineer	Draughtsman	8	2	INR 15000/- per Month	Fifteen Thousand per Month Only

Note:

1. Contractor shall deploy key personnel under Sr. No. 1, 3 & 10 at project site within 20 (twenty) days of the Appointed date.
2. Contractor shall deploy technical manpower under Sr. No. 2, 4, 6, 8 & 12 at project site within 45 (forty five) days of the Appointed date.
3. Contractor shall deploy remaining manpower at project site as per clause 10.1.3 of Article 10.

ARTICLE 4**4 Obligations of the Authority****4.1 Obligations of the Authority**

4.1.1 The Authority shall, at its own cost and expense, undertake, comply with and perform all its obligations set out in this Agreement or arising hereunder.

Authority will be represented in this contract by Engineer-in- Charge (Authority's representative) for the contract management. To assist in due discharge of Authority/Engineer-In-Charge's obligation, the Authority has appointed Project Management Consultant (PMC). The PMC will be responsible for conceptualization of Projects and further, during the design and Construction stage, overseeing the work of contractors, including reviewing, monitoring, resolution of interface issues, and reporting to the Authority/Engineer-In-Charge on the Project progress. All communications relating to contract management on this Project shall be submitted through PMC to the Engineer-In charge for final approval of Authority. Engineer-In charge will act as a Authority's representative and PMC assist with end to end support in carrying out review of preconstruction activities, construction supervision, progress monitoring, quality control, testing, test check of invoices, resolution of claims, change in design, taking over and safety management for all contracts and post construction supervision of contractors work. As such, the Engineer-in-Charge of the Authority is vested with all such powers and responsibilities as are entrusted upon the Authority's Engineer and is fully competent to issue any instructions for proper monitoring and supervision of the project and the agreement, either by himself (including his authorised person) or through the Authority's Engineer. Instructions issued by the Engineer-in-Charge of the Authority shall have the same effect as that of the Authority's Engineer in terms of this Agreement. Wherever such Engineer-in-Charge issues any instructions or notice to the Contractor, he shall endorse a copy thereof to the Authority's Engineer.

4.1.2 The Authority shall be responsible for the correctness of the Scope of the Project, Project Facilities, Specifications and Standards and the criteria for Testing of the completed Works.

4.1.3 The Authority shall, upon receiving the Performance Security under Clause 7.1.1 of Article 7, provide to the Contractor:

- a. the Right of Way in accordance with the provisions of Clauses 8.2 of Article 8, within a period of 15 (fifteen) days from the date of this Agreement, on no less than 80% (Eighty per cent) of the total land required for the Project;
- b. Deleted
- c. Deleted

4.1.4 Not Applicable

4.1.5 Deleted

- 4.1.6 The Authority agrees to provide support to the Contractor and undertakes to observe, comply with and perform, subject to and in accordance with the provisions of this Agreement and Applicable Laws, the following:
- a. upon written request from the Contractor, and subject to the Contractor complying with Applicable Laws, may provide reasonable support to the Contractor in procuring Applicable Permits required from any Government Instrumentality for implementation of the Project;
 - b. upon written request from the Contractor, provide reasonable assistance to the Contractor in obtaining access to all necessary infrastructure facilities and utilities, including water and electricity at rates and on terms no less favourable than those generally available to commercial customers receiving substantially equivalent services;
 - c. procure that no barriers that would have a material adverse effect on Works are erected or placed on or about the Project by any Government Instrumentality or persons claiming through or under it, except for reasons of Emergency, national security or law and order;
 - d. not do or omit to do any act, deed or thing which may in any manner be violative of any of the provisions of this Agreement;
 - e. support, cooperate with and facilitate the Contractor in the implementation of the Project in accordance with the provisions of this Agreement; and
 - f. upon written request from the Contractor and subject to the provisions of Clause 3.3 of Article 3, provide reasonable assistance to the Contractor and any expatriate personnel of the Contractor or its Sub-contractors to obtain applicable visas and work permits for the purposes of discharge by the Contractor or its Sub-contractors of their obligations under this Agreement and the agreements with the Sub-contractors.

4.2 **Obligations relating to Operation & Maintenance**

Deleted

4.3 **Obligations relating to CRZ Clearances**

The Authority represents and warrants that the CRZ clearance required for construction of the Project is under process. The Authority agrees and undertakes that the CRZ clearance for the project, if any, shall be procured by the Authority no later than 60 (sixty) days from the Appointed Date. In the event of any delay beyond such 60 (sixty) days, the Contractor shall be entitled to Time Extension for the period of such delay in accordance with the provisions of Clause 10.4 of Article 10 of this Agreement. The contractor agrees that it shall not be entitled to claim any other damages on account of any such delay by the Authority. For the avoidance of doubt, the present status of environmental and CRZ clearances is specified in Schedule-A.

ARTICLE 5**5 Representations and Warranties****5.1 Representations and warranties of the Contractor**

The Contractor represents and warrants to the Authority that:

- a. it is duly organised and validly existing under the laws of India, and has full power and authority to execute and perform its obligations under this Agreement and to carry out the transactions contemplated hereby;
- b. it has taken all necessary corporate and other actions under Applicable Laws to authorise the execution and delivery of this Agreement and to validly exercise its rights and perform its obligations under this Agreement;
- c. this Agreement constitutes its legal, valid and binding obligation, enforceable against it in accordance with the terms hereof, and its obligations under this Agreement will be legally valid, binding and enforceable obligations against it in accordance with the terms hereof;
- d. it is subject to the laws of India, and hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement or matters arising thereunder including any obligation, liability or responsibility hereunder;
- e. the information furnished in the Bid and as updated on or before the date of this Agreement is true and accurate in all respects as on the date of this Agreement;
- f. the execution, delivery and performance of this Agreement will not conflict with, result in the breach of, constitute a default under, or accelerate performance required by any of the terms of its memorandum and articles of association or any Applicable Laws or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets is bound or affected;
- g. there are no actions, suits, proceedings, or investigations pending or, to its knowledge, threatened against it at law or in equity before any court or before any other judicial, quasi-judicial or other authority, the outcome of which may result in the breach of this Agreement or which individually or in the aggregate may result in any material impairment of its ability to perform any of its obligations under this Agreement;
- h. it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any legally binding order of any Government Instrumentality which may result in any material adverse effect on its ability to perform its obligations under this Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect the performance of its obligations under this Agreement;
- i. it has complied with Applicable Laws in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil or criminal liabilities which in the aggregate have or may have a material adverse effect on its ability to perform its obligations under this Agreement;

- j. no representation or warranty by it contained herein or in any other document furnished by it to the Authority or to any Government Instrumentality in relation to Applicable Permits contains or will contain any untrue or misleading statement of material fact or omits or will omit to state a material fact necessary to make such representation or warranty not misleading;
- k. no sums, in cash or kind, have been paid or will be paid, by it or on its behalf, to any person by way of fees, commission or otherwise for securing the contract or entering into this Agreement or for influencing or attempting to influence any officer or employee of the Authority in connection therewith;
- l. all information provided by the {selected bidder/ members of the Joint Venture} in response to the Request for Proposals or otherwise, is to the best of its knowledge and belief, true and accurate in all material respects;
- m. all undertakings and obligations of the Contractor arising from the Request for Proposals or otherwise shall be binding on the Contractor as if they form part of this Agreement; and
- n. nothing contained in this Agreement shall create any contractual relationship or obligation between the Authority and any Sub- contractors, designers, consultants or agents of the Contractor.

5.2 Representations and warranties of the Authority

The Authority represents and warrants to the Contractor that:

- a. it has full power and authority to execute, deliver and perform its obligations under this Agreement and to carry out the transactions contemplated herein and that it has taken all actions necessary to execute this Agreement, exercise its rights and perform its obligations, under this Agreement;
- b. it has taken all necessary actions under Applicable Laws to authorise the execution, delivery and performance of this Agreement;
- c. it has the financial standing and capacity to perform its obligations under this Agreement;
- d. this Agreement constitutes a legal, valid and binding obligation enforceable against it in accordance with the terms hereof;
- e. it has no knowledge of any violation or default with respect to any order, writ, injunction or any decree of any court or any legally binding order of any Government Instrumentality which may result in any material adverse effect on the Authority's ability to perform its obligations under this Agreement;
- f. it has complied with Applicable Laws in all material respects;
- g. it has good and valid right to the Site and has the power and authority to grant the Right of Way in respect thereof to the Contractor; and

-
- h. It shall have procured Right of Way and CRZ clearances such that the Contractor can commence construction forthwith on 80% (Eighty per cent) of the total land of the Project.

5.3 Disclosure

In the event that any occurrence or circumstance comes to the attention of either Party that renders any of its aforesaid representations or warranties untrue or incorrect, such Party shall immediately notify the other Party of the same. Such notification shall not have the effect of remedying any breach of the representation or warranty that has been found to be untrue or incorrect nor shall it adversely affect or waive any obligation of either Party under this Agreement.

ARTICLE 6

6 Disclaimer

6.1 Disclaimer

- 6.1.1 The Contractor acknowledges that prior to the execution of this Agreement, the Contractor has, after a complete and careful examination, made an independent evaluation of the Request for Proposals, Scope of the Project, Specifications and Standards, Site, local conditions, physical qualities of ground, subsoil and geology, traffic volumes, suitability and availability of access routes to the Site and all information provided by the Authority or obtained, procured or gathered otherwise, and has determined to its satisfaction the accuracy or otherwise thereof and the nature and extent of difficulties, risks and hazards as are likely to arise or may be faced by it in the course of performance of its obligations hereunder. Save as provided in Clause 4.1.2 and Clause 5.2 of Article 5, the Authority makes no representation whatsoever, express, implicit or otherwise, regarding the accuracy, adequacy, correctness, reliability and/or completeness of any assessment, assumptions, statement or information provided by it and the Contractor confirms that it shall have no claim whatsoever against the Authority in this regard.
- 6.1.2 The Contractor acknowledges and hereby accepts to have satisfied itself as to the correctness and sufficiency of the Contract Price.
- 6.1.3 The Contractor acknowledges and hereby accepts the risk of inadequacy, mistake or error in or relating to any of the matters set forth in Clause 6.1.1 above and hereby acknowledges and agrees that the Authority shall not be liable for the same in any manner whatsoever to the Contractor, or any person claiming through or under any of them, and shall not lead to any adjustment of Contract Price or Scheduled Completion Date.
- 6.1.4 The Parties agree that any mistake or error in or relating to any of the matters set forth in Clause 6.1.1 above shall not vitiate this Agreement, or render it voidable.
- 6.1.5 In the event that either Party becomes aware of any mistake or error relating to any of the matters set forth in Clause 6.1.1 above, that Party shall immediately notify the other Party, specifying the mistake or error.
- 6.1.6 Except as otherwise provided in this Agreement, all risks relating to the Project shall be borne by the Contractor; and the Authority shall not be liable in any manner for such risks or the consequences thereof.

PART III

Construction

ARTICLE 7

7 Performance Security

7.1 Performance Security and Additional Performance Security

- 7.1.1 The Contractor shall, for the performance of its obligations hereunder, provide to the Authority, within 15 (fifteen) days of the date of LOA, an irrevocable and unconditional guarantee, for an amount equal to 3% (Three percent) of the Contract Price, from a Scheduled Bank in the form set forth in Annex-I of Schedule-F (the “Performance Security”). The Performance Security shall be valid until 60 (sixty) days of the expiry of the Defects Liability Period specified in Clause 15.1.1 of Article 15. Until such time the Performance Security is provided by the Contractor pursuant hereto and the same comes into effect, the Bid Security shall remain in force and effect, and upon such provision of the Performance Security, the Authority shall release the Bid Security to the Contractor. For the avoidance of doubt, the Parties expressly agree that the Contractor shall provide, no later than 30 (thirty) days prior to the expiry of the Performance Security for the Defects Liability Period specified in Clause 15.1.1 of Article 15, a Performance Security in respect of the extended Defects Liability Period, as specified in Clause 15.1.2 of Article 15, for an amount equal to 3% (three percent)
- 7.1.2 Notwithstanding anything to the contrary contained in this Agreement, the Parties agree that in the event of failure of the Contractor to provide the Performance Security in accordance with the provisions of Clause 7.1.1 and within the time specified therein or such extended period as may be provided by the Authority, in accordance with the provisions of Clause 7.1.5, the Authority may encash the Bid Security and appropriate the proceeds thereof as Damages, and thereupon all rights, privileges, claims and entitlements of the Contractor under or arising out of this Agreement shall be deemed to have been waived by, and to have ceased with the concurrence of the Contractor, and this Agreement shall be deemed to have been terminated by mutual agreement of the Parties.
- 7.1.3 In case of bids mentioned below, the Selected Bidder, along with the Performance Security, shall also furnish to the Authority an irrevocable and unconditional guarantee from a Scheduled Bank in the same form given at Annex-I of Schedule-F towards an Additional Performance Security (the “Additional Performance Security”) for an amount calculated as under:
- a. If the Bid Price offered by the Selected Bidder is lower than 10% but upto 20% of the estimated Project Cost, then the Additional Performance Security shall be calculated @20% of the difference in the (i) 90% of the Estimated Project Cost and (ii) the Bid Price offered by the selected Bidder.
 - b. If the Bid Price offered by the Selected Bidder is lower than 20% of the Estimated Project Cost, then the Additional Performance Security shall be calculated @ 30% of the

difference in the (i) 90% of the Estimated Project Cost and (ii) the Bid Price offered by the Selected Bidder.

c. This Additional Performance Security shall be treated as part of the Performance Security.

7.1.4 The Selected Bidder has the option to provide 50% of the Performance Security and 50% of the Additional Performance Security, if any, within 15 (fifteen) days of receipt of Letter of Acceptance in any case before signing of the Contract Agreement and the remaining Performance Security and Additional Performance Security, if any, shall be submitted within 15 days of signing of the agreement

7.1.5 In the event the Contractor fails to provide the remaining Performance Security within 15 (fifteen) days of the date of this Agreement, it may seek extension of time for a period not exceeding a further 15 (fifteen) days on payment of Damages for such extended period in a sum calculated at the rate of 0.05% (zero point zero five per cent) of the Contract Price for each day until the Performance Security is provided.

7.2 Extension of Performance Security

The Contractor may initially provide the Performance Security for a period of valid until 60 (sixty) days after the Defects Liability Period; provided that it shall procure the extension of the validity of the Performance Security, as necessary, at least 2 (two) months prior to the date of expiry thereof. Upon the Contractor providing an extended Performance Security, the previous Performance Security shall be deemed to be released and the Authority shall return the same to the Contractor within a period of 7 (seven) business days from the date of submission of the extended Performance Security.

7.3 Appropriation of Performance Security

7.3.1 Upon occurrence of a Contractor Default, the Authority shall, without prejudice to its other rights and remedies hereunder or in law, be entitled to encash and appropriate from the Performance Security the amounts due to it as Damages for the Contractor's Default.

7.3.2 Upon such encashment and appropriation from the Performance Security, the Contractor shall, within 30 (thirty) days thereof, replenish, in case of partial appropriation, to its original level the Performance Security, and in case of appropriation of the entire Performance Security provide a fresh Performance Security, as the case may be, and the Contractor shall, within the time so granted, replenish or furnish fresh Performance Security as aforesaid failing which the Authority shall be entitled to terminate the Agreement in accordance with Article 21. Upon such replenishment or furnishing of a fresh Performance Security, as the case may be, the Contractor shall be entitled to an additional Cure Period of 30 (thirty) days for remedying the Contractor Default, and in the event of the Contractor not curing its default within such Cure Period, the Authority shall be entitled to encash and appropriate such Performance Security as Damages, and to terminate this Agreement in accordance with Article 21.

7.4 Release of Performance Security and Additional Performance Security

The Authority shall release the 50% of Performance Security within 60 (sixty) days of the issue of Construction completion certificate under this Agreement. As the tendered work involves operation & maintenance, after construction of project and other works, then 50% of Performance Guarantee shall be retained as Security Deposit.

The Authority shall release the retained Performance Security within 60 (sixty) days of the issue of Construction completion certificate or the Defects Liability Period or the extended Defects Liability Period, as the case may be, under this Agreement. Notwithstanding the aforesaid, the Parties agree that the Authority shall not be obliged to release the Performance Security until all Defects identified during the Defects Liability Period or the extended Defects Liability Period, as the case may be, have been rectified.

The Authority shall return the Additional Performance Security to the Contractor within 60 (Sixty) days from the date of issue of Completion Certificate under Article 12 of this Agreement.

7.5 Retention Money

7.5.1 From every payment for Works due to the Contractor in accordance with the provisions of Clause 17.5 of Article 17, the Authority shall deduct 6% (six percent) thereof as guarantee money for performance of the obligations of the Contractor during the Construction Period (the “Retention Money”) subject to the condition that the maximum amount of Retention Money shall not exceed 5% (five percent) of the Contract Price.

7.5.2 Upon occurrence of a Contractor’s Default, the Authority shall, without prejudice to its other rights and remedies hereunder or in law, be entitled to appropriate the relevant amounts from the Retention Money as Damages for such Contractor’s Default.

7.5.3 The Contractor may, upon furnishing an irrevocable and unconditional bank guarantee substantially in the form provided at Annex-II of Schedule-F, require the Authority to refund the Retention Money deducted by the Authority under the provisions of Clause 7.5.1. Provided that the refund hereunder shall be made in tranches of not less than 1% (one percent) of the Contract Price. The said bank guarantee shall be valid till the end of the O&M period

7.5.4 Within 15 (fifteen) days of the date of completion of the Defect Liability Period, the Authority shall discharge the bank guarantees, if any, furnished by the Contractor under the provisions of Clause 7.5.3 and refund the balance of Retention Money remaining with the Authority after adjusting the amounts appropriated under the provisions of Clause 7.5.2 and the amounts refunded under the provisions of Clause 7.5.3.

7.5.5 The Parties agree that in the event of Termination of this Agreement, the Retention Money and the bank guarantees specified in this Clause 7.5 shall be treated as if they are Performance Security and shall be reckoned as such for the purposes of Termination Payment under Clause 21.6 of Article 21.

7.6 Deduction for Maintenance Period Charges

- 7.6.1 From every payment for Works due to the Contractor in accordance with the provisions of Clause 17.5 of Article 17, the Authority shall deduct 6% (six percent) thereof as guarantee money for performance of the obligations of the Contractor during the O & M Period (the “Maintenance Period”) subject to the condition that the maximum amount of Maintenance Period charges shall not exceed 5% (five per cent) of the Contract Price.
- 7.6.2 the amount shall be released to the Contractor as per the Clause 26.1 of Article 26.

ARTICLE 8

8 Right of Way

8.1 The Site

The site of the Project (the “Site”) shall comprise the site described in Schedule-A in respect of which the Right of Way shall be provided by the Authority to the Contractor. The Authority shall be responsible for:

- a. acquiring and providing Right of Way on the Site in accordance with the plan finalised by the Authority, free from all encroachments and encumbrances, and free access thereto for the execution of this Agreement; and
- b. Obtaining CRZ clearance for the Project.

8.2 Procurement of the Site

8.2.1 The Authority Representative and the Contractor shall, within 15 (fifteen) days of the date of this Agreement, inspect the Site and prepare a memorandum containing an inventory of the Site including the vacant and unencumbered land, buildings, structures, road works, trees and any other immovable property on or attached to the Site. Subject to the provisions of Clause 8.2.2, such memorandum shall have appended thereto as an appendix (the “Appendix”) specifying in reasonable detail those parts of the Site to which vacant access and Right of Way has not been given to the Contractor. Signing of the memorandum, in 2 (two) counterparts (each of which shall constitute an original), by the authorised representatives of the Parties shall be deemed to constitute a valid evidence of giving the Right of Way to the Contractor for discharging its obligations under and in accordance with the provisions of this Agreement and for no other purpose whatsoever. For the avoidance of doubt, the Parties agree that subject to the provisions of Clauses 8.2.2 and 8.2.3, whenever the Authority is ready to provide Right of Way for any part or parts of the Site included in the Appendix, it shall by notice inform the Contractor of the proposed date and time when the Authority Representative and the Contractor shall inspect the specified parts of the Site, and prepare a memorandum which shall be deemed to constitute a valid evidence of giving such Right of Way to the Contractor in accordance with the provision of this Clause 8.2.1.

8.2.2 Notwithstanding anything to the contrary contained in this Clause 8.2, the Authority shall specify the parts of the Site, if any, for which Right of Way shall be provided to the Contractor on the dates specified in Schedule-A. Such parts shall also be included in the Appendix prepared in pursuance of Clause 8.2.1. For the avoidance of doubt, the Parties expressly agree that the Appendix shall in no event contain Sections of the Project the cumulative area of which exceeds 20% (Twenty per cent) of the total land required for the Project.

8.2.3 The Authority shall provide the Right of Way to the Contractor, in respect of the land included in the Appendix, by the date specified in this RFP of Clause 8.2.1 for those parts of the Site referred to therein. The contractor agrees that it shall not be entitled to claim any damages on account of any such delay by the Authority.

8.3 Deleted

8.4 Site to be free from Encumbrances

Subject to the provisions of Clause 8.2, the Site shall be made available by the Authority to the Contractor pursuant hereto free from all Encumbrances and occupations and without the Contractor being required to make any payment to the Authority on account of any costs, compensation, expenses and charges for the acquisition and use of such Site for the duration of the Project Completion Schedule. For the avoidance of doubt, it is agreed that the existing rights of way, easements, privileges, liberties and appurtenances to the Site shall not be deemed to be Encumbrances. It is further agreed that, unless otherwise specified in this Agreement, the Contractor accepts and undertakes to bear any and all risks arising out of the inadequacy or physical condition of the Site.

8.5 Protection of Site from encroachments

On and after signing the memorandum and/or subsequent memorandum referred to in Clause 8.2.1, and until the issue of the Provisional Certificate, the Contractor shall maintain a round-the-clock vigil over the Site and shall ensure and procure that no encroachment thereon takes place. During the Construction Period, the Contractor shall protect the Site from any and all occupations, encroachments or Encumbrances, and shall not place or create nor permit any Sub-contractor or other person claiming through or under the Agreement to place or create any Encumbrance or security interest over all or any part of the Site or the Project Assets, or on any rights of the Contractor therein or under this Agreement, save and except as otherwise expressly set forth in this Agreement. In the event of any encroachment or occupation on any part of the Site, the Contractor shall report such encroachment or occupation forthwith to the Authority and undertake its removal at its own cost and expenses.

8.6 Special/temporary Right of Way

The Contractor shall bear all costs and charges for any special or temporary right of way required by it in connection with access to the Site. The Contractor shall obtain at its cost such facilities on or outside the Site as may be required by it for the purposes of the Project and the performance of its obligations under this Agreement.

8.7 Access to the Authority and the Authority's Engineer

8.7.1 The Right of Way given to the Contractor hereunder shall always be subject to the right of access of the Authority and the Authority's Engineer and their employees and agents for inspection, viewing and exercise of their rights and performance of their obligations under this Agreement.

8.7.2 The Contractor shall ensure, subject to all relevant safety procedures that the Authority has unrestricted access to the Site during any Emergency.

8.8 Geological and archaeological finds

It is expressly agreed that mining, geological or archaeological rights do not form part of this Agreement with the Contractor for the Works, and the Contractor hereby acknowledges that it shall not have any mining rights or interest in the underlying minerals, fossils, antiquities, structures or other remnants or things either of particular geological or archaeological interest and that such rights, interest and property on or under the Site shall vest in and belong to the Authority or the concerned Government Instrumentality. The Contractor shall take all reasonable precautions to prevent its workmen or any other person from removing or damaging such interest or property and shall inform the Authority forthwith of the discovery thereof and comply with such instructions as the Authority or the concerned Government Instrumentality may reasonably give for the removal of such property. For the avoidance of doubt, it is agreed that any reasonable expenses incurred by the Contractor hereunder shall be reimbursed by the Authority and Authority decision shall be binding upon contractor. It is also agreed that the Authority shall procure that the instructions hereunder are issued by the concerned Government Instrumentality within a reasonable period so as to enable the Contractor to continue its Works with such modifications as may be deemed necessary.

ARTICLE 9

9 Utilities and Trees

9.1 Existing utilities and roads

Notwithstanding anything to the contrary contained herein, the Contractor shall ensure that the respective entities owning the existing roads, right of way, level crossings, structures, or utilities on, under or above the Site are enabled by it to keep them in continuous satisfactory use, if necessary, by providing suitable temporary diversions with the authority of the controlling body of that road, right of way or utility.

9.2 Shifting of obstructing utilities

The contractor shall be responsible to construct all the utilities required for the project. The contractor undertakes to have the site clean, free from rubbish to the satisfaction of the Authority/Authority Engineer all surplus materials, rubbish, etc. will be removed to the place fixed by the Authority/Authority's Engineer and nothing extra will be paid. Contractor shall divert/ remove/ maintain/ repair all the existing services like water supply, drainage, storm water, electric etc. at his own cost which will affect the construction activity up to end of the project. During excavation of any kind of activity, if any existing lines of any type come in a way throughout construction area, it is contractor's responsibility to divert/repair/replace/provide new lines if required with prior permission of relevant departments. Contractor has to take necessary approval from concerned Authority for the same. No extra cost will be given for the same.

9.3 New utilities

9.3.1 The Contractor shall allow, subject to such conditions as the Authority may specify, access to, and use of the Site for laying telephone lines, water pipes, electric cables or other public utilities. Where such access or use causes any financial loss to the Contractor, it may require the user of the Site to pay compensation or damages as per Applicable Laws. For the avoidance of doubt, it is agreed that use of the Site under this Clause 9.3 shall not in any manner relieve the Contractor of its obligation to construct the Project in accordance with this Agreement and any damage caused by such use shall be restored forthwith at the cost of the Authority.

9.3.2 In the event the construction of any Works is affected by a new utility or works undertaken in accordance with this Clause 9.3, the Contractor shall be entitled to a reasonable Time Extension as determined by the Authority's Engineer in accordance with the provisions of Clause 10.4 of Article 10.

9.3.3 The Authority may, by notice, require the Contractor to connect any adjoining road to the Project, and the connecting portion thereof falling within the Site shall be constructed by the Contractor at the Authority's cost in accordance with Article 10.

9.3.4 The Authority may by notice require the Contractor to connect, through a paved road, any adjoining service station, hotel, motel or any other public facility or amenity to the Project,

whereupon the connecting portion thereof that falls within the Site shall be constructed by the Contractor on payment of the cost. The cost to be paid by the Authority to the Contractor shall be determined by the Authority's Engineer as per the Schedule-G and under the Clause 13.2 of Article 13. For the avoidance of doubt, in the event such road is to be constructed for the benefit of any entity, the Authority may require such entity to make an advance deposit with the Contractor or the Authority, as the case may be, of an amount equal to the estimated cost as determined by the Authority's Engineer and such advance shall be adjusted against the cost of construction as determined by the Authority's Engineer hereunder.]

9.4 Felling of trees

The Authority shall assist the Contractor in obtaining the Applicable Permits for felling of trees in non-forest area to be identified by the Authority's Engineer/ Authority for this purpose if and only if such trees cause a Material Adverse Effect on the construction of the Project. The cost of such felling shall be included by the contractor in the contract price and of the compensatory plantation of trees, if any, shall be borne by the Authority as per the Schedule-G and under the Clause 13.2 of Article 13. In the event of any delay in felling thereof for reasons beyond the control of the Contractor; it shall be excused for failure to perform any of its obligations hereunder if such failure is a direct consequence of delay in the felling of trees. The Parties hereto agree that the felled trees shall be deemed to be owned by the Authority and shall be disposed in such manner and subject to such conditions as the Authority may in its sole discretion deem appropriate. For the avoidance of doubt, the Parties agree that if any felling of trees hereunder is in a forest area if any, the Applicable Permit thereof shall be procured by the Authority within the time specified in the Agreement and the Contractor shall be entitled to Time Extension for the period of such delay.

ARTICLE 10

10 Design and Construction of the Project

10.1 Obligations prior to commencement of Works

10.1.1 Within 20 (twenty) days of the Appointed Date, the Contractor shall:

- a. appoint its representative, duly authorised to deal with the Authority in respect of all matters under or arising out of or relating to this Agreement;
- b. appoint a design director (the “Design Director”) who will head the Contractor’s design unit and shall be responsible for surveys, investigations, collection of data, and preparation of preliminary and detailed designs;
- c. undertake and perform all such acts, deeds and things as may be necessary or required before commencement of Works under and in accordance with this Agreement, Applicable Laws and Applicable Permits; and
- d. make its own arrangements for quarrying of materials and procurement needed for the Project under and in accordance with Applicable Laws and Applicable Permits.

10.1.2 The Authority shall, direct the appointed “**Authority’s Engineer**” to discharge the functions and duties specified in this Agreement, and shall notify to the Contractor the details of the Authority’s Engineer forthwith.

10.1.3 Within 30 (thirty) days of the Appointed Date, the Contractor shall submit to the Authority and the Authority’s Engineer a programme (the “**Programme**”) including scheduling of the deployment of the manpower for construction of the Works, developed using networking techniques and latest project control software such as MS Project or Primavera P6 etc. and giving the following details:

Part I Contractor’s organisation for the Project, the general methods and arrangements for design and construction, environmental management plan, Quality Assurance Plan including design quality plan, traffic management and safety plan covering safety of users and workers during construction, Contractor’s key personnel, and equipment.

Part II Programme for completion of all stages of construction given in Schedule-G and Project Milestones of the Works as specified in Project Completion Schedule set forth in Schedule-I. The Programme shall include:

- a. the order in which the Contractor intends to carry out the Works, including the anticipated timing of design and stages of Works;
- b. the periods for reviews under Clause 10.2; and
- c. the sequence and timing of inspections and tests specified in this Agreement.

The Contractor shall submit a revised programme whenever the previous programme is inconsistent with the actual progress or with the Contractor’s obligations.

Part III Monthly cash flow forecast for the Project.

For the avoidance of doubt, the Contractor acknowledges and agrees that the Authority may, within a period of 30 days of receipt of the Programme, convey its comments to the Contractor stating the modifications, if any, required for compliance with the provisions of this Agreement, and the Contractor shall carry out such modifications, to the extent required for conforming with the provisions of this Agreement.

- 10.1.4 The Contractor shall compute, on the basis of the Drawings prepared in accordance with Clause 10.2.7, and provide to the Authority's Engineer, the length, area and numbers, as the case may be, in respect of the various items of work specified in Schedule-G and comprising the Scope of the Project. The Parties expressly agree that these details shall form the basis for estimating the interim payments for the Works in accordance with the provisions of Clause 17.3 of Article 17. For the avoidance of doubt, the sum of payments to be computed in respect of all the items of work shall not exceed the Contract Price, as may be adjusted in accordance with the provisions of this Agreement.
- 10.1.5 The Contractor shall appoint a safety consultant (the "Safety Consultant") to carry out safety audit at the design stage of the Project in accordance with Applicable Laws and Good Industry Practice. The Safety Consultant shall be appointed after proposing to the Authority a panel of 3 (three) names of qualified and experienced firms from which the Authority may choose 1 (one) to be the Safety Consultant. Provided, however, that if the panel is not acceptable to the Authority and the reasons for the same are furnished to the Contractor, the Contractor shall propose to the Authority a revised panel of 3 (three) names for obtaining the consent of the Authority. The Authority shall, within 15 (fifteen) days of receiving a proposal from the Contractor hereunder, convey its decision, with reasons, to the Contractor, and if no such decision is conveyed within the said period, the Contractor may proceed with engaging of the Safety Consultant. For the avoidance of doubt, the Parties agree that no firm or person having any conflict of interest shall be engaged hereunder. The Parties further agree that any assignments completed at least 3 (three) years prior to the appointment hereunder shall not be reckoned for the purposes of conflict of interest.
- 10.1.6 The safety audit pursuant to Clause 10.1.5 shall be carried out by the Safety Consultant in respect of all such design details that have a bearing on safety of Users as well as pedestrians and animals involved in or associated with accidents. The recommendations of the Safety Consultant shall be incorporated in the design of the Project and the Contractor shall forward to the Authority's Engineer a certificate to this effect together with the recommendations of the Safety Consultant. In the event that any works required by the Safety Consultant shall fall beyond the scope of Schedule-B, Schedule-C or Schedule-D, the Contractor shall make a report thereon and seek the instructions of the Authority for Change in Scope. For the avoidance of doubt, the Safety Consultant to be engaged by the Contractor shall be independent of the design and implementation team of the Contractor.

10.2 Design and Drawings

10.2.1 Design and Drawings shall be developed in conformity with the Specifications and Standards set forth in Schedule-D. In the event, the Contractor requires any relaxation in design standards due to restricted Right of Way in any Section, the alternative design criteria for such Section shall be provided for review of the Authority's Engineer.

10.2.1.1 The design shall take into consideration the existing site surface/sub-surface layers condition including any existing site features already in sound condition and conforming to the project specification shall be retained and built into the proposed design as far as possible.

10.2.1.2 While developing the design and drawing the contractor has to keep in view of the existing infrastructure work and the drawing and details of all such work are included in Schedule-H.

10.2.1.3 The cost adjustment for the existing infrastructure used shall be determined under the Schedule-G and under the Clause 13.2 of Article 13.

10.2.1.4 Contractor shall not demolish any existing surface without prior approval of Authority/EIC.

10.2.2 The Contractor shall appoint a proof check consultant (the "Proof Consultant") after proposing to the Authority a panel of 3 (three) names of qualified and experienced firms from whom the Authority may choose 1 (one) to be the Proof Consultant. Provided, however, that if the panel is not acceptable to the Authority and the reasons for the same are furnished to the Contractor, the Contractor shall propose to the Authority a revised panel of 3 (three) names for obtaining the consent of the Authority. The Contractor shall also obtain the consent of the Authority for 2 (two) key personnel of the Proof Consultant who shall have adequate experience and qualifications with respect to the main elements of the Project. The Authority shall, within 30 (Thirty) days of receiving a proposal from the Contractor hereunder, convey its decision, with reasons, to the Contractor, and if no such decision is conveyed within the said period, the Contractor may proceed with engaging of the Proof Consultant. For the avoidance of doubt, the Parties agree that no firm or person having any conflict of interest shall be engaged hereunder. The Parties further agree that any assignments completed at least three years prior to the appointment hereunder shall not be reckoned for the purposes of conflict of interest.

10.2.3 The Proof Consultant shall:

- a. evolve a systems approach with the Design Director so as to minimise the time required for final designs and construction drawings; and
- b. proof check the detailed calculations, drawings and designs, which have been approved by the Design Director.

10.2.4 In respect of the Contractor's obligations with respect to the design and Drawings of the Project as set forth in Schedule-H, the following shall apply:

- a. The Contractor shall prepare and submit, with reasonable promptness and in such sequence as is consistent with the Project Completion Schedule, 6 (six) copies each of the design and Drawings, duly certified by the Proof Consultant, to the Authority's Engineer for review. The Authority's Engineer may require additional drawings for its review in accordance with Good Industry Practice;
- b. by submitting the Drawings for review to the Authority's Engineer, the Contractor shall be deemed to have represented that it has determined and verified that the design and engineering, including field construction criteria related thereto, are in conformity with the Scope of the Project, Specifications and Standards, Applicable Laws and Good Industry Practice;
- c. within 15 (fifteen) days of the receipt of the Drawings, the Authority's Engineer shall review the same and convey its observations to the Contractor with particular reference to their conformity or otherwise with the Scope of the Project and the Specifications and Standards. The Contractor shall not be obliged to await the observations of the Authority's Engineer on the Drawings submitted pursuant hereto beyond the said period of 15 (fifteen) days and may begin or continue Works at its own discretion and risk; Provided, however, that in case of additional design/drawings, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days;
- d. if the aforesaid observations of the Authority's Engineer indicate that the Drawings are not in conformity with the Scope of the Project or the Specifications and Standards, such Drawings shall be revised by the Contractor in conformity with the provisions of this Agreement and resubmitted to the Authority's Engineer for review. The Authority's Engineer shall give its observations, if any, within 10 (ten) days of receipt of the revised Drawings. In the event the Contractor fails to revise and resubmit such Drawings to the Authority's Engineer for review as aforesaid, the Authority's Engineer may cause the payment for the affected works to be withheld under the provisions of Clause 17.5.4 of Article 17. If the Contractor disputes any decision, direction or determination of the Authority's Engineer hereunder, the Dispute shall be resolved in accordance with the Dispute Resolution Procedure as per Article 24;
- e. no review and/or observation of the Authority's Engineer and/or its failure to review and/or convey its observations on any Drawings shall relieve the Contractor of its obligations and liabilities under this Agreement in any manner nor shall the Authority's Engineer or the Authority be liable for the same in any manner; and if errors, omissions, ambiguities, inconsistencies, inadequacies or other Defects are found in the Drawings, they shall be corrected, along with the affected Works, at the Contractor's cost, notwithstanding any review under this Article 10;
- f. the Contractor shall be responsible for delays in submitting the Drawings, as set forth in Schedule-H, caused by reason of delays in surveys and field investigations, and shall not be entitled to seek any relief in respect thereof from the Authority; and
- g. the Contractor warrants that its designers, including any third parties engaged by it, shall have the required experience and capability in accordance with Good Industry Practice and

it shall indemnify the Authority against any damage, expense, liability, loss or claim, which the Authority might incur, sustain or be subject to arising from any breach of the Contractor's design responsibility and/or warranty as set out in this Clause.

10.2.5 Any cost or delay in construction arising from review by the Authority's Engineer shall be borne by the Contractor.

10.2.6 Works shall be executed in accordance with the Drawings provided by the Contractor in accordance with the provisions of this Clause 10.2 and the observations of the Authority's Engineer thereon as communicated pursuant to the provisions of Clause 10.2.4 (d). Such Drawings shall not be amended or altered without prior written notice to the Authority's Engineer. If a Party becomes aware of an error or defect of a technical nature in the design or Drawings, that Party shall promptly give notice to the other Party of such error or defect.

10.2.7 Within 90 (ninety) days from the Project Completion Date, the Contractor shall furnish to the Authority and the Authority's Engineer a complete set of as-built Drawings, in 2 (two) hard copies and in its editable digital format or in such other medium or manner as may be acceptable to the Authority, including an as-built survey illustrating the layout of the Project and setback lines, if any, of the buildings and structures forming part of Project Facilities, and shall hand them over to the Authority against receipt thereof.

10.3 Construction of the Project

10.3.1 The Contractor shall construct the Project as specified in Schedule-B and Schedule-C, and in conformity with the Specifications and Standards set forth in Schedule-D. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works. The 730th (Seven hundred and thirtieth) day from the Appointed Date shall be the scheduled completion date (the "**Scheduled Completion Date**") and the Contractor agrees and undertakes that the construction shall be completed on or before the Scheduled Completion Date, including any extension thereof.

- a pilot area or sample area to be developed by the Contractor with all finishes including flooring, furniture, under and over ground utilities, signages, illumination, horticulture etc. post approval of the same, further work to be undertaken. No deviation to be undertaken post approval in material finishes.
- any construction activity undertaken within protected / Archeological monument/ CRZ/ ecologically sensitive zones buffer zone should undertake all necessary construction activity precautions and follow all guidelines set by the relevant authority

10.3.2 If the Contractor fails to maintain the required progress in terms of Schedule I or to complete the work and the justified extended date of completion as per clause 10.4, he shall, without prejudice to any other right or remedy available under the contract on account of such breach, pay as compensation the amount calculated at the rates stipulated below as the Authority may decide on the amount of accepted Tendered Value of the work for every completed day/month (as determined) that the progress remains below that specified in Schedule I or that the work remains incomplete.

Compensation for delay of work with maximum rate @ 1% (one percent) per month of delay to be computed on per day basis based on quantum of damage suffered due to stated delay on the part of Contractor.

Provided always that the total amount of compensation for delay to be paid under this condition shall not exceed 10 % (ten percent) of the accepted Tendered Value of work

In case no compensation has been decided by the Authority in during the progress of work, this shall be no waiver of right to levy compensation by the said Authority if the work remains incomplete on final justified extended date of completion. If the Authority Engineer / Engineer-in-Charge decide to give further extension of time allowing performance of work beyond the justified extended date, the Contractor shall be liable to pay compensation for such extended period. If any variation in amount of contract takes place during such extended period beyond justified extended date and the Contractor becomes entitled to additional time, the net period for such variation shall be accounted for while deciding the period for levy of compensation. However, during such further extended period beyond the justified extended period, if any delay occurs by events under Force Majeure and for the reason not attributable to the Contractor, the Contractor shall be liable to pay compensation for such delay.

In case action under this clause has not been finalized and the work has been terminated by the Authority, the right of action under this clause shall remain post termination of Contract but levy of compensation shall be for days the progress is behind the schedule on date of termination, as assessed by the Authority Engineer, after due consideration of justified extension. The compensation for delay, if not decided before the termination of contract, shall be decided after of determination of Contract.

The amount of compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other Contract with the Authority. In case, the Contractor does not achieve a particular milestone mentioned in Schedule-I, or the re-scheduled milestone(s), the amount shown against that milestone shall be withheld, to be adjusted against the compensation levied as above. With-holding of this amount on failure to achieve a milestone, shall be automatic without any notice to the Contractor. However, if the Contractor catches up with the progress of work on the subsequent milestone(s), the withheld amount shall be released. In case the Contractor fails to make up for the delay in subsequent milestone(s), amount mentioned against each milestone missed subsequently also shall be withheld. However, no interest, whatsoever, shall be payable on such withheld amount.

10.3.3 The Authority shall notify the Contractor of its decision to impose Damages in pursuance of the provisions of this Clause 10.3. Provided, however, that no deduction on account of Damages shall be effected by the Authority without taking into consideration the representation, if any, made by the Contractor within 20 (twenty) days of such notice. The

Parties expressly agree that the total amount of Damages under Clause 10.3.2 shall not exceed 10% (ten percent) of the Contract Price.

10.4 Extension of time for completion

10.4.1 Without prejudice to any other provision of this Agreement for and in respect of extension of time, the Contractor shall be entitled to extension of time in the Project Completion Schedule (the “Time Extension”) to the extent that completion of any Project Milestone is or will be delayed by any of the following, namely:

- a. delay in providing Right of Way, CRZ clearances, specified in Clause 4.1.4 of Article 4;
- b. Change of Scope, unless an adjustment to the Scheduled Completion Date has been agreed under Article 13;
- c. occurrence of a Force Majeure Event;
- d. any delay, impediment or prevention caused by or attributable to the Authority, the Authority’s personnel or the Authority’s other contractors on the Site; and
- e. any other cause or delay which entitles the Contractor to Time Extension in accordance with the provisions of this Agreement.

10.4.2 The Contractor shall, no later than 15 (fifteen) business days from the occurrence of an event or circumstance specified in Clause 10.4.1, inform the Authority’s Engineer by notice in writing, with a copy to the Authority, stating in reasonable detail with supporting particulars, the event or circumstances giving rise to the claim for Time Extension in accordance with the provisions of this Agreement. Provided that the period of 15 (fifteen) business days shall be calculated from the date on which the Contractor became aware, or should have become aware, of the occurrence of such an event or circumstance. Provided further that notwithstanding anything to the contrary contained in this Agreement, Time Extension shall be due and applicable only for the Works which are affected by the aforesaid events or circumstances and shall not in any manner affect the Project Completion Schedule for and in respect of the Works which are not affected thereby.

10.4.3 In the event of the failure of the Contractor to issue to the Authority’s Engineer a notice in accordance with the provisions of Clause 10.4.2 within the time specified therein, the Contractor shall not be entitled to any Time Extension and shall forfeit its right to any such claims in future. For the avoidance of doubt, in the event of failure of the Contractor to issue notice as specified in this Clause 10.4.3, the Authority shall be discharged from all liability in connection therewith.

10.4.4 The Authority’s Engineer shall, on receipt of a claim in accordance with the provisions of Clause 10.4.2, examine the claim expeditiously within the time frame specified herein. In the event the Authority’s Engineer requires any clarifications to examine the claim, the Authority’s Engineer shall seek the same within 15 (fifteen) days from the date of receiving the claim. The Contractor shall, on the receipt of the communication of the Authority’s Engineer requesting for clarification, furnish the same to the Authority’s Engineer within 10 (ten) days thereof. The Authority’s Engineer shall, within a period of 30 (thirty) days from the date of receipt of such clarifications, forward in writing to the Contractor its

determination of Time Extension. For the avoidance of doubt, the Parties agree that the Authority's Engineer shall, in accordance with the provisions of this Agreement, notify the Contractor of the aforesaid Time Extension no later than 60 (sixty) days from the date of receipt of the Contractor's claim for Time Extension.

10.4.5 If the event or circumstance giving rise to the notice has a continuing effect:

- a. the detailed claim shall be considered as interim;
- b. the Contractor shall, no later than 10 (ten) days after the close of each month, send further interim claims specifying the accumulated delay, the extension of time claimed, and such further particulars as the Authority's Engineer may reasonably require; and
- c. the Contractor shall send a final claim within 30 (thirty) days after the effect of the event or the circumstance ceases.

Upon receipt of the claim hereunder, the Authority's Engineer shall examine and determine the same in accordance with the provisions of Clause 10.4.4 within a period of 60 (sixty) days of the receipt thereof.

10.5 Incomplete Works

In the event the Contractor fails to complete the Works in accordance with the Project Completion Schedule, including any Time Extension granted under this Agreement, the Contractor shall endeavour to complete the balance work expeditiously and shall pay Damages to the Authority in accordance with the provisions of Clause 10.3.2 for delay of each day until the Works are completed in accordance with the provisions of this Agreement. Recovery of Damages under this Clause shall be without prejudice to the rights of the Authority under this Agreement including the right to termination under Clause 21.1 of Article 21.

10.6 Maintenance Manual

No later than 60 (sixty) days prior to the Project Completion Date, the Contractor shall, in consultation with the Authority's Engineer, evolve a maintenance manual (the "Maintenance Manual") for the regular and preventive maintenance of the Project in conformity with the Specifications and Standards, safety requirements and Good Industry Practice, and shall provide 5 (five) copies thereof to the Authority's Engineer. The Authority's Engineer shall review the Maintenance Manual within 15 (fifteen) days of its receipt and communicate its comments to the Contractor for necessary modifications, if any.

10.7 As-Built Records

The Contractor shall prepare, and keep up-to-date, a complete set of as built records of the execution of the Works, showing the exact as built locations, sizes and details on the Works as executed with cross references to all relevant specifications and data sheets. These records shall be kept on the Site and shall be used exclusively for the purpose of this Sub-Clause 10.7. The Contractor shall provide 2 (two) copies of as built records to the Authority prior to the commencement of the Tests on Completion.

ARTICLE 11

11 Quality Assurance, Monitoring and Supervision

11.1 Site Office and Lab room Requirements

11.1.1 Contractor to provide site office and Lab room: (within 60 days after issue work order otherwise **INR 20,000/-** Per month penalty will imposed as penalty over and above L.D. Contractor shall provide a permanent site office (Masonry & RCC structure) and portable stores (Metal / Wood / PVC) at the location suggested by the Employer in the area identified by DSCL. The site office shall be utilized exclusively for the Engineer- In- Charge staff. Site office shall be fully furnished computer, internet, printer, furniture, cooler and such necessary facilities. The site office shall room with allied utilities like toilets, pantry etc. Intermediate shifting of portable structures (such as stores) may be required during any stage of project, hence contractor is abided to do so without any cost or time factor. Contractor should maintain the site office till the project tenure and hand it over to DSCL without claiming any extra cost. Following utility services shall be provided for DSCL staff / Engineer-in-Charge with water supply, drainage, electricity and housekeeping services etc. free of cost till project completion and O & M Period.

- a. Site office with conference room and toilet block. (minimum requirement 1500 Sqft.)
- b. Lab room with lab equipments (minimum requirement 2000 Sqft)
- c. Office furniture:- tables, revolving chairs, visitor chairs, Cupboards, rack, drawing stands, water cooler with RO plant, laptops / computers of Dell, HP, Lenovo or Acer company with latest configuration and version, printer with scanner and all type of office stationary.
- d. Computer operator cum clerk
- e. Peon
- f. Internet connection with running services till the end of the project.
- g. Fax machine with connection and running services till the end of the project.
- h. AC & pedestal fan
- i. Security Guard for 24 hrs.

11.2 Quality of Materials and workmanship

11.2.1 The Contractor shall ensure that the Construction, Materials and workmanship are in accordance with the requirements specified in this Agreement, Specifications and Standards and Good Industry Practice.

11.2.2 The Contractor warrants that all Materials shall be new, unused, not reconditioned and in conformity with Specification and Standards, Applicable Laws and Good Industry Practice, and that the Contractor shall not use any materials which are generally recognised as being deleterious under Good Industry Practice.

11.3 Quality control system

11.3.1 The Contractor shall establish a quality control mechanism to ensure compliance with the provisions of this Agreement (the “Quality Assurance Plan” or “QAP”).

11.3.2 The Contractor shall, within 30 (thirty) days of the Appointed Date, submit to the Authority’s Engineer its Quality Assurance Plan which shall include the following:

- a. organisation, duties and responsibilities, procedures, inspections and documentation;
- b. quality control mechanism including sampling and testing of Materials, test frequencies, standards, acceptance criteria, testing facilities, reporting, recording and interpretation of test results, approvals, check list for site activities, and proforma for testing and calibration in accordance with the Specifications and Standards and Good Industry Practice; and
- c. Internal quality audit system.

The Authority’s Engineer shall convey its comments to the Contractor within a period of 21 (twenty-one) days of receipt of the QAP stating the modifications, if any, required, and the Contractor shall incorporate those in the QAP to the extent required for conforming with the provisions of this Clause 11.2

11.3.3 The Contractor shall procure all documents, apparatus and instruments, fuel, consumables, water, electricity, labour, Materials, samples, and qualified personnel as are necessary for examining and testing the Project Assets, Materials and workmanship in accordance with the Quality Assurance Plan.

11.3.4 The cost of testing of Construction, Materials and workmanship under this Article 11 shall be borne by the Contractor.

11.4 Methodology

The Contractor shall, at least 15 (fifteen) days prior to the commencement of construction, submit to the Authority’s Engineer for review the methodology proposed to be adopted for executing the Works, giving details of equipment to be deployed, traffic management and measures for ensuring safety. The Authority’s Engineer shall complete the review and convey its comments, if any, to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor

11.5 Inspection and technical audit by the Authority

The Authority or any representative authorised by the Authority in this behalf may inspect and review the progress and quality of the construction of Works and issue appropriate directions to the Authority's Engineer and the Contractor for taking remedial action in the event the Works are not in accordance with the provisions of this Agreement.

11.6 External technical audit

At any time during construction, the Authority may appoint an external technical auditor to conduct an audit of the quality of the Works. The findings of the audit, to the extent accepted by the Authority, shall be notified to the Contractor and the Authority's Engineer for taking remedial action in accordance with this Agreement. The Contractor shall provide all assistance as may be required by the auditor in the conduct of its audit hereunder. Notwithstanding anything contained in this Clause 11.5, the external technical audit shall not affect any obligations of the Contractor or the Authority's Engineer under this Agreement.

11.7 Inspection of construction records

The Authority shall have the right to inspect the records of the Contractor relating to the Works

11.8 Monthly progress reports

During the Construction Period, the Contractor shall, no later than 10 (ten) days after the close of each month, furnish to the Authority and the Authority's Engineer a monthly report on the progress of Works and shall promptly give such other relevant information as may be required by the Authority's Engineer.

11.9 Inspection

11.9.1 The Authority's Engineer and its authorised representative shall at all times:

- a. have full access to all parts of the Site and to all places from which natural Materials are being obtained for use in the Works; and
- b. during production, manufacture and construction at the Site and at the place of production, be entitled to examine, inspect, measure and test the Materials and workmanship, and to check the progress of manufacture of Materials.

11.9.2 The Contractor shall give the Authority's Engineer and its authorised agents access, facilities and safety equipment for carrying out their obligations under this Agreement.

11.9.3 The Authority's Engineer shall submit a monthly inspection report (the "Inspection Report") to the Authority covering the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. For the avoidance of doubt, such inspection or submission of Inspection Report by the Authority's Engineer shall not relieve or absolve the Contractor of its obligations and liabilities under this Agreement in any manner whatsoever.

11.10 Samples

The Contractor shall submit the following samples of Materials and relevant information to the Authority's Engineer for review:

- a. manufacturer's test reports and standard samples of manufactured Materials; and
- b. samples of such other Materials as the Authority's Engineer may require.

11.11 Tests

11.11.1 For determining that the Works conform to the Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out or cause to be carried out tests, at such time and frequency and in such manner as specified in this Agreement, and in accordance with Good Industry Practice for quality assurance. The Contractor shall, with due diligence, carry out all the tests as required and furnish the results thereof to the Authority's Engineer. The test checks by the Authority's Engineer shall comprise at least 20 (twenty) percent of the quantity or number of Tests prescribed for each category or type of test for quality control by the Contractor.

11.11.2 In the event that results of any tests conducted under this Clause 11.10 establish any Defects or deficiencies in the Works, the Contractor shall carry out remedial measures and furnish a report to the Authority's Engineer in this behalf. The Authority's Engineer shall require the Contractor to carry out or cause to be carried out tests to determine that such remedial measures have brought the Works into compliance with the Specifications and Standards, and the procedure shall be repeated until such Works conform to the Specifications and Standards. For the avoidance of doubt, the cost of such tests and the remedial measures in pursuance thereof shall be solely borne by the Contractor.

11.12 Examination of work before covering up

In respect of the work which the Authority's Engineer is entitled to examine, inspect, measure or test before it is covered up or put out of view or any part of the work is placed thereon, the Contractor shall give notice to the Authority's Engineer whenever any such work is ready and before it is covered up. The Authority's Engineer shall then either carry out the examination, inspection or testing without unreasonable delay, or promptly give notice to the Contractor that the Authority's Engineer does not require to do so. Provided, however, that if any work is of a continuous nature where it is not possible or prudent to keep it uncovered or incomplete, the Contractor shall notify the schedule of carrying out such work to give sufficient opportunity, not being less than 3 (three) business days' notice, to the Authority's Engineer to conduct its inspection, measurement or test while the work is continuing. Provided further that in the event the Contractor receives no response from the Authority's Engineer within a period of 3 (three) business days from the date on which the Contractor's notice hereunder is delivered to the Authority's Engineer, the Contractor shall be entitled to assume that the Authority's Engineer would not undertake the said inspection.

11.13 Rejection

11.13.1 If, as a result of an examination, inspection, measurement or testing, any Plant, Material, design or workmanship is found to be defective or otherwise not in accordance with the provisions of this Agreement, the Authority's Engineer may reject such Plant, Material, design or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the Defect and ensure that the rejected item Corrected and/or made good with the project requirements of this Agreement.

11.13.2 If the Authority's Engineer requires the Plant, Material, design or workmanship to be retested, the tests shall be repeated on the same terms and conditions, as applicable in each case. If the rejection and retesting cause the Authority to incur any additional costs, such costs shall be recoverable by the Authority from the Contractor and may be deducted by the Authority from any monies due to be paid to the Contractor.

11.13.3 The Contractor shall not be entitled to any extension of time on account of rectifying any Defect or retesting as specified in this Clause 11.12

11.13.4 No examination, inspection, measurement or testing of any Plant, Material, design or workmanship by the Authority's Engineer or its failure to convey its observations or to examine, inspect, measure or test shall relieve the Contractor of its obligations and liabilities under this Agreement in any manner nor shall the Authority be liable for the same in any manner.

11.14 Remedial work

11.14.1 Notwithstanding any previous test or certification, the Authority's Engineer may instruct the Contractor to:

- a. remove from the Site and replace any Plant or Materials which are not in accordance with the provisions of this Agreement;
- b. remove and re-execute any work which is not in accordance with the provisions of this Agreement and the Specification and Standards; and
- c. execute any work which is urgently required for the safety of the Project, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work which is required on account of a Force Majeure Event, the provisions of Clause 19.6 of Article 19 shall apply.

11.14.2 If the Contractor fails to comply with the instructions issued by the Authority's Engineer under Clause 11.13.1, within the time specified in the Authority's Engineer's notice or as mutually agreed, the Authority's Engineer may advise the Authority to have the work executed by another agency. The cost so incurred by the Authority for undertaking such work shall, without prejudice to the rights of the Authority to recover Damages in accordance with the provisions of this Agreement, be recoverable from the Contractor and may be deducted by the Authority from any monies due to be paid to the Contractor.

11.15 Delays during construction

Without prejudice to the provisions of Clause 10.3.2 of Article 10, in the event the Contractor does not achieve any of the Project Milestones within the time period stipulated in Schedule I or the Authority's Engineer shall have reasonably determined that the rate of progress of Works is such that Completion of the Project is not likely to be achieved by the end of the Scheduled Completion Date, it may notify the same to the Contractor, and the Contractor shall, within 15 (fifteen) days of such notice, by a communication inform the Authority's Engineer in reasonable detail about the steps it proposes to take to expedite progress and the period within which it shall meet the Project Completion Date. In the event that the Contractor fails to achieve any Project Milestone or the Scheduled Completion Date within a period of 30 (thirty) days from the date set forth in Schedule-I, unless such failure has occurred due to Force Majeure or for reasons not attributable to the Contractor, it shall pay Damages to the Authority in a sum calculated as per Clause 10.3.2 of Article 10 (**shall not exceed 10% (Ten percent) of the Contract Price**) reckoned from the date specified in Schedule - I and until such Project Milestone is achieved or the Works are completed.

11.16 Quality control records and Documents

The Contractor shall hand over to the Authority's Engineer a copy of all its quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.2 of Article 12.

11.17 Video recording

During the Construction Period, the Contractor shall provide to the Authority for every calendar quarter, a video recording, which will be compiled into a 3 (three) hour digital video disc or any substitute thereof, covering the status and progress of Works in that quarter. The video recording shall be provided to the Authority no later than 15 (fifteen) days after the close of each quarter after the Appointed Date.

11.18 Suspension of unsafe Construction Works

11.18.1 Upon recommendation of the Authority's Engineer to this effect, or on its own volition in cases of emergency or urgency, the Authority may by notice require the Contractor to suspend forthwith the whole or any part of the Works if, in the reasonable opinion of the Authority's Engineer or the Authority, as the case may be, such work threatens the safety of the Users and or other persons on or about the Project. Provided, however, that in case of an emergency, the Authority may suo moto issue the notice referred to hereinabove.

11.18.2 The Contractor shall, pursuant to the notice under Clause 11.17.1, suspend the Works or any part thereof for such time and in such manner as may be specified by the Authority and thereupon carry out remedial measures to secure the safety of suspended works, the

Users, other persons and vehicles on or about the Project including pedestrians. The Contractor may by notice require the Authority's Engineer to inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked. Upon receiving the recommendations of the Authority's Engineer, the Authority shall either revoke such suspension or instruct the Contractor to carry out such other and further remedial measures as may be necessary in the reasonable opinion of the Authority, and the procedure set forth in this Clause 11.17 shall be repeated until the suspension hereunder is revoked.

11.18.3 Subject to the provisions of Clause 19.6 of Article 19, all reasonable costs incurred for maintaining and protecting the Works or part thereof during the period of suspension (the "Preservation Costs"), shall be borne by the Contractor; provided that if the suspension has occurred as a result of any breach of this Agreement by the Authority, the Preservation Costs shall be borne by the Authority.

11.18.4 If suspension of Works is for reasons not attributable to the Contractor, the Authority's Engineer shall determine any Time Extension to which the Contractor is reasonably entitled in accordance with the provisions of Clause 10.4 of Article 10.

11.19 Third Party Inspection

Material such as all type of pipes (of all sizes) R.C.C. / M.S. /D.I. /CI./A.C./HDPE/PVC/GRP & other power equipments like transformers, switch gear, cables, panels etc. All type of valves (of all sizes), any other materials as per requirements which are supplied by the contractor under this contract are subject to third party inspection. The charges for third party inspection shall be 0.20% on the actual cost of materials, excluding Excise and freight of materials. The charges for such inspection shall be paid by the contractor. All the arrangements for inspection i.e. measuring tools, testing equipments and tools, labour required for handling materials during testing etc. shall be made available / arranged by the contractor at own costs. These cost shall be deemed included in contractor's price bid and nothing extra shall be paid to the said account. If any particular testing facility is not available at the premises / location of Factory, then the test shall be arranged by the factory owner / Vendor at his own cost at other locations / test laboratory. All expenses and arrangements in this regard shall also have to be borne by the contractor only.

If the material inspected fails during test on no fault of the inspecting agency, fees are payable to the inspecting agency for the said inspection and for any further re-inspection of the same material. The name of the agency for third party inspection shall be informed to Authority's Engineer.

If it is subsequently observed that there are defects in the quality of material, the contractor shall replace the material without any extra cost.

In addition to third party inspection, the Authority's Engineer or his representative may conduct inspection intermittently.

Third Party Inspection Report: The third party inspection report merely in the certificate form stating that pipes/valves/specials or any other material inspected are found satisfactory will not be accepted, but it should be in the form of detailed report stating the parameters checked & observations made with comments of the Inspecting Officer in accordance with the respective Specifications/detailed item wise specifications / as per Tender notice.

ARTICLE 12

12 Completion Certificate

12.1 Tests on completion

12.1.1 No later than 30 (thirty) days prior to the likely completion of the Project, or a Section thereof, the Contractor shall notify the Authority's Engineer of its intent to subject the Project or a Section thereof, to Tests. The date and time of each of the Tests shall be determined by the Authority's Engineer in consultation with the Contractor, and notified to the Authority who may designate its representative to witness the Tests. The Contractor shall either conduct the Tests as directed by the Authority's Engineer or provide such assistance as the Authority's Engineer may reasonably require for conducting the Tests. For the avoidance of doubt, the Parties agree that in the event of the Contractor and the Authority's Engineer failing to mutually agree on the dates for conducting the Tests, the Contractor shall fix the dates by giving not less than 10 (ten) days' notice to the Authority's Engineer.

12.1.2 All Tests shall be conducted in accordance with Schedule-J at the cost and expense of the Contractor. The Authority's Engineer shall observe, monitor and review the results of the Tests to determine compliance of the Project or a Section thereof, with Specifications and Standards and if it is reasonably anticipated or determined by the Authority's Engineer during the course of any Test that the performance of the Project or Section or any part thereof, does not meet the Specifications and Standards, it shall have the right to suspend or delay such Test and require the Contractor to remedy and rectify any Defect or deficiency. Upon completion of each Test, the Authority's Engineer shall provide to the Contractor and the Authority copies of all Test data including detailed Test results. For the avoidance of doubt, the Parties expressly agree that the Authority's Engineer may require the Contractor to carry out or cause to be carried out additional Tests, in accordance with Good Industry Practice, for determining the compliance of the Project or Section thereof with the Specifications and Standards.

12.2 Provisional Certificate

12.2.1 Subject to the provisions of Clause 12.2.5, upon completion of all Works forming part of the Project, save and except the Works for which Time Extension has been granted under Clause 10.5 of Article 10, the Authority's Engineer shall, at the request of the Contractor, issue a provisional certificate of completion substantially in the form set forth in Schedule-K (the "Provisional Certificate") if the Tests for and in respect of the completed Works are successful. The Provisional Certificate shall have appended thereto a list of outstanding items of work (the "Punch List") that need to be completed in accordance with the provisions of this Agreement. The Contractor undertakes to complete the minor outstanding items of works in respect of those Sections of the Project for which the Provisional Certificate has been issued, within a period of 30 (thirty) days of the date of Provisional Certificate, and those parts of the Works in respect of which Time Extension has been granted, within the extended period thereof. For the avoidance of doubt, the Parties agree that the Punch List shall include all Works for which Time Extension has been granted and shall also include any minor outstanding items of work forming part of the completed Sections if such works do not materially affect the use of the completed Sections for their intended purpose. The

Parties further agree that Provisional Certificate shall not be issued if the completed Works cannot be safely and reliably placed in service of the Users thereof.

12.2.2 Upon issue of Provisional Certificate, the provisions of Article 15 shall apply to the completed parts of the Project and the property and ownership of all such completed Works shall vest in the Authority.

12.2.3 If the Authority's Engineer determines that the Project or any completed part thereof does not conform to the provisions of this Agreement and cannot be safely and reliably placed in operation, it shall forthwith make a report in this behalf and send copies thereof to the Authority and the Contractor and withhold issuance of the Provisional Certificate until the Defects or deficiencies are rectified by the Contractor and Tests are successful in accordance with this Article 12.

12.2.4 Notwithstanding anything to the contrary contained in Clause 12.2.3, the Authority may, at any time after receiving a report from the Authority's Engineer under that Clause, direct the Authority's Engineer to issue a Provisional Certificate under Clause 12.2.1 and such direction shall be complied forthwith.

12.2.5 No Provisional Certificate shall be issued under the provisions of this Clause 12.2 until the Contractor has submitted valid claims for payment of at least 80% (eighty per cent) of the amount arrived at after reducing the lump sum price specified in Clause 17.1.1 of Article 17 by the amount attributable to works which have been withdrawn if any. For the avoidance of doubt and by way of illustration, the Parties agree that if the Contract Price specified in Clause 17.1.1 of Article 17 is Rs..... cr. (Rs. crore) and the works withdrawn if any have a value of Rs..... cr. (Rs. crore), a Provisional Certificate shall not be issued until valid claims for payment of an amount of Rs.....cr. (Rs. crore) have been submitted by the Contractor in accordance with the provisions of this Agreement. It is further agreed that all price adjustments made in pursuance of Clause 17.10 of Article 17 shall not be reckoned for computation of the claims for payments referred to in this Clause 12.2.5. It is also agreed that any Change of Scope effected within 30 (thirty) days of the Appointed Date shall be reckoned for the purposes of determining the Contract Price hereunder.

12.3 Completion of remaining Works

All items in the Punch List shall be completed by the Contractor in accordance with the provisions of this Agreement. For any delay in their completion other than for the reasons not attributable to the Contractor or due to Force Majeure, the Authority shall be entitled to recover Damages from the Contractor in accordance with the provisions of Clause 10.3.2 of Article 10 of this Agreement.

12.4 Completion Certificate

12.4.1 Upon completion of all Works forming part of the Project, including the items specified in the Punch List, and the Authority's Engineer determining the Tests to be successful, it shall forthwith issue to the Contractor and the Authority a certificate substantially in the form set forth in Schedule-K (the "Completion Certificate").

12.4.2 Upon receiving the Completion Certificate, the Contractor shall remove its equipment, materials, debris and temporary works from the Site within a period of 30 (thirty) days

thereof, failing which the Authority may remove or cause to be removed, such equipment, materials, debris and temporary works and recover from the Contractor an amount equal to 120% (one hundred and twenty per cent) of the actual cost of removal incurred by the Authority.

12.4.3 Without prejudice to the obligations of the Contractor specified in Article 15, the property and ownership of all the completed Works forming part of the Project shall vest in the Authority.

12.5 Rescheduling of Tests

If the Authority's Engineer certifies to the Authority and the Contractor that it is unable to issue the Completion Certificate or Provisional Certificate, as the case may be, because of events or circumstances on account of which the Tests could not be held or had to be suspended, the Contractor shall be entitled to re-schedule the Tests and hold the same as soon as reasonably practicable.

ARTICLE 13**13 Change of Scope****13.1 Change of Scope**

13.1.1 The Authority may, notwithstanding anything to the contrary contained in this Agreement, require the Contractor to make modifications or alterations to the Works (“Change of Scope”) 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 Article 13.

13.1.2 Change of Scope shall mean:

- a. change in specifications of any item of Works;
- b. omission of any work from the Scope of the Project; provided that, subject to Clause 13.5, the Authority shall not omit any work under this Clause in order to get it executed by any other entity; or
- c. Any additional work, Plant, Materials or services which are not included in the Scope of the Project, including any associated Tests on completion of construction.

13.1.3 If the Contractor determines at any time that a Change of Scope will, if adopted, (i) accelerate completion, (ii) reduce the cost to the Authority of executing, maintaining or operating the Project, (iii) improve the efficiency or value to the Authority of the completed Project, or (iv) otherwise be of benefit to the Authority, it shall prepare a proposal with relevant details at its own cost. The Contractor shall submit such proposal, supported with the relevant details including the amount of reduction / addition in the Contract Price, if any, to the Authority to consider such Change of Scope. The Authority shall, within 15 (fifteen) days of receipt of such proposal, either accept such Change of Scope with modifications, if any, and initiate proceedings therefor in accordance with this Article 13 or reject the proposal and inform the Contractor of its decision. For the avoidance of doubt, the Parties agree that the Contractor shall not undertake any Change of Scope without a Change of Scope Order being issued by the Authority, save and except any Works necessary for meeting any Emergency.

13.2 Procedure for Change of Scope

13.2.1 In the event of the Authority determining that a Change of Scope is necessary, it may direct the Authority’s Engineer to issue to the Contractor a notice specifying in reasonable detail the works and services contemplated thereunder (the “Change of Scope Notice”).

13.2.2 Upon receipt of a Change of Scope Notice, the Contractor shall, with due diligence, provide to the Authority and the Authority's Engineer such information as is necessary, together with preliminary documentation in support of:

- a) the impact, if any, which the Change of Scope is likely to have on the Project Completion Schedule if the works or services are required to be carried out during the Construction Period; and
- b) the options for implementing the proposed Change of Scope and the effect, if any, each such option would have on the costs and time thereof, based on the following methodology shall be adopted :
 - i. break down of the quantities, unit rates and cost for different items of work;
 - ii. proposed design for the Change of Scope; and
 - iii. proposed modifications, if any, to the Project Completion schedule of the project.

for the avoidance of doubt, the Parties expressly agree that, subject to the provisions of Clause 13.4.2, the Contract Price shall be increased or decreased, as the case may be, on account of Change of Scope.

13.2.3 The Contractor's quotation of costs for the Change of Scope shall be determined on the following principles as per order of precedence as given below:

- i) The cost is to be determined under the provision of the **Schedule-G**;
- ii) Break down of the quantities, unit rates and cost for different items of work as per Gujarat **Standard Schedule of Rate**;
- iii) The cost of work shall be derived on the basis of [MORTH Standard Data Book];
- iv) the applicable schedule of rates for the relevant circle, as published by the respective State Government, and such rates shall be indexed with reference to the WPI once every year at the commencement of the financial year, with the base being the month and year of the publication of the said schedule of rates;
- v) However, that for any item not included in the schedule of rates, the prevailing market rates as determined by the Authority's Engineer shall apply, and for any item in respect of which [MORTH Standard Data Book] does not provide the requisite details;
- vi) The Authority's Engineer shall determine the rate in accordance with Good Industry Practice

13.2.4 Upon reaching an agreement, the Authority shall issue an order (the “Change of Scope Order”) requiring the Contractor to proceed with the performance thereof. In the event that the Parties are unable to agree, the Authority may:

- a) Issue a Change of Scope Order including rate and cost requiring the Contractor to proceed with the performance thereof at the rates and conditions approved by the Authority, whose decision shall be final and binding.
- b) Proceed in accordance with Clause 13.5.

13.2.5 The provisions of this Agreement, insofar as they relate to Works and Tests, shall apply mutatis mutandis to the works undertaken by the Contractor under this Article 13.

13.3 Payment for Change of Scope

Payment for Change of Scope shall be made in accordance with the payment schedule specified in the Change of Scope Order.

13.4 Restrictions on Change of Scope

13.4.1 No Change of Scope shall be executed unless the Authority has issued the Change of Scope Order save and except any Works necessary for meeting any Emergency.

13.4.2 Unless the Parties mutually agree to the contrary, the total value of all Change of Scope Orders shall not exceed 10% (ten per cent) of the Contract Price.

13.4.3 Notwithstanding anything to the contrary in this Article 13, no change arising from any default of the Contractor in the performance of its obligations under this Agreement shall be deemed to be Change of Scope, and shall not result in any adjustment of the Contract Price or the Project Completion Schedule

13.5 Power of the Authority to undertake works

13.5.1 In the event the Parties are unable to agree to the proposed Change of Scope Orders in accordance with Clause 13.2, the Authority may, after giving notice to the Contractor and considering its reply thereto, award such works or services to any person or agency on the basis of open competitive bidding. It is also agreed that the Contractor shall provide assistance and cooperation to the person who undertakes the works or services hereunder, The Contractor shall not be responsible for rectification of any Defects, but the Contractor shall carry out maintenance of such works after completion of Defect Liability Period of work by other person or agency during the remaining period of this agreement without any extra payment.

13.5.2 The works undertaken in accordance with this Clause 13.5 shall conform to the Specifications and Standards and shall be carried out in a manner that minimises disruption to the Project. The provisions of this Agreement, insofar as they relate to Works and Tests, shall apply mutatis mutandis to the works carried out under this Clause 13.5.

ARTICLE 14**14 Traffic Regulation****14.1 Traffic regulation by the Contractor**

- 14.1.1 The Contractor shall take all the required measures and make arrangements for the safety of Users during the construction of the Project or a Section thereof in accordance with Good Industry Practice. It shall provide, erect and maintain all such barricades, signs, markings, flags, and lights as may be required for the safety of the traffic passing through the Section under construction.
- 14.1.2 All works shall be carried out in a manner creating least interference to the traffic passing through the Project or a Section thereof. In Sections where construction works on the carriageway are taken up, the Contractor shall ensure that safe passage is provided for the traffic. Where it is not possible or safe to allow traffic on part width of the carriageway, a temporary diversion of reasonable specifications shall be constructed by the Contractor at its own cost. The Contractor shall take prior approval of the Authority's Engineer for any proposed arrangement for traffic regulation during the Construction Period, which approval shall not be unreasonably withheld.

ARTICLE 15**15 Defects Liability****15.1 Defects Liability Period**

15.1.1 The Contractor shall be responsible for all the Defects and deficiencies, except usual wear and tear in the Project or any Section thereof, till the expiry of a period of 5 (Five) years commencing from the date of Provisional Certificate or expiry of a period of 54 (Fifty Four) months from the date of Completion Certificate, whichever is later (the “Defects Liability Period”).

15.1.2 Deleted

15.2 Remedy and rectification of Defects and deficiencies

Without prejudice to the provisions of Clause 26.1 of Article 26, the Contractor shall repair or rectify all Defects and deficiencies observed by the Authority’s Engineer during the Defects Liability Period within a period of 15 (fifteen) days from the date of notice issued by the Authority’s Engineer in this behalf, or within such reasonable period as may be determined by the Authority’s Engineer at the request of the Contractor, in accordance with Good Industry Practice.

15.3 Cost of remedying Defects

For the avoidance of doubt, any repair or rectification undertaken in accordance with the provisions of Clause 15.2, including any additional tests, shall be carried out by the Contractor at its own risk and cost, to the extent that such rectification or repair is attributable to:

- a. the design of the Project;
- b. Works, Plant, Materials or workmanship not being in accordance with this Agreement and the Specifications and Standards;
- c. improper maintenance during construction of the Project by the Contractor; or
- d. failure by the Contractor to comply with any other obligation under this Agreement.

15.4 Contractor’s failure to rectify Defects

In the event that the Contractor fails to repair or rectify such Defect or deficiency within the period specified in Clause 15.2, the Authority shall be entitled to get the same repaired, rectified or remedied at the Contractor’s cost so as to make the Project conform to the Specifications and Standards and the provisions of this Agreement. All costs consequent thereon shall, after due consultation with the Authority and the Contractor, be determined by the Authority’s Engineer. The cost so determined for repair or rectification or replacement of such defects plus , and an amount equal to 50% (Fifty per cent) of such cost as Damages, shall be recoverable by the Authority from the Contractor and may be deducted by the Authority from any monies due to the Contractor.

15.5 Contractor to search cause

15.5.1 The Authority's Engineer may instruct the Contractor to examine the cause of any Defect in the Works or part thereof before the expiry of the Defects Liability Period.

15.5.2 In the event any Defect identified under Clause 15.5.1 is attributable to the Contractor, the Contractor shall rectify such Defect within the period specified by the Authority's Engineer, and shall bear the cost of the examination and rectification of such Defect.

15.5.3 In the event such Defect is not attributable to the Contractor, the Authority's Engineer shall, after due consultation with the Authority and the Contractor, determine the costs incurred by the Contractor on such examination and notify the same to the Contractor, with a copy to the Authority, and the Contractor shall be entitled to payment of such costs by the Authority.

15.6 Extension of Defects Liability Period

15.6.1 The Defects Liability Period shall be deemed to be extended till the identified Defects under Clause 15.2 have been remedied.

15.6.2 Any Materials or Works with Defects identified under Clause 15.2 and replaced or repaired during the Defects Liability Period or the extended Defects Liability Period, as the case may be, would be further warranted for a period of twelve (12) months from the date of completion of such repair or replacement.

15.6.3 The Contractor shall upon termination or expiry of this Agreement, or upon expiry of the Defects Liability Period, assign any outstanding benefit in respect of any subcontract or any warranty from any subcontractor, to the Authority or to such other person as the Authority may direct.

ARTICLE 16**16 Authority's Engineer****16.1 Appointment of the Authority's Engineer**

Authority will be represented in this contract by Engineer-in- Charge (Authority's representative) for the contract management. To assist in due discharge of Authority/Engineer-In-Charge's obligation, the Authority has appointed Project Management Consultant (PMC). The PMC will be responsible for conceptualization of Projects and further, during the design and Construction stage, overseeing the work of contractors, including reviewing, monitoring, resolution of interface issues, and reporting to the Authority/Engineer-In-Charge on the Project progress. All communications relating to contract management on this Project shall be submitted through PMC to the Engineer-In charge for final approval of Authority. Engineer-In charge will act as a Authority's representative and PMC assist with end to end support in carrying out review of preconstruction activities, construction supervision, progress monitoring, quality control, testing, test check of invoices, resolution of claims, change in design, taking over and safety management for all contracts and post construction supervision of contractors work. As such, the Engineer-in-Charge of the Authority is vested with all such powers and responsibilities as are entrusted with the Authority's Engineer and is fully competent to issue any instructions for proper monitoring and supervision of the project and the agreement, either by himself (including his authorised person) or through the Authority's Engineer. Instructions issued by the Engineer-in-Charge of the Authority shall have the same effect as that of the Authority's Engineer in terms of this Agreement. Wherever such Engineer-in-Charge issues any instructions or notice to the Contractor, he shall endorse a copy thereof to the Authority's Engineer.

16.1.1 Deleted

16.1.2 Deleted

16.1.3 The staffs of the Authority's Engineer include suitably qualified engineers and other professionals who are competent to assist the Authority's Engineer to carry out its duties.

16.2 Duties and functions of the Authority's Engineer

16.2.1 The Authority's Engineer shall perform its duties and discharge its functions in accordance with the provisions of this Agreement, and substantially in accordance with the terms of reference ("Terms of Reference" or "TOR") set forth in Annex 1 of Schedule L, but subject to obtaining prior written approval of the Authority before determining:

- a. any Time Extension;
- b. any additional cost to be paid by the Authority to the Contractor;
- c. the Termination Payment; or
- d. any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or financial liability on either Party.

16.2.2 No decision or communication of the Authority's Engineer shall be effective or valid unless it is accompanied by an attested true copy of the approval of the Authority for and in respect of any matter specified in Clause 16.2.1.

16.2.3 The Authority's Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this Agreement. Such reports shall be submitted by the Authority's Engineer within 10 (ten) days of the beginning of every month. For the avoidance of doubt, the Authority's Engineer shall include in its report compliance of the recommendations of the Safety Consultant.

16.2.4 A true copy of all communications sent by the Authority to the Authority's Engineer and by the Authority's Engineer to the Authority shall be sent forthwith by the Authority's Engineer to the Contractor.

16.2.5 A true copy of all communications sent by the Authority's Engineer to the Contractor and by the Contractor to the Authority's Engineer shall be sent forthwith by the Authority's Engineer to the Authority.

16.3 Authorised signatories

The Authority shall require the Authority's Engineer to designate and notify to the Authority and the Contractor up to 2 (two) persons employed in its firm to sign for and on behalf of the Authority's Engineer, and any communication or document required to be signed by the Authority's Engineer shall be valid and effective only if signed by any of the designated persons; provided that the Authority's Engineer may, by notice in writing, substitute any of the designated persons by any of its employees.

16.4 Instructions of the Authority's Engineer

16.4.1 The Authority's Engineer may issue to the Contractor instructions for remedying any Defect. The Contractor shall take such instructions from the Authority's Engineer.

16.4.2 The instructions issued by the Authority's Engineer shall be in writing. However, if the Authority's Engineer issues any verbal instructions to the Contractor, it shall confirm in writing the verbal instructions within 2 (two) working days of issuing such verbal instructions.

16.4.3 In case the Contractor does not receive the confirmation of the verbal instructions within the time specified in Clause 16.4.2, the Contractor shall seek the written confirmation of the verbal instructions from the Authority's Engineer and shall obtain acknowledgement from the Authority's Engineer of the communication seeking written confirmation. In case of failure of the Authority's Engineer to reply to the Contractor within 2 (two) working days of the receipt of the communication from the Contractor, the Contractor may not carry out the instruction.

16.5 Determination by the Authority's Engineer

16.5.1 The Authority's Engineer shall consult with each Party in an endeavour to reach agreement wherever this Agreement provides for the determination of any matter by the Authority's

Engineer. If such agreement is not achieved, the Authority's Engineer shall make a fair determination in accordance with this Agreement having due regard to all relevant circumstances. The Authority's Engineer shall give notice to both the Parties of each such agreement or determination, with supporting particulars.

16.5.2 Each Party shall give effect to each agreement or determination made by the Authority's Engineer in accordance with the provisions of this Agreement. Provided, however, that if any Party disputes any instruction, decision, direction or determination of the Authority's Engineer, the Dispute shall be resolved in accordance with the Dispute Resolution Procedure.

16.6 Deleted

16.7 Deleted

16.8 Deleted

PART IV

Financial Covenants

ARTICLE 17

17 Payments

17.1 Contract Price

- 17.1.1 The Authority shall make payments to the Contractor for the Works on the basis of the lump sum price accepted by the Authority in consideration of the obligations specified in this Agreement for an amount of Rs. ***** (Rs. *****) (the “Contract Price”), which shall be subject to adjustments in accordance with the provisions of this Agreement. For the avoidance of doubt, the Parties expressly agree that the Contract Price shall include the cost of Operation & Maintenance for 5 years which shall be paid separately in accordance with the provisions of Clause 17.18. The Parties further agree that save and except as provided in this Agreement, the Contract Price shall be valid and effective until issue of Completion Certificate.
- 17.1.2 The Contract Price includes all duties, taxes, royalty, and fees that may be levied in accordance with the laws and regulations in force as on the Base Date on the Contractor’s equipment, Plant, Materials and supplies acquired for the purpose of this Agreement and on the Works undertaken under this Agreement. Nothing in this Agreement shall relieve the Contractor from its responsibility to pay any tax including any tax that may be levied in India on profits made by it in respect of this Agreement.
- 17.1.3 The Contract Price shall not be adjusted for any change in duties, taxes etc. specified in Clause 17.1.2 above, save and except as specified in Clauses 17.8 and 17.13.
- 17.1.4 The Contract Price shall not be adjusted to take account of any unforeseen difficulties or costs, unless otherwise provided for in this Agreement.
- 17.1.5 Unless otherwise specified in this Agreement, the Contract Price covers all the Contractor’s obligations for the Works under this Agreement and all things necessary for the Construction thereof and for the rectification of any Defects in the Project.
- 17.1.6 All payments under this Agreement shall be made in Indian Rupees

17.2 Advance Payment

- 17.2.1 The Authority may make an advance payment (the “Advance Payment”), equal to **10% (Ten Percent)** of the Contract Price, for mobilisation expenses and for acquisition of equipment. The advance payment (the “Advance Payment”) shall carry simple interest @ **“Bank Rate + 3%”** per annum and shall be made in two equal instalments
- 17.2.2 The Contractor may apply to the Authority for the 1st (first) instalment of the Advance Payment at any time after the Appointed Date, along with an irrevocable and unconditional guarantee from a Bank for an amount equivalent to 110% (one hundred and ten per cent) of such instalment, substantially in the form provided at Annex-III of

Schedule-F, to remain effective till the complete and full repayment of such instalment and any interest thereon.

- 17.2.3 At any time, after 60 (sixty) days from the disbursement of the 1st (first) instalment of the advance payment, the Contractor may apply to the Authority for the 2nd (second) instalment of the Advance Payment along with an irrevocable and unconditional guarantee from a Bank for an amount equivalent to 110% (one hundred and ten per cent) of such instalment, substantially in the form provided at Annex-III of Schedule-F, to remain effective till the complete and full repayment of such instalment and any interest thereon.
- 17.2.4 The instalments of Advance Payment shall be paid by the Authority to the Contractor within 30 (Thirty) days of the receipt of its respective requests in accordance with the provisions of this Clause 17.2.
- 17.2.5 The Advance Payment shall be recovered through proportionate deductions to be made in the Interim Payments Certificates issued in accordance with the provisions of Clause 17.5.2. Deductions of Advance Payment shall commence from the Interim Payment Certificate in which the cumulative interim payments certified shall have reached 50% (fifty per cent) of the Contract Price. The total amount recovered in each Interim Payment Certificate shall not exceed 30% (thirty per cent) of the amount due and payable under such Interim Payment Certificate, which shall include interest on the amount being recovered hereunder. For the avoidance of doubt, the Parties agree that in the event the total payment specified in any Interim Payment Certificate exceeds the limit of 50% (fifty per cent) of the Contract Price, the proportion of recovery hereunder shall be restricted to the amount exceeding 50% (fifty per cent) of the Contract Price. By way of illustration, the Parties agree that if the first recovery of say, Rupees 'x' is made after 20 (twenty) months from the date of 1st (first) instalment of the Advance Payment, interest on Rupees 'x' shall be due and payable for a period of 20 (twenty) months; and when the next recovery is made in the following month for say, Rupees 'y', interest on Rupees 'y' shall be due and payable for a period of 21 (twenty one) months. The Parties further agree that no payments in excess of 90% (ninety per cent) of the Contract Price shall be released to the Contractor until the Advance Payment, including interest thereon, has been fully recovered.
- 17.2.6 If the Advance Payment has not been fully repaid prior to Termination under Clause 19.7 of Article 19 or Article 21, as the case may be, the whole of the balance then outstanding shall immediately become due and payable by the Contractor to the Authority. In the event of Termination for Contractor Default, the Advance Payment shall be deemed to carry interest at an annual rate of 5% (Five per cent) above the Bank Rate from the date of Advance Payment to the date of recovery thereof. For the avoidance of doubt, the aforesaid interest shall be payable on the unrecovered balance.
- 17.2.7 The contractor, on signing an indenture in the form to be specified by the Authority/Authority's Engineer, shall be entitled to be paid during the progress of the execution of the work up to 75% of the assessed value of any materials or an amount not exceeding 75% of the material element cost in the tendered rate of the finished item of the work, whichever is lower, which are in the opinion of the Authority/Authority's Engineer, non-fragile and non-combustible and are in accordance with the contract and

which have been brought on the site in connection therewith and are adequately stored and/or protected against damage by weather or other causes but which have not at the time of advance been incorporated in the works. When materials on account of which an advance has been made under this sub-clause are incorporated in the work, the amount of such advance shall be recovered / deducted from the next payment made under any of the clause or clauses of this contract. Such secured advance shall also be payable on other items of perishable nature, fragile and combustible with the approval of the Authority/Authority's Engineer provided the contractor provides a comprehensive insurance cover for the full cost of such materials. The decision of the Authority/Authority's Engineer shall be final and binding on the contractor in this matter. No secured advance, shall however, be paid on high-risk materials such as ordinary glass, sand, petrol, diesel etc.

17.3 Procedure for estimating the payment for the Works

- 17.3.1 The Authority shall make interim payments to the Contractor, as certified by the Authority's Engineer on completion of a stage, for a length, number or area as specified, and valued in accordance with the proportion of the Contract Price assigned to each item and its stage and payment procedure in Schedule-G
- 17.3.2 The Contractor shall make its claim for interim payment for the stages completed till the end of the month for which the payment is claimed, valued in accordance with Clause 17.3.1, and supported with necessary particulars and documents in accordance with this Agreement.
- 17.3.3 Any reduction in the Contract Price arising out of Change of Scope, as the case may be, shall not affect the amounts payable for the items or stage payments thereof which are not affected by such Change of Scope or withdrawal. For the avoidance of doubt and by way of illustration, the Parties agree that if the amount assigned to any item of works are reduced from Rs. 100 crore to Rs. 80 crore owing to Change of Scope or withdrawal of Works, as the case may be, the reduction in payment shall be restricted to the relevant payments for scope of work and the payment due in respect of all other stage payments under the item scope of work shall not be affected in any manner. The Parties further agree that the adjustments arising out of the aforesaid modifications shall be carried out in a manner that the impact of such modifications is restricted to the said Change of Scope or withdrawal, as the case may be, and does not alter the payments due for and in respect of items or stage payments which do not form part of such Change of Scope or withdrawal.

17.4 Stage Payment Statement for Works

The Contractor shall submit a statement (the "Stage Payment Statement"), in 3 copies, by the 7th (seventh) day of a month to the Authority's Engineer in the form set forth in Schedule-P, showing the amount calculated in accordance with Clause 17.3 to which the Contractor considers itself entitled for the completed stage(s) of Works. The Stage Payment Statement shall be accompanied with the progress reports and any other supporting documents. The Contractor shall not submit any claim for payment of incomplete stages of work. In the event that there is no claim for a month in accordance with the provisions of this Clause 17.4.

17.5 Stage Payment for Works

- 17.5.1 Within 15 (Fifteen) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 17.4, the Authority's Engineer shall broadly determine the amount due to the Contractor and recommend the release of 90% (ninety per cent) of the amount so determined as part payment against the Stage Payment Statement, pending issue of the Interim Payment Certificate by the Authority's Engineer. Within 15 (Fifteen) days of the receipt of recommendation of the Authority's Engineer, the Authority shall make an electronic payment thereof directly to the Contractor's bank account, The minimum value of Interim Payment Certificate shall be **INR 8.00 (eight) crores**.
- 17.5.2 Within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 17.4, the Authority's Engineer shall determine and shall deliver to the Authority and the Contractor an IPC certifying the amount due and payable to the Contractor, after adjusting the payments already released to the Contractor against the said statement. For the avoidance of doubt, the Parties agree that the IPC shall specify all the amounts that have been deducted from the Stage Payment Statement and the reasons therefor.
- 17.5.3 In cases where there is a difference of opinion as to the value of any stage, the opinion of the Authority's Engineer shall prevail and interim payments shall be made to the Contractor on that basis;
- 17.5.4 The Authority's Engineer may, for reasons to be recorded, withhold from payment:
- a. the estimated value of work or obligation that the Contractor has failed to perform in accordance with this Agreement and in respect of which the Authority's Engineer had notified the Contractor; and
 - b. the estimated cost of rectification of any Works which have not been constructed in accordance with this Agreement.
- 17.5.5 Payment by the Authority hereunder shall be deemed to be provisional and shall not be construed as the Authority's acceptance, approval, consent or satisfaction with the work done.
- 17.5.6 In the event the amounts released by the Authority under Clause 17.5.1 exceed the amount finally determined by the Authority's Engineer pursuant to Clauses 17.5.2 to 17.5.4, the difference thereof shall be accounted for in the next IPC.

17.6 Deleted

17.7 Time of payment

- 17.7.1 The Authority shall pay to the Contractor any amount due under any payment certificate issued by the Authority's Engineer in accordance with the provisions of this Agreement as follows:

- a. Within 30 (thirty) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 17.4, the Authority's Engineer shall broadly determine the amount due to the Contractor and recommend the release of 90% (ninety per cent) of the amount so determined as part payment against the Stage Payment Statement, pending issue of the Interim Payment Certificate by the Authority's Engineer. Within 30 (thirty) days of the receipt of recommendation of the Authority's Engineer, the Authority shall make an electronic payment thereof directly to the Contractor's bank account and any discrepancy therein shall be adjusted in the next payment certificate

17.7.2 Deleted

17.8 Price adjustment for Works

17.8.1 The amounts payable to the Contractor for Works shall be adjusted in accordance with the provisions of this Clause 17.8

17.8.2 Subject to the provisions of Clause 17.8.3, the amounts payable to the Contractor for and in respect of Works shall be adjusted for any increase or decrease in the index cost of inputs, by the addition or subtraction of the amounts determined in accordance with the formulae specified in Clause 17.8.4

17.8.3 To the extent that any compensation or reimbursement for increase or decrease in costs is not covered by the provisions of this Agreement, the costs and prices payable under this Agreement shall be deemed to include the contingency of such increase or decrease in costs

17.8.4 The Contract Price shall be adjusted for increase or decrease in rates and prices of labour, cement, steel, Plant, machinery and spares, bitumen, fuel and lubricants, and other Materials or inputs in accordance with the principles, procedures and formulae specified below

- a) Price adjustment shall be applied on completion of the specified stage of the respective item of work in accordance with Schedule-G;
- b) Adjustment for each item of work/stage shall be made separately.
- c) The following expressions and meanings are assigned to the value of the work done:

RW= Value of work done for the completion of a stage under the following items of Schedule-G:

- (i) Road works; and
- (ii) Other works

BR = Value of work done for the completion of a stage under the items Major Structures in accordance with Schedule-G.

- d) Price adjustment for change in costs shall be paid in accordance with the following formulae:

- i. $VRW = 0.85 RW \times [PL \times (LI - LO)/LO + PA \times (AI - AO)/AO + PF \times (FI - FO)/FO + PB \times (BI - BO)/BO + PM \times (MI - MO)/MO + PC \times (CI - CO)/CO + PS \times (SI - SO)/SO]$;
and
- ii. $VBR = 0.85 BR \times [PL \times (LI - LO)/LO + PA \times (AI - AO)/AO + PF \times (FI - FO)/FO + PM \times (MI - MO)/MO + PC \times (CI - CO)/CO + PS \times (SI - SO)/SO]$;

Where

VRW = Increase or decrease in the cost of road works and other works during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (e);

VBR = Increase or decrease in the cost of Major Structures during the period under consideration due to changes in the rates for relevant components as specified in sub-paragraph (e);

PB, PC, PL, PM, and PS are the percentages of bitumen, cement, labour, other materials, and steel/components (including strands and cables) respectively for the relevant item as specified in sub-paragraph (e);

PA is the percentage of Plant, machinery and spares component for the relevant item as specified in sub-paragraph (e);

PF is the percentage of fuel and lubricants for the relevant items as specified in sub-paragraph (e)

AO = The wholesale price index as published by the Ministry of Commerce

& Industry, Government of India (hereinafter called “WPI”) for

construction machinery for the month of the Base Date;

AI = The WPI for construction machinery for the month which is three months prior to the month to which the IPC relates;

BO = The official retail price of bitumen at the nearest refinery at [Haldia] on the Base Date;

BI = The official retail price of bitumen at nearest refinery at [Haldia], on the first day of the month which is three months prior to the month to which the IPC relates;

CO = The WPI for cement for the month of the Base Date;

CI = The WPI for cement for the month which is three months prior to the month to which the IPC relates;

FO = The official retail price of high speed diesel (HSD) oil at the existing consumer pumps of Indian Oil Corporation (“IOC”) in the State of [Gujarat/Diu UT] on the Base Date;

FI = The official retail price of HSD at the existing consumer pumps of IOC in the State of [Gujarat/Diu UT] on the first day of the month which is three months prior to the month to which the IPC relates;

LO = The consumer price index for industrial workers for the [circle **** in the State of Gujarat/Diu UT], published by Labour Bureau, Ministry of Labour, Government of India, (hereinafter called “CPI”) for the month of the Base Date;

LI = The CPI for the month which is three months prior to the month to which the IPC relates;

MO = The WPI for all commodities for the month of the Base Date;

MI = The WPI for all commodities for the month which is three months prior to the month to which the IPC relates;

SO = The WPI for steel (rods) for the month of the Base Date; and

SI = The WPI for steel (rods) for the month which is three months prior to the month to which the IPC relates

e) The following percentages shall govern the price adjustment of the

Contract Price:

Component	Item				
	Road Works				Major Structures
	Earthwork, Granular work, and Other works	Bituminous work	Cement Concrete Pavement	Culverts, minor bridges and other structures	
Labour (PL)	[20%]	[20%]	[20%]	[15%]	[15%]
Cement (PC)	[5%]	Nil	[20%]	[15%]	[15%]
Steel (PS)	Nil	Nil	Nil	[15%]	[20%]
Bitumen (PB)	Nil	[15%]	Nil	Nil	Nil
Fuel and lubricants (PF)	[10%]	[10%]	[10%]	[10%]	[10%]
Other Materials (PM)	[50%]	[40%]	[35%]	[30%]	[25%]
Plant, machinery and spares (PA)	[15%]	[15%]	[15%]	[15%]	[15%]
Total	100%	100%	100%	100%	100%

- f) In case an IPC relates to a month which is within 3 (three) months from the Base Date, no price adjustment shall be applicable.

17.9 Restrictions on Price adjustment

Price adjustment shall be due and payable only in respect of the stages of Works for which the Stage Payment Statement has been submitted by the Contractor no later than 30 (thirty) days from the date of the applicable Project Milestone or the Scheduled Completion Date, as the case may be, including any Time Extension granted therefor in accordance with the provisions of this Agreement. For the avoidance of doubt, in the event of submission of any Stage Payment Statement after the period specified herein, price adjustment shall be applicable only until the date of the respective Project Milestone or the Scheduled Completion Date, as the case may be.

17.10 Final Payment Statement

17.10.1 Within 90 (Ninety) days of receiving the Completion Certificate under Clause 12.4 of Article 12, the Contractor shall submit to the Authority's Engineer six copies of a final payment statement (the "Final Payment Statement"), with supporting documents, in the form prescribed by the Authority's Engineer in respect of:

- a. the summary of Contractor's Stage Payment Statements for Works as submitted in accordance with Clause 17.4;
- b. the amounts received from the Authority against each claim; and
- c. any further sums which the Contractor considers due to it from the Authority.

17.10.2 If the Authority's Engineer disagrees with or cannot verify any part of the Final Payment Statement, the Contractor shall submit such further information as the Authority's Engineer may reasonably require.

17.10.3 The Authority's Engineer shall deliver to the Authority:

- i. an IPC for those parts of the Final Payment Statement which are not in dispute, along with a list of disputed items which shall then be settled in accordance with the provisions of Article 24; or
- ii. a Final Payment Certificate in accordance with Clause 17.15, if there are no disputed items.

17.10.4 If, The Authority's Engineer does not prescribe the form referred to in Clause 17.10.1 within 15 (fifteen) days of the date of issue of the Completion Certificate, the Contractor shall submit the statement in such form as it deems fit.

17.11 Discharge

Upon submission of the Final Payment Statement under Clause 17.10, the Contractor shall give to the Authority, with a copy to the Authority's Engineer, a written discharge confirming that the total of the Final Payment Statement represents full and final settlement of all monies due to the Contractor in respect of this Agreement for all the Works arising out of this Agreement, except for any monies

due to either Party on account of any Defect. Provided that such discharge shall become effective only after the payment due has been made in accordance with the Final Payment Certificate issued pursuant to Clause 17.12.

17.12 Final Payment Certificate

17.12.1 Within 90 (Ninety) days after receipt of the Final Payment Statement under Clause 17.10, and the written discharge under Clause 17.11, and there being no disputed items of claim, the Authority's Engineer shall deliver to the Authority, with a copy to the Contractor, a final payment certificate (the "Final Payment Certificate") stating the amount which, in the opinion of the Authority's Engineer, is finally due under this Agreement or otherwise. For the avoidance of doubt, before issuing the Final Payment Certificate, the Authority's Engineer shall ascertain from the Authority all amounts previously paid by the Authority, all sums due to the Authority, and the balance, if any, due from the Authority to the Contractor or from the Contractor to the Authority, as the case may be.

17.12.2 The Authority shall, in accordance with the provisions of Clause 17.7, pay to the Contractor the amount which is specified as being finally due in the Final Payment Certificate.

17.13 Change in law

17.13.1 If as a result of Change in Law, the Contractor suffers any additional costs in the execution of the Works or in relation to the performance of its other obligations under this Agreement, the Contractor shall, within 15 (fifteen) days from the date it becomes reasonably aware of such addition in costs, notify the Authority with a copy to the Authority's Engineer of such additional costs due to Change in Law.

17.13.2 If as a result of Change in Law, the Contractor benefits from any reduction in costs for the execution of this Agreement or in accordance with the provisions of this Agreement, either Party shall, within 15 (fifteen) days from the date it becomes reasonably aware of such reduction in costs, notify the other Party with a copy to the Authority's Engineer of such reduction in costs due to Change in Law.

17.13.3 The Authority's Engineer shall, within 15 (fifteen) days from the date of receipt of notice from the Contractor or the Authority, as the case may be, determine any addition or reduction to the Contract Price, as the case may be, due to the Change in Law.

17.14 Correction of Interim Payment Certificates

The Authority's Engineer may by an Interim Payment Certificate make any correction or modification in any previous Interim Payment Certificate issued by the Authority's Engineer.

17.15 Authority's claims

If the Authority considers itself to be entitled to any payment from the Contractor under any Clause of this Agreement, it shall give notice and particulars to the Contractor 20 (twenty) days before making the recovery from any amount due to the Contractor, and shall take into consideration the representation, if any, made by the Contractor in this behalf, before making such recovery.

17.16 Bonus for early completion

In the event that the Project Completion Date occurs prior to the Scheduled Completion Date, the Contractor shall be entitled to receive a payment of bonus equivalent to 0.2% (zero point two per cent) of the Contract Price per month by which the Project Completion Date precedes the Scheduled Completion Date, but subject to a maximum of 1% (One per cent) of the Contract Price. Provided, however, that the payment of bonus, if any, shall be made only after the issue of the Completion Certificate. For the avoidance of doubt, the Parties agree that for the purpose of determining the bonus payable hereunder, the Contract Price shall always be deemed to be the amount specified in Clause 17.1.1, and shall exclude any revision thereof for any reason.

17.16.1.1 Maintenance Statement of the Project Works

17.16.2 The Contractor shall submit to the Authority's Engineer a Quarterly Maintenance statement ("Quarterly Maintenance Statement") in (three) copies by the 7th (seventh) day of starting Quarter in the format set forth in Schedule-P for the Maintenance of the Project Works during the previous month. However, contractor needs to submit the monthly O&M report for records and performance.

17.16.3 The Quarterly lump sum amount payable for Maintenance shall be 1/4th (one-fourth) of the annual cost of Maintenance as specified in Clause 26.1.1 of Article 26.

17.17 Payment for Maintenance of the Project Works

17.17.1 Within 15 (fifteen) days of receipt of the Quarterly Maintenance Statement from the Contractor pursuant to Clause 17.17, the Authority's Engineer shall verify the Contractor's Quarterly Maintenance statement and certify the amount to be paid to the Contractor taking into account:

- d. Compliance with the Maintenance Requirements; and
- e. Reduction for non-compliance with the Maintenance Requirement in accordance with Clause 17.18.2.

The Authority's Engineer shall deliver to the Authority an IPC approving or amending the quarterly Maintenance statement to reflect the amount due to the Contractor in accordance with this Agreement.

Within 60 (Sixty) days of the receipt of certified IPC, the Authority shall pay the contractor the approved/certified sum against the said IPC.

17.17.2 Maintenance shall be measured in units of one kilometer each length of road/drain/pipelines and all other units as decided by the Authority's Engineer based on the O&M of such units; provided, however, that payment thereof shall be made in fixed Quarterly amounts in accordance with this Agreement. If the Maintenance Requirements set forth in Schedule-O are not met, reduction in payments shall be made in accordance with the provisions of Schedule-M. The reductions for noncompliance with the Maintenance Requirements shall be applied on the basis of monthly inspections by the Authority's Engineer.

17.17.3 The deduction made on account of non-compliance with the Maintenance Requirements shall not be subsequently considered for payment after the compliance is achieved by repair or rectification.

17.18 Final payment statement for Maintenance

17.18.1 Within 30 (thirty) days after completion of the Maintenance Period, the Contractor shall submit to the Authority's Engineer six copies of the final payment statement for Maintenance of the Project Works, with supporting documents showing the details set forth below in the form prescribed by the Authority's Engineer

- f. the total amount claimed in accordance with the Quarterly statement for Maintenance of Project Works;
- g. the amount paid in accordance with the Interim Payment
- h. Certificates; and
- i. any sums which the Contractor considers to be due to it, with supporting documents.

17.18.2 The Authority's Engineer shall certify final payment within 60 (Sixty) days of the receipt of the final payment statement of Maintenance under Clause 17.15, segregating the items of amount payable from the items of amount disallowed. The Authority shall make payment on the basis of the final payment authorized by the Authority's Engineer within a period of 60 (Sixty) days of the receipt of the Final Payment Statement from the Authority's Engineer.

ARTICLE 18**18 Insurance****18.1 Insurance for Works**

18.1.1 The Contractor shall effect and maintain at its own cost the insurances specified in Schedule-N and as per the requirements under Applicable Laws

18.1.2 Subject to the provisions of Clause 19.6 of Article 19, the Contractor shall, in accordance with the provisions of this Agreement, be liable to bear the cost of any loss or damage that does not fall within the scope of this Article 18 or cannot be recovered from the insurers.

18.1.3 Save and except as provided in Clause 18.1.4, the Contractor shall fully indemnify, hold harmless and defend the Authority from and against any and all losses, damages, costs, charges and/or claims with respect to:

- a. the death of or injury to any person; or
- b. the loss of or damage to any property,

that may arise out of or in consequence of any breach by the Contractor of this Agreement during the execution of the Works or the remedying of any Defects therein.

18.1.4 Notwithstanding anything in Clause 18.1.3, the Authority shall fully indemnify the Contractor from and against any and all losses, damages, costs, charges, proceedings and/or claims arising out of or with respect to

- a. the use or occupation of land or any part thereof by the Authority;
- b. the damage to property which is the unavoidable result of the execution and completion of the Works, or the remedying of any Defects therein, in accordance with this Agreement; and
- c. the death of or injury to persons or loss of or damage to property resulting from any act or neglect of the Authority, its agents, servants or other contractors, not being employed by the Contractor.

Provided, however, that in the event of any injury or damage as a result of the contributory negligence of the Contractor, the Authority shall be liable to indemnify the Contractor from and against any and all losses, damages, costs, charges, proceedings and/or claims to the extent as proportionate to the liability of the Authority, its servants or agents or other contractors not associated with the Contractor in such injury or damage.

18.1.5 Without prejudice to the provisions of Clauses 18.1.3 and 18.1.4, the Contractor shall maintain or effect such third party insurances as may be required under Applicable Laws

18.1.6 The Contractor shall provide to the Authority, within 30 days of the Appointed Date, evidence of professional liability insurance maintained by its Design Director and/or consultants to cover the risk of professional negligence in the design of Works. The

professional liability cover shall be for a sum of not less than [3% (three per cent)] of the Contract Price and shall be maintained until the end of the Defects Liability Period.

18.2 Notice to the Authority

No later than 15 (fifteen) days after the date of this Agreement, the Contractor shall by notice furnish to the Authority, in reasonable detail, information in respect of the insurances that it proposes to effect and maintain in accordance with this Article 18. Within 15 (fifteen) days of receipt of such notice, the Authority may require the Contractor to effect and maintain such other insurances as may be necessary pursuant hereto, and in the event of any difference or disagreement relating to any such insurance, the Dispute Resolution Procedure shall apply.

18.3 Evidence of Insurance Cover

18.3.1 All insurances obtained by the Contractor in accordance with this Article 18 shall be maintained with insurers on terms consistent with Good Industry Practice. Within 10 (ten) days from the Appointed Date, the Contractor shall furnish to the Authority notarised true copies of the certificate(s) of insurance, copies of insurance policies and premia payment receipts in respect of such insurance, and no such insurance shall be cancelled, modified, or allowed to expire or lapse until the expiration of at least 45 (forty- five) days after notice of such proposed cancellation, modification or non- renewal has been delivered by the Contractor to the Authority.

18.3.2 The Contractor shall procure and ensure the adequacy of the insurances at all times in accordance with the provisions of this Agreement.

18.4 Remedy for failure to insure

If the Contractor shall fail to effect and keep in force all insurances for which it is responsible pursuant hereto, the Authority shall have the option to either keep in force any such insurances, and pay such premia and recover the costs thereof from the Contractor, or in the event of computation of a Termination Payment, treat an amount equal to the Insurance Cover as deemed to have been received by the Contractor

18.5 Waiver of subrogation

All insurance policies in respect of the insurance obtained by the Contractor pursuant to this Article 18 shall include a waiver of any and all rights of subrogation or recovery of the insurers thereunder against, inter alia, the Authority, and its assigns, successors, undertakings and their subsidiaries, Affiliates, employees, insurers and underwriters, and of any right of the insurers to any set-off or counterclaim or any other deduction, whether by attachment or otherwise, in respect of any liability of any such person insured under any such policy or in any way connected with any loss, liability or obligation covered by such policies of insurance.

18.6 Contractor's waiver

The Contractor hereby further releases, assigns and waives any and all rights of subrogation or recovery against, inter alia, the Authority and its assigns, undertakings and their subsidiaries, Affiliates, employees, successors, insurers and underwriters, which the Contractor may otherwise

have or acquire in or from or in any way connected with any loss, liability or obligation covered by policies of insurance maintained or required to be maintained by the Contractor pursuant to this Agreement (other than third party liability insurance policies) or because of deductible clauses in or inadequacy of limits of any such policies of insurance

18.7 Cross liabilities

Any such insurance maintained or effected in pursuance of this Article 18 shall include a cross liability clause such that the insurance shall apply to the Contractor and to the Authority as separately insured.

18.8 Accident or injury to workmen

Notwithstanding anything contained in this Agreement, it is hereby expressly agreed between the Parties that the Authority shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or Sub-contractor, save and except as for death or injury resulting from any act, omission or default of the Authority, its agents or servants. The Contractor shall indemnify and keep indemnified the Authority from and against all such claims, proceedings, damages, costs, charges, and expenses whatsoever in respect of the above save and except for those acts, omissions or defaults for which the Authority shall be liable

18.9 Insurance against accident to workmen

The Contractor shall effect and maintain during the Agreement such insurances as may be required to insure the Contractor's personnel and any other persons employed by it on the Project from and against any liability incurred in pursuance of this Article 18 Provided that for the purposes of this Clause 18.9, the Contractor's personnel/any person employed by the Contractor shall include the Sub-contractor and its personnel. Provided further that in respect of any persons employed by any Sub-contractor, the Contractor's obligations to insure as aforesaid under this Clause 18.9 shall be discharged if the Sub-contractor shall have insured against any liability in respect of such persons in such manner that the Authority is indemnified under the policy. The Contractor shall require such Sub-contractor to produce before the Authority, when required, such policy of insurance and the receipt for payment of the current premium within 10 (ten) days of such demand being made by the Authority.

18.10 Application of insurance proceeds

The proceeds from all insurance claims, except for life and injury, shall be applied for any necessary repair, reconstruction, reinstatement, replacement, improvement, delivery or installation of the Project and the provisions of this Agreement in respect of construction of Works shall apply mutatis mutandis to the Works undertaken out of the proceeds of insurance

18.11 Compliance with policy conditions

The Contractor hereby expressly agrees to fully indemnify the Authority from and against all losses and claims arising from the Contractor's failure to comply with conditions imposed by the insurance policies effected in accordance with this Agreement

Part V

Force Majeure and Termination

ARTICLE 19

19 Force Majeure

19.1 Force Majeure

As used in this Agreement, the expression “**Force Majeure**” or “**Force Majeure Event**” shall mean occurrence in India of any or all of Non-Political Event, Indirect Political Event and Political Event, as defined in Clauses 19.2, 19.3 and 19.4 respectively, if it affects the performance by the Party claiming the benefit of Force Majeure (**the “Affected Party”**) of its obligations under this Agreement and which act or event (a) is beyond the reasonable control of the Affected Party, and

(b) the Affected Party could not have prevented or overcome by exercise of due diligence and following Good Industry Practice, and (c) has Material Adverse Effect on the Affected Party.

19.2 Non-Political Event

A Non-Political Event shall mean one or more of the following acts or events:

- a. act of God, epidemic, extremely adverse weather conditions, lightning, earthquake, landslide, cyclone, flood, volcanic eruption, chemical or radioactive contamination or ionising radiation, fire or explosion (to the extent of contamination or radiation or fire or explosion originating from a source external to the Site);
- b. strikes or boycotts (other than those involving the Contractor, Sub- contractors or their respective employees/representatives, or attributable to any act or omission of any of them) interrupting supplies and services to the Project for a continuous period of 24 (twenty-four) hours and an aggregate period exceeding 10 (ten) days in an Accounting Year, and not being an Indirect Political Event set forth in Clause 19.3;
- c. any failure or delay of a Sub-contractor but only to the extent caused by another Non-Political Event;
- d. any judgement or order of any court of competent jurisdiction or statutory authority made against the Contractor in any proceedings for reasons other than (i) failure of the Contractor to comply with any Applicable Law or Applicable Permit, or (ii) on account of breach of any Applicable Law or Applicable Permit or of any contract, or (iii) enforcement of this Agreement, or (iv) exercise of any of its rights under this Agreement by the Authority; or (v) breach of its obligations by the Contractor under its sub-contracts
- e. the discovery of geological conditions, toxic contamination or archaeological remains on the Site that could not reasonably have been expected to be discovered through a site inspection; or
- f. any event or circumstances of a nature analogous to any of the foregoing.

19.3 Indirect Political Event

An Indirect Political Event shall mean one or more of the following acts or events:

- a. an act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, riot, insurrection, terrorist or military action, civil commotion or politically motivated sabotage
- b. industry-wide or State-wide strikes or industrial action for a continuous period of 24 (twenty-four) hours and exceeding an aggregate period of 10 (ten) days in an Accounting Year;
- c. any civil commotion, boycott or political agitation which prevents construction of the Project by the Contractor for an aggregate period exceeding 10 (ten) days in an Accounting Year;
- d. failure of the Authority to permit the Contractor to continue with its Construction Works, with or without modifications, in the event of stoppage of such work after discovery of any geological or archaeological finds;
- e. any failure or delay of a Sub-contractor to the extent caused by any Indirect Political Event;
- f. any Indirect Political Event that causes a Non-Political Event; or
- g. any event or circumstances of a nature analogous to any of the foregoing.

19.4 Political Event

A Political Event shall mean one or more of the following acts or events by or on account of any Government Instrumentality:

- a. Change in Law, only if consequences thereof cannot be dealt with under and in accordance with the provisions of Clause 17.13 of Article 17;
- b. compulsory acquisition in national interest or expropriation of any Project Assets or rights of the Contractor or of the Sub-contractors;
- c. unlawful or unauthorised or without jurisdiction revocation of, or refusal to renew or grant without valid cause, any clearance, licence, permit, authorisation, no objection certificate, consent, approval or exemption required by the Contractor or any of the Sub-contractors to perform their respective obligations under this Agreement; provided that such delay, modification, denial, refusal or revocation did not result from the Contractor's or any Sub-contractor's inability or failure to comply with any condition relating to grant, maintenance or renewal of such clearance, licence, authorisation, no objection certificate, exemption, consent, approval or permit;
- d. any failure or delay of a Sub-contractor but only to the extent caused by another Political Event; or

- e. any event or circumstances of a nature analogous to any of the foregoing.

19.5 Duty to report Force Majeure Event

19.5.1 Upon occurrence of a Force Majeure Event, the Affected Party shall by notice report such occurrence to the other Party forthwith. Any notice pursuant hereto shall include full particulars of:

- a. the nature and extent of each Force Majeure Event which is the subject of any claim for relief under this Article 19 with evidence in support thereof;
- b. the estimated duration and the effect or probable effect which such Force Majeure Event is having or will have on the Affected Party's performance of its obligations under this Agreement;
- c. the measures which the Affected Party is taking or proposes to take for alleviating the impact of such Force Majeure Event; and
- d. any other information relevant to the Affected Party's claim.

19.5.2 The Affected Party shall not be entitled to any relief for or in respect of a Force Majeure Event unless it shall have notified the other Party of the occurrence of the Force Majeure Event as soon as reasonably practicable, and in any event no later than 10 (ten) days after the Affected Party knew, or ought reasonably to have known, of its occurrence, and shall have given particulars of the probable material effect that the Force Majeure Event is likely to have on the performance of its obligations under this Agreement

19.5.3 For so long as the Affected Party continues to claim to be affected by such Force Majeure Event, it shall provide the other Party with regular (and not less than weekly) reports containing information as required by Clause 19.5.1, and such other information as the other Party may reasonably request the Affected Party to provide.

19.6 Effect of Force Majeure Event on the Agreement

19.6.1 Upon the occurrence of any Force Majeure

- a. prior to the Appointed Date, both Parties shall bear their respective Force Majeure costs.
- b. after the Appointed Date, the costs incurred and attributable to such event and directly relating to this Agreement (the "Force Majeure costs") shall be allocated and paid as follows:
 - i. upon occurrence of a Non-Political Event, the Parties shall bear their respective Force Majeure costs and neither Party shall be required to pay to the other Party any costs thereof;
 - ii. upon occurrence of an Indirect Political Event, all Force Majeure costs attributable to such Indirect Political Event, and not exceeding the Insurance Cover for such Indirect Political Event, shall be borne by the Contractor, and to the extent Force Majeure

costs exceed such Insurance Cover, one half of such excess amount shall be reimbursed by the Authority to the Contractor for the Force Majeure events; and

- iii. upon occurrence of a Political Event, all Force Majeure costs attributable to such Political Event shall be reimbursed by the Authority to the Contractor.

For the avoidance of doubt, Force Majeure costs may include costs directly attributable to the Force Majeure Event, but shall not include debt repayment obligations, if any, of the Contractor.

19.6.2 Save and except as expressly provided in this Article 19, neither Party shall be liable in any manner whatsoever to the other Party in respect of any loss, damage, cost, expense, claims, demands and proceedings relating to or arising out of occurrence or existence of any Force Majeure Event or exercise of any right pursuant hereto.

19.6.3 Upon the occurrence of any Force Majeure Event during the Construction Period, the Project Completion Schedule for and in respect of the affected Works shall be extended on a day to day basis for such period as performance of the Contractor's obligations is affected on account of the Force Majeure Event or its subsisting effects, as may be determined by the Authority's Engineer/ Engineer-In-Charge.

19.6.4 Force Majeure costs for any event which results in any offsetting compensation being payable to the Contractor by or on behalf of its Sub-contractors shall be reduced by such amounts that are payable to the Contractor by its Sub-contractors.

19.7 Termination Notice for Force Majeure Event

If a Force Majeure Event subsists for a period of 60 (sixty) days or more within a continuous period of 120 (one hundred and twenty) days, either Party may in its discretion terminate this Agreement by issuing a Termination Notice to the other Party without being liable in any manner whatsoever, save as provided in this Article 19, and upon issue of such Termination Notice, this Agreement shall, notwithstanding anything to the contrary contained herein, stand terminated forthwith; provided that before issuing such Termination Notice, the Party intending to issue the Termination Notice shall inform the other Party of such intention and grant 15 (fifteen) days time to make a representation, and may after the expiry of such 15 (fifteen) days period, whether or not it is in receipt of such representation, in its sole discretion issue the Termination Notice.

19.8 Termination Payment for Force Majeure Event

19.8.1 In the event of this Agreement being terminated on account of a Non- Political Event, the Termination Payment shall be an amount equal to the sum payable under Clause 21.5 of Article 21.

19.8.2 If Termination is on account of an Indirect Political Event, the Termination Payment shall include:

- a. any sums due and payable under Clause 21.5 of Article 21; and
- b. the reasonable cost, as determined by the Authority's Engineer, of the Plant and Materials procured by the Contractor and transferred to the Authority for use in Construction, only if such Plant and Materials are in conformity with the Specifications and Standards;

19.8.3 If Termination is on account of a Political Event, the Authority shall make a Termination Payment to the Contractor in an amount that would be payable under Clause 21.6.2 of Article 21 as if it were an Authority Default.

19.9 Dispute resolution

In the event that the Parties are unable to agree in good faith about the occurrence or existence of a Force Majeure Event, such Dispute shall be finally settled in accordance with the Dispute Resolution Procedure; provided that the burden of proof as to the occurrence or existence of such Force Majeure Event shall be upon the Party claiming relief and/or excuse on account of such Force Majeure Event.

19.10 Excuse from performance of obligations

If the Affected Party is rendered wholly or partially unable to perform its obligations under this Agreement because of a Force Majeure Event, it shall be excused from performance of such of its obligations to the extent it is unable to perform on account of such Force Majeure Event; provided that:

- a. the suspension of performance shall be of no greater scope and of no longer duration than is reasonably required by the Force Majeure Event;
- b. the Affected Party shall make all reasonable efforts to mitigate or limit damage to the other Party arising out of or as a result of the existence or occurrence of such Force Majeure Event and to cure the same with due diligence; and
- c. when the Affected Party is able to resume performance of its obligations under this Agreement, it shall give to the other Party notice to that effect and shall promptly resume performance of its obligations hereunder.

ARTICLE 20**20 Suspension of Contractor's Rights****20.1 Suspension upon Contractor Default**

Upon occurrence of a Contractor Default, the Authority shall be entitled, without prejudice to its other rights and remedies under this Agreement including its rights of Termination hereunder, to (a) suspend carrying out of the Works or any part thereof, and (b) carry out such Works itself or authorise any other person to exercise or perform the same on its behalf during such suspension (the "Suspension"). Suspension hereunder shall be effective forthwith upon issue of notice by the Authority to the Contractor and may extend up to a period not exceeding 90 (ninety) days from the date of issue of such notice.

20.2 Authority to act on behalf of the Contractor

During the period of Suspension hereunder, all rights and liabilities vested in the Contractor in accordance with the provisions of this Agreement shall continue to vest in the Contractor and all things done or actions taken, including expenditure incurred by the Authority for discharging the obligations of the Contractor under and in accordance with this Agreement shall be deemed to have been done or taken for and on behalf of the Contractor and the Contractor undertakes to indemnify the Authority for all costs incurred during such period. The Contractor hereby licences and sub-licences respectively, the Authority or any other person authorised by it under Clause 20.1 to use during Suspension, all Intellectual Property belonging to or licenced to the Contractor with respect to the Project and its design, engineering, construction, and which is used or created by the Contractor in performing its obligations under the Agreement.

20.3 Revocation of Suspension

20.3.1 In the event that the Authority shall have rectified or removed the cause of Suspension within a period not exceeding 60 (sixty) days from the date of Suspension, it shall revoke the Suspension forthwith and restore all rights of the Contractor under this Agreement. For the avoidance of doubt, the Parties expressly agree that the Authority may, in its discretion, revoke the Suspension at any time, whether or not the cause of Suspension has been rectified or removed hereunder.

20.3.2 Upon the Contractor having cured the Contractor Default within a period not exceeding 60 (sixty) days from the date of Suspension, the Authority shall revoke the Suspension forthwith and restore all rights of the Contractor under this Agreement.

20.4 Termination

- 20.4.1 At any time during the period of Suspension under this Article 20, the Contractor may by notice require the Authority to revoke the Suspension and issue a Termination Notice. The Authority shall, within 15 (fifteen) days of receipt of such notice, terminate this Agreement under and in accordance with Article 21 as if it is a Contractor Default under Clause 21.1 of Article 21.
- 20.4.2 Notwithstanding anything to the contrary contained in this Agreement, in the event that Suspension is not revoked within 90 (ninety) days from the date of Suspension hereunder, the Agreement shall, upon expiry of the aforesaid period, be deemed to have been terminated by mutual agreement of the Parties and all the provisions of this Agreement shall apply, mutatis mutandis, to such Termination as if a Termination Notice had been issued by the Authority upon occurrence of a Contractor Default.

ARTICLE 21

21 Termination

21.1 Termination for Contractor Default

21.1.1 Save as otherwise provided in this Agreement, in the event that any of the defaults specified below shall have occurred, and the Contractor fails to cure the default within the Cure Period set forth below, or where no Cure Period is specified, then within a Cure Period of 30 (Thirty) days, the Contractor shall be deemed to be in default of this Agreement (the “Contractor Default”), unless the default has occurred as a result of any breach of this Agreement by the Authority or due to Force Majeure. The defaults referred to herein shall include the following:

- a. The Contractor fails to provide, extend or replenish, as the case may be, the Performance Security in accordance with this Agreement;
- b. subsequent to the replenishment or furnishing of fresh Performance Security in accordance with Clause 7.3 of Article 7, the Contractor fails to cure, within a Cure Period of 30 (thirty) days, the Contractor Default for which the whole or part of the Performance Security was appropriated;
- c. the Contractor does not achieve the latest outstanding Project Milestone due in accordance with the provisions of Schedule-I, subject to any Time Extension, and continues to be in default for 45 (forty five) days;
- d. the Contractor abandons or manifests intention to abandon the construction of the Project without the prior written consent of the Authority;
- e. the Contractor fails to proceed with the Works in accordance with the provisions of Clause 10.1 of Article 10 or stops Works for 30 (thirty) days without reflecting the same in the current programme and such stoppage has not been authorised by the Authority’s Engineer/ Engineer-in-Charge;
- f. the Project Completion Date does not occur within the period specified in Schedule-I for the Scheduled Completion Date, or any extension thereof;
- g. failure to complete the Punch List items within the periods stipulated therefor in Clause 12.3 of Article 12;
- h. the Contractor fails to rectify any Defect, the non-rectification of which shall have a Material Adverse Effect on the Project, within the time specified in this Agreement or as directed by the Authority’s Engineer/ Authority;
- i. the Contractor subcontracts the Works or any part thereof in violation of this Agreement or assigns any part of the Works without the prior approval of the Authority;
- j. the Contractor creates any Encumbrance in breach of this Agreement;

- k. an execution levied on any of the assets of the Contractor has caused a Material Adverse Effect;
 - l. the Contractor is adjudged bankrupt or insolvent, or if a trustee or receiver is appointed for the Contractor or for the whole or material part of its assets that has a material bearing on the Project;
 - m. the Contractor has been, or is in the process of being liquidated, dissolved, wound-up, amalgamated or reconstituted in a manner that would cause, in the reasonable opinion of the Authority, a Material Adverse Effect;
 - n. a resolution for winding up of the Contractor is passed, or any petition for winding up of the Contractor is admitted by a court of competent jurisdiction and a provisional liquidator or receiver is appointed and such order has not been set aside within 90 (ninety) days of the date thereof or the Contractor is ordered to be wound up by a court except for the purpose of amalgamation or reconstruction; provided that, as part of such amalgamation or reconstruction, the entire property, assets and undertaking of the Contractor are transferred to the amalgamated or reconstructed entity and that the amalgamated or reconstructed entity has unconditionally assumed the obligations of the Contractor under this Agreement; and provided that:
 - i. the amalgamated or reconstructed entity has the capability and experience necessary for the performance of its obligations under this Agreement; and
 - ii. the amalgamated or reconstructed entity has the financial standing to perform its obligations under this Agreement and has a credit worthiness at least as good as that of the Contractor as at the Appointed Date;
 - o. any representation or warranty of the Contractor herein contained which is, as of the date hereof, found to be materially false or the Contractor is at any time hereafter found to be in breach thereof;
 - p. the Contractor submits to the Authority any statement, notice or other document, in written or electronic form, which has a material effect on the Authority's rights, obligations or interests and which is false in material particulars;
 - q. the Contractor has failed to fulfil any obligation, for which failure Termination has been specified in this Agreement; or
 - r. the Contractor has failed to make any payment to the Authority within the period specified in this Agreement;
 - s. the Concessionaire issues a Termination Notice in violation of this Agreement; or
 - t. the Contractor commits a default in complying with any other provision of this Agreement if such a default causes a Material Adverse Effect on the Project or on the Authority.
- 21.1.2 Without prejudice to any other rights or remedies which the Authority may have under this Agreement, upon occurrence of a Contractor Default, the Authority shall be entitled to terminate this Agreement by issuing a Termination Notice to the Contractor; provided that

before issuing the Termination Notice, the Authority shall by a notice inform the Contractor of its intention to issue such Termination Notice and grant 15 (fifteen) days to the Contractor to make a representation, and may after the expiry of such 15 (fifteen) days, whether or not it is in receipt of such representation, issue the Termination Notice.

21.1.3 After termination of this Agreement for Contractor Default, the Authority may complete the Works and/or procure its completion through any other entity. The Authority and such entity may, for this purpose, use any Materials, Plant and equipment, Contractor's documents and other design documents made by or on behalf of the Contractor.

21.2 Termination for Authority Default

21.2.1 In the event that any of the defaults specified below shall have occurred, and the Authority fails to cure such default within a Cure Period of 90 (ninety) days or such longer period as has been expressly provided in this Agreement, the Authority shall be deemed to be in default of this Agreement (the "Authority Default") unless the default has occurred as a result of any breach of this Agreement by the Contractor or due to Force Majeure. The defaults referred to herein shall include the following:

- a. The Authority commits a material default in complying with any of the provisions of this Agreement and such default has a Material Adverse Effect on the Contractor;
- b. the Authority repudiates this Agreement or otherwise takes any action that amounts to or manifests an irrevocable intention not to be bound by this Agreement;

21.2.2 Without prejudice to any other right or remedy which the Contractor may have under this Agreement, upon occurrence of an Authority Default, the Contractor shall be entitled to terminate this Agreement by issuing a Termination Notice to the Authority; provided that before issuing the Termination Notice, the Contractor shall by a notice inform the Authority of its intention to issue the Termination Notice and grant 15 (fifteen) days to the Authority to make a representation, and may after the expiry of such 15 (fifteen) days, whether or not it is in receipt of such representation, issue the Termination Notice.

21.3 Termination for Authority's convenience

Notwithstanding anything hereinabove, the Authority may terminate this Agreement for its own convenience. The termination shall take effect 30 (thirty) days from the date of notice hereunder and shall be deemed to be termination on account of Authority Default.

21.4 Requirements after Termination

Upon Termination of this Agreement in accordance with the provisions of this Article 21, the Contractor shall comply with and conform to the following:

- a. deliver to the Authority all Plant and Materials which shall have become the property of the Authority under this Article 21;

- b. deliver all relevant records, reports, Intellectual Property and other licences pertaining to the Works, other design documents and in case of Termination occurring after the Provisional Certificate has been issued, the “as built” Drawings for the Works;
- c. transfer and/or deliver all Applicable Permits to the Authority to the extent permissible under Applicable Laws; and
- d. vacate the Site within 15 (fifteen) days.

21.5 Valuation of Unpaid Works

21.5.1 Within a period of 45 (forty-five) days after Termination under Clause 21.1, 21.2 or 21.3, as the case may be, has taken effect, the Authority’s Engineer shall proceed in accordance with Clause 16.5 of Article 16 to determine as follows the valuation of unpaid Works (the “Valuation of Unpaid Works”):

- a. value of the completed stage of the Works, less payments already made; and
- b. reasonable value of the partially completed stages of works as on the date of Termination, only if such works conform with the Specifications and Standards.

and shall adjust from the sum thereof (i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement; and (ii) all taxes due to be deducted at source. Reasonable value of the partially completed stages of works shall be estimated based on as per Schedule-G and clause 13.2 of Article 13.

21.5.2 The Valuation of Unpaid Works shall be communicated to the Authority, with a copy to the Contractor, within a period of 45 (forty five) days from the date of Termination.

21.6 Termination Payment

21.6.1 Upon Termination on account of Contractor Default under Clause 21.1, the Authority shall:

- a. encash and appropriate the Performance Security or Retention Money, whichever is more, and in the event the Contractor has failed to replenish or extend the Performance Security, claim the amount stipulated in Clause 7.1.1 of Article 7, as agreed pre-determined Damages, if any;
- b. encash and appropriate the bank guarantee, if any, to the extent of the outstanding Advance Payment and interest thereon; and
- c. pay to the Contractor, by way of Termination Payment, an amount equivalent to the Valuation of Unpaid Works after adjusting any other sums payable or recoverable, as the case may be, in accordance with the provisions of this Agreement,

and shall adjust from the sum thereof (i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement, and (ii) all taxes due to be deducted at source.

21.6.2 Upon Termination on account of an Authority Default under Clause 21.2 or for

Authority's convenience under Clause 21.3, the Authority shall:

- a. return the Performance Security and Retention Money forthwith;
- b. encash and appropriate the bank guarantee, if any, to the extent of the outstanding Advance Payment, including interest thereon; and
- c. pay to the Contractor, by way of Termination Payment, an amount equal to:
 - i. Valuation of Unpaid Works as per Schedule-G and clause 13.2 of Article 13;
 - ii. the reasonable cost, as determined by the Authority's Engineer, of the Plant and Materials procured by the Contractor and transferred to the Authority for its use, only if such Plant and Materials are in conformity with the Specifications and Standards;
 - iii. the reasonable cost of temporary works, as determined by the Authority's Engineer;

and shall adjust from the sum thereof (i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement, and (ii) all taxes due to be deducted at source.

21.6.3 Termination Payment shall become due and payable to the Contractor within 60 (Sixty) days of a demand being made by the Contractor to the Authority with the necessary particulars, after the Valuation of Unpaid Works has been communicated by the Authority's Engineer, and in the event of any delay if any no additional claim shall be made by the contractor. For the avoidance of doubt, it is expressly agreed that Termination Payment shall constitute full discharge by the Authority of its payment obligations in respect thereof hereunder.

21.6.4 The Contractor expressly agrees that Termination Payment under this Article 21 shall constitute a full and final settlement of all claims of the Contractor on account of Termination of this Agreement and that it shall not have any further right or claim under any law, treaty, convention, contract or otherwise.

21.7 Other rights and obligations of the Parties

Upon Termination for any reason whatsoever

- a) the property and ownership in all Materials, Plant and Works and the Project shall, as between the Contractor and the Authority, vest in the Authority in whole, free from any and all Encumbrances; provided that the foregoing shall be without prejudice to Clause 21.6;
- b) the risk of loss or damage to any Materials, Plant or Works and the care and custody thereof shall pass from the Contractor to the Authority; and

- c) the Authority shall be entitled to restrain the Contractor and any person claiming through or under the Agreement from entering upon the Site or any part of the Project except for taking possession of materials, stores, implements, construction plants and equipment of the Contractor, which have not been vested in the Authority in accordance with the provisions of this Agreement.

21.8 Survival of rights

Notwithstanding anything to the contrary contained in this Agreement any Termination pursuant to the provisions of this Agreement shall be without prejudice to the accrued rights of either Party including its right to claim and recover money damages, insurance proceeds, security deposits, and other rights and remedies, which it may have in law or Agreement. All rights and obligations of either Party under this Agreement, including Termination Payments, shall survive the Termination to the extent such survival is necessary for giving effect to such rights and obligations

21.9 Foreclosure of contract due to Abandonment or Reduction in Scope of Work

If at any time after acceptance of the tender or during the progress of work, the purpose or object for which the work is being done changes due to any supervening cause and as a result of which the work has to be abandoned or reduced in scope the Authority/Authority's Engineer shall give notice in writing to that effect to the contractor stating the decision as well as the cause for such decision and the contractor shall act accordingly in the matter. The contractor shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the works in full but which he did not derive in consequence of the foreclosure of the whole or part of the works.

The contractor shall be paid at contract rates, full amount for works executed at site and, in addition, a reasonable amount as certified by the Authority/Authority's Engineer for the items hereunder mentioned which could not be utilized on the work to the full extent in view of the foreclosure;

- i. Any expenditure incurred on preliminary site work, e.g. temporary access roads, temporary labour huts, staff quarters and site office; storage accommodation and water storage tanks.
- ii. Authority shall have the option to take over contractor's materials or any part thereof either brought to site or of which the contractor is legally bound to accept delivery from suppliers (for incorporation in or incidental to the work) provided, however Authority shall be bound to take over the materials or such portions thereof as the contractor does not desire to retain. For materials taken over or to be taken over by Government, cost of such materials as detailed by Authority/Authority's Engineer shall be paid. The cost shall, however, take into account purchase price, cost of transportation and deterioration or damage which may have been caused to materials whilst in the custody of the contractor.
- iii. Reasonable compensation for transfer of T & P from site to contractor's permanent stores or to his other works, whichever is less. If T & P are not transported to either of the said places, no cost of transportation shall be payable.

- iv. Reasonable compensation for repatriation of contractor's site staff and imported labour to the extent necessary.

The contractor shall, if required by the Authority/Authority's Engineer, furnish to him, books of account, wage books, time sheets and other relevant documents and evidence as may be necessary to enable him to certify the reasonable amount payable under this condition.

The reasonable amount of items on (i), (iii) and (iv) above shall not be in excess of 1% (One Percent) of the cost of the work remaining incomplete on the date of closure, i.e. total stipulated cost of the work as per accepted tender less the cost of work actually executed under the contract and less the cost of contractor's materials at site taken over by the Authority as per item (ii) above. Provided always that against any payments due to the contractor on this account or otherwise, the Authority/Authority's Engineer shall be entitled to recover or be credited with any outstanding balances due from the contractor for advance paid in respect of any tool, plants and materials and any other sums which at the date of termination were recoverable by the Authority from the contractor under the terms of the contract.

In the event of action being taken under Clause 21.9 to reduce the scope of work, the contractor may furnish fresh Performance Guarantee on the same conditions, in the same manner and at the same rate for the balance tendered amount and initially valid up to the extended date of completion or stipulated date of completion if no extension has been granted plus minimum 60 days beyond that. Wherever such a fresh Performance Guarantee is furnished by the contractor the Authority/Authority's Engineer may return the previous Performance Guarantee.

PART VI**Other Provisions****ARTICLE 22****22 Assignment and Charges****22.1 Restrictions on assignment and charges**

This Agreement shall not be assigned by the Contractor to any person, save and except with the prior consent in writing of the Authority, which consent the Authority shall be entitled to decline without assigning any reason.

22.2 Hypothecation of Materials or Plant

Notwithstanding the provisions of Clause 22.1, the Contractor may pledge or hypothecate to its lenders, any Materials or Plant prior to their incorporation in the Works. Further, the Contractor may, by written notice to the Authority, assign its right to receive payments under this Agreement either absolutely or by way of charge, to any person providing financing to the Contractor in connection with the performance of the Contractor's obligations under this Agreement. The Contractor acknowledges that any such assignment by the Contractor shall not relieve the Contractor from any obligations, duty or responsibility under this Agreement. For the avoidance of doubt, all Materials and Plants shall, upon their incorporation into Works, be free from any and all Encumbrances without the Authority being required to make any payment to any person on account of any costs, compensation, expenses and charges for such Materials, Plants and Works.

ARTICLE 23**23 Liability and Indemnity****23.1 General indemnity**

The Contractor shall indemnify, defend, save and hold harmless the Authority and its officers, servants, agents, Government Instrumentalities and Government owned and/or controlled entities/enterprises, (the “Authority Indemnified Persons”) against any and all suits, proceedings, actions, demands and third party claims for any loss, damage, cost and expense of whatever kind and nature, whether arising out of any breach by the Contractor of any of its obligations under this Agreement or from any negligence under the Agreement, including any errors or deficiencies in the design documents, or tort or on any other ground whatsoever, except to the extent that any such suits, proceedings, actions, demands and claims have arisen due to any negligent act or omission, or breach or default of this Agreement on the part of the Authority Indemnified Persons.

23.2 Indemnity by the Contractor

23.2.1 Without limiting the generality of Clause 23.1, the Contractor shall fully indemnify, hold harmless and defend the Authority and the Authority Indemnified Persons from and against any and all loss and/or damages arising out of or with respect to:

- a. failure of the Contractor to comply with Applicable Laws and Applicable Permits;
- b. payment of taxes required to be made by the Contractor in respect of the income or other taxes of the Sub-contractors, suppliers and representatives; or
- c. non-payment of amounts due as a result of Materials or services furnished to the Contractor or any of its Sub-contractors which are payable by the Contractor or any of its Sub-contractors.

23.2.2 Without limiting the generality of the provisions of this Article 23, the Contractor shall fully indemnify, hold harmless and defend the Authority Indemnified Persons from and against any and all suits, proceedings, actions, claims, demands, liabilities and damages which the Authority Indemnified Persons may hereafter suffer, or pay by reason of any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other Intellectual Property, proprietary or confidentiality rights with respect to any materials, information, design or process used by the Contractor or by the Sub-contractors in performing the Contractor’s obligations or in any way incorporated in or related to the Project. If in any such suit, action, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the Contractor shall make every reasonable effort, by giving a satisfactory bond or otherwise, to secure the revocation or suspension of the injunction or restraint order. If, in any such suit, action, claim or proceedings, the Project, or any part thereof or comprised therein, is held to constitute an infringement and its use is permanently enjoined, the Contractor shall promptly make every reasonable effort to secure for the Authority a licence, at no cost to the Authority, authorising continued use of the infringing work. If the Contractor is unable to secure such licence within a reasonable time, the Contractor shall, at its own expense, and without impairing the Specifications and Standards, either replace the affected work,

or part, or process thereof with non-infringing work or part or process, or modify the same so that it becomes non-infringing.

23.3 Notice and contest of claims

In the event that either Party receives a claim or demand from a third party in respect of which it is entitled to the benefit of an indemnity under this Agreement (the “**Indemnified Party**”) it shall notify the other Party (the “**Indemnifying Party**”) within 15 (fifteen) days of receipt of the claim or demand and shall not settle or pay the claim without the prior approval of the Indemnifying Party, which approval shall not be unreasonably withheld or delayed. In the event that the Indemnifying Party wishes to contest or dispute the claim or demand, it may conduct the proceedings in the name of the Indemnified Party, subject to the Indemnified Party being secured against any costs involved, to its reasonable satisfaction.

23.4 Defence of claims

23.4.1 The Indemnified Party shall have the right, but not the obligation, to contest, defend and litigate any claim, action, suit or proceeding by any third party alleged or asserted against such Party in respect of, resulting from, related to or arising out of any matter for which it is entitled to be indemnified hereunder, and reasonable costs and expenses thereof shall be indemnified by the Indemnifying Party. If the Indemnifying Party acknowledges in writing its obligation to indemnify the Indemnified Party in respect of loss to the full extent provided by this Agreement, the Indemnifying Party shall be entitled, at its option, to assume and control the defence of such claim, action, suit or proceeding, liabilities, payments and obligations at its expense and through the counsel of its choice; provided it gives prompt notice of its intention to do so to the Indemnified Party and reimburses the Indemnified Party for the reasonable cost and expenses incurred by the Indemnified Party prior to the assumption by the Indemnifying Party of such defence. The Indemnifying Party shall not be entitled to settle or compromise any claim, demand, action, suit or proceeding without the prior written consent of the Indemnified Party, unless the Indemnifying Party provides such security to the Indemnified Party as shall be reasonably required by the Indemnified Party to secure the loss to be indemnified hereunder to the extent so compromised or settled.

23.4.2 If the Indemnifying Party has exercised its rights under Clause 23.3, the Indemnified Party shall not be entitled to settle or compromise any claim, action, suit or proceeding without the prior written consent of the Indemnifying Party (which consent shall not be unreasonably withheld or delayed).

23.4.3 If the Indemnifying Party exercises its rights under Clause 23.3, the Indemnified Party shall nevertheless have the right to employ its own counsel, and such counsel may participate in such action, but the fees and expenses of such counsel shall be at the expense of the Indemnified Party, when and as incurred, unless:

- a. the employment of counsel by such party has been authorised in writing by the Indemnifying Party;

- b. the Indemnified Party shall have reasonably concluded that there may be a conflict of interest between the Indemnifying Party and the Indemnified Party in the conduct of the defence of such action;
- c. the Indemnifying Party shall not, in fact, have employed independent counsel reasonably satisfactory to the Indemnified Party, to assume the defence of such action and shall have been so notified by the Indemnified Party; or
- d. the Indemnified Party shall have reasonably concluded and specifically notified the Indemnifying Party either:
 - (i) that there may be specific defences available to it which are different from or additional to those available to the Indemnifying Party; or
 - (ii) that such claim, action, suit or proceeding involves or could have a material adverse effect upon it beyond the scope of this Agreement:

Provided that if Sub-clauses (b), (c) or (d) of this Clause 23.4.3 shall be applicable, the counsel for the Indemnified Party shall have the right to direct the defence of such claim, demand, action, suit or proceeding on behalf of the Indemnified Party, and the reasonable fees and disbursements of such counsel shall constitute legal or other expenses hereunder.

23.5 No consequential claims

Notwithstanding anything to the contrary contained in this Article 23, the indemnities herein provided shall not include any claim or recovery in respect of any cost, expense, loss or damage of an indirect, incidental or consequential nature, including loss of profit, except as expressly provided in this Agreement.

23.6 Survival on Termination

The provisions of this Article 23 shall survive Termination.

ARTICLE 24**24 Dispute Resolution****24.1 Dispute resolution**

24.1.1 Any dispute, difference or controversy of whatever nature howsoever arising under or out of or in relation to this Agreement (including its interpretation) between the Parties, and so notified in writing by either Party to the other Party (the “Dispute”) shall, in the first instance, be attempted to be resolved amicably in accordance with the conciliation procedure set forth in Clause 24.2.

24.1.2 The Parties agree to use their best efforts for resolving all Disputes arising under or in respect of this Agreement promptly, equitably and in good faith, and further agree to provide each other with reasonable access during normal business hours to all non-privileged records, information and data pertaining to any Dispute.

24.2 Conciliation

In the event of any Dispute between the Parties, either Party can approach to an officer of the Authority, not below the rank of Secretary to the Government or Chief Engineer, as the case may be, or such other person as the Parties may mutually agree upon (the “Conciliator”) to conciliate and assist the Parties in arriving at an amicable settlement thereof. Failing conciliation by the Conciliator or without the intervention of the Conciliator, either Party may require such Dispute to be referred to the Secretary or Chairman of the Authority and the Chairman of the Board of Directors of the Contractor for amicable settlement, and upon such reference, the said persons shall meet no later than 7 (seven) business days from the date of reference to discuss and attempt to amicably resolve the Dispute. If such meeting does not take place within the 7 (seven) business day period or the Dispute is not amicably settled within 15 (fifteen) business days of the meeting or the Dispute is not resolved as evidenced by the signing of written terms of settlement within 30 (thirty) business days of the notice in writing referred to in Clause 24.1.1 or such longer period as may be mutually agreed by the Parties, either Party may refer the Dispute to arbitration in accordance with the provisions of Clause 24.3.

24.3 Arbitration

24.3.1 Any dispute which remains unresolved between the parties through the mechanisms available/ prescribed in the Agreement, irrespective of any claim value, which has not been agreed upon/ reached settlement by the parties, will be referred to the Arbitral Tribunal as per the Arbitration and Conciliation Act 1996 (as amended upto date). Such disputes shall be referred to an Arbitral Tribunal consisting of three arbitrators, one each to be appointed by the AUTHORITY and the Contractor, the third arbitrator shall be chosen by the two arbitrators so appointed by the parties and shall act as Presiding Arbitrator. In case of failure of the two arbitrators, appointed by the parties to reach a consensus regarding the appointment of the third arbitrator within a period of 30 (thirty) days from the date of appointment of the two arbitrators, the Presiding arbitrator shall be appointed as per law. The Arbitration and Conciliation Act, 1996 and any statutory modification or re-enactment thereof, shall apply to these arbitration proceedings

24.3.2 Arbitration proceedings shall be held in Diu, UT of Dadra & Nagar Haveli and Daman & Diu, India and the language of the arbitration proceedings and that of all documents and communications between the parties shall be English

24.3.3 Deleted

24.3.4 The arbitral tribunal shall make a reasoned award (the "Award"). Any Award made in any arbitration held pursuant to this Article 24 shall be final and binding on the Parties as from the date it is made, and the Contractor and the Authority agree and undertake to carry out such Award without delay.

24.3.5 The Contractor and the Authority agree that an Award may be enforced against the Contractor and/or the Authority, as the case may be, and their respective assets wherever situated.

24.3.6 This Agreement and the rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder. Further, the parties unconditionally acknowledge and agree that notwithstanding any dispute between them, each Party shall proceed with the performance of its respective obligations, pending resolution of Dispute in accordance with this Article.

24.3.7 This Agreement and the rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder.

24.3.8 In the event the Party against whom the Award has been granted challenges the Award for any reason in a court of law, it shall make an interim payment to the other Party for an amount equal to 75% (seventy five per cent) of the Award, pending final settlement of the Dispute. The aforesaid amount shall be paid forthwith upon furnishing an irrevocable Bank Guarantee for a sum equal to 120 % (one hundred and twenty per cent) of the aforesaid amount. Upon final settlement of the Dispute, the aforesaid interim payment shall be adjusted and any balance amount due to be paid or returned, as the case may be, shall be paid or returned with interest calculated at the rate of Bank Rate plus 2% (two per cent) per annum from the date of interim payment to the date of final settlement of such balance.

24.4 Adjudication by a tribunal

In the event of constitution of a statutory regulatory authority, tribunal or commission, as the case may be, with powers to adjudicate upon disputes between the Contractor and the Authority, all Disputes arising after such constitution shall, instead of reference to arbitration under Clause 24.3, be adjudicated upon by such regulatory authority, tribunal or commission in accordance with the Applicable Law and all references to Dispute Resolution Procedure shall be construed accordingly. For the avoidance of doubt, the Parties hereto agree that the adjudication hereunder shall not be final and binding until an appeal against such adjudication has been decided by an appellate tribunal or court of competent jurisdiction, as the case may be, or no such appeal has been preferred within the time specified in the Applicable Law..

ARTICLE 25**25 Miscellaneous****25.1 Governing law and jurisdiction**

This Agreement shall be construed and interpreted in accordance with and governed by the laws of India, and the courts in the State shall have exclusive jurisdiction over matters arising out of or relating to this Agreement.

25.2 Waiver of immunity

Each Party unconditionally and irrevocably:

- a. agrees that the execution, delivery and performance by it of this Agreement constitute commercial acts done and performed for commercial purpose;
- b. agrees that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Agreement or any transaction contemplated by this Agreement, no immunity (whether by reason of sovereignty or otherwise) from such proceedings shall be claimed by or on behalf of the Party with respect to its assets;
- c. waives any right of immunity which it or its assets, property or revenues now has, may acquire in the future or which may be attributed to it in any jurisdiction; and
- d. consents generally in respect of the enforcement of any judgement or award against it in any such proceedings to the giving of any relief or the issue of any process in any jurisdiction in connection with such proceedings (including the making, enforcement or execution against it or in respect of any assets, property or revenues whatsoever irrespective of their use or intended use of any order or judgement that may be made or given in connection therewith).

25.3 Delayed payments

The Parties hereto agree that payments due from one Party to the other Party under the provisions of this Agreement shall be made within the period set forth therein, and if no such period is specified, within 90 (Ninety) days of receiving a demand along with the necessary particulars. In the event of delay beyond such period, the defaulting Party shall pay interest for the period of delay calculated at a rate equal to Bank Rate plus 2% (two per cent), save and except as otherwise specified in this Agreement. All interest payment under this Agreement shall, save and except as otherwise specified, be calculated at quarterly rests, and recovery thereof shall be without prejudice to the rights of the Parties under this Agreement including Termination thereof.

25.4 Waiver

25.4.1 Waiver, including partial or conditional waiver, by either Party of any default by the other Party in the observance and performance of any provision of or obligations under this Agreement:

- a. shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions of or obligations under this Agreement;
- b. shall not be effective unless it is in writing and executed by a duly authorised representative of the Party; and
- c. shall not affect the validity or enforceability of this Agreement in any manner.

25.4.2 Neither the failure by either Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation thereunder nor time or other indulgence granted by a Party to the other Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right hereunder.

25.5 Liability for review of Documents and Drawings

Except to the extent expressly provided in this Agreement:

- a. no review, comment or approval by the Authority or the Authority's Engineer of any Document or Drawing submitted by the Contractor nor any observation or inspection of the construction of the Project nor the failure to review, approve, comment, observe or inspect hereunder shall relieve or absolve the Contractor from its obligations, duties and liabilities under this Agreement, Applicable Laws and Applicable Permits; and
- b. the Authority shall not be liable to the Contractor by reason of any review, comment, approval, observation or inspection referred to in Sub-clause (a) above.

25.6 Exclusion of implied warranties etc.

This Agreement expressly excludes any warranty, condition or other undertaking implied at law or by custom or otherwise arising out of any other agreement between the Parties or any representation by either Party not contained in a binding legal agreement executed by both Parties.

25.7 Survival

25.7.1 Termination shall:

- a. not relieve the Contractor or the Authority, as the case may be, of any obligations hereunder which expressly or by implication survive Termination hereof; and
- b. except as otherwise provided in any provision of this Agreement expressly limiting the liability of either Party, not relieve either Party of any obligations or liabilities for loss or

damage to the other Party arising out of, or caused by, acts or omissions of such Party prior to the effectiveness of such Termination or arising out of such Termination.

25.7.2 All obligations surviving Termination shall only survive for a period of 3 (three) years following the date of such Termination.

25.8 Entire Agreement

This Agreement and the Schedules together constitute a complete and exclusive statement of the terms of the agreement between the Parties on the subject hereof, and no amendment or modification hereto shall be valid and effective unless such modification or amendment is agreed to in writing by the Parties and duly executed by persons especially empowered in this behalf by the respective Parties. All prior written or oral understandings, offers or other communications of every kind pertaining to this Agreement are abrogated and withdrawn. For the avoidance of doubt, the Parties hereto agree that any obligations of the Contractor arising from the Request for Proposals and bid submissions, as the case may be, shall be deemed to form part of this Agreement and treated as such.

25.9 Severability

If for any reason whatsoever, any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties will negotiate in good faith with a view to agreeing to one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable to such invalid, illegal or unenforceable provision. Failure to agree upon any such provisions shall not be subject to the Dispute Resolution Procedure set forth under this Agreement or otherwise.

25.10 No partnership

This Agreement shall not be interpreted or construed to create an association, joint venture or partnership between the Parties, or to impose any partnership obligation or liability upon either Party, and neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

25.11 Third Parties

This Agreement is intended solely for the benefit of the Parties, and their respective successors and permitted assigns, and nothing in this Agreement shall be construed to create any duty to, standard of care with reference to, or any liability to, any person not a Party to this Agreement.

25.12 Successors and assigns

This Agreement shall be binding upon, and inure to the benefit of the Parties and their respective successors and permitted assigns.

25.13 Notices

Any notice or other communication to be given by any Party to the other Party under or in connection with the matters contemplated by this Agreement shall be in writing and shall:

- a. in the case of the Contractor, be given by facsimile or e-mail and by letter delivered by hand to the address given and marked for attention of the person set out below or to such other person as the Contractor may from time to time designate by notice to the Authority; provided that notices or other communications to be given to an address outside the city specified in Sub- clause (b) below may, if they are subsequently confirmed by sending a copy thereof by registered acknowledgement due, air mail or by courier, be sent by facsimile or e-mail to the person as the Contractor may from time to time designate by notice to the Authority;

Attention:

{Designation:

Address:

Fax No:

Email:}

- b. In the case of the Authority, be given by facsimile or e-mail and by letter delivered by hand and be addressed to the person named below with a copy delivered to the Authority Representative or such other person as the Authority may from time to time designate by notice to the Contractor; provided that if the Contractor does not have an office in the same city as the Authority, it may send such notice by facsimile or e-mail and by registered acknowledgement due, air mail or by courier;

{Designation:

Address:

Fax No:

Email :}; and

- c. any notice or communication by a Party to the other Party, given in accordance herewith, shall be deemed to have been delivered when in the normal course of post it ought to have been delivered and in all other cases, it shall be deemed to have been delivered on the actual date and time of delivery; provided that in the case of facsimile or e-mail, it shall be deemed to have been delivered on the working day following the date of its delivery.

25.14 Language

All notices required to be given by one Party to the other Party and all other communications, Documentation and proceedings which are in any way relevant to this Agreement shall be in writing and in English language.

25.15 Counterparts

This Agreement may be executed in two counterparts, each of which, when executed and delivered, shall constitute an original of this Agreement.

25.16 Confidentiality

The Parties shall treat the details of this Agreement as private and confidential, except to the extent necessary to carry out obligations under it or to comply with Applicable Laws. The Contractor shall not publish, permit to be published, or disclose any particulars of the Works in any trade or technical paper or elsewhere without the previous consent of the Authority.

25.17 Copyright and Intellectual Property rights

25.17.1 As between the Parties, the Contractor shall retain the copyright and other Intellectual Property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor. The Contractor shall be deemed (by signing this Agreement) to give to the Authority a non-terminable transferable non-exclusive royalty-free licence to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This licence shall:

- a. apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,
- b. entitle any person in proper possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and
- c. in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by this Agreement, including replacements of any computers supplied by the Contractor:

25.17.2 The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent, be used, copied or communicated to a third party by (or on behalf of) the Authority for purposes other than those permitted under this Clause 25.17.

25.17.3 As between the Parties, the Authority shall retain the copyright and other Intellectual Property rights in this Agreement and other documents made by (or on behalf of) the Authority. The Contractor may, at its cost, copy, use, and obtain communication of these documents for the purposes of this Agreement. They shall not, without the

Authority's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the contract.

25.18 Limitation of Liability

- 25.18.1 Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with this Agreement.
- 25.18.2 The total liability of one Party to the other Party under and in accordance with the provisions of this Agreement, save and except as provided in Articles 21 and 23, shall not exceed the Contract Price. For the avoidance of doubt, this Clause shall not limit the liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party.

ARTICLE 26**26 Maintenance****26.1 Maintenance obligations of the Contractor**

26.1.1 The Contractor shall maintain the Project Works for a period of [5 (Five) years] commencing from the date of issue of the Completion Certificate (the "Maintenance Period"). For the performance of its Maintenance obligations, the Contractor has to maintain the components as specified in the Schedule O.

The contractor shall be paid a total amount equal to 0.5 % (zero point Five per cent) of the final Contract Price (inclusive of all taxes) for each of the above components against their respective cost (as per Schedule G) for the first year of Maintenance, and 1.0% (One per cent) of the Contract Price for each of the above components for the second and third year respectively and 1.25% (One point Two five per cent) for each of the above components the fourth year and fifth year of Maintenance, inclusive of all Taxes. The amount payable for Maintenance shall be adjusted to reflect any increase or decrease arising out of variation in WPI to be determined in accordance with the provisions of Clause 17.12 of Article 17. It is further agreed that the Contract Price hereunder shall be reckoned with reference to the amount specified in Clause 17.1.1 of Article 17, which shall be adjusted to the extent of Change of Scope.

26.1.2 During the Maintenance Period, the Authority shall provide to the Contractor access to the Site for Maintenance in accordance with this Agreement. The obligations of the Contractor hereunder shall include:

- a. permitting safe, smooth and uninterrupted flow of traffic on the Project Roads;
- b. undertaking routine Maintenance including prompt repairs of potholes, cracks, joints, drains, embankments, structures, pavement markings, lighting, road signs and other traffic control devices;
- c. undertaking repairs to structures such as retaining wall
- d. informing the Authority of any unauthorized use of the Project Roads;
- e. informing the Authority of any encroachments on the Project Roads; and
- f. operation and Maintenance of all communication, patrolling, and administrative systems necessary for the efficient Maintenance of the Project Works in accordance with the provisions of this Agreement.

26.1.3 In respect of any Defect or deficiency not specified in Schedule-O, the Contractor shall, at its own cost, undertake repair or rectification in accordance with Good Industry Practice, save and except to the extent that such Defect or deficiency shall have arisen on account of any default or neglect of the Authority or a Force Majeure Event.

26.1.4 The Contractor shall remove promptly from the Project Roads/areas any waste Materials (including hazardous Materials and waste water), rubbish and other debris (including, without limitation, accident debris) and keep the Project Highway in a clean, tidy and orderly

condition, and in conformity with the Applicable Laws, Applicable Permits and Good Industry Practice.

26.2 Maintenance Requirements

The Contractor shall ensure that at all times during the Maintenance Period; the Project Works conforms to the Maintenance requirements set forth in Schedule-O (the “Maintenance Requirements”).

26.3 Maintenance Programme

The Contractor shall prepare a monthly Maintenance Programme (the Maintenance Programme”) in consultation with the Authority’s Engineer and submit the same to the Authority’s Engineer not later than 10 (ten) days prior to the commencement of the month in which the Maintenance is to be carried out. For this purpose a joint monthly inspection by the Contractor and the Authority’s Engineer shall be undertaken. The Maintenance Programme shall contain the following:

- a. The condition of the road in the format prescribed by the Authority’s Engineer;
- b. the proposed Maintenance Works; and
- c. Deployment of resources for Maintenance Works.

26.4 Safety, vehicle breakdowns and accidents

26.4.1 The Contractor shall ensure safe conditions for the Users, and in the event of unsafe conditions, lane closures, diversions, vehicle breakdowns and accidents, it shall follow the relevant operating procedures for removal of obstruction and debris without delay. Such procedures shall conform to the provisions of this Agreement, Applicable Laws, Applicable Permits and Good Industry Practice.

26.4.2 The Contractor shall promptly remove any damaged vehicles and debris from the Project Road/Areas to enable safe movement of traffic and shall report all accidents to the police forthwith.

26.5 Lane closure/Utility line closure

26.5.1 The Contractor shall not close any lane of the Project Road/ Utility line for undertaking Maintenance Works except with the prior written approval of the Authority’s Engineer. Such approval shall be sought by the Contractor through a written request to be made at least 10 (ten) days before the proposed closure of lane and shall be accompanied by particulars thereof. Within 5 (five) business days of receiving such request, the Authority’s Engineer shall grant permission with such modifications as it may deem necessary and a copy of such permission shall be sent to the Authority.

26.5.2 Upon receiving the permission pursuant to Clause 26.5.1, the Contractor shall be entitled to close the designated lane for the period specified therein, and in the event of any delay in re-opening such lane, the Contractor shall, for every stretch of 250 (two hundred and fifty) metres, or part thereof, pay Damages to the Authority calculated at the rate of 0.1% (zero

point one percent) of the Quarterly Maintenance payment for each day of delay until the lane has been re-opened for traffic/public use.

26.6 Reduction of Payment for Non-performance of Maintenance Obligations

26.6.1 In the event that the Contractor fails to repair or rectify any Defect or deficiency set forth in Schedule-O within the period specified therein, it shall be deemed as failure of performance of Maintenance obligations by the Contractor and the Authority shall be entitled to effect reduction in Quarterly lump sum payment for Maintenance in accordance with Clause 17.8 of of Article 17 and Schedule-M, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.

26.6.2 If the nature and extent of any Defect justifies more time for its repair or rectification than the time specified in Schedule-O, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Authority's Engineer and conveyed to the Contractor and the Authority's with reasons thereof.

26.7 Authority's Right to take Remedial Measures

In the event the Contractor does not maintain and/or repair the Project Works or any part thereof in conformity with the Maintenance Requirements, the Maintenance Manual or the Maintenance Programme, as the case may be, and fails to commence remedial Works within 15 (fifteen) days of receipt of the Maintenance Inspection Report under Clause 27.2 of Article 27 or a notice in this behalf from the Authority or the Authority's Engineer, as the case may be, the Authority shall, without prejudice to its rights under this Agreement including Termination thereof, be entitled to undertake such remedial measures at the cost of the Contractor, and to recover its cost from the Contractor. In addition to recovery of the aforesaid cost, a sum equal to 20% (twenty per cent) of such cost shall be paid by the Contractor to the Authority as Damages.

26.8 Restoration of Loss or Damage to Project Works

Save and except as otherwise expressly provided in this Agreement, in the event that the Project Works or any part thereof suffers any loss or damage during the Maintenance from any cause attributable to the Contractor, the Contractor shall, at its cost and expense, rectify and remedy such loss or damage forthwith so that the Project Works conforms to the provisions of this Agreement.

26.9 Overriding Powers of the Authority

26.9.1 If in the reasonable opinion of the Authority, the Contractor is in Material breach of its obligations under this Agreement and, in particular, the Maintenance Requirements, and such breach is causing or likely to cause Material hardship or danger to the Users and pedestrians, the Authority may, without prejudice to any of its rights under this Agreement including Termination thereof, by notice require the Contractor to take reasonable measures immediately for rectifying or removing such hardship or danger, as the case may be.

26.9.2 In the event that the Contractor, upon notice under Clause 29.9.1 of Article 29, fails to rectify or remove any hardship or danger within a reasonable period, the Authority may exercise overriding powers under this Clause 26.9.2 and take over the performance of any or all the obligations of the Contractor to the extent deemed necessary by it for rectifying or removing

such hardship or danger; provided that the exercise of such overriding powers by the Authority shall be of no greater scope and of no longer duration than is reasonably required hereunder; provided further that any costs and expenses incurred by the Authority in discharge of its obligations hereunder shall be recovered by the Authority from the Contractor, and the Authority shall be entitled to deduct any such costs and expenses incurred from the payments due to the Contractor under Clause 17.8 of Article 17 for the performance of its Maintenance obligations.

26.9.3 In the event of a national emergency, civil commotion or any other circumstances specified in Clause 19.3 of Article 19, the Authority may take over the performance of any or all the obligations of the Contractor to the extent deemed necessary by it, and exercise such control over the Project Works or give such directions to the Contractor as may be deemed necessary; provided that the exercise of such overriding powers by the Authority shall be of no greater scope and of no longer duration than is reasonably required in the circumstances which caused the exercise of such overriding power by the Authority. For the avoidance of doubt, it is agreed that the consequences of such action shall be dealt in accordance with the provisions of Article 19. It is also agreed that the Contractor shall comply with such instructions as the Authority may issue in pursuance of the provisions of this Clause 26.9.3, and shall provide assistance and cooperation to the Authority, on a best effort basis, for performance of its obligations hereunder.

ARTICLE 27**27 Supervision and Monitoring During Maintenance****27.1 Inspection by the Contractor**

27.1.1 The Authority's Engineer shall undertake regular inspections to evaluate continuously the compliance with the Maintenance Requirements.

27.1.2 The Contractor shall carry out a detailed pre-monsoon inspection of all structures, culverts and drainage system in accordance with the guidelines contained in IRC: SP35-1990 & IRC: SP13-2004. Report of this inspection together with details of proposed Maintenance Works as required shall be conveyed to the Authority's Engineer forthwith. The Contractor shall complete the proposed Maintenance Works before the onset of the monsoon and send a compliance report to the Authority's Engineer. Post monsoon inspection shall be undertaken by the Contractor and the inspection report together with details of any Damages observed and proposed action to remedy the same shall be conveyed to the Authority's Engineer forthwith.

27.2 Inspection and Payments

27.2.1 The Authority's Engineer may inspect the Project Works at any time, but at least once every month, to ensure compliance with the Maintenance Requirements. It shall make a report of such inspection ("Maintenance Inspection Report") stating in reasonable detail the Defects or deficiencies, if any, with particular reference to the Maintenance Requirements, the Maintenance Manual, and the Maintenance Programme, and send a copy thereof to the Authority and the Contractor within 10 (ten) days of such inspection.

27.2.2 After the Contractor submits to the Authority's Engineer the Quarterly Maintenance Statement for the Project Works pursuant to Clause 17.7 of Article 17, the Authority's Engineer shall carry out an inspection within 10 (ten) days to certify the amount payable to the Contractor. The Authority's Engineer shall inform the Contractor of its intention to carry out the inspection at least 3 (three) business days in advance of such inspection. The Contractor shall assist the Authority's Engineer in verifying compliance with the Maintenance Requirements.

27.2.3 For each case of non-compliance of Maintenance Requirements as specified in the inspection report of the Authority's Engineer, the Authority's Engineer shall calculate the amount of reduction in payment in accordance with the formula specified in Schedule-M.

27.2.4 Any deduction made on account of non-compliance will be paid 75% of the value of work subsequently after establishing the compliance thereof.

27.3 Tests

For determining that the Project Works conforms to the Maintenance Requirements, the Authority Engineer shall require the Contractor to carry out, or cause to be carried out, Tests specified by it in accordance with Good Industry Practice. The Contractor shall, with due diligence, carry out or cause to be carried out all such Tests in accordance with the instructions of the Authority's Engineer and furnish the results of such Tests forthwith to the Authority's Engineer.

27.4 Reports of Unusual Occurrence

The Contractor shall, during the Maintenance Period, prior to the close of each day, send to the Authority and the Authority's Engineer, by facsimile or e-mail, a report stating accidents and unusual occurrences on the Project Works relating to the safety and security of the Users and Project Roads and satisfactory performance of the utility lines. A monthly summary of such reports shall also be sent within 3 (three) business days of the closing of month. For the purposes of this Clause 27.4, accidents and unusual occurrences on the Project Road/Works shall include:

- a. accident, death or severe injury to any person;
- b. damaged or dislodged fixed equipment;
- c. flooding of Project Roads;
- d. Functioning of the utilities lines; and
- e. Any other unusual occurrence.

ARTICLE 28

28 Definitions

28.1 Definitions

In this Agreement, the following words and expressions shall, unless repugnant to the context or meaning thereof, have the meaning hereinafter respectively assigned to them:

“Accounting Year” means the financial year commencing from the first day of April of any calendar year and ending on the thirty-first day of March of the next calendar year;

“Advance Payment” shall have the meaning as set forth in Clause 17.2.1 of Article 17; **“Affected Party”** shall have the meaning as set forth in Clause 19.1 of Article 19;

“Affiliate” means, in relation to either Party {and/or Members}, a person who controls, is controlled by, or is under the common control with such Party {or Member} (as used in this definition, the expression “control” means, with respect to a person which is a company or corporation, the ownership, directly or indirectly, of more than 50% (fifty per cent) of the voting shares of such person, and with respect to a person which is not a company or corporation, the power to direct the management and policies of such person, whether by operation of law or by contract or otherwise);

“Agreement” means this Agreement, its Recitals, the Schedules hereto and any amendments thereto made in accordance with the provisions contained in this Agreement;

“Applicable Laws” means all laws, brought into force and effect by GOI or the State Government(s) including rules, regulations and notifications made thereunder, and judgements, decrees, injunctions, writs and orders of any court of record, applicable to this Agreement and the exercise, performance and discharge of the respective rights and obligations of the Parties hereunder, as may be in force and effect during the subsistence of this Agreement;

“Applicable Permits” means all clearances, licences, permits, authorisations, no objection certificates, consents, approvals and exemptions required to be obtained or maintained under Applicable Laws in connection with the construction of the Project during the subsistence of this Agreement;

“Appointed Date” means that date which is later of:

- a. the 15th day of the date of this Agreement;
- b. the date on which the Contractor has delivered the Performance Security in accordance with the provisions of Article 7;
- c. the date on which the Authority has provided the Right of Way on at least 80% (Eighty per cent) of the total land required for the Project in conformity with the provisions of Clause 8.2 of Article 8; and
- d. the date on which the Authority has provided to the Contractor the CRZ clearances for at least 80% of the total land required for the Project;

“**Arbitration Act**” means the Arbitration and Conciliation Act, 1996 and shall include modifications to or any re-enactment thereof, as in force from time to time;

“**Authority**” shall have the meaning attributed thereto in the array of Parties hereinabove as set forth in the Recitals;

“**Authority Default**” shall have the meaning as set forth in Clause 21.2.1 of Article 21;

“**Authority’s Engineer**” shall have the meaning as set forth in Clause 16.1 of Article 16;

“**Authority Representative**” means such person or persons as may be authorised in writing by the Authority to act on its behalf under this Agreement and shall include any person or persons having authority to exercise any rights or perform and fulfil any obligations of the Authority under this Agreement; Chief Operating Officer (COO)/ Chief Technical Officer (CTO) / Executive Engineer (EE) / Engineer-in-charge / the person designated as such by the Authority from time to time and shall include those who are expressly authorized by the Authority to act for and on its behalf for all functions pertaining to the execution and operation of this Contract. The Contractor will be given a copy of the Authority's authorization designating by name and delegating him his authority, at the time when Contract is signed. It is however, to be distinctly understood that, no delegation of powers shall be made to such assistants or sub-ordinates, except in respect of supervision to ensure compliance of the Contract conditions.

“**Bank**” means a bank incorporated in India and having a minimum net worth of Rs. 1,000 crore (Rupees one thousand crore) or any other bank acceptable to the Authority;

“**Bank Rate**” means the rate of interest specified by the Reserve Bank of India from time to time in pursuance of section 49 of the Reserve Bank of India Act, 1934 or any replacement of such Bank Rate for the time being in effect;

“**Base Date**” means the last date of that calendar month, which date precedes the Bid Due Date by at least 28 (twenty eight) days;

“**Bid**” means the documents in their entirety comprised in the bid submitted by the [selected bidder/Joint Venture] in response to the Request for Proposals in accordance with the provisions thereof and “Bids” shall mean the bids submitted by any and all pre-qualified bidders;

“**Bid Security**” means the bid security provided by the Contractor to the Authority in accordance with the Request for Proposals, and which is to remain in force until substituted by the Performance Security;

“**Bidder**” means the Individual, proprietary firm, partnership firm, LLP, limited company private or Public Corporation;

“**CPI (IW)**” means the Consumer Price Index for Industrial Workers as published by the Labour Bureau, Government of India and shall include any index which substitutes the CPI (IW), and any reference to CPI (IW) shall, unless the context otherwise requires, be construed as a reference to the CPI (IW) published for the period ending with the preceding month, save and except that for the purposes of annual revision of the Fixed Charge in accordance with the provisions of Clause 25.3 of Article 25, the revision due on April 1 of any year shall be computed with reference to CPI (IW) as on January 31 of that year;

“Change in Law” means the occurrence of any of the following after the Base Date

- a. the enactment of any new Indian law;
- b. the repeal, modification or re-enactment of any existing Indian law;
- c. the commencement of any Indian law which has not entered into effect until the Base Date;
- d. a change in the interpretation or application of any Indian law by a judgement of a court of record which has become final, conclusive and binding, as compared to such interpretation or application by a court of record prior to the Base Date; or
- e. any change in the rates of any of the Taxes or royalties that have a direct effect on the Project;

“Change of Scope” shall have the meaning as set forth in Article 13; **“Change of Scope Notice”** shall have the meaning as set forth in Clause 13.2.1 of Article 13;

“Change of Scope Order” shall have the meaning as set forth in Clause 13.2.4 of Article 13; **“Completion Certificate”** shall have the meaning as set forth in Clause 12.4.1 of Article 12;

{**“Joint Venture”** means the Joint Venture of entities which have formed a joint venture for implementation of this Project;}⁵

“Construction” shall have the meaning as set forth in Clause 1.2.1 (f) of Article 1; **“Construction Period”** means the period commencing from the Appointed Date and ending on the date of the Completion Certificate;

“Contract Price” means the amount as specified in Clause 17.1.1 of Article 17; **“Contractor”** shall have the meaning attributed thereto in the array of Parties hereinabove as set forth in the Recitals;

“Contractor Default” shall have the meaning as set forth in Clause 21.1.1 of Article 21;

“Cure Period” means the period specified in this Agreement for curing any breach or default of any provision of this Agreement by the Party responsible for such breach or default and shall:

- a. commence from the date on which a notice is delivered by one Party to the other Party asking the latter to cure the breach or default specified in such notice;
- b. not relieve any Party from liability to pay Damages or compensation under the provisions of this Agreement; and
- c. not in any way be extended by any period of Suspension under this Agreement; provided that if the cure of any breach by the Contractor requires any reasonable action by the Contractor that must be approved by the Authority or the Authority’s Engineer hereunder, the applicable Cure Period shall be extended by the period taken by the Authority or the Authority’s
- d. Engineer to accord their approval;

⁵ This definition may be omitted if the Contractor is not a Joint Venture.

“**Damages**” shall have the meaning as set forth in paragraph (w) of Clause 1.2.1 of Article 1;

“**Defect**” means any defect or deficiency in Construction of the Works or any part thereof, which does not conform with the Specifications and Standards;

“**Defects Liability Period**” shall have the meaning as set forth in Clause 15.1.1 of Article 15;

“**Dispute**” shall have the meaning as set forth in Clause 24.1.1 of Article 24;

“**Dispute Resolution Procedure**” means the procedure for resolution of Disputes as set forth in Article 24;

“**DSCL**” means Diu Smart City Limited, Diu;

“**Drawings**” means all of the drawings, calculations and documents pertaining to the Project as set forth in Schedule-H, and shall include ‘as built’ drawings of the Project;

“**Document**” or “**Documentation**” means documentation in printed or written form, or in tapes, discs, drawings, computer programmes, writings, reports, photographs, films, cassettes, or expressed in any other written, electronic, audio or visual form;

“**Emergency**” means a condition or situation that is likely to endanger the safety or security of the individuals on or about the Project, including Users thereof, or which poses an immediate threat of material damage to the Works or any of the Project Assets;

“**Encumbrances**” means, in relation to the Project, any encumbrances such as mortgage, charge, pledge, lien, hypothecation, security interest, assignment, privilege or priority of any kind having the effect of security or other such obligations, and shall include any designation of loss payees or beneficiaries or any similar arrangement under any insurance policy pertaining to the Project, where applicable herein but excluding utilities referred to in Clause 9.1;

“**EPC**” means engineering, procurement and construction;

“**Final Payment Certificate**” shall have the meaning as set forth in Clause 17.12.1 of Article 17;

“**Final Payment Statement**” shall have the meaning as set forth in Clause 17.10.1;

“**Force Majeure**” or “**Force Majeure Event**” shall have the meaning ascribed to it in Clause 19.1 of Article 19;

“**GAD**” or “**General Arrangement Drawings**” shall have the meaning as set forth in Clause 4.1.3 (b) of Article 4;

“**GOI**” or “**Government**” means the Government of India;

“**Good Industry Practice**” means the practices, methods, techniques, designs, standards, skills, diligence, efficiency, reliability and prudence which are generally and reasonably expected from a reasonably skilled and experienced contractor engaged in the same type of undertaking as envisaged under this Agreement and which would be expected to result in the performance of its obligations by the Contractor in accordance with this Agreement, Applicable Laws and Applicable Permits in reliable, safe, economical and efficient manner;

“Government Instrumentality” means any department, division or sub-division of the Government or the State Government and includes any commission, board, authority, agency or municipal and other local authority or statutory body, including panchayat, under the control of the Government or the State Government, as the case may be, and having jurisdiction over all or any part of the Project or the performance of all or any of the services or obligations of the Contractor under or pursuant to this Agreement;

“IRC” means the Indian Roads Congress;

“Indemnified Party” means the Party entitled to the benefit of an indemnity pursuant to Article 23;

“Indemnifying Party” means the Party obligated to indemnify the other Party pursuant to Article 23;

“Indirect Political Event” shall have the meaning as set forth in Clause 19.3 of Article 19; **“Insurance Cover”** means the aggregate of the maximum sums insured under the insurances taken out by the Contractor pursuant to Article 18, and includes all insurances required to be taken out by the Contractor under Clauses 18.1 and 18.9 of Article 18 but not actually taken, and when used in the context of any act or event, it shall mean the aggregate of the maximum sums insured and payable or deemed to be insured and payable in relation to such act or event;

“Intellectual Property” means all patents, trademarks, service marks, logos, get-up, trade names, internet domain names, rights in designs, blue prints, programmes and manuals, drawings, copyright (including rights in computer software), database rights, semi-conductor, topography rights, utility models, rights in know-how and other intellectual property rights, in each case whether registered or unregistered and including applications for registration, and all rights or forms of protection having equivalent or similar effect anywhere in the world;

“Interim Payment Certificate” or **“IPC”** means the interim payment certificate issued by the Authority’s Engineer for payment to the Contractor in respect of Contractor’s claims for payment raised in accordance with the provisions of this Agreement;

“LOA” or **“Letter of Acceptance”** means the letter of acceptance referred to in Recital (D);

{**“Lead Member”** shall, in the case of a Joint Venture, mean the member of such Joint Venture who shall have the authority to bind the Contractor and each member of the Joint Venture; and shall be deemed to be the Contractor for the purposes of this Agreement ;}⁶

“Structure” means a structure retaining walls, Buildings, Plazas, Pavilion, Kisoks, Arches ;

“Operation & Maintenance” means the Operation & maintenance of the Project as set forth in Article 26 for the period specified therein;

“Maintenance Inspection Report” shall have the meaning set forth in Clause 27.2;

“Maintenance Manual” shall have the meaning ascribed to it in Clause 10.6;

“Maintenance Programme” shall have the meaning set forth in Clause 26.3;

“Maintenance Period” shall have the meaning set forth in Clause 26.1;

⁶ This definition may be omitted if the Contractor is not a Joint Venture

“Maintenance Requirements” shall have the meaning set forth in Clause 26.2

“Manuals” shall mean the manuals as specified in Schedule D;

“Material Adverse Effect” means a material adverse effect of any act or event on the ability of either Party to perform any of its obligations under and in accordance with the provisions of this Agreement and which act or event causes a material financial burden or loss to either Party;

“Materials” are all the supplies used by the Contractor for incorporation in the Works of the Project;

“Non-Political Event” shall have the meaning as set forth in Clause 19.2 of Article 19; **“Parties”** means the parties to this Agreement collectively and **“Party”** shall mean any of the parties to this Agreement individually;

“Performance Security/Additional Performance Security” shall have the meaning as set forth in Clause 7.1.1 of Article 7;

“Plant” means the apparatus and machinery intended to form or forming part of the Works;

“Political Event” shall have the meaning as set forth in Clause 19.4 of Article 19; **“Programme”** shall have the meaning as set forth in Clause 10.1.3 of Article 10;

“Project” means the construction of the Project in accordance with the provisions of this Agreement, and includes all works, services and equipment relating to or in respect of the Scope of the Project;

“Project Assets” means all physical and other assets relating to (a) tangible assets such as civil works and equipment including [foundations, embankments, pavements, road surface, interchanges, bridges, culverts, road over-bridges, drainage works, traffic signals, sign boards, kilometre-stones, electrical systems, communication systems, rest areas, relief centres, maintenance depots and administrative offices]; and (b) Project Facilities situated on the Site;

“Project Completion Date” means the date on which the last Provisional Certificate is issued;

“Project Completion Schedule” means the progressive Project Milestones set forth in Schedule-I for completion of the Project on or before the Scheduled Completion Date;

“Project Facilities” means all the amenities and facilities to be constructed on the Site, as described in Schedule-C;

“Project Milestone” means the project milestone as set forth in Schedule-I and includes the Scheduled Completion Date;

“Proof Consultant” shall have the meaning as set forth in Clause 10.2.2 of Article 10; **“Provisional Certificate”** shall have the meaning as set forth in Clause 12.2.1 of Article 12; **“Punch List”** shall have the meaning as set forth in Clause 12.2.1 of Article 12;

“Quality Assurance Plan” or **“QAP”** shall have the meaning as set forth in Clause 11.2.1 of Article 11;

“Re.”, **“Rs.”** or **“Rupees”** or **“Indian Rupees”** means the lawful currency of the Republic of India;

“Request for Proposals” or **“RFP”** shall have the meaning as set forth in Recital (C);

“Retention Money” shall have the meaning as set forth in Clause 7.5.1 of Article 7;

“Right of Way” means the constructive possession of the Site free from encroachments and encumbrances, together with all way leaves, easements, unrestricted access and other rights of way, howsoever described, necessary for construction of the Project in accordance with this Agreement;

“Safety Consultant” shall have the meaning as set forth in Clause 10.1.5 of Article 10; **“Scheduled Completion Date”** shall be the date as set forth in Clause 10.3.1 of Article 10; **“Scope of the Project”** shall have the meaning as set forth in Clause 2.1 of Article 2; **“Section”** means a part of the Project;

“Site” shall have the meaning as set forth in Clause 8.1 of Article 8;

“Specifications and Standards” means the specifications and standards relating to the quality, quantity, capacity and other requirements for the Project, as set forth in Schedule-D, and any modifications thereof, or additions thereto, as included in the design and engineering for the Project submitted by the Contractor to, and expressly approved by, the Authority;

“Stage Payment Statement” shall have the meaning as set forth in Clause 17.4 of Article 17;

“State” means the State or the Union Territory, as the case may be, in which the headquarters of the Authority are situate and **“State Government”** means the government of that State or Union Territory;

“Sub-contractor” means any person or persons to whom a part of the Works has been subcontracted by the Contractor and the permitted legal successors in title to such person, but not an assignee to such person;

“Suspension” shall have the meaning as set forth in Clause 20.1 of Article 20;

“Taxes” means any Indian taxes including excise duties, customs duties, value added tax, sales tax, local taxes, cess and any impost or surcharge of like nature (whether Central, State or local) on the goods, Materials, equipment and services incorporated in and forming part of the Project charged, levied or imposed by any Government Instrumentality, but excluding any interest, penalties and other sums in relation thereto imposed on any account whatsoever. For the avoidance of doubt, Taxes shall not include taxes on corporate income;

“Termination” means the expiry or termination of this Agreement;

“Termination Notice” means the communication issued in accordance with this Agreement by one Party to the other Party terminating this Agreement;

“Termination Payment” means the amount payable by either Party to the other upon Termination in accordance with Article 21;

“Terms of Reference” or **“TOR”** shall have the meaning as set forth in Clause 16.2.1 of Article 16;

“Tests” means the tests set forth in Schedule-J to determine the completion of Works in accordance with the provisions of this Agreement;

“Time Extension” shall have the meaning as set forth in Clause 10.4.1 of Article 10;

“**User**” means a person who uses or intends to use the Project or any part thereof in accordance with the provision of this Agreement and Applicable Laws;

“**Valuation of Unpaid works**” shall have the meaning as set forth in Clause 21.5.1 of Article 21;

“**WPI**” means the wholesale price index for various commodities as published by the Ministry of Commerce and Industry, GOI and shall include any index which substitutes the WPI, and any reference to WPI shall, unless the context otherwise requires, be construed as a reference to the WPI published for the period ending with the preceding month; and

“**Works**” means all works including survey and investigation, design, engineering, procurement, construction, Plant, Materials, temporary works and other things necessary to complete the Project in accordance with this Agreement.

IN WITNESS WHEREOF THE PARTIES HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DAY, MONTH AND YEAR FIRST ABOVE WRITTEN.

SIGNED, SEALED AND

DELIVERED

For and on behalf of

[THE AUTHORITY] by:

(Signature)

SIGNED, SEALED AND

DELIVERED

For and on behalf of

THE CONTRACTOR by:

(Signature) (Name)
(Name) (Designation)
(Designation)

In the presence of:

1.

2.

{COUNTERSIGNED and accepted by:

Name and particulars of other members of the Joint Venture}

Schedules

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Schedule A Site of the Project

(See Clauses 2.1 and 8.1)

1.0 The Site

- 1.1 The Site location is provided in **Annexure I** of this Schedule
- 1.2 The Land Status is provided in **Annexure II** of this Schedule
- 1.3 An inventory of the Site including trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority's Representative and the Contractor, and such inventory shall form part of the Agreement.
- 1.4 The brief of draft development Plan is provided as **Annexure III**
- 1.5 The requirement of CRZ Clearance is given as **Annexure IV**

Annexure I - Site for Project

(Schedule-A)

1.0 Site for Project

The Work (Development of Coastal promenade from (i) Diu Ghoghla bridge to Diu fort, (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple including Night lighting and (iii) Landscaping & Beautification of Summer house garden) and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street are situated at Diu, U.T. Administration of Dadra and Nagar Haveli and Daman & Diu, Government of India.

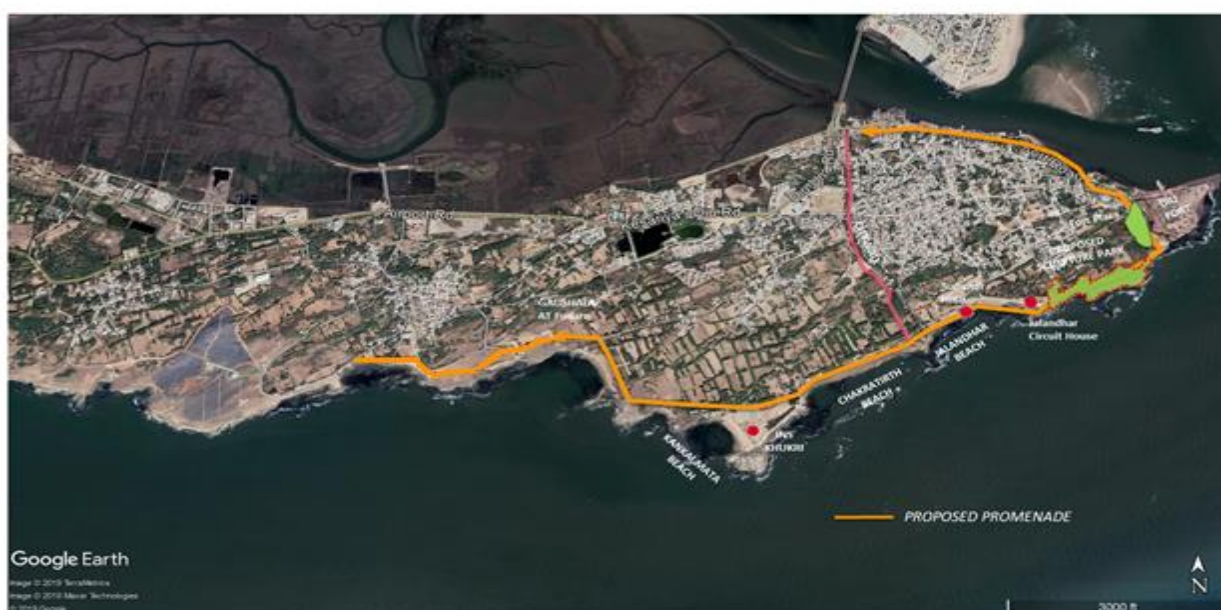
About 5.0 km of coastal stretch (starts from Ghoghla Bridge and ends at Gangeshwar Temple via INS Khukari Junction & Fudam Ghousala) is identified for the development of coastal promenade along Northern and Southern side of Diu town and About 12.13 KM of Urban design of selected street and Portuguese street inwalled city area is proposed to be developed in the subsequent stages.

The site under consideration in this proposal is as follows.

Section-1: Coastal Promenade

- **Stretch 1:** Existing Fort road between Diu Ghoghla Bridge (0+000 Km) to Diu fort (1+525 Km) and its abutting area considered in the concept design.
- **Stretch 2:** Existing Road between Summer House (0+000 Km.) to Gangeshwar Temple (3+426 Km.) Via Fudam Ghousala which includes MDR-6 & MDR-7 and ODR-2, ODR-3 & ODR-5 and its abutting area considered in the concept design
- **Stretch 3:** Landscaping & Beautification Summer House Garden Area including construction of road @ 0.200 Km. (ODR-10)

The map showing the proposed Coastal Promenade development extent is given below



These stretches are falling in CRZ II as per approved Coastal Zone Management Plan (CZMP) of Diu.

Section-2: Urban Design of selected street & Portuguese street

The Work (Development of Streets in Diu MC & Ghoghla including Portuguese Street) is situated at Diu, U.T. Administration of Dadra and Nagar Haveli and Daman & Diu, Government of India. Proposed development work is to redevelop identified ~9.57 Km Street/Road network in Diu and additional ~2.5 km of the Portuguese Street considering Urban Street Design Guidelines (totaling ~12.13 km).

Map showing the proposed project site area and the Urban Streets/Road network for proposed development is shown as Figure A 1 to Figure A 4. Details of the streets to be taken up for development are provided in Table A 1.

- **Stretch 1:** Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla which includes MDR-3, MDR-8 & MDR-10 and its abutting area considered in the concept design
- **Stretch 2:** Development of Portuguese Street (2+500 Km.) and its abutting area considered in the concept design.

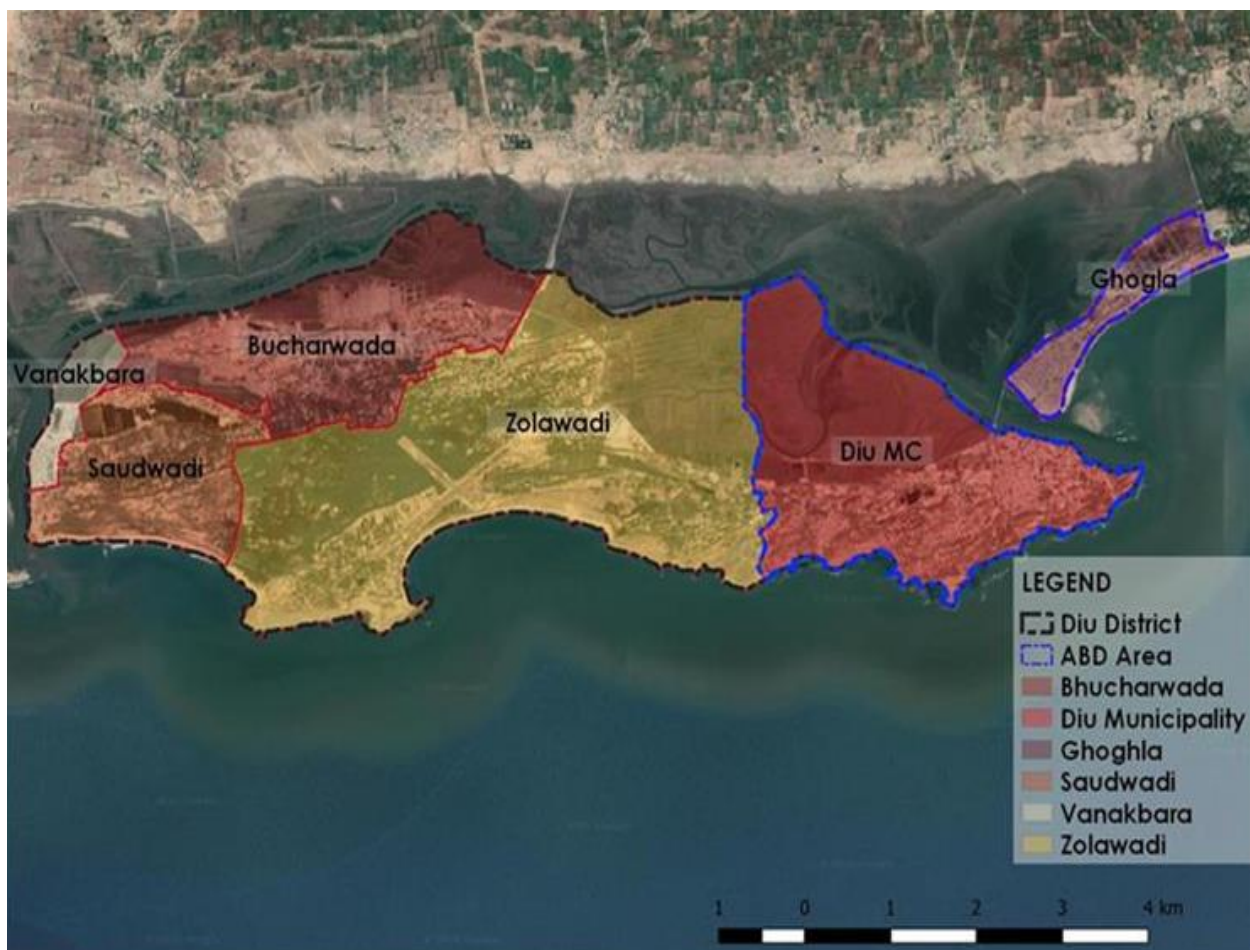


Figure A-1 Diu District

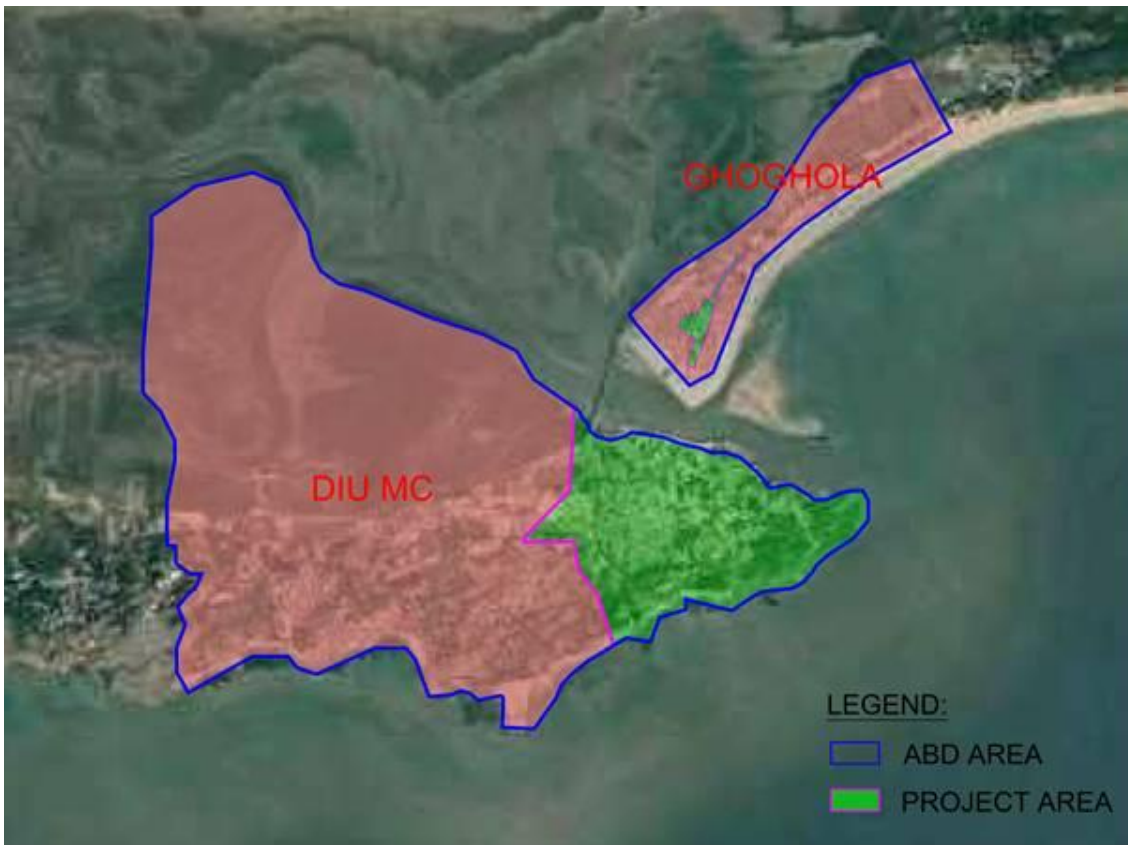


Figure A-2 Key Map showing Project Area



Figure A-3 Streets Network Map – Diu MC

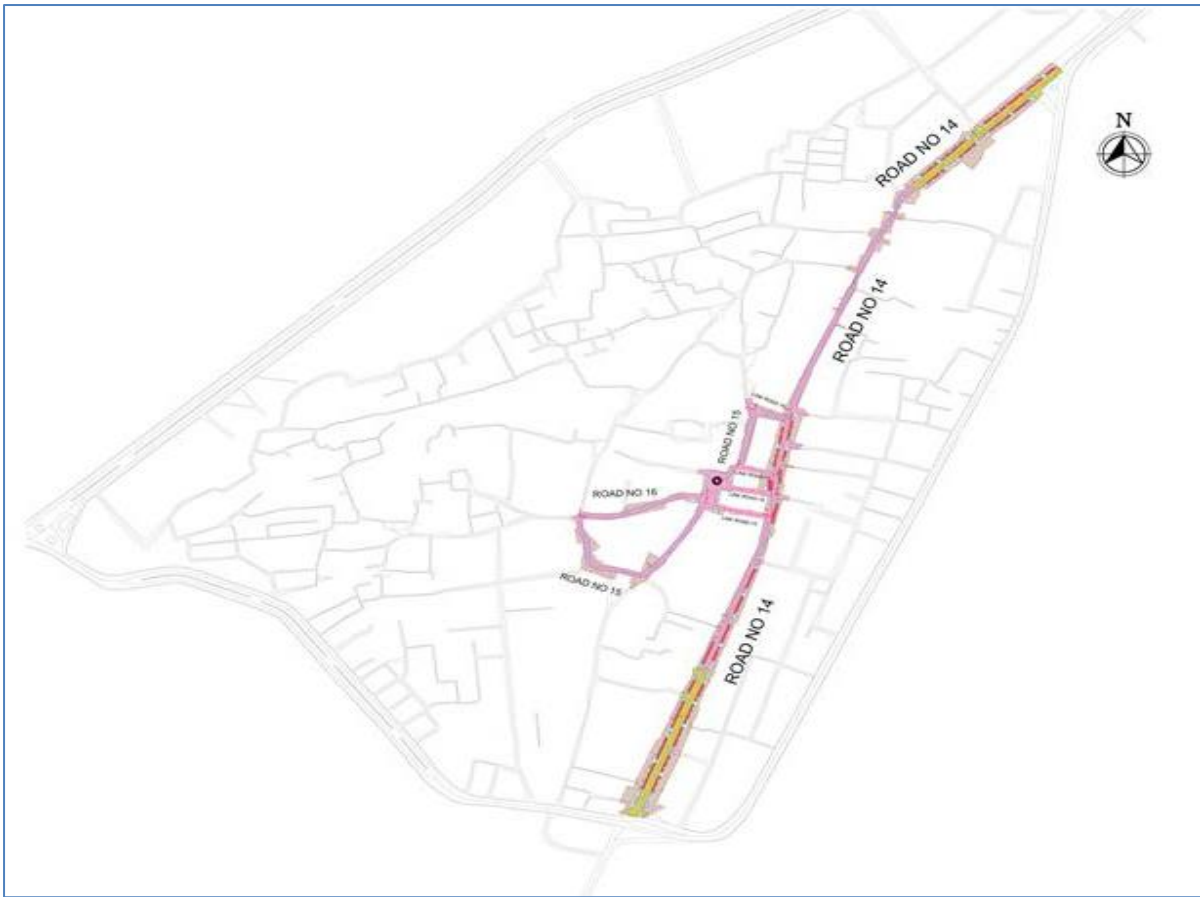


Figure A-4 Streets Network Map – Ghoghla

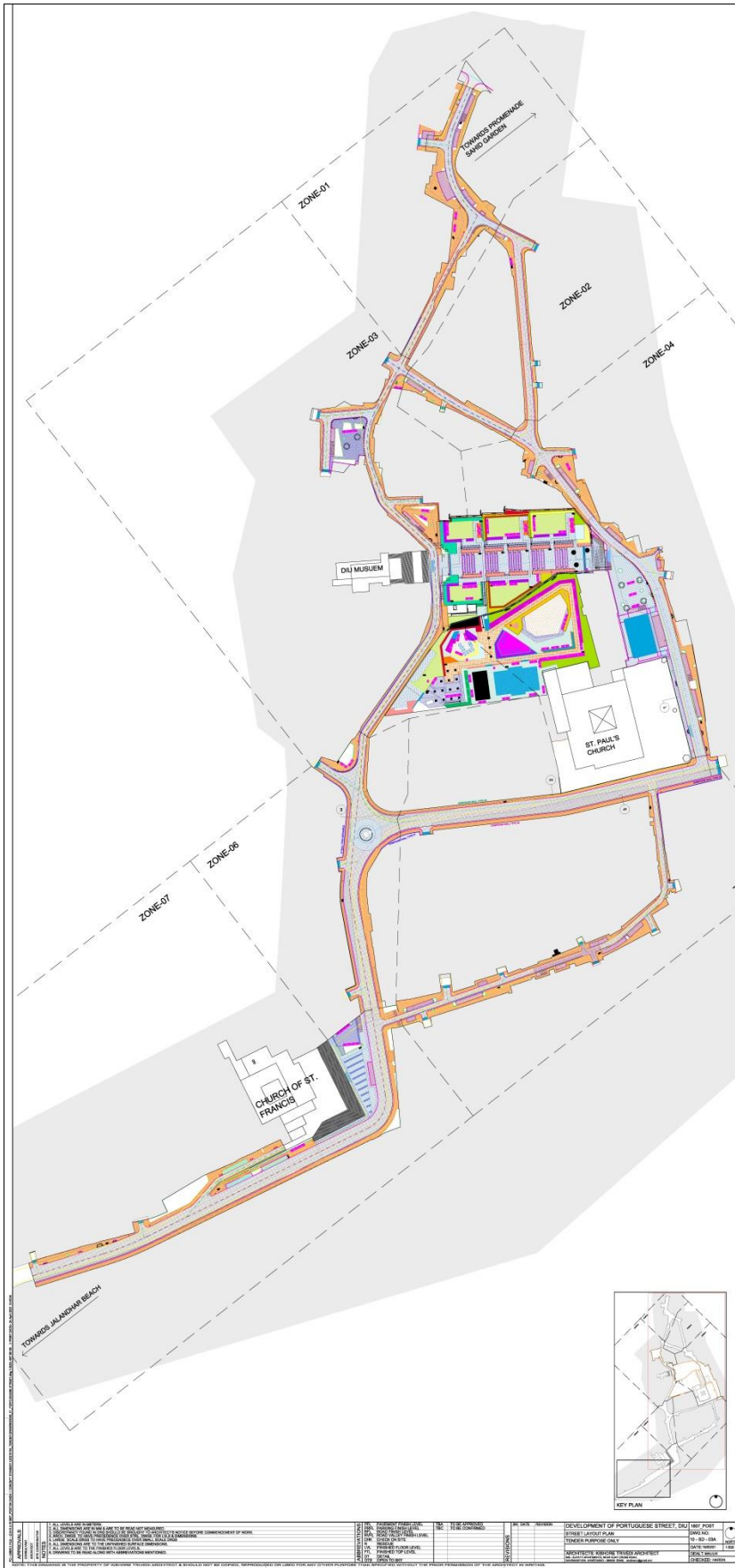


Figure A-5 Portuguese Street Network Map

Table showing the Length of the selected network of streets proposed for development:

Table A-1 Development Street Details

S. No	Name of the Road	Road No.	Length (m)
1	Zampa to Markata (via Nagar seth Haveli) to Vekaria	Road No-01	881.34
2	Zampa to Jethibai Marg to Hotel Smarat	Road No-02	831.94
3	Samrat Hotel to Director of Accounts General office	Road No-02A	288.40
4	Hadmatia road to Vekaria Laxminarayan Temple	Road No-03	610.35
5	Soratia street	Road No-04	355.93
6	Dr. Rajaram Kelkar Road	Road No-05	366.22
7	Ghodia street to Jumma Masjid	Road No-06	449.06
8	Education Office to Bhavsarwada	Road No-07	294.55
9	Dena Bank ATM to Darjiwada Road Via Panibai School	Road No-08	355.76
10	Nehru Park to Laxmi park	Road No-09	310.57
11	Hotel Samrat to Nehru park	Road No-09A	175.64
12	GST Office to Nirmala Matha School Backside	Road No-10	199.85
13	Nehru park to Child Development office	Road No-10A	179.40
14	Samrat Hotel to DMC office	Road No-11	258.32
15	St.PaulChurch to PWD office	Road No-12	163.93
16	Bunglee Chowk to Ghoghla Subpost office	Road No-14	790.10
17	Panchayath Chowk road-1	Road No-15	271.65
18	Panchayath Chowk road-2	Road No-16	104.98
19	Jethibai Busstand road to Lalshah bava Dargah	Link Road No-01	130.11
20	Hotel TGH to FCS Warehouse at Fort road	Link Road No-02	148.82
21	Near Jumma Masjid to Bunder Chowk road via SBI	Link Road No-03	61.15

S. No	Name of the Road	Road No.	Length (m)
22	Electricity bill collection center to Bunder Chowk	Link Road No-04	99.25
23	Electricity bill collection center to Education office	Link Road No-05	59.13
24	Street Behind Bal Bhavan	Link Road No-06	65.41
25	Some Part Of Randal Street	Link Road No-07	44.02
26	Jamath khana to Panibai School road	Link Road No-08	80.20
27	Samrat Hotel to Market	Link Road No-09	71.54
28	Street Connecting Hadmatia road and soratia street	Link Road No-10	37.68
29	The Street Connecting Hadmatia road and soratia street (Near Gopal Lal Mandir)	Link Road No-11	65.50
30	Near Hingraj Mata Temple to City wall street	Link Road No-12	92.84
31	Nehru park to Bhavsarwad	Link Road No-13	96.36
32	Darjeewada Road	Link Road No-14	77.93
33	Hanuman Mandir Street	Link Road No-15	54.15
34	Panchayath Chowk Street-1	Link Road No-16	46.58
35	Panchayath Chowk Street-2	Link Road No-17	31.64
36	Panchayath Chowk Street-3	Link Road No-18	28.65
37	Near Govt.Middle School to Fort Road	Missing Link (MDR -10)	315.08
38	Beotli to Zampa	MDR – 03	345.00
39	Zampa to Vijayapath Junction	MDR – 08	743.00
40	Portuguese Street	-	2529.50
Total Length of Street Network for Development			12111.53 ~12.11 kms

1.1 Land Ownership Status

Section-1: Coastal Promenade

The land ownership status of the proposed development is

Stretch No.	Project Stretch	Chainage (km)		Area (sqm)	Remarks / status
		From	To		
1	Promenade Development including Night lighting from Diu-Ghoghla Bridge till Diu Fort	0+000	1+525	84,500	Predominant land is under Government ownership and part (5533 sqm) is under Private land ownership which is under final stages of land Acquisition process.
2	Continuous Beach promenade including Night lighting from Summer House Garden to Fudam Gaushala extended to Gangeshwar Temple	0+000	3+426	1,11,250	Predominant land is under Government ownership and part (~25,307 sqm) is under Private land ownership which is under process of land Acquisition process.
3	Landscaping & Beautification of Summer House Garden	-	-	14,368	Predominant land is under Government/ provisional land ownership, and small part (234 sqm) is under Private land ownership which is under process of Land Acquisition.
Total Area in Sqm :				21,01,18.00	(~31,074 Sqm) under Private land ownership which is under process of Land Acquisition

Section-2: Urban Design of street & Portuguese street

Stretch No.	Project Stretch	Length	Area (sqm)	Remarks / status
1	Urban Street- MDR- 03	336.00	5376.00	Predominant land is under Government ownership, and part (~1200 sqm) is under Private land ownership which is under process of Land Acquisition.
2	Urban Street- MDR- 08	743.00	13374.00	Predominant land is under Government ownership, and part (3139 sqm) is under Private land ownership which is under

Stretch No.	Project Stretch	Length	Area (sqm)	Remarks / status
				process of Land Acquisition
3	Urban Street- MDR- 10 a) Missing Link Road b) ZONE NO-05 - St. Paul's Church to Football Ground and St. Paul's Church to St. Francis of Assisi Church c) ZONE NO-06 - Children Park road to St. Francis of Assisi Church d) d) ZONE NO-07 - St. Francis of Assisi Church to Summer House Garden	1656.00	22975.00	Predominant land is under Government ownership, and part (~4167 sqm) is under Private land ownership which is under process of Land Acquisition.
4	All Urban streets	8288.12	67014.00	Ready for construction
5	ZONE NO-01 : DMC Building (Shahid Garden) to Directorate of Accounts building	230.00	2792.33	Ready for construction
6	ZONE NO-02 : Collectorate to City Survey Office building and Directorate of Accounts to City Survey Office	236.00	1956.00	Ready for construction
7	ZONE NO-03 Directorate of Accounts building to Children Park road	385.00	3348.00	Ready for construction
8	ZONE NO-04 : City Survey Office building to St. Paul's Church	325.00	5329.00	Ready for construction
12	Museum Garden in front of Diu Museum building	NA	5269.00	Ready for construction
13	Children Park next to the Museum Garden on	NA	6494.00	Ready for construction

Stretch No.	Project Stretch	Length	Area (sqm)	Remarks / status
	southern side			
	Total Area in Sqm :		1,31,911.68	(~8,506 Sqm) under Private land ownership which is under process of Land Acquisition













Proposed development works will be taken up within existing RoW which is under Government ownership. The land/area at all the identified streets/roads is already available to take up planned development activities under the Urban Streets/Roads project.







1.2 Existing Features





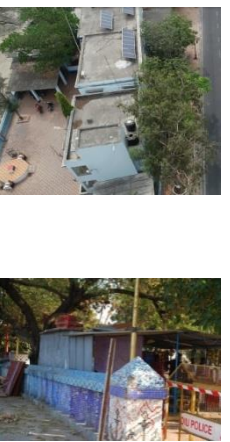







Section-1: Coastal Promenade











1.2.1 Stretch 1: Promenade from Diu Ghoghla Bridge to Diu fort

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
	Location	From Goghla bridge to near Fishermen jetty	From Fishermen jetty till Jivabhai Supermarket	From Jivabhai supermarket to Bunder jetty	Bunder jetty to DMC building	DMC building to PWD building	PWD building to Diu Fort
	Approx. area in Sqm	15238 sqm	18090 sqm	14625 sqm	8310 sqm	15667 sqm	12570 sqm
	Chainage/ Length	Ch 0-190 m	Ch 190-420 m	Ch 420- 640 m	Ch 640-850 m	Ch 850 -1260 m	Ch 1260-1545 m
	Land ownership	Private + Government land	Government land + leased property	Government land with existing building like Diu tourism and Port office	Government land ownership	Government ownership with building like Police station	Government and Private land ownership near Diu fort.
Existing Road and pavements							
1	Road carriage width	9m	Varying 8.5-5.7 m	Varying 5.2-5.7 m	5.7 m	Varying 5.7-5.9 m	Varying 5.3-5.7 m
	Material	Bitumen road	Bitumen road	Bitumen road	Bitumen road	Bitumen road	Bitumen road
2	Pavement						
	Northern side- Avg.	2.2 m	1.9-2.7 m	0.2-6 m	1-7.4 m	2.4-18 m	1.8-6.4 m

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
	Southern side- Avg.	1.6 m	1.4-5.8 m	0.45-2.8m	1.4-4.7m	1.3-8.1 m	2.6-6.2
	Images						
	Material	Paver blocks	Paver blocks	Paver blocks	Paver blocks	Paver blocks	Paver blocks
Existing Surfaces and flooring							
3	Surface area partly or full demolition/ excavation	Natural ground- Most of this zone is covered by natural ground and partly by existing building plots	Concrete- Predominantly is covered with concrete floor of jetty area and existing building like Jivabhai supermarket.	Hardscape- predominantly Paver blocks in Parking area with sand filled play area. There is a level difference between Parking area and Bunder chowk arch area of around 0.9 m	Hardscape-There is existing Bunder jetty area and a newly constructed jetty opposite Alishan Hotel	Soft+Hardscape This area consist mainly of Shahid Park opposite of Collector's office. It also have paver area zones near existing police station area	Mainly softscape- predominantly natural ground with private property and hardscape area.
	Images						
Existing retaining/Jetty wall							

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
4	Retaining/Jetty structure						
	Material	No-wall	Concrete jetty/Bela stone wall -335 Rmt	Concrete / Bela stone jetty wall- 240 rmt	Existing + New concrete jetty-244 rmt	Bela stone wall-507 rmt	Bela stone-338 rmt
Existing buildings							
5	Existing Buildings- To be demolished	Govt. Printing press, Rinku residence, Prathna mandir and others around 10 permanent-temporary buildings. Around 735 sqm of plinth area	Shops,kachha houses, temporary structures, OI DC godown, Ice plant, Around 2500 sqm of plinth area.	Railway reservation centre, Police chowki, Shops in Bunder chowk, Toilets, Tourism/Fishery/Ticket room/Diu pavilion buildings. Tentative area of 1300 sqm.	Toilet opposite Alishan hotel, around 29 sqm plinth area.	G+1 Diu Police station and Temporary structures accounting around 1300 sqm area.	Existing residences, Shops, Huts, Hawkers accounting around 400 sqm.

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
							
Existing structures/ elements							
6	Existing structures/elements						
	Compound/ Railing wall- To be demolished	2-2.4 m high Bela stone- 758 rmt, MS railing- 82.5 rmt	271 rmt Bela stone wall 0.9-2m high. 50 rmt MS railing	392 rmt Bela stone wall Avg. 0.9m high. 324 rmt Cast iron and MS railing	296 rmt 0.45-0.9m high Bela stone wall. 27 rmt MS railing	669 rmt 1.5 m high bela-jali wall. 186 rmt MS railing	556 rmt 1.2m high Belastone wall. Avg. 100 rmt MS railing.
							

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
	Heritage/Religious structures	NA	NA		NA		
		NA	NA	<p>Bunder chowk archway, 1 monument, 1 statue to be preserved</p> 	NA	<p>Shahid Smarak, Temple near Police station to be preserved</p>	<p>2 Portuguese monuments- Opposite PWD office and Diu college- to be preserved</p>
	Typical Trees						
	Existing Tree Count	137 Nos.	36 Nos.	19 Nos.	04 Nos.	235 Nos.+ Green Area	54 Nos. + Green Area
Existing Utilities							

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
	Existing Fort road has live utilities like Electrical, ELV, Plumbing, Partial storm water						
		Light poles cast iron/MS steel/GI around 3 m to 6m tall around 154 nos along the length of Fort road. Road signages, Direction signages along the Fort road and Jetty area. 4 High mast 8-10m high.	Transformer and Pole structure near 1 Bunder chowk existing food zone area, 1 Near existing Tourism office, 1 Gold moon restaurant, 1 near Diu Fort area. 10 high pole structure 6-8m high.	Electrical manhole and live lines along Fort road near Collector's office	Existing plumbing line along the Fort road.	Storm water provision near Alishan hotel and near Apna Hotel in non-integrated manner	

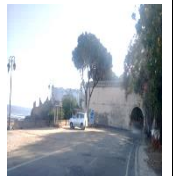


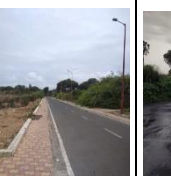
1.2.2 Stretch 2: Promenade from Summer House to Fudam Ghousala and extended to Gangeshwar Temple

S No	Description		At summer House	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Fudam Gaushala	From Fudam Gaushala to Gangeshwar Temple
1	Location		P0	P1	P2	P3	P4	P5	P6	P7	P8
2	Chainage	From	0+000.000	0+180.000	0+370.000	0+460.000	1+050.000	1+370.000	1+810.000	2+140.000	2+420.000
		To	0+180.000	0+370.000	0+460.000	1+050.000	1+370.000	1+810.000	2+140.000	2+420.000	3+426.130
3	Length (m)		180.000	190.000	90.000	590.000	320.000	440.000	330.000	280.000	1006.130
4	Category of Road		MDR-10	MDR-06	MDR-06	MDR-06	MDR-10	MDR-10	MDR-10	ODR-02	ODR-03 & 05
5	Type of Pavement		Flexible	Flexible	Flexible	Flexible	Flexible	Flexible	Flexible	Flexible	Flexible
6	Width of the Road (m)		6.00	6.00 to 6.50	4.5 to 8.50	7.00	6.00 to 6.50	5.50 to 6.00	5.50 to 6.00	5.50 to 6.20	5.50 to 6.20
7	Width of Pathway	LHS	0	4.00 to 9.00	1.50 to 4.50	2.50 to 3.50	1.00 to 2.00	1.20 to 1.40	1.20 to 2.30	1.20 to 1.40	1.20 to 1.40
		RHS	1.20 to 2.00	1.00 to 1.20	1.50 to 1.80	1.30 to 1.50	1.50 to 2.50	2.00 to 2.50	1.20 to 1.40	1.20 to 1.40	1.20 to 1.40

S No	Description		At summer House	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavavad a road	From Naida Bhavavad a road to Fudam Gaushala	From Fudam Gaushala to Gangeshwar Temple
8	Existing Kerb	LHS	-	CC	CC	CC	Flushed with Road	Flushed with Road	Flushed with Road	Flushed with Road	Flushed with Road
		RHS	-	Flushed with Road	Flushed with Road	Flushed with Road	Flushed with Road	Flushed with Road	Flushed with Road	Flushed with Road	Flushed with Road
9	Existing Tree Count	300mm-600mm-LHS	-	6	-	37	-	10	11	-	-
		300mm-600mm-RHS	5	24	-	43	45	46	-	-	-
		600mm-1200mm-LHS	-	2	-	-	-	15	15	-	-
		600mm-1200mm-RHS	5	33	-	34	33	34	-	-	-
		1200mm-2400mm-LHS	-	-	-	-	-	-	-	-	-











S No	Description		At summer House	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Fudam Gaushala	From Fudam Gaushala to Gangeshwar Temple
		1200mm-2400mm-RHS	-	-	-	3	-	-	-	-	-
10	Box Culvert	Location	-	-	1 no of box culvert @ 0+330	-	1 no of box culvert @ 1+030	-	-	-	-
		Size	-	-	Depth @ 3.6m	-	Depth @ 0.8m	-	-	-	-
11	Pipe Culvert	Location	-	-	-	-	-	-	1 no of Pipe culvert @ 1+810	-	-
		Size	-	-	-	-	-	-	1.0m dia	-	-
12	Road side Drain		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13	Water Supply		N/A	N/A	N/A	N/A	N/A	N/A	N/A	80mm dia AC pressure	N/A




S No	Description		At summer House	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Fudam Gaushala	From Fudam Gaushala to Gangeshwar Temple
14	Street Pole (Nos)	5.5m Ht-LHS	15	-	41	-	-	-	-	-	-
		9m Ht.-RHS	14	-	15	-	-	-	-	1	10
		9m Ht.-LHS	-	-	-	-	2	-	-	-	-
15	High Mast Location	-	-	1	1	-	-	1	1	-	
16	Junction Details		Summer House Garden Junction		Vijay Path Junction	Chakratirath Junction	-	-	Naida Bhavravada road Junction	Fudam Village Junction	On the way to Gangeshwar Temple Junction
17	Existing Retaining wall Structure		-	Stone Masonry Structure	-	Stone Masonry + RCC Structure	-	Stone Masonry Structure	Stone Masonry Structure	-	-
18	Open Gym & Gazebo		-	-	Yes	-	-	-	-	-	-











S No	Description	At summer House	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Fudam Gaushala	From Fudam Gaushala to Gangeshwar Temple
19	Wooden Bridge with Steel truss (Nos)	-	-	3	-	-	-	-	-	-
20	Foot Over Bridge (Nos)	-	-	1	-	-	-	-	-	-
21	Bench (in Nos)	-	8	-	-	-	-	-	-	-
22	Steps Towards Beach (Locations)	-	2	-	5	-	-	-	-	-
23	Wire Fence (m)	-	-	-	-	-	270m of each side	-	255m of LHS side	-
24	Related Photographs									




1.2.3 Stretch 3: Landscaping & Beautification of Summer House

Sr no	Description	Zone 01_A Road area	Zone 01_B Lower Garden area	Zone 01_D Jalandhar Promenade	Zone 02_A Upper landscape area	Zone 02_B Pavilion area	Zone 02_C Mitigation of Existing Cliff
	Location	Jalandhar Beach	Jalandhar Beach	Jalandhar Beach	Summer House Garden	Summer House Garden	Summer House Garden
	Approx. area in Sqm/Rmt	6855 sqm	1558.50 sqm	740 sqmt	4408.50 sqm	805 sqm	221 rmt
	Land ownership	Govt. land ownership + Private land ownership	Govt. land ownership	Govt. land ownership	Provisional land ownership	Provisional land ownership	Provisional land ownership
Existing Road and Pavements							
1	Road width	Varying 5.0 - 8.0 m width, 340 rmt length	NA	NA	NA	NA	NA
	Material	Bitumen road	Bitumen road	NA	NA	NA	NA
2	Pavement						
	Northern side- Avg.	1.8 - 2.5 m Wd.- Length 100 rmt	1.2 - 2.5 m Wd.- Length 64 rmt	NA	1-2 m Wd-159 m Lt	1.5 m	NA
	Southern side- Avg.	varies from 0.65 - 3.0m Wd.- Length 410 rmt	NA	NA	1.2-4.8 m Wd- 96m Lt.	3.2 m	NA


Sr no	Description	Zone 01_A Road area	Zone 01_B Lower Garden area	Zone 01_D Jalandhar Promenade	Zone 02_A Upper landscape area	Zone 02_B Pavilion area	Zone 02_C Mitigation of Existing Cliff
	Images						
	Material	Paver blocks/ PCC	Paver blocks/ PCC	NA	Local stone/ PCC	Local stone/ PCC	NA
Existing Surfaces and flooring							
3	Surface area partly or full demolition/ excavation	Bitumen road, RCC road, paved area, Sea side paver block footpath	Natural ground and some of the parts paved surfaces	Retaining wall, Existing pavilion with steps	Existing mound and below that there is cave with hardscape granite flooring	Existing mound and local stone flooring for paths, local stone amphitheatre	NA
	Images						NA
Cliff wall							

Sr no	Description	Zone 01_A Road area	Zone 01_B Lower Garden area	Zone 01_D Jalandhar Promenade	Zone 02_A Upper landscape area	Zone 02_B Pavilion area	Zone 02_C Mitigation of Existing Cliff
4	Cliff wall	NA	NA	NA	NA	NA	
	Material	NA	NA	NA	NA	NA	Rocky terrain
Existing Buildings							
5	Existing Buildings- To be demolished	NA	NA	Existing Pavilion	NA	Existing Pavilion	NA
	Images	NA	NA		NA		NA
Existing structures/ elements							


Sr no	Description	Zone 01_A Road area	Zone 01_B Lower Garden area	Zone 01_D Jalandhar Promenade	Zone 02_A Upper landscape area	Zone 02_B Pavilion area	Zone 02_C Mitigation of Existing Cliff
6	Existing structures/elements	 	 	 	 	 	NA
	Compound/ Railing wall- To be demolished	1.2-1.8m high brick/Bela stone wall of 300 rmt, gate, kiosk, benches and other street furnitures	1.2m high RCC wall of 137 rmt, 1.2 - 1.8m high stone wall of 115 rmt. play equipments, 14 benches, gate	Stone wall of 95 rmt., footpath with kerb	1.2m high Local stone wall 200 rmt. length, 56 sqmt. MS structure, MS railing, 1m high MS gate, play equipment, Benches	1m high Existing stone wall, benches	
7	Existing Tree Count	50 Nos. + Garden Area	40 Nos. + Garden Area	NA	30 Nos.	25 Nos.	NA
Existing Utilities							
8	Utilities						

Sr no	Description	Zone 01_A Road area	Zone 01_B Lower Garden area	Zone 01_D Jalandhar Promenade	Zone 02_A Upper landscape area	Zone 02_B Pavilion area	Zone 02_C Mitigation of Existing Cliff
				NA		NA	NA
		Metal Light poles 3-5m high and signages along the road,6-8 Cast iron Electrical pole 3-5m high, manhole, storm water line	Metal Light poles 3m high	NA	Metal Light poles 3m high	NA	NA


Section-2: Urban Design of street & Portuguese street**1.2.4 Existing Features – Urban Streets in Diu MC & Ghoghla****1.2.4.1 Road No-01 Zampa to Markata (via Nagar Seth Haveli) to Vekaria**

S. No.	Description	Features
1.	Location	Zampa to Markata (via Nagar Seth Haveli) to Vekaria
2.	Chainage (m)	From 0.00
		To 881.34
3.	Length (m)	881.34
4.	Approx. area in Sqm	6203.5974
5.	Land ownership	Government (existing RoW)
6.	Type of Pavement	Rigid
7.	Width of the Road (m)	3 – 4 m
8.	Existing Tree Count	3 nos
9.	Surface area partly or full demolition/ excavation	Yes
10.	Buildings/ Compound Walls to be demolished	No
11.	Street Poles	29 Nos
12.	High Mast	-
13.	Junction Details	5 Junctions
14.	Related Photographs	


1.2.4.2 Road No-02 Zampa to Jethibai Marg to Hotel Smarat

S. No.	Description	Features	
1.	Location	Zampa to Jethibai Marg to Hotel Smarat	
2.	Chainage (m)	From	0.00
		To	831.94
3.	Length (m)	831.94	
4.	Approx. area in Sqm	7188.9393	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 5 m	
8.	Existing Tree Count	8 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	19 Nos	
12.	High Mast	1 Nos	
13.	Junction Details	12 Junction	
14.	Related Photographs		


1.2.4.3 Road No-02A Samrat Hotel to Director of Accounts General office

S. No.	Description	Features	
1.	Location	Samrat Hotel to Director of Accounts General office	
2.	Chainage (m)	From	0.00
		To	288.40
3.	Length (m)	288.40	
4.	Approx. area in Sqm	2673.7761	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 5 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	5 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.4 Road No-03 Hadmatia road to Vekaria Laxminarayan Temple

S. No.	Description	Features	
1.	Location	Hadmatia road to Vekaria Laxminarayan Temple	
2.	Chainage (m)	From	0.00
		To	610.35
3.	Length (m)	610.35	
4.	Approx. area in Sqm	4984.9206	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 5 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	25 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.5 Road No-04 Soratia Street

S. No.	Description	Features
1.	Location	Soratia street
2.	Chainage (m)	From
		To
3.	Length (m)	355.93
4.	Approx. area in Sqm	1485.8184
5.	Land ownership	Government (existing RoW)
6.	Type of Pavement	Rigid
7.	Width of the Road (m)	2 – 3 m
8.	Existing Tree Count	-
9.	Surface area partly or full demolition/ excavation	Yes
10.	Buildings/ Compound Walls to be demolished	No
11.	Street Poles	12 Nos
12.	High Mast	-
13.	Junction Details	8 Junction
14.	Related Photographs	


1.2.4.6 Road No-05 Dr. Rajaram Kelkar Road

S. No.	Description	Features	
1.	Location	Dr. Rajaram Kelkar Road	
2.	Chainage (m)	From	0.00
		To	366.22
3.	Length (m)	366.22	
4.	Approx. area in Sqm	2868.9889	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	2 – 4 m	
8.	Existing Tree Count	4 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	11 Nos	
12.	High Mast	-	
13.	Junction Details	5 Junction	
14.	Related Photographs		


1.2.4.7 Road No-06 Ghodia Street to Jumma Masjid

S. No.	Description	Features	
1.	Location	Ghodia street to Jumma Masjid	
2.	Chainage (m)	From	0.00
		To	449.06
3.	Length (m)	449.06	
4.	Approx. area in Sqm	2189.9482	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	2 – 4 m	
8.	Existing Tree Count	1 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	8 Nos	
12.	High Mast	-	
13.	Junction Details	7 Junction	
14.	Related Photographs		


1.2.4.8 Road No-07 Education Office to Bhavsarwada

S. No.	Description	Features	
1.	Location	Education Office to Bhavsarwada	
2.	Chainage (m)	From	0.00
		To	294.55
3.	Length (m)	294.55	
4.	Approx. area in Sqm	1555.3944	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	3 – 4 m	
8.	Existing Tree Count	4 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	10 Nos	
12.	High Mast	-	
13.	Junction Details	8 Junction	
14.	Related Photographs		


1.2.4.9 Road No-08 Dena Bank ATM to Darjiwada Road Via Panibai School

S. No.	Description	Features	
1.	Location	Dena Bank ATM to Darjiwada Road Via Panibai School	
2.	Chainage (m)	From	0.00
		To	355.76
3.	Length (m)	355.76	
4.	Approx. area in Sqm	2563.1665	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	2 – 4 m	
8.	Existing Tree Count	1 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	16 Nos	
12.	High Mast	1 Nos	
13.	Junction Details	8 Junction	
14.	Related Photographs		


1.2.4.10 Road No-09 Nehru Park to Laxmi Park

S. No.	Description	Features	
1.	Location	Nehru Park to Laxmi park	
2.	Chainage (m)	From	0.00
		To	310.57
3.	Length (m)	310.57	
4.	Approx. area in Sqm	2382.3219	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	2 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	13 Nos	
12.	High Mast	-	
13.	Junction Details	6 Junction	
14.	Related Photographs		


1.2.4.11 Road No-09 A Hotel Samrat to Nehru Park

S. No.	Description	Features	
1.	Location	Hotel Samrat to Nehru Park	
2.	Chainage (m)	From	0.00
		To	175.64
3.	Length (m)	175.64	
4.	Approx. area in Sqm	1346.7601	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	4 Nos	
12.	High Mast	-	
13.	Junction Details	3 Junction	
14.	Related Photographs		


1.2.4.12 Road No-10 GST Office to Nirmala Matha School Backside

S. No.	Description	Features	
1.	Location	GST Office to Nirmala Matha School Backside	
2.	Chainage (m)	From	0.00
		To	199.85
3.	Length (m)	199.85	
4.	Approx. area in Sqm	1406.1134	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	1 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	5 Nos	
12.	High Mast	-	
13.	Junction Details	3 Junction	
14.	Related Photographs		


1.2.4.13 Road No-10 A Nehru Park to Child Development office

S. No.	Description	Features	
1.	Location	Nehru Park to Child Development office	
2.	Chainage (m)	From	0.00
		To	179.40
3.	Length (m)	179.40	
4.	Approx. area in Sqm	1971.5157	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	2 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	2 Nos	
12.	High Mast	-	
13.	Junction Details	3 Junction	
14.	Related Photographs		


1.2.4.14 Road No-11 Samrat Hotel to DMC office

S. No.	Description	Features	
1.	Location	Samrat Hotel to DMC office	
2.	Chainage (m)	From	0.00
		To	258.32
3.	Length (m)	258.32	
4.	Approx. area in Sqm	1973.7655	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	5 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	9 Nos	
12.	High Mast	-	
13.	Junction Details	6 Junction	
14.	Related Photographs		


1.2.4.15 Road No-12 St. Paul Church to PWD Office

S. No.	Description	Features	
1.	Location	St. Paul Church to PWD Office	
2.	Chainage (m)	From	0.00
		To	163.93
3.	Length (m)	163.93	
4.	Approx. area in Sqm	1872.92	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	1 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	10 Nos	
12.	High Mast	-	
13.	Junction Details	1 Junction	
14.	Related Photographs		


1.2.4.16 Road No-14 Bunglee Chowk to Ghoghla Subpost office

S. No.	Description	Features	
1.	Location	Bunglee Chowk to Ghoghla Subpost office	
2.	Chainage (m)	From	0.00
		To	790.10
3.	Length (m)	790.10	
4.	Approx. area in Sqm	10134.35	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	2 – 6 m	
8.	Existing Tree Count	20 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	23 Nos	
12.	High Mast	-	
13.	Junction Details	10 Junction	
14.	Related Photographs		


1.2.4.17 Road No-15 Panchayath Chowk Road-1

S. No.	Description	Features	
1.	Location	Panchayath Chowk Road-1	
2.	Chainage (m)	From	0.00
		To	271.65
3.	Length (m)	271.65	
4.	Approx. area in Sqm	2276.487	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	3 – 4 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	-	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.18 Road No-16 Panchayath Chowk Road-2

S. No.	Description	Features	
1.	Location	Panchayath Chowk Road-1	
2.	Chainage (m)	From	0.00
		To	104.98
3.	Length (m)	104.98	
4.	Approx. area in Sqm	706.5986	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	3 – 4 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	-	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.19 Link Road No-01 Jethibai Busstand road to Lalshah bava Dargah

S. No.	Description	Features	
1.	Location	Jethibai Busstand road to Lalshah bava Dargah	
2.	Chainage (m)	From	0.00
		To	130.11
3.	Length (m)	130.11	
4.	Approx. area in Sqm	1590.7367	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	1 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	-	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.20 Link Road No-02 Hotel TGH to FCS Warehouse at Fort Road

S. No.	Description	Features	
1.	Location	Hotel TGH to FCS Warehouse at Fort Road	
2.	Chainage (m)	From	0.00
		To	148.82
3.	Length (m)	148.82	
4.	Approx. area in Sqm	1896.2744	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	2 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	6 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.21 Link Road No-03 Near Jumma Masjid to Bunder Chowk Road via SBI

S. No.	Description	Features	
1.	Location	Near Jumma Masjid to Bunder Chowk Road	
2.	Chainage (m)	From	0.00
		To	61.15
3.	Length (m)	61.15	
4.	Approx. area in Sqm	415.5733	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	1 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.22 Link Road No-04 Electricity bill collection center to Bunder Chowk

S. No.	Description	Features	
1.	Location	Electricity bill collection center to Bunder Chowk	
2.	Chainage (m)	From	0.00
		To	99.25
3.	Length (m)	99.25	
4.	Approx. area in Sqm	758.4448	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	4 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.23 Link Road No-05 Electricity bill collection center to Education office

S. No.	Description	Features	
1.	Location	Electricity bill collection center to Education office	
2.	Chainage (m)	From	0.00
		To	59.13
3.	Length (m)	59.13	
4.	Approx. area in Sqm	409.7313	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	4 – 6 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	3 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.24 Link Road No-06 Street behind Bal Bhavan

S. No.	Description	Features
1.	Location	Street Behind Bal Bhavan
2.	Chainage (m)	From
		To
3.	Length (m)	65.41
4.	Approx. area in Sqm	836.4793
5.	Land ownership	Government (existing RoW)
6.	Type of Pavement	Rigid
7.	Width of the Road (m)	4 – 6 m
8.	Existing Tree Count	-
9.	Surface area partly or full demolition/ excavation	Yes
10.	Buildings/ Compound Walls to be demolished	No
11.	Street Poles	2 Nos
12.	High Mast	1 Nos
13.	Junction Details	2 Junction
14.	Related Photographs	


1.2.4.25 Link Road No-07 Some Part of Randal Street

S. No.	Description	Features
1.	Location	Some Part of Randal Street
2.	Chainage (m)	From
		To
3.	Length (m)	44.02
4.	Approx. area in Sqm	257.2085
5.	Land ownership	Government (existing RoW)
6.	Type of Pavement	Rigid
7.	Width of the Road (m)	4 – 6 m
8.	Existing Tree Count	-
9.	Surface area partly or full demolition/ excavation	Yes
10.	Buildings/ Compound Walls to be demolished	No
11.	Street Poles	1 Nos
12.	High Mast	-
13.	Junction Details	2 Junction
14.	Related Photographs	


1.2.4.26 Link Road No-08 Jamath khana to Panibai School road

S. No.	Description	Features	
1.	Location	Jamath khana to Panibai School road	
2.	Chainage (m)	From	0.00
		To	80.20
3.	Length (m)	80.20	
4.	Approx. area in Sqm	504.2653	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	3 – 4 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	4 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.27 Link Road No-09 Samrat Hotel to Market

S. No.	Description	Features	
1.	Location	Samrat Hotel to Market	
2.	Chainage (m)	From	0.00
		To	71.54
3.	Length (m)	71.54	
4.	Approx. area in Sqm	616.7487	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	6 – 8 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	2 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.28 Link Road No-10 Street Connecting Hadmatia road and Soratia street.

S. No.	Description	Features	
1.	Location	Connecting Hadmatia road and Soratia street	
2.	Chainage (m)	From	0.00
		To	37.68
3.	Length (m)	37.68	
4.	Approx. area in Sqm	88.6563	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	2 – 3 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	-	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.29 Link Road No-11 Street Connecting Hadmatia road and soratia street (Near Gopal Lal Mandir)

S. No.	Description	Features
1.	Location	Street Connecting Hadmatia road and soratia street (Near Gopal Lal Mandir)
2.	Chainage (m)	From 0.00
		To 65.50
3.	Length (m)	65.50
4.	Approx. area in Sqm	217.0961
5.	Land ownership	Government (existing RoW)
6.	Type of Pavement	Rigid
7.	Width of the Road (m)	2 – 3 m
8.	Existing Tree Count	-
9.	Surface area partly or full demolition/ excavation	Yes
10.	Buildings/ Compound Walls to be demolished	No
11.	Street Poles	3 Nos
12.	High Mast	-
13.	Junction Details	2 Junction
14.	Related Photographs	


1.2.4.30 Link Road No-12 near Hingraj Mata Temple to City Wall Street

S. No.	Description	Features	
1.	Location	Near Hingraj Mata Temple to City wall street	
2.	Chainage (m)	From	0.00
		To	92.84
3.	Length (m)	92.84	
4.	Approx. area in Sqm	585.577	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	3 – 4 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	-	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.31 Link Road No-13 Nehru Park to Bhavsarwad

S. No.	Description	Features	
1.	Location	Nehru park to Bhavsarwad	
2.	Chainage (m)	From	0.00
		To	96.36
3.	Length (m)	96.36	
4.	Approx. area in Sqm	497.6516	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	3 – 4 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	4 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.32 Link Road No-14 Darjeewada Road

S. No.	Description	Features	
1.	Location	Darjeewada Road	
2.	Chainage (m)	From	0.00
		To	77.93
3.	Length (m)	77.93	
4.	Approx. area in Sqm	268.5113	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	2 – 3 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	3 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.33 Link Road No-15 Hanuman Mandir Street

S. No.	Description	Features	
1.	Location	Hanuman Mandir Street	
2.	Chainage (m)	From	0.00
		To	54.15
3.	Length (m)	54.15	
4.	Approx. area in Sqm	279.5101	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	3 – 4 m	
8.	Existing Tree Count	2 Nos	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	1 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.34 Link Road No-16 Panchayath Chowk Street-1

S. No.	Description	Features	
1.	Location	Panchayath Chowk Street-1	
2.	Chainage (m)	From	0.00
		To	46.58
3.	Length (m)	46.58	
4.	Approx. area in Sqm	121.1761	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	3 – 4 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	1 Nos	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.35 Link Road No-17 Panchayath Chowk Street-2

S. No.	Description	Features
1.	Location	Panchayath Chowk Street-2
2.	Chainage (m)	From
		To
3.	Length (m)	31.64
4.	Approx. area in Sqm	96.6446
5.	Land ownership	Government (existing RoW)
6.	Type of Pavement	Rigid
7.	Width of the Road (m)	3 – 4 m
8.	Existing Tree Count	-
9.	Surface area partly or full demolition/ excavation	Yes
10.	Buildings/ Compound Walls to be demolished	No
11.	Street Poles	1 Nos
12.	High Mast	-
13.	Junction Details	2 Junction
14.	Related Photographs	


1.2.4.36 Link Road No-18 Panchayath Chowk Street-3

S. No.	Description	Features	
1.	Location	Panchayath Chowk Street-3	
2.	Chainage (m)	From	0.00
		To	28.65
3.	Length (m)	28.65	
4.	Approx. area in Sqm	144.3116	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	3 – 4 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	-	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		


1.2.4.37 Missing Link Road (MDR 10)- Near Govt. Middle School to Fort Road

S. No.	Description	Features	
1.	Location	Near Govt.Middle School to Fort Road- MDR10	
2.	Chainage (m)	From	0.00
		To	315.08
3.	Length (m)	315.08	
4.	Approx. area in Sqm	5142.45	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	10.0 m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	-	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		

1.2.4.38 MDR-03 Road - Beotli to Zampa

S. No.	Description	Features	
1.	Location	Beotli to Zampa	
2.	Chainage (m)	From	0.00
		To	345.000
3.	Length (m)	345.000	
4.	Approx. area in Sqm	6210	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Rigid	
7.	Width of the Road (m)	7.0m	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	No	
11.	Street Poles	-	
12.	High Mast	-	
13.	Junction Details	2 Junction	
14.	Related Photographs		

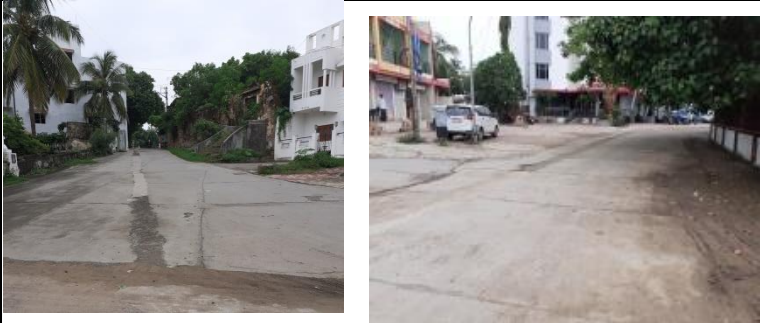
1.2.4.39 MDR-8 Road - Zampa to Vijaypath Jn

S. No.	Description	Features	
1.	Location	Zampa to Vijaypath Jn, MDR 8	
2.	Chainage (m)	From	0.00
		To	743
3.	Length (m)	743	
4.	Approx. area in Sqm	11888	
5.	Land ownership	Government (existing RoW)	
6.	Type of Pavement	Bitumen	
7.	Width of the Road (m)	7.0	
8.	Existing Tree Count	-	
9.	Surface area partly or full demolition/ excavation	Yes	
10.	Buildings/ Compound Walls to be demolished	Yes	
11.	Street Poles	20	
12.	High Mast	-	
13.	Junction Details	1 Junction	
14.	Related Photographs		

1.2.5 Existing Features – Portuguese Street


1.2.5.1 Zone No-01 DMC Building (Shahid Garden) to Directorate of Accounts building

S. No.	Description	Features	
1.	Location	DMC Building (Shahid Garden) to Directorate of Accounts building	
2.	Chainage (m)	From	CA 0.00, CB 0.00
		To	CA 192.91, CB 15.45 and adjoining streets of 21 rmt.
3.	Length (m)	230.00	
4.	Approx. area in Sqm	2792.33	
5.	Land ownership	Ready For Construction	
6.	Category of Road	RCC road	
7.	Type of Pavement	Rigid	
8.	Width of the Road (m)	Varying 3.20- 11.5 m	
9.	Existing Tree Count	4 nos.	
10.	Surface area partly or full demolition/ excavation	Yes	
11.	Existing Buildings- To be demolished	NA	
12.	Compound/ Railing wall- To be demolished	NA	
13.	Heritage/Religious structures	YES (Statue at Z1-P3 area)	
14.	Road side Drain	NA	
15.	Water Supply	Yes	
16.	Junction Details	2 Primary street Junctions	

S. No.	Description	Features
17.	Related Photographs	

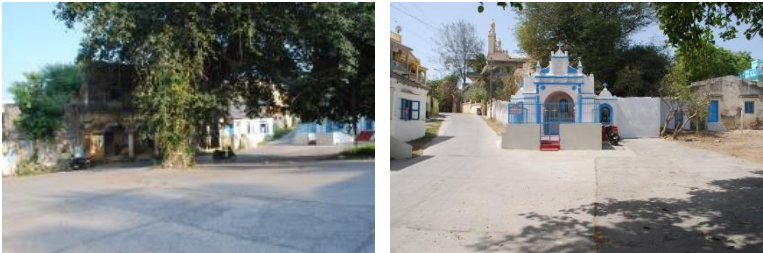
1.2.5.2 Zone No-02 Collectorate to City Survey Office building and Directorate of Accounts to City Survey Office

S. No.	Description	Features	
1.	Location	Collectorate to City Survey Office building and Directorate of Accounts to City Survey Office	
2.	Chainage (m)	From	CB 15.45, CC 16.65 and CE 0.00
		To	CB 146.83, CC 95.57, CE 15.00 and adjoining streets of 20.60 rmt.
3.	Length (m)	236.00	
4.	Approx. area in Sqm	1956.00	
5.	Land ownership	Ready For Construction	
6.	Category of Road	RCC road	
7.	Type of Pavement	Rigid	
8.	Width of the Road (m)	Varying 4.75- 5.8 m	
9.	Existing Tree Count	11 nos.	
10.	Surface area partly or full demolition/ excavation	Yes	
11.	Existing Buildings- To be demolished	NA	
12.	Compound/ Railing wall- To be	NA	

S. No.	Description	Features
	demolished	
13.	Heritage/Religious structures	NA
14.	Road side Drain	NA
15.	Water Supply	Yes
16.	Junction Details	4 internal street Junctions
17.	Related Photographs	


1.2.5.3 Zone No-03 Directorate of Accounts building to Children Park road

S. No.	Description	Features	
1.	Location	Directorate of Accounts building to Children Park road	
2.	Chainage (m)	From	CA 192.91, CC 0.00
		To	CA 471.22, CC 16.65 and adjoining streets of 98.26 rmt.
3.	Length (m)	396.00	
4.	Approx. area in Sqm	3348.00	
5.	Land ownership	Ready For Construction	
6.	Category of Road	RCC road	
7.	Type of Pavement	Rigid	
8.	Width of the Road (m)	Varying 2.4- 5.5 m	
9.	Existing Tree Count	4 nos.	
10.	Surface area partly or full demolition/ excavation	Yes	

S. No.	Description	Features
11.	Existing Buildings- To be demolished	NA
12.	Compound/ Railing wall- To be demolished	1.5 mt high Bela stone + RCC column- 126 rmt
13.	Heritage/Religious structures	House of Prayer Chapel, Larco de N.S.A. da Conceicao Haritage Haveli, Diu Museum
14.	Road side Drain	NA
15.	Water Supply	Yes
16.	Junction Details	3 Primary street Junctions, 1 Internal street Junction
17.	Related Photographs	


1.2.5.4 Zone No-04 City Survey Office building to St. Paul's Church

S. No.	Description	Features	
1.	Location	City Survey Office building to St. Paul's Church	
2.	Chainage (m)	From	CB 146.83, CC 95.57 and CE 0.00
		To	CB 399.36, CC 108.93, CE 39.49 and adjoining streets of 12.40 rmt.
3.	Length (m)	325.00	
4.	Approx. area in Sqm	5329.00	
5.	Land ownership	Ready For Construction	
6.	Category of Road	RCC road	
7.	Type of Pavement	Rigid	
8.	Width of the Road (m)	Varying 1.75- 6.0 m	

S. No.	Description	Features
9.	Existing Tree Count	13 nos.
10.	Surface area partly or full demolition/ excavation	Yes
11.	Existing Buildings- To be demolished	Old deteriorated Structure of 15 sqm
12.	Compound/ Railing wall- To be demolished	NA
13.	Heritage/Religious structures	St. Paul's Church
14.	Road side Drain	NA
15.	Water Supply	Yes
16.	Junction Details	2 Primary street Junctions
17.	Related Photographs	

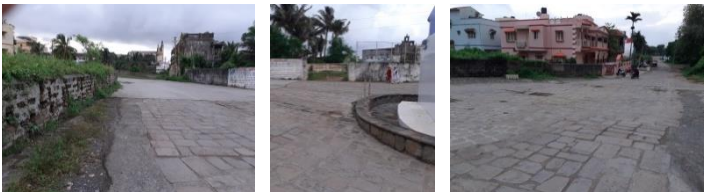
1.2.5.5 Zone No-05 St. Paul's Church to Football Ground and St. Paul's Church to St. Francis of Assisi Church

S. No.	Description	Features	
1.	Location	St. Paul's Church to Football Ground and St. Paul's Church to St. Francis of Assisi Church	
2.	Chainage (m)	From	CB 399.36, CD 0.00
		To	CB 608.40, CD 262.60 and adjoining streets of 77.50 rmt.
3.	Length (m)	550.00	
4.	Approx. area in Sqm	6161.00	
5.	Land ownership	Under Land acquisition	

S. No.	Description	Features
6.	Category of Road	RCC road
7.	Type of Pavement	Rigid
8.	Width of the Road (m)	Varying 2.85- 6.0 m
9.	Existing Tree Count	34 nos.
10.	Surface area partly or full demolition/ excavation	Yes
11.	Existing Buildings- To be demolished	NA
12.	Compound/ Railing wall- To be demolished	2 mt high Bela stone- 261.20 rmt 1.2 mt high Bela stone- 71.50 rmt.
13.	Heritage/Religious structures	Old Lady of Rosary Chapel
14.	Road side Drain	NA
15.	Water Supply	Yes
16.	Junction Details	3 Primary street Junctions, 6 Internal street Junction
17.	Related Photographs	

1.2.5.6 Zone No-06 Children Park road to St. Francis of Assisi Church

S. No.	Description	Features	
1.	Location	Children Park road to St. Francis of Assisi Church	
2.	Chainage (m)	From	CA 471.22, CB 608.40, CE 0.00 and CF 0.00
		To	CA 650.00, CB 674.00, CE 32.00, CF 52.50 and adjoining

S. No.	Description	Features
		streets of 26.75 rmt.
3.	Length (m)	350.00
4.	Approx. area in Sqm	3920.00
5.	Land ownership	Under Land acquisition
6.	Category of Road	RCC and stone road
7.	Type of Pavement	Rigid
8.	Width of the Road (m)	Varying 3.3- 7.0 m
9.	Existing Tree Count	6
10.	Surface area partly or full demolition/ excavation	Yes
11.	Existing Buildings- To be demolished	Yes
12.	Compound/ Railing wall- To be demolished	2 mt high Bela stone- 26.50 rmt 1.2 mt high Bela stone- 114.50 rmt.
13.	Heritage/Religious structures	Central Chapel at Junction
14.	Road side Drain	NA
15.	Water Supply	Yes
16.	Junction Details	1 Primary street Junctions, 1 Internal street Junction
17.	Related Photographs	

1.2.5.7 Zone No-07 St. Francis of Assisi Church to Summer House Garden


S. No.	Description	Features
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S. No.	Description	Features	
1.	Location	St. Francis of Assisi Church to Summer House Garden	
2.	Chainage (m)	From	CA 650.00, CD 262.60, CE 0.00
		To	CA 968.00, CD 280.40, CE 79.50 and adjoining streets of 20.52 rmt.
3.	Length (m)	441.50	
4.	Approx. area in Sqm	7695.00	
5.	Land ownership	Under Land acquisition	
6.	Category of Road	Bitumen road and RCC road	
7.	Type of Pavement	Rigid	
8.	Width of the Road (m)	Varying 3.0- 11.0 m	
9.	Existing Tree Count	35 nos.	
10.	Surface area partly or full demolition/ excavation	Yes	
11.	Existing Buildings- To be demolished	NA	
12.	Compound/ Railing wall- To be demolished	1.2 mt high Bela stone- 237 rmt	
13.	Heritage/Religious structures	St. Francis of Assisi Church and 2 Chapels at plaza 07	
14.	Road side Drain	NA	
15.	Water Supply	Yes	
16.	Junction Details	3 Primary street Junctions, 2 Internal street Junction	

S. No.	Description	Features
17.	Related Photographs	


1.2.5.8 Museum Garden In front of Diu Museum building

S. No.	Description	Features	
1.	Location	Museum Garden In front of Diu Museum building	
2.	Chainage (m)	From	NA
		To	NA
3.	Length (m)		
4.	Approx. area in Sqm	5269 sqm	
5.	Land ownership	Ready For Construction	
6.	Category of Road	NA	
7.	Type of Pavement	Paver Blocks	
8.	Width of the Pathway (m)	Varying 2.0- 3.0 m	
9.	Existing Tree Count	All trees to be retained.	
10.	Surface area partly or full demolition/ excavation	Yes	
11.	Existing Buildings- To be demolished	2 nos. of Cast iron Pavilion and RCC pavilion, Sculptures	
12.	Compound/ Railing wall- To be	0.75 mt high bela Stone wall- 332 rmt	

S. No.	Description	Features
	demolished	(Light poles cast iron/Ms steel/GI around 2-3 m high around 78 nos. in garden. Play Equipments, fountains, Cast iron and wooden benches to relocate.)
13.	Heritage/Religious structures	NA
14.	Road side Drain	NA
15.	Water Supply	Yes
16.	Junction Details	NA
17.	Related Photographs	

1.2.5.9 Children Park next to the Museum Garden on southern side

S. No.	Description	Features	
1.	Location	Children Park next to the Museum Garden on southern side	
2.	Chainage (m)	From	NA
		To	NA
3.	Length (m)	NA	
4.	Approx. area in Sqm	6494	
5.	Land ownership	Ready For Construction	
6.	Category of Road	NA	

S. No.	Description	Features
7.	Type of Pavement	Concrete floor/ Paver blocks
8.	Width of the Pathways (m)	Varying 2.0- 2.50 m
9.	Existing Tree Count	All trees to be retained.
10.	Surface area partly or full demolition/ excavation	Yes
11.	Existing Buildings- To be demolished	RCC and Bela stone building structure 2 nos.
12.	Compound/ Railing wall- To be demolished	2 mt high bela stone wall- 160 rmt (Light poles cast iron/Ms steel/GI around 2-3 m high around 37 nos. in park. Play Equipments, fountains, Cast iron and wooden benches to relocate.)
13.	Heritage/Religious structures	NA
14.	Road side Drain	NA
15.	Water Supply	Yes
16.	Junction Details	NA
17.	Related Photographs	

Annex – II - Dates for providing Land/Right of Way**(Schedule-A)****Section-1: Coastal Promenade**

The dates on which the Authority shall provide Right of Way to the Contractor on different Sections of the Site are specified below:

Stretch No.	Project Stretch	Chainage (km)		Area (sqm)	Date of providing Land/RoW
		From	To		
1	Promenade Development including Night lighting from Diu-Ghoghla Bridge till Diu Fort	0+000	1+525	84,500.00	90% of the land is available for development and some developments are leased by the Government. Rest 10% of land falls under private ownership which will be made available within 180 days from the date of award of contract.
2	Continuous Beach promenade including Night lighting from Summer House Garden to Fudam Gaushala extended to Gangeshwar Temple	0+000	3+426	1,11,250.00	80% of the land is available for development. The total area proposed under acquisition is ~20% which will be made available within 180 days from the date of award of contract
3	Landscaping & Beautification of Summer House Garden	-	-	14,368	98% of the land is available for development. The total area proposed under acquisition is ~2% which will be made available within 180 days from the date of award of contract
	Total Area in Sqm :			21,01,18.00	In total 85% of the land is available for development. The total area proposed under acquisition is 15% which will be made available within 180 days from the date of award of contract

Section-2: Urban Design of street & Portuguese street

Proposed development works will be taken up within existing RoW which is under Government ownership. The land/area at all the identified streets/roads is already available to take up planned development activities under the Urban Streets/Roads project.

Stretch No.	Project Stretch	Length	Area (sqm)	Date of providing Land/RoW
1	Urban Street- MDR- 03	336.00	5376	80% of the land is available for development. The total area proposed under acquisition is ~20% which will be made available within 180 days from the date of award of contract
2	Urban Street- MDR- 08	743.00	13374	80% of the land is available for development. The total area proposed under acquisition is ~20% which will be made available within 180 days from the date of award of contract.
3	Urban Street- MDR- 10 a) Missing Link Road b) ZONE NO-05 - St. Paul's Church to Football Ground and St. Paul's Church to St. Francis of Assisi Church c) ZONE NO-06 - Children Park road to St. Francis of Assisi Church d) ZONE NO-07 - St. Francis of Assisi Church to Summer House Garden	1656.00	22975.00	82% of the land is available for development. The total area proposed under acquisition is ~18% which will be made available within 180 days from the date of award of contract.
4	ZONE NO-01 DMC Building (Shahid Garden) to Directorate of Accounts building	230.00	2792.33	Ready for construction
5	ZONE NO-02 Collectorate to City Survey Office building and Directorate of Accounts to City Survey Office	236.00	1956.00	Ready for construction
6	ZONE NO-03 Directorate of Accounts building to Children Park road	385.00	3348.00	Ready for construction

Stretch No.	Project Stretch	Length	Area (sqm)	Date of providing Land/RoW
7	ZONE NO-04 City Survey Office building to St. Paul's Church	325.00	5329.00	Ready for construction
8	Museum Garden in front of Diu Museum building	NA	5269.00	Ready for construction
9	Children Park next to the Museum Garden on southern side	NA	6494.00	Ready for construction
	Total Area in Sqm :		1,31,911.68	In total 94% of the land is available for development. The total area proposed under acquisition is 6% which will be made available within 180 days from the date of award of contract

Annex – III – Development Plan

(Schedule-A)

1.3 Development plan

Section-1: Coastal Promenade

The promenade development work comprises the following

- **Stretch 1:** Development of Coastal promenade from Diu Ghoghla bridge to Diu fort including Night lighting
- **Stretch 2:** Development of Coastal promenade from Summer House to Fudam Ghousala and extended to Gangeshwar Temple including Night lighting
- **Stretch 3:** Landscaping & Beautification of Summer House garden

The brief of work expected to be carried out by the contractor is given below and details scope of work to be carried out is given in **Schedule B**.

Section-2: Urban Design of street & Portuguese street

- **Stretch 1:** Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla which includes MDR-3, MDR-8 & MDR-10 and its abutting area considered in the concept design
- **Stretch 2:** Development of Portuguese Street (2+500 Km.) and its abutting area considered in the concept design.

The proposed development plan is for redevelopment of identified road/street network in Diu including the Portuguese Street consisting of up gradation and augmentation of foot path, traffic junctions and other miscellaneous works along with Operation and Maintenance of tendered works for period of Five Years for Diu Smart City.

The scope of work to be taken up under the streets development will include:

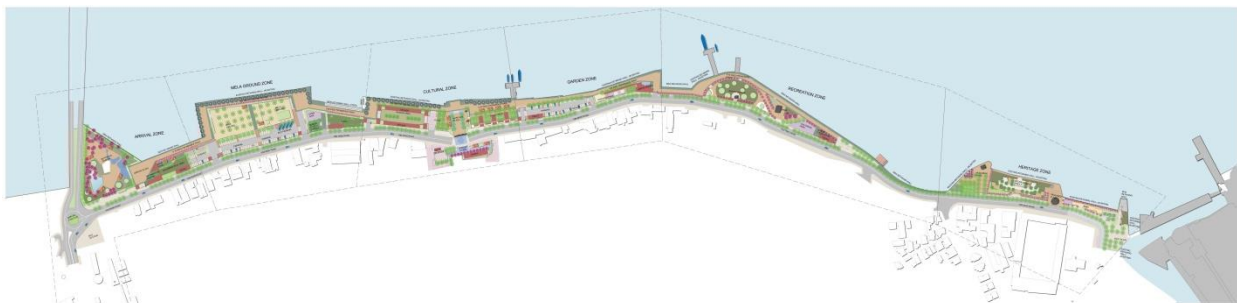
- Dismantling, Excavation and Filling Works
- Road Works and Flooring Works
- Road furniture's & sign boards
- Horticulture items
- Storm water drain
- Rainwater Harvesting by provision of rainwater recharge pits along storm water drain network
- Street lighting
- Electrical utility duct

- Portable water supply
- Recycle water supply
- Sanitary works at Portuguese Street
- Firefighting provisions at Portuguese Street
- Play area/equipment's at Park area
- Provision of Bus Shelters

In addition, overall proposed development will include providing necessary works for gas supply. This scope will be taken up in parallel by another agency. The agency appointed for the “**Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu under Smart Cities Mission**” will need to coordinate with the agency to be appointed for the gas supply works and vice-versa. The cross-section figures provided in the RFP also indicates the gas supply component for information and necessary planning purpose. The street development details and plan are discussed in **Schedule B**

1.4 Stretch 1: Promenade from Diu Ghoghla Bridge to Diu fort

The project is located in the urban area of Diu (U.T. Daman & Diu) along the 1.525 km long Fort Road that connects from the existing Bus Station to the Diu Fort. The Promenade site area is around 8.5 Ha. The proposed Promenade development is along the seafront and has been divided in 6 Zones with varying uses and activities.



S no.	Zone	Location	Activities proposed
1	Arrival zone 15238 sqm	Near the existing Jethi bai Bus stop area	<ul style="list-style-type: none"> • Arrival plaza and Junction design • New waterside retaining wall • Dismantling-Demolition of existing structures • Development of Botanical Garden • Information centre • Toilet • Children play area • Parking

S no.	Zone	Location	Activities proposed
2	Mela Ground 18090 sqm	Present Fishermen jetty area	<ul style="list-style-type: none"> • Mela ground • Parking • Toilet • Plaza • Park
3	Cultural zone 14625 sqm	Opposite Bunder chowk area	<ul style="list-style-type: none"> • Bazaar area • Heritage plaza • Food court • Toilet • Bunder chowk
4	Garden zone 8310 sqm	Opposite Alishan hotel area	<ul style="list-style-type: none"> • Parking • Children's park • Amphitheatre
5	Recreational zone 15667 sqm	Opposite Collector's office area	<ul style="list-style-type: none"> • Shahid Garden redevelopment • Broad walk • New waterside retaining wall • Toilet
6	Heritage zone 12570 sqm	Near Diu Fort area	<ul style="list-style-type: none"> • Monument plazas • Fort plaza and Kiosk zone • Fort side garden • Children Play Area

Note: All zones would have common elements such as Road works, Cycle lane, New retaining wall, Resurfacing and strengthening of existing retaining wall, Pavilion design, Street furniture, Flooring works, Bus Shelters, Compound wall, Horticulture and Landscape elements, Utility works like electrical, Storm water, Plumbing, recycle water supply, Fire fighting, LV and MV Cable Network etc.

1.5 Stretch 2: Promenade from Summer House to Gangeshwar temple via Fudam Ghousala

The stretch is located in the urban area of Diu along the Southern coast road of about 3.426 km stretch between Summer House garden & Gangeshwar temple. The proposed Promenade development is along the seafront and has been divided in 6 Zones with varying uses and activities.



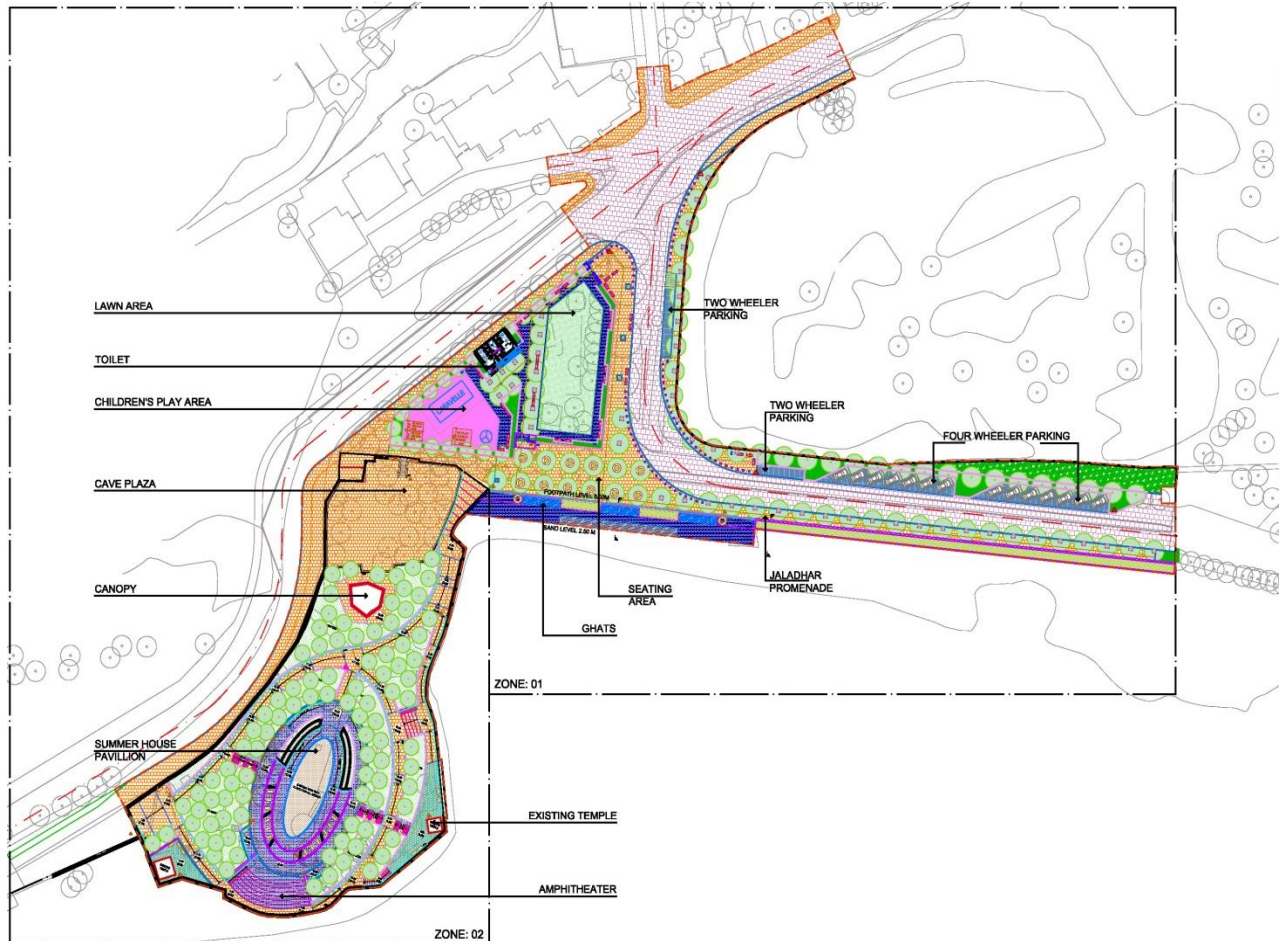
S no.	Zone	Chainage	Activities proposed
1	The Jalandhar Beach Promenade	Chainage from Km. 0+000 to Km. 0+370	<ul style="list-style-type: none"> • Segregation of various mode- Vehicular, cycle and pedestrian • Resurfacing of the Promenade and carriage way to intergrade and achieve an identity within the walled city. • Dedicated parking lane to regulate the parking • Dedicated Kiosk space to organize the space • Accessibility to the beach with fleet of steps • Universal access with addition of ramp and tactile tiles • State of art play equipment's to enhance the user experience
2	The Chakratirth beach	Chainage from km. 0+370 to km. 1+050	<ul style="list-style-type: none"> • Re-appropriation of the junction and correct geometry to enhance the driver experience. • Refurbish to retain the heritage look of existing Heritage features, • Dedicated Parking lane flushed with the carriage way • Resurfacing of the Promenade to bring in uniformity and integrate with city fabric • Accessibility to the beach is established with fleet

S no.	Zone	Chainage	Activities proposed
			<ul style="list-style-type: none"> of steps Universal access provided with addition of ramp and tactile tiles E-Toilets
3	Stretch between Chakratirth beach and INS Khukri parking	Chainage from km. 1.050 to km. 1+370	<ul style="list-style-type: none"> Vantage point along the Promenade as Pause point Dedicated Parking lane flushed with the carriage way Resurfacing of the Promenade to bring in uniformity and integrate with city fabric Universal access provided with addition of ramp and tactile tiles
4	Stretch between INS Khukri and Naida Bhavravada Road	Chainage from km. 1+370 to km. 2+140	<ul style="list-style-type: none"> Sunset Point to enhance user experience and create new tourist point of interest Parking lane along the promenade to assist the user movement and accessibility to the new vantage point Resurfacing of the Promenade to bring in uniformity and integrate with city fabric Universal access provided with addition of ramp and tactile tiles Development of the Junction with Naida Bhavravada road
5	Stretch between Naida Bhavravada Road Gaushala at Fudam	Chainage from km. 2+140 to km. 2+420	<ul style="list-style-type: none"> Dedicated Parking lot Resurfacing of the Promenade to bring in uniformity and integrate with city fabric
6	Stretch between Gaushala at Fudam to Gangeshwar Temple	Chainage from km. 2+420 to km. 3+426	<ul style="list-style-type: none"> Dedicated Parking lane flushed with the carriage way Resurfacing of the Promenade to bring in uniformity and integrate with city fabric

Note: All zones would have common elements such as Road works, Cycle Track, Promenade Walk way, Resurfacing of existing retaining wall and construction of New retaining wall, Pavilion design, Street furniture, Flooring works, Bus Shelters, Horticulture and Landscape elements, Dust bins, Utility works like electrical, Storm water, Water supply/recycle water supply etc.

1.6 Stretch 3: Landscaping & Beautification of Summer House

The site is around 14,368 sqm and is located within the island area of Diu Town along the Jalandhar beach at the southern tip of the Diu town. The site is an active tourist spot due to the Jalandhar beach area and Summer House pavilion. Locals also use the place for walks and play areas for kids. The present structures are not in good shape, lack of parking and traffic junction near Jalandhar circuit house is a concern. With upcoming circuit house facilities and other projects it was key to develop this underutilized place as a key attractor.



S no.	Zone	Location	Scope of works
1	Road area 6855 sqm	Jalandhar circuit house	<ul style="list-style-type: none"> • Dismantling-Demolition of existing road • New waterside cobble road • Road side footpath • Parking area • Sea side promenade area • Cave area • Toilet
2	Lower garden area	Jalandhar circuit	<ul style="list-style-type: none"> • Children's play area

S no.	Zone	Location	Scope of works
	1558.50 sqm	house	<ul style="list-style-type: none"> Garden area Toilet Seating area
3	Jalandhar Promenade 740 Sqm	Jalandhar circuit house	<ul style="list-style-type: none"> Ghats Seating area Horticulture Area
4	Upper landscape area 4408.50 sqm	Jalandhar circuit house	<ul style="list-style-type: none"> Amphitheatre Pathways Horticulture area Seating area
5	Pavilion area 805 sqm	Jalandhar circuit house	<ul style="list-style-type: none"> Structural pavilion with ramp Shaded seating area
6	Beautification of Existing retaining wall 221 rmt	Jalandhar circuit house	<ul style="list-style-type: none"> Beautification and strengthening

Note: All zones would have common elements such as Road works, New retaining wall, Resurfacing and strengthening of existing retaining wall, Pavilion design, Street furniture, Flooring works, Compound wall, Horticulture and Landscape elements, Utility works like electrical, Storm water, Plumbing, recycle water supply etc.

Annex – IV – Environmental/CRZ Clearances**(Schedule-A)**

The Authority represents and warrants that the CRZ clearances required for Construction of the Project are being procured by the Authority. The Authority agrees and undertakes that the CRZ clearances shall be procured by the Authority no later than 60(sixty) days from the date of the Agreement. In the event of any delay beyond such 60(sixty) days, the Contractor shall be entitled to Time Extension for the period of such delay in accordance with the provision of Clause 10.4 of this Agreement.

Further, the contractor shall be required to comply with the conditions and requirements stipulated in ESMP and the environmental clearance which is mandatory to be followed during the construction and operational phase as part of Contractor's Environmental Plan for the Project

Schedule B Development of the Project

(See Clause 2.1)

1.0 Development of the Project

Development of the Project shall include design and construction, operation and maintenance (5 Years) of the Project as described in this Schedule-B (Annex – I) and in Schedule-C.

1.1 Specifications and Standards

The Project shall be designed and constructed in conformity with the Specifications and Standards specified in Annex-I of Schedule-D.

Annex – I - Description of the Project

(Schedule-B)

Section-1: Coastal Promenade

- **Stretch 1:** Existing Fort road between Diu Ghoghla Bridge (0+000 Km) to Diu fort (1+525 Km) and its abutting area considered in the concept design.
- **Stretch 2:** Existing Road between Summer House (0+000 Km.) to Fudam Gaushala extended to Gangeshwar Temple (3+426 Km.) Via Fudam Ghousala which includes MDR-6 & MDR-7 and ODR-2,ODR-3 & ODR-5 and its abutting area considered in the concept design
- **Stretch 3:** Landscaping & Beautification Summer House Garden Area including construction of road @ 0.200 Km. (ODR-10)

Section-2: Urban Design of selected street & Portuguese street

The Work (Development of Streets in Diu MC & Ghoghla including Portuguese Street) is situated at Diu, U.T. Administration of Dadra and Nagar Haveli and Daman & Diu, Government of India. Proposed development work is to redevelop identified ~9.57 Km Street/Road network in Diu and additional ~2.56 km of the Portuguese Street considering Urban Street Design Guidelines (totaling ~12.13 km).

Map showing the proposed project site area and the Urban Streets/Road network for proposed development is shown as Figure A 1 to Figure A 4. Details of the streets to be taken up for development are provided in Table A 1.

- **Stretch 1:** Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla which includes MDR-3, MDR-8 & MDR-10 and its abutting area considered in the concept design
- **Stretch 2:** Development of Portuguese Street (2+500 Km.) and its abutting area considered in the concept design.

1.0 General

Scope of work includes applying the design principles, objective and expected outcomes illustrated in drawings. This section is meant to provide a brief about proposed design interventions on some important parts of the Coastal Promenade project. The Implementing Agency shall review the proposal and details for betterments or improvements if any which may be incorporated to better achieve the Authority's goals and objectives. These betterments, if any, shall be submitted by the Implementing Agency to the Authority for review and for the approval before the commencement of on ground working stage. The Implementing Agency must make itself aware of general and specific site conditions, topography and any existing landscape prior to commencement of any works on site. The on-site execution scope of work comprises of preparation of detailed engineering design execution drawings, full, final and entire installation and completion of works to a 'best practice standard' for such works, (inclusive of road surface, road section elements, hardscape, soft-scape, street furniture, utilities, signage and lighting) and associated services (leveling, drainage etc.) based on the proposal design

developed by the Authority and Implementing Agency's good for construction drawings and handing over of the same in full accordance with the Authority's requirements.

Section-1: Coastal Promenade

1.1 Objective

Primary objective is to redevelop identified approx. 4.0 Km. road network as a continuous coastal promenade with homogenous character of public realm experience that provides continuity to upcoming projects along the coast along with Summer House garden to achieve the following goals:

- Develop an aesthetically pleasing, functionally cohesive, Tourist friendly and economically viable project design
- Reallocation of available Right of Way space to various cross section elements
- Improve road geometrics and junctions
- A continuous coastal promenade walk as a main feature of the project which will encourage people to walk and cycle along the water side via public parks, plazas, children's play area
- Creating multiple type of public places through this project like Mela ground for local events, Heritage plaza with Heritage monuments part of it, Food courts for eating, Parks and gardens for recreational use and recreation activities.
- Improve road aesthetics and beautification
- Development of buildings like Information centre for tourist, public toilets, Bazaar area for shopping and small kiosks
- Key Components like viewing decks, interactive sculptures, play areas, seating provisions, cycle parking stands, Bus Shelter, Multi-purpose kiosks & indigenous plantations
- Design the landscape retaining existing trees and proposing additional plantation thereby increasing the green cover.
- Underground utilities
- Provision of street furniture like waste bins, public benches, signage etc.
- Selection of variety of lighting fixtures compatible to the nature of the site. Appropriate Night Lighting, illumination with variety of light fixtures like street light (Heritage theme poles), bollards, gobo projectors, etc. spread across the entire promenade
- Landscaping & Beautification of Summer House Garden

1.2 Scope

The scope under this contract comprises of Data collection and investigation/survey/studies, Design, Engineering, Manufacture, Supply, Transportation to site, Storage, Construction, Installation/Erection, Testing, Commissioning and putting into successful operation of the complete Facility on EPC basis with 5 year O&M including all Civil, Structural and Architectural,

Mechanical, Electrical, Control & Instrumentation and all Infrastructural work covering lighting, drains, all preparatory & temporary works for the purpose of meeting the entire scope of works.

The Contractor shall be fully responsible to ensure that the whole of the Works, including each individual component, is designed and constructed in a manner so that the System as a whole operates as a fully integrated system which is capable of achieving the required output in an efficient and economical manner, and to include all plant, equipment and accessories required for the safe and satisfactory operation of the facilities. To achieve this, the Contractor shall ensure that each individual component performs in a manner which is complimentary to that of all other components. Any accessories which are not specifically mentioned in the specifications, but which are usual or necessary for completion of the Works and successful performance of the System and facilities shall be provided by the successful Bidder within the tendered cost. The Contractor shall, to the maximum extent practical and feasible, endeavour to standardize on the manufacture and supply of plant and equipment so as to minimize the operation and maintenance requirements. The Contractor shall ensure that his designs are "maintenance-friendly" and that all items of plant and equipment are designed and installed in a manner which will facilitate routine and periodic maintenance operations.

The scope of work is **Design, Construction, Operation & Maintenance** of Coastal promenade comprises of following

- **Stretch 1:** Diu Ghoghla Bridge (0+000 Km) to Diu fort (1+525 Km) including Night lighting.
- **Stretch 2:** Summer House (0+000 Km) to Gangeshwar temple (3+426 Km) which includes MDR 6 & 7 and ODR-2,ODR-3 & ODR-5 including Night lighting
- **Stretch 3:** Landscaping & Beautification Summer House Garden Area including construction of road @ 0.200 Km. (ODR-10)

The details of scope of the above stretches is given below

1.2.1 Stretch 1: Coastal Promenade from Diu Ghoghla Bridge to Diu Fort including Night lighting

S. No.	Component wide works	Details of Scope of Works
1.	Survey	<ul style="list-style-type: none"> • The contractors are advised to inspect and examine the site and its surroundings and satisfy himself with the nature and extent of site and work, the hydrological and climatic conditions the means of access to the site, the constraints of space for stacking material/machinery, labour etc. he requires, if any, weather conditions at site, general ground/subsoil conditions etc. or any other circumstances which may affect or influence their bid. No claim, whatsoever, shall be entertained from the bidder, on the plea that the information supplied by the Owner is insufficient or is at variance to the actual site conditions. • The contractor should carry out detail Total station survey with Differential Global Positioning Systems (DGPS) TBM and marking of all spot levels, trees with trunk diameters, utility services like

S. No.	Component wide works	Details of Scope of Works
		Manhole locations, Electric boxes, poles, all buildings, compound wall and civil works before commencement of the construction activity.
2.	Cleaning of site	<ul style="list-style-type: none"> • All working areas under construction should be cleaned of unnecessary vegetation, malba, grass and any other items. Total site area of around 8.5 Hectare. • Removal of Vegetation such as grass, shrubs and Trees around 1.7 Hectare area.
3.	Dismantling and Demolition	<ul style="list-style-type: none"> • Dismantling and disposal of unserviceable materials with all leads and lift of unreinforced cement concrete / RCC / WBM/ rubble soling in road works / Pavements / rubble works. • Dismantling of Stone Masonry works, paver blocks, cobble stone floor, China mosaic floor, tile dado, etc. • Dismantling Roof works of A.C sheet, Mangalore tiles, G.I. sheet, etc • Dismantling steel work including distempering and stacking the materials with all lead and lift steel works. • Dismantling of Dilapidated doors, windows, rafters, joists etc. • Removal of existing lighting fixtures, Junction boxes and cables, RCC manhole, RCC manhole cover, etc.
4.	Excavation works	<ul style="list-style-type: none"> • Excavation up to 1.5m to 5.0m depth including sorting out and stacking of useful materials and disposing off the excavated stuff with all lead and lift for all kinds of soil. • Disposing off the un-used excavated earth, debris, malba, dismantled materials for all lead and lift/ depth out at non objectionable place as directed by Engineer-in-charge. Disposing off the excavated stuff for lead upto 3km. • Rubble fillings, Murrum and Course sand under floors, etc. works as per specification and the drawings.
5.	Road works	<ul style="list-style-type: none"> • Construction of around 10 m wide and 1.5 km in length of bitumen and cobble stone flooring at road along existing fort road length. • Road works key items include Granular sub-base (GSB), Wet mix macadam (WMM). • Providing and applying tack coat with bitumen emulsion (RS-1) using emulsion pressure distributor works. • Prime coat with bitumen emulsion (SS1) works. • Providing and laying Bituminous concrete using crushed stone

S. No.	Component wide works	Details of Scope of Works
		<p>aggregates.</p> <ul style="list-style-type: none"> • Painting the BT surface with bitumen of grade VG-40 works. • Construction of reinforced, dowel jointed, plain cement concrete pavement of M40 Broom Finish or stamping texture of flooring pattern works. • Providing and fixing pre-cast fair finish M40 concrete kerb stone works. • Supplying and fixing factory made Precast utility trench. • Supplying and fixing reinforced concrete heavy duty non-pressure NP3 and NP4 pipes works. • Providing Hot applied thermoplastic compound, cat eye (Stimsonite) on road surface wherever specified. • Providing and fixing Sign board, Direction sign, Stop sign as per given specification and the drawings. • For additional information please see Table provided on Page 45 of Schedules (Volume 2) under Section 1.2.1
6.	Tidal works	<ul style="list-style-type: none"> • Construction of New retaining wall in tidal area around 800 rmt. Construction of retaining wall works during Tidal condition. • Filling of excavation, dewatering during construction, stacking of murrum, etc. works need to be done during Tidal condition. • Guniting existing retaining wall with 6mm polyester fibre. • Filling of excavation, dewatering during construction, stacking of murrum, etc. Works need to be done during Tidal condition. • Ready Mix concrete M40 grade for RCC Retaining wall/ Diaphragm wall, steps and ramp, etc. • TMT Bar Fe 500D reinforcement for RCC works with anticorrosive treatments. • Anchoring /Re-baring with existing retaining wall during Tidal condition. • Expansion Joint, Guniting, weep holes, Water drain outlet in existing and new retaining wall.
7.	PCC and RCC works	<ul style="list-style-type: none"> • PCC works as per given structural specification and the drawings. • Providing and laying RCC of M25 & M30 grade in batch mix machine and ready mixed as per mentioned for foundation, footing, columns, walls, fins, slabs, beams, staircase, etc. as per specification and approved by design mix and latest IS 456 for all

S. No.	Component wide works	Details of Scope of Works
		<p>works as per given structural specification and the drawings.</p> <ul style="list-style-type: none"> All RCC work formworks to be executed with steel/ply shuttering for Fair/expose RCC finish.
8.	Steel and Wood works	<ul style="list-style-type: none"> TMT Bar Fe 500D reinforcement for R.C.C. work as per specification with ISI standard approved companies. Anticorrosive treatments to all HYSD/ Fe 500D bars with Fusion Bonded Epoxy Coating (FBEC) at approved plant. All types steel works as per specified steel sizes. Samples should be approved before execution. All wooden works should be seasoning, chemical treatment and randha works. Sample should be approved before execution. Stainless steel (Grade 316) as per mentioned and specified as per given specification and the drawings. Use of all forms of MS Rolled Steel Sections, ISMB, ISMC, UC, H-Section, Hollow sections, Tubular Sections, MS Plates, Chequered Plates, MS Pipes, Perforated Sheet, Flats, Bars, Angles, MS Sheet, Girder, Beam, cattle trap, deep threaded. Steel pavilions to have imported seasoned and chemically treated Malaysian hardwood. All steel work items to have Hot dip Galvanised coating confirming to Indian Standard 4579/2629/2633 with zinc coating thickness to be 86 micron. Erection of Tensile roof structure made from Hot Dip Galvanised M. S steel Structure of CHS/RHS/SHS, including HILTI Chemical Anchoring. The structure should be with rust-free or corrosion free guarantee for minimum of 10 years. Erection of Imported Tensile Jute Fabric structure and Cable system made of 100% HDPE UV Stabilized with all accessories Like Galvanized Cable & Wire Rope System with SS 304 Turn Buckle, Plate Nut Bolt Etc. The minimum warranty of the fabric should be of 10 years.
9.	Stone and Brick work	<ul style="list-style-type: none"> Uncoursed Rubble Masonry with Black hard stone/ Bela stones for foundation and super structure works. Plinth treatment to post construction / existing structure by spraying chemical solution for termite control. Precast Clay jaali works as per given specification and the drawings.

S. No.	Component wide works	Details of Scope of Works
10.	Flooring works	<ul style="list-style-type: none"> • Providing and laying of Stone works of Natural chiseled kota stone, River washed green kota stone, River Granite stone, Polished Granite stone, Mandana, Flame finish Rajula stone, etc. works as per given specification and the drawings. • Providing Edge moulding of Kota/Granite works. • Providing and laying of 10x10, 14x14, 20x14 cm Granite Cobble stone, Rajula cobble Stone, Kadappa cobble stone, Viga Blue cobble stone block works as per given specification and the drawings. • Providing and laying of Large Stone Boulders works. • Providing and laying of Vitrified and glazed tile works as per specification. • Providing and laying broken China mosaic flooring for terrace using 12 to 20mm broken pieces works as per specification and the drawings. • Providing and laying integral cement based water proofing treatment conforming to IS: 2645 for treatment of roofs, balconies, terraces, etc. works and APP waterproofing sheets as per mentioned areas. • Providing and laying of Terrazzo works.
11.	Paver, EPDM and other flooring works	<ul style="list-style-type: none"> • Providing and laying of 80mm thk. Cement concrete paver block, Shot blasted cement cobble works, Turf Cement Paver, etc. works. • Providing and laying of Tactile tile works as per given specification and the drawings. • Providing and laying of EPDM flooring works.
12.	Plaster, Painting and Finishing works	<ul style="list-style-type: none"> • Providing and carrying out Washed stone/stone grit plaster works with forming groove of uniform size from 12x12 mm and upto 25x15 mm works. Sample should be approved before execution. • Providing and applying 10mm, 15mm and 20mm thk. cement plaster works with Lapy-putty and as per mentioned paint specification. • Providing and applying hot dip galvanized coating works as per specified items and the drawings. • Providing and applying External wood paint works. • Providing material and labour for Painting with Silicone based Water Repellent (Translucent) for expose concrete /Stone

S. No.	Component wide works	Details of Scope of Works
		<p>surfaces works.</p> <ul style="list-style-type: none"> All steel structures to have epoxy based primer (Epoxy Zinc Phosphate primer) paint.
13.	Door window and opening works	<ul style="list-style-type: none"> Providing and fixing frames/shutters for any type of Aluminium works. Samples should be approved before execution. Providing material and labour for fixing 6mm/12mm thick Clear Toughen Glass works. Providing and fixing 35mm flush door / FRP frames and shutter works. Providing & fixing Louvers of Anodized Aluminium sections works. Samples should be approved before execution. Providing and fixing M.S. grill works, Gate, Railing as per mentioned specification. Samples should be approved before execution. Providing and fixing in position, interlocking rolling shutter works. Tensile roof M.S. steel structure with Tensile Jute Fabric structure works.
14.	Street furniture and signage works	<ul style="list-style-type: none"> Providing and fixing Precast Concrete Cylindrical bollard of 450mm dia x 1000mm height works. Providing and fixing seating benches like Precast Concrete designer backless benches, Precast Concrete Modular backless benches, Precast Concrete Sphere bollards, Precast Designer backless Concrete circular seating bench, and Precast Concrete Modular backless Cube Seating. Providing and fixing spot pole mounted Dustbin of 50-60 lit., Precast Concrete dustbin, etc. Providing and fixing 4/6mtr. Boom barrier - AC Motors works. Providing and fixing MS Hot dip Galvanized coating gate 1.5 to 1.8m ht. and MS Hot dip Galvanized Railing of 1.2 to 1.5 m ht. works as per specification. Samples should be approved before execution. Providing and Fixing Bicycle stand made from Stainless Steel 316 works. STONE-CORTEN STEEL SIGNAGE: Providing and fixing sign boards made out of 2 mm Corten steel sheet. Providing and fixing sign boards made out of 2.5mm S.S 304 sheet; size 45 x 45cms individual letters works.

S. No.	Component wide works	Details of Scope of Works
		<ul style="list-style-type: none"> • Providing and fixing precast tree pit cover around the tree pit works.
15.	Play equipment's	<ul style="list-style-type: none"> • Providing and fixing Double swings, see-saw, Merry-Go- Round, Monkey bar with loops, Air walker, Cycling fitness rider, double surf board, etc. • Providing & fixing Multi Children-Eucalyptus play zone and Multi Children- Caravella play zone equipment.
16.	Bus Shelter	<p>I. Provision of 7 (Seven) Smart Bus Shelter facilities at identified locations</p> <p>Supply and install Bus Shelter that shall serve as an all-weather shade for the bus commuters. It shall be made of SS/ MS frame work, powder coated metal roofing, SS metal seating, toughened glass/ acrylic and electronic circuit to control its lighting. The structure shall be designed to withstand wind load according to regulations and as per IRC codes.</p> <p>Bus stop shall consist of an advertisement panel ((back lit) and one backlit info panel and 1 digital panel/ VMS showing bus status update as per traffic department GPS system. Space provision for all 3 is shown in the indicative design provided in the RFP.</p>
17.	Horticulture and landscape works	<ul style="list-style-type: none"> • Providing and planting with including cost of the tree, excavation of 0.6x0.6x0.6 m pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 2 m height and min. 20 cm girth healthy saplings with required stacking and maintaining it for 3 year for trees works. • Providing and planting with including cost of the shrubs, excavation of 0.3x0.3x0.3/0.5x0.5x0.5 m pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 0.6 m height healthy saplings with required stacking and maintaining it for 3 year for shrub works. • Providing and planting with including cost of the ground covers, excavation of 0.3x0.3x0.3 m pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 0.6 m height healthy saplings with required stacking and maintaining it for 3 year for Ground cover works. • Cleaning of earth and back filling with 150mm of garden soil with 25 mm of farmyard manure works. • Supplying, stacking and spreading of sludge / well decayed farm

S. No.	Component wide works	Details of Scope of Works
		yard manure works.
18.	Demolition and Salvage value	<ul style="list-style-type: none"> Salvage value from the demolition of existing building/ structures/ compound wall/electric post including cleaning the site from all debris. Material recovered from the demolition work would be the property of the contractor.
19.	Sanitary Fixture, fittings	<ul style="list-style-type: none"> Providing and fixing sanitary fixture and C.P. Fittings as per specified in technical specification and the plumbing drawing.
20.	Water supply	<ul style="list-style-type: none"> Providing and fixing sanitary ware and C.P fittings as per specification and the plumbing drawings. Providing and fixing water supply CPVC (SDR 13.5) pipe as per specification and the plumbing drawings. Providing and fixing water supply UPVC (SCH-80) pipe as per specification and the plumbing drawings. Providing, lowering, laying and jointing HDPE pipe as per specified in technical specification and the plumbing drawing. Providing, fixing Gray water supply MDPE pipe as per specified in technical specification and the plumbing drawing. Providing, fixing ball valves for water supply system as per specified in technical specification and the plumbing drawing. Providing, fixing butterfly valves for water supply system as per specified in technical specification and the plumbing drawing. Providing, fixing Air release valves for water supply system as per specified in technical specification and the plumbing drawing. Providing, fixing Ball float valves for water supply system as per specified in technical specification and the plumbing drawing. Providing, fixing PVC double coated overhead tank (Sintex) for water supply system as per specified in technical specification and the plumbing drawing. Providing, fixing Garden hydrant as per specified in technical specification and the plumbing drawing. Providing & Fixing of factory made Precast Chamber, for garden hydrant, having size (W X L) with variable (H) mm as per specified in technical specification and the plumbing drawing. Providing & fixing of factory made Precast Chamber, for Valve chamber, having size (W X L) with variable (H) mm as per specified in technical specification and the plumbing drawing. Providing & erecting RCC underground water storage tank as per

S. No.	Component wide works	Details of Scope of Works
		specified in technical specification and the plumbing drawing.
21.	Landscape and Irrigation work	<ul style="list-style-type: none"> • Providing, laying and fixing UPVC 6kg/cm² agriculture pipe for landscape work as per specified in technical specification and the plumbing drawing. • Providing and fixing Pop up sprinkler with saddle services and swing joint assembly as per specified in technical specification and the plumbing drawing. • Providing and fixing drip irrigation system with Plain drip pipe, micro tubing with dripper as per specified in technical specification and the plumbing drawing. • Providing and fixing Pop up sprinkler with saddle services and swing joint assembly as per specified in technical specification and the plumbing drawing. • Providing and fixing ball valve, isolation valve and quick coupling valve with required size valve box as per specified in technical specification and the plumbing drawing. • Providing and fixing air release valve with required size valve box as per specified in technical specification and the plumbing drawing. • Providing and fixing water filtration system for sprinkler system as per specified in technical specification and the plumbing drawing. • Providing and fixing pumping system with all related accessories for sprinkler system as per specified in technical specification and the plumbing drawing. • Providing and fixing automation system for landscape sprinkler system as per specified in technical specification and the plumbing drawing.
22.	Filtration unit, Pumping unit, automation equipment	<ul style="list-style-type: none"> • Providing Filtration unit, Pumping unit, Automation equipment arrangements as per specification and the drawings.
23.	Fire fighting	<p>Providing Firefighting hydrant and jockey pumps with all related accessories as per specification and the Firefighting drawings.</p> <p>Providing and fixing pressure vessel as per specification and the Firefighting drawings.</p> <p>Providing and fixing fire alarm motor gong as per specification and the Firefighting drawings.</p> <p>Providing and fixing fire panel as per specification and the Firefighting</p>

S. No.	Component wide works	Details of Scope of Works
		<p>drawings.</p> <p>Providing and fixing fire alarm motor gong as per specification and the Firefighting drawings.</p> <p>Providing, laying and fixing M.S. ERW Black Heavy duty (Class C) Pipes as per specification and the Firefighting drawings.</p> <p>Providing and fixing M.S. ERW Black Heavy duty (Class C) buried pipes protection as per specification and the Firefighting drawings.</p> <p>Providing and fixing butterfly valves as per specification and the Firefighting drawings.</p> <p>Providing and fixing hydrant stand pipe, landing valve, rubber hose pipe, short branch pipe, orifice plate and hose cabinet as per specified in technical specification and the plumbing drawing.</p> <p>Providing and fixing Fire brigade connection, 2-way connection and Siamese connection for fire brigade as per specified in technical specification and the plumbing drawing.</p> <p>Providing and fixing fire extinguisher and axe as per specified in technical specification and the plumbing drawing.</p>
24.	Electrical	<ul style="list-style-type: none"> • Providing Electrical arrangements as per specification and the electrical drawings.
25.	Sanitary Fixture, fittings	<ul style="list-style-type: none"> • Providing and fixing sanitary fixture and C.P. Fittings as per specified in technical specification and the plumbing drawing.
26.	Drainage System	<ul style="list-style-type: none"> • Providing, laying and fixing UPVC drainage pipes as per specified in technical specification and the plumbing drawing. • Providing and fixing PVC P-trap with height riser for internal drainage as per specified in technical specification and the plumbing drawing. • Excavation up to 1.5m to 5.0m depth including sorting out and stacking of useful materials and disposing off the excavated stuff with all lead and lift for all kinds of soil. • Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers, in depth consolidating each deposited layer by ramming and watering. • Providing, lowering, laying and jointing of DWC pipe for external drainage as. per specified in technical specification and the plumbing drawing. • Providing and fixing Gully trap for drainage system as per specified in technical specification and the plumbing drawing.

S. No.	Component wide works	Details of Scope of Works
		<ul style="list-style-type: none"> • Providing and fixing Sewer Trap (Intercepting trap) for drainage system as per specified in technical specification and the plumbing drawing. • Providing & Fixing of factory made Precast Chamber, having size(W X L) with variable (H) mm as as per specified in technical specification and the plumbing drawing. • Providing and fixing Grease Trap for kitchen of food court area as per specified in technical specification and the plumbing drawing. • Providing, lowering, laying and jointing of RCC Hume pipe (NP3) for services passing as. per specified in technical specification and the plumbing drawing.
27.	Storm water drain	<ul style="list-style-type: none"> • Providing and fixing UPVC (Type A) Storm water internal drain pipes as per specified in technical specification and the plumbing drawing. • Providing and fixing Khurras for storm water internal drain as per specified in technical specification and the plumbing drawing. • Providing and fixing PVC cowl for storm water internal drain as per specified in technical specification and the plumbing drawing. • Providing, laying and fixing of factory made Precast U shape type drain channel with lid having (W) X (H) clear inner dimensions in required lengths as per specified in technical specification and the plumbing drawing. • Providing and fixing of rainy filter for roof drain as well surface drain as per specified in technical specification and the plumbing drawing. • Providing, laying and fixing Aco surface drain channel for mela ground area as per specified in technical specification and the plumbing drawing. • Providing, laying and fixing of factory made Precast Box type drain having (W) X (H) clear inner dimensions in required lengths as per design confirming to IS requirements
28.	Storage tanks and septic tanks	<ul style="list-style-type: none"> • Providing and erecting underground water storage tanks as per specified in technical specification and the plumbing drawing. • Providing and erecting underground Septic tank for sewage collection as per specified in technical specification and the plumbing drawing. <p><i>Note: Sizes shall be arrived by the EPC Contractor.</i></p>
29.	Filtration unit,	<ul style="list-style-type: none"> • Providing Filtration unit, Pumping unit, Automation equipment

S. No.	Component wide works	Details of Scope of Works
	Pumping unit, Automation equipment	arrangements as per specification and the drawings.
30.	Pumping unit, Borewell	<ul style="list-style-type: none"> • Providing and fixing water supply and landscaping pumping unit as per specified in technical specification and the plumbing drawing. • Providing and fixing underground tank accessories likewise flanges and water level indicator as per specified in technical specification and the plumbing drawing. • Drilling bore well as per specified in technical specification or geological details and the plumbing drawing. • Providing, lowering and fixing bore well column and casing pipe as per specified in technical specification and the plumbing drawing. • Providing and fixing submersible pump set for water draw out as per specified in technical specification and the plumbing drawing.
31.	Transformers	<ul style="list-style-type: none"> • Supply, installation, testing & commissioning of 250KVA transformer with required two pole structure or plinth with necessary base and foundation. Contractor has to follow the approved make list. Contractor has to dismantle, shift, install and test the existing transformer wherever required. • Transformer must be of the latest IS norms and liasioning of the power shall be on contractor's scope. Contractor must submit the data sheet and get the approval of the make from the consultant/site in charge. <p>Note for Information: Transformer makes (indicative) – Crompton/ Voltamp/ Bhel/ Areva /ABB/Kirloskar/ABB/Schneider. However, contractor must submit the data sheet and get the approval of the make from the Authority Engineer.</p>
32.	Panels & Accessories	<ul style="list-style-type: none"> • Supply, installation, testing and commissioning of all kind of indoor and outdoor panels fabricated with weather proof powder coated paint as per latest IS norms. All the connections and accessories must be weather proof for outdoor panels. All indoor/outdoor panels must have floor stand covering the stand and bottom entry with fabrication sheet. • Contractor must provide fabricated junction box with weather proof terminations at appropriate distance to avoid higher voltage drop for cabling of all kind of light and sub distribution boards. Contractor has to get the approval of the data sheets and the GA

S. No.	Component wide works	Details of Scope of Works
		drawings from the consultant/site incharge. Contractor has to follow the approved make list.
33.	Cables & Pipes	<ul style="list-style-type: none"> Contractor has to do supply, installation, testing and commissioning of aluminum/copper armoured cables in appropriate size of HDPE pipe at every location for outdoor power requirement. Underground cables must be buried at sufficient depth shown in the drawings, as per the IS norms. For power requirement like junction box to the electrical fittings contractor must provide aluminum/copper armoured/flexible cable in appropriate size of HDPE pipe. For light poles, aluminum armoured cables must be used in HDPE pipe. Contractor has to follow the approved make list.
34.	Manholes/Chambers	<ul style="list-style-type: none"> Supply, installation and commissioning of all size of manholes and chambers must be of pre cast concrete. Contractor has to provide manholes at appropriate distance considering installation, future maintenance and provision purpose. Contractor has to follow the approved make list. Sizes of the manholes must be (1) 1000Lx1200Wx1275Dmm size, (2) 900Lx900Wx1000Dmm and (3) 750Lx750Wx600Dmm. Contractor can use any three sizes of manholes for electrical requirements including weather proof FRP covers considering sufficient weight load for public and/or vehicle movement. <p>Note – Sizes are indicative and can be modified as per the design of the contractor.</p>
35.	Wires & Conduits	<ul style="list-style-type: none"> Supply, installation, testing and commissioning of FRLS wires in appropriate size of medium duty rigid pvc conduits as per the latest IS norms. Contractor has to use conduits for all indoor electrification. All conduits must be concealed in slab or buried in floor but must not be open. Contractor has to follow the approved make list.
36.	Distribution Boards	<ul style="list-style-type: none"> Supply, installation, testing and commissioning of all type of weather proof metal double door distribution box for each zone. Contractor has to distribute the power zone wise for separate operation and maintenance. All the connections must be as per the IS norms providing colour codes and numbering for each circuits. Contractor has to follow the approved make list. All three-phase/single phase distribution boards must be concealed in wall. Earthing wire must be provided for all distribution boards. All switchgear including MSB/MCCB/ELCB and busbar must be connected as per the standard norms. Contractor must get the approval of the sample from the

S. No.	Component wide works	Details of Scope of Works
		consultant /site in charge.
37.	Indoor Light Fixtures, Fan, Exhaust Fan, Ventilation Fan & Other Fittings	<ul style="list-style-type: none"> • Supply, installation, testing and commissioning of all type of indoor light fixtures with all accessories and appropriate connections. Light fixtures shall include concealed/open fittings for ceiling and wall. Contractor has to finish the surface in a proper manner after fixing the fixtures. All light fixtures must be LED fittings and contractor has to maintain the lux level as per the standard norms. • Supply, installation, testing and commissioning of all types of Fan, Exhaust Fans & Ventilation fans with all accessories and connections. Contractor must get the approval of the sample before the installation from the consultant /site in charge.
38.	Outdoor Decorative Lights, Post Top Poles & Street Poles	<ul style="list-style-type: none"> • Supply, installation, testing and commissioning of decorative light fixtures, post top lanterns, arm bracket poles and street light poles including required RCC base and foundation. All the poles and fixtures must have weather proof colour coating and connections with earthing. • All the outdoor light fittings must be of European/International brands. Contractor has to follow the standards during the installation of such fixtures. Also contractor has to provide minimum 3 years of warranty for all those fitting and poles. • Contractor must get the approval of the sample before the installation from the site in charge <p><i>Note: The quantity would depend on the pole height, type of fixture, lux level and spacing as per final design. Quantities & sizes shall be arrived by the EPC contractor.</i></p>
39.	Highmast	<ul style="list-style-type: none"> • Supply, installation, testing and commissioning of Highmast including all kind of accessories, connections and RCC base. Contractor has to use the highmast at certain public areas for illumination and safety purpose considering public and vehicle movement. • Contractor has to maintain the lux levels as per the standard norms and according to which the LED light fitting used. Contractor must submit the data sheet and get the approval of the sample before the installation from the site in charge. <p><i>Note: The indicative levels are being provided. These may vary further during design finalization & execution stage.</i></p> <p><i>For information purpose: Lux level will be dependent on brand selected, type of fixture design and spacing. Basic high mast lux level should be 30-50 lux average per sqm on floor surface. 30 lux for</i></p>

S. No.	Component wide works	Details of Scope of Works
		<i>roadside highmast and 50 lux for sea side highmast.</i>
40.	LV and MV Cable Network	<ul style="list-style-type: none"> Providing and Laying LV and MV cable networking as per requirement and specification.

1.2.1.1 Proposed Features of 6 Zones in the Stretch 1 are shown below

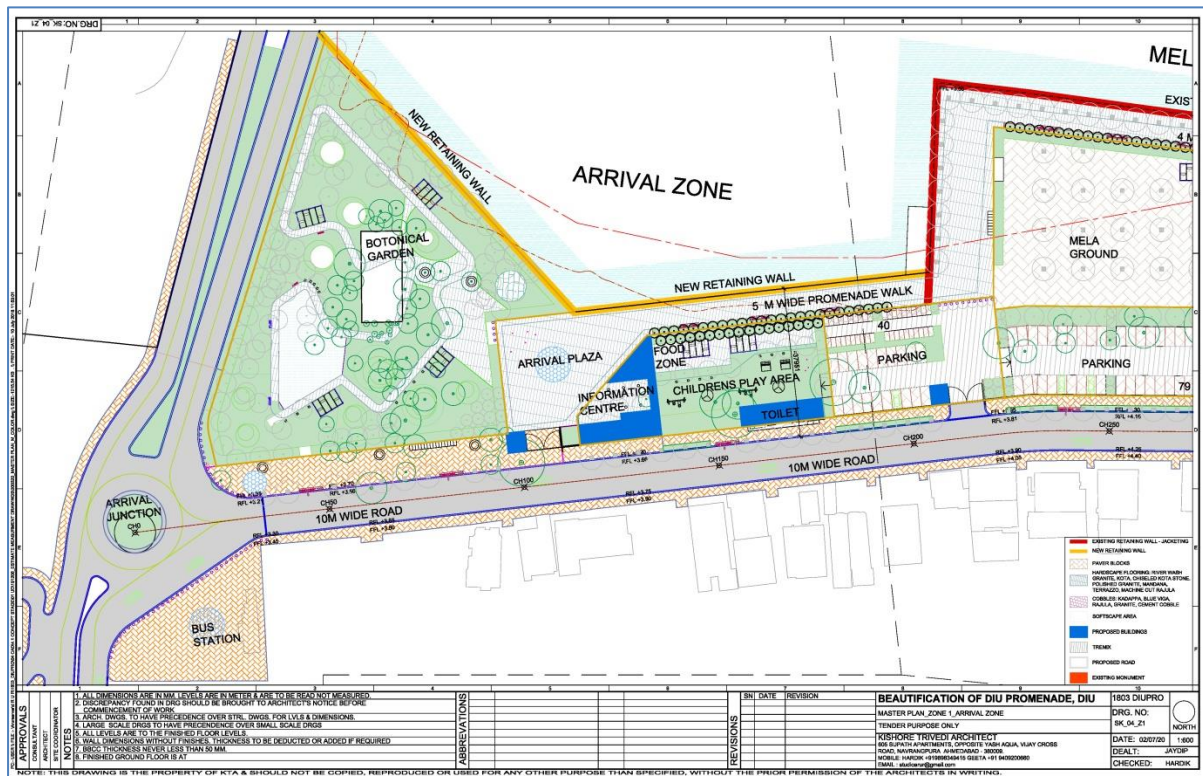


Figure 5: Master Plan of Zone 1



Figure 6: Botanical Garden at the arrival area junction (3d view) – Zone 1



Figure 7: Arrival area and information center (3d view) – Zone 1

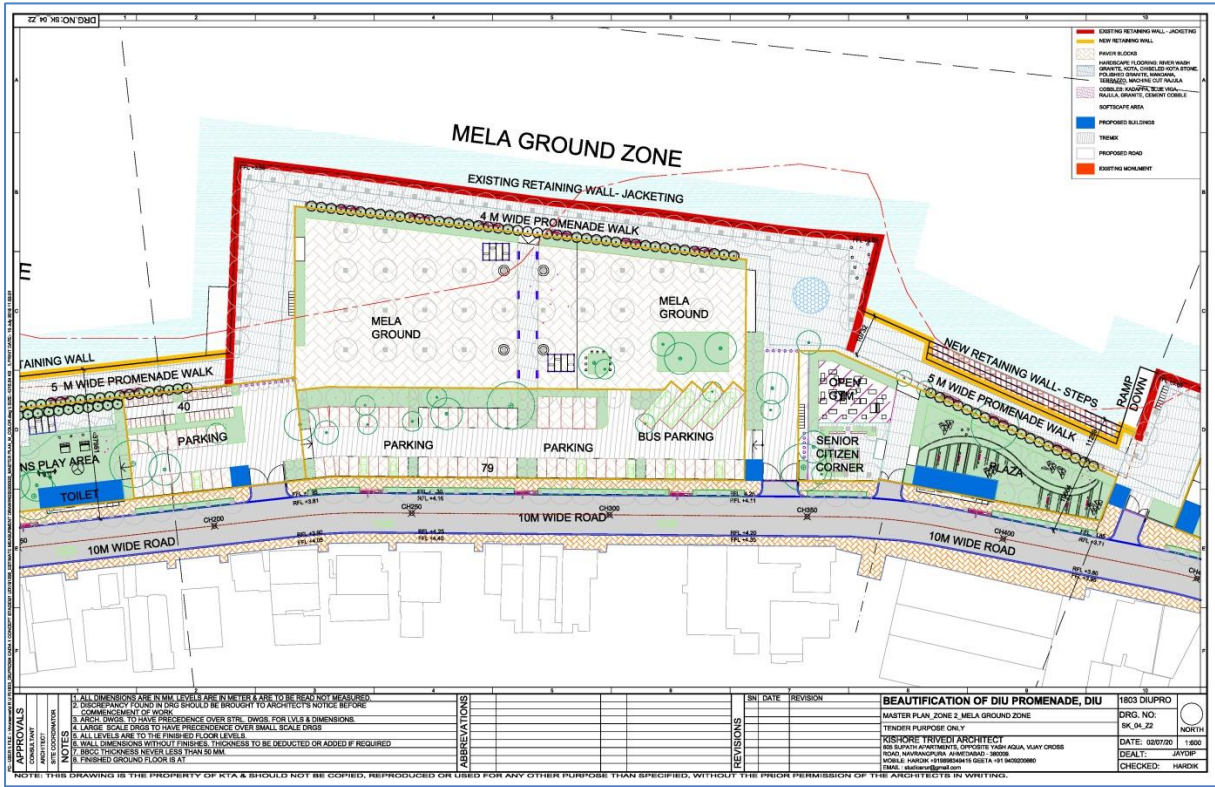


Figure 8: Master Plan of Zone 2

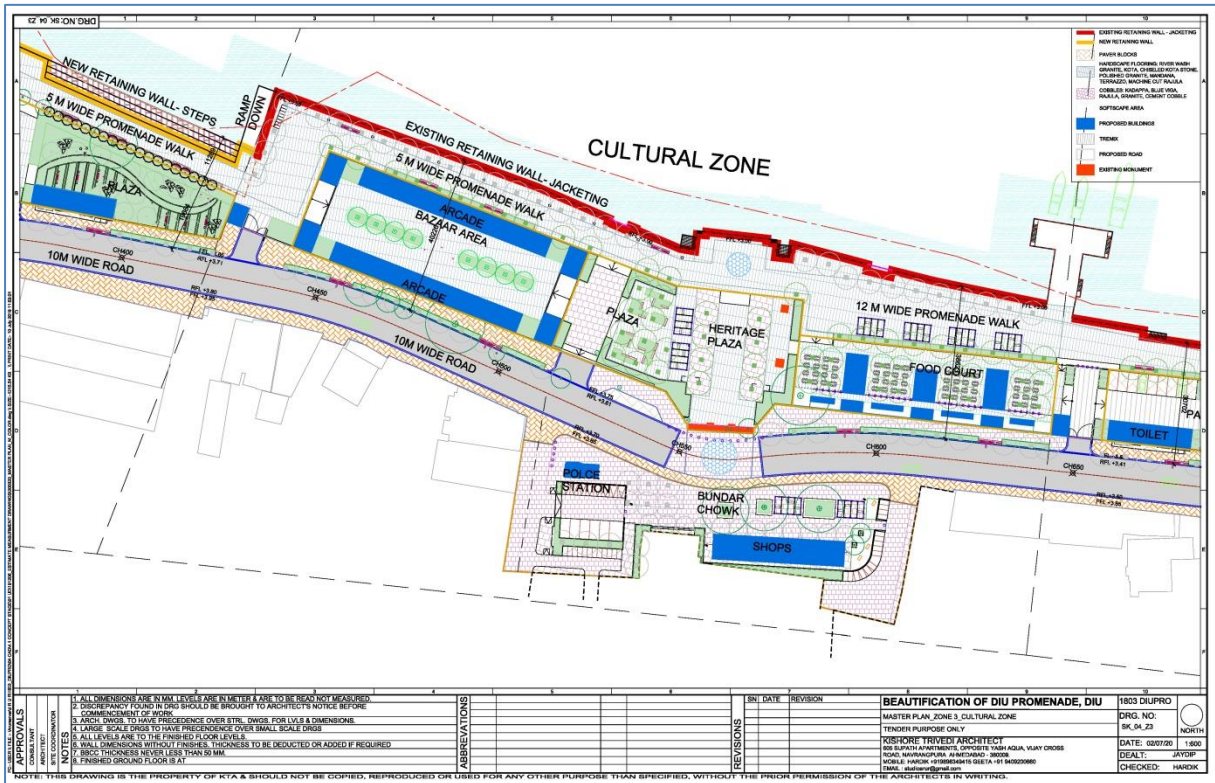


Figure 9: Master Plan of Zone 3

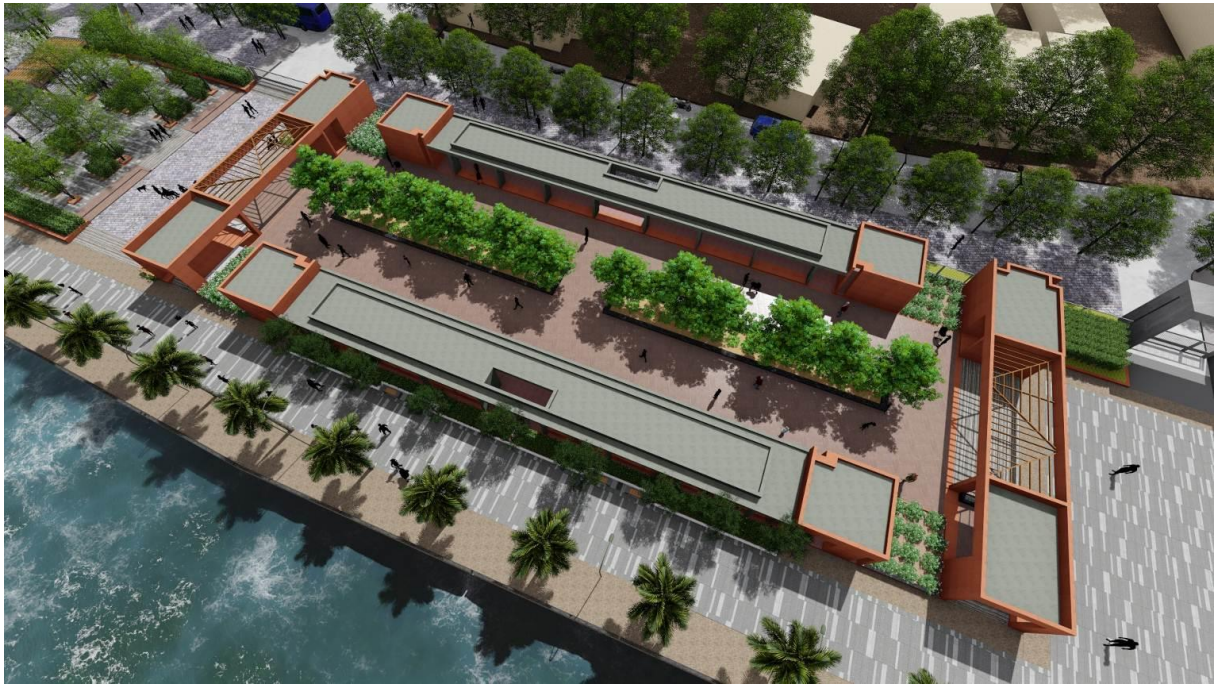


Figure 10: Bazaar area (3d view) – Zone 3



Figure 11: Heritage plaza – Zone 3



Figure 12: Heritage plaza seating area with pavilion



Figure 13: Bundar chowk junction with heritage plaza – Zone 3



Figure 14: Bundar chowk plaza with Pavilion and shops area



Figure 15: Food court area with seating arrangements

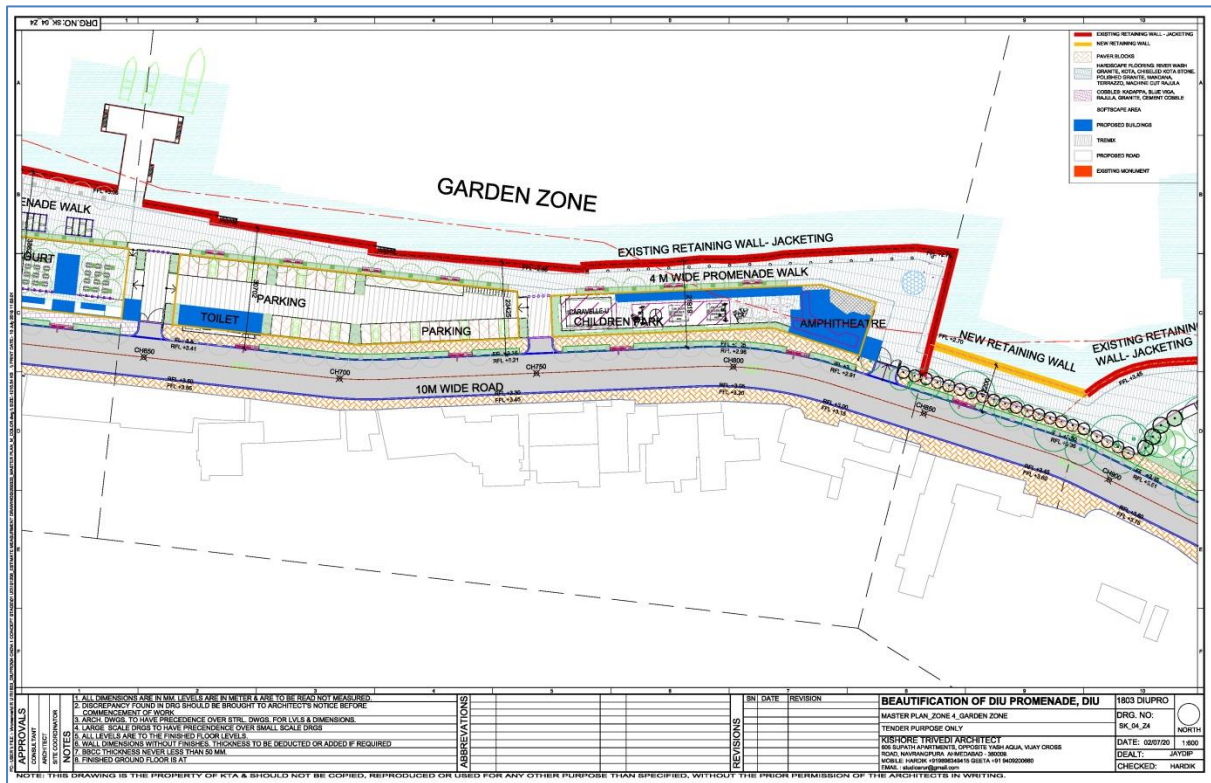


Figure 16: Master Plan of Zone 4



Figure 17: Children's park with amphitheater

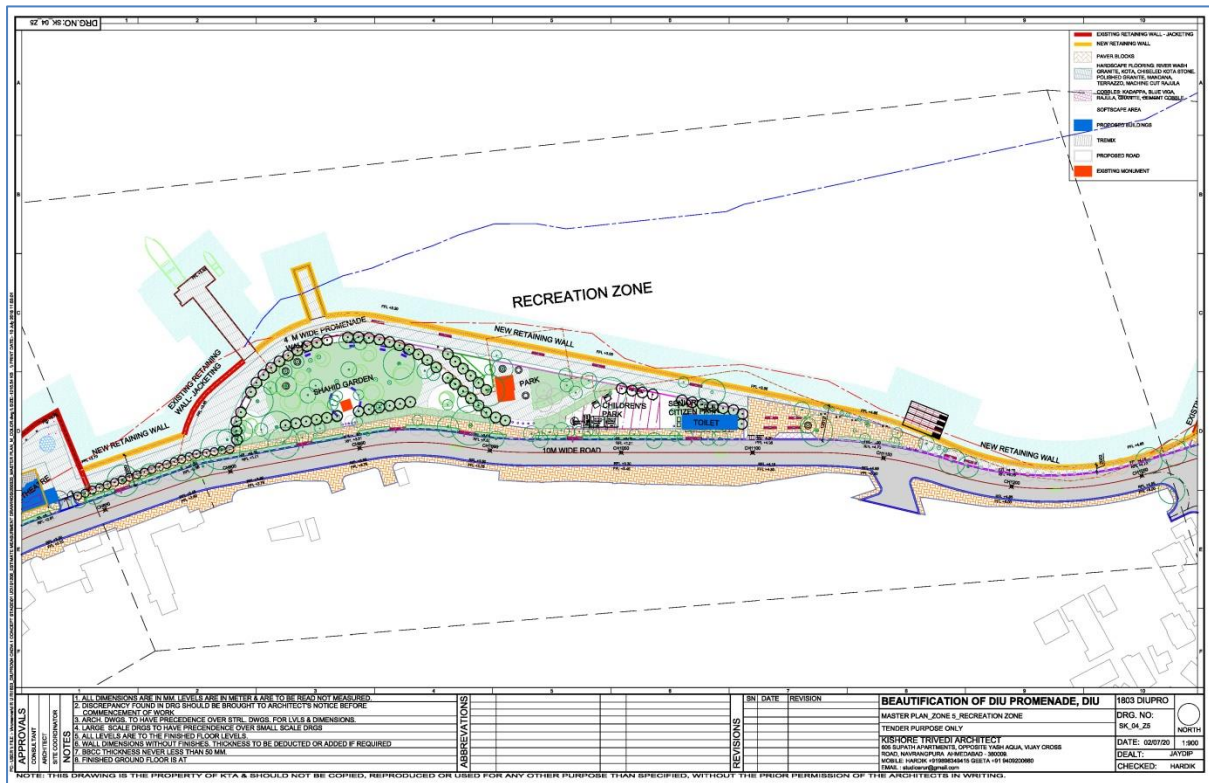


Figure 18: Master Plan of Zone 5



Figure 19: Shahid garden with horticulture and landscape

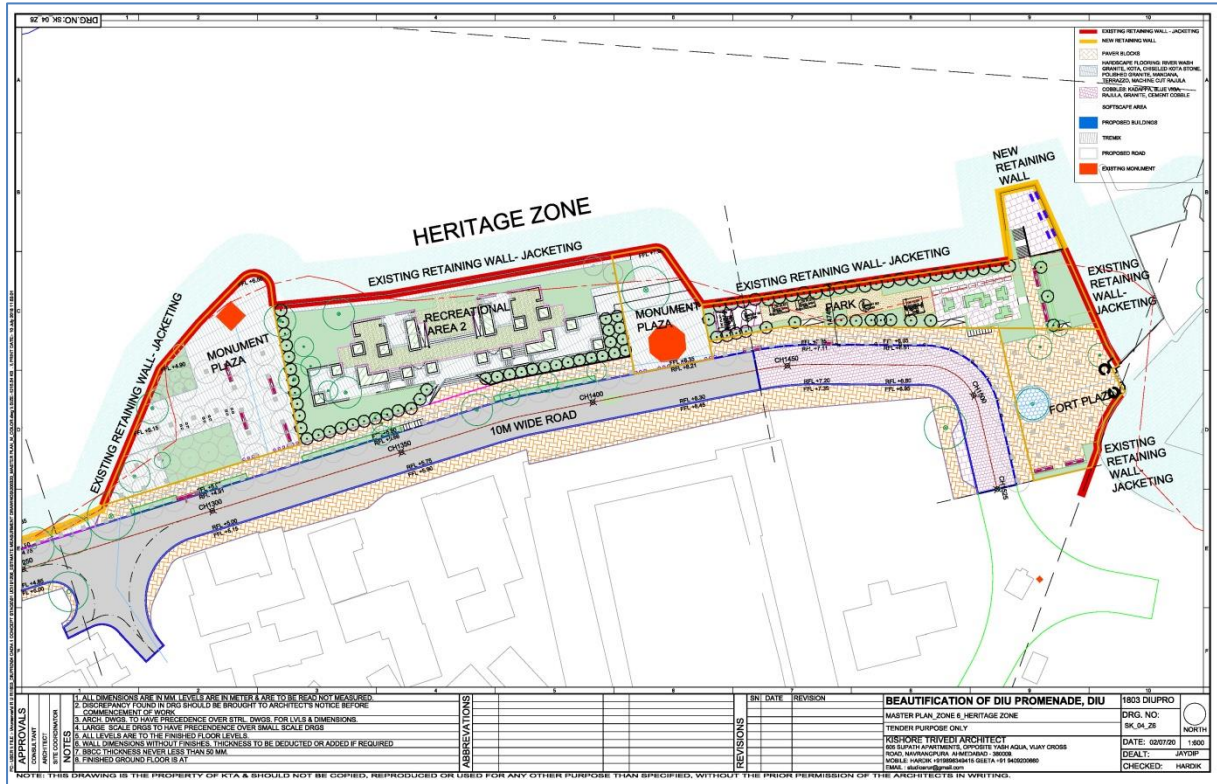


Figure 20: Master Plan of Zone 6

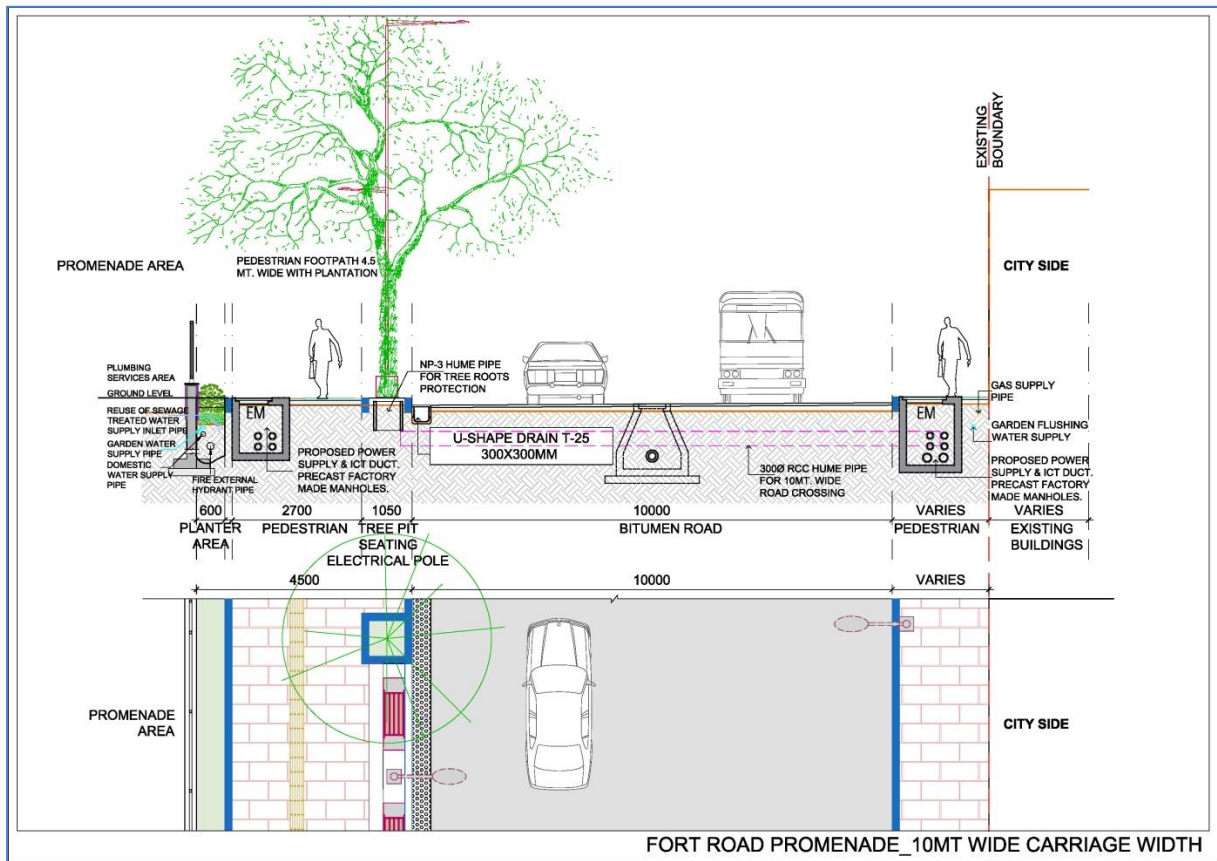
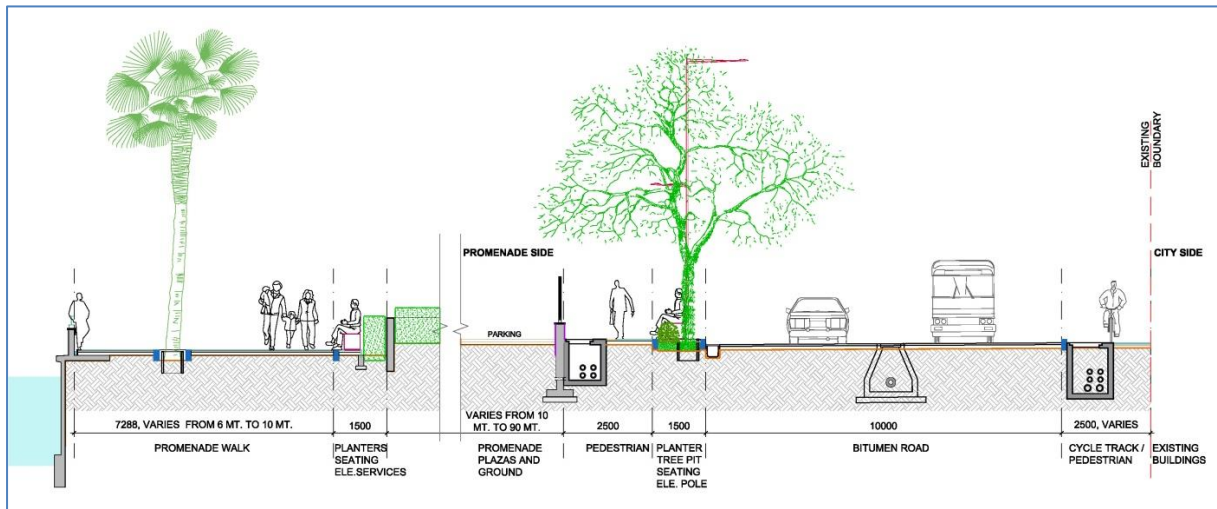


Figure 21: Cross Section of Fort Road Promenade



Figure 22: Pedestrian walk



Figure 23: Promenade walk with Steel and wood pavilion and seating area



Figure 24: Entry gate with security cabin

HARDSCAPE

PROMENADE AREA

KOTA STONE

AREA: TO DEFINE THE MAIN WALKWAY OF THE PROMENADE
 PRODUCT: KOTASTONE 30MM THICK
 PRODUCT CODE: ----
 SIZE: AS PER ARCHITECT'S SPECIFICATION
 COLOUR: AS PER ARCHITECT'S SPECIFICATION
 FINISH: AS PER ARCHITECT'S SPECIFICATION

GRANITE STONE

AREA: TO DEFINE SEATING BAYS
 PRODUCT: GRANITE STONE 30MM THICK
 PRODUCT CODE: ----
 SIZE: AS PER ARCHITECT'S SPECIFICATION
 COLOUR: AS PER ARCHITECT'S SPECIFICATION
 FINISH: AS PER ARCHITECT'S SPECIFICATION

STONECRETE

AREA: ----
 PRODUCT: ----
 PRODUCT CODE: ----
 SIZE: ----
 COLOUR: AS PER ARCHITECT'S SPECIFICATION
 FINISH: AS PER ARCHITECT'S SPECIFICATION

SMALL TILES

AREA: TO DIFFERENTIATE BETWEEN TWO MATERIALS
 PRODUCT: PAVIT TILE
 PRODUCT CODE: ----
 SIZE: 100X100X12 MM
 COLOUR: AS PER ARCHITECT'S SPECIFICATION
 FINISH: AS PER ARCHITECT'S SPECIFICATION



Figure 25: Hardscape materials

STREET FURNITURE

CONCRETE BENCH

AREA: ALONG THE PROMENADE
 PRODUCT: TDW
 PRODUCT CODE: RCC COBE-1
 SIZE: 1180L x 480W x 440H mm
 COLOUR: AS PER ARCHITECT'S SPECIFICATION
 FINISH: AS PER ARCHITECT'S SPECIFICATION



CYCLE STAND

AREA: ALONG THE PROMENADE
 PRODUCT: CHEVRON INC
 PRODUCT CODE: BICYCLE STEEL RACK SS 304
 SIZE: 32" HEIGHT X 119" WIDTH X 10' LENGTH
 COLOUR: STAINLESS STEEL
 FINISH: AS PER ARCHITECT'S SPECIFICATION



BARRIERS- CONCRETE BOLLARDS

AREA: TO CONTROL ACCESS FOR PROMENADE
 SIZE: AS PER ARCHITECT'S SPECIFICATION
 COLOUR: AS PER ARCHITECT'S SPECIFICATION
 FINISH: AS PER ARCHITECT'S SPECIFICATION



Figure 26: Street furniture

PLAY AREAS

CHILDREN'S PLAY AREA COMPONENTS

FIXED PLAY

AREA: CHILDREN'S PLAY AREA / PARKS
 PRODUCT:
 PRODUCT CODE:
 SIZE:
 COLOUR: AS PER ARCHITECT'S SPECIFICATION
 FINISH: AS PER ARCHITECT'S SPECIFICATION



RUBBER FLOORING

AREA: CHILDREN'S PLAY AREA / PARKS
 PRODUCT: ECOFLEX
 PRODUCT CODE: PLAYSAFE EPDM
 SIZE: 38MM
 COLOUR: AS PER ARCHITECT'S SPECIFICATION
 FINISH: AS PER ARCHITECT'S SPECIFICATION



PLAY EQUIPMENT

AREA: CHILDREN'S PLAY AREA / PARKS
 PRODUCT: OKPLAY
 PRODUCT CODE: OUTDOOR PLAY EQUIPMENT
 SIZE: AS PER ARCHITECT'S SPECIFICATION
 COLOUR: AS PER ARCHITECT'S SPECIFICATION
 FINISH: AS PER ARCHITECT'S SPECIFICATION



Figure 27: Play area materials and equipments

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
	Location	From Goghla bridge to near Fishermen jetty	From Fishermen jetty till Jivabhai Supermarket	From Jivabhai supermarket to Bunder jetty	Bunder jetty to DMC building	DMC building to PWD building	PWD building to Diu Fort
	Approx. area in Sqm	15238 sqm	18090 sqm	14625 sqm	8310 sqm	15667 sqm	12570 sqm
	Chainage/ Length	Ch 0-190 m	Ch 190-420 m	Ch 420- 640 m	Ch 640-850 m	Ch 850 -1260 m	Ch 1260-1525 m
	Land ownership	Private + Government land	Government land + leased property	Government land with existing building like Diu tourism and Port office	Government land ownership	Government ownership with building like Police station	Government and Private land ownership near Diu fort.
Proposed Road and Pavement works							
1	Road carriage width	10 m wide Bitumen road with local storm water pre-cast channel and kerbing	10 m wide Bitumen road with local storm water pre-cast channel and kerbing	10 m Bitumen road with Rajula, Granite cobble stone table top surface at Bunder Chowk	10 m wide Bitumen road with local storm water pre-cast channel and kerbing	10 m wide Bitumen road with local storm water pre-cast channel and kerbing	10 m wide Bitumen road with local storm water pre-cast channel and kerbing till Fort Circuit house, then 10m wide Rajula cobble stone road.
	CC Pavement road	Existing city access road connecting Fort Road to be developed in CC M40 pavement for a length of 6m. Internal roads to the Promenade and Parking areas in RCC road.					

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
		6m wide CC Parking road	9m CC access road, 7.5 m parking road	6m and 9m access road. Around 7m wide access road to Bunder chowk street	3 No.s 6m wide access road	NA	NA
	Parking Provision	20 4-wheeler, 40 bike, 20 cycle	59 4-wheeler, 4 bus, 5 mini bus, 20 cycle	8 Richshaw, 6 Taxi, 27 bike, 20 cycle	41 4-wheeler, 20 bike, 20 cycle	10 cycle	20 cycle
2	Junctions	Key 4 junction design at Arrival area, Bunder chowk, PWD and Diu Fort junction to be designed					
3	Pavement						
	Northern side-Avg.	Flame finish Rajula flooring- 2.5 - 7.5 m wide + 1.5 m green buffer	2.5m flame finish Rajula stone paving + 1.5 m green buffer	2.5m flame finish Rajula stone paving + 1.5 m green buffer	2.5m flame finish Rajula stone paving + 1.5 m green buffer	avg. 7.5 m flame finish Rajula stone and river wash Granite paving + 1.5 m green buffer	2.5m- 5.0m flame finish Rajula stone paving
	Southern side-Avg.	2.5m min. avg flame finish Rajula stone cycle lane/footpath	2.5m min. avg flame finish Rajula stone cycle lane/footpath	2.5m min. avg flame finish Rajula stone cycle lane/footpath	2.5m min. avg flame finish Rajula stone cycle lane/footpath	2.5m min. avg flame finish Rajula stone cycle lane/footpath	2.5m min. avg flame finish Rajula stone cycle lane/footpath
4	Signage	Road signages, direction signages, parking signages, Cateye, painting of lines/dashes/arrows/zebra crossing,					

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
Proposed Hardscape Surfaces and flooring							
1	For Plazas, Gardens	Riverwashed Granite/Kota flooring mainly, EPDM	Paver blocks, Riverwashed Granite/Kota flooring mainly, Mandana stone, EPDM	Riverwashed Granite/Kota/Mandana flooring. Rajula/Granite cobble flooring.	Riverwashed Granite/Kota flooring, Paver block, EPDM, Terrazzo	Riverwashed Granite/Kota flooring mainly, Rajula/Granite cobble, Shot blasted pavers,	Granite/Mandana, Eco pavers, EPDM flooring. Granite/Kadappa cobble.
Existing retaining/Jetty wall							
1	Works on Existing wall	NA	249 rmt beautifacaiton works	240 rmt beautifacaiton works	244 rmt beautifacaiton works	37 rmt beautifacaiton works	173 rmt beautifacaiton works
	New sea side Tidal retaining wall	188 rmt new Retaining wall	86 rmt new retaining wall with steps/Ghats 106 rmt	NA	NA	452 rmt new Retaining wall + 35 rmt steps/ghats	45 new retaining wall + 165 rmt bela stone strenghening wall
Proposed buildings/ Plazas/Gardens							

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
	Buildings/ area in sqm	<ul style="list-style-type: none"> Information centre-450 sqm 6 Steel-wood pavilion Toilet- 109 sqm 1 Security cabin- 57 sqm each 	<ul style="list-style-type: none"> 2 Steel-wood pavilion Toilet- 109 sqm 2 Security cabin- 57 sqm each 	<ul style="list-style-type: none"> Bazaar building area-2440 sqm 42 Hawker Food court with seating-1185 sqm 8 Steel-wood pavilion Small toilet Bunder chowk development with 11 no.s shops and Police Chowki 1 Security cabin- 57 sqm each 	<ul style="list-style-type: none"> 2 Security cabin- 57 sqm each Toilet- 109 sqm Stone masonry pavillion 	<ul style="list-style-type: none"> Toilet- 109 sqm 	
	Plaza/Hardscape	<ul style="list-style-type: none"> Arrival plaza 	<ul style="list-style-type: none"> Mela ground 2 No.s Plaza 	<ul style="list-style-type: none"> Heritage plaza 	<ul style="list-style-type: none"> Informal Amphitheatre 	<ul style="list-style-type: none"> Broad walk 	<ul style="list-style-type: none"> 2 Monument plaza Fort plaza with kiosk facility
	Garden/Park/Children's park	<ul style="list-style-type: none"> Botanical Garden Children play 	<ul style="list-style-type: none"> Open Gym Senior Citizen corner 	<ul style="list-style-type: none"> Children play area Pocket park 	<ul style="list-style-type: none"> Children's park 	<ul style="list-style-type: none"> Shahid Garden redevelopment 	<ul style="list-style-type: none"> Children's park Recreational area 2

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
		area	<ul style="list-style-type: none"> Pocket park 			<ul style="list-style-type: none"> Senior citizen corner Children play area 	<ul style="list-style-type: none"> Pocket park
		Note: All zones would have common elements such as continuous Promenade walk, Street furniture, Flooring works, Compound wall, Horticulture and Landscape elements, Utility works like electrical, Storm water, Plumbing, Firefighting etc.					
	Horticulture	<ul style="list-style-type: none"> Providing and planting with including cost of the tree, excavation pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 2 m height and min. 20 cm girth healthy saplings with required stacking and maintaining it for 3 year for trees works. Providing and planting with including cost of the shrubs, excavation pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 0.6 m height healthy saplings with required stacking and maintaining it for 3 year for shrub works Providing and planting with including cost of the ground covers, excavation pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 0.6 m height healthy saplings with required stacking and maintaining it for 3 year for Ground cover works. Cleaning of earth and back filling with 150mm of garden soil with 25 mm of farmyard manure works. Supplying, stacking and spreading of sludge / well decayed farm yard manure works. 					
	Proposed elements						

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
	Civil work elements	<ul style="list-style-type: none"> • New Promenade walk side wall and railing 1 m high • Fort road side compound wall+railing is proposed for entire 1.55 km stretch- 1.8m high • 1.2-1.5m high Landscape mounds in parks and gardens • Vertical poles in MS steel 6m high • Pathways in green spaces • Rubble masonry Stone fins near Childrens park 					
	Street furniture/ Signages	<ul style="list-style-type: none"> • Providing Precast Concrete Cylindrical bollard Terrazzo finish of 450mm dia x 1000mm height works. • Providing and fixing seating benches like Precast GFR Concrete designer backless benches, Precast GFR Concrete Modular backless benches, Precast Concrete Sphere bollards, Precast Designer backless GFR Concrete circular seating bench, and Precast Concrete Modular backless Cube Seating. • Providing and fixing spot pole mounted Dustbin, Precast GFR Concrete dustbin, etc. • Providing and fixing 4/6mtr. Boom barrier - AC Motors works. • Providing and fixing MS Hot dip Galvanized coating gate and MS Hot dip Galvanized Railing works as per specification. Samples should be approved before execution. • Providing and Fixing Bicycle stand made from Stainless Steel 316 works. • STONE-CORTEN STEEL SIGNAGE: Providing and fixing sign boards made out of Corten steel sheet. • Providing and fixing sign boards made out of S.S 304 sheet individual letters works. • Providing and fixing precast tree pit cover around the tree pit works. 					

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
	Play equipments	<ul style="list-style-type: none"> Providing and fixing Double swings, see-saw, Merry-Go- Round, Monkey bar with loops, Air walker, Cycling fitness rider, double surf board, etc. Providing & fixing Multi Children-Eucalyptus play zone Size and Multi Children- Caravella play zone large equipment. All play equipments structural steel members to be of Hot-dip Galvanized. 					
	Bus Shelter	<ul style="list-style-type: none"> Provision of 7 (Seven) Smart Bus Shelter facilities at identified locations <p>Supply and install Bus Shelter that shall serve as an all-weather shade for the bus commuters. It shall be made of SS/ MS frame work, powder coated metal roofing, SS metal seating, toughened glass/ acrylic and electronic circuit to control its lighting. The structure shall be designed to withstand wind load according to regulations and as per IRC codes.</p> <ul style="list-style-type: none"> Bus stop shall consist of an advertisement panel ((back lit) and one backlit info panel and 1 digital panel/ VMS showing bus status update as per traffic department GPS system. Space provision for all 3 is shown in the indicative design provided in the RFP. 					
	Heritage/Religious structures	NA	NA	Bunder chowk archway, 1 monument, 1 statue to be preserved	NA	Shahid Smarak, Temple near Police station to be preserved	2 Portuguese monuments- Opposite PWD office and Diu college- to be preserved
	Demolition and Dismantling						
	Demolition and Dismantling of buildings, structures, surface areas, walls, electric poles etc as per provided details						
	Proposed Utilities						

S no	Description	Zone 01 Arrival zone	Zone 02 Mela zone	Zone 03 Cultural zone	Zone 04 Garden zone	Zone 05 Recreational zone	Zone 06 Heritage zone
	Fort road to have continuous street lighting poles as per specification and spacing marked of high quality brand qualifying of latest IP patents.						
	Continuous Promenade walk light post and illumination along retaining wall						
	Mela ground to have 10m high mast						
	City side and Promenade side MEPF conduits for present and future requirements						
	Providing water supply, storm water and sewage arrangements as per specification and the plumbing drawings.						
	Providing Irrigation, Drip Irrigation, Auto-popup Sprinklers arrangements as per specification and the plumbing drawings.						
	Providing Filtration unit, Pumping unit, Automation equipment arrangements as per specification and the drawings.						
	Providing Firefighting arrangements as per specification and the Firefighting drawings.						
	Providing and Laying LV/MV cable networking as per requirement and specification.						

1.2.2 Stretch 2: Development of Coastal promenade from Summer House to Gangeshwar temple via Fudam Ghousala including Night lighting

S.No	Component	Details of Scope of Work
1.	Dismantling & Excavation of the soil	<ol style="list-style-type: none"> I. Cleaning and grubbing of the existing road II. Dismantling and disposal of unreinforced cement concrete / RCC / rubble soling in road works / WBM/ Pavements / rubble works. III. Dismantling of Stone Masonry works, paver blocks, cobble stone floor, China mosaic floor, tile dado, etc. IV. Removal of existing lighting fixtures, Junction boxes and cables, etc. V. Felling of the trees of various girth sizes. VI. Excavation of all kinds of soil (including rock cutting) up to 1.5m to 5.0m depth.
2.	Road Works	<ol style="list-style-type: none"> I. Construction of around 12 m wide of 3.056 km in length of bitumen road along the coast from the city wall till fudam gaushala and 10 m wide of 0.37 Kms of cobble surface road starting from the summer garden till the fort wall. II. Filling with murrum or selected soil in layers of 20cms at desired locations III. Road works key items include Subgrade, Granular sub-base (GSB), Wet mix macadam (WMM). IV. Providing and applying tack coat with bitumen emulsion (RS-1) using emulsion pressure distributor works. V. Prime coat with bitumen emulsion (SS1) works. VI. Laying of Dense Bituminous macadam (DBM), and Bituminous Concrete (BC) VII. Laying of the cobble stone as per the approved design. VIII. Construction of un-reinforced, dowel jointed, plain cement concrete pavement of M40 Broom Finish or stamping texture of flooring pattern works. IX. Providing and fixing pre-cast fair finish M40 concrete kerb stone of Bull nose kerb, flushed kerb, Splayed kerb of sizes 60cm length, 30cm height and 15cm thick. X. Providing and fixing Sign board, Direction sign, Stop sign, Information Board as per given specification and the drawings. XI. Construction of cycle track of width 2.5m all along the road.

S.No	Component	Details of Scope of Work
		<p>XII. Construction of paved area for parking of width 4.5m all along the road.</p> <p>XIII. Construction of the Footpath/ Promenade of width 4.5m on sea side and of width 2.0m width of footpath on landward side till city wall and 5.0m till INS Khukri Parking gate on land ward side Finished with pattern of cobble stone and concrete paver blocks.</p> <p>XIV. Providing and laying of Hot applied Thermoplastic as per IRC: 35 & finished surface to be level, uniform and free from streaks and holes.</p> <p>XV. Supplying and fixing cat eye (Stimsonite) made out from Acrilo beaultile sterine injuction high compressed molding with reflector made of MMC (prismatic type of size 12cm x 6cm x 2.5cm) provided with bituminous adhesive 100g. with each unit for fixing. (High Intensity grade)</p>
3.	PCC and RCC works	<p>I. PCC works as per given structural specification and the drawings.</p> <p>II. Providing and laying RCC of M25 & M30 grade as per mentioned for foundation, footing, columns, walls, fins, slabs, beams, staircase, etc. as per specification and approved by design mix and latest IS 456 for all works as per given structural specification and the drawings.</p> <p>III. TMT Bar Fe 500D reinforcement for R.C.C. work as per specification with ISI standard approved companies.</p> <p>IV. Providing anticorrosive treatment to Fe 500D bars with FUSION BONDED EPOXY COATING (FBEC) confirming to specifications</p> <p>V. All types of steel works as per specified steel sizes. Samples should be approved before execution.</p>
4.	Roofing, Flooring and surfacing for structures	<p>I. Providing and laying of Stone works of Granite stone, River washed stone, River washed Granite stone, Granite stone, Flame finish Rajula stone, etc. works as per given specification and the drawings.</p> <p>II. Providing and laying of 10x10, 30x15, 20x15 cm size Granite Cobble stone, Rajula cobble Stone and of 30x15 Rajula Tiles,</p> <p>III. Providing and laying factory made chamfered edge Cement Concrete paver blocks as per direction of Engineer-in-Charge. 80 mm thick C.C. paver block of M-</p>

S.No	Component	Details of Scope of Work
		<p>30 grade with approved color design and pattern</p> <p>IV. Providing and laying of Vitrified and glazed tile works as per specification.</p> <p>V. Providing and laying broken China mosaic flooring for terrace using 12 to 20mm broken pieces works as per specification and the drawings.</p> <p>VI. Providing and laying integral cement based water proofing treatment conforming to IS: 2645 for treatment of roofs, balconies, terraces, etc. works and APP waterproofing sheets as per mentioned areas.</p> <p>VII. Providing and laying of Terrazzo works.</p> <p>VIII. Providing and laying of Stone Boulders of sizes 5 cm to 20 cm works.</p> <p>IX. Providing, laying and fixing 20mm thick polycarbonate sheet as per the design & drawing and as per directed by the engineer in charge.</p> <p>X. Providing and fixing the MS hot dip galvanized flats of various sizes as per the design & drawing</p> <p>XI. Providing and laying 25mm thick non shrinkage grout over the pedestal for fixing of base plate with bolts complete as per design & drawing</p> <p>XII. Providing and laying of Brick work (Vernacular material) as per design & drawing</p> <p>XIII. Providing and fixing the size of 80mm x 11 mm engineered wooden plank as per design and drawing.</p> <p>XIV. Supply and fixing of the railing made up of MS box and MS Flats painted with Epoxy paint as per specifications.</p> <p>XV. Providing and fixing or replacing 75x25 mm Indian teak wood hand rail including bend and French polishing complete</p> <p>XVI. Polishing with French polish on previously polished wood and wood based surface.</p> <p>XVII. Applying priming coat over new / old steel and other metal surface after cleaning and preparing the surface.</p> <p>XVIII. Providing and fixing MS hot dip galvanized Tube Steel work in built up for 100 mm dia tubular (round, square or rectangular hollow tubes etc.) trusses etc.</p>
5.	Corten steel arch	I. Providing, Fabricating & fixing in position of ISMB 175 mm thick Hot Dip Galvanised (120 microns).

S.No	Component	Details of Scope of Work
		<p>II. Providing, Fabricating & fixing in position of MS PLATE 12mm thick Hot Dip Galvanised (120 microns).</p> <p>III. COR-TEN Steel plate for Closure: Providing, Fabricating and fixing in position (Welding all around the frame) COR-TEN Steel closure plates (4mm thick).</p>
6.	Bus Shelter	<p>I. Provision of 5 (Five) Smart Bus Shelter facilities at identified locations</p> <p>Supply and install Bus Shelter that shall serve as an all-weather shade for the bus commuters. It shall be made of SS/ MS frame work, powder coated metal roofing, SS metal seating, toughened glass/ acrylic and electronic circuit to control its lighting. The structure shall be designed to withstand wind load according to regulations and as per IRC codes.</p> <p>Bus stop shall consist of an advertisement panel ((back lit) and one backlit info panel and 1 digital panel/ VMS showing bus status update as per traffic department GPS system. Space provision for all 3 is shown in the indicative design provided in the RFP.</p>
7.	Boring of Cast insitu pile	<p>Construction of cast in situ RCC bored piles with M.S. liner including driving liner up to required depth, boring in all types of soil strata, removal of excavated material, stabilizing unlined soil using bentonite or any other approved method, providing reinforcement as per design / drawing..</p>
8.	Surfacing for Decks	<p>I. Providing and laying 100 x 100 x 80 to 100 mm Cobble tile cladding for deck & edging and natural finish on top.</p> <p>II. Supply and installation of the ship Deck wood batons of size 100 x 60 mm with 50mm thick with necessary Anti-termite treatment as per the drawing.</p>
9.	Landscape Horticulture work /	<p>I. Trees includes : Pongamia Pinnata Tree, Hokka palms Tree, Thespesia populnea Tree, Leucaena leucocephala Tree, Delonix elata Tree, Cassia fistula Tree, Wodyetia bifurcata Tree, Cordia sebastinia Tree.</p> <p>II. Shrubs includes : Nerium oleander pink Shrub, Hamelia patens Shrub, Plumbago capensis Shrub, Tecoma gaudichaudi Shrub, Polygala myrtifolia Shrub, Pennisetum alopecuroides Shrub, Bougainvillea glabra Shrub, Ficus nitida Shrub, Amaranthus tricolor Shrub, Liriope muscari Shrub, Thevetia peruviana Shrub, Ophiopogon variegated Shrub, Pandanus variegated Shrub, Pennisetum alopecuroides leafy structure, Liriope muscari leafy</p>

S.No	Component	Details of Scope of Work
		<p>structure, Cuphea hyssopifolia Shrub, Thunbergia grandiflora Shrub, Lantana nivea Shrub, Russelia juncea Shrub, Zoyasia matt.</p> <p>III. Providing and planting of the ground covers.</p> <p>IV. Providing and fixing size of 1000 MM X 1000 MM x 500 MM Inner Dia Thickness 20 mm with frame Laser Cut With Akzonobel (Netherland) Powder Coating</p> <p>V. Providing and fixing size of 1000 X 1000 X 75 mm thk with High Performance/GFRC Concrete and manufactured with M30 Grade of concrete, Stain resistant coat, Colour and finish customization possible to match Cobbles or pavers in the surroundings.</p> <p>VI. Filling Garden soil of farmyard manure, mixing and levelling it as per required slopes application of required pesticides and chemical fertilizer and weed free including watering, ramming and consolidating etc., complete.</p> <p>VII. Lawn: Supply, stacking and laying of 0.06 to 0.09 mtr height, leafy structure.</p>
10.	Plumbing and Miscellaneous Items	<p>I. Providing and installing the (E-Toilet 9007 LCS Model) prefabricated public toilet made of stainless steel platform & closet (Indian /western), having toilet vacant status display, coin/switch based automated entry, manual exit, automated interior light & exhaust fan, wash basins, health faucet & cloth hanger, voice assistance system, self-cleaning, washing mechanism, manual flush option, water low indication, power backup facility, sensor for water & electricity conservation, GPRS based remote monitoring control facility.</p> <p>II. Providing and fixing concealed center point to wall ceiling & floor CPVC (SDR 13.5) pipe having national sanitation foundation (NSF) seal for potable water</p> <p>III. Providing and laying (to level or slopes) and jointing reinforced concrete light duty non pressure pipes I.S Class NP2.</p> <p>IV. Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts</p> <p>V. Constructing brick masonry chamber for underground C.I Inspection chamber and bends with bricks having crushing strength not less than 35kg Cm².</p> <p>VI. Providing and fixing P.V.C. rain water / electrical pipes of 50mm outer diameter and having, bend, necessary</p>

S.No	Component	Details of Scope of Work
		<p>fittings.</p> <p>VII. Providing and fixing 110 mm diameter PVC pipe (450mm long) for weep holes on retaining wall.</p>
11.	Benches and Dust Bins	<p>I. Providing and fixing Precast Reinforced Concrete bench of M250 grade of size 1800 x 600 x 450 mm ht of minimum 480 kg full body cover finished with stone Crete and seating area with seasoned teak wooden top with antitermite treatment and varnish weatherproof coating</p> <p>II. Providing Composite cement concrete litter bin.</p>
12.	Play equipment's	<p>I. Supply & Fixing of Pinta: Upright structural posts of height 1.28 m, 2.45 m, 4.4 m , 5.5 m are to be schedule HOT DIP Galvanized steel with a 114mm OD and 2.2mm (wall) thickness of the tubing.</p> <p>II. Specialized connectors such as clamps and couplings casted from aluminum alloy which is pretreated, cured and sandblasted and finished with a baked on powder coat finish using AkzoNobel INTERPON coatings are used to connect the various components of the playground Decks of size 1.45 x 1.45m, Staircase of size 1.49 m x 0.78 m are fabricated from 2mm perforated solid punched steel. Decks are pressed, punched, and welded sand blasted and vinyl plastic coated to a thickness of 4mm [optional]. Leaf Ladder of thickness Dia 38 mm, Frisbee Disc Climber of Dia 420 mm, Piped walls of Height 2.1 m are all robotic welded fabricated from 32 O.D. galvanized steel pipes for the outer pipes and 25mm O.D. galvanized steel for the inner parallel bars with a baked on powder coat finish. The Electrostatically applied polyester powder has a tough finish with maximum durability. Finished products have the following typical characteristics: 0.5mm thickness, oven cured between 191°C and 220°C, Flexibility, Impact, Salt Spray resistance, Hardness, and Adhesion.</p> <p>III. Providing and laying of EPDM flooring works.</p>
13.	Storm water drain and Manhole Chamber	<p>I. Providing, laying and fixing of factory made Precast Box type drain having (W) X (H) clear inner dimensions in required lengths as per design confirming to IS requirements.</p> <p>II. Providing & Fixing of factory made Precast Chamber/manholes, having size(W X L) with variable (H) mm The Precast cover having size 944 x 944 X 120 mm</p>

S.No	Component	Details of Scope of Work
		<p>thick, designed for T-25 load carrying capacity - 10 T Axle Load - 5 T Wheel Load confirming to Japanese Industrial Standards (JIS) & meeting IS requirements, having High Performance Self Compacting Concrete of M-40 cylinder strength/M-50 cube strength & Fe 500 / 500D shall be used for reinforcement.</p> <p>III. Construction of Cast in Situ manhole chambers, having size of (W X L) of capacity - 10 T Axle Load - 5 T Wheel Load, confirming to IS requirements of M30grade of concrete, M10 grade of PCC and steel FE 500D. Precast manhole SFRC cover having size clear 750x750mm, designed for capacity of 20T load & meeting IS requirements.</p> <p>IV. Storm water outfall is envisaged to the nearby secondary/tertiary drain/sea/moat locations; accordingly the appropriate outfall arrangement is to be provided</p>
Street Lighting		
1	Street Lighting and other Accessories.	<p>I. Providing Electrical arrangements as per specification and the electrical drawings.</p> <p>These include Post Top Lamps, Architectural Lamp posts, Wall mounted Down lights, Bollard lightings, Flexible LED Strip, Recessed In ground Column Up Light, RB1 -4.8 W Wall Grazing, Tree up lighting, GOBO lighting, Ceiling Mounted Down Lights, Ceiling fans, LED Lights, Stout Plus LED Lights, Point Wiring for lights and Bell, XLPE cables with aluminium conductor of various sizes as per the design.</p> <p>II. Providing, supplying, lowering, laying and jointing of high density Polyethylene H.D.P.E. Pipes as per IS specification no. 4984/1995 in standard.</p> <p>III. Providing and, fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armoured cable complete.</p> <p>IV. Solderless crimping type Copper lugs conforming to IS suitable for cable of different size evenly crimped with high pressure tool & connected to switchgear terminals with brass/cadmium plated nut bolts in an approved manner.</p> <p>V. Supply and installation of FEEDER PILLAR:</p> <p>VI. Supply and installation of Lighting DB:</p> <p>VII. Single phase 8-way single door:</p>

S.No	Component	Details of Scope of Work
		<p>VIII. Supplying & erecting in earth pit of minimum bore dia. 225mm size ASH or approved make Safe Earthing Electrode consisting Pipe-in-Pipe Technology as per IS 3043-1987 made of corrosion free G.I.Pipes .</p> <p>[B] For Electrical installation up to 11 KV.</p>
2	Electrical Utility Duct	<p>IX. Providing, supplying, lowering, laying and jointing of IS Marked High density Polyethylene HDPE PE100PN10 pipes of different sizes in standard length as per IS-4984/2016 suitable for underground cables and specials (By butt fusion welding method) including of Couplers and endcaps . Sizes include – 160mm, 110mm</p> <p>X. Providing and laying of Spacers for the maintaining space between the HDPE conduit pipes.</p> <p>XI. Providing and laying of precast Manhole Chamber (1200x600x2200) including the 40mm copper electrode for every manhole</p> <p>XII. Providing and fixing in position pre-cast RCC manhole cover and frame of required dimension, shape and approved quality</p> <p>XIII. Back filling with the available excavated earth in trenches</p> <p>XIV. Providing of 3C X 300 Sqmm, XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 11 KV cable</p> <p>XV. Providing of 3.5C X 240 Sqmm, XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 11 KV cable</p> <p>XVI. Supply, laying, testing and commissioning 1.1 kV , grade XLPE insulated, stranded aluminium conductor, galvanized steel flat strip/ round wire armoured of various sizes</p> <p>XVII. Erection testing and commissioning of LT service pillar (I/C 400 Amps MCCB, O\G 3 No's of 250Amps HRC fuses</p> <p>XVIII. Erection testing and commissioning of LT mini pillar (I/C 250 Amps MCCB, O\G 10 No's of 63Amps HRC fuses</p> <p>XIX. Providing and fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armoured cable complete without going tails, insulating take etc. for various sizes of cables.</p>

S.No	Component	Details of Scope of Work
Water Supply		
1	Earthwork for Portable Water supply	<p>I. Excavation up to 1.5m to 5.0m depth including sorting out and stacking of useful materials and disposing off the excavated stuff with all lead and lift for all kinds of soil.</p> <p>II. Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers, in depth consolidating each deposited layer by ramming and watering.</p>
2	Laying of the Pipe lines	<p>I. Providing and supplying D. I. K-9, K-7 grade S&S pipes(IS 8329-2000).</p> <p>II. Supply & Delivery of Ductile Iron socket spigot bends, tees, reducers or any other specials as per BS-EN-545/1995 Class-A series K12 With external bitumen & zinc.</p> <p>III. Lowering, laying and jointing Tyton joints / Mortar lined D. I. Pipes of various classes with DI specials of various diameters in proper position, grade and alignment including hydraulic testing etc. complete.</p>
3	Thrust Blocks	<p>I. Providing and cast in situ C.C. in grade M-30 proportions of ingredients as per mix design.</p> <p>II. Supplying cutting, bending, binding and placing in position with deformed (TMT) bars confirming to relevant IS Fe – 500D grade for all diameters.</p>
4	Valves, bends and Tee's	<p>I. Providing, supplying Lowering, laying, and jointing of ISI mark CI D/F Sluice Valves as per IS:14846 (Latest Edition) of PN-1.6 With hand/wheel cap operated (Alt-1 type long body) and different diameter including placing following C. I. / D/F Reflux valves, Butterfly valves, Sluice valves and Air valves complete. Size: 10mm</p> <p>II. Providing, supplying Lowering, laying, and jointing C. I. / D/F Reflux valves, Butterfly valves, Sluice valves and Air valves Air valves double ball Flanged of approved make & quality of following class and diameter.</p> <p>III. Supply & Delivery of Ductile Iron socket spigot bends, tees, reducers or any other specials as per BS-EN-545/1995 Class-A series K12 With external bitumen & zinc coating.</p>
5	Valve Chambers	<p>I. Construction of valves chambers in brick or bela stone</p>

S.No	Component	Details of Scope of Work
		masonry. II. RCC precast M.H. Frame & Cover Manufacture.
6	Fire Hydrants	I. Supply and fixing C. I. Fire hydrants: Double Valves type underground.
Recycle Water Supply:		
1.	Earth Work for Recycle water supply	I. Supplying and filling in plinth with sand under floors, including watering, ramming, consolidating and dressing complete as per direction of engineer-in-charge.
2.	Pipe line	I. Providing, supplying, lowering, laying and jointing of ISI mark high density Polyethylene H.D.P.E. Pipes suitable for potable water as per IS specification no. 4984/1995 in standard length. II. Providing and supply of 20 mm dia MDPE (PE80 - SDR 11) Pipe as per ISO: 4427.

1.2.2.1 Proposed Features in the Stretch 2

The following are the proposed typical details from summer house to City wall of stretch 2 promenade.

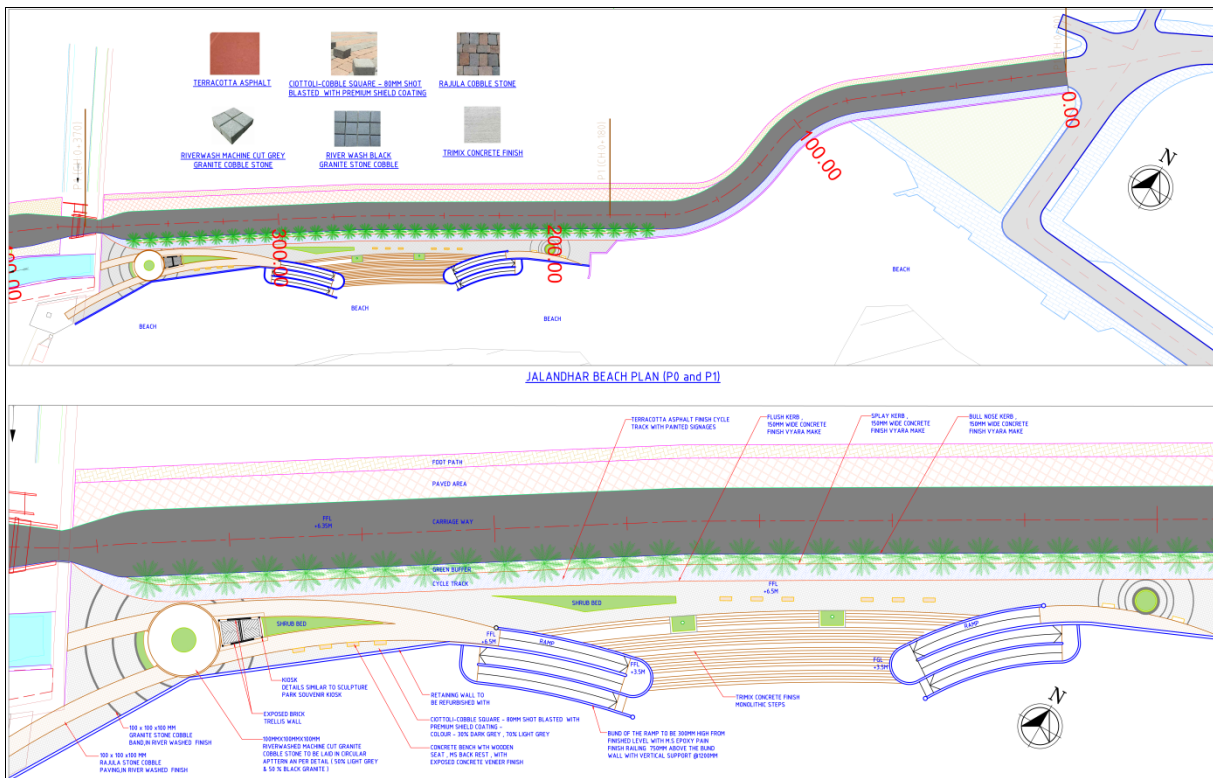


Figure 28: Development Plan from Summer house to City wall – Stretch 2

- The following are the proposed typical plan and section of stretch 2 promenade.

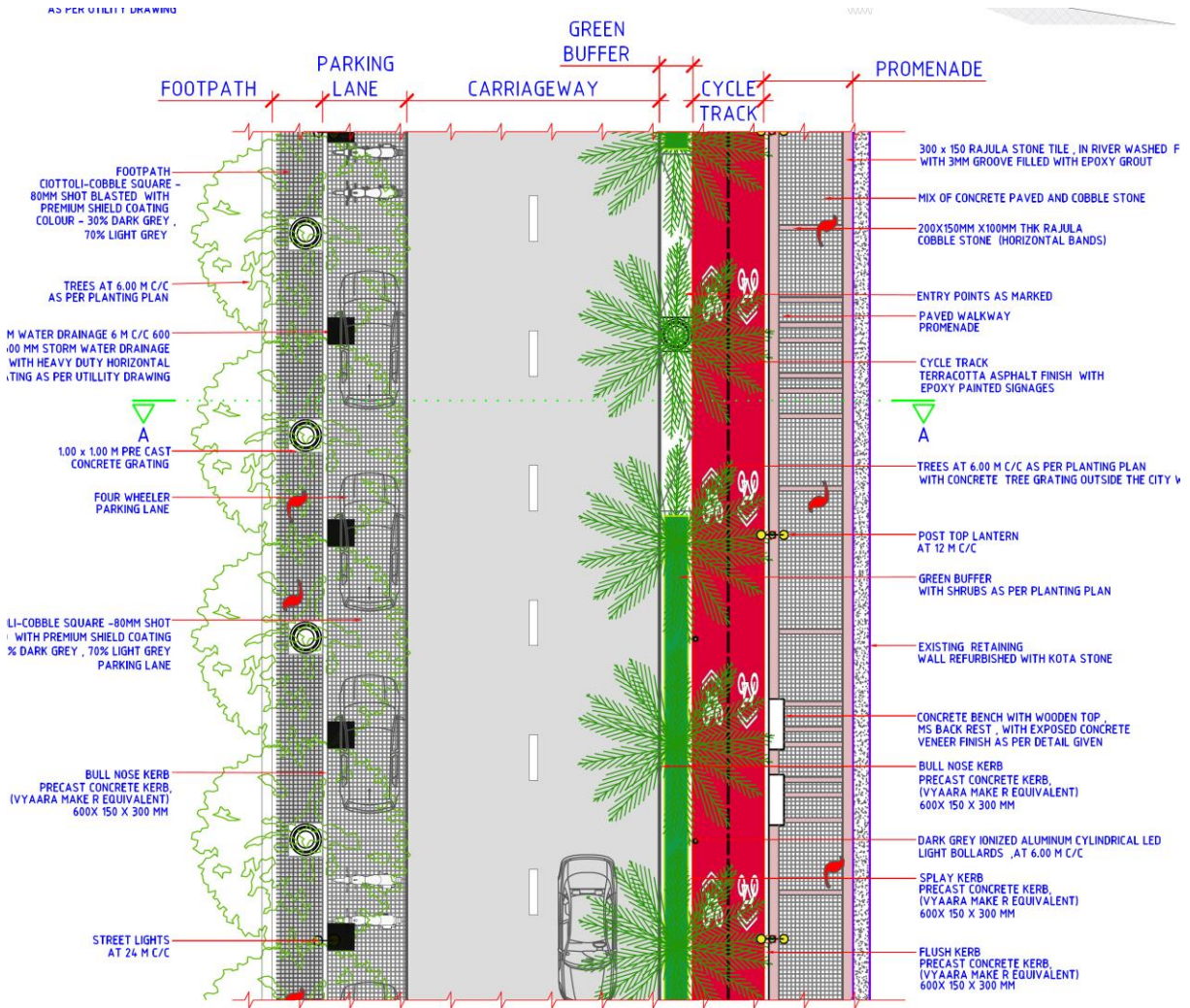


Figure 29: Typical Plan of Promenade – Stretch 2

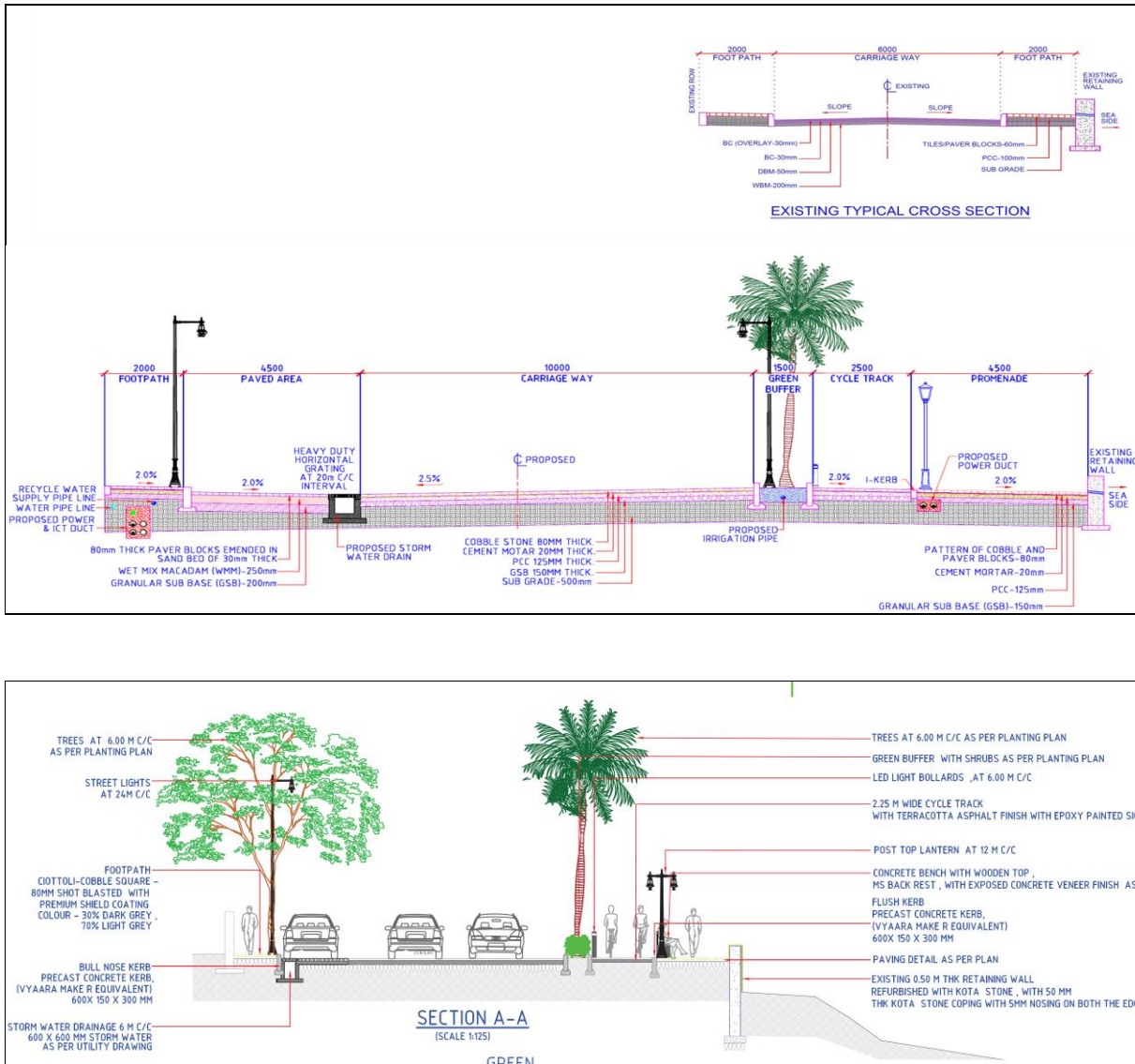


Figure 30: Typical Section of Promenade – Stretch 2



Figure 31: Typical Section of Promenade – Stretch 2 (3D View)

The following are the proposed paving pattern of stretch 2 promenade.

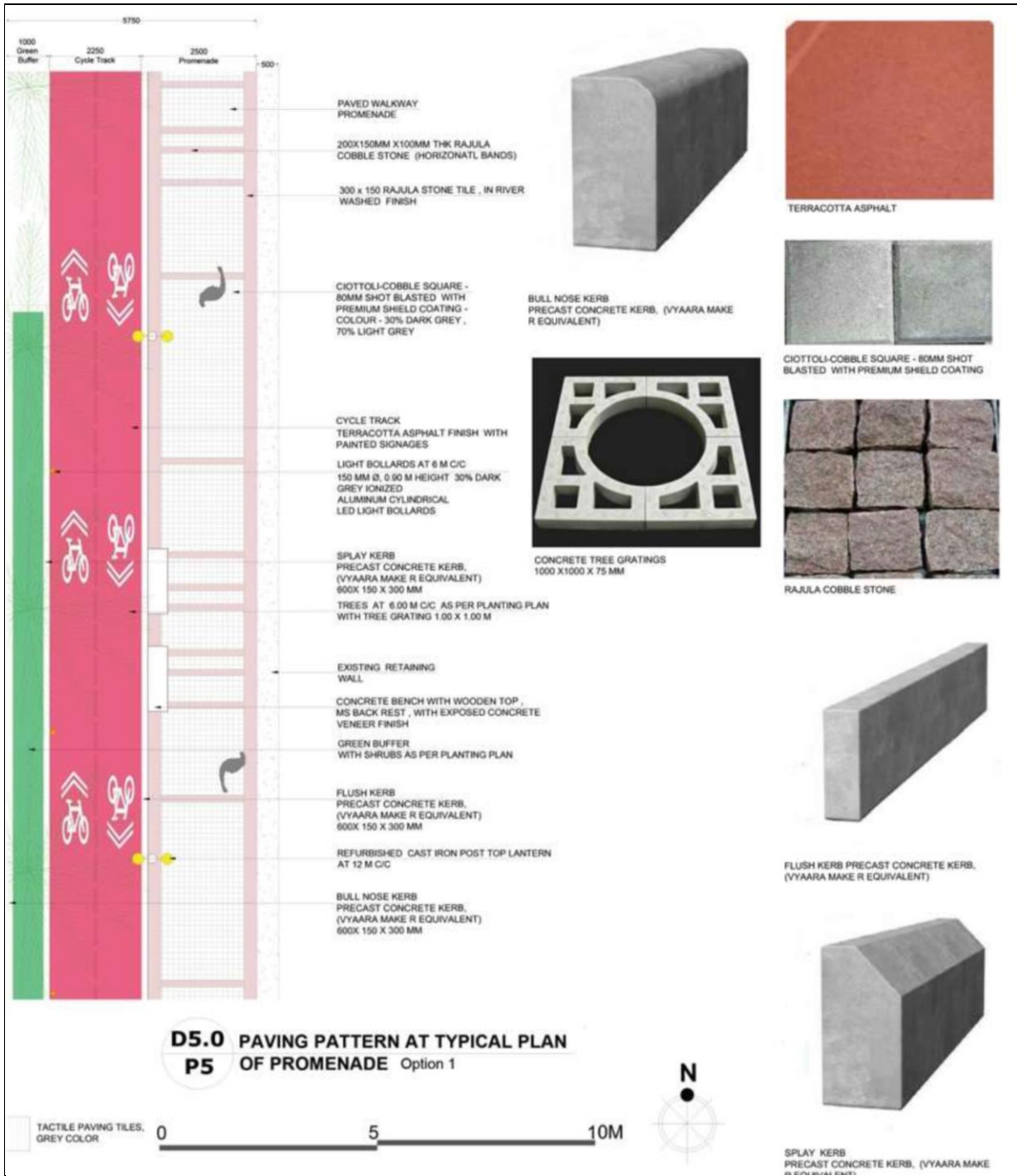


Figure 32: Typical Paving Pattern of Promenade & Cycle Track



Figure 33: Typical Paving Pattern of Promenade & Cycle Track (3D View)

The following are the proposed typical plan and section of stretch 2 promenade.



Figure 34: Proposed view from the Carriage way (3D View)



Figure 35: Proposed View of the Ramp at Jalandhar Beach



Figure 36: Proposed View of the Entry steps at Vijaypath Junction



Figure 37: Proposed View of decks towards Chakratirath junction road



Figure 38: Proposed View of Cycle track at Chakratirath junction road



Figure 39: Proposed View of Sunset point at INS khukri

Location Map

Sr No.	Bus stop Locations	Proposed Bus Shelters
1	Jama Masjid (FCI Warehouse)	1
2	Bandar Chowk	2 (on both side of road)
3	DMC / Collectorate	2 (on both side of road)
4	GHS	0
5	PWD Office	1
6	Diu Fort	1
7	Summer House Garden	1
8	Chandrika Mata Temple	1
9	INS Khukhri Memorial	1
10	Fudam Gaushala	1
11	Gangeshwar Temple	1
	Total	12

Note: The specific location of the bus shelter shall be referred from the detailed layout drawing of the coastal promenade as provided in the RFP.

Figure 40: Proposed Bus Shelter Locations (Total 12 Numbers)

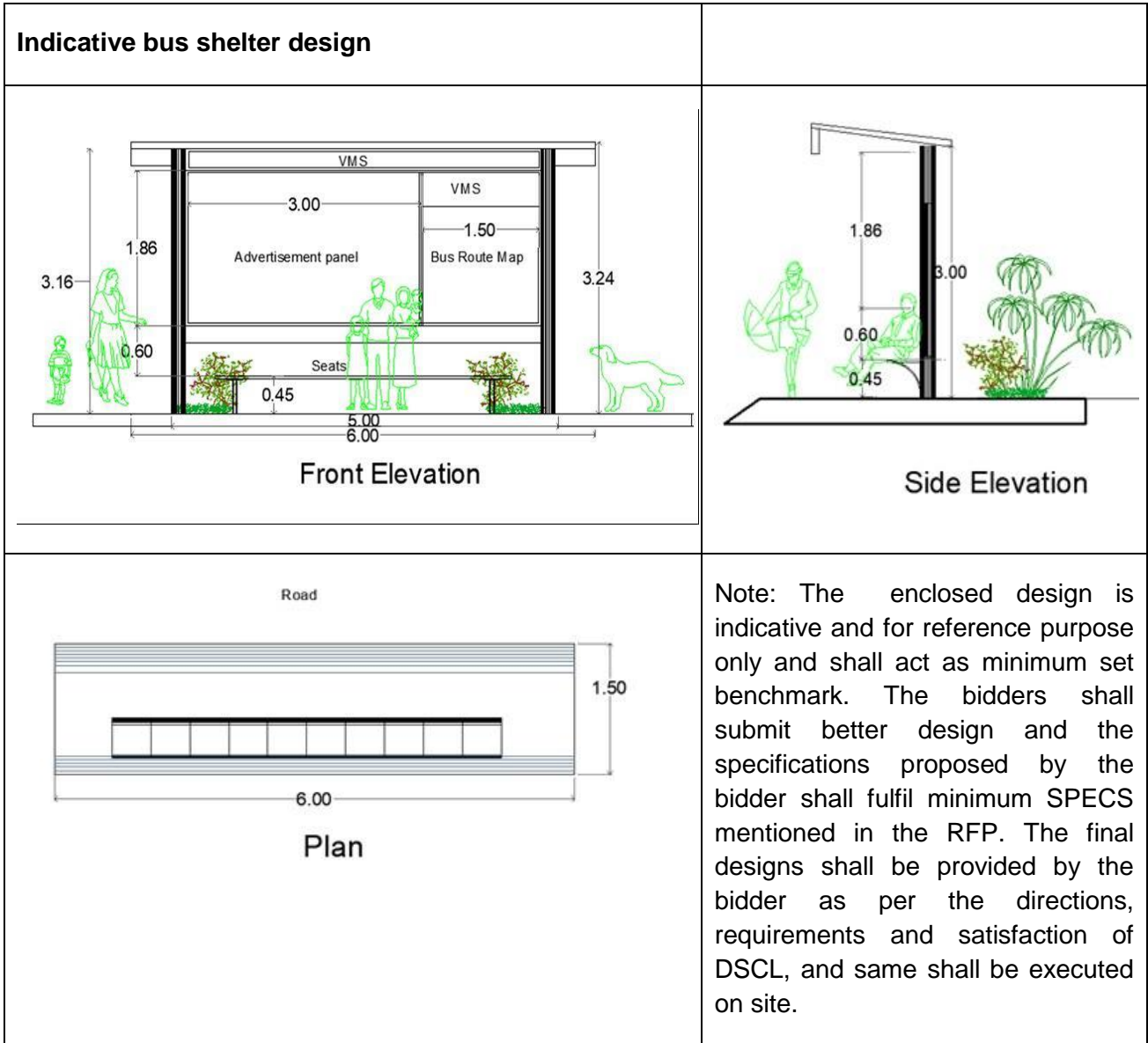



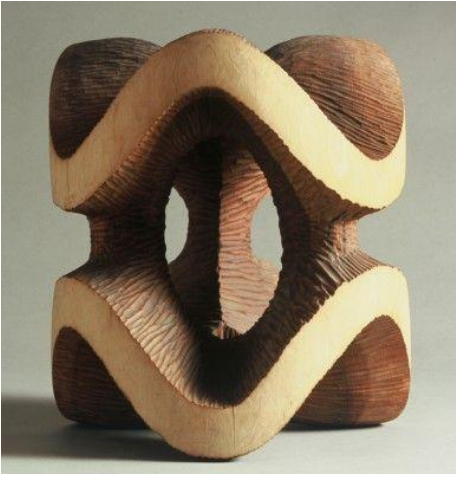


Figure 41: Indicative Bus Shelter Design

1.3 Development of Roundabouts & Traffic Island with Sculptures along Promenade & Road Development projects in Diu city.

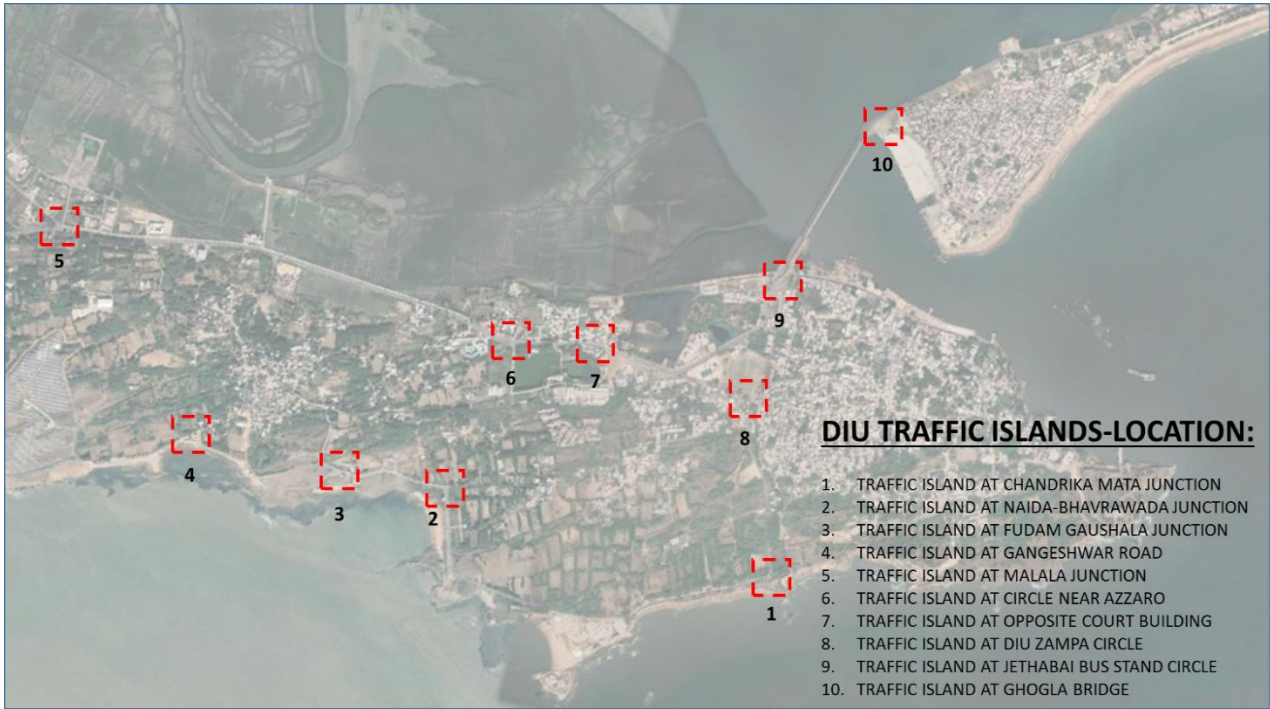
<p><u>Design Objectives:</u></p>	<p>The objective is to design and develop roundabouts & traffic islands along with installation of appropriate sculptures at the identified locations along the arterial/major roads and Waterfront/Coastal Promenade in Diu City. Appropriate design options shall be worked out by contractor and presented to DSCL based on the given concepts. The design option approved by DSCL will have to be implemented.</p>
<p style="text-align: center;"><u>Roundabout, Traffic island & Sculpture Specifications</u></p>	
<p>Design Parameters</p>	<ul style="list-style-type: none"> Traffic Islands & Roundabouts shall be designed & developed in an integrated manner with the relevant road & promenade development

	<p>proposals in Diu that are proposed by agencies like DSCL, PWD, DMC, etc.</p> <ul style="list-style-type: none"> • The geometry of the traffic islands & roundabouts shall be formulated & worked out in required shapes & sizes as per the proposed road development design at the identified location. • Traffic Islands & Roundabouts shall be in accordance with the norms & standards of road design & geometry by relevant agencies like IRC, etc. • Traffic Islands & Roundabouts shall consist of the following components & elements like Hardscape, soft-scape/plantations, sculptures & lightings, water supply/irrigation system. • The Traffic island/roundabouts and its aesthetic features shall be well designed to go with the Diu Smart City Theme/concepts and match with the city's architectural language. • The sculpture shall be designed based on the concepts/themes & guidelines given by DSCL • The Height of the sculpture shall be in the range of approximately 10-12 feet. • (depending on the design stability) • The miniature sculpture model of scale 1:10 shall be made for approval of DSCL. • The sculptures shall be designed to withstand wind load according to regulations. • The Design of the traffic island/roundabout & its features like sculpture, plantation & lighting, etc. shall be approved by DSCL prior to implementing the same on site. 	
<p>Concepts/Themes for Sculptures</p>	<ul style="list-style-type: none"> • The inspiration of the sculptures shall be taken from the Natural features of Diu, unique experiences in Diu. 	
	<p>CONCEPT 1</p> <ul style="list-style-type: none"> • <i>Inspiration- SEASHELLS IN DIU</i> • Diu houses a vast variety of unique and beautiful seashells. • The most common types of seashell (Eg.-tulip shells, scallop and cockle shells) generally found at Diu beaches are considered for the form of sculptures in abstract version. 	

	<p>CONCEPT 2</p> <ul style="list-style-type: none"> • <i>Inspiration- Occupation of Diu- "Fishing"</i> • Fishing is a major occupation practiced by the people in Diu. Various kinds of fish like shark, pomfret, squid, tuna, prawns, Dara, Eel etc. are found in Diu. • Different shapes of fish tails can be used as concept for the shape of sculptures in abstract form. 	
	<p>CONCEPT 3</p> <ul style="list-style-type: none"> • <i>Inspiration- Gushing winds experienced in Diu</i> • Diu has an inexplicable beauty of its own that meticulously combines the natural features and experiences 	
	<p>CONCEPT 4</p> <ul style="list-style-type: none"> • <i>Inspiration- NAIDA CAVES IN DIU</i> • A series of caves that look like a classic example of wind erosion. These caves are great example of Brilliant rock formations. • This rock formation concept can be used for developing a sculpture in abstract form. 	
<p>Note: The enclosed design is indicative and for reference purpose only and shall act as minimum set benchmark. The bidders shall submit better design and the specifications proposed by the bidder shall fulfil minimum SPECS mentioned in the RFP. The final designs shall be provided by the bidder as per the directions, requirements and satisfaction of DSCL, and same shall be executed on site.</p>		

Materials	<p>Sculpture</p> <ul style="list-style-type: none"> • Sculpture shall be made of stainless steel (SS 304 grade), rustproof coated metal, Stone, Cement as per the concept finalized & approved by DSCL. • All the stainless steel parts shall be HDG –Hot dip galvanized and aluminum parts shall be anodized or powder coated to give longer life and better quality. The material used shall be unaffected by outdoor exposure • The material shall be Non-flammable. • The Foundation slab shall be made in min M25 concrete. • There should be seamless joints
Vandalism-proof	<ul style="list-style-type: none"> • The Parts used shall not be fragile and safely secured to its foundation with anchor fasteners which makes the furniture more stable and joint fasteners not visible from outside. • None of the joints shall be visible from outside and it is completely sealed. Opening shall be by specialized key. • The parts used shall be of steel, aluminum, toughened glass or acrylic for better durability. • The stainless steel shall be treated to be resistant in all weathers.
Security & Safety parameter	<ul style="list-style-type: none"> • There shall be no falling parts, no sharp edges involved in the Sculpture all the parts shall be well fastened. • The foundation used shall be designed in order to take loads from wind and persons leaning over the panel.

Location Map



Sr. No	Item Description	Unit	Quantity
	<p>Development of the junctions and its development works including civil and landscape works. Also Supply and installation of Sculpture that shall serve as a focal point and identity to the precinct. It shall be made of, powder coated metal, Stone and electronic circuit to control its lighting. The sculpture shall be designed to withstand wind load according to regulations and as per IRC codes.</p> <p>Sculpture shall have of a curation panel ((back lit)</p> <p>(Note: Sculpture shall installed for Junctions 1, 2, 5, 6, 8, 9 & 10) & junctions 3,4 & 7 shall only have junction development works (civil & landscape) without sculpture.</p>	No.	10

Si No.	Description	At S - Curve	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Gangeshwar Temple Via Fudam Gaushala	
1	Location	P0	P1	P2	P3	P4	P5	P6	P7 & P8	
2	Chainage	From	0+000.000	0+180.00	0+370.00	0+460.00	1+050.00	1+370.00	1+810.00	2+140.00
		To	0+180.00	0+370.00	0+460.00	1+050.00	1+370.00	1+810.00	2+140.00	3+426.130
3	Length (m)	180.00	190.00	90.00	590.00	320.00	440.00	330.00	1286.130	
4	Category of Road	MDR	MDR	MDR	MDR	MDR	MDR	MDR	ODR	
5	Type of Pavement	Rajula Cobble stone	Rajula Cobble stone	Flexible	Flexible	Flexible	Flexible	Flexible	Flexible	
6	Width of the Road (m)	10.00	10.00	10.00	12.00	12.00	12.00	12.00	12.00	
7	Width of Pathway with pattern of Paver block and Rajula cobble stone	LHS	N/A	4.50 - 7.00	4.50	4.50	4.50	4.50	4.50	4.50
		RHS	2.00	2.00	NA	5.00	NA	NA	NA	NA

Si No.	Description	At S - Curve	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Gangeshwar Temple Via Fudam Gaushala	
	(m)									
8	Cycle Track with bitumen and terracotta premix carpet (m)	LHS	2.50	2.50	2.50	2.50	2.50	2.50	2.50	
9	Width of Planter bed (m)	LHS	NA	1.50	NA	1.50	1.50	1.50	1.50	
10	Dedicated Parking with Paver block (m)	RHS	NA	4.50	NA	4.50	4.50	4.50	4.50	
11	Pipe Culvert	Location	-	-	-	-	-	-	1 no of Pipe culvert @1+810	-
		Size	-	-	-	-	-	-	1.0m dia / 5.0m length	-

Si No.	Description	At S - Curve	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Gangeshwar Temple Via Fudam Gaushala
12	Wooden Bridge to be rehabilitate	-	-	3	-	-	-	-	-
13	Foot Over Bridge to be rehabilitate (Nos)	-	-	1	-	-	-	-	-
14	Horticulture Work								
									<ul style="list-style-type: none"> • Providing and planting with including cost of the tree, excavation pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 2.7 m height and min. 30 cm- 40 cm girth healthy saplings with required stacking and maintaining it for 3 year for trees works. • Providing and planting with including cost of the shrubs, excavation pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 0.6 m height healthy saplings with required stacking and maintaining it for 3 year for shrub works. • Providing and planting with including cost of the ground covers, excavation pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 0.6 m height healthy saplings with required stacking and maintaining it for 3 year for Ground cover works. • Cleaning of earth and back filling with 150mm of garden soil with 25 mm of farmyard manure works. • Supplying, stacking and spreading of sludge / well decayed farm yard manure works. • Providing and fixing precast tree pit cover around the tree pit works.

Si No.	Description	At S - Curve	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Gangeshwar Temple Via Fudam Gaushala
15	Proposed elements								
		Civil elements	<ul style="list-style-type: none"> • Bull nose kerb Separating the Planter bed with carriage way • Splay Kerb Separating the Planter bed with cycle track • Flushed Kerb separating the cycle track and the foot path • Providing and installing the (E-Toilet 9007 LCS Model) prefabricated public toilet made of stainless steel platform & closet (Indian /Western) at various locations. • Providing and fixing Precast Reinforced Concrete bench of M250 grade minimum 480 kg full body cover finished with stone crete and seating area with seasoned teak wooden top with ant termite treatment and varnish weatherproof coating. Also providing the hand rest with wooden top. • Supply and Installation of sculptures at two strategic locations made up of fibre/copper/SS metals having an height of 12 to 15 feet approxiamtley and design as per approved by Authority/Authority's Representative/Authority'e Engineer • Providing Viewing Deck towards beach - Semi-circular and Triangular Deck • Providing Kiosk at various location • Providing concrete Ramp and steps towards beach • Development of junctions and roundabouts at 9 junctions – Panjarapoprt Jn, Jn Opp. Court Building, Chandrikamata Jn, Ghoghola Bridge Jn, Jethibai Busstand Jn, Beotli Jn, AzzaroJn, Malala Jn. 						

Si No.	Description	At S - Curve	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Gangeshwar Temple Via Fudam Gaushala
	Road Signages and street furniture								<ul style="list-style-type: none"> Providing signages board - Regulatory/ Mandatory sign boards, Cautionary /warning sign boards, Stop Sign boards and informatory sign boards
	Play Equipment & Sculptures								<ul style="list-style-type: none"> Providing and fixing Play equipments with finished products of Two Straight Slide, Tube Slide, Panels. Providing and installation of the sculptures at the mentioned locations
	Bus Shelter								<ul style="list-style-type: none"> Provision of 5 (Five) Smart Bus Shelter facilities at identified locations Supply and install Bus Shelter that shall serve as an all-weather shade for the bus commuters. It shall be made of SS/ MS frame work, powder coated metal roofing, SS metal seating, toughened glass/ acrylic and electronic circuit to control its lighting. The structure shall be designed to withstand wind load according to regulations and as per IRC codes. Bus stop shall consist of an advertisement panel ((back lit) and one backlit info panel and 1 digital panel/ VMS showing bus status update as per traffic department GPS system. Space provision for all 3 is shown in the indicative design provided in RFP.

Si No.	Description	At S - Curve	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Gangeshwar Temple Via Fudam Gaushala
	Street Lighting								
16	Demolition and Dismantling								
17	Proposed Utilities								

Si No.	Description	At S - Curve	From summer House to City wall	From City wall to Vijay Path Junction	From Vijay Path Junction to Chakratirath Junction	From Chakratirath Junction to INS Khukri Parking gate	From INS Khukri parking gate to Old dumping site	From Old dumping site to Naida Bhavravada road	From Naida Bhavravada road to Gangeshwar Temple Via Fudam Gaushala
			<ul style="list-style-type: none"> Providing Manhole chamber system at various locations 						

1.3.2 Stretch 3: Landscaping & Beautification of Summer House Garden

S. NO.	Components	Details of Scope of Work
1.	Survey	<ul style="list-style-type: none"> • The contractors are advised to inspect and examine the site and its surroundings and satisfy himself with the nature and extent of site and work, the hydrological and climatic conditions the means of access to the site, the constraints of space for stacking material/machinery, labour etc. he requires, if any, weather conditions at site, general ground/subsoil conditions etc. or any other circumstances which may affect or influence their bid. No claim, whatsoever, shall be entertained from the bidder, on the plea that the information supplied by the Owner is insufficient or is at variance to the actual site conditions. • The contractor should carry out detail Total station survey with Differential Global Positioning Systems (DGPS) TBM and marking of all spot levels, trees with trunk diameters, utility services like Manhole locations, Electric boxes, poles, all buildings, compound wall and civil works before commence of the construction activity.
2.	Cleaning of site	<ul style="list-style-type: none"> • All working areas under construction should be cleaned of unnecessary vegetation, malba, grass and any other items. • Removal of Vegetation such as grass, shrubs and Trees.
3.	Dismantling and Demolition	<ul style="list-style-type: none"> • Dismantling and disposal of unserviceable materials with all leads and lift of unreinforced cement concrete / RCC / WBM/ rubble soling in road works / Pavements / rubble works • Dismantling of Brick and Stone Masonry works, paver blocks, cobble stone floor, China mosaic floor, tile dado, etc. • Dismantling steel work including distempering and stacking the materials with all lead and lift steel works • Dismantling and disposal of roofing works with A.C sheet, Mangalore tiles, G.I. sheet, etc. with removing old deteriorated plaster works • Felling of trees, Removal of Telephone/ Electrical poles, Junction boxes and cables, RCC manhole, RCC manhole cover, etc. • Taking out and raising, Supplying and fixing of RCC manholes/ manhole covers, etc.
4.	Excavation works	<ul style="list-style-type: none"> • Excavation in all kinds of soil and Hard rock up to 1.5m to

S. NO.	Components	Details of Scope of Work
		<p>5.0m depth including sorting out and stacking of useful materials and disposing off the excavated stuff with all lead and lift for all kinds of soil.</p> <ul style="list-style-type: none"> • Disposing off the un-used excavated earth, debris, malba, dismantled materials for all lead and lift/ depth out at non objectionable place as directed by Engineer-in-charge. Disposing off the excavated stuff for lead upto 3km. • Rubble fillings, Murrum, Filling excavated earth and Course sand under floors, etc. works as per specification and the drawings.
5.	Road works	<ul style="list-style-type: none"> • Road construction works with Cobble stone flooring, • Layers with power roller including filling in depressions. • Road works key items include Granular sub-base (GSB), Wet mix macadam (WMM). • Providing and fixing pre-cast fair finish M40 concrete kerb stone works. • Providing Hot applied thermoplastic compound, cat eye (Stimsonite) on road surface wherever specified • Providing RCC heavy duty non-pressure NP3 and NP4 pipes with/without collars and SFRC manhole covers etc. • Supplying and fixing factory made precast utility trench. • Providing and fixing Sign board, Direction sign, Stop sign as per given specification and the drawings.
6.	Tidal works	<ul style="list-style-type: none"> • Excavation upto 3.0m depth. • Boring in all kind of strata including rock. • Filling of excavation, dewatering during construction, stacking of murrum, etc. works need to be done during Tidal condition. • Providing and driving for steel liners including Vertical load testing of piles. • Chipping and dressing of the RCC piles including laying filter media with granular stone crushed aggregates and weep holes along the length of compound wall • Anchor/ re baring work for existing retaining wall with new height. • Filling of excavation, dewatering during construction and

S. NO.	Components	Details of Scope of Work
		<p>removal of old surface area of RCC/ Stone surfaces etc.</p> <ul style="list-style-type: none"> • Drilling holes, Guniting concrete surfaces, providing double scaffolding system, fixing reinforcement in form of welded wire mesh fabric with polyester fibers in triangular cross section along the length of sea face. • Ready Mix concrete M40 grade for RCC Retaining wall/ Diaphragm wall, steps and ramp, etc. • Structural strengthening work by providing 50 mm thick expansion joint by polythene foam joint filler in cracks, with also Providing 12mm dia. galvanized steel injection nipple in honey comb area and along the crack line at required spacing and Shotcreting with 75mm thick M40 cement on existing wall/ surfaces. • HYSD bar reinforcement for RCC works with anticorrosive treatments.
7.	PCC and RCC works	<ul style="list-style-type: none"> • PCC works as per structural specification and requirement wherever mentioned. • Providing and laying RCC of M30 grade as per mentioned for foundation, footing, columns, walls, fins, slabs, beams, staircase, etc. as per specification and approved by design mix and latest IS 456 for all works as per given structural specification and the drawings. • All RCC work formworks to be executed with steel/ply shuttering for Fair/expose RCC finish.
8.	Steel and Wood works	<ul style="list-style-type: none"> • TMT Bar Fe 500D reinforcement for R.C.C. work as per specification with ISI standard approved. • Anticorrosive treatments to all HYSD/ Fe 500D bars with Fusion Bonded Epoxy Coating (FBEC) at approved plant. • All types steel works as per specified steel sizes. Samples should be approved before execution. • All kind of steel/ Structural steel works including fabricating, assembling, hoisting/ erecting and fixing in all position using MS Rolled Steel Sections, ISMB, ISMC, UC, H-Section, Hollow sections, Tubular Sections, MS Plates, Chequered Plates, MS Pipes, Perforated Sheet, Flats, Bars, Angles, MS Sheet, Girder, Beam, cattle trap, deep threaded MS bolts with anchor bolts and washer plates all complete, confirming to relevant IS codes.

S. NO.	Components	Details of Scope of Work
		<ul style="list-style-type: none"> • All steel work items to have Hot dip Galvanised coating confirming to Indian Standard 4579/2629/2633 with zinc coating thickness to be 86 micron. • Providing imported Malaysian Hardwood sections with all heights and as per drawing. All wooden works should be seasoning, chemical treatment and randha works. Sample should be approved before execution. • Providing and Stainless steel (Grade 316) as per mentioned and specified as per drawing • Providing PUF insulated sandwich panels for walls including bottom and top U track made of precoated GI sheet for closing of end joints for cut PUF panels with lipping on both edges.
9.	Stone and Brick work	<ul style="list-style-type: none"> • Providing coursed White Stone Bela masonry with stone of approved quality in foundation / superstructure works. • Plinth treatment to post construction / existing structure by spraying chemical solution for termite control.
10.	Flooring works	<ul style="list-style-type: none"> • Providing and laying of Stone works of Flame finish Rajula stone, Polished kota stone, River washed green kota stone, River washed Granite stone, Granite gang saw cut stone, Machine cut natural finish Rajula stone, etc. works as per given specification. • Providing Edge moulding to Kota/Granite/ other stones. • Providing and laying of 10x10, 14x14, 20x14 cm Granite Cobble stone, Rajula cobble Stone, Kadappa cobble stone works as per given specification. • Providing and laying of Large Stone Boulders works. • Providing and laying of Vitrified and glazed tile works as per specification. • Providing and laying broken China mosaic flooring for terrace using 12 to 20mm broken pieces works as per specification • Providing and laying integral cement based water proofing treatment conforming to IS: 2645 for treatment of roofs, balconies, terraces, etc. works.
11.	Paver, EPDM and other flooring works	<ul style="list-style-type: none"> • Providing and laying of 80mm thk. Cement concrete paver block, Shot blasted cement cobble works, Turf Cement

S. NO.	Components	Details of Scope of Work
		<p>Paver, etc. works.</p> <ul style="list-style-type: none"> • Providing and laying of Tactile tile works as per given specification. • Providing and laying of EPDM flooring works.
12.	Plaster, Painting and Finishing works	<ul style="list-style-type: none"> • Providing and carrying out Washed stone/stone grit plaster works with forming groove of uniform size from 12x12 mm and upto 25x15 mm works. Sample should be approved before execution. • Providing and applying 15mm and 20mm thick cement plaster works with acrylic Lapy-putty as per mentioned paint specification. • Providing and applying wall painting with plastic emulsion paint and weather proof exterior emulsion paint as per mentioned specification. • Providing and applying hot dip galvanized coating and epoxy based paint for all the metal works as per specified items. • Providing and applying External wood paint works. • Providing and core cutting work in Stone/ RCC/ Brick Structure • Providing material and labour for Painting with Silicone based Water Repellent (Translucent) for expose concrete /Stone surfaces works.
13.	Door window and opening works	<ul style="list-style-type: none"> • Providing and fixing frames/shutters for any type of Aluminium works Samples should be approved before execution. • Providing material and labour for fixing 6mm/ 12mm thick Clear Toughen Glass works. • Providing and fixing 35mm flush door / FRP frames and shutter works. • Providing & fixing Louvers of Anodized Aluminium sections works. Samples should be approved before execution. • Providing and fixing M.S. hot dip galvanized grill works, Gate, Railing as per mentioned specification. Samples should be approved before execution. • Providing and fixing Locks and door closers hydraulic wherever required.

S. NO.	Components	Details of Scope of Work
		<ul style="list-style-type: none"> • Providing and fixing 6mm thick Lexan Polycarbonate multi wall Roofing sheet.
14.	Street furniture and signage works	<ul style="list-style-type: none"> • Providing and fixing Precast Concrete Cylindrical bollard of 450mm dia x 1000mm height works. • Providing and fixing seating benches like Precast Concrete designer backless benches and Precast Designer backless Concrete circular seating bench as per specification. • Providing and fixing Precast Concrete dustbin single cast mono element with terrazzo Texture finish made of Full Depth Terrazzo as per specification. • Providing and Fixing Bicycle stand made from Stainless Steel 316 works. • Providing and fixing MS Hot dip Galvanized coating gate 1.5 to 1.8m ht. and MS Hot dip Galvanized Railing of 1.2 to 1.5 m ht. works as per specification. Samples should be approved before execution. • STONE-CORTEN STEEL SIGNAGE: Providing and fixing sign boards made out of 2 mm Corten steel sheet. • Providing and fixing sign boards made out of 2.5mm S.S 304 sheet; size 45 x 45cms individual letters works. • Providing and fixing precast tree pit cover around the tree pit works.
15.	Play equipment's	<ul style="list-style-type: none"> • Providing and fixing Double swings, see-saw, Merry-Go-Round, etc. • Providing & fixing Multi Children-Caravella play zone large equipment.
16.	Landscape and Horticulture works	<ul style="list-style-type: none"> • Providing and planting with including cost of the trees as per specification, excavation of 0.6x0.6x0.6 m pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 2 m height and min. 20 cm girth healthy saplings with required stacking and maintaining it for 3 year for trees works. • Providing and planting with including cost of the shrubs as per specification, excavation of 0.3x0.3x0.3/0.5x0.5x0.5 m pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 0.6 m height healthy saplings with required stacking and maintaining it for 3 year for shrub

S. NO.	Components	Details of Scope of Work
		<p>works.</p> <ul style="list-style-type: none"> • Cleaning of earth and back filling with 150mm of garden soil with 25 mm of farmyard manure works including Supplying, stacking and spreading of sludge / well decayed farm yard manure works.
17.	Sanitary fittings Fixture,	<ul style="list-style-type: none"> • Providing and fixing sanitary fixture and C.P. Fittings as per specified in technical specification and the plumbing drawing.
18.	Water supply	<ul style="list-style-type: none"> • Providing and fixing water supply CPVC (SDR 13.5) pipe as per specification and the plumbing drawings. • Providing and fixing water supply UPVC (SCH-80) pipe as per specification and the plumbing drawings. • Providing, lowering, laying and jointing HDPE pipe as per specified in technical specification and the plumbing drawing. • Providing, fixing Gray water supply MDPE pipe as per specified in technical specification and the plumbing drawing. • Providing, fixing ball valves for water supply system as per specified in technical specification and the plumbing drawing. • Providing, fixing butterfly valves for water supply system as per specified in technical specification and the plumbing drawing. • Providing, fixing Air release valves for water supply system as per specified in technical specification and the plumbing drawing. • Providing, fixing Ball float valves for water supply system as per specified in technical specification and the plumbing drawing. • Providing, fixing PVC double coated overhead tank (Sintex) for water supply system as per specified in technical specification and the plumbing drawing. • Providing, fixing Garden hydrant as per specified in technical specification and the plumbing drawing. • Providing & Fixing of factory made Precast Chamber, for garden hydrant, having size(W X L) with variable (H) mm as per specified in technical specification and the plumbing drawing.

S. NO.	Components	Details of Scope of Work
		<p>drawing.</p> <ul style="list-style-type: none"> • Providing & Fixing of factory made Precast Chamber, for Valve chamber, having size(W X L) with variable (H) mm as per specified in technical specification and the plumbing drawing. • Providing & erecting RCC underground water storage tank as per specified in technical specification and the plumbing drawing.
19.	Drainage System	<ul style="list-style-type: none"> • Providing, laying and fixing UPVC drainage pipes as per specified in technical specification and the plumbing drawing. • Providing and fixing PVC P-trap with height riser for internal drainage as per specified in technical specification and the plumbing drawing. • Excavation up to 1.5m to 5.0m depth including sorting out and stacking of useful materials and disposing off the excavated stuff with all lead and lift for all kinds of soil. • Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers, in depth consolidating each deposited layer by ramming and watering. • Providing, lowering, laying and jointing of DWC pipe for external drainage as. per specified in technical specification and the plumbing drawing. • Providing and fixing Gully trap for drainage system as per specified in technical specification and the plumbing drawing. • Providing and fixing Sewer Trap (Intercepting trap) for drainage system as per specified in technical specification and the plumbing drawing. • Providing & Fixing of factory made Precast Chamber, having size(W X L) with variable (H) mm as as per specified in technical specification and the plumbing drawing. • Providing and fixing nahni trap and PVC deep seal floor drain as per specified in technical specification and the plumbing drawing. • Providing, lowering, laying and jointing of RCC Hume pipe (NP3) for services passing as. per specified in technical

S. NO.	Components	Details of Scope of Work
		specification and the plumbing drawing.
20.	Landscape Irrigation work and	<ul style="list-style-type: none"> • Providing, laying and fixing UPVC 6kg/cm² agriculture pipe for landscape work as per specified in technical specification and the plumbing drawing. • Providing and fixing Pop up sprinkler with saddle services and swing joint assembly as per specified in technical specification and the plumbing drawing. • Providing and fixing drip irrigation system with Plain drip pipe, micro tubing with dripper as per specified in technical specification and the plumbing drawing. • Providing and fixing Pop up sprinkler with saddle services and swing joint assembly as per specified in technical specification and the plumbing drawing. • Providing and fixing ball valve, isolation valve and quick coupling valve with required size valve box as per specified in technical specification and the plumbing drawing. • Providing and fixing air release valve with required size valve box as per specified in technical specification and the plumbing drawing. • Providing and fixing water filtration system for sprinkler system as per specified in technical specification and the plumbing drawing.
21.	Storm water drain	<ul style="list-style-type: none"> • Providing and fixing UPVC (Type A) Storm water internal drain pipes as per specified in technical specification and the plumbing drawing. • Providing and fixing Khurras for storm water internal drain as per specified in technical specification and the plumbing drawing. • Providing, laying and fixing of factory made Precast U shape type drain channel with lid having (W) X (H) clear inner dimensions in required lengths as per specified in technical specification and the plumbing drawing. • Providing, laying and fixing of factory made Precast Box type drain having (W) X (H) clear inner dimensions in required lengths as per design confirming to IS requirements.
22.	Storage tanks and septic tanks	<ul style="list-style-type: none"> • Providing and erecting underground water storage tanks as per specified in technical specification and the plumbing

S. NO.	Components	Details of Scope of Work
		<p>drawing.</p> <ul style="list-style-type: none"> • Providing and erecting underground Septic tank for sewage collection as per specified in technical specification and the plumbing drawing.
23.	Pumping Borewell unit,	<ul style="list-style-type: none"> • Providing and fixing water supply and landscaping pumping unit as per specified in technical specification and the plumbing drawing. • Providing and fixing underground tank accessories likewise flanges and water level indicator as per specified in technical specification and the plumbing drawing. • Drilling bore well as per specified in technical specification or geological details and the plumbing drawing. • Providing, lowering and fixing bore well column and casing pipe as per specified in technical specification and the plumbing drawing. • Providing and fixing submersible pump set for water draw out as per specified in technical specification and the plumbing drawing.
24.	Filtration unit, Pumping unit, Automation equipment	Providing Filtration unit, Pumping unit, Automation equipment arrangements as per specification and the drawings.
25.	Transformers	<ul style="list-style-type: none"> • Supply, installation, testing & commissioning of 250KVA transformer with required two pole structure or plinth with necessary base and foundation. Contractor has to follow the approved make list. Contractor has to dismantle, shift, install and test the existing transformer wherever required. <p>Transformer must be of the latest IS norms and liasioning of the power shall be on contractor's scope. Contractor must submit the data sheet and get the approval of the make from the consultant/site in charge.</p>
26.	Panels and Accessories	<ul style="list-style-type: none"> • Supply, installation, testing and commissioning of all kind of indoor and outdoor panels fabricated with weather proof powder coated paint as per latest IS norms. All the connections and accessories must be weather proof for outdoor panels. All indoor/outdoor panels must have floor stand covering the stand and bottom entry with fabrication sheet.

S. NO.	Components	Details of Scope of Work
		<ul style="list-style-type: none"> Contractor must provide fabricated junction box with weather proof terminations at appropriate distance to avoid higher voltage drop for cabling of all kind of light and sub distribution boards. Contractor has to get the approval of the data sheets and the GA drawings from the consultant/site incharge. Contractor has to follow the approved make list.
27.	Cables and Pipes	<ul style="list-style-type: none"> Contractor has to do supply, installation, testing and commissioning of aluminum/copper armoured cables in appropriate size of HDPE pipe at every location for outdoor power requirement. Underground cables must be buried at sufficient depth shown in the drawings, as per the IS norms. For power requirement like junction box to the electrical fittings contractor must provide aluminum/copper armoured/flexible cable in appropriate size of HDPE pipe. For light poles, aluminum armoured cables must be used in HDPE pipe. Contractor has to follow the approved make list.
28.	Indoor Light Fixtures, Fan, Exhaust Fan, Ventilation Fan & Other Fittings	<ul style="list-style-type: none"> Supply, installation, testing and commissioning of all type of indoor light fixtures with all accessories and appropriate connections. Light fixtures shall include concealed/open fittings for ceiling and wall. Contractor has to finish the surface in a proper manner after fixing the fixtures. All light fixtures must be LED fittings and contractor has to maintain the lux level as per the standard norms. Supply, installation, testing and commissioning of all types of Fan, Exhaust Fans & Ventilation fans with all accessories and connections. Contractor must get the approval of the sample before the installation from the architect/consultant.
29.	Outdoor Decorative Lights, Post Top Poles & Street Poles	<ul style="list-style-type: none"> Supply, installation, testing and commissioning of decorative ligh fixtures, post top lanterns, arm bracket poles and street light poles including required RCC base and foundation. All the poles and fixtures must have weather proof colour coating and connections with earthing. All the outdoor light fittings must be of European/International brands. Contractor has to follow the standards during the installation of such fixtures. Also contractor has to provide minimum 3 years of warranty for all those fitting and poles. Contractor must get the approval of the sample before the installation from the site in charge.

S. NO.	Components	Details of Scope of Work
30.	Highmast	<ul style="list-style-type: none"> Supply, installation, testing and commissioning of Highmast including all kind of accessories, connections and rcc base. Contractor has to use the highmast at certain public areas for illumination and safety purpose considering public and vehicle movement. Contractor has to maintain the lux levels as per the standard norms and according to which the LED light fitting used. Contractor must submit the data sheet and get the approval of the sample before the installation from the consultant.
31.	Manholes/Chambers	<ul style="list-style-type: none"> Supply, installation and commissioning of all size of manholes and chambers must be of pre cast concrete. Contractor has to provide manholes at appropriate distance considering installation, future maintenance and provision purpose. Contractor has to follow the approved make list. Sizes of the manholes must be (1) 1000Lx1200Wx1275Dmm size, (2) 900Lx900Wx1000Dmm and (3) 750Lx750Wx600Dmm. Contractor can use any three sizes of manholes for electrical requirements including weather proof FRP covers considering sufficient weight load for public and/or vehicle movement.
32.	Wires & Conduits	<ul style="list-style-type: none"> Supply, installation, testing and commissioning of FRLS wires in appropriate size of medium duty rigid pvc conduits as per the latest IS norms. Contractor has to use conduits for all indoor electrification. All conduits must be concealed in slab or buried in floor but must not be open. Contractor has to follow the approved make list.
33.	Distribution Boards	<ul style="list-style-type: none"> Supply, installation, testing and commissioning of all type of weather proof metal double door distribution box for each zone. Contractor has to distribute the power zone wise for separate operation and maintenance. All the connections must be as per the IS norms providing colour codes and numbering for each circuits. Contractor has to follow the approved make list. All three-phase/single phase distribution boards must be concealed in wall. Earthing wire must be provided for all distribution boards. All switchgear including MSB/MCCB/ELCB and busbar must be connected as per the standard norms. Contractor must get the approval of the sample from the consultant /site in charge.

1.3.2.1 Proposed Features in Landscaping & Beautification of Summer House Garden

The following are the proposed typical details for Beautification of summer house Garden

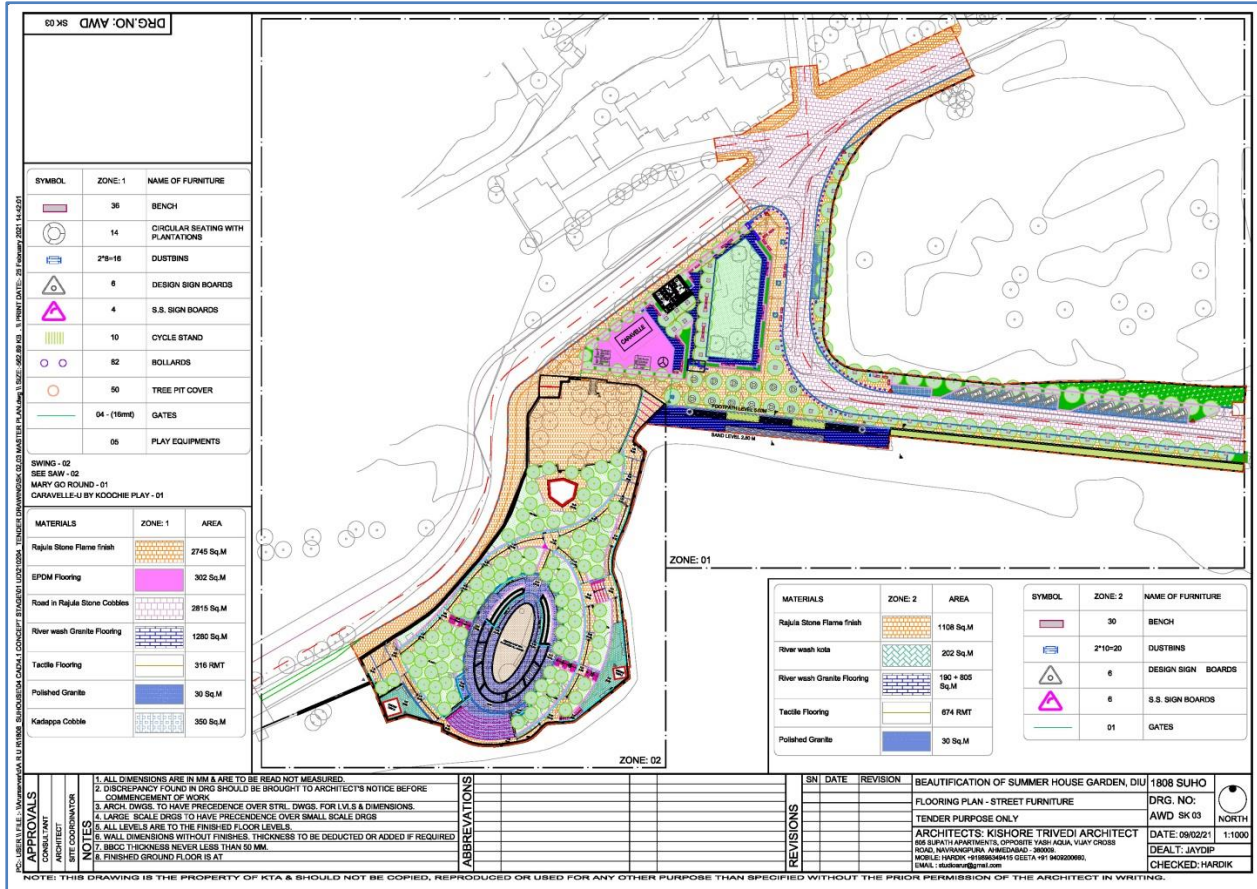


Figure 42: Proposed View of Summer House Garden (Stretch 2)

Sr no	Description	Zone 01_A Road area	Zone 01_B Lower Garden area	Zone 01_D Jalandhar Promenade	Zone 02_A Upper landscape area	Zone 02_B Pavilion area	Zone 02_C Mitigation of Existing Cliff
	Location	Jalandhar Beach	Jalandhar Beach	Jalandhar Beach	Summer House Garden	Summer House Garden	Summer House Garden
	Approx. area in Sqm	6855 sqm	1558.50 sqm	740 sqmt	4408.50 sqm	805 sqm	221 rmt
	Land ownership	Govt. land ownership + Private land ownership	Govt. land ownership	Govt. land ownership	Provisional land ownership	Provisional land ownership	Provisional land ownership
Proposed Road and Pavement works							
1	Road cairrage width	7.5 - 10.0 m wide Cobble stone road with storm water outlet slope and kerbing	NA	NA	NA	NA	NA
	Parking Provision	14 four wheelers, 20 two wheelers, 10 cycle	NA	NA	NA	NA	NA
2	Junctions	Key 2 junction design at garden area and Government circuit house junction to be designed					
3	Signages	Road signages, direction signages, parking signages, Cateye, painting of lines/dashes/arrows/zebra crossing,					
4	Pavement						
	Northern side- Avg.	Flame Finish Rajula stone - 2.5 - 5.0 m wide	Granite River Washed - varies from 1.5 - 6.0 m wide	Granite River Washed	Flame Finish Rajula, Riverwashed kota stone- 3.0 - 5.0 m wide	Granite River Washed 2.4 - 4.0 m wide	NA

Sr no	Description	Zone 01_A Road area	Zone 01_B Lower Garden area	Zone 01_D Jalandhar Promenade	Zone 02_A Upper landscape area	Zone 02_B Pavilion area	Zone 02_C Mitigation of Existing Cliff
	Southern side- Avg.	Flame Finish Rajula stone - 3.0 -6.0m wide, 12.0 m wide in plaza					NA
Proposed Hardscape Surfaces and flooring							
		Rajula cobble stone, Flame finish Rajula stone, Kadappa stone cobble, Tactile flooring	Flame Finish Rajula stone, Riverwash Granite, Polished granite, EPDM, Tactile flooring	Flame Finish Rajula stone, Riverwash Granite stone, Tactile flooring	Flame Finish Rajula stone, Riverwash Kota stone, Riverwash Granite, Polished Granite stone, Tactile flooring	Riverwash Granite, Polished Granite stone, Tactile flooring	
Cliff wall							
	Works on Existing wall	NA	NA	NA	NA	NA	221 rmt mitigation of rocky mound surface exposed to sea water. Guniting with polyster fibres, Chemical anchoring and filling up cracks, scaffolding and working in tidal condition.
Proposed buildings/ Plazas/Gardens							

Sr no	Description	Zone 01_A Road area	Zone 01_B Lower Garden area	Zone 01_D Jalandhar Promenade	Zone 02_A Upper landscape area	Zone 02_B Pavilion area	Zone 02_C Mitigation of Existing Cliff
	Buildings/area in sqm	<ul style="list-style-type: none"> Seating area Green landscape area 	<ul style="list-style-type: none"> Childrens play equipments Seating area Green landscape area Toilet - 74 sqm 	<ul style="list-style-type: none"> Promenade walk - 175 rmt Retaining wall 	<ul style="list-style-type: none"> Amphitheater Path ways Seating area 	<ul style="list-style-type: none"> Pavilion with ramps and covered seating area - 805 sqm 	
	Plaza/Hardscape	<ul style="list-style-type: none"> Arrival Junction and Parking area 	<ul style="list-style-type: none"> Pathways 	<ul style="list-style-type: none"> Ghats 	<ul style="list-style-type: none"> Pathways Cave area with sitting space 		
	Garden/Park/Childrens park	NA	<ul style="list-style-type: none"> Childrens play area Senior Citizen corner Lawn area 		<ul style="list-style-type: none"> Garden area with Trees planation and seating 	<ul style="list-style-type: none"> Existing Rock with stone boulders and planation 	
		Note: All zones would have common elements such as Street furniture, Flooring works, Compound wall, Horticulture and Landscape elements, Utility works like electrical, Storm water, Plumbing, Fire fighting etc.					
	Horticulture	<ul style="list-style-type: none"> Providing and planting with including cost of the tree, excavation pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 2 m height and min. 20 cm girth healthy saplings with required stacking and maintaining it for 3 year for trees works. Providing and planting with including cost of the shrubs, excavation pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 0.6 m height healthy saplings with required stacking and maintaining it for 3 year for shrub works. Cleaning of earth and back filling with 150mm of garden soil with 25 mm of farmyard manure works, mixing and levelling it as per required slopes. Grassing with dibbling method with the distance of 50x50mm, application of required pesticides and chemical fertiliser and maintaining it properly and weed free for 3 year. 					

Sr no	Description	Zone 01_A Road area	Zone 01_B Lower Garden area	Zone 01_D Jalandhar Promenade	Zone 02_A Upper landscape area	Zone 02_B Pavilion area	Zone 02_C Mitigation of Existing Cliff
		<ul style="list-style-type: none"> Supplying, stacking and spreading of sludge / well decayed farm yard manure works. 					
Proposed elements							
	Civil work elements	<ul style="list-style-type: none"> Proposed New Compound wall with railing Proposed Pavilion Proposed steps at Jalandhar Beach with Plantation Proposed Toilet Building in Garden Area 					
	Street furniture/ Signages	<ul style="list-style-type: none"> Providing Precast Concrete Cylindrical bollard of 450mm dia x 1000mm height works. Providing and fixing seating benches like Precast GFR Concrete designer backless benches, Precast Designer backless GFR Concrete circular seating bench, large boulders,etc. Providing and fixing Precast GFR Concrete dustbin, etc. Providing and fixing MS Hot dip Galvanized coating gate and MS Hot dip Galvanized Railing works as per specification. Samples should be approved before execution. Providing and Fixing Bicycle stand made from Stainless Steel 316 works. STONE-CORTEN STEEL SIGNAGE: Providing and fixing sign boards made out of Corten steel sheet. Providing and fixing sign boards made out of S.S 304 sheet individual letters works. Providing and fixing precast tree pit cover around the tree pit works. 					
	Play equipments	<ul style="list-style-type: none"> Providing and fixing Double swings, see-saw, Merry-Go- Round, etc. Providing & fixing Multi Children- Caravella play zone large equipment. 					
Demolition and Dismantling							
		Demolition and Dismantling of structures, surface areas, walls, electric poles etc as per provided details					

Sr no	Description	Zone 01_A Road area	Zone 01_B Lower Garden area	Zone 01_D Jalandhar Promenade	Zone 02_A Upper landscape area	Zone 02_B Pavilion area	Zone 02_C Mitigation of Existing Cliff
	Proposed Utilities						
		Jalandhar beach to Circuit road to have continuous street lighting poles as per specification and spacing marked.					
		Continuous Jalandhar Promenade walk light post and illumination along sea edge.					
		Providing water supply, Storm water and sewage arrangements as per specification and the plumbing drawings.					
		Providing Irrigation, Sprinklers arrangements as per specification and the plumbing drawings.					

Section – 2: Urban Design of selected street & Portuguese street

“Scope of Work” means the Development of Streets in Diu & Ghoghla including Portuguese Street consisting of up gradation and augmentation of foot path, traffic junctions and other miscellaneous works along with Operation and Maintenance of tendered works for period of Five Years for Diu Smart City. Scope of Work is to redevelop the identified street network of ~9.57 Km Street/Road network and ~2.56 km of Portuguese Street in Diu and Ghoghla by considering Urban Street Design Guidelines.

The scope of work to be taken up under the streets development will include but not limited to:

- Dismantling, Excavation and Filling Works
- Road Works and Paving Works as per the themes of streets.
- Road furniture's & sign boards
- Horticulture items, Creeper katta
- Storm water drain
- Rainwater harvesting by provision of rainwater recharge pits along storm water drain network
- Street lighting
- Electrical & ICT utility duct including provision for house service connection of electricity
- Portable water supply including provision for house service connections
- Recycle water supply
- Sanitary works at Portuguese Street
- Firefighting provisions at Portuguese Street
- Play area/equipment's at Park area
- Provision of Bus Shelters

Note:

- (i) In addition, overall proposed development will include providing necessary works for gas supply. This scope will be taken up in parallel by another agency. The agency appointed for the “Development of Urban Streets in Diu MC & Ghoghla including Portuguese Street” will need to coordinate with the agency to be appointed for the gas supply works and vice-versa. The cross-section figures provided in this RFP also indicates the gas supply component for information and necessary planning purpose.
- (ii) The Electrical ducts/conduits will be placed now however the laying the cable is not in the scope. The cross-section figures provided in the RFP also indicates cables in the ducts which is for information and necessary planning purpose.

1.4 Components of the Urban Streets Development

1.4.1 Street Furniture

Apart from surfacing many other components have been considered in the development of the street network. The following components have been considered in this project;

- Street Furniture, Bollards
- Tree Planters
- Footpath, Glow Studs
- Information Sign Board, Mandatory Signs, Cautionary Signs
- Landscaping
- Marking, painting
- Solar lights/Blinkers/Road Studs
- Play area/equipment
- Street lighting and decorative lighting

1.4.2 Utility Section

The following components of the various utilities have been considered for the development:

- Storm Water Drains
- Electrical & ICT Ducts
- Portable Water Supply
- Recycle Water Supply

1.5 Roads/Streets Development Details

The activities proposed along each of the identified road corridors and Portuguese Street are detailed in respectively. In addition to these, storm water drainage, rainwater harvesting, water supply, recycle water supply, electrical ducts and street furniture are also being provided for the streets/roads.

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
1.	ROAD NO-01 Zampa to Markata (via Nagar seth Haveli) to Vekaria	0.00	659.34	659.34		659.34				<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Shared Space • Street Lighting • Dedicated Foot paths • Parking Zones • Benches & Plantation
		659.34	881.34	222.00			222.00			
2.	ROAD NO-02 Zampa to Jethibai Marg to Hotel Smarat	0.00	831.94	831.94			831.94			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Dedicated Foot paths • Parking areas • Benches & Plantation • Street Lighting • Creeper kata
3.	ROAD NO-2A Samrat Hotel to Director of Accounts General office	0.00	288.40	288.40				288.40		<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
										<ul style="list-style-type: none"> carriageway width Dedicated Foot paths Parking areas Benches & Plantation Street Lighting
4.	ROAD NO-03 Hadmatia road to Vekaria Laxminarayan Temple	0.00	57.00	57.00	57.00					<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width Shared Space Street Lighting Dedicated Foot paths Parking areas Benches & Plantation Creeper kata
		57.00	194.09	137.09		137.09				
		194.09	409.00	214.91				214.91		
		409.00	610.35	201.35			201.35			
5.	ROAD NO-04 Soratia street	0.00	355.93	355.93	355.93					<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width Shared Space Street Lighting

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
6.	ROAD NO-05 Dr. Rajaram Kelkar Road	0.00	292.72	292.72			292.72			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Dedicated Foot paths • Parking areas • Benches & Plantation • Street Lighting • Shared Space
		292.72	366.22	73.50	73.50					
7.	ROAD NO-06 Ghodia street to Jumma Masjid	0.00	47.51	47.51	47.51					<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Shared Space • Street Lighting • Dedicated Parking areas
		47.51	155.76	108.25			108.25			
		155.76	260.76	105.00		105.00				
		260.76	449.06	188.30	188.30					
8.	ROAD NO-07 Education Office to Bhavsarwada	0.00	294.55	294.55			294.55			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Shared Space

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
										<ul style="list-style-type: none"> • Creeper kata • Street Lighting
9.	ROAD NO-08 Dena Bank ATM to Darjiwada Road Via Panibai School	0.00	73.67	73.67		73.67				<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Shared Space • Street Lighting • Dedicated Foot paths • Parking areas • Benches & Plantation
		73.67	179.82	106.15			106.15			
		179.82	212.40	32.58	32.58					
		212.40	355.76	143.36		143.36				
10.	ROAD NO-09 Nehru Park to Laxmi park	0.00	310.57	310.57			310.57			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Dedicated Foot paths • Parking areas • Benches & Plantation • Street Lighting
11.	ROAD NO-9A	0.00	175.64	175.64			175.64			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
	Hotel Samrat to Nehru park									<ul style="list-style-type: none"> street including redesign of the carriageway width • Parking areas • Benches & Plantation • Street Lighting
12.	ROAD NO-10 GST Office to Nirmala Matha School Backside	0.00	199.85	199.85			199.85			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Dedicated Foot paths • Parking areas • Benches & Plantation • Street Lighting
13.	ROAD NO-10A Nehru park to Child Development office	0.00	179.40	179.40				179.40		<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Dedicated Foot paths • Parking areas • Benches & Plantation • Street Lighting

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
14.	ROAD NO-11 Samrat Hotel to DMC office	0.00	173.93	173.93		173.93				<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Shared Space • Street Lighting • Dedicated Foot paths • Parking areas • Benches & Plantation
		173.93	258.32	84.39					84.39	
15.	ROAD NO-12 St. Paul Church to PWD office	0.00	163.93	163.93				163.93		<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Dedicated Foot paths • Parking areas • Street Lighting
16.	ROAD NO-14 Bunglee Chowk to Ghoghla Subpost office	0.00	143.45	143.45				143.45		<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width
		143.45	590.00	446.55			446.55			
		590.00	620.00	30.00	30.00					

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
		620.00	790.10	170.10				170.10		<ul style="list-style-type: none"> • Dedicated Foot paths • Parking areas • Benches & Plantation • Street Lighting • Shared Space
17.	ROAD NO-15 Panchayath Chowk road-1	0.00	271.65	271.65			271.65			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Shared Space • Street Lighting
18.	ROAD NO-16 Panchayath Chowk road-2	0.00	104.98	104.98			104.98			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Shared Space • Street Lighting
19.	LINK ROAD NO-01 Jethibai Busstand road to Lalshah bava Dargah	0.00	79.00	79.00			79.00			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width
		79.00	130.11	51.11				51.11		

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
										<ul style="list-style-type: none"> • Dedicated Foot paths • Parking areas • Benches & Plantation • Street Lighting
20.	LINK ROAD NO-02 Hotel TGH to FCS Warehouse at Fort road	0.00	117.00	117.00			117.00			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Dedicated Foot paths • Parking areas • Benches & Plantation • Creeper kata • Street Lighting
		117.00	148.82	31.82				31.82		
21.	LINK ROAD NO-03 Near Jumma Masjid to Bunder Chowk road via SBI	0.00	61.15	61.15			61.15			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Dedicated Foot paths • Parking areas • Benches & Plantation

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
										<ul style="list-style-type: none"> Street Lighting
22.	LINK ROAD NO-04 Electricity bill collection center to Bunder Chowk	0.00	99.25	99.25			99.25			<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width Dedicated Foot paths Parking areas Benches & Plantation Street Lighting
23.	LINK ROAD NO-05 Electricity bill collection center to Education office	0.00	59.13	59.13			59.13			<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width Dedicated Foot paths Parking areas Benches & Plantation Street Lighting
24.	LINK ROAD NO-06 Street Behind Bal Bhavan	0.00	65.41	65.41			65.41			<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
										<ul style="list-style-type: none"> • Dedicated Foot paths • Parking areas • Benches & Plantation • Street Lighting
25.	LINK ROAD NO-07 Some Part Of Randal Street	0.00	44.02	44.02			44.02			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Dedicated Foot paths • Parking areas • Benches & Plantation • Street Lighting
26.	LINK ROAD NO-08 Jamath khana to Panibai School road	0.00	80.20	80.20		80.20				<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Dedicated Foot paths • Street Lighting
27.	LINK ROAD NO-09 Samrat Hotel to Market	0.00	71.54	71.54					71.54	<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
										<ul style="list-style-type: none"> carriageway width Dedicated Foot paths Parking areas Street Lighting
28.	LINK ROAD NO-10 The Street Connecting Hadmatia Road and Soratia Street	0.00	37.68	37.68	37.68					<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width Shared Space Street Lighting
29.	LINK ROAD NO-11 The Street Connecting Hadmatia Road and Soratia Street (Near Gopal Lal Mandir)	0.00	65.50	65.50	65.50					<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width Shared Space Street Lighting
30.	LINK ROAD NO-12 Near Hingraj Mata Temple to City wall street	0.00	61.28	61.28			61.28			<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width Dedicated Foot paths
		61.28	92.84	31.56		31.56				

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
										<ul style="list-style-type: none"> Street Lighting Shared Space
31.	LINK ROAD NO-13 Nehru park to Bhavsarwad	0.00	69.47	69.47			69.47			<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width Dedicated Foot paths Street Lighting Street Lighting
		69.47	96.36	26.89			26.89			
32.	LINK ROAD NO-14 Darjeewada Road	0.00	77.93	77.93	77.93					<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width Shared Space Street Lighting
33.	LINK ROAD NO-15 Hanuman Mandir Street	0.00	54.15	54.15			54.15			<ul style="list-style-type: none"> Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width Shared Space Street Lighting

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
34.	LINK ROAD NO-16 Panchayath Chowk Street-1	0.00	46.58	46.58			46.58			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Shared Space • Street Lighting
35.	LINK ROAD NO-17 Panchayath Chowk Street-2	0.00	31.64	31.64			31.64			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Shared Space • Street Lighting
36.	LINK ROAD NO-18 Panchayath Chowk Street-3	0.00	28.65	28.65			28.65			<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width • Shared Space • Street Lighting
37.	MISSING LINK ROAD (MDR – 10) Near Govt. Middle School to Fort Road	0.00	315.08	315.08					315.08	<ul style="list-style-type: none"> • Reconstruction of pavement with Cobble stone surface in street including redesign of the carriageway width

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		2 m	3 m	4 m	5-8 m	>8 m	
										<ul style="list-style-type: none"> • Dedicated Foot paths • Benches & Plantation • Parking areas • Street Lighting
38.	MDR - 03 Bivotli to Zampa	0.00	345.00	345.00					345.00	<ul style="list-style-type: none"> • Dedicated Foot paths • Benches & Plantation • Dedicating Parking areas • Street Lighting
39.	MDR 10 Road Zampa to Vijaypath Jn	0.00	743.00	743.00					743.00	<ul style="list-style-type: none"> • Dedicated Foot paths • Parking Zones • Plantation • Street Lighting

The activities proposed along each zone of the Portuguese Street are detailed in the table mentioned below. The proposed activities include the following:

- Providing and fixing pre-cast concrete dished channel/saucer channel with and without hole of M40 grade cement based concrete block as per approved design.
- Providing and fixing Precast GFR Concrete Street furniture i.e. bollards, benches, dustbin, tree pit cover, bicycle stand etc.
- Providing and fixing MS Hot dip Galvanized coating gate and MS Hot dip Galvanized Railing works as per specification.

- Providing and fixing signages and sign boards made out of Corten steel and S.S. 316 sheet.
- Providing and planting tree, shrubs, ground covers, including cleaning of earth and back filling, supplying, stacking and spreading of sludge / well decayed farm yard manure works.
- Demolition and Dismantling of buildings, structures, surface areas, walls, electric poles etc. as per provided details.
- In addition to these, all zones would have common elements such as Street lighting poles, high mast, Transformers, Flooring works, Compound wall; Utility works like electrical, Storm water, Plumbing, Sewage, PNG Gas supply, etc.
- Garden/ Plaza/ Play areas to have illumination.
- MEPF conduits along the street for present and future requirements.
- Providing Irrigation, Sprinklers, Filtration unit, Pumping unit and Automation equipment arrangements as per specification.
- Providing Electrical, Water supply and excavation for connection to all the households.
- Providing water supply and storm water arrangements for internal, external and Road Street as per specification and the plumbing drawings.
- Providing and laying LV and MV Network cable all along the street.

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		3 m	3.75 m	5 m	7.5 m	10m	
1	ZONE NO-01 DMC Building (Shahid Garden) to Directorate of Accounts building	CA 0.00	CA 192.91	192.91	33.32		159.5 9			<ul style="list-style-type: none"> • Cobble Stone Street including redesign of the carriage width with pavements. • Parking Spaces, • Junction designing, • Street furniture, • Universal access with addition of ramp and tactile tiles, • Trees and Landscape areas, • Shared Spaces
		CB 0.00	CB 15.45	15.45			15.45			
		Adjoining streets		21.00			21.00			
2.	ZONE NO-02 Collectorate to City Survey Office building and Directorate of Accounts to City Survey Office	CB 15.45	CB 146.83	131.38			131.3 8			<ul style="list-style-type: none"> • Cobble stone street including redesign of the carriage width with pavements, • Parking Spaces, • Street furniture, • Universal access with addition of ramp and tactile tiles, • Trees and Landscape areas, • Shared Spaces
		CC 16.65	CC 95.57	78.92			78.92			
		CE 0.00	CE 15.00	15.00			15.00			
		Adjoining streets		20.60	20.60					
3.	ZONE NO-03 Directorate of Accounts	CA 192.91	CA 471.22	278.31		61.50	216.8 1			<ul style="list-style-type: none"> • Cobble stone street including redesign of the carriage width with

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		3 m	3.75 m	5 m	7.5 m	10m	
	building to Children Park road	CC 0.00	CC 16.65	16.65			16.65			pavements, <ul style="list-style-type: none"> • Monument Plaza Design as Pause point, • Parking Spaces, • Junction designing, • Street furniture, • Universal access with addition of ramp and tactile tiles, • Trees and Landscape areas, • Shared Spaces
		Adjoining streets		98.26		24.73	73.53			
4.	ZONE NO-04 City Survey Office building to St. Paul's Church	CB 146.83	CB 399.36	252.53			109.6 2	142.9 1		<ul style="list-style-type: none"> • Cobble stone street including redesign of the carriage width with pavements, • Monument Plaza Design as Pause point, • Parking Spaces, • Junction designing, • Compound wall and Planter wall design, • Street furniture, • Universal access with addition of
		CC 95.57	CC 108.93	13.36			13.36			
		CE 0.00	CE 39.49	39.49	16.40	23.09				
		Adjoining streets		12.40		12.40				

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		3 m	3.75 m	5 m	7.5 m	10m	
										ramp and tactile tiles, <ul style="list-style-type: none"> Trees and Landscape areas, Shared Spaces
5.	ZONE NO-05 St. Paul's Church to Football Ground and St. Paul's Church to St. Francis of Assisi Church	CB 399.36	CB 610.11	210.75					210.75	<ul style="list-style-type: none"> Cobble stone street including redesign of the carriage width with pavements/cycle lane, Parking Spaces, Junction designing, Retaining wall towards Quarry side, Compound wall and Planter wall design, Street furniture, Universal access with addition of ramp and tactile tiles, Trees and Landscape areas, Shared Spaces
		CD 0.00	CD 262.60	262.60		262.60				
		Adjoining streets		77.50	13.19	35.03	19.63		9.65	
6.	ZONE NO-06 Children Park road to St. Francis of Assisi Church	CA 471.22	CA 650.00	190.70			32.25		158.45	<ul style="list-style-type: none"> Cobble stone street including redesign of the carriage width with pavements/cycle lane, Parking Spaces,
		CB 604.40	CB 674.00	68.20					68.20	

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		3 m	3.75 m	5 m	7.5 m	10m	
		CE 0.00	CE 32.00	32.00			32.00			<ul style="list-style-type: none"> • Junction designing, • Street furniture, • Universal access with addition of ramp and tactile tiles, • Trees and Landscape areas, • Shared Spaces
		CF 0.00	CF 39.60	39.60					39.60	
		Adjoining streets		18.8		10.8	8			
7.	ZONE NO-07 St. Francis of Assisi Church to Summer House Garden	CA 966.00	311.5					311.5	CA 966.00	<ul style="list-style-type: none"> • Cobble stone street including redesign of the carriage width with pavements/cycle lane, • Monument Plaza Design as Pause point, • Parking Spaces, • Junction designing, • Street furniture, • Universal access with addition of ramp and tactile tiles, • Retaining wall design, • Trees and Landscape areas, • Shared Spaces
		CD 280.40	21		21					
		CE 0.00	CE 79.50	87		87				
		Adjoining streets		22	22					
8.	Museum Garden In front of Diu Museum	5269 sqm								<ul style="list-style-type: none"> • Developing a relationship and uniform user experience between monuments

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		3 m	3.75 m	5 m	7.5 m	10m	
	building									<p>(St. Paul's Church and Diu museum) by Connecting the spaces as one,</p> <ul style="list-style-type: none"> Defining axis for Diu museum (St. Thomas Church) with pathways and landscape terraces to enhance the historical structures and create identity of the space, Street furniture, Universal access with addition of ramp and tactile tiles, Planter Retaining wall Designs with MS railing and gates, Plantation of trees and Shrubs providing RCC walls as required with dedicated Lawn areas, Steel –wood Pavilion as sitting space, Toilet and drinking water facility for the users
9.	Children Park Next to the Museum Garden on southern side	6494 sqm								<ul style="list-style-type: none"> Realignment of pathways and arrangement of spaces to create a better place, Providing pathways to integrate and achieve an Universal access with

S. No.	Road/Street	Chainage (m)		Length (m)	Proposed Width of Road					Activities Proposed
		From	To		3 m	3.75 m	5 m	7.5 m	10m	
										addition of ramp and tactile tiles, <ul style="list-style-type: none"> • Street furniture, • Plantation of trees and Shrubs providing planter walls as required with Lawn areas, • EPDM flooring for children, • Children play area with play equipment, • Information Kiosk/ Utility room, • Senior Citizen corner, • Open Gym, • Volley ball, Basketball/ Badminton court, • Jogging track

1.6 Details of Scope of Work

S. No	Component	Details of Scope of Work
1.	Dismantling & Excavation Works	<ul style="list-style-type: none"> • Dismantling and disposal of unreinforced cement concrete / RCC / rubble soling in road works / WBM/ Pavements / rubble works / Stone Masonry works, paver blocks, cobble stone floor, China mosaic floor, tile dado, etc. • Demolition/dismantling manually/by mechanical means including stacking of serviceable material and disposal of unserviceable material with all lead and lift • Removal of existing lighting fixtures, Junction boxes and cables, etc. • Felling of the trees of various girth sizes • Excavation of all kinds of soil (including rock cutting) up to 1.5 m to 5.0 m depth
2.	Road and Paving Works	<ul style="list-style-type: none"> • Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. • Construction of Granular sub-base • Providing, laying, spreading and compacting graded stone aggregate to Wet mix macadam specification • Providing and applying Prime coat with bitumen emulsion (SS1) Bulk • Providing and applying tack coat with bitumen emulsion (RS-1) • Providing and laying Dense Graded Bituminous Macadam using crushed stone aggregates • Providing and laying Bituminous concrete using crushed stone aggregates • Providing and laying in position plain cement concrete of specified grade (M15) and curing • Filling with sand (Zone IV) including watering ramming, consolidating and dressing • Providing and laying factory made chamfered edge Cement Concrete paver blocks • Providing and fixing 100 x 100 x 80 mm Green Granite cobble stone flooring & edging for paving in streets/ floors, etc. • Providing and fixing 100 x 100 x 80 mm Viga Blue Granite cobble stone flooring & edging for paving in streets/ floors, etc.

S. No	Component	Details of Scope of Work
		<ul style="list-style-type: none"> • Providing and fixing 100 x 100 x 80 mm Yellow Granite cobble stone flooring & edging for paving in streets/ floors, etc. • Providing and fixing 100 x 100 x 80 mm Red Granite cobble stone flooring & edging for paving in streets/ floors, - etc. • Providing and fixing 100 x 100 x 80 mm Black Granite cobble stone flooring & edging for paving in streets/ floors, etc. • Providing and fixing 100 x 100 x 80 mm White Granite cobble stone flooring & edging for paving in streets/ floors, etc. • Providing and fixing 100 x 100 x 80 mm Grey Rajula cobble stone flooring & edging for paving in streets/ floors, footpaths etc. • Providing and fixing 100 x 100 x 80 mm Yellow Rajula cobble stone flooring & edging for paving in streets/ floors, footpaths etc.
3.	Road Furniture's & Sign Boards	<ul style="list-style-type: none"> • Providing and fixing pre-cast concrete kerb stone including corner, quadrants, angles, radius, dropper kerbs in all shapes (with M40 grade cement based concrete blocks) • Providing and laying of Hot applied Thermoplastic compound 2.5 mm thick including Reflectorising Glass Beads • Supplying and fixing cat eye (Stimsonite) • Providing and fixing Regulatory/Mandatory sign boards • Providing and fixing cautionary/warning sign boards • Providing and fixing stop sign boards • Providing and fixing of information boards (Aluminium anodised frames) • Supply and installation of the Terrazzo benches • Providing and fixing Cast Iron bollards
4.	Horticulture Works	<ul style="list-style-type: none"> • Supply, stacking and plantation of Pongamia glabra/Thespesia populnea/Cassia fistula (Amaltash)/ Peltophorum inerme/ Nerium oleander Shurb/Thevetia peruviana Shurb/Galphimia glauca Shurb/ Galphimia glauca Shurb/Pandanus dwarf gold Shurb/ plants • Providing and fixing RCC Tree Grating • Installation of the bamboo Creeper Kata using the poles of Bamboo species Dendrocalamus Stocksii

S. No	Component	Details of Scope of Work
5.	Storm Water Drain Works	<ul style="list-style-type: none"> • Providing and laying in position plain cement concrete of M10 grade and curing • Providing, laying and fixing of factory made Precast Box type drain with High Performance Self Compacting Concrete of M40 Grade using Fe 500 D reinforcement bar designed for 5 T wheel Load • Providing & Fixing of factory made Precast manhole/Chamber of M40 grade using FE500D (T25 load carrying capacity, 10 T Axle Load, 5T wheel load) • Construction of Cast in Situ manhole/ chambers (10 T Axle Load, 5T wheel load, M30 grade of concrete, M10 grade of PCC bed and steel FE 500D) • Providing & Fixing of factory made Precast Cement Concrete Saucer Drains • Provision for Rain water harvesting recharge pits below the manholes as per the directions, requirements and satisfaction of the Authority • Storm water outfall is envisaged to the nearby secondary/tertiary drain or moat locations; accordingly the appropriate outfall arrangement is to be provided
6.	Rainwater Harvesting	<ul style="list-style-type: none"> • Rain Water Harvesting recharge pits shall be within the storm water drain manholes • Typical interval between 2 RWH recharge pits may be ~ 100 m • RWH recharge pits shall be provided with a perforated PVC pipe which shall terminate in the soil layer before it reaches the water table • RWH recharge pit designs shall be provided by the contractor as per the directions, requirements and satisfaction of the Authority
7.	Street Lighting Works	<ul style="list-style-type: none"> • Dismantling of the Existing street light poles, including pole, luminary & removal of cable terminations from pole Terminal box including disposal of material. • Removal of existing cable including disposal of material • Supply and Installation of 6 m height single arm poles (Centre to centre 20 meters distance) • Supply and Installation of 3.5 Meter Height Poles • Supply and Installation of Post Top Light

S. No	Component	Details of Scope of Work
		<ul style="list-style-type: none"> • Supply and installation of Decorative design bracket (Centre to centre 10 meters distance) • Supply, installation and testing of Wall Lights • Supply , installation and testing of Bollard Lights • Supply , installation and testing of Recessed In ground Diffused Lights (Centre to centre 1.5 meter distance) • Supply , installation and testing of Pole Mounted Multispot Lights (63W) • Supply and installation of lighting control panel • Providing and laying XLPE/PVC (IS:7098) (I)-88 ISI armoured cable multistrand Copper / aluminium conductor of 1.1 KV. rated • Providing, Lowering, laying and jointing of class SN 8(75 mm dwc pipe) • Providing and fixing heavy duty flange type brass cable gland with rubber ring for XLPE/PVC insulated armoured cable complete without going tails, insulating tape etc for all cables • Solderless crimping type lugs conforming to IS evenly crimped with high pressure tool & connected to switchgear terminals with brass/cadmium plated nut bolts in an approved manner. • Supplying & erecting of earth pit
8.	Electrical Utility Works	<ul style="list-style-type: none"> • Lowering, laying and jointing HDPE pipes (160mm) with specials • Providing and supplying in standard length ISI mark high density Polyethylene H.D.P.E. Pipes of size HDPE PE100 PN10 SIZE 160mm as per IS-4984/2016. suitable for underground cable duct ,including of Couplers and endcaps • Lowering, laying and jointing HDPE pipes (110mm) and specials • Providing and supplying in standard length ISI mark high density Polyethylene H.D.P.E. Pipes of size HDPE PE100 PN10 SIZE 110mm as per IS-4984/2016. suitable for underground cable duct ,Including of couplers and endcaps for house hold connections • Providing and laying of Spacers for the maintaining space between the HDPE conduit pipe at a spacing of 2.5 mts • Providing and laying Manhole Chamber (1200x600) including

S. No	Component	Details of Scope of Work
		<p>cover</p> <ul style="list-style-type: none"> • Providing and fixing in position pre-cast RCC manhole cover and frame of suitable duty. • Providing and laying chambers 300x300 mm (100 Thick) and depth 300 mm for house service connections • Supplying and fixing C.I. cover 300x300 mm without frame of suitable duty. • Providing, Lowering, laying and jointing of class SN8 (75 mm dwc pipe) structured wall Polyethylene Piping and fittings • Providing, supplying, lowering, fixing and laying of 110mm diameter PE100 PN10 class in standard length ISI mark rigid unplasticised PVC pipes suitable for the laying of the underground ICT Cable • Back filling with the available excavated earth in trenches • Supplying and making outdoor cable end termination with heat shrinkable jointing kit complete with all accessories including lugs • Supplying and making straight through joint with heat shrinkable kit including ferrules and other jointing materials for size of 3½ X 240 sq. mm PVC insulated and PVC sheathed / XLPE aluminium conductor cable of 1.1 KV grade as required. • Providing of 3C X 300 Sqmm, XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 11 KV cable • Providing of 3.5C X 240 Sqmm, XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 11 KV cable • Supply, laying, testing and commissioning 1.1 kV , grade XLPE insulated, stranded aluminium conductor, galvanized steel flat strip/ round wire armoured of various sizes • Erection testing and commissioning of LT service pillar (I/C 400 Amps MCCB, O\G 3 No's of 250Amps HRC fuses • Erection testing and commissioning of LT mini pillar (I/C 250 Amps MCCB, O\G 10 No's of 63Amps HRC fuses • Providing and fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armoured cable complete without going tails, insulating take etc. for various sizes of cables.

S. No	Component	Details of Scope of Work
		<ul style="list-style-type: none"> • Providing LV and MV lines arrangements as per specification.
9.	Portable Water Supply Works	<ul style="list-style-type: none"> • Providing and supplying D. I. K-9, K-7 grade S&S pipes(IS 8329-2000) • Supply & Delivery of Ductile Iron socket spigot bends, tees, reducers or any other specials • Lowering, laying and jointing Tyton joints / Mortar lined D. I. Pipes of various classes with DI specials • Providing and cast in situ C.C. in grade M-30 proportions including scaffolding centering formwork, needle vibrated consolidation, curing and hydraulic testing etc. • Supplying cutting, bending, binding and placing in position with deformed (TMT) bars confirming to relevant IS Fe – 500 grade for all diameters for reservoirs/structures including lift up to 6 meter height or depth below G.L. for all diameters. • Providing and supplying ISI mark CI D/F Sluice Valves as per IS:14846 (Latest Edition) of PN-1.6 With hand/wheel cap operated (Alt-1 type long body) • Supply & Delivery of Ductile Iron socket spigot bends, tees, reducers or any other specials • Lowering, laying and jointing in position following C. I. / D/F Reflux valves, Butterfly valves, Sluice valves and Air valves including cost of all labour, jointing material, nut bolts and giving satisfactory hydraulic testing, etc. complete. • Providing and supplying C. I. Air valves of approved make & quality • Supply & Delivery of Ductile Iron socket spigot bends, tees, reducers or any other specials • Lowering, laying and jointing in position C. I. / D/F Reflux valves, Butterfly valves, Sluice valves and Air valves Air valves double ball Flanged including cost of all labour, jointing material, including nut bolts and giving satisfactory hydraulic testing, etc. • Construction of valves chambers in brick or bela stone masonry • Excavation for pipe line trenches in all sorts of soil and soft murrum for valve chambers/manhole etc. with shoring and strutting if required as per required gradient and line including safety provisions using site rails and stacking excavated stuff including up to all required lead cleaning the site etc. complete for all lifts and strata as specified (1.5 m to 3 m

S. No	Component	Details of Scope of Work
		<p>depth)</p> <ul style="list-style-type: none"> • Refilling the valve chambers/manholes with selected soil brought from outside including all lead incl. ramming, watering, consolidating desposal of surplus stuff as directed within a radius of 3 km. • RCC precast M.H. Frame & Cover Manufacture, supply & Delivery suitable to Valve chambers • Removing of existing pipeline incl. removal of specials, valves jointing material including carting and stacking of removed material • Plot Connection/Service Connections • Providing and constructing rectangular brick masonry chamber for house connection • Supply and fixing RCC precast slab M-20 with lifting arrangement suitable to House Connection chamber • Providing 10mm H.Y.S.D. Bar reinforcement placed at 100mm spacing for R.C.C. work including bending, binding and placing in position complete (up to 10 ton) • Providing and supply of 20 mm MDPE Pipe as per ISO: 4427 • Supply and fixing C. I. Fire hydrants: Double Valves type underground.
10.	Recycle Water Supply Works	<ul style="list-style-type: none"> • Refilling the pipeline trenches with selected soil brought from outside including all lead incl. ramming, watering, consolidating desposal of surplus stuff as directed within a radius of 3 km. • Supplying and filling in plinth with sand under floors, including watering, ramming, consolidating and dressing complete as per direction of engineer-in-charge. • Providing and supplying in standard length ISI mark high density Polyethylene H.D.P.E. Pipes suitable for potable water as per IS specification no. 4984/1995 • Lowering, laying and jointing HDPE pipes and specials • Providing and supplying ISI mark CI D/F Sluice Valves as per IS:14846 (Latest Edition) of PN-1.6 With hand/wheel cap operated (Alt-1 type long body) • Lowering, laying and jointing in position C. I. / D/F Reflux valves, Butterfly valves, Sluice valves and Air valves including cost of all labour, jointing material, including nut bolts and

S. No	Component	Details of Scope of Work
		<p>giving satisfactory hydraulic testing, etc.</p> <ul style="list-style-type: none"> • Providing and supplying C. I. Air valves of approved make & quality • Lowering, laying and jointing in position C. I. / D/F Reflux valves, Butterfly valves, Sluice valves and Air valves Air valves double ball Flanged • RCC precast M.H. Frame & Cover Manufacture, supply & Delivery at store or at site of work precast RCC M.200 Frame & cover suitable to Valve chambers • Providing and supply of 20 mm dia MDPE (PE80 - SDR 11) Pipe as per ISO:4427 • Designing (aesthetically) and constructing R.C.C frame structure of pump room with positive suction / Negative suction without Gantry structure (Upto 3.60 M). • Preparing structural design of RCC Under Ground / Partially under ground / above high ground level Reservoir of required capacity as per relevant I.S. standards and constructing the same • Design, Manufacture, supply, Installing, testing & commissioning of Horizontal Centrifugal Splitcase Pumps with suitable motor and rpm • Providing & erecting Approved make Ceiling Fan • Supplying & erecting single phase approved make industrial exhaust fan • Mains with 1.1kV grade FRLS PVC insulated ISI marked stranded copper conductor wire to be erected in/ on wall /ceiling for earth continuity • Point wiring for Light / Bell, FAN with 2-1.5 sq.mm & earthwire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires • Point wiring for Individual Plug with & earthwire of 1.5 sq.mm (Green) • Supplying & erecting in earthpit of minimum bore dia. 225mm size ASH or approved make Safe Earthing Electrode
11.	Bus Shelter	<ul style="list-style-type: none"> • Provision of 4 (Four) Smart Bus Shelter facilities at identified locations • Supply and install Bus Shelter that shall serve as an all-weather shade for the bus commuters. It shall be made of SS/ MS frame work, powder coated metal roofing, SS metal

S. No	Component	Details of Scope of Work
		<p>seating, toughened glass/ acrylic and electronic circuit to control its lighting. The structure shall be designed to withstand wind load according to regulations and as per IRC codes.</p> <ul style="list-style-type: none"> • Bus stop shall consist of an advertisement panel ((back lit) and one backlit info panel and 1 digital panel/ VMS showing bus status update as per traffic department GPS system. Space provision for all 3 is shown in the indicative design provided in the RFP.

Table B-1 Development Details – Portuguese Street

S. No	Component	Details of Scope of Work
1.	Survey	<ul style="list-style-type: none"> • The contractors are advised to inspect and examine the site and its surroundings and satisfy himself with the nature and extent of site and work, the hydrological and climatic conditions the means of access to the site, the constraints of space for stacking material/machinery, labour etc. he requires, if any, weather conditions at site, general ground/subsoil conditions etc. or any other circumstances which may affect or influence their bid. No claim, whatsoever, shall be entertained from the bidder, on the plea that the information supplied by the Owner is insufficient or is at variance to the actual site conditions. • The contractor should carry out detail Total station survey with Differential Global Positioning Systems (DGPS) TBM and marking of all spot levels, trees with trunk diameters, utility services like Manhole locations, Electric boxes, poles, all buildings, compound wall and civil works before commencement of the construction activity.
2.	Cleaning of site	<ul style="list-style-type: none"> • All working areas under construction should be cleaned of unnecessary vegetation, malba, grass and any other items. • Clearing and grubbing road land in area of light jungle including removal of Vegetation such as grass, shrubs and Trees.
3.	Dismantling and Demolition	<ul style="list-style-type: none"> • Dismantling and disposal of unserviceable materials with all leads and lift of unreinforced cement concrete / RCC / WBM/ rubble soling/ bituminous surface layers in road works / Pavements / rubble works. • Dismantling of Brick and Stone Masonry works and removal of old deteriorated plaster works.

S. No	Component	Details of Scope of Work
		<ul style="list-style-type: none"> • Dismantling tiles of stone floors including paver blocks, cobble stone floor, China mosaic floor, tile dado, etc. • Dismantling steel work including distempering and stacking the materials with all lead and lift steel works • Dismantling and disposal of roofing works with A.C sheet, Mangalore tiles, G.I. sheet, etc. • Felling of trees, Removal of Telephone/ Electrical poles, Junction boxes and cables, RCC manhole, RCC manhole cover, etc. • Taking out and raising, Supplying and fixing of RCC manholes/ manhole covers, etc.
4.	Excavation works	<ul style="list-style-type: none"> • Excavation works upto 3.0m depth in all kinds of soil. • Excavation works upto 3.0m depth in Hard Rock. • Filling excavated earth, Rubbles, Murrum and Coarse sand under floors and plinths including disposal of un used excavated earth, malba, etc.
5.	Road works	<ul style="list-style-type: none"> • Road construction works of 2.51 km stretch with Cobble stone flooring. • Layers with power roller including filling in depressions. • Construction of Granular sub base (GSB) and Wet mix macadam (WMM) below road surfaces wherever required and specified by structure eng. • Providing and fixing pre-cast fair finish M40 concrete kerb stone and dished channel/ saucer channel with and without hole. • Providing Hot applied thermoplastic compound, cat eye (Stimsonite) on road surface wherever specified. • Providing RCC heavy duty non-pressure NP3 with/without collars and SFRC manhole covers etc. • Providing Sign Boards, Directional Signs and Stop Signs as per given specification.
6.	PCC and RCC works	<ul style="list-style-type: none"> • PCC works as per structural specification and requirement wherever mentioned. • Nominal reinforcement is provided to arrest temperature changes in PCC. • Providing and laying RCC of M30 grade in ready mixed for foundation, footing, columns, pillars, walls, fins, slabs, landing,

S. No	Component	Details of Scope of Work
		<p>lintels, beams, cantilever, staircase, etc. including fair/ expose RCC finish as per specification and approved by structure engineer with latest IS 456 for all work.</p> <ul style="list-style-type: none"> • Providing and fixing double scaffolding system (cup lock type) wherever required.
7.	Steel and Wood works	<ul style="list-style-type: none"> • TMT Bar Fe 500D reinforcement for R.C.C. work as per specification approved as per ISI standards • Anticorrosive treatments to all HYSD/ Fe 500D bars with Fusion Bonded Epoxy Coating (FBEC) at approved plant. • All kind of steel/ Structural steel works including fabricating, assembling, hoisting/ erecting and fixing in all position using MS Rolled Steel Sections, ISMB, ISMC, UC, H-Section, Hollow sections, Tubular Sections, MS Plates, Chequered Plates, MS Pipes, Perforated Sheet, Flats, Bars, Angles, MS Sheet, Girder, Beam, cattle trap, deep threaded MS bolts with anchor bolts and washer plates all complete, confirming to relevant IS codes. • Steel works samples to be approved before execution as specified. • Providing imported Malaysian Hardwood sections with all heights and as per drawing. All wooden works should be seasoned and chemical treated. • Providing and Stainless steel (Grade 316) as per mentioned and specified as per drawing • Anchor/Re baring work by drilling in Stone masonry/RCC wall and chemical grouting wherever required and specified. • Providing and fixing expansion joint by hydro cell semi rigid UV resistance with high performance laminated closed cell polythene foam joint filler, elastomeric joint sealant two component, high performance polysulfide formulation conforming to BS:4254 and ASTM C 920 having weathering resistance to ultra-violet rays.
8.	Stone and Brick work	<ul style="list-style-type: none"> • Providing Coursed rubble masonry with hard stone of approved quality in foundations, plinth and above plinth wherever required and specified. • Providing coursed White Stone Bela masonry with stone of approved quality in foundation, superstructure and partition walls. • Carrying out Plinth treatment to post construction / existing structure by spraying chemical solution for termite control as

S. No	Component	Details of Scope of Work
		<p>specified.</p> <ul style="list-style-type: none"> • Providing and Laying filter media of specified thickness with granular material/stone crushed aggregates satisfying the requirements laid down in clause 2504.2.2 of MORTH specifications with smaller size towards the soil and bigger size towards the wall and provided over the entire surface behind whaft wall, abutment, wing wall or return wall.
9.	Door window and opening works	<ul style="list-style-type: none"> • Providing and fixing frames/shutters for any type of Aluminium works Samples should be approved before execution. • Providing material and labour for fixing 6mm thick Clear Toughen Glass works. • Providing and fixing 35mm flush door / FRP frames and shutter works. • Providing & fixing Louvers of Anodized Aluminium sections works, Samples should be approved before execution. • Providing and fixing M.S. hot dip galvanized grill works, Gate, Railing as per mentioned specification. Samples should be approved before execution • Providing and fixing Locks and door closers hydraulic wherever required. • Providing and fixing in position, interlocking rolling shutter of approved make as per specification. • Providing and fixing 6mm thick Lexan Polycarbonate multi wall Roofing sheet as per specification.
10.	Flooring works	<ul style="list-style-type: none"> • Providing and laying Stone works of Chiseled kota stone, River washed green kota stone, Polished Kota stone, River washed Granite stone, Granite gang saw cut stone, Flame finish/ machine cut natural finish Rajula stone, etc. works as per given specification. • Providing Edge moulding to Kota/Granite/ other stones as per specification. • Providing and laying of 10x10, 14x14, 20x14 cm size 75mm Granite Cobble stone, 80 mm thk. Rajula cobble Stone, Kadappa cobble stone and Viga blue Granite cobble stone works as per given specification. • Providing and laying of Large Stone Boulders as per specification. • Providing and laying of glazed tile works as per specification.

S. No	Component	Details of Scope of Work
		<ul style="list-style-type: none"> • Providing and laying broken China mosaic flooring for terrace using 12 to 20mm broken pieces works as per specification. • Providing and laying integral cement based water proofing treatment conforming to IS: 2645 for treatment of roofs, balconies, terraces, etc. works.
11.	Paver, EPDM and other flooring works	<ul style="list-style-type: none"> • Providing and laying of 80mm Thick Turf Cement Paver blocks and 70 mm thick shot-blasted cement cobbles as per specification. • Providing and laying of Tactile tile works as per given specification. • Providing and laying of EPDM flooring works. • Providing and laying of matt finished vitrified tile and antiskid Vitrified tile in floor works as per specification.
12.	Plaster, Painting and Finishing works	<ul style="list-style-type: none"> • Providing and carrying out Washed stone/stone grit plaster works with forming groove of uniform size from 12x12 mm and upto 25x15 mm works. Sample should be approved before execution. • Providing and applying 15mm and 20mm thick cement plaster works with acrylic Lapy-putty as mentioned in paint specification. • Providing and applying wall painting with plastic emulsion paint and weather proof exterior emulsion paint as per mentioned specification. • Providing and applying hot dip galvanized coating and epoxy based paint for all the metal works as per specification. • Providing and applying External wood paint works. • Providing and core cutting work in Stone/ RCC/ Brick Structure and laying weep holes in walls, abutments as per detail specification.
13.	Street furniture and signage works	<ul style="list-style-type: none"> • Providing and laying Precast Concrete Cylindrical bollard of 450mm dia x 1000mm height. • Providing and fixing seating benches like Precast Concrete designer backless benches and Precast Designer backless Concrete circular seating bench as per specification. • Providing and fixing Precast Concrete dustbin single cast mono element with terrazzo Texture finish made of Full Depth Terrazzo as per specification. • Providing and Fixing Bicycle stand made from Stainless Steel

S. No	Component	Details of Scope of Work
		<p>grade 316.</p> <ul style="list-style-type: none"> • Providing and fixing MS Hot dip Galvanized coating gate 1.5 to 1.8m ht. and MS Hot dip Galvanized Railing of 1.2 to 1.5 m ht. works as per specification. Samples should be approved before execution. • STONE-CORTEN STEEL SIGNAGE: Providing and fixing sign boards made out of 2 mm Corten steel sheet. • Providing and fixing sign boards made out of 2.5mm S.S 304 sheet; size 45 x 45cms individual letters works. • Providing and fixing precast tree pit cover around the tree pit as per specification.
14.	Play equipment	<ul style="list-style-type: none"> • Providing and fixing Double swings, see-saw, Merry-Go-Round, monkey bar with loops etc. • Providing and fixing Gym equipment air walker, Cycling fitness rider and Double surf board as per specification. • Providing & fixing Multi Children-Eucalyptus play zone Size 38' 6" X 19' 0" X 14' 0" and Caravella play zone- Size 10.51x4.91x3.8 m large equipment. • Providing and fixing Volleyball net and Galvanised chain link as per specification.
15.	Landscape and Horticulture works	<ul style="list-style-type: none"> • Providing and planting with including cost of the trees as per specification, excavation of 0.6x0.6x0.6 m pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 2 m height and min. 20 cm girth healthy saplings with required stacking and maintaining it for 3 year for trees works • Providing and planting with including cost of the shrubs as per specification, excavation of 0.3x0.3x0.3/0.5x0.5x0.5 m pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 0.6 m height healthy saplings with required stacking and maintaining it for 3 year for shrub works • Providing and planting with including cost of the ground covers as per specification, excavation of 0.3x0.3x0.3 m pit, back filling with garden soil and farmyard manure (3:1 ratio), application of required pesticides for anti-termite treatment. Planting of 0.6 m height healthy saplings with required stacking and maintaining it for 3 year. • Cleaning of earth and back filling with 150mm of garden soil with 25 mm of farmyard manure works including Supplying,

S. No	Component	Details of Scope of Work
		stacking and spreading of sludge / well decayed farm yard manure works
16.	Sanitary fixtures and fittings	<ul style="list-style-type: none"> • Providing and fixing sanitary fixture and C.P. Fittings as per specified in technical specification and the plumbing drawing.
17.	Water supply	<ul style="list-style-type: none"> • Providing and fixing water supply CPVC (SDR 13.5) pipe as per specification and the plumbing drawings. • Providing and fixing water supply UPVC (SCH-80) pipe as per specification and the plumbing drawings. • Providing, lowering, laying and jointing HDPE pipe as per specified in technical specification and the plumbing drawing. • Providing, fixing Gray water supply MDPE pipe as per specified in technical specification and the plumbing drawing. • Providing, fixing ball valves for water supply system as per specified in technical specification and the plumbing drawing. • Providing, fixing butterfly valves for water supply system as per specified in technical specification and the plumbing drawing. • Providing, fixing Air release valves for water supply system as per specified in technical specification and the plumbing drawing. • Providing, fixing Ball float valves for water supply system as per specified in technical specification and the plumbing drawing. • Providing, fixing PVC double coated overhead tank (Sintex) for water supply system as per specified in technical specification and the plumbing drawing. • Providing, fixing Garden hydrant as per specified in technical specification and the plumbing drawing. • Providing & fixing of factory made Precast Chamber, for garden hydrant, having size (W X L) with variable (H) mm as per specified in technical specification and the plumbing drawing. • Providing & fixing of factory made Precast Chamber, for Valve chamber, having size (W X L) with variable (H) mm as per specified in technical specification and the plumbing drawing. • Providing laying (to level or slopes) and jointing reinforced concrete Light duty non-pressure pipes I.S. class NP2 of the following internal diameter with collars and butt ends prepared

S. No	Component	Details of Scope of Work
		<p>for collar joint.</p> <ul style="list-style-type: none"> • Providing and supplying ductile iron nominal bore diameter K-7 class pipe with internal cement mortar lining. • Lowering, laying and jointing C. I. S & S Spun pipes suitable for Tyton joints / Mortar lined D. I. Pipes of various classes with CI / MS specials. • Providing and supplying ISI mark CI D/F Sluice Valves as per IS:14846 (Latest Edition) of PN-1.6 With hand/wheel cap operated. • Lowering, laying and jointing HDPE pipes as per specified in technical specification and the plumbing drawing.
18.	Drainage system	<ul style="list-style-type: none"> • Providing, laying and fixing UPVC drainage pipes as per specified in technical specification and the plumbing drawing. • Providing and fixing PVC P-trap with height riser for internal drainage as per specified in technical specification and the plumbing drawing. • Providing, fixing and testing PVC Height Riser with wings and necessary accessories with making necessary holes and cutting in Slab/Walls. • Providing and fixing S.W. gully trap with C.I. grating brick masonry chamber and water tight C.I. cover with frame with standard weight. • Excavation up to 1.5m to 5.0m depth including sorting out and stacking of useful materials and disposing off the excavated stuff with all lead and lift for all kinds of soil. • Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers, in depth consolidating each deposited layer by ramming and watering. • Providing, lowering, laying and jointing of DWC pipe for external drainage as. per specified in technical specification and the plumbing drawing. • Providing and fixing Gully trap for drainage system as per specified in technical specification and the plumbing drawing. • Providing and fixing Sewer Trap (Intercepting trap) for drainage system as per specified in technical specification and the plumbing drawing. • Providing & Fixing of factory made Precast Chamber, having size(W X L) with variable (H) mm as as per specified in technical specification and the plumbing drawing.

S. No	Component	Details of Scope of Work
		<ul style="list-style-type: none"> • Providing, lowering, laying and jointing of RCC Hume pipe (NP3) for services passing as per specified in technical specification and the plumbing drawing.
19.	Storm water drain	<ul style="list-style-type: none"> • Providing and fixing UPVC (Type A) Storm water internal drain pipes as per specified in technical specification and the plumbing drawing. • Providing and fixing Khurras for storm water internal drain as per specified in technical specification and the plumbing drawing. • Supplying of precast U shape surface Storm Water Drain confirming to Japanese Industrial Standards (JIS) & meeting IS requirements, having High Performance Self Compacting concrete of M-40 cylinder strength/M-50 cube strength & Fe 500D shall be used for reinforcement as per specification. • Providing, laying and fixing of factory made Precast Box type drain of different sizes as applicable having n required lengths as IS requirements, made by using advanced Technology having High Performance Self Compacting Concrete of M40 Grade using Fe 500 D reinforcement bar as per specification. • Providing & Fixing of factory made Precast Chamber, having size(W X L) with variable (H) mm as per specified in technical specification and the plumbing drawing. • Providing and fixing PVC cowl for storm water internal drain as per specified in technical specification and the plumbing drawing.
20.	Storage and Septic tanks	<ul style="list-style-type: none"> • Providing and erecting underground water storage tanks as per specified in technical specification and the plumbing drawing. • Providing and erecting underground Septic tank and sock pit for sewage collection as per specified in technical specification and the plumbing drawing.
21.	Pumping unit, bore well, percolation well and automation equipment	<ul style="list-style-type: none"> • Supply, fixing and jointing of heavy class GI puddle flange of varying sizes respectively epoxy coated, fixed in underground sumps, water tanks as per specification. • Providing and fixing water supply and landscaping pumping unit as per specified in technical specification and the plumbing drawing. • Providing and fixing underground tank accessories likewise flanges and water level indicator as per specified in technical

S. No	Component	Details of Scope of Work
		<p>specification and the plumbing drawing.</p> <ul style="list-style-type: none"> • Drilling bore well as per specified in technical specification or geological details and the plumbing drawing. • Providing, lowering and fixing bore well column and casing pipe as per specified in technical specification and the plumbing drawing. • Providing and fixing submersible pump and pump set for water draw out as per specified in technical specification and the plumbing drawing. • Boring holes in all type of soil, hard rock (for cast in situ piles) and getting out the soil and disposal of the surplus excavated soil. • Supplying, filling, spreading & leveling gravels, coarse sand, charcoal, boulders in the recharge pit in required thickness as per specification. • Supplying & erecting approved make 3 phase motor control cubical panel (Star - Delta) made from 16 G. CRCA sheet duly painted with epoxy powder painted inside and outside with hinged doors and locking arrangement as per specification. • Supply and fixing of Direct burial cable for two way communication between controller and Valves with all necessary fittings and connection etc. • Supply and fixing of 4/6 station outdoor controller, ac outdoor mount with ac internal transformer control system, cycle with soak rain delay, SOLARSYNC Mini weather station, controlling upto 1 master valve as per specification. • Supply and fixing of Solenoid globe Valves with fabric reinforced diaphragm and rugged PVC construction as per specification. • Supply and fixing of solarsync and pressure regulator compatible with pro-C, ICC and I-core controllers with sensor platform and controller interface, automatically respond to local weather changes. • Supply and fixing of pump relay and copper grounding rod, clamps, charcoal with all necessary fittings and connection etc.
22.	Landscape and Irrigation work	<ul style="list-style-type: none"> • Providing, laying and fixing UPVC 6kg/cm² agriculture pipe for landscape work as per specified in technical specification and the plumbing drawing. • Providing and fixing Pop up sprinkler with saddle services and

S. No	Component	Details of Scope of Work
		<p>swing joint assembly as per specified in technical specification and the plumbing drawing.</p> <ul style="list-style-type: none"> • Providing and fixing drip irrigation system with Plain drip pipe, micro tubing with dripper as per specified in technical specification and the plumbing drawing. • Providing and fixing Pop up sprinkler with saddle services and swing joint assembly as per specified in technical specification and the plumbing drawing. • Providing and fixing ball valve, isolation valve and quick coupling valve with required size valve box as per specified in technical specification and the plumbing drawing. • Providing and fixing air release valve with required size valve box as per specified in technical specification and the plumbing drawing. • Providing and fixing water filtration system for sprinkler system as per specified in technical specification and the plumbing drawing. • Providing and fixing pumping system with all related accessories for sprinkler system as per specified in technical specification and the plumbing drawing. • Providing and fixing automation system for landscape sprinkler system as per specified in technical specification and the plumbing drawing.
23.	Transformers	<ul style="list-style-type: none"> • Supply, installation, testing & commissioning of 250KVA transformer with required two pole structure or plinth with necessary base and foundation. Contractor has to follow the approved make list. Contractor has to dismantle, shift, install and test the existing transformer wherever required. • Transformer must be of the latest IS norms and liasioning of the power shall be on contractor's scope. Contractor must submit the data sheet and get the approval of the make from the consultant/site in charge.
24.	Panels & Accessories	<ul style="list-style-type: none"> • Supply, installation, testing and commissioning of all kind of indoor and outdoor panels fabricated with weather proof powder coated paint as per latest IS norms. All the connections and accessories must be weather proof for outdoor panels. All indoor/outdoor panels must have floor stand covering the stand and bottom entry with fabrication sheet. • Contractor must provide fabricated junction box with weather

S. No	Component	Details of Scope of Work
		proof terminations at appropriate distance to avoid higher voltage drop for cabling of all kind of light and sub distribution boards. Contractor has to get the approval of the data sheets and the GA drawings from the consultant/site incharge. Contractor has to follow the approved make list.
25.	Cables & Pipes	<ul style="list-style-type: none"> Contractor has to do supply, installation, testing and commissioning of aluminum/copper armoured cables in appropriate size of HDPE pipe at every location for outdoor power requirement. Underground cables must be buried at sufficient depth shown in the drawings, as per the IS norms. For power requirement like junction box to the electrical fittings contractor must provide aluminum/copper armoured/flexible cable in appropriate size of HDPE pipe. For light poles, aluminum armoured cables must be used in HDPE pipe. Contractor has to follow the approved make list.
26.	Manholes/Chambers	<ul style="list-style-type: none"> Supply, installation and commissioning of all size of manholes and chambers must be of precast concrete. Contractor has to provide manholes at appropriate distance considering installation, future maintenance and provision purpose. Contractor has to follow the approved make list. Sizes of the manholes must be (1) 1000Lx1200Wx1275Dmm size, (2) 900Lx900Wx1000Dmm and (3) 750Lx750Wx600Dmm. Contractor can use any three sizes of manholes for electrical requirements including weather proof FRP covers considering sufficient weight load for public and/or vehicle movement.
27.	Wires & Conduits	<ul style="list-style-type: none"> Supply, installation, testing and commissioning of FRLS wires in appropriate size of medium duty rigid pvc conduits as per the latest IS norms. Contractor has to use conduits for all indoor electrification. All conduits must be concealed in slab or buried in floor but must not be open. Contractor has to follow the approved make list.
28.	Distribution Boards	<ul style="list-style-type: none"> Supply, installation, testing and commissioning of all type of weather proof metal double door distribution box for each zone. Contractor has to distribute the power zone wise for separate operation and maintenance. All the connections must be as per the IS norms providing colour codes and numbering for each circuits. Contractor has to follow the approved make list. All three-phase/single phase distribution boards must be concealed in wall. Earthing wire must be provided for all distribution boards. All switchgear including MSB/MCCB/ELCB

S. No	Component	Details of Scope of Work
		and busbar must be connected as per the standard norms. Contractor must get the approval of the sample from the consultant.
29.	Indoor Light Fixtures, Fan, Exhaust Fan, Ventilation Fan & Other Fittings	<ul style="list-style-type: none"> • Supply, installation, testing and commissioning of all type of indoor light fixtures with all accessories and appropriate connections. Light fixtures shall include concealed/open fittings for ceiling and wall. Contractor has to finish the surface in a proper manner after fixing the fixtures. All light fixtures must be LED fittings and contractor has to maintain the lux level as per the standard norms. • Supply, installation, testing and commissioning of all types of Fan, Exhaust Fans & Ventilation fans with all accessories and connections. Contractor must get the approval of the sample before the installation from the architect/consultant.
30.	Outdoor Decorative Lights, Post Top Poles & Street Poles	<ul style="list-style-type: none"> • Supply, installation, testing and commissioning of decorative light fixtures, post top lanterns, arm bracket poles and street light poles including required rcc base and foundation. All the poles and fixtures must have weather proof colour coating and connections with earthing. • All the outdoor light fittings must be of European/International brands. Contractor has to follow the standards during the installation of such fixtures. Also contractor has to provide minimum 3 years of warranty for all those fitting and poles. • Contractor must get the approval of the sample before the installation from the architect/consultant.
31.	Highmast	<ul style="list-style-type: none"> • Supply, installation, testing and commissioning of Highmast including all kind of accessories, connections and rcc base. Contractor has to use the highmast at certain public areas for illumination and safety purpose considering public and vehicle movement. • Contractor has to maintain the lux levels as per the standard norms and according to which the LED light fitting used. Contractor must submit the data sheet and get the approval of the sample before the installation from the consultant.
32.	LV and MV Network Cable	<ul style="list-style-type: none"> • Providing LV and MV lines arrangements as per specification.

1.7 Cross Sections/Features of Proposed Developments

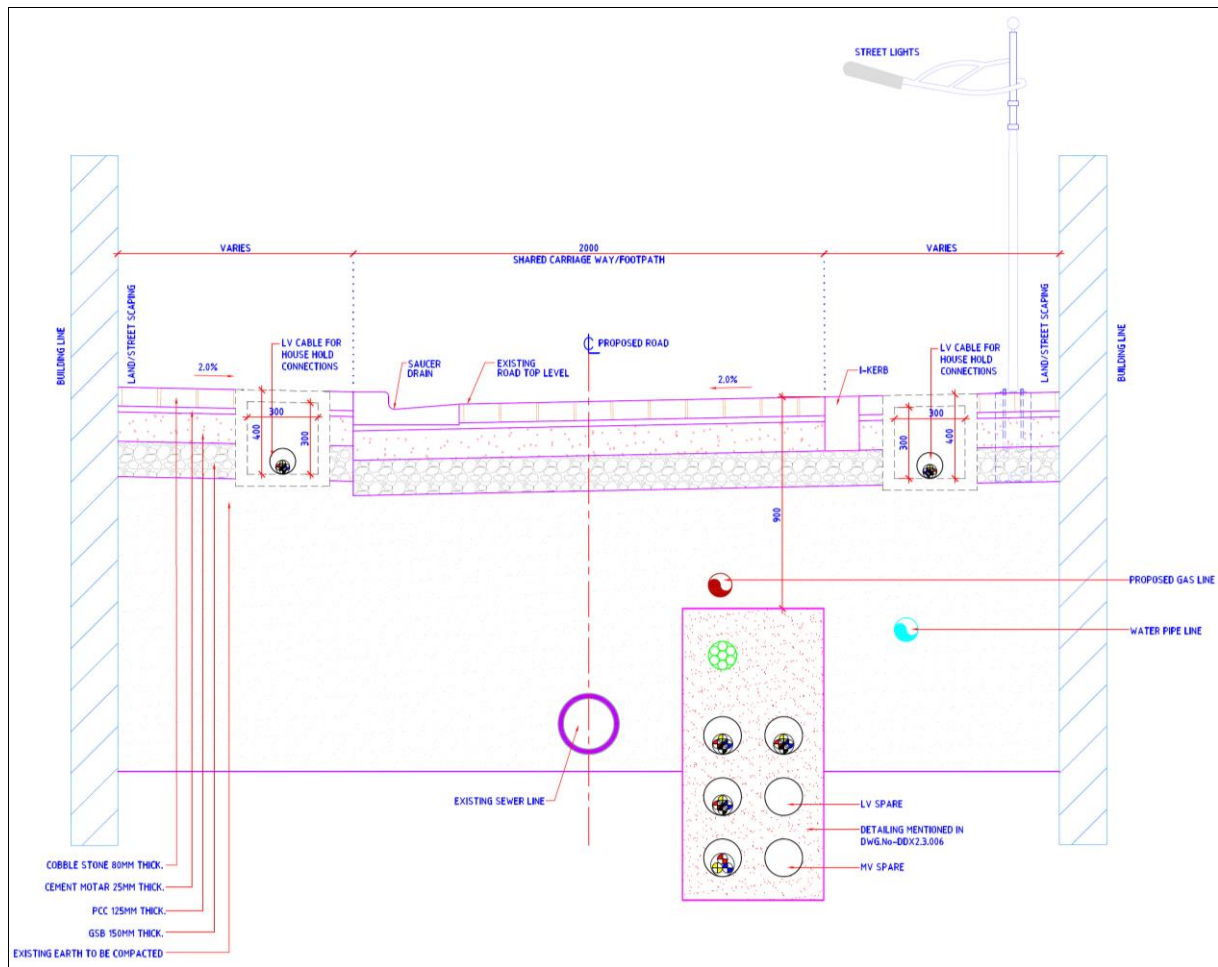


Figure B-43 Typical C/S 2 - 3 m RoW Street

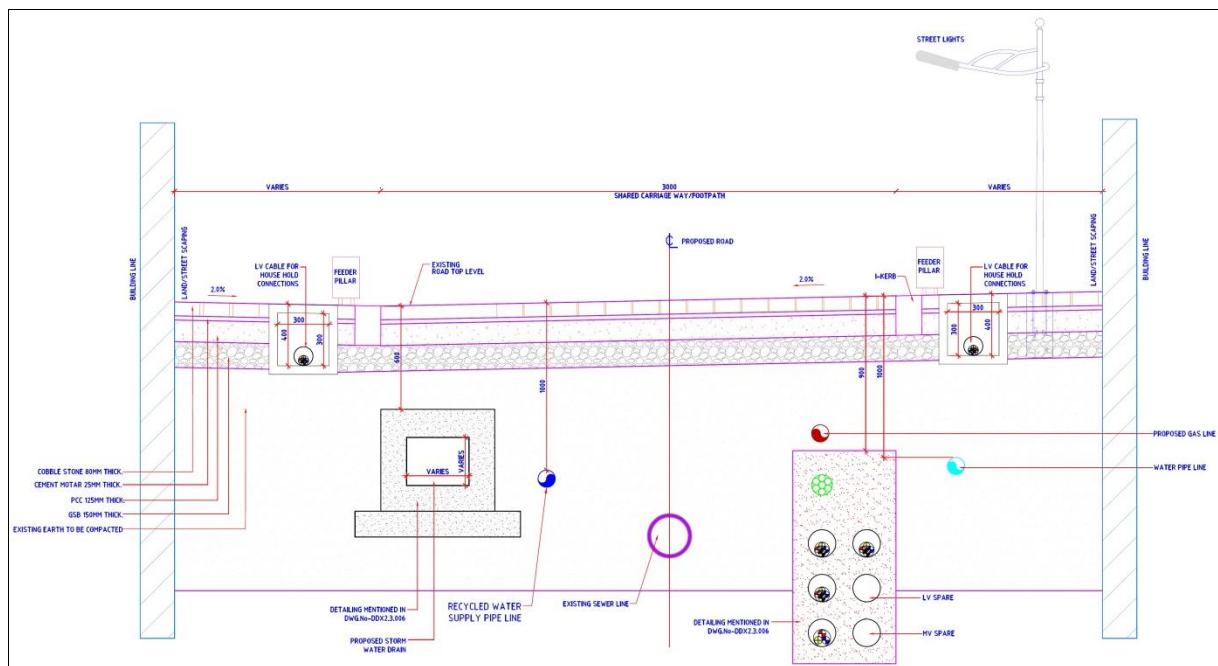


Figure B-44 Typical C/S 3 - 4 m RoW Street

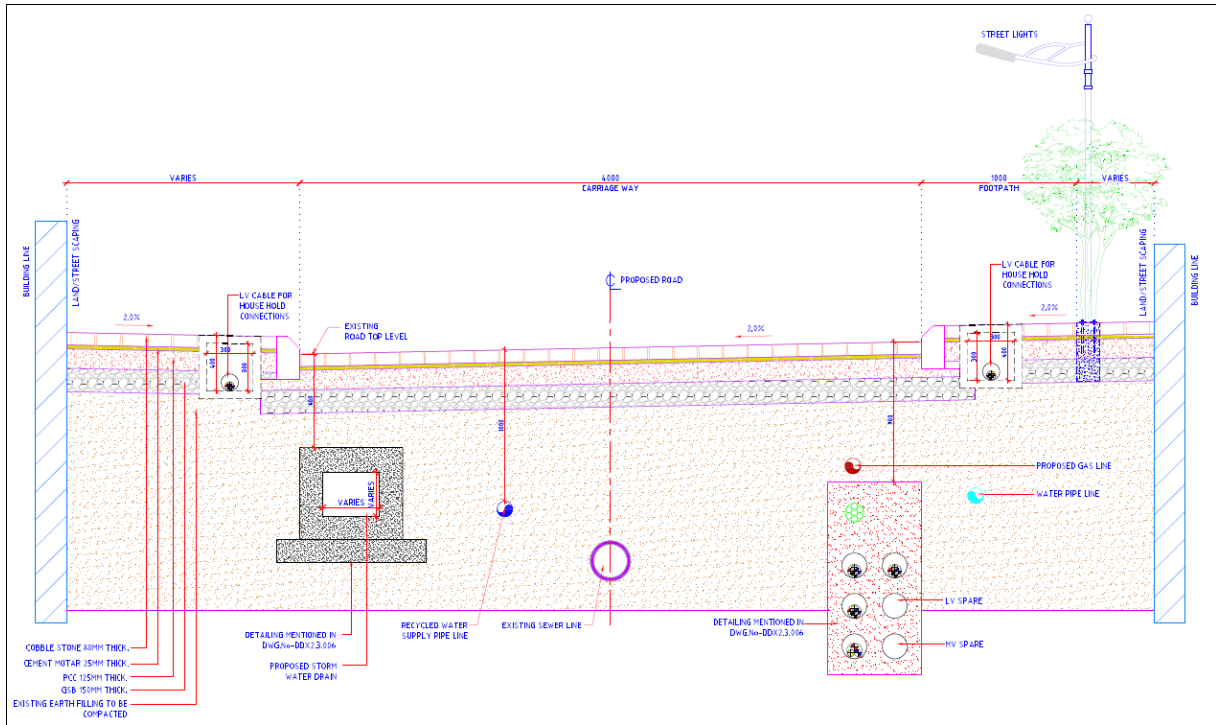


Figure B-45 Typical C/S 5 - 8 m RoW Street

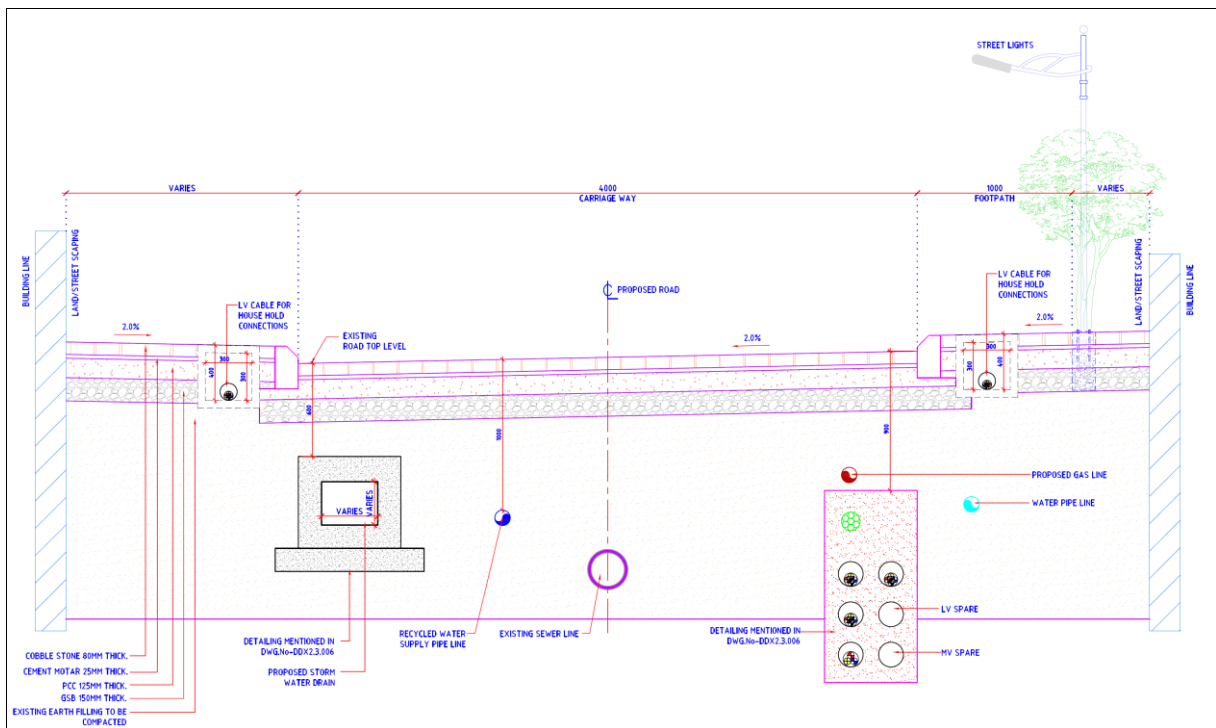


Figure B-46 Typical C/S >8 m RoW Street

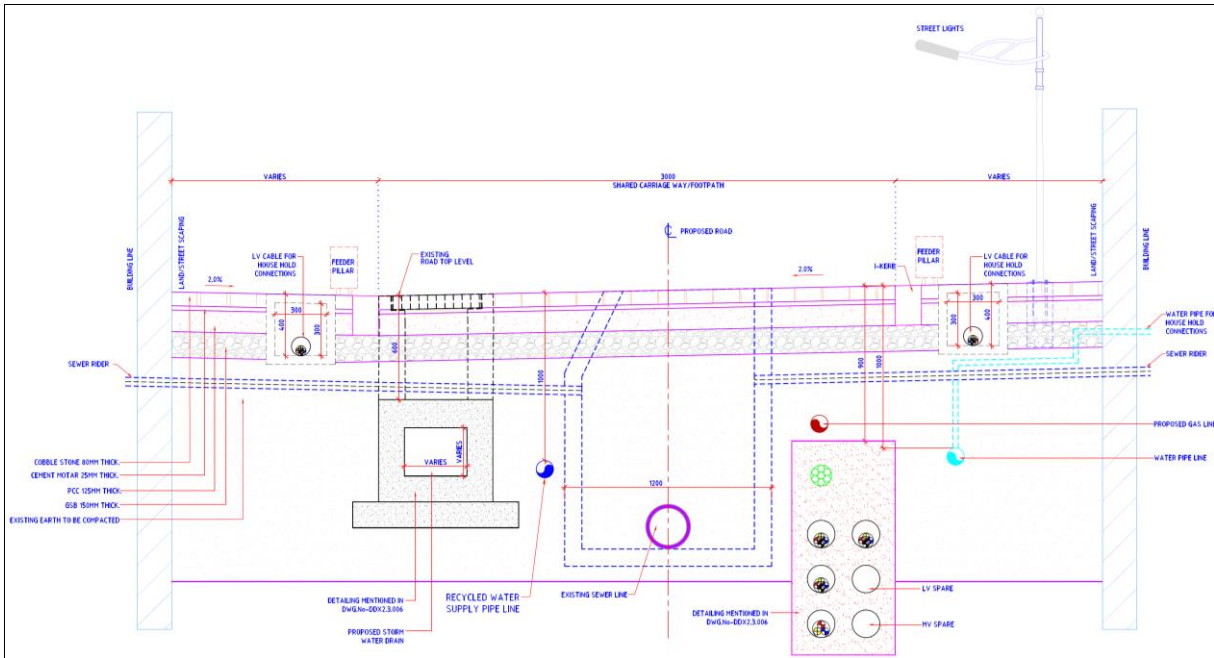


Figure B-47 Typical House Service Connection Arrangement

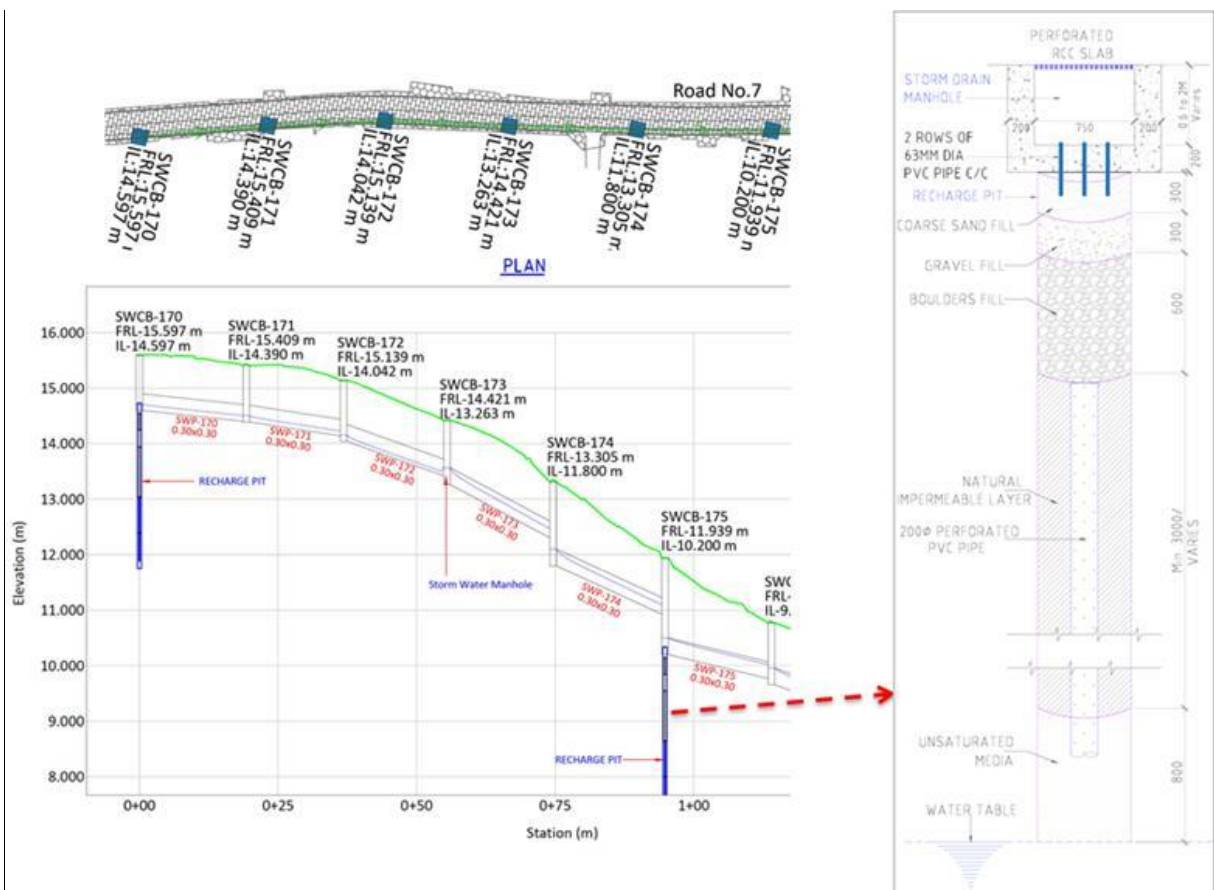


Figure B-48 Illustrative Plan-Profile showing arrangement of Rainwater Recharge Pits and Typical C/S of Recharge Pit



Figure B-49: Illustrative view of the Streetscape Component – Creeper Katta



Figure B-50: Indicative view of the Streetscape Component – Cast Iron Bollards



Figure B-51: Indicative view of the Streetscape Component – Cast Iron Tree Planter & Heritage Street Light

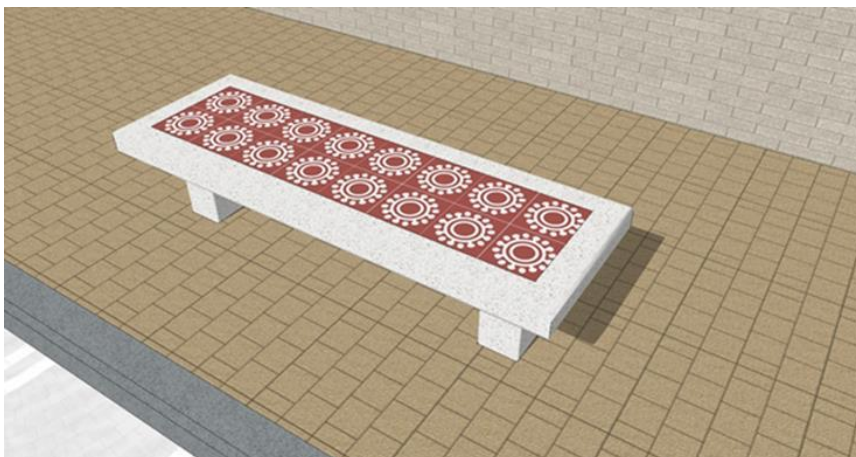


Figure B-52: Illustrative view of the Streetscape Component – Street Furniture (Bench)



For Vehicular Zone



for Pedestrian Zone

Figure B-53: Illustrative view of the Streetscaping – Cobblestone Surface Finish



Figure B-54: Illustrative 3D View – Streetscaping (Heritage Streets/Bazaar Street)



Figure B-55: Illustrative 3D View – Streetscaping (Historic Referencing – Blacksmith Quarter)

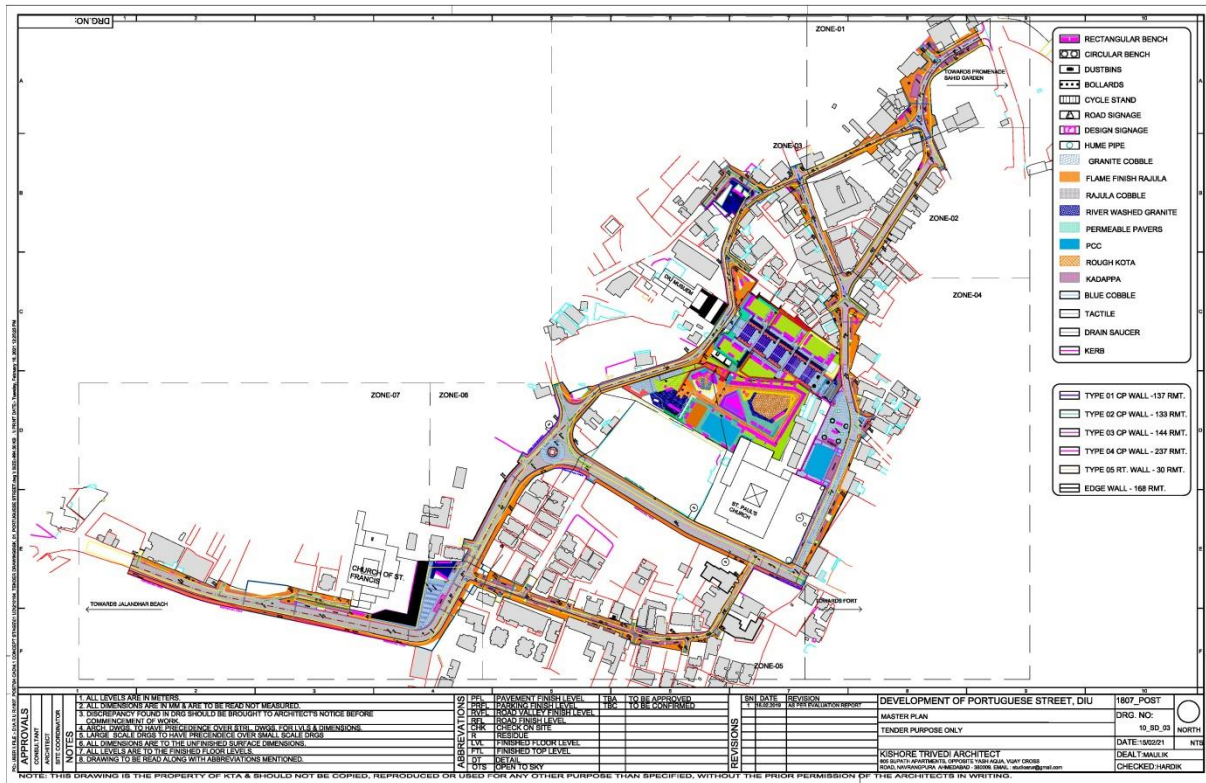


Figure B-56: Portuguese Street – Proposed Master Plan with Zoning



Figure B-57: Portuguese Street – Illustrative 3D View of Plaza 01 (Cobble Stone Street)



Figure B-58: Portuguese Street – Illustrative 3D View of Plaza 01 (Zone 03)

TERRAZZO FINISH GRFC BENCH

CONCRETE CIRCULAR SEATING BENCH

CYLINDRICAL BOLLARDS

DUSTBINS



STREET LIGHTS

CYCLE STAND

PAVILION



Figure B-59: Portuguese Street – Proposed Street Furniture



Figure B-60: Portuguese Street – Illustrative 3D View of Diu Museum Landscape

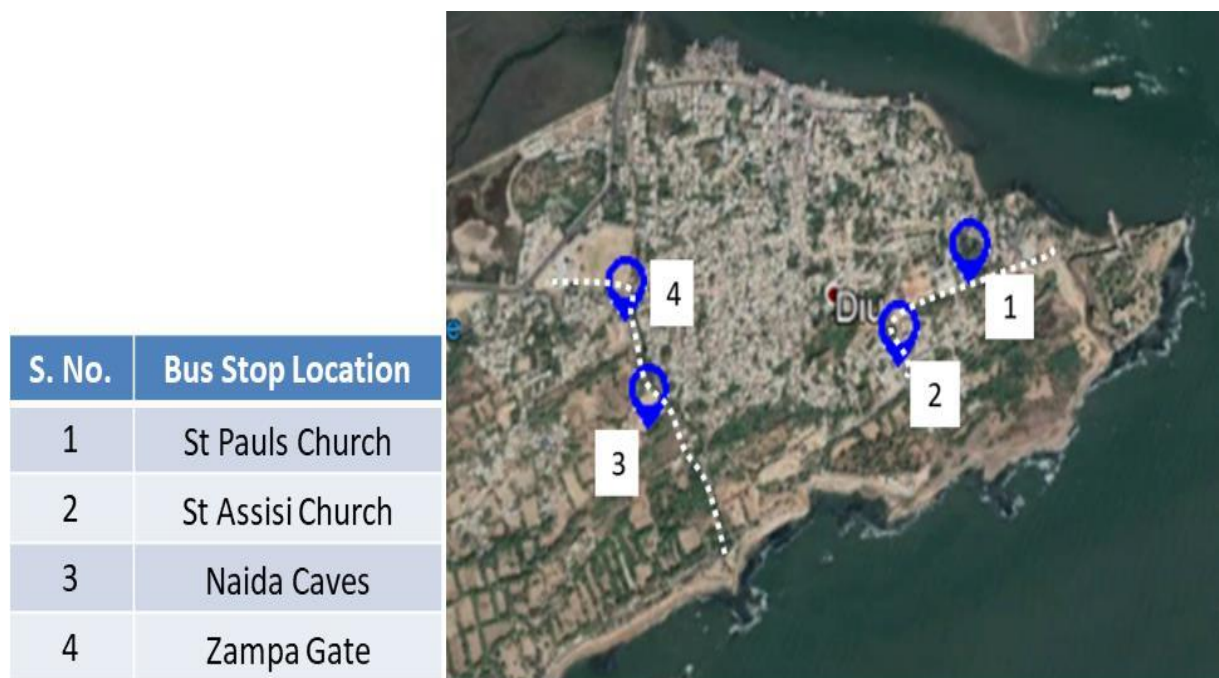


Figure B-61: Proposed Bus Shelter Locations

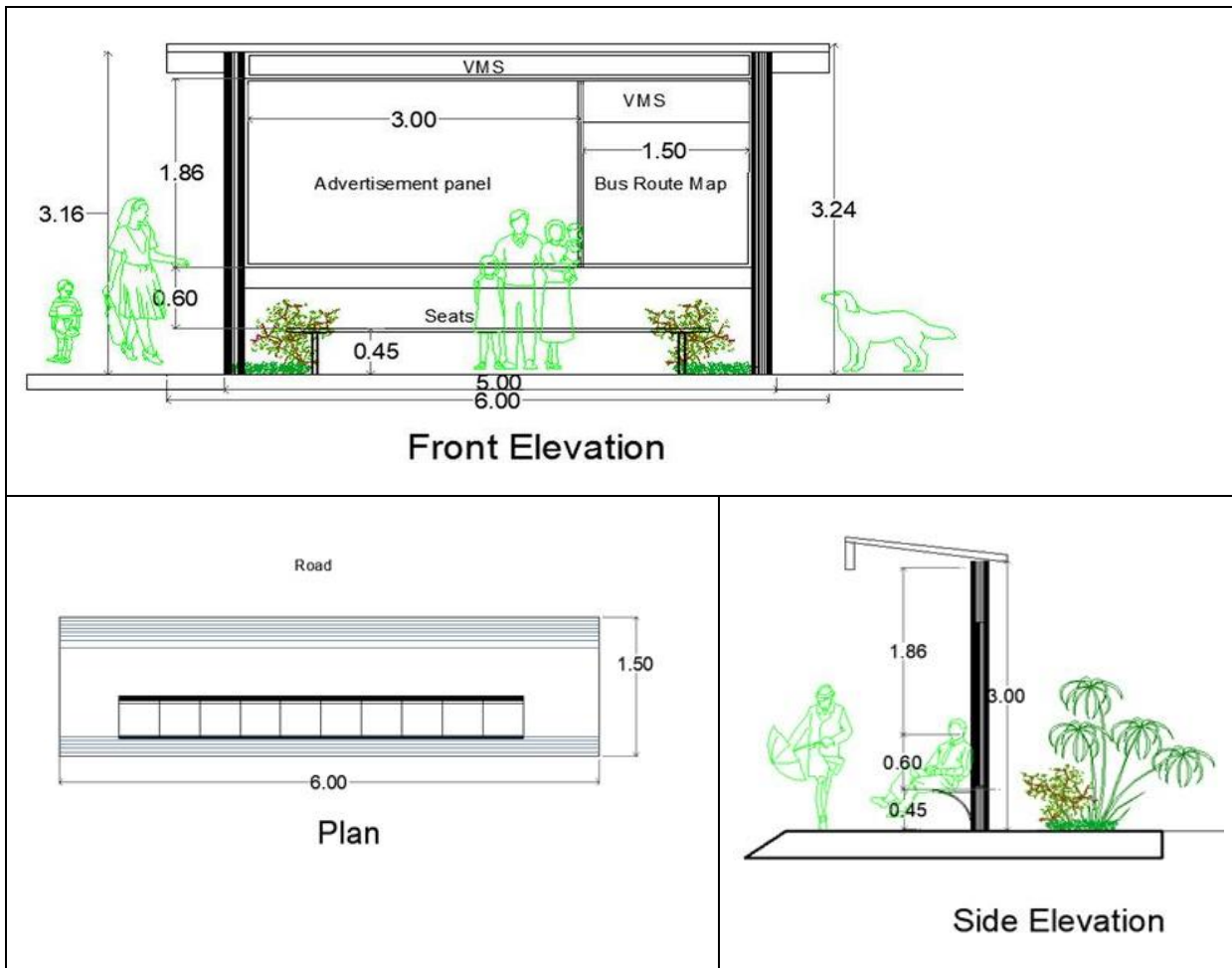


Figure B-62: Indicative Bus Shelter Design

1.8 Design Basis

1.7.1 General Specifications and Design Basis

Preparation of detailed design and engineering construction drawings comprising of Civil, Structural work complete in all respect shall be prepared. The civil works consist of excavation, site cleaning, trenching, Plain Cement and Reinforced cement concrete works, bituminous concrete works, and Reinforcement steel works, centering and finishing works etc. as per the approved designs and drawings by the AUTHORITY.

The design criteria / method applied for important components of the project are as follows:

- Structure Design: IRC Codes, MORTH, U T Administration of Daman and Diu, Public Works Department & other relevant codes required
- Geometric Design: IRC Codes, Street design guidelines, MORTH, U T Administration of Daman and Diu, Public Works Department & other relevant codes required
- Pavement Design:
 - IRC and AASHTO Design guide for design of pavement
 - Codes and manuals of international standards

1.7.2 Guidelines and Best Practice

Urban Street Design is an approach to re-design the city roads from 'Non-motorized Modes' point of view rather than designing them for vehicles and increased speeds. The practice allows equitable allocation of road space for all types of transport modes and road users. This concept also allows creating public spaces on streets, install street elements like public benches, toilet blocks, waste bins, bus stops, signage along with improving road geometric features and landscaping.

Challenge of development in cities have a common character of Urban Streets which includes inadequate space for pedestrians, encroached footpaths by vendors and utilities, lack of footpaths, inadequate public amenities like bus stops, toilet blocks and public benches, inappropriate footpath and kerb heights, lack of pedestrian safety and refuge islands etc. There is a need for a adopting a prospective and equitable design that benefits all class of society, all road users and all types of transport modes whether be motorized or non- motorized. Routine practice is to widen roads as much as possible, wall to wall, so that they facilitate faster mobility to motor vehicles. This approach overlooks the need for providing basic infrastructure for safety of pedestrians. The Indian Road Congress (IRC) Guidelines, which are mostly based on Highway Design & Standards for high speed roads, are commonly followed by urban local bodies in designing urban roads. However, the IRC has published a recent edition of its code '*103:2012 Guidelines for Pedestrian Facilities*' which is a revision done after 24 years.

Smart City Mission which mainly focuses on improving the urban road geometry and upgrading the basic infrastructure to facilitate non-motorized transport modes. The prospective benefits of Urban Street Designs are; increase in comfort for current walking population, equitable allocation of right of way and space for all road users and all modes, provision of basic public amenities, adequacy of road signage, road safety, creation of public places, provision for organized on-street vehicle parking, designing for underground utilities, ensuring adequate night time illumination and daytime visibility, providing aesthetic landscaping and increasing green cover along the road stretch, etc. This section presents some of the best practice examples adopted in design of infrastructure on Urban Roads.

For the design of Urban Streets/ Roads in Diu, available information and guidelines on urban street design have been referred. Guiding principles in design of urban street elements and certain best practice examples are covered in this section. The basic thumb rule 'mobility for all' and 'Pedestrian and Non-Motorized Vehicles are one of the important road users' is at the core of the design process.

Ideal elements of Urban Streets/ Road as per IRC 103:2012, Guidelines for Pedestrian Facilities shall be followed. Such elements include: footpaths, clear walking zones, kerb/access ramps, traffic/refuge islands, organized parking and multi-utility zone with tree pits, common utility ducts, streetscape signage, planters, street furniture's, lighting, etc.

1.9 Tender Drawings

Section -1 Costal Promenade

The following drawings are given as tender drawings in **APPENDIX A of this Schedule.**

S.No	Drawing Number	Drawing Tittle
A	PROMENADE DEVELOPMENT FOR DIU TOWN	
1	SK_01	Demolish Buildings
2	SK_02	Demolish Surfaces
3	SK_04	Master Plan
4	SK_05	Cut And Fill Plan
5	SK_06	Infrastructure Plan
6	SK_07_1	Civil Plan_1
7	SK_08	Flooring Plan
8	SK_09	Street Furniture
9	SK_14	Horticulture Plan
10	SK_17	Bazaar Area_Plan
11	SK_18	Bazaar Area_Section
12	SK_19	Children's Park
13	SK_20	Food Court
14	SK_22	Security Cabin
15	SK_23	Toilet Detail_Typ_2
16	SK_30	Bunder Chowk_1
17	SK_31	Bunder Chowk_2
18	SK_32	Bunder Chowk_3
19	SK_04A	Typical Road Section
20	SK_04B	Typical Section
21	PL_MP_1	PI_Master Plan

S.No	Drawing Number	Drawing Title
22	EL_MP_1	El_Master Plan
23	DDO3.2b-54	Development of Fort Promenade – Typical Outfall Arrangement with Flap Gate at Creek locations (Outfall –O-35, 37,38)
24	DDO3.2b-55	Network Plan of Storm water Drain for Fort Promenade and Annexe Circuit House
B	Development of Coastal Promenade From Summer House Garden To Till Gangeshwar Temple Via Fudam Gaushala	
1	DDO3.2b001	Development of Coastal Promenade Plan
2	DDO3.2b002	Development of Coastal Promenade- Jalandhar Beach Plan (P0 & P1)
3	DDO3.2b003	Development of Coastal Promenade- Chakra tirth Beach Plan (P2) & Plan(P3)
4	DDO3.2b004	Development of Coastal Promenade- Seating Pod Plan
5	DDO3.2b005	Development of Coastal Promenade- Kankai Matha Beach Plan (P4)
6	DDO3.2b006	Development of Coastal Promenade- Stretch Between INS Khukri Memorial Park(P5)
7	DDO3.2b007	Development of Coastal Promenade- Stretch Between INS Khukri Memorial Park(P6) & Fudam Gaushala Plan (P7)
8	DDO3.2b008	Development of Coastal Promenade- Fudam Gaushala Plan
9	DDO3.2b009	Development of Coastal Promenade- Fudam Gaushala to Gangeshwar Temple
10	DDO3.2b013	Coastal Promenade Plan with existing Contours
11	DDP3.2b001	Plan and Profile From CH:0000 to CH:1000
12	DDP3.2b002	Plan and Profile From CH:1000 to CH:2000
13	DDP3.2b003	Plan and Profile From CH:2000 to CH:3000
14	DDP3.2b004	Plan and Profile From CH:3000 to CH:3426
15	DDX3.2b001	Development of Coastal Promenade- Typical cross section-01

S.No	Drawing Number	Drawing Title
16	DDX3.2b002	Development of Coastal Promenade- Typical cross section-02
17	DDX3.2b003	Development of Coastal Promenade- Typical cross section-03
18	DDX3.2b004	Development of Coastal Promenade- Typical cross section-04
19	DDO3.2b038	Development of Coastal Promenade-Typical Promenade Details
20	DDO3.2b011	Development of Coastal Promenade-Drain Network
21	DDO3.2b.051	Network Plan of Storm Water Drain for Coastal Promenade
22	DDO3.2b012	Development of Coastal Promenade-Multi Utility Duct
23	DDO3.2b048	Development of Coastal Promenade-Potable Water Supply Network
24	DDO3.2b049	Development of Coastal Promenade-Recycle Water Supply Network
25	DDO3.2b040	Development of Coastal Promenade- Jalandhar Beach Details
26	DDO3.2b032	Details of Kiosk at Jalandhar beach
27	DDO3.2b041	Development of Coastal Promenade- Circular Deck Layout
28	DDO3.2b042	Development of Coastal Promenade- Triangular Deck Layout
29	DDO3.2b016-017	Railing Details
30	DDE3.2b001	Electrical Network CH (0+000 to CH 0+600)
31	DDE3.2b0012	Electrical Network CH (0 + 600 to CH 1+200)
32	DDE3.2b003	Electrical Network CH (1+200 to CH 1+800)
33	DDE3.2b004	Electrical Network CH (1+800 to CH 2+400)
34	DDE3.2b005	Electrical Network CH (2+400 to CH 3+000)
35	DDE3.2b006	Electrical Network CH (3+000 to CH 3+426)
36	DDI-101	NUM & RC Details Of Manhole Type-1A

S.No	Drawing Number	Drawing Title
37	DDI-102	NUM & RC Details Of Manhole Type-1B
38	DDI-103	NUM & RC Details Of Manhole Type-1C
39	DDI-104	NUM & RC Details Of Manhole Type-1D
40	DDI-105	NUM & RC Details Of Manhole Type-1E
41	DDI-106	NUM & Rc Details Of Manhole Type-1F
42	DDI-111	NUM & RC Details Of Manhole Type-2A (SH-1)
43	DDI-111	NUM & RC Details Of Manhole Type-2A (SH-2)
44	DDI-112	NUM & RC Details Of Manhole Type-2B
45	DDI-113	NUM & RC Details Of Manhole Type-2C (SH-1)
46	DDI-113	NUM & RC Details Of Manhole Type-2C (SH-2)
47	DDO3.2b050	Development Of Coastal Promenade - 600 X 600 Precast Manhole Chamber
48	DDO3.2b051	Development Of Coastal Promenade - 800 X 800 Precast Manhole Chamber
49	DDO3.2b052	Development Of Coastal Promenade - 1000 X 1000 Precast Manhole Chamber
50	DDI-301	Numeration & RC Details Of Retaining Wall Cum Square Return Wall
51	DDG-014	Structural Details Of Cor-Ten Steel Arch
52	SK-001	Pedestrian Bridge
53	DDJ001	Chandrika Mata Circle Junction Details
54	DDJ002	Naida-Bhavrawada Junction Details

S.No	Drawing Number	Drawing Title
55	DDJ003	Fudam Gaushala Junction Details
56	DDJ004	Gangeshwar Road Junction Details
57	DDJ005	Malala Junction Details
58	DDJ006	Circle Near Azzaro Junction Details
59	DDJ007	Opposite Court Building Junction Details
60	DDJ008	NH-Sports Complex Junction Details
61	DDJ009	Jethibai Bus Stand Circle Junction Details
62	DDJ010	Ghoghola Bridge Junction Details
C	Landscaping & Beautification of Summer House Garden at Jalandhar Beach, Diu	
1	SK_01	Demolition Plan
2	SK_02	Master Plan
3	SK_03	Flooring and Street Furniture Plan
4	SK_04	Civil Plan
5	SK_05	Horticulture Plan
6	SK_07	Cut and Fill Plan
7	SK_11	Summer House Pavilion Plan
8	SK_12	Zone 2_Sections
9	SK_14	Toilet Plan
10	SK_15	Toilet Section
11	SK_16	Road Section
12	PL-SHDM-MP-01	Master Plan for Plumbing Layout
13	PL-SHDM-TD-01	Toilet Details for Plumbing Layout

S.No	Drawing Number	Drawing Title
14	E-SHD-LTG-PAV01	Preliminary Electrical Layout_Pavilion Part_01
15	E-SHD-LTG-PAV02	Preliminary Electrical Layout_Pavilion Part_02

Section – 2: Urban Streets and Portuguese Street:

S. No.	Drawing Number	Drawing Title
Diu MC Drawings List		
1.	DDO2.3.046	Alignment plan of Diu streets
2.	DDO2.3.048	Surface Finishes
3.	DDX2.3001-008	Typical Cross Sections
4.	DDP.2.3.026	Network Plan of Storm Water Drain (Box Type)
5.	DDO2.3.046	Multi Utility Duct
6.	DDO2.3.047	Multi Utility Corridor Along Transformer, Feeder, Mini Pillar Locations
7.	DDP.2.3.029	Flow Arrow Drawing of Storm Water Drain (Box Type)
8.	DDO2.3.200	Water Supply Network
9.	DDO2.3.201	Recycled Water Supply Network
10.	DDE.2.3.001-005	General Arrangement of Typical Cross Section
11.	DDE.2.3.011	General Arrangement of Typical Cross Section
12.	DDE.2.3.007-008	Development of Street Detailing
13.	DDE.2.3.009-010	Details of the Utility Crossing
14.	DDE.2.3.011-012	Road Wise Power and ICT Network Layout
15.	DDO2.3.052	Plan of Streets Showing the Manholes and House Hold Cambers
16.	DDO2.3.051	Furniture Details
17.	DDO2.3.050	Details of Signages
18.	DDO2.3.049	Details of Creeper Katta

S. No.	Drawing Number	Drawing Title
19.	DDO2.3a200	MDR-10 ROAD PLAN
20.	DDX2.3a050-54	MDR-10 ROAD TYPICAL CROSS SECTION
21.	DDO2.3a201	MDR 10 – Storm Water Drain Plan
22.	DDO2.3a202	MDR -10 Drain Network
23.	DDO2.3a203	MDR -10 Multi Utility Duct Plan
24.	DDO2.3a301	MDR-10 ROAD FRESH WATER SUPPLY
25.	DDO2.3a302	MDR-10 ROAD RECYCLED WATER SUPPLY
26.	DDE2.3a051	MDR-10 ROAD ELECTRICAL NETWORK
Ghoghla Drawings List		
27.	DDO2.3.075	Alignment Plan
28.	DDO2.3.079	Surface Finishes
29.	DDX2.3.011-014	Typical Cross Sections
30.	DDO2.3.081	Multi Utility Duct
31.	DDO2.3.082	Drain Network
32.	DDP.2.3.027	Network Plan of Storm Water Drain (Box Type)
33.	DDP.2.3.028	Flow Arrow Drawing of Storm Water Drain (Box Type)
34.	DDO2.3.210	Water Supply Main Line Layout
35.	DDO2.3.211	Recycled Water Supply Network
36.	DDE.2.3.021-024	General Arrangement of Electrical Network
37.	DDE.2.3.026-027	Road Wise Power and ICT Network Layout
38.	DDO2.3.083	Plan of Streets Showing the Manholes and House Hold Cambers
Storm Drain Related Drawings (common for all streets)		
39.	DDO2.3.054	600 x 600 Precast Manhole Chamber
40.	DDO2.3.055	800 x 800 Precast Manhole Chamber

S. No.	Drawing Number	Drawing Title
41.	DDO2.3.056	1000 x 1000 Precast Manhole Chamber
42.	DDI-101	NUM & RC DETAILS OF MANHOLE TYPE-1A
43.	DDI-112	NUM & RC DETAILS OF MANHOLE TYPE-2B
44.	DDI-151	NUM & RC DETAILS OF MANHOLE TYPE-5A
45.	DDI-161	NUM & RC DETAILS OF MANHOLE TYPE-6A
46.	DDI-171	NUM & RC DETAILS OF MANHOLE TYPE-7A
MDR 03		
47.	DDO2.3a210	MDR-03 ROAD PLAN
48.	DDO2.3a211	MDR-03 ROAD WITH EXISTING CONTOUR
49.	DDX2.3a061	MDR-03 TYPICAL CROSS SECTION
50.	DDO2.3a213	MDR-03 DRAIN NETWORK
51.	DDO2.3a214	MDR-03 MULTI UTILITY DUCT
52.	DDO2.3a311	MDR-03 FRESH WATER SUPPLY
53.	DDO2.3a312	MDR-03 RECYCLED WATER SUPPLY
54.	DDE2.3a061	MDR-03 ELECTRICAL NETWORK
MDR 08		
55.	DDO2.3a200	MDR-08 ROAD PLAN
56.	DDO2.3a201	MDR-08 ROAD WITH EXISTING CONTOUR
57.	DDO2.3a202	MDR-08 STORM WATER DRAIN
58.	DDX2.3a051	MDR-08 TYPICAL CROSS SECTION
59.	DDO2.3a203	MDR-08 DRAIN NETWORK
60.	DDO2.3a204	MDR-08 MULTI UTILITY DUCT
61.	DDO2.3a301	MDR-08 FRESH WATER SUPPLY
62.	DDO2.3a302	MDR-08 RECYCLED WATER SUPPLY

S. No.	Drawing Number	Drawing Title
63.	DDE2.3a051	MDR-08 ELECTRICAL NETWORK
Portuguese Street Drawings List		
64.	10_SD_03A	Master Plan Part_A
65.	10_SD_03B	Master Plan Part_B
66.	10_SD_03D	Compound wall Typical Section
67.	10_SD_03E	Street Layout Plan_Zone 1
68.	10_SD_03F	Street Layout Plan_Zone 2
69.	10_SD_03G	Street Layout Plan_Zone 3
70.	10_SD_03H	Street Layout Plan_Zone 4
71.	10_SD_03I	Street Layout Plan_Zone 5
72.	10_SD_03J	Street Layout Plan_Zone 6
73.	10_SD_03K	Street Layout Plan_Zone 7
74.	SD_01	Demolition Plan
75.	SD_02	Horticulture Plan
76.	SD_03C	Typival Road Section_01
77.	SD_03D	Typival Road Section_01
78.	SK_08	Museum Garden Master Plan
79.	SK_09	Museum Garden Demolition Plan
80.	SK_10	Museum Garden Level Plan
81.	SK_11	Museum Garden Street Furniture Plan
82.	SK_12	Museum Garden Horticulture Plan
83.	SK_13	Museum Garden Flooring Plan
84.	SK_16	Toilet Plan
85.	SK_17	Toilet Section

S. No.	Drawing Number	Drawing Title
86.	SK_18A	Pavilion 1
87.	SK_18B	Pavilion 2
88.	SK_19	Typical Gate and Railing Detail
89.	SK_21	Museum and Children's Park_Civil Plan
90.	SK_25	Garden Electrical Room
91.	PL_01	POST_Water Supply Layout
92.	PL_02	POST_WSL_Museum Garden
93.	PL_03	POST_Storm Water Layout
94.	E-PSD-RD-ZONE-1	PSD-E- Street Layout- Zone- 01
95.	E-PSD-RD-ZONE-2	PSD-E- Street Layout- Zone- 02
96.	E-PSD-RD-ZONE-3	PSD-E- Street Layout- Zone- 03
97.	E-PSD-RD-ZONE-4	PSD-E- Street Layout- Zone- 04
98.	E-PSD-RD-ZONE-5	PSD-E- Street Layout- Zone- 05

1.10 Traffic Management Plan

During construction work for road improvement, under ABD area of Diu Smart City there are probabilities of disruption or delay to existing traffic and resultant inconveniences to road users. There is need to ensure continued effective function of the carriage way during such works for which necessity plan and traffic management measures are to be prepared and implemented during construction activities. This section outlines broad scope of activities to be undertaken by the contractor.

- i. To conduct trial run on the identified stretch of road in the ABD area
- ii. To prepare/follow traffic management plan during construction of road network including special arrangement for special days/festive season
- iii. The contractor shall be responsible for the control guidance in direction of traffic movement and protection of all roads and pedestrian traffic along the entire road

improvement stretch which may be affected while work. These plan/strategies need to be discussed and approved by AUTHORITY, Traffic Police and other relevant authorities.

The traffic management plan strategy involves various activities or staging of construction activities and should also include but not to be limited to such items as pedestrian walk ways signage, application, and/or removal of pavement markings, road way, lighting, methods and devices for delineation, channelization and placement with careful strategies.

During construction traffic management plan should include:

- Road user safety
- Traffic flow
- Reduction in delay
- Access arrangement for adjoining properties
- Pedestrian and cyclist
- Parking for construction vehicles

1.11 Operation and Maintenance

Comprehensive Operation and Maintenance of the above work including repair works, provision of manpower & original spares, replacement with original or better component in case one turns faulty/damaged/defective during the course of entire contract period in order to maintain the upkeep intact shall be provided. Post commissioning O&M of the new system for 5 years will be in the scope of the agency who executes the project and the agreements will be signed in that regard.

Project Phasing, Operation & Maintenance

The project should be executed in phased manner. It is recommended that roads having purely residential land use and moderate traffic flow be taken up in first phase such that traffic movement is less affected during construction period. Traffic movement planning will be required while taking up roads having commercial land use and higher traffic volumes. Clearance of ROW is also a challenge. The implementing agency will have to carry out maintenance activities on the completed roads including maintenance of landscaping, minor and major repairs of civil infrastructure including like kerbs, paver blocks, street furniture etc. during construction period till the entire work is completed and during the Defect Liability Period of 5 years. Repainting of road markings will also be required to be done once the entire work is completed. The operation & maintenance of the road stretch will be liability of AUTHORITY once the site is handed over by the implementing agency.

The following maintenance activities are anticipated (**Schedule O Shall be Referred**):

- Regular maintenance and finishing of footpaths, paver blocks, kerbs etc.
- Maintenance of street furniture including dustbins, benches, signage, tree guards etc
- Painting of road marking including kerbs, zebra crossings, lane marking etc.

- Adequacy of street lighting and related maintenance
- Replacement of dilapidated civil works
- Maintenance of landscaping and beatification works

1.11.1 Promenade Roads & Streets

- The Specifications shall apply to all items of road maintenance works as required to be carried out under the Contract or as directed by the Engineer.
- The works shall be carried out in conformity with the relevant Specifications to the required level, grade and lines using approved materials.
- The works shall be carried out using appropriate machinery. Wherever the Specifications are not given for an item, sound engineering practice shall be adopted to the satisfaction of the Engineer.
- Restoration of rain cuts
- Maintenance treatments required under the Contract or instructed by the Engineer may include pothole and patch repair, crack-sealing and filling, fog spray, dusting, slurry sealing, surface dressing, overlays and specialist repairs.
- The materials (particularly patching and overlay materials) used in maintenance operations shall be of a standard not less than those specified for the original construction.
- Traffic control during maintenance operations shall conform to the requirements of the Contract and Section 100 of MORTH 5th revision
- Both the promenade and cycle tracks of hard and soft surfaces shall regularly be cleaned on a daily basis defective components shall be replaced by the bidder
- The streets/roads shall regularly be cleaned on a daily basis; defective components shall be replaced by the bidder

1.11.2 Electrical Items

The maintenance for all Electrical and illumination components will be comprehensive in nature and it will be contractor's responsibility to replace them as and when required (whether under guarantee period or not) during the whole defect & maintenance liability Period including the defects caused by the Public / Tourists.

The Agency shall maintain the lamps of the project effectively for proper use. Wastage of electricity should be avoided by switching off the lights during day time. Replacement of bulbs and switches shall be done by the Agency

1.11.3 Landscaping & Hardscaping

The bidder is responsible for regular and timely upkeep, maintenance, repair etc of the entire project (including car parking area, Promenade lamps, Toilets etc). Garden and Lawn Maintenance including soft and hard landscaping: Maintenance and upkeep of lawns, plants, trees, creepers, hedges, palms and plants by doing the following:

- Watering, cleaning and mowing
- Trimming considering shape of all hedges
- Trimming of unwanted branches
- Replacement of plants, if required
- Gap filling
- Loosening of soil
- Staking if required
- Regular use of insecticides and pesticides to control infection to plants including all other prophylactic measures
- Shaping of all specimen plants
- Sweeping and cleaning of soft and hard landscape area to be done daily.
- Seasonal plants to be maintained in consultation with DSCL.

1.11.4 Garbage Collection/ Disposal:

- Cleaning of all garbage containers, wipe clean and replace liners
- Collect the waste papers, empty the garbage drums, waste paper baskets and arrange to carry away from the premises to the common garbage dump.

1.11.5 Civil works:

Maintaining the civil structures like hardscapes, sculptures, benches etc.

1.11.6 Maintenance of toilets:

All the toilets should regularly be cleaned and the frequency of cleaning shall be high during the peak hours i.e., morning and evening.

1.11.7 Water supply

- Water sprinklers and water lines shall regularly be checked and properly maintained.
- Regular routine maintenance of the pumps and associated equipment, valves, pressure gauges etc
- Prepare inventory of spares and ensure that critical spares are always available.
- Regular checking and repairs of all supply lines

1.12 Surveys, Topographical Survey and Soil Investigation

The Contractor is required to reconfirm the topographical surveys and conduct the soil investigations. The Authority does not warrant either the sufficiency or accuracy of site data

provided in the Bid Documents or elsewhere. Any Site data in Authority's possession that is not included in the Bid Documents will be available for inspection at the Authority's addresses provided in Conditions of Contract.

He should be ready with the qualified agencies he intends to use for the purpose and ensure that the work starts within a fortnight of the Letter to Proceed. He shall conduct investigations as are normally necessary to ensure full and satisfactory designs and safety.

1.13 Field Laboratories

The Contractor will be required to establish a field laboratory as approved by Authority's Representative, suitably equipped to carry out tests as stipulated in the QA/QC Manual, including all specialized equipment which will be required for testing the material and equipment being supplied under the Contract. Suitable trained laboratory staff will have to be posted with full facility of computerized record keeping. The minimum equipment to be provided in the laboratory shall be as listed below in the Table 1. Additional equipment as may be deemed necessary may be added to the same in due course on requirement of the Authority/Contractor. The Contractor shall provide a laboratory as approved by Authority's Representative for the testing of materials.

In addition to the equipment in the laboratory, the Contractor will also provide field testing equipment as directed by the Authority's Representative on sites where work is in progress.

The contractor shall put a concrete batching plant of required capacity within the site area for efficient working.

The laboratory shall have the following facilities required for sampling and testing materials and concrete in the field. All such facilities shall be provided by the Contractor at no extra cost to the Authority. The following equipment with operators shall be made available at Authority's /Authority's Representative request (all must be in serviceable condition):

Table 1: List of Equipment to be provided for Laboratory by the Contractor

S.No	Name of Equipments	Nos
1.	Concrete cube testing machine suitable for 15 cm cubes of 100 tonnes capacity with proving calibration ring	1 No.
2.	Cast Iron Cube moulds 15 cm size	50 Nos. (Minimum)
3.	Slump cone complete with tamping rod (as required to suit concrete plan)	5 sets
4.	Laboratory balance to weigh upto 10 Kg. with sensitivity of 10 gm.	2 No.
5.	Laboratory balance to weigh upto 20 Kg. with sensitivity of 10 gm.	2 No.
6.	Electronic Balance 5Kg	1 No.

S.No	Name of Equipments	Nos
7.	I S. Sieves for coarse and fine aggregates	2 Set
8.	Set of measures from 5 litres to 0.1 litre	2 Set
8.	Electric oven with thermostat upto 120oC	1 No.
9.	Flakiness gauge	2 No.
10.	Schmidt Hammer	2 Nos.
11.	Elongation index gauge	1 No.
12.	Sedimentation pipette	1 No.
13.	Pycnometer	1 No.
14.	Calibrated glass jar (1 litre capacity)	2 Nos.
15.	Glass flasks and metal containers	As required
16.	Chemical reagents like sodium hydroxide, tannic acid, litmus papers, etc.	As required
17.	Laboratory balance of 2 Kg capacity and sensitivity of 1 gm	1 No.
18.	Total Station	2 nos.
19.	Staff and associate equipment's for total station	4 nos.
20.	SS Std. Measuring Tap	15 nos.
21.	Rapid Moisture Meter	2 Nos
22.	Core Cutting Machine	1 Nos
23.	Auto level	4 nos
24.	Atterberg limit apparatus	1 Nos
25.	Compaction test equipment (Modified Proctor), 2250 cc mould & steel rammer	1 Nos
26.	Dry bulk density test app.	1 Nos
27.	Sand replacement method, 100mm Dia. Cylinder Tray with hole & calibration equipment	1 Nos
28.	Speedy moisture meter.	2 Nos

S.No	Name of Equipments	Nos
29.	Camber board -3m and 3m Straight edge	1 Nos
30.	Specific gravity - pycnometer 1 litre capacity	1 Nos
31.	Specific gravity - 50ml Bottle	1 Nos
32.	Air Conditioner 1.5 T capacity Carrier/Hitachi or equivalent	2 Nos
33.	Vicat apparatus for testing setting time	1 Nos
34.	Slump testing apparatus and Air Meter.	3 Nos
35.	Needle vibrator 40mm	3 Nos
36.	Concrete Beam moulds.150 x 150 x700	8 Nos
37.	Mortar cube moulds 50 Sqcm.	3 Nos
38.	First aid box	1 Nos

Table 2: List of Machinery to be provided by the Contractor

S.No	Name of Equipments	Nos
1.	Paver Finisher	1 Nos
2.	Vibratory Road Rollers / Compactors	2 Nos
3.	Excavators (Chain Mounted of reasonable capacity)	4 Nos
4.	Front Loaders of adequate capacity.	4 Nos
5.	Field Testing Equipment	2 Set
6.	Truck / Tipper and Dumpers	6 Nos.
7.	Water Tankers	5 Nos.
8.	Generators (20 KVA and above)	2 Nos.
9.	Dredgers	2 Nos.
10.	Compressors	2 Nos.
11.	Batching Plant (Concrete) – 60 to 90 cu.m/hr	1 Nos.
12.	Bituminous Plant (Bituminous) – 40 to 60 cu.m/hr	1 Nos.

S.No	Name of Equipments	Nos
13.	Concrete Batching plant (Capacity 30cum/hr) with appropriate concrete pump	1 Nos.
14.	Batching Type Hot Mix Asphalt plant of capacity with average output of 50 TPH	1 Nos
15.	Transit Mixture	1 Nos.
16.	Concrete Pump	5 Nos
17.	Boom Placer	1 Nos
18.	Tandem Roller	1 Nos
19.	Pneumatic Tyre Roller	1 Nos

Arrangement can be made by the Contractor to have the cubes tested in an approved laboratory in lieu of a testing machine at site at his expense, with the prior consent of the Authority. The outside laboratory shall also be used for routine testing of cement, reinforcement, coarse and fine aggregate and other items.

The type of Machinery to be deployed shall not be limited to the list mentioned above but relevant machinery as applicable shall be deployed.

1.14 Development of the Project Roads and Utilities/Services

Development of the Promenade/Roads and Utilities/Services shall include detailed design and Construction of the components as described in this Schedule-B and in Schedule-C.

1.15 Standards and Specifications

The Promenade/Roads and Utilities/Services shall be designed and constructed in conformity with the Standards and Specifications given in Schedule-B and D respectively.

1.16 Other mandatory Requirements

- With submission to GAD drawings the Contractor has to submit 3D view/model/walkthrough of the project with all necessary details for better understanding of the projects. The 3D Clash free model shall comprise of all the components of the project and shall be compatible with GIS platform, Infra works and Navis works and shall be submitted in following stages:
 - (i) Good for construction
 - (ii) As built
- Video with 3 d views / walk through of the project shall be submitted
- Detail drawings such as finish materials, joineries, flooring pattern, folded elevations etc. should be submitted as part of GFC package.

- Contractor should carry out a Pilot area where most of the items used to be installed and approved by the relevant authority.
- The Contractor should undertake multiple revision to the design till the satisfaction of the concerned authority. Changes suggested by the authority post approval of the design should be integrated by the contractor in any stage of the project

Schedule C Project Facilities

(See Clause 2.1)

The project details along with the project facilities are provided in the Schedule B.

Schedule D Technical Specifications

The materials have been selected strategically with considerations of climate, design requirement and aesthetical value of city and surrounding region. The specifications shall be as per Junagadh-SOR 2015-16, GWSSB-2019-20 and GMB-2016-17 or latest edition of SOR. The list of approved makes/agency of materials will be as per Junagadh SOR 2015-16, GWSSB 2019-20, GMB 2016-17 or latest edition of SOR. In absence of available rate in the said SOR, the rate of as per latest available Market rate and Delhi SOR latest revision, or CPWD have been followed.

- IRC 11-2015 : Recommended Practice for the Design and Layout of Cycle Tracks
- IRC 16-2008 : Standard Specifications and Code of Practice for Prime and Tack Coat
- IRC 27-2009 : Specifications for Bituminous Macadam
- IRC 30-1968 : Standard letter and numerals of different heights
- IRC 32-1969 : Standard for vertical and horizontal clearances for overhead electric power and

Telecommunication lines related to roads

- IRC 35: 2015 : Code of practice for Road Markings (with paints)
- IRC 37-2018 : Tentative Guidelines for the Design of Flexible Pavements
- IRC 38-1988 : Guidelines for Design of Horizontal Curves for Highways and Design Tables
- IRC 58-2015 : Guidelines for the Design of Plain Jointed Rigid Pavements for Highways
- IRC 67:2012 : Code of practice for Road Signs
- IRC 69-1977 : Space standards for roads in urban areas
- IRC 70-2017 : Guidelines on regulation and control of mixed traffic
- IRC 72-1978 : Recommended Practice for Use and Upkeep of Equipment, Tools and Appliances for

Bituminous Pavement Construction

- IRC 82-2015 : Code of Practice for Maintenance of Bituminous Surface of Roads
- IRC 86-2018 : Geometric design standards for urban roads in plains
- IRC 90-2010 : Guidelines of Selection, Operation and Maintenance of Bituminous Hot Mix Plant
- IRC 98-2011 : Guidelines on Accommodation of Utility Services on Roads in Urban Areas

- IRC 103-2012 : Guidelines for pedestrian facilities
- IRC 106-1990 : Guidelines for capacity of urban roads in plain areas
- IRC:109-2015 : Guidelines for Wet Mix Macadam
- IRC 111-2009 : Specifications for Dense Graded Bituminous Mixes
- IRC: SP: 19-2001 : Manual for Survey, Investigation and Preparation of Road Projects
- IRC SP 12-2012 : Tentative recommendation on provision of parking space for urban areas.
- IRC SP 21-2009 : Guidelines for landscaping and Tree Plantation.
- IRC SP 42-2014 : Guidelines for road drainage
- IRC SP 43-1994 : Guidelines for low cost traffic management techniques for urban areas
- IRC SP 50-2013 : Guidelines on urban drainage.
- IRC: SP: 44-1996 : Highways Safety Code
- IRC: SP:63 -2018 : Guidelines for the Use of Interlocking Concrete Block Pavement
- MoUD Codes for Urban Roads - Volume 4 (Signages)
- BS 7533-7:2010 - Pavements constructed with clay, natural stone or concrete pavers. Code of practice for the construction of pavements of natural stone paving units and cobbles, and rigid construction with concrete block paving
- IS 73-2013 : Paving Bitumen
- CPHEEO Manual (Central Public Health and Environmental Engineering Organisation) Ministry of Urban development IS 1200(Part 1)-1992: Methods of measurement of building and civil engineering works: Part 1 Earthwork
- IS 1200(Part 2)-1974: Method of measurement of building and civil engineering works: Part 2 concrete works
- IS 1200(Part 3)-1976: Method of Measurement of Building and Civil Engineering Works, Part III: Brickwork
- IS 1200(Part 4)-1976: Method of measurement of building and civil engineering works: Part 4 stone masonry
- IS 1200(Part 5)-1982: Method of measurement of building and civil engineering works: Part 5 Formwork
- IS 1200(Part 8)-1993: Method of measurement of building and civil engineering works: Part 8 steel work and iron work
- IS 1200(Part 9)-1973: Method of measurement of building and civil engineering works: Part 9 roof covering (Including cladding)

- IS 1200(Part 11)-2013: Method of Measurement of Building and Civil Engineering Works Part 11 Paving, Floor Finishes, Dado and Skirting
- IS 1200(Part 12)-1976: Method of Measurement of Building and Civil Engineering Works, Part 12: Plastering and Pointing
- IS 1200(Part 15)-1987: Method of measurement of building and civil engineering works: Part 15 painting, polishing, varnishing etc
- IS 1200(Part 16)-1979: Method of measurement of building and civil engineering works, Part 16: laying of water and sewer lines including appurtenant items
- IS 1200(Part 18)-1974: Method of measurement of building and civil engineering works, Part 18: demolition and dismantling
- IS 1200(Part 19)-1981: Method of Measurement of Building and Civil Engineering Works, Part 19: Water Supply, Plumbing and Drains
- IS 1200(Part 22)-1982: Method of measurement of building and civil engineering works, Part 22: materials
- IS 1200(Part 22)-1988: Method of measurement of building and civil engineering works, Part 23: piling
- IS 3861-2002 : Method of Measurement of Plinth, Carpet and Rentable Area of Buildings
- SP 27- 1987 : Handbook of Method of Measurement of Buildings Works
- IS 15658-2006 : Precast concrete blocks for paving

Foundation Engineering:

- IS-I080 (1995) : Design and Construction of shallow foundation on soils
- IS-8009 Part I (1976): Calculation of settlement of Foundations
- IS-8009 Part 11(1980): Calculation of settlement of Foundations

Loading Standard Codes & Design Aids for RCC works:

- IS: 456-2000 : Code of practice for plain and reinforced concrete
- IS: 875-1997/2015: Dead Load (Part I)
Imposed Loads (Part II)
Wind Loads (Part III)
- IS: 875-1997/2015: Special Loads and Load Combinations (Part V)
- IS:1893 -2016 : Criteria for Earthquake resistance design of structures (part-1)
- IS:3370-2009 : Code of practice for concrete structures, storage of liquids.

Part-1 2009: General requirements

Part-2 2009: Reinforced concrete structures

Part-3 1967: Pre-stressed concrete structures

Part-4 1967: Design tables

- IS: 4326-2013 : Code of practice for earthquake resistant design and construction of buildings
- IS: 13920-2016 : Ductility detailing of RCC Structure subjected to seismic forces
- SP-7 : National Building Code of India
- SP-16 : Design Aids for reinforced concrete to IS:456-2000
- SP-22 : Explanatory Hand book on Codes of Earthquake engineering.
- SP-24 : Explanatory Hand book on plain and R.C.C. I.S.456
- SP-34 : Handbook of concrete, reinforcement and detailing (SCIP)
- SP-38 : Handbook of typified design for structures with steel roof trusses.
- **Reinforcement:**
 - IS-1786 (1985) : High strength deformed steel bars
 - IS-2502 (1963) : Bending and fixing of bars for concrete reinforcement
 - IS-5525 (1969) : Recommendation for detailing of reinforcement in concrete works
- **Brick and Hollow block:**
 - IS-1077 (1990) : Common burnt clay building bricks
 - IS-2212 (1991) : Brick work
 - IS- 2185 : Cement Concrete Block. Part 1 (1979), Part II (1983),
 - IS-2185 : Hollow cement concrete blocks Part III (1984)
- **Cement and Fine & Coarse aggregates:**
 - IS-269 (1989) : 33 grade Ordinary Portland Cement (OPC)
 - IS-455 (1989) : Portland Slag Cement
 - IS-1489 Part 1(1991): Portland Pozzolana Cement (PPC)
Fly ash based, Part II (1989)
PPC Calcined clay based.
 - IS-8112 (1989) : 43 grade Ordinary Portland Cement (OPC)

- IS-12330 (1988) : Sulphate Resisting Portland Cement
- IS-12269 : 53 Grade ordinary Portland cement
- IS-383 (1970) : Coarse and Fine aggregate
- **Steel design :**
- IS-2062 (1992) : Steel for general structural purpose
- IS-800 (2007) : Use of structural steel for general Building construction
- IS-806 (1968) : Use of Steel tubes in general building construction
- IS-1363 (1992) : Bolts and nuts -Grade C (Part I to III)
- IS-1364 (1992) : Bolts and nuts -Grade A & B (Part I to V)
- IS-4000 (1992) : High strength bolt in steel structures
- IS-5624 (1993) : Foundation Bolts.

GENERAL CONDITIONS

1. The contractors are advised to inspect and examine the site and its surroundings and satisfy himself with the nature and extent of site and work, the hydrological and climatic conditions the means of access to the site, the constraints of space for stacking material/machinery, labour etc. he requires, if any, weather conditions at site, general ground/subsoil conditions etc. or any other circumstances which may affect or influence their bid. No claim, whatsoever, shall be entertained from the bidder, on the plea that the information supplied by the Owner is insufficient or is at variance to the actual site conditions.
2. The work shall be carried out as per CPWD specifications for works-2019- (Vol.-I & II), MoRTH Specifications (Fifth Revision) and Latest revision of IRC, CPHEEO & IS codes with up to date correction slips unless otherwise specified in the nomenclature of individual item or in the specifications and special conditions, where specifications are silent, the decision of Engineer-in-Charge shall be final and binding on contractors.
3. Entire construction lineout work will be undertaken through Co-ordinate marking due to the scale of the project hence the contractor should carry out detail Total station survey with Differential Global Positioning Systems (DGPS) TBM and marking of all spot levels, trees with trunk diameters, utility services like Manhole locations, Electric boxes, poles, all buildings, compound wall and civil works before commence of the construction activity.
4. The contractor should carry out SBR soil testing reports where and when required as per the design.
5. Any reference made to any Indian Standard Specifications in these documents, shall imply to the latest version of that standard, including such revisions / amendments as issued by the Bureau of Indian Standards up to last date of receipt of tenders. The contractor shall keep at his own cost all such publications of relevant Indian Standards applicable to the work at site.
6. Testing of materials: -

In case there is any discrepancy in the frequency of testing as given in the list of mandatory test and that in the individual sub-head of work as per the CPWD specifications for works-2019- (Vol-I & II) and relevant IS-Code with up to date correction slips, the higher of the two frequencies shall be followed and nothing extra shall be payable to the contractor on this account.

- i. Contractor shall carryout all required test pre and post construction including NDT for cement, steel, flooring tiles, piles (load test and integrity test etc..) or any other item related to construction without claiming any extra cost what so ever from the Authority in this regard.
 - ii. Samples of all fittings and fixture to be provided shall be got approved from the Engineer-in-charge before use in the work.
7. Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and their payment, housing, feeding and transport.
 8. The contractor shall make his own arrangement of water for construction and drinking purpose as well for electricity and its distribution at his own cost. The department will render only assistance to the contractor for making application to DJB/ authorized Electric supply agency,

if required. All the fees and charges including consumption charges shall be borne by the contractor. The water should be as per CPWD specifications, 2019.

9. The contractor will not have any claim in case of any delay by the Engineer-in-Charge in removal of trees or shifting, removing of telegraph, telephone or electric lines (overhead or underground), water and sewer lines and other structure etc., if any which may come in the way of the work. However, suitable extension of time can be granted to cover such delay.
10. The malba /garbage generated at site due to construction activities shall be removed from the site immediately & shall be disposed off by the contractor to the approved dumping site identified by the Engineer-in-charge. The surplus soil/earth shall be disposed of as per the directions of Engineer-in-charge separately.
11. The contractor shall clean the site thoroughly of scaffolding materials, rubbish, equipment's left out of his work and dress the site around the building to the complete satisfaction of the Engineer-in-charge before the work is treated as completed.
12. The portion of the work to be carried out as per the data provided includes working along the sea front in tidal conditions, hence all items to be operated in tidal conditions should be inclusive of all, making of water bunds and working within the time frame provided for the project.**Relation with Public Authorities**

The contractor shall comply with all obligations arising out of legal orders and directions that may be given to him from time to time, by any local or public authorities and shall pay out of his own money, all charges becoming payable to such authorities. He shall co-ordinate his activities during execution, with all agencies including PWD, Design Consultants, and Construction management consultants, agencies like DDED (Daman & Diu Electricity department), GEB (Gujarat Electricity Board), DMC (Diu Municipal Corporation), PWD (Public Works Development), Government of Gujarat Daman Telephones and their representatives without any dispute.

13. The labour welfare cess/ fund @ 1% of gross work done shall be deducted.
14. **Avoidance to damage of roads :**

The Contractor shall ensure that no damage to roads and bridges on the route to the sites occurs due to his or his subcontractor's traffic. He shall ensure minimum possible hindrance to the traffic movements on public roads and bridges due to his materials, plant, temporary works etc. No materials shall be stacked on public roads and thoroughfares.

15. **Barricading**

- i. The site is to be barricaded on all sites with 3m high GS sheets.
- ii. The detailed design of barricading of considering height of barricade, wind load etc. should be prepared by contractor. The design calculation and working drawing will be provided by the contractor & approved by Engineer- in- Charge. The G.S sheet barricading will be designed above the wall area on the iron frame embedded properly in concrete block.
- iii. Access gate of adequate sized opening in barricading should be provided to allow smooth flow of contractor's machinery, trucks, trailers etc.

- iv. Contractor shall take measures to maintain the integrity of the barricade and will maintain safe work condition at site.
 - v. Contractor shall write Chief Executive Officer, DSCL, Diu, name and logo at suitable interval over a primary coat of red oxide zinc chromate primer and paint as directed by Engineer-in-Charge.
 - vi. After successful completion of work, all the barricading will be dismantled / removed by contractor and it will be the property of contractor.
 - vii. The work of barricading mentioned as above shall be executed by the agency at his own cost and nothing shall be paid on this account.
16. **Defect & Maintenance Liability Period.**

The Defect & Maintenance Liability Period for the Work shall be of the Five (5) years from the date of final completion. The above mentioned period shall supersede the defect liability period provided in the Article 15 this volume.

SPECIAL CONDITIONS FOR PROCUREMENT OF CEMENT

1. The contractor shall procure OPC cement in work from reputed manufacturers of cement having a production capacity not less than one million tonnes or more per annum, such as ACC, Ultra Tech, Siddhi, Sanghi Cement, Birla Jute & cement corporation of India etc., as approved by Ministry of Industry, Government of India and holding license to use ISI certification mark for their product. The tenderers may also submit a list of names of cement manufacturers which he proposes to use in the work. The tender accepting authority reserves rights to accept or reject name (s) of cement manufacturer(s) which the tenderer proposes to use in the work. No change in the tendered rates will be accepted if the tender accepting authority does not accept the list of cement manufacturers, given by the tenderer fully or partially.

The supply of cement shall be taken in 50 kg. bags bearing manufacturer's name and ISI marking. Samples of cement arranged by the contractors shall be taken by the Engineer-in-Charge and got tested in accordance with provisions of relevant BIS codes. In case of test results indicate that the cement arranged by the contractor does not conform to the relevant BIS Codes, the same shall stand rejected, and it shall be removed from the site by the contractor at his own cost within a week's time of written order from the Engineer-in-Charge to do so.

2. The cement shall be got tested by the Engineer-in-Charge and shall be used on the work only after satisfactory test results have been received. The contractor shall supply free of charge the cement required for testing including its transportation cost to testing laborites. The cost of tests shall be borne by the contractor / department in the manner indicated below:
 - a) By the contractor, if the result shows that the cement does not conform to relevant BIS code.
 - b) By the department, if the result shows that the cement conforms to relevant BIS codes.
3. The actual issue and consumption of cement on work shall be regulated and proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of cement shall be worked out as per procedure prescribed in clause 42 of the contract and shall be governed by conditions laid therein. In case of cement consumption is less than theoretical

consumption including permissible variation; recovery at the rate show prescribed shall be made. In case of excess consumption no adjustment need to be made.

SPECIAL CONDITION FOR PROCUREMENT OF STEEL

1. The contractor shall procure TMT bars of **Fe500-D grade** (the grade to be procured is to be specified) from primary producers such as SAIL or TISCO or RINL or JINDAL or JSW Steel Ltd. as approved by the Ministry of Steel. In case of non-availability of steel form primary producers the NIT approving authority may permit use of TMT reinforcement bars procured from secondary producers. In such cases following action is to be taken by NIT approving authority:
 - a. The grade of the steel **Fe500-D grade** to be procured is to be specified as per BIS 1786-2008.
 - b. TMT bars procured either from primary producers or secondary producers, the specifications shall meet the provisions of IS 1786 : 2008 pertaining to **Fe500-D grade** of steel as specified in the tender of steel as specified in the tender .
 - c. All TMT Bars to be duly factory coated against corrosion in coastal environments.

Technical Specifications

- 1 GENERAL:** The work in general shall be executed as per the description of items, special conditions, provision of this NIT and **CPWD Specifications for works-2019 - (Vol.- I & II)** and **MoRTH (Fifth Revision)** with up-to-date correction slips:-

The work shall be executed and measured as per metric dimensions given in the Schedule of Quantities, drawings etc. (FPS units wherever indicated are for guidance only)

- 1.1** All stone aggregate and stone ballast shall be of hard stone variety to be obtained from approved quarries and or any other source to be got approved from the Engineer-in-Charge

2 Dewatering:

Sub-soil water table at work site is reported to be about approx. 4 to 6 meter (to be filled based on soil investigation) below general ground level. The water level may rise 1 to 2 m during rainy season.

Sub-soil water level shall be maintained at least 50cm below the P.C.C level during laying of P.C.C water proofing treatment, laying of basement raft and beams including filling of earth/sand under the basement floor. The water table shall not be allowed to rise above base of raft level until completion of outer retaining wall including water proofing of vertical surface of walls and back filling along the walls up to ground level and until the structure attains such height to counter balance the uplift pressure.

- i. The contractor shall carry out detailed hydrological survey for designing dewatering scheme. The dewatering scheme shall be got designed from IIT/CBRI/NCBM. The safety of adjacent structures shall be ensured as per the codal Provisions. Vacuum based dewatering should be considered in scope of the contractor and no extra charge will be paid for dewatering.

3 TEMPORARY EARTH RETAINING STRUCTURE:

The space for movement of heavy construction machineries or the space for open earth excavation by benching, in steps or in slope may not be available. A temporary earth retaining structures like Steel sheet pile / soldier pile etc. with strutting or soil / rock anchors shall be required for the safety of existing building and trees before taking up deep basement excavation work for the construction of basement.

The information and details given herein, in the architectural, structural drawings, preliminary soil investigation report and elsewhere in the tender documents is only indicative and for general information and guidance only. The Contractor and his associate, structural Design Consultant shall inspect the site of work and get familiar with the actual site conditions.

- i. The department shall not be responsible if soil is found to be of different character and properties during actual execution of work or testing of soil. The Department shall not be responsible for the inaccuracy thereof or any interpretation or conclusion drawn from them by the contractor.
- ii. The contractor may carryout detailed soil investigation at his own cost if he considers so. No payment shall be made to him for this purpose. The Owner shall not bear any responsibility for the lack of such knowledge and also the consequences thereof to the contractor.

- iii. Sheet piles/ Soldier piles and appurtenant materials shall be tested and certified to meet the specified chemical, mechanical and sectional properties requirement prior to delivery to site, as per relevant IS code.
- iv. Before execution of work, the contractor shall submit the construction procedure/ Methodology and Specifications of Temporary Earth Retaining Structure from the structural consultant viz IIT/CBRI/NCBM and shall get approved from Engineer in Charge. The work of earth retaining structure shall be carried out strictly in accordance with the sequence, specifications, and procedure given in approved structural design & drawings and as per direction of Engineer in Charge.

4 SPECIAL STRUCTURES

- A. For structures like retaining walls, wing walls, chimneys, overhead reservoirs/ tanks and other elevated structures, where elevations/ heights above a defined datum level have not been specified and identification of floors cannot be done as in case of building. Level, at 1.2 m above the ground level shall be the floor 1 level as well as plinth level. Level at a height of 3.5 m above floor 1 level will be reckoned as floor 2 level and level at a height of 3.5 m above the floor 2 level will be floor 3 level and so on, where the total height above floor 1 level is not a whole number multiple of 3.5 meter. Top most floor level shall be the next in sequence to the floor level below even if the difference in height between the two upper most floor levels is less than 3.5 meters.

5 MATERIALS

- 5.1 Samples of all materials to be used on the work shall be got approved by the contractor from the Engineer-in- Charge well in time. The approved samples duly authenticated and sealed shall be kept in the custody of the Engineer-in-Charge till the completion of the work. All materials to be provided by the contractor shall be brand new and as per the samples approved by the Engineer-in-Charge.
- 5.2 Materials obtained by the contractor from the sources approved by the Department shall be subjected to the Mandatory tests. Where such materials do not conform to the relevant specifications, the matter shall be taken up by the Engineer-in-Charge for appropriate action against the defaulters. In all such cases, necessary documents in original and proof of payment relating to the procurement of materials shall be made available by the contractor to the Engineer-in-Charge.
- 5.3 Samples, whether submitted for approval to govern bulk supplies or required for testing before use and also the sample of materials bearing 'Standard mark,' if required for testing, shall be provided free of cost by the contractor. All other incidental expenditure to be incurred for testing of samples e.g. packaging, sealing transportation, loading, unloading etc. including testing charges shall be borne by the contractor.
- 5.4 The materials, supplied by the Department shall be deemed to be complying with the specifications.
- 5.5 Materials stored at site, depending upon the individual characteristics, shall be protected from atmospheric effects due to rain, sun, wind and moisture to avoid deterioration.
- 5.6 Materials like timber, paints etc. shall be stored in such a way that there may not be any possibility of fire hazards. Inflammable materials and explosives shall be stored in

accordance with the relevant rules and regulations or as approved by Engineer-in-Charge in writing so as to ensure desired safety during storage.

- 5.7** The unit weight of materials unless otherwise specified shall be reckoned as given in IS: 1911-1967.

6 SAFETY IN CONSTRUCTION

- 6.1** The contractor shall employ only such methods of construction, tools and plant as are appropriate for the type of work or as approved by Engineer-in-Charge in writing.
- 6.2** The contractor shall take all precautions and measures to ensure safety of works and workmen and shall be fully responsible for the same. Safety pertaining to construction works such as excavation, centering and shuttering, trenching, blasting, demolition, electric connections, scaffolds, ladders, working platforms, working at heights, gangway, mixing of bituminous materials, electric and gas welding, use of hoisting and construction machinery shall be governed by CPWD safety code, relevant safety codes and the direction of Engineer-in-Charge

7 STACKING AND STORAGE OF MATERIAL

7.1 CEMENT & LIME

7.1.1. In case cement is received in bags.

7.1.1.1. Cement shall be stored at the work site in a building or a shed which is dry, leak-proof and as moisture proof as possible. The building or shed for storage should have minimum number of windows and close fitting doors and these should be kept closed as far as possible.

7.1.1.2. Cement shall be stored and stacked in bags and shall be kept free from the possibility of any dampness or moisture coming in contact with them. Cement bags shall be stacked off the floor on wooden planks in such a way as to keep about 150 mm to 200 mm clear above the floor. The floor may comprise of lean cement concrete or two layers of dry bricks laid on well consolidated earth. A space of 600 mm minimum shall be left all-round between the exterior walls and the stacks. In the stacks the cement bags shall be kept close together to reduce circulation of air as much as possible. Owing to pressure on the bottom layer of bags sometimes 'warehouse pack' is developed in these bags. This can be removed easily by rolling the bags when the cement is taken out for use. Lumbered bags, if any should be removed and disposed off.

7.1.2. In case cement is received in drums

These shall be stored on plane level ground, as far as possible near the concrete mixing place. After taking out the required quantity of cement, the lid of the drum shall be securely tied to prevent ingress of moisture.

7.1.3. In case cement is received in silos

The silos shall be placed near the concrete batching plant. Proper access shall be provided for the replacement of silos.

7.1.4. Different types of cements shall be stacked and stored separately.

7.1.5. Lime

Un-slaked lime shall be stored in a place inaccessible to water and because of the fire hazard, shall be segregated from the consumable material

7.1.6. BRICKS / BELA STONES

7.1.6.1. Bricks shall be stacked in regular tiers as and when they are unloaded to minimize breakage and defacement. These shall not be dumped at site.

7.1.6.2. Bricks shall be stacked on dry firm ground. For proper inspection of quality and ease in counting the stacks shall be 50 bricks long, 10 bricks high and not more than 4 bricks in width, the bricks being placed on edge, two at a time along the width of the stack. Clear distance between adjacent stacks shall not be less than 0.8 m. Bricks of each truck load shall be put in one stack.

7.1.6.3. Bricks of different types, such as clay bricks, clay fly ash bricks, fly ash lime bricks, sand lime (calcium silicate) bricks, Bela stone, auto-clave bricks etc. shall be stacked separately. Bricks of different classification and size consideration (such as, conventional and modular) shall be stacked separately. Also bricks of different types, such as, solid, hollow and perforated shall be stacked separately.

7.1.7. FLOOR, WALL AND ROOF TILES

7.1.7.1. Floor, wall and clay roof tiles of different types, such as, cement concrete tiles (plain, coloured and terrazzo) and ceramic tiles (glazed and unglazed) shall be stacked on regular platform as far as possible under cover in proper layers and in tiers and they shall not be dumped in heaps. In the stack, the tiles shall be so placed that the mould surface of one faces that of another. Height of the stack shall not be more than one metre. During unloading, these shall be handled carefully so as to avoid breakage.

7.1.7.2. Ceramic tiles and clay roof tiles are generally supplied in cartons which shall be handled with care. It is preferable to transport these at the site on platform trolleys.

8 AGGREGATES

8.1 Aggregates shall be stored at site on a hard dry and level patch of ground. If such a surface is not available, a platform of planks or old corrugated iron sheets, or a floor of bricks, or a thin layer of lean concrete shall be made so as to prevent contamination with clay, dust, vegetable and other foreign matter.

8.2 Stacks of fine and coarse aggregates shall be kept in separate stock piles sufficiently removed from each other to prevent the material at the edges of the piles from getting intermixed. On a large job, it is desirable to construct dividing walls to give each type of aggregates its own compartment. Fine aggregates shall be stacked in a place where loss due to the effect of wind is minimum.

8.3 Unless specified otherwise or necessitated by site conditions stacking of the aggregates should be carried out in regular stacks.

9 STEEL

9.1 For each classification of steel, separate areas shall be earmarked. It is desirable that ends of bars and sections of each class be painted in distinct separate colours.

9.2 Steel reinforcement shall ordinarily be stored in such a way as to avoid distortion and to prevent deterioration and corrosion. It is desirable to coat reinforcement with cement wash before stacking to prevent scaling and rusting.

9.3 Bars of different classification, sizes and lengths shall be stored separately to facilitate issues in such sizes and lengths so as to minimize wastage in cutting from standard lengths.

9.4 In case of long storage, reinforcement bars shall be stacked above ground level by at least 150 mm. Also in coastal areas or in case of long storage a coat of cement wash shall be given to prevent scaling and rusting.

9.5 Structural steel of different classification, sizes and lengths shall be stored separately. It shall be stored above ground level by at least 150 mm upon platforms, skids or any other suitable supports to avoid distortion of sections. In coastal areas or in case of long storage suitable protective coating of primer paint shall be given to prevent scaling and rusting.

10 WATER

Wherever water is to be stored for construction purposes this shall be done in proper storage tanks to prevent any organic impurities getting mixed up with it.

11 OTHER MATERIALS

Small articles like nails, screws, nuts and bolts, door and window fittings, polishing stones, protective clothing, spare parts of machinery, linings, packing, water supply and sanitary fittings, electrical fittings, insulation board, etc., shall be kept in suitable and properly protected store rooms. Valuable small material such as, copper pipes and fittings shall be kept under lock and key.

12 EARTH

12.1 In loose stacks such as cart loads, lorry loads, etc. – 20%

12.2 In fills consolidated by light mechanical machinery – 10%

12.3 In fills consolidated by heavy mechanical machinery but not under OMC (Optimum Moisture Content) – 5%

12.4 In fills consolidated by heavy mechanical machinery at OMC – Nil

12.5 Consolidated fills in confined situation such as under floors. etc. – Nil

13 OTHER MATERIALS

13.1 Moorum, building rubbish Lime and sand – Nil

13.2 Stone metal, 40 mm nominal size and above – 7.5%

13.3 Coarse aggregate/ stone metal below 40 mm nominal size – Nil

13.4 Soling stone/ Boulder 100 mm and above – 15%

13.5 Excavated rocks – 50%

14 DISMANTLING AND DEMOLISHING

All items mentioned under the criteria of "Demolition" shall include – Providing, erecting and dismantling all necessary scaffolds, tools, tackles, construction cranes and other equipment etc. working at any floors in the functioning facilities, breaking as far as practicable – with Mechanical Breakers using appropriate attachments, scrapping the surfaces with wire-brush or broom to remove the remnant lumps, cleaning the surface with air-jet or water jet, transporting via external independent temporary passage / lift / ramp to avoid disturbance in working of the institute, all debris down to ground level, with the help of covered sacs or chutes or through adjustable, flexible garbage ducts for preventing spread of dust and avoiding free hurling or throwing from upper floors, hauling immediately to the demarcated dump – yards on site, for temporary stacking, segregating the salvable / resalable scrap and finally carting away remaining debris from the site etc. complete.

14. 1. Demolition and disposal of unreinforced cement concrete / Pavements / rubble
14. 2. Demolition of R.C.C. work/Road works
14. 3. Demolition of Brick work and stone masonry in Cement Mortar.
14. 4. Dismantling of sheet roofing G.I.sheet roofing, A.C. sheet roofing.
14. 5. Dismantling steel work.
14. 6. Dismantling doors, windows, ventilators etc. (wood or steel) shutters

15 FELLING TREES

While clearing jungle, growth trees above 30 cm girth (measured at a height of one meter above ground level) to be cut, shall be approved by the Engineer-in-Charge and then marked at site. Felling trees shall include taking out roots up to 60 cm below ground level or 30 cm below formation level or 15 cm below sub-grade level, whichever is lower.

All excavation below general ground level arising out of the removal of trees, stumps etc. shall be filled with suitable material in 20 cm layers and compacted thoroughly so that the surfaces at these points conform to the surrounding area. The trunks and branches of trees shall be cleared of limbs and tops and cut into suitable pieces as directed by the Engineer-in-Charge.

15.1 CLEARANCE OF GRASS

Clearing and grubbing operation involving only the clearance of grass shall be measured and paid for separately and shall include removal of rubbish and disposing outside the periphery of the area under clearance.

16 EXCAVATION IN ALL KINDS OF SOILS

- 16.1** All excavation operations manually or by mechanical means shall include excavation and 'getting out' the excavated materials. In case of excavation for trenches, drains, roads, basements, water tanks, retaining walls, below all kinds of structures etc. 'getting out' shall include throwing the excavated materials at a distance of at least one metre or half the depth of excavation, whichever is more, clear off the edge of excavation. In all other cases 'getting out' shall include depositing the excavated materials as specified. The subsequent disposal of the excavated material shall be either stated as a separate item or included with the items of excavation stating lead.

17 EARTH WORK BY MECHANICAL MEANS

Earth work by mechanical means involves careful planning keeping in view site conditions i.e. type of soil, nature of excavation, distances through which excavated soil is to be transported and working space available for employing these machines. The earth moving equipment should be accordingly selected.

The earth moving equipment consists of excavating and transporting equipment. Excavating equipment's may be further classified as excavators and tractor based equipment's.

18 FILLING

18.1 The earth used for filling shall be free from all roots, grass, shrubs, rank vegetation, brushwood, tress, sapling and rubbish.

18.2 Filling with excavated earth shall be done in regular horizontal layers each not exceeding 20 cm in depth. All lumps and clods exceeding 8 cm in any direction shall be broken. Each layer shall be watered and consolidated with steel rammer or ½ tonne roller. Where specified, every third and top most layer shall also be consolidated with power roller of minimum 8 tonnes. Wherever depth of filling exceeds 1.5 metre vibratory power roller shall be used to consolidate the filing unless otherwise directed by Engineer-in-charge. The top and sides of filling shall be neatly dressed. The contractor shall make good all subsidence and shrinkage in earth fillings, embankments, traverses etc. during execution and till the completion of work unless otherwise specified.

19 EMBANKMENT/SUBGRADE CONSTRUCTION

19.1 General

Description

These Specifications as per MORTH Clause 305 shall apply to the construction of embankments including sub-grades, earthen shoulders and miscellaneous backfills with approved material obtained from approved source, including material from roadway and drain excavation, borrow pits or other sources. All embankments sub-grades, earthen shoulders and miscellaneous backfills shall be constructed in accordance with the requirements of these Specifications and in conformity with the lines, grades, and cross-sections shown on the drawings or as directed by the Engineer.

19.2 Materials and General Requirements

19.3 Physical Requirements

The materials used in embankments, subgrades, earthen shoulders and miscellaneous backfills shall be soil, moorum, gravel, reclaimed material from pavement, fly ash, pond ash, a mixture of these or any other material as approved by the Engineer. Such materials shall be free of logs, stumps, roots, rubbish or any other ingredient likely to deteriorate or affect the stability of the embankment.

The following types of material shall be considered unsuitable for embankment:

- a) Materials from swamps, marshes and bogs;

- b) Peat, log, stump and perishable material; any soil that classifies as OL, 01, OH or Pt in accordance with IS:1498;
- c) Materials susceptible to spontaneous combustion;
- d) Materials in a frozen condition;
- e) Clay having liquid limit exceeding 50 and plasticity index exceeding 25; and
- f) Materials with salts resulting in leaching in the embankment.

Expansive clay exhibiting marked swell and shrinkage properties ("free swelling index" exceeding 50 percent when tested as per 18:2720 - Part 40) shall not be used as a fill material. Where an expansive clay having "free swelling index" value less than 50 percent is used as a fill material, subgrade and top 500 mm portion of the embankment just below sub-grade shall be non-expansive in nature.

- a) Any fill material with a soluble sulphate content exceeding 1.9 grams of sulphate (expressed as S03) per litre when tested in accordance with BS: 1377, Part 3, but using a 2:1 water-soil ratio shall not be deposited within 500 mm distance (or any other distance described in the Contract), of permanent works constructed out of concrete, cement bound materials or other cementitious material.
- b) Materials with a total sulphate content (expressed as S03) exceeding 0.5 percent by mass, when tested in accordance with BS: 1377, Part 3 shall not be deposited within 500 mm, or other distances described in the Contract, of metallic items forming part of the Permanent Works.
- c) Ordinarily, only the materials satisfying the density requirements given in Table-1 shall be employed for the construction of the embankment and the sub-grade.

Table-1 Density Requirements of Embankment and Sub-grade Materials

SI no	Type of Work	Maximum laboratory dry unit weight when tested as per 15:2720 (Part 8)
1	Embankments up to 3 m height, not subjected to extensive flooding	Not less than 15.2 kN/cu.m
2	Embankments exceeding 3 m height or embankments of any height subject to long periods of inundation	Not less than 16 kN/ cu.m
3	Subgrade and earthen shoulders/verges/backfill	Not less than 17.5 kN/cu.m

This Table is not applicable for lightweight fill material, e.g., cinder, fly ash, etc.

- a) The material to be used in subgrade shall be non-expansive and shall satisfy design CBR at the specified dry density and moisture content. In case the available materials fail to meet the requirement of CBR, by any stabilization method approved by the Engineer shall be followed.

- b) The material to be used in high embankment construction shall satisfy the specified requirements of strength parameters.

19.4 General Requirements

- a) The materials for embankment shall be obtained from approved sources with preference given to acceptable materials becoming available from nearby roadway excavation under the same Contract.
- b) The work shall be so planned and executed that the best available materials are saved for the subgrade and the embankment portion just below the subgrade.

19.5 Borrow Materials

- a) The arrangement for the source of supply of the material for embankment and sub-grade and compliance with the guidelines, and environmental requirements, in respect of excavation and borrow areas as stipulated, from time to time by the Ministry of Environment and Forests, Government of India and the local bodies, as applicable shall be the sole responsibility of the Contractor.
- b) Borrow pits along the road shall be discouraged. If permitted by the Engineer, these shall not be dug continuously. Ridges of not less than 8 m width should be left at intervals not exceeding 300 m. Small drains shall be cut through the ridges to facilitate drainage. The depth of the pits shall be so regulated that their bottom does not cut an imaginary line having a slope of 1 vertical to 4 horizontal projected from the edge of the final section of the bank, the maximum depth in any case being limited to 1.5 m. Also, no pit shall be dug within the offset width of a minimum of 10 m.
- c) Haulage of material to embankments or other areas of fill shall proceed only when sufficient spreading and compaction plant is operating at the place of deposition.
- d) Where the excavation reveals a combination of acceptable and unacceptable materials, the Contractor shall, unless otherwise agreed by the Engineer, carry out the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the unacceptable materials. The acceptable materials shall be stockpiled separately.

19.6 Compaction Requirements

The Contractor shall obtain representative samples from each of the identified borrow areas and have these tested at the site laboratory following a testing programmer approved by the Engineer. It shall be ensured that the subgrade material when compacted to the density requirements as in Table below shall yield the specified design CBR value of the sub-grade.

Table – 2 Compaction Requirements for Embankment and Sub-grade

S no	Type of work/Material	Relative compaction as percentage of max. laboratory dry density as per 15:2720 (Part 8)
1	Subgrade and earthen shoulders	Not less than 97%

2	Embankment,	Not less than 95%
3	Expansive Clays a) Subgrade and 500 mm portion just below the subgrade b) Remaining portion of embankment	Not allowed 90-95%

The Contractor shall at least 7 working days before commencement of compaction submit the following to the Engineer for approval:

- a) The values of maximum dry density and optimum moisture content obtained in accordance with **IS:2720 (Part 8)**, appropriate for each of the fill materials he intends to use.
- a) A graph of dry density plotted against moisture content from which each of the values in (I) above of maximum dry density and optimum moisture content were determined.

The maximum dry density and optimum moisture content approved by the Engineer shall form the basis for compaction.

19.7 Spreading Material in Layers and Bringing to Appropriate Moisture Content

- a) The embankment and sub-grade material shall be spread in layers of uniform thickness in the entire width with a motor grader. The compacted thickness of each layer shall not be more than 250 mm when vibratory roller/vibratory soil compactor is used and not more than 200 mm when 80-100 kN static roller is used. The motor grader blade shall have hydraulic control suitable for initial adjustment and maintain the same so as to achieve the specific slope and grade. Successive layers shall not be placed until the layer under construction has been thoroughly compacted to the specified requirements as in Table above and got approved by the Engineer. Each compacted layer shall be finished parallel to the final cross-section of the embankment.
- b) If the material delivered to the roadbed is too wet, it shall be dried, by aeration and exposure to the sun, till the moisture content is acceptable for compaction. Should circumstances arise, where owing to wet weather, the moisture content cannot be reduced to the required amount by the above procedure, compaction work shall be suspended.
- c) Moisture content of each layer of soil shall be checked in accordance with **IS:2720 (Part 2)**, and unless otherwise mentioned, shall be so adjusted, making due allowance for evaporation losses, that at the time of compaction it is in the range of 1 percent above to 2 percent below the optimum moisture content determined in accordance with IS:2720 (Part 8) as the case may be. Expansive clays shall, however, be compacted at moisture content corresponding to the specified dry density, but on the wet side of the optimum moisture content obtained from the laboratory compaction curve.
- d) After adding the required amount of water, the soil shall be processed by means of graders, harrows, rotary mixers or as otherwise approved by the Engineer until the layer is uniformly wet.
- e) Clods or hard lumps of earth shall be broken to have a maximum size of 75 mm when being placed in the embankment and a maximum size of 50 mm when being placed in the subgrade.

- f) Embankment and other areas of fill shall, unless otherwise required in the Contract or permitted by the Engineer, be constructed evenly over their full width and their fullest possible extent and the Contractor shall control and direct construction plant and other construction vehicles. Damage by construction plant and other vehicular traffic shall be made good by the Contractor with material having the same characteristics and strength of the material before it was damaged.
- g) Whenever fill is to be deposited against the face of a natural slope, or sloping earthworks face including embankments, cuttings, other fills and excavations steeper than 1 vertical to 4 horizontal, such faces shall be benched as per **Morth Clause 305.4.1** immediately before placing the subsequent fill.

19.8 Compaction

- a) Only the compaction equipment approved by the Engineer shall be employed to compact the different material types encountered during construction. Static three-wheeled roller, self-propelled single drum vibratory roller, tandem vibratory roller, pneumatic tyre roller, pad foot. Roller, etc., of suitable size and capacity as approved by the Engineer shall be used for the different types and grades of materials required to be compacted either individually or in suitable combinations.
- b) The compaction shall be done with the help of self-propelled single drum vibratory roller or pad foot vibratory roller of 80 to 100 kN static weight or heavy pneumatic tyre roller of adequate capacity capable of achieving the required compaction. The Contractor shall demonstrate the efficacy of the equipment he intends to use by carrying out compaction trials. The procedure to be adopted for the site trials shall be submitted to the Engineer for approval.
- c) Each layer of the material shall be thoroughly compacted to the densities specified in MORTH Table 300-2. Subsequent layers shall be placed only after the finished layer has been tested according to MORTH Clause 903.2.2 and accepted by the Engineer. The Engineer may permit measurement of field dry density by a nuclear moisture/density gauge used in accordance with agreed procedure and provided the gauge is calibrated to give results identical to that obtained from tests in accordance with IS:2720 (Part 28). A record of the same shall be maintained by the Contractor.
- d) When density measurements reveal any soft areas in the embankment/sub-grade/earthen shoulders, further compaction shall be carried out as directed by the Engineer. If in spite of that the specified compaction is not achieved, the material in the soft areas shall be removed and replaced by approved material, compacted using appropriate mechanical means such as light weight vibratory roller, double drum walk behind roller, vibratory plate compactor, trench compactor or vibratory tamper to the density requirements and satisfaction of the Engineer.

19.9 DRAINAGE

The surface of the embankment/sub-grade at all times during construction shall be maintained at such a cross fall (not flatter than that required for effective drainage of an earthen surface) as will shed water and prevent ponding.

19.10 FINISHING OPERATIONS

Finishing operations shall include the work of shaping and dressing the shoulders/verge/roadbed and side slopes to conform to the alignment, levels, cross-sections and dimensions

shown on the drawings or as directed by the Engineer subject to the surface tolerance described in Clause 902. Both the upper and lower ends of the side slopes shall be rounded off to improve appearance and to merge the embankment with the adjacent terrain.

19.11 EARTHWORK FOR WIDENING EXISTING ROAD EMBANKMENT

When an existing embankment and/or sub-grade is to be widened and its slopes are steeper than 1 vertical on 4 horizontal, continuous horizontal benches, each at least 300 mm wide, shall be cut into the old slope for ensuring adequate bond with the fresh embankment/subgrade material to be added. The material obtained from cutting of benches could be utilized in the widening of the embankment/subgrade. However, when the existing slope against which the fresh material is to be placed is flatter than 1 vertical on 4 horizontal, the slope surface may only be ploughed or scarified instead of resorting to benching.

19.12 SETTLEMENT PERIOD

Where settlement period is specified in the Contract, the embankment shall remain in place for the required settlement period before excavating for abutment, wing wall, retaining wall, footings, etc., or driving foundation piles. The duration of the required settlement period at each location shall be as provided for in the Contract or as directed by the Engineer.

19.13 SURFACE FINISH AND QUALITY CONTROL OF WORK

The surface finish of construction of sub-grade shall conform to the requirements of Morth Clause 902. Control on the quality of materials and works shall be exercised in accordance with Morth Clause 903.

19.14 SUB-GRADE STRENGTH

- a) It shall be ensured prior to actual execution that the material to be used in the sub-grade satisfies the requirements of design CBR.
- b) Sub-grade shall be compacted and finished to the design strength consistent with other physical requirements. The actual laboratory CBR values of constructed subgrade shall be determined on remoulded samples, compacted to the field density at the field moisture content and tested for soaked/unsoaked condition as specified in the Contract or as per MORTH Clause 305.

20 GRANULAR SUB-BASE

20.1 SCOPE

This work shall consist of laying and compacting well-graded material on prepared subgrade in accordance with the requirements and specifications of MORTH clause 401. The material shall be laid in one or more layers as sub-base or lower sub-base and upper sub-base (termed as sub-base here in after) as necessary according to lines, grades and cross-sections shown on the drawings or as directed by the Engineer-in-Charge

20.2 MATERIALS

The material to be used for the work shall be natural sand, crushed gravel, crushed stone, crushed slag or combination thereof depending upon the grading required. Use of materials like brick metal, Kankar and crushed concrete shall be permitted in the lower sub-base. The

material shall be free from organic or other deleterious constituents and shall conform to the grading given in table-1 and physical requirement given in table-2. Gradings III and IV shall preferably be used in lower sub-base. Grading V and VI shall be used as a sub-base-cum-drainage layer. The grading to be adopted for a project shall be as specified in the Contract. Where the sub-base is laid in two layers as upper sub-base and lower sub-base, the thickness of each layer shall not be less than 150 mm.

If the water absorption of the aggregate determined as per IS : 2386 (Part 3); if this value is greater than 2 per cent, the aggregate shall be tested for Wet Aggregate Impact Value (AIV) (IS: 5640). Soft aggregates like Kankar, Brick ballast and laterite shall also be tested for Wet AIV (IS: 5640).

TABLE -1: GRADING FOR GRANULAR SUB-BASE MATERIALS

IS Sieve Designation	Percent by Weight Passing the IS Sieve					
	Grading I	Grading II	Grading III	Grading IV	Grading V	Grading VI
75.0 mm	100	-	-	-	100	-
53.00 mm	80-100	100	100	100	80-100	100
26.5 mm	55-90	70-100	55-75	50-80	55-90	75-100
9.50 mm	35-65	50-80	-	-	35-65	55-75
4.75 mm	25-55	40-65	10-30	15-35	25-50	30-55
2.36 mm	20-40	30-50	-	-	10-20	10-25
0.85 mm	-	-	-	-	2-10	-
0.425 mm	10-15	10-15	-	-	0-5	0-8
0.075 mm	<5	<5	<5	<5	-	0-3

TABLE -2: PHYSICAL REQUIREMENTS FOR MATERIALS FOR GRANULAR SUB-BASE

Aggregate Impact Value (AIV)	IS:2386 (Part 4) or IS:5640	40 Maximum
Liquid Limit	IS:2720 (Part 5)	Maximum 25
Plasticity Index	IS:2720 (Part 5)	Maximum 6
CBR at 98% dry density (at IS:2720-Part 8)	IS:2720 (Part 5)	Minimum 30 unless otherwise specified in the Contract

21 WET MIX MACADAM (WMM) SUB-BASE/BASE

21.1 SCOPE

This work shall consist of laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass on a prepared subgrade/sub-base/base or existing pavement as the case may be in accordance with the requirements and Specifications of MORTH Clause 406. The material shall be laid in one or more layers as necessary to lines, grades and cross-sections shown on the approved drawings or as directed by the Engineer-in-charge.

The thickness of a single compacted Wet Mix Macadam layer shall not be less than 75 mm. When vibrating or other approved types of compacting equipment are used, the compacted depth of a single layer of the subbase course may be increased to 200 mm upon approval of the Engineer-in-charge.

21.2 PHYSICAL REQUIREMENTS

Coarse aggregates shall be crushed stone. If crushed gravel/shingle is used, not less than 90 per cent by weight of the gravel/shingle pieces retained on 4.75 mm sieve shall have at least two fractured faces. The aggregates shall conform to the physical requirements set forth in Table-1 below.

If the water absorption value of the coarse aggregate is greater than 2 per cent, the soundness test shall be carried out on the material delivered to site as per IS: 2386 (Part-5).

Table-1 – Physical requirements of coarse aggregates for WMM

Si No.	Test	Test Method	Requirement
1	Los Angeles Abrasion value Or Aggregate impact value	IS:2386 (Part-4) IS:2386 (Part-4) or IS:5640	40 per cent (Max.) 30 per cent (Max.)
2	Combined Flakiness and Elongation indices (Total)	IS:2386 (Part-1)	35 per cent (Max.)*

- * To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness index is weight of flaky stone metal divided by weight of Stone sample. Only the elongated particles be separated out from the remaining (non-flaky) Stone metal. Elongation index is weight of elongated particles divided by total non-flaky Particles. The value of flakiness index and elongation index so found are added up.

21.3 GRADING REQUIREMENTS:

The aggregates shall conform to the grading given in Table 2 below.

Table-2 – Grading requirements of Aggregates for WMM

IS sieve designation	Percent by weight passing the IS sieve
53.00 mm	100

45.00 mm	95-100
26.50 mm	-
22.40 mm	60-80
11.20 mm	40-60
4.75 mm	25-40
2.36 mm	15-30
600.00 micron	8-22
75.00 micron	0-5

Material finer than 425 micron shall have Plasticity Index (PI) not exceeding 6.

The final gradation approved within these limits shall be graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa.

22 DENSE BITUMINOUS MACADAM

22.1 SCOPE

The specification describes the design and construction procedure for Dense Bituminous Macadam, (DBM) in MORTH clause 505, for use mainly, but not exclusively, in base/binder and profile corrective Courses. The work shall consist of construction in a single or multiple layers of DBM on a previously prepared base or sub-base. The thickness of a single layer shall be 50 mm to 100 mm.

22.2 BITUMEN

The bitumen shall be viscosity grade paving bitumen complying with the Indian Standard Specification IS: 73. The type and grade of bitumen to be used shall be specified in the Contract.

22.3 COARSE AGGREGATES

The coarse aggregates shall consist of crushed rock, crushed gravel or other hard material retained on 2.36 mm sieve. They shall be clean, hard, and durable, of cubical shape, free from dust and soft or friable matter, organic or other deleterious substances. Where the Contractor's selected source of aggregates has poor affinity for bitumen, the Contractor shall produce test results that with the use of anti-stripping agents, the stripping value is improved to satisfy the specification requirements. The Engineer may approve such a source and as a condition for the approval of that source, the bitumen shall be treated with an approved anti-stripping agent, as per the manufacturer's recommendations, at the cost of the Contractor. The aggregates shall satisfy the requirements specified in Table 1.

Where crushed gravel is proposed for use as aggregate, not less than 90 percent by weight of the crushed material retained on the 4.75 mm sieve shall have at least two fractured faces.

22.4 FINE AGGREGATES

Fine aggregates shall consist of crushed or naturally occurring mineral material, or a combination of the two, passing the 2.36 mm sieve and retained on the 75 micron sieve. These shall be clean, hard, durable, dry and free from dust, and soft or friable matter, organic or other deleterious matter. Natural sand shall not be allowed in binder courses. However, natural sand upto 50 percent of the fine aggregate may be allowed in base courses. The fine aggregate shall have a sand equivalent value of not less than 50 when tested in accordance with the requirement of IS: 2720 (Part 37). The plasticity index of the fraction passing the 0.425 mm sieve shall not exceed 4, when tested in accordance with IS: 2720 (Part 5).

22.5 FILLER

Filter shall consist of finely divided mineral matter such as rock dust, hydrated lime or cement approved by the Engineer. The filler shall be graded within the limits indicated in Table 2.

The filler shall be free from organic impurities and have a plasticity Index not greater than 4. The Plasticity Index requirement shall not apply if filler is cement or lime. Where the aggregates fail to meet the requirements of the water sensitivity test in Table 1, then 2 percent by total weight of aggregate, of hydrated lime shall be used and percentage of fine aggregate reduced accordingly.

22.6 AGGREGATE GRADING AND BINDER CONTENT

When tested in accordance with IS:2386 Part 1 (wet sieving method), the combined grading of the coarse and fine aggregates and filler for the particular mixture shall fall within the limits given in Table – 3 for grading 1 or 2 as specified in the Contract. To avoid gap grading, the combined aggregate gradation shall not vary from the lower limit on one sieve to higher limit on the adjacent sieve.

Table – 1 Physical Requirement for Coarse Aggregate for Dense Bituminous Macadam

Property	Test	Specification	Method of test
Cleanliness (dust)	Grain size analysis	Max 5% passing 0.075 mm sieve	IS:2386 Part I
Particle shape	Combined Flakiness and Elongation Indices*	Max 35%	IS:2386 Part I
Strength	Los Angeles Abrasion Value or Aggregate Impact Value	Max 35% Max 27%	IS:2386 Part IV
Durability	Soundness either :Sodium Sulphate or Magnesium Sulphate	Max 12% Max 18%	IS:2386 Part V
Water absorption	Water Absorption	Max 2%	IS:2386 Part III
Stripping	Coating and Stripping of Bitumen Aggregate Mix	Minimum retained coating 95%	IS:6241

Water Sensitivity	Retained Tensile Strength**	Min. 80%	AASHTO 283
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To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness index is weight of flaky stone metal divided by weight of stone sample. Only the elongated particles be separated out from the remaining (non-flaky) stone metal. Elongation index is weight of elongated particles divided by total non-flaky particles. The values of flakiness index and elongation index so found are added up.

If the minimum retained tensile test strength falls below 80 percent, use of anti-stripping agent is recommended to meet the requirement.

Table - 2 Grading Requirements for Mineral Filler

IS Sieve (mm)	Cumulative percent passing by weight of total aggregate
0.6	100
0.3	95-100
0.075	85-100

Table – 3 Composition of Dense Graded Bituminous Macadam

Grading	1	2
Nominal aggregate size	37.5 mm	26.5 mm
Layer Thickness	75-100 mm	50-75 mm
IS sieve (mm)	Cumulative % by weight of aggregate passing	
45	100	
37.5	95-100	100
26.5	63-93	90-100
19	-	71-95
13.2	55-75	56-80
9.5	-	-
4.75	38-54	38-54
2.36	28-42	28-42
1.18	-	-

Grading	1	2
0.6	-	-
0.3	7-21	7-21
0.15	-	-
0.075	2-8	2-8
Bitumen content % by mass of total mix	Min 4.0**	Min 4.5**

Note:

*The nominal maximum particle size is the largest specified sieve size upon which any of the aggregate is retained.

**Corresponds to specific gravity of aggregates being 2.7. In case aggregate have specific gravity more than 2.7, the minimum bitumen content can be reduced proportionately. Further the region here highest daily mean air temperature is 30°C or lower and lowest daily air temperature is - 10°C or lower, the bitumen content may be increased by 0.5 percent.

Bitumen content indicated in Table 3 is the minimum quantity. The quantity shall be determined in accordance with the following clause.

22.7 MIX DESIGN

The bitumen content required shall be determined following the Marshall Mix design procedure contained in Asphalt Institute Manual MS-2.

The Fines to Bitumen (F/B) ratio by weight of total mix shall range from 0.6 to 1.2.

Apart from conformity with the grading and quality requirements for individual ingredients, the mixture shall meet the requirements set out in Table 4.

Table – 4 Requirements for dense bituminous macadam

Properties	Viscosity Grade paving Bitumen	Modified bitumen		Test Method
		Hot climate	Cold climate	
Compaction level	75 blows on each face of the specimen			
Minimum stability (KN at 600C)	9.0	12.0	10.0	AASHTO T245
Marshall flow (mm)	2-4	2.5-4	3.5-5	AASHTO T245
Marshall Quotient (Stability / Flow)	2-5	2.5-5		MS-2 and ASTM D2041

Properties	Viscosity Grade paving Bitumen	Modified bitumen		Test Method
		Hot climate	Cold climate	
% air voids	3-5			
% Voids Filled with Bitumen (VFB)	65-75			
Coating of aggregate particle	95% minimum			IS:6241
Tensile Strength ratio	80% Minimum			AASHTO T 283
% Voids in Mineral Aggregate (VMA)	Minimum percent voids in mineral aggregate (VMA) are set out in Table 6			

22.8 BINDER CONTENT

The binder content shall be optimized to achieve the requirements of the mix set out in Table 4. The binder content shall be selected to obtain 4 percent air voids in the mix design. The Marshall method for determining the optimum binder content shall be adopted as described in the Asphalt Institute Manual MS-2.

Where maximum size of the aggregate is more than 26.5 mm, the modified Marshall method using 150 mm diameter specimen described in MS-2 and ASTM D 5581 shall be used. This method requires modified equipment and procedures. When the modified Marshall test is used, the specified minimum stability values in Table 5 shall be multiplied by 2.25, and the minimum flow shall be 3 mm.

Table – 5 Minimum Percent Voids in Mineral Aggregate (VMA)

Nominal Maximum particle size (mm)	Maximum VMA percent Related to Design Percentage Air voids		
	3.0	4.0	5.0
26.5	11.0	12.0	13.0
37.5	10.0	11.0	12.0

Note: Interpolate minimum voids in the mineral aggregate (VMA) for designed percentage air voids values between those listed.

Table – 6 Permissible Variations in the Actual Mix from the Job Mix Formula

Description	Base/Binder Course
Aggregate passing 19 mm sieve or larger	±8%

Aggregate passing 13.2 mm, 9.5 mm	±7%
Aggregate passing 4.75 mm	±6%
Aggregate passing 2.36 mm, 1.18 mm, 0.6 mm	±5%
Aggregate passing 0.3 mm, 0.15 mm	±4%
Aggregate passing 0.075 mm	±2%
Binder content	±0.3%
Mixing temperature	±10°C

23 BITUMINOUS CONCRETE

23.1 SCOPE

This work shall consist of construction of Bituminous Concrete, for use in wearing and profile corrective courses confining to the specifications of MORTH clause 507. This work shall consist of construction in a single layer of bituminous concrete on a previously prepared bituminous bound surface. A single layer shall be 30 mm/40 mm/50 mm thick.

23.2 BITUMEN

The bitumen shall conform to Clause 504.2.1 of MORTH specification for road and bridge revision 5.

23.3 COARSE AGGREGATES

The coarse aggregates shall be generally as specified in Clause 504.2.2 of MORTH specification for road and bridge revision 5, except that the aggregates shall satisfy the physical requirements of Table 1 and where crushed gravel is proposed for use as aggregate, not less than 95 percent by weight of the crushed material retained on the 4.75 mm sieve shall have at least two fractured faces.

Table-1 Physical Requirements for Coarse Aggregate for Bituminous Concrete

Property	Test	Specification	Method of Test
Cleanliness (dust)	Grain size analysis	Max 5% passing 0.075 mm sieve	IS:2386 Part I
Particle shape	Combined Flakiness and Elongation Indices	Max 35%	IS:2386 Part I
Strength	Los Angeles Abrasion Value or Aggregate Impact Value	Max 30% Max 24%	IS:2386 Part IV
Durability	Soundness either: Sodium Sulphate or Magnesium	Max 12%	IS:2386 Part V

Property	Test	Specification	Method of Test
	Sulphate	Max 18%	
Polishing	Polished Stone Value	Min 55%	BS:812-114
Water Absorption	Water Absorption	Max 2%	IS:2386 Part III
Stripping	Coating and Stripping of Bitumen Aggregate Mix	Minimum retained coating 95%	IS:6241
Water Sensitivity	Retained Tensile Strength	Min 80%	AASHT0283

*If the minimum retained tensile test strength falls below 80 percent, use of anti-stripping agent is recommended to meet the requirement.

23.4 FINE AGGREGATES

The fine aggregates shall be as specified in Clause 505.2.3 of MORTH specification for road and bridge revision 5.

23.5 FILLER

Filler shall be as specified in Clause 505.2.4 of MORTH specification for road and bridge revision 5.

23.6 AGGREGATE GRADING AND BINDER CONTENT

When tested in accordance with IS:2386 Part 1 (Wet grading method), the combined grading of the coarse and fine aggregates and filler shall fall within the limits shown in Table 2. The grading shall be as specified in the Contract.

Table-2 Composition of Bituminous Concrete Pavement Layers

Grading	1	2
Nominal aggregate size	19 mm	13.2 mm
Layer Thickness	50 mm	30-40 mm
IS sieve (mm)	Cumulative % by weight of aggregate passing	
45		
37.5		
26.5	100	
19	90-100	100

Grading	1	2
13.2	59-79	90-100
9.5	52-72	70-88
4.75	35-55	53-71
2.36	28-44	42-58
1.18	20-34	34-48
0.6	15-27	26-38
0.3	10-20	18-28
0.15	5-13	12-20
0.075	2-8	4-10
Bitumen content % by mass of total mix	Min 5.2*	Min 5.4**

Note: * The nominal maximum particle size is the largest specified sieve size up on which any of the aggregate is retained.

** Corresponds to specific gravity of aggregate being 2.7. In case aggregate have specific gravity more than 2.7, the minimum bitumen content can be reduced proportionately. Further the region where highest daily mean air temperature is 30°C or lower and lowest daily air temperature is – 10° C or lower, the bitumen content may be increased by 0.5 percent

Description	Permissible variation
Aggregate passing 19 mm sieve or larger	±7%
Aggregate passing 13.2 mm, 9.5 mm	±6%
Aggregate passing 4.75 mm	±5%
Aggregate passing 2.36 mm, 1.18 mm, 0.6 mm	±4%
Aggregate passing 0.3 mm, 0.15 mm	±3%
Aggregate passing 0.075 mm	±1.5%
Binder content	±0.3%
Mixing temperature	±10°C

24 TACK COAT

24.1 SCOPE

The work shall consist of the application of a single coat of low viscosity liquid bituminous material to existing bituminous, cement concrete or primed granular surface preparatory to the superimposition of a bituminous mix, as per the specifications of MORTH Clause 503 when specified in the Contract or as instructed by the Engineer.

24.2 MATERIALS

The binder used for tack coat shall be either Cationic bitumen emulsion (RS 1) complying with IS: 8887 or suitable low viscosity paving bitumen of VG 10 grade conforming to IS: 73. The use of cutback bitumen RC: 70 as per IS: 217 shall be restricted only for sites at sub-zero temperatures or for emergency applications as directed by the Engineer. The type and grade of binder for tack coat shall be as specified in the Contract or as directed by the Engineer.

24.3 WEATHER AND SEASONAL LIMITATIONS

Bituminous material shall not be applied during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Where the tack coat consists of emulsion, the surface shall be slightly damp, but not wet. Where the tack coat is of cutback bitumen, the surface shall be dry.

Table – 1 Rate of Application of Tack Coat

Type of Surface	Rate of Spray of Binder in Kg per sq. m
Bituminous surfaces	0.20 - 0.30
Granular surfaces treated with primer	0.25 - 0.30
Cement concrete pavement	0.30 - 0.35

25 PRIME COAT OVER GRANULAR BASE

25.1 SCOPE

This work shall consist of the application of a single coat of low viscosity liquid bituminous material to a porous granular surface preparatory to the superimposition of bituminous treatment or mix. The work shall be carried out on a previously prepared granular surface and as per the specifications of MORTH Clause 502.

25.2 MATERIALS

28.2.1.1 The primer shall be cationic bitumen emulsion SS1 grade conforming to IS:8887 or medium curing cutback bitumen conforming to IS:217 or as specified in the Contract

28.2.1.2 Quantity of SS1 grade bitumen emulsion for various types of granular surface shall be as given in Table 1

Table – 1 Quantity of Bitumen Emulsion for Various Types of Granular Surfaces

Type of surface	Rate of spray (kg/sq.m)
WMM/WBM	0.7-1.0
Stabilized soil bases/Crusher Run Macadam	0.9-1.2

25.2.2 Cutback for primer shall not be prepared at the site" Type and quantity of cutback bitumen for various types of granular surface shall be as given in Table 2

Table 2: Type and Quantity of Cutback Bitumen for Various Types of Granular Surface

Type of surface	Type of Cutback	Rate of spray (kg/sq.m)
WMM/WBM	MC 30	0.6-0.9
Stabilized soil bases/Crusher Run Macadam	MC 70	0.9-1.2

The correct quantity of primer shall be decided by the Engineer and shall be such that it can be absorbed by the surface without causing run-off of excessive primer and to achieve desired penetration of about 8-10 mm.

25.3 WEATHER AND SEASONAL LIMITATIONS

Primer shall not be applied during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C. Cutback bitumen as primer shall not be applied to a wet surface. Surfaces which are to receive emulsion primer should be damp, but no free or standing water shall be present. Surface can be just wet by very light sprinkling

26 MORTARS

Specifications shall be as per Sub Head 3.0 of CPWD Vol -1.

26.1 MATERIALS

26.1.1 WATER

Water used for mixing and curing shall be clean and free from injurious quantities of alkalis, acids, oils, salts, sugar, organic materials, vegetable growth or other substance that may be deleterious to bricks, stone, concrete or steel. Potable water is generally considered satisfactory for mixing. The Ph value of water shall be not less than 6. The following concentrations represent the maximum permissible values: (of deleterious materials in water).

The physical and chemical properties of ground water shall be tested along with soil investigation and if the water is not found conforming to the requirements of IS 456-2000, the tender documents shall clearly specify that the contractor has to arrange good quality water for construction indicating the source.

26.1.2 CEMENT

- I. The cement used shall be any of the following grades and the type selected should be appropriate for the intended use.
 - a. 33 grade ordinary Portland cement conforming to IS 269-2013.

- b. 43 grade ordinary Portland cement conforming to IS 8112-2013.
- c. 53 grade ordinary Portland cement conforming to IS 12269-2013.
- d. Rapid hardening Portland cement conforming to IS 8041-1990, **Reaffirm Apr 2014**
- e. Portland slag cement conforming to IS 455-1989, **Reaffirm Apr 2014.**
- f. Portland Pozzolana cement (fly ash based) conforming to IS 1489 (Part 1)-1991, **Reaffirm Apr 2014.**
- g. Portland Pozzolona cement (calcined clay based) conforming to IS 1489 (part 2)-1991, **Reaffirm Apr 2014.**
- h. Hydrophobic **Portland** cement conforming to IS 8043-1991, **Reaffirm Apr 2014.**
- i. Low heat Portland cement conforming to IS 12600-1989, **Reaffirm Apr 2014.**
- j. Sulphate resisting Portland cement conforming to IS 12330-1988, **Reaffirm Apr 2014.**
- k. White cement conforming to IS 8042-1989, **Reaffirm Apr 2014.**

Different types of cement shall not be mixed together. In case more than one type of cement is used in any work, a record shall be kept showing the location and the types of cement used.

- II. Compressive Strength** : Compressive strength requirement of each type of cement for various grades when tested in accordance with IS 4031 (part 6) shall be as under:

Sample	Strength in N/mm ² not less than for		
	Gr. 33	Gr.43	Gr. 53
Age at testing			
72 + 1 hr	16	23	27
168 + 2 hrs	22	33	37
672 + 4 hrs	33	43	53

26.1.3 FINE AGGREGATE

- I. Aggregate most of which passes through 4.75 mm IS sieve is known as fine aggregate. Fine aggregate shall consist of natural sand, crushed stone sand, crushed gravel sand stone dust or marble dust, fly ash and broken brick (Burnt clay) . It shall be hard, durable, chemically inert, clean and free from adherent coatings, organic matter etc. and shall not contain any appreciable amount of clay balls or pellets and harmful impurities e.g. iron pyrites, alkalis, salts, coal, mica, shale or similar laminated materials in such form or in such quantities as to cause corrosion of metal or affect adversely the hardening, the strength, the durability or the appearance of mortar, plaster or concrete. The sum of the percentages of all deleterious material shall not exceed 5%. Fine aggregate must be checked for organic impurities such as decayed vegetation humps, coal dust etc. in accordance with the procedure prescribed in Appendix 'A' of Chapter 3 of CPWD Specifications (Vol 1) 2019.

- II. Silt Content:** The maximum quantity of silt in sand as determined by the method prescribed in Appendix 'C' of Chapter 3 (**CPWD Specification – Vol 1, 2109**) shall not exceed 8%. Fine aggregate containing more than allowable percentage of silt shall be washed as many times as directed by Engineer-in-Charge so as to bring the silt content within allowable limits for which nothing extra shall be paid.
- III. Grading:** On the basis of particle size, fine aggregate is graded in to four zones. The grading when determined in accordance with the procedure prescribed in Appendix 'B' of Chapter 3 CPWD Specifications Vol 1 2019 shall be within the limits. Where the grading falls outside the limits of any particular grading zone of sieves, other than 600 micron IS sieve, by a total amount not exceeding 5 per cent, it shall be regarded as falling within that grading zone.

26.2 PREPARTATION OF MORTARS AND ITS GRADE

26.2.1 GRADE OF MASONRY MORTAR

The grade of masonry mortar will be defined by its compressive strength in N/mm² at the age of 28 days as determined by the standard procedure detailed in IS 2250.

For proportioning the ingredients by volume, the conversion of weight into volume shall be made on the following basis:

a) Burnt Clay Pozzolana	860 Kg/cum
b) Coarse Sand (dry)	1280 kg/cum
c) Fine sand (dry)	1600 kg/ cum
d) Fly Ash	590 kg/ cum

26.2.2 CEMENT MORTAR

This shall be prepared by mixing cement and sand with or without the addition of pozzolana in specified proportions as per Appendix 'F' of Chapter 4 of CPWD Specification (Vol 1) 2019.

27 CONCRETE WORK

Specifications shall be as per Sub Head 4.0 of CPWD Vol -1.

27.1 MATERIAL

Water, cement, fine aggregate or sand, surkhi, and fly ash shall be as specified in Chapter Mortar.

27.1.1 Coarse Aggregate

- I. General:** Aggregate most of which is retained on 4.75 mm IS Sieve and contains only as much fine material as is permitted in IS 383 for various sizes and grading is known as coarse aggregate. Coarse aggregate shall be specified as stone aggregate, gravel or brick aggregate and it shall be obtained from approved/ authorized sources.

A. Stone Aggregate: It shall consist of naturally occurring (uncrushed, crushed or broken) stones. It shall be hard, strong, dense, durable and clean. It shall be free from veins, adherent

coating, and injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious substances. It shall be roughly cubical in shape. Flaky and elongated pieces shall be avoided. **Aggregates from other than natural resources shall comply with the requirements of IS 383.**

B. Gravel: It shall consist of naturally occurring (uncrushed, crushed or broken) river bed shingle or pit gravel. It shall be sound, hard and clean. It shall be free from flat particles of shale or similar laminated material, powdered clay, silt, loam, adherent coating, alkali, vegetable matter and other deleterious substances. Pit gravel shall be washed if it contains soil materials adhering to it. These shall conform to IS 383 unless otherwise specified.

C. Brick Aggregate: Brick aggregate shall be obtained by breaking well burnt or over burnt dense brick/ brick bats. They shall be homogeneous in texture, roughly cubical in shape and clean. They shall be free from unburnt clay particles. Soluble salt, silt, adherent coating of soil, vegetable matter and other deleterious substances. Such aggregate should not contain more than one percent of sulphates and should not absorb more than 10% of their own mass of water, when used in cement concrete. It shall conform to IS 306 unless otherwise specified.

D. Light weight aggregate such as sintered fly ash aggregate may also be used provided the Engineer-in-Charge is satisfied with the data on the proportion of concrete made with them.

II. Stacking: Aggregate shall be stacked on a hard, dry and level patch of ground. When stack piling, the aggregate shall not form pyramids resulting in segregation of different sized materials. It shall be stacked separately according to nominal size of coarse aggregates. Stacking shall be done in regular stacks, of height not exceeding 100 cm.

III. Testing: Coarse aggregate shall be tested for the followings (as per IS 2386)

- 1) Determination of particle size and shape (Appendix 'A' of Chapter 4 of CPWD Vol-I)
- 2) Estimation of organic impurities (as per IS 2386 - Part II)
- 3) Surface moisture (Appendix 'B' of Chapter 4 of CPWD Vol-I 2019)
- 4) Determination of 10% fine value (Appendix 'C' of Chapter 4 of CPWD Vol-I 2019)

IV. Chemical Admixtures When required, admixtures of approved quality shall be mixed with concrete, as specified. The admixtures shall conform to IS 9103

27.2 CEMENT CONCRETE

30.2.1 Grades of Cement Concrete

The concrete shall be in grade designated as under:

Group	Grade Designation	Specified characteristic compressive strength of 150 mm Cube at 28 Days in N/mm ²
(1)	(2)	(3)
Ordinary Concrete	M10	10
	M15	15

Group	Grade Designation	Specified characteristic compressive strength of 150 mm Cube at 28 Days in N/mm ²
	M20	20
Standard Concrete	M25	25
	M30	30
	M35	35
	M40	40
	M45	45
	M50	50
	M55	55
	M60	60
High Strength Concrete	M65	65
	M70	70
	M75	75
	M80	80
	M85	85
	M90	90
	M95	95
	M100	100

Notes :

1. In the designation of concrete mix M refers to the mix and the number to the specified compressive strength of 150 mm size cube at 28 days, expressed in N/mm²
2. For concrete of compressive strength greater than **M60**, design parameters given in the standard may not be applicable and the values may be obtained from specialized literatures and experimental results.
3. The characteristic strength is defined as the strength of material below which not more than 5 percent of the test results are expected to fall.

The percentage variation between the quantities of cement, fine aggregate and coarse aggregates (as found by weighing in water) in the two halves of a batch and average of the two halves of the batch shall not be more than the following limits:

Cement 8%

Fine aggregate 6%

Coarse aggregate 5%

28 REINFORCED CEMENT CONCRETE**28.1 GENERAL:-**

The RCC work shall be done with RMC of Design Mix Concrete, unless otherwise specified in the nomenclature of items, wherever letter M has been indicated, the same shall imply for the Design Mix Concrete. The Ready Mix Concrete shall be as per IS : 4926 and as per CPWD Specification and guide lines. For the nominal mix in RCC, CPWD specification shall be followed. The Design Mix Concrete will be designed based on the principles given in IS : 456, 10262 and SP 23. The contractor shall carry out design mixes for each class of concrete indicating that the concrete ingredients and proportions will result in concrete mix meeting requirements specified. The cement shall be actually weighed as presumption of each bag having 50 kg shall not be allowed. In case of use of admixture, the mix shall be designed with these ingredients as well. The specification mentioned herein below shall be followed for Design Mix Concrete.

INGREDIENTS:-

- i. Coarse Aggregate: - As per CPWD Specifications.
- ii. Fine Aggregate: - As per CPWD Specifications.
- iii. Water: - As per requirements laid down in IS 456-2000 and CPWD specifications.
- iv. Cement: Cement arranged by the contractor will be OPC / PPC (in bags) conforming to IS : 1489 : Part-I.

28.2 Admixture:- Admixtures shall not be used without approval of Engineer-in-Charge. Wherever required, admixtures of approved quality shall be mixed with concrete to achieve the desired workability within specified water cement ratio. The admixture shall conform to IS:9103. The chloride content in the admixture shall satisfy the requirement of BS : 5075. The total amount of chlorides in the admixture mixed concrete shall also satisfy the requirements of IS : 456-2000.

28.3 The contractor shall not be paid anything extra for admixture required for achieving desired workability without any change in specified water cement ratio for RCC / CC work.

28.4 Grade of concrete:- The characteristic compressive strength of various grades of concrete shall be as per IS 456 2000 and/or as per Mix Design approved by Engineer-Incharge.

The Concrete mix will be designed for minimum workability as specified in para 7 of IS-456-2000.

WORKABILITY OF CONCRETE (UNLESS OTHERWISE SPECIFIED ELSEWHERE OR AS DECIDED BY ENGINEER IN CHARGE.

Placing Conditions	Degree of	Slump (mm)
(1)	(2)	(3)
Lightly reinforced sections in slabs, beams, walls, columns	Low	25-75

Heavily reinforced section in slabs, beams, walls, columns.	Medium	50-100
Pumped concrete	Medium	75-100

The recommended values of slump for various members shall conform to IS 456-2000.

In the designation of concrete mix letter M refers to the mix and the number to the specified characteristic compressive strength of 15 cm – Cube at 28 days expressed in N/mm². It is specifically highlighted that in addition to above requirement the maximum cement concrete (PPC i/c flyash) for any grade shall not exceed 430 kg/cum.

The concrete design mix with or without admixture will be carried out by the contractor through as mentioned below and as per direction of Engineer-In-Charge.

- (i) IIT, Delhi
- (ii) National Council for Cement & Building Materials, Ballabgarh.
- (iii) CRRI, Delhi.
- (iv) LD college of Engineering, Ahmedabad.
- (v) SVNIT, Surat.
- (vi) IITB, Powai, Mumbai

The various ingredients for mix design/laboratory tests shall be sent to the lab / test houses through the Engineer-In-Charge of the project and got it tested in approved laboratories as may be decided by the Engineer-in-charge immediately after award of work and the samples of such aggregate sent shall be preserved at site by the department. The admixture if used by contractor shall be at his own cost without any extra payment.

* Note : The Cement content means PP Cement including fly ash added during production of PPC at the cement plant/factory.

The contractor shall submit the mix design report from any of above approved laboratories as mentioned in 4.9 Above for approval of Engineer in charge within 30 days from the date of issue of letter of acceptance of the bid. No concreting shall be done until the mix design is approved.

In case of change of source or characteristic properties of the ingredients used in the concrete mix during the work, a revised laboratory mix design report conducted in approved by Engineer-In-Charge shall be submitted by the contractor as per the direction of the Engineer in charge.

Measurement of Cement	±2% of the quantity of cement in each batch
Measurement of Water	±3% of the quantity of water in each batch

Measurement of Aggregate	±3% of the quantity of aggregate in each batch
Measurement of Admixture	±3% of the quantity of admixture in each batch

Velocity criterion for Concrete Quality Grading.

Sl. No.	Pulse velocity by Cross Probing (km/sec)	Concrete Quality Grading
1	Above 4.5	Excellent
2	4.5 to 3.5	Good
3	3.5 to 3.0	Medium
4	Below 3.0	Doubtful

Note : In Case of “doubtful” quality it may be necessary to carry further tests.

Tolerance shall be determined in accordance with method given in IS 1786.

High strength deformed bars & wires shall conform to IS 1786. The physical properties for all sizes of steel bars are mentioned in below Table.

Sl. No	Property	Fe 415	Fe 415 D	Fe 500 D	Fe 550 D
(i)	0.2 Per cent Proof stress/yield stress, Min, N/mm ²	415.0	415.0	500.0	550.0
(ii)	Elongation, per cent, Min. on gauge length 5.65 √A, where A is the corss-sectional area of the test piece.	14.5	18.0	16.0	14.5
(iii)	Tensile strength, Min	10 Per cent more than the actual 0.2 per cent proof stress/ yield stress but	12 Per cent more than the actual 0.2 percent proof stress/yield stress	10 Per cent more than the actual 0.2 per cent proof stress/ yield stress but not less	8 Per cent more than the actual 0.2 per cent proof stress/yield stress but not less

		not less than 485.0 N/mm ²	but not less than 500.0 N/mm ²	than 565.0 N/mm ²	than 600.0 N/mm ²
(iv)	Total elongation at maximum force, percent, Min on gauge length 5.65 \sqrt{A} , where A is the cross-sectional area of the test piece.		5	5	5

Chemical composition of reinforcement bars shall be as per below table as follows:-

Constituent	Maximum Per cent			
	Fe 415	Fe 415 D	Fe 500 D	Fe 550 D
Carbon	0.30	0.25	0.25	0.25
Sulphur	0.060	0.045	0.040	0.040
Phosphorus	0.060	0.045	0.040	0.040
Sulphur and Phosphorus	0.110	0.085	0.075	0.075

Thermo Mechanically treated reinforcement bars:

- There is no BIS code for TMT bars. The available code BIS 1786 pertains to HSD Bars. Therefore there should be no stipulation that TMT bars should conform to relevant BIS code.
- The TMT bars are being produced under valid license from either of the firms namely Tempcore, Thermex Evcon Turbo & Turbo Quench. These firms have acquired patents and are giving licences to various producers to produce TMT Bars.
- The TMT bars shall conform to IS 1786 pertaining to Fe 415 D or Fe 500 D or Fe grade of steel as specified.
- In design and construction of reinforced concrete building in seismic zone III and above, steel reinforcement of Grade Fe 415 D shall be used. However, high strength deformed steel bars, produced by thermo mechanical treatment process of grade Fe 415, Fe 500 and Fe 550 having elongation more than 14.5. % and conform to other requirements of Fe 415 D, Fe 500 D and Fe 550 D respectively of IS 1786 may also be used for reinforcement. In future, latest provision of IS 456 and IS 13920 or any other relevant code as modified from time to time shall

be applicable.

Identification

Care shall also be taken to properly identify these bars at site. The staff shall be specially trained for looking for identification marks on these bars given by the manufacturers which are generally given colour code. It will be advisable to see that only one type/grade of bars are brought to site and used in the project after conducting tests for each lot.

28.5 FORM WORK (CENTRING & SHUTTERING)

Form Work

Form work shall include all temporary or permanent forms or moulds required for forming the concrete which is cast-in-situ, together with all temporary construction required for their support.

Design & Tolerance in Construction

Form work shall be designed and constructed to the shapes, lines and dimensions shown on the drawings with the tolerance given below.

(a)	Deviation from specified dimension of cross section of columns and beams	+10 mm -5 mm
(b)	Deviation from dimensions of footings	
	(i) Dimension in Plan	(+ 50 mm (-10 mm
	(ii) Eccentricity in plan	0.02 times the width of the footing in the direction of deviation but not more than 50 mm.
	(iii) Thickness	+50mm Or ± 0.05 times the specified thickness Whichever is less

(Note- These tolerances apply to concrete dimensions only, and not to positioning of vertical steel or dowels).

General Requirement

It shall be strong enough to withstand the dead and live loads and forces caused by ramming and vibrations of concrete and other incidental loads, imposed upon it during and after casting of concrete. It shall be made sufficiently rigid by using adequate number of ties and braces, screw jacks or hard board wedges where required shall be provided to make up any settlement in the form work either before or during the placing of concrete.

Form shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections, care shall be taken to see that no piece is keyed into the concrete.

Material for Form Work

Propping and Centering: All propping and centering should be either of steel tubes with extension pieces or built up sections of rolled steel.

- a. **Centering/Staging** : Staging should be as designed with required extension pieces as approved by Engineer-in-Charge to ensure proper slopes, as per design for slabs/ beams etc. and as per levels as shown in drawing. All the staging to be either of Tubular steel structure with adequate bracings as approved or made of built up structural sections made form rolled structural steel sections.
- i. In case of structures with two or more floors, the weight of concrete, centering and shuttering of any upper floor being cast shall be suitably supported on one floor below the top most floor already cast.
- ii. Form work and concreting of upper floor shall not be done until concrete of lower floor has set at least for 14 days.

Shuttering: Shuttering used shall be of sufficient stiffness to avoid excessive deflection and joints shall be tightly butted to avoid leakage of slurry. If required, rubberized lining of material as approved by the Engineer-in-Charge shall be provided in the joints. Steel shuttering used or concreting should be sufficiently stiffened. The steel shuttering should also be properly repaired before use and properly cleaned to avoid stains, honey combing, seepage of slurry through joints etc.

Form work shall be properly designed for self-weight, weight of reinforcement, weight of fresh concrete, and in addition, the various live loads likely to be imposed during the construction process (such as workmen, materials and equipment). In case the height of centering exceeds 3.50 metres, the prop may be provided in multi-stages.

Walls : The form faces have to be kept at fixed distance apart and an arrangement of wall ties with spacer tubes or bolts is considered best.. The two shutters of the wall are to be kept in place by appropriate ties, braces and studs,

Removal of Form work (Stripping Time): In normal circumstance and where various types of cements are used, forms, may generally be removed after the expiry of the following periods:

Type of Form work	Minimum period Before Striking Form work for OPC 33 grade	Minimum period Before Striking Form work for OPC 43 grade	Minimum period Before Striking Form work for PPC
(a)Vertical form work to columns, walls, beams	16-24 h	16-24 h	24-36 h
(b)Soffit form work to slabs (Props to be refixed immediately after	3 days	3 days	4 days

Type of Form work	Minimum period Before Striking Form work for OPC 33 grade	Minimum period Before Striking Form work for OPC 43 grade	Minimum period Before Striking Form work for PPC
removal of formwork)			
(c) Soffit form work to beams (Props to be refixed immediately after removal of formwork)	7 days	7 days	10 days
(d) Props to slabs:			
(1) Spanning upto 4.5m	7 days	7 days	10 days
(2) Spanning over 4.5m	14 days	14 days	20 days
(e) Props to beams and arches:			
(1) Spanning upto 6m	14 days	14 days	20 days
(2) Spanning over 6m	21 days	21 days	30 days

Note 1: For other types of cement, the stripping time recommended for ordinary Portland cement may be suitably modified. Generally If Portland Pozzolana or low heat cement or OPC with direct addition of fly ash has been used for concrete, the stripping time will be 10/7 of the period stated for OPC with 43 grade cement above.

Note 2: The number of props left under, their sizes and disposition shall be such as to be able to safely carry the full dead load of the slabs, beam or arch as the case may be together with any live load likely to occur during curing or further construction.

Note 3: For rapid hardening cement, 3/7 of above periods for OPC 33 grade will be sufficient in all cases except for vertical side of slabs, beams and columns which should be retained for at least 24 hours.

Note 4: In case of cantilever slabs and beams, the centering shall remain till structures for counter acting or bearing down have been erected and have attained sufficient strength.

Note 5: Proper precautions should be taken to allow for the decrease in the rate of hardening that occurs with all types of cement in cold weather and accordingly stripping time shall be increased.

Note 6: Work damaged through premature or careless removal of forms shall be reconstructed within 24 hrs. The design of form work and erection shall conform to sound Engineering practices and relevant IS codes.

28.6 REINFORCEMENTS

GENERAL REQUIREMENTS

Steel for reinforcement shall be clear and free from loose mill scales, dust, loose rust, coats of

paints, oil or other coating which may destroy or reduce bond. It shall be stored in such a way as to avoid distortion and to prevent deterioration and corrosion. Prior to assembly of reinforcement on no account any oily substance shall be used for removing the rust.

Assembly of Reinforcement: Bars shall be bent correctly and accurately to the size and shape as shown in the detailed drawing or as directed by Engineer-in-Charge. Preferably bars of full length shall be used. Necessary cutting and straightening is also included. Overlapping of bars, where necessary shall be done as directed by the Engineer-in-Charge. The overlapping bars shall not touch each other and these shall be kept apart with concrete between them by 25mm or $1\frac{1}{2}$ times the maximum size of the coarse aggregate whichever is greater. But where this is not possible, the overlapping bars shall be bound together at intervals not exceeding twice the dia. of such bars with two strands annealed steel wire of 0.90 mm to 1.6 mm twisted tight. The overlaps/ splices shall be staggered as per directions of the Engineer-in-Charge But in no case the overlapping shall be provided in more than 50% of cross sectional area at one section.

Bonds and Hooks Forming End Anchorages: Reinforcement shall be bent and fixed in accordance with procedure specified in IS 2502, code of practice of bending and fixing of bars for concrete reinforcement. The details of bends and hooks are shown below for guidance.

U-Type Hook

In case of mild steel plain bars standard U type hook shall be provided by bending ends of rod into semicircular hooks having clear diameter equal to four times the diameter of the bar.

Note: In case of work in seismic zone, the size of hooks at the end of the rod shall be eight times the diameter of bar or as given in the structural drawings.

Bends

Bend forming anchorage to a M.S. plain bar shall be bent with and internal radius equal to two times the diameter of the bar with a minimum length beyond the bend equal to four times the diameter of the bar.

Anchoring Bars in Tension: Deformed bars may be used without end anchorages provided, development length equipment is satisfied. Hooks should normally be provided for plain bars in tension. Development length of bars will be determined as per IS: 456.

Anchoring Bars in Compression: The anchorage length of straight bar in compression shall be equal to the 'Development length' of bars in compression as specified in IS: 456. The projected length of hooks, bend and straight lengths beyond the bend, if provided for a bar in compression, shall be considered for development length.

Binders, stirrups, links etc. : In case of binders, stirrups, links etc. the straight portion beyond the curve at the end shall be not less than eight times the nominal size of bar.

Welding of Bars: *Wherever facility for electric arc welding or gas pressure welding is available, welding of bars shall be done in lieu of overlap. The location and type of welding shall be got approved by the Engineer-in-Charge Welding shall be as per IS 2751 and 9417.*

Placing in Position: *Fabricated reinforcement bars shall be placed in position as shown in the drawings or as directed by the Engineer-in-charge. The bars crossing one another*

shall be tied together at every intersection with two strands of annealed steel wire 0.9 to 1.6 mm thickness twisted tight to make the skeleton of the steel work rigid so that the reinforcement does not get displaced during deposition of concrete.

Tack welding in crossing bars shall also be permitted in lieu of binding with steel wire if approved by Engineer-in-Charge

The bars shall be kept in correct position by the following methods:

In case of beam and slab construction pre-cast cover blocks in cement mortar 1:2 (1 cement : 2 coarse sand) about 4x4 cm section and of thickness equal to the specified cover shall be placed between the bars and shuttering, so as to secure and maintain the requisite cover of concrete over reinforcements.

In case of cantilevered and doubly reinforced beams of slabs, the vertical distance between the horizontal bars shall be maintained by introducing chairs, spacers or support bars of steel at 1.0 m or at shorter spacing to avoid sagging.

In case of columns and walls, the vertical bars shall be kept in position by means of timber templates with slots accurately cut in them: or with block of cement mortar 1:2 (1 cement: 2 coarse sand) of required size suitable tied to the reinforcement to ensure that they are in correct position during concreting.

In case of other R.C.C. structure such as arches, domes, shells, storage tanks etc. a combination of cover blocks, spacers and templates shall be used as directed by Engineer-in-Charge

Tolerance on Placing of Reinforcement: Unless otherwise specified by the Engineer-in-Charge, reinforcement shall be placed within the following tolerances:

Tolerance in spacing

For effective depth, 200 mm or less	+10 mm
For effective depth, more than 200 mm	+ 15 mm

Bending at Construction Joints: Where reinforcement bars are bent aside at construction joints and afterwards bent back into their original position care should be taken to ensure that at no time the radius of the bend is less than 4 bar diameters for plain mild steel or 6 bar diameter for deformed bars. Care shall also be taken when bending back bars to ensure that the concrete around the bar is not damaged.

Cover: The minimum nominal cover to meet durability requirements shall be as under:-

Exposure	Nominal Concrete cover in mm not less than
Mild	20
Moderate	30
Severe	45
Very severe	50

Extreme	75
---------	----

Notes:

1. For main reinforcement upto 12 mm diameter bar for mild exposure the nominal cover may be reduced by 5 mm.
2. Unless specified otherwise, actual concrete cover should not deviate from the required nominal cover by + 10 mm.
3. For exposure condition 'severe' and 'very severe' reduction of 5 mm may be made, where concrete grade is M35 and above.
4. Nominal cover to meet specified period of fire resistance shall not be less than as given in Table 16A of IS 456.

28.7 CONCRETING

The concrete shall be as specified under chapter 4 (CPWD Specification Volume 1 21019) concrete work. The proportion by volume or by the weight of ingredients shall be as specified.

28.8 STRENGTH OF CONCRETE

The compressive strength on the work tests for different mixed shall be as given in Table below:

Concrete Mix (Nominal Mix on Volume basis)	Compressive Strength in (Kg/ sq cm)	
	7 days'	28 days'
1:1:2	210	315
1:1.5:3	175	265
1:2:4	140	210

28.9 COVER/SPACER BLOCK

The contractor shall provide approved type of support for maintaining the bars in position and ensuring required spacing and correct cover of concrete to reinforcement as called for in the drawings, spacer blocks of required shape and size. Chairs and spacer bars shall be used in order to ensure accurate positioning of reinforcement. Spacer blocks shall be cast well in advance with approved proprietary pre-packed free flowing mortars (Conbextra as manufactured by M/S Fosroc Chemicals India Ltd. or equivalent as approved by the Engineer-in-charge at his discretion) of high early strength and same colour as surrounding concrete, Pre-cast cement mortar/concrete blocks/blocks of polymer shall not be used as spacer blocks unless specially approved by the Engineer-in-charge, rate of RCC items is inclusive of cost of such cover blocks.

29 Coating of Reinforcing Bars**29.1 Fusion Bonded Epoxy Coated Reinforcement**

Fusion bonded epoxy coated reinforcement shall conform to IS: 13620 or other international standards as approved by Engineer. The location of the source of supply of the coated bars shall be such as to ensure that the bars are not transported for a distance of more than 300 Km.

29.2 Hot Dipped Galvanized Bars

Hot dipped galvanized reinforcing steel shall be provided wherever specified. The coating shall conform to IS: 12594-1988.

29.3 Steel Forgings

Forged steel pins shall comply with clause 3, 3A or 4 of IS:1875 and steel forgings shall comply with clause 3, 3A or 4 of IS:2004. Raw materials of the forging shall be as per IS:1875 with minimum reduction ratio of 1.8:1. Alternatively, if forging is made from ingot, the minimum reduction ratio shall be 4:1. Forging shall be normalized.

29.4 Structural Steel

Unless otherwise permitted, all structural steel shall, before fabrication, comply with requirements of the following Indian Standards:

- IS: 226 : Structural Steel (Standard Quality)
- IS: 961 : Structural Steel (High Tensile)
- IS: 2062: Weldable Structural Steel
- IS: 8500: Weldable Structural Steel (medium and high qualities)
- IS: 1148: Hot rolled rivet bars (upto 40 mm dia for structural purposes)
- IS: 1149: High tensile rivet bars for structural purposes
- IS: 1161: Steel tubes for structural purposes
- IS: 4923: Hollow Steel sections for structural use
- IS: 11587: Structural weather resistant steel
- IS: 808: Specifications for Rolled Steel Beam, Channel and Angle Sections
- IS: 1239: Mild Steel Tubes
- IS: 1730: Dimension for Steel Plate, sheet and strip for structural and general Engineering purposes.
- IS: 1731: Dimension for Steel flats for structural and general engineering purposes
- IS: 1732: Dimension for round and square steel bars for structural and general engineering purposes.
- IS: 1852: Rolling and cutting tolerances for hot rolled steel products

The use of structural steel not covered by the above standards may be permitted with the specific approval of the Engineer. Refer to Section 1900 of these Specifications for further details

29.5 Stainless Steel

Stainless steel shall be austenitic chromium-nickel steel, possessing rust, acid and heat resistant properties conforming to IS:6603 and IS:6911. Mechanical properties/grade for such stainless steel shall be as specified by the accepting authority, but in no case inferior to mild steel. Generally, stainless steel is available as per AISI grades. AISI 304 which is equivalent to grade 04 Cr 18 Ni 110 of IS: 6911 satisfies the requirements for mechanical properties of structural steel. Other grades of stainless steel for specific purposes may be provided as per specific requirements. For application in adverse/corrosive environment, stainless steel shall conform to AISI 316L or 02G17 Ni M02 of IS: 6911.

30 WATER PROOFING:

1. The work in general shall be executed as per CPWD specifications.
2. The water proofing compound used in integral water proofing treatment shall satisfy all the requirements indicated in IS: 2645 and shall be got tested before its use.

31 EXPANSION JOINT SYSTEM

31.1 WALL JOINT

General requirement of material

The expansion joint system related with wall joint (internal/ external) shall be of extruded aluminum base members, self-aligning / centering arrangement and support plates as per ASTM B221-02. The material shall be such that it provides an Expansion joints systems suitable for vertical wall to wall/ wall to corner application, both new and existing construction in office buildings & complexes with no slipping down tendency amongst the components of the joint system. The Joint System shall utilize lightweight aluminum profiles exhibiting minimal exposed aluminum surfaces mechanically snap locking the multicellular to facilitate movement. (Material shall confirm to ASTM 6063)

Performance Requirement

Material and works shall conform to the latest edition of reference specifications as specified in the item and to all applicable codes and requirement of local authorities having jurisdiction.

Approval of expansion joint system

Sample of expansion joint system along with manufacturers latest published literature for material specified herein, material test reports, shop drawings etc. shall be submitted for obtaining approval before material are delivered at the site. The expansion joint cover assembly should be from one source (from single manufacturer)

Installation of expansion joint system

In all cases the manufacturer's standard written instruction or specific instructions for installation shall be followed.

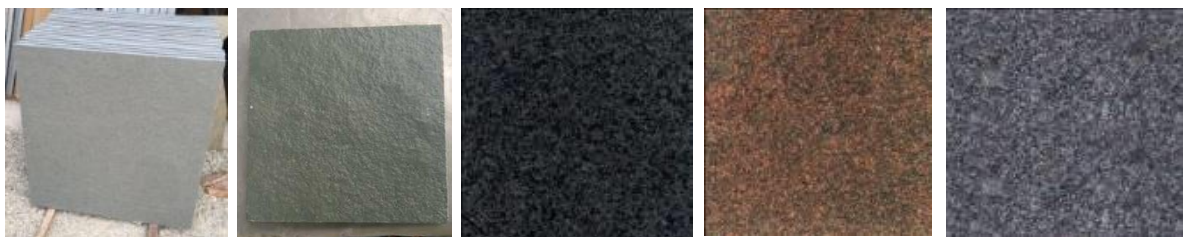
32 FLOORING

32.1 Granite / Kota flooring

32.1.1. Granite / Kota Slabs for Flooring

The slabs shall be of selected quality, hard, sound, dense and homogeneous in texture free from cracks, decay, weathering and flaws. They shall be hand or machine cut to the requisite thickness. They shall be of the colour indicated in the drawings or as instructed by the Engineer-in-Charge

Each slab shall be cut to the required size and shape and fine chisel dressed at all the edges. The sides thus dressed shall have a full contact if a straight edge is laid along. The sides shall be table rubbed with coarse sand before paving. All angles and edges of the slabs shall be true square and free from chippings and giving plain surface.



All Flooring work, wall lining work and stone cladding work in general including testing etc. shall be carried out as per CPWD TECHNICAL specifications document 2019 or latest.

32.2 Rajula/Granite/ Limestone Cobble Stones/Cobble tile, Kadapa Stone Cobble.

Cobble stones shall be free from flaws, injurious veins, cavities and similar imperfections that would impair its structural integrity and adversely affect its strength and appearance. Cobble stones shall be rectangular or square and of specified dimensions. The tolerance in length and breadth shall be ± 5 mm and thickness ± 1 mm. The bottom face may be rough but the top surface shall be fine dressed and joint faces shall be dressed back square with the top surface for at least 50 mm, without hollowness or spalling off. The dimensions of the blocks shall be as specified. The tolerances shall be allowed ± 5 mm for facing blocks. The edges of the blocks shall be dressed according to IS: 1129.



33 FACTORY MADE CEMENT CONCRETE INTERLOCKING PAVER BLOCK (AS PER CPWD VOL 2)

33.1 BASE

Interlocking paver block to be fixed on the bed 50 mm or specified otherwise thick of coarse sand of approved specification and filling the joints with the sand of approved type and quality or as specified and as directed by Engineer-in-charge.

33.2 INTERLOCKING PAVER BLOCK

Factory made precast paver block of M-30 or otherwise specified grade to be used. Paver blocks to be of approved brand and manufacturer and of approved quality. Minimum strength as prescribed by manufacturer and as per direction of Engineer-in-Charge.



34 DRAIN SAUCER

Providing and fixing pre-cast concrete Dished channel/saucer channel with and without hole with vacuum wet hydraulic pressing technology of M40 grade cement based concrete block thick as per approved design and including excavation for fixing in proper line and level, filling the joint with C:M 1:3 (1 cement:3 fine sand) etc complete including transportation and fixing without and edge or corner damage.

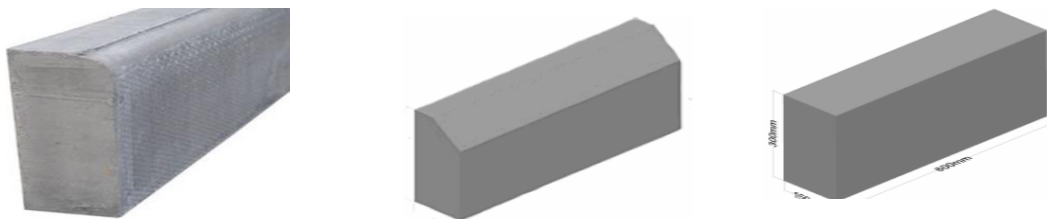
35 KERB STONE (PRECAST)

35.1 Laying

Trenches shall first be made along the edge of the wearing course of the road to receive the kerb stones of cement concrete of specified grade. The bed of the trenches shall be compacted manually with steel rammers to a firm and even surface and then the stones shall be set in cement mortar of specified proportion.

Precast Kerb slab casted with the cement concrete of M-40 grade (specification refer chapter RCC) of size specified in item made of approved brand and manufacturer to be used. Wherever specified all joints shall be filled with mortar 1:3 (1 cement: 3 coarse sand) and pointed with mortar 1:2 (1 cement: 2 fine sand) which shall be cured for 7 days.

The necessary drainage openings of specified sizes shall be made through the kerb as per drawings or as directed by the Engineer-in-Charge for connecting to storm water drains.



Specification: CPWD specification- 2019 Vol- II to be followed.

36 THERMOPLASTIC PAINT (As per CPWD vol 2)

36.1 Painting Road Markings

36.2 GENERAL

The thermoplastic material shall be homogenously composed of aggregate, pigment, resins and glass reflectorizing beads.

1.1 The thermoplastic compound shall be screeded/extruded on to the pavement surface in a molten state by suitable machine capable of controlled preparation and laying with surface application of glass beads at a specific rate. Upon cooling to ambient pavement temperature, it shall produce an adherent pavement marking of specified thickness and width and capable of resisting deformation by traffic.

1.2 The thermoplastic material shall conform to ASTM D36/BS-3262-(Part I).

1.3 The material shall meet the requirements of these specifications for a period of one year. The thermoplastic material must also melt uniformly with no evidence of skins or un melted particles for the one year storage period. Any material not meeting the above requirements shall be replaced by the manufacturer/supplier/Contractor.

37 Steel works: Fabricating, assembling, hoisting/ erecting and fixing in position at all heights/ all levels/ all floors/ all shapes & sizes with all leads & lifts using MS Rolled Steel Sections, ISMB, ISMC, UC, H-Section, Hollow sections, Tubular Sections, MS Plates, Chequered Plates, MS Pipes, Perforated Sheet, Flats, Bars, Angles, MS Sheet, Girder, Beam, cattle trap, deep threaded MS bolts.

37.1 The steel sections as specified or required shall be cut, square and to correct lengths, as per drawings and design. The cut ends exposed to view shall be finished smooth. All stiffeners shall be formed by pressure and where practicable, the metal shall not be cut and welded in making these. In major works or where so specified shop drawings giving complete details and information for the fabrication of the component parts of the structure, including location type size, length and details of rivets, bolts, or weld shall be prepared in advance of the actual fabrication and as approved. The welding work shall conform to I.S. 816-2000


38 Corten Steel

1.1 Corten Steel (or weathered steel as it is sometimes known) is a group of steel alloys that are often used in outdoor building works. They were designed to eliminate the need for painting and if left outside, exposed to the weather, then they will develop a rusted appearance in as little as a few months. Corten is now used in a variety of different outdoor applications. Within architecture it can be incorporated into many designs such as buildings, roofing, bridges and sculptures.

1.2 High resistance to corrosion and weather, up to 8 times higher than common carbon steel, which makes it particularly suitable for outdoor use.

1.3 **COR-TEN** (Corten A / IRSM 41-97 - DUAL GRADE in coil form) Steel plate for Closure: Providing, Fabricating & fixing (welding including consumables) in position (Welding all around the frame) COR-TEN Steel closure plates including finishing & transportation and loading & unloading labour, all complete as per direction of Engineer-in-charge.

U.S. Steel holds the registered trademark on the name COR-TEN-A

Carbon, Max	0.12	
Manganese	0.20-50	

Phosphorus	0.07-0.15	
Sulphur, max	0.030	
Silicon	0.25-0.75	
Nickel, max	0.65	
Chromium	0.50-1.25	
Molybdenum, max	–	
Copper	0.25-0.55	
Vanadium	–	
Aluminium	–	

39 Brick work with common clay machine moulded perforated bricks (Vernacular material) and AAC blockwork/Belastone works/ flooring & wall lining / veneer works.

39.1 A column of clay is pushed through a rectangular die plate to obtain a continuous rectangular column of clay which is then cut precisely in pieces to convert them into individual bricks. The high pressure conditions of the extrusion process make the clay body very dense and stiff automatically yielding higher strength and density.



39.2 Specifications:

Weight: 2.4 Kg

Strength: Above: 75 Kg/Cm²

Water absorption: < 12%

Coverage per sq.: (10mm joint)

4" Wall: 5.3 pcs.

9" Wall: 10.7 pcs.

1 m²: 56.5 pcs.

1 m³: 504.2 pcs.

Unless otherwise specified external masonry walls and walls of shafts and toilets shall be with modular flyash lime lime bricks (FALG) confirming to IS:12894-2002. The classification of bricks brought by the contractor shall strictly confirm with CPWD Specifications – 2009 Vol-1 & II with upto date correction slips or as specified. The rate shall also include for leaving chases / notches for dowels / cramps for all kinds of cladding to come over brick work.

The interior and external walls shall be made with autoclaved aerated cement block masonry with AAC blocks. Autoclaved aerated concrete (AAC), also known as autoclaved cellular

concrete (ACC) or autoclaved lightweight concrete (ALC). It is a lightweight, precast building material that simultaneously provides structure, insulation, and fire and mold resistance. A.A.C Blocks shall meet the requirement of DIN standards, as well as Indian standard specifications.

Specifications	Value	Unit
Length	600, 625	mm
Height	200, 250,300	mm
Thickness	100,150,200,300	mm
Density(oven dry)	550-650	kg/cum
Compressive Strength*	> 3.0	N/mm ²
Thermal Conductivity(K Value)	>0.14	W/M deg.k
Drying Shrinkage	0.04%(of the length of block)	%
Resistant to Fire	2-6	hr
Heat Transmission Coefficient 'u'	>2.0	w/m ² - °k
Drying Shrinkage	0.02	%
Thermal Resistant	>0.40	M2 - °k/w
Sound Reduction	37-42	db

40 PREMIX CARPET WITH HOT BITUMEN OF PAVING ASPHALT GRADE VG- 10/ VG-30 (As per CPWD vol 2)

Specifications shall be as per Clause 16.30 of CPWD Vol -II

40.1 This type of treatment is normally applied on roads where the motor traffic is of medium intensity, but bullock cart traffic is fairly heavy. This treatment is suitable for district roads and for internal and service road in colonies. The consolidated thickness of this type of treatment shall be 2 cm or 2.5 cm as specified.

This treatment consists of applying a tack coat on the prepared base followed immediately by spreading aggregates pre-coated with specified binder to camber and consolidated.

Premix carpet shall not be laid during rainy weather or when the base course is damp or wet or, when the atmospheric temperature in the shade is not more than 16 degrees C.

40.2 Materials

Consolidated	Binder hot Bitument of	Stone Chippings (In cum/ 100 sqm)
--------------	------------------------	-----------------------------------

thickness of premix carpet	grade VG- 10/VG-30 (kg/cum of stone chipping)	13.2 mm size	11.2 mm size
2.00 cm	(52 kg/cum of 13.2 mm size and 56 kg per cum of 11.2 mm)	1.8	0.90
2.50 cm		2.25	1.12

41 ROOF SHEETING

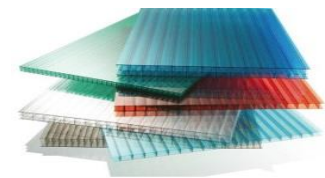
41.1 General

41.2 POLYCARBONATE ROOF

The multi-cell polycarbonate panel to be used for Roofing/Wall Panels should have the following.

Specifications:

- Two side Co-extrusion for UV rays protection
- Panels have to be joined together by protected polycarbonate connector/aluminium
- Connector/any other mechanism that makes joint perfectly water tight.
- Thermal Insulation $\geq 1.50 \text{ W/m}^2\text{.K}$
- Fire Reaction BS1d0 or better as per EN 13501:2002



20mm thick polycarbonate sheet including It is incredibly tough and absorbs minimal moisture, making it resistant to impact damage as well as water damage, complete flame retardant and chemical resistant as well etc., as per the design & drawing and as per directed by the engineer in charge.

42 Priming and Painting for Pedestal Bridge

42.1 PAINTING:

42.2 Surface preparation for painting shall be done using grid blasting conforms to SA 2.5. Painting shall be done as per the following table.

Specification:

Description	Specification	Dry film thickness (DFT)
Primer coat	Inorganic zinc silicate (65 micron) + Epoxy tie coat (25 micron) or organic zinc rich epoxy (75 micron)	65 + 25 micron (or) 75 micron

Intermediate coat	2 coat epoxy m10	100 + 125 micron
Final coat	Polyurethane top coat	60 micron

43 REFLECTIVE PAVEMENT MARKER (ROAD STUDS/CAT EYE) (AS PER MORTH)

Specifications shall be as per MORTH clause 804

43.1 SCOPE

The work shall cover the providing and fixing of reflective pavement marker (RPM) or road stud, a device which is bonded to or anchored within the road surface, for lane marking and delineation for night-time visibility, as specified in the Contract.

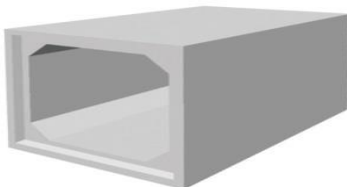
43.2 MATERIAL

- 1.1 Plastic body of RPM/road stud shall be moulded from ASA (Acrylic Styrene Acrylonitrile) or HIPS (Hi-impact Polystyrene) or Acrylonitrile Butadiene Styrene (ABS) or any other suitable material approved by the Engineer. The markers shall support a load of 13635 kg tested in accordance with ASTM 0 4280.
- 1.2 Reflective panels shall consist of number of lenses containing single or dual prismatic cubes capable of providing total internal reflection of the light entering the lens face lenses shall be moulded of methyl methacrylate conforming to ASTM D 788 or equivalent.

44 PRECAST BOX DRAINS

44.1 ITEM DESCRIPTION

Providing and Laying of factory made Precast Box Drain/ Culvert having mm (W) mm X (H) mm in to in dimension units of 2000mm length, conforming and meeting IS requirements, made by using High Performance Self Compacting Concrete of M40 Grade cylinder strength/ M50 Grade cube strength and using Fe500 /Fe 500D reinforcement bar designed for 5 T wheel Load with 100 mm to 3000 mm cushion above it. Product also includes male & female jointing system, groove for fixing rubber gasket, flange coupling jointing arrangements and special in-built hanging brackets at appropriate locations for faster & safe installation of the product. In no case the casting shall be allowed to be prepared at site. It should be casted in the stringent atmospheric & pre-defined condition, as per approved QAP as by Engineer In charge.



44.2 MATERIAL

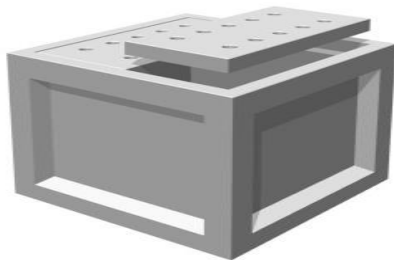
M-40 grade Cylinder strength/ M-50 grade cube strength Self compacting concrete using excellent quality River sand as per IS-383, maximum aggregate size 15 mm machine cut aggregates of approved quality & size as per IS-383, OPC -53 grade cement conforming to IS :269 of reputed brand having major cement plant, Super plasticizer as per IS-9103, R.O water as per IS-456. Use Fe 500/500D steel conforming to IS 1786. Excellent Quality of welding rods

(IS code) for manufacturing of reinforcement cage, for fixing the reinforcement in place High grade plastic spacers. High quality lifting studs of appropriate weight bearing capacity and all other required material are to be used to produce the complete precast BOX culvert in all the aspects and respects.

45 STORM MANHOLE CHAMBERS

45.1 PRECAST MANHOLE CHAMBER

- 43.1.1** Providing & Laying of factory made or equivalent brand Precast Chamber, having size (in to in) of 600(L) X 600 (B) / 800(L) X 800 (B)/ 1000 mm (L) X 1000 mm (B), Variable in height of H: 600,800,1000,1200,1400,1600,1800,2000 mm T-25 load carrying capacity - 10 T Axle Load - 5 T Wheel Load, confirming and meeting IS requirements, having High Performance Self Compacting Concrete of M-40 cylinder strength/M-50 cube strength & Fe 500 / Fe 500D shall be used for reinforcement.



- 43.1.2** The contractor shall prepare & provide the base using PCC/Foundation concrete as a levelling course as per drawing / as recommended by the consultant depending upon the foundation soil strata. The precast Chamber unit should consist of special in built insert of suitable load carrying capacity at appropriate location for fixing De-shackle (Hanging hole) for safe & fast mechanical installation. Hole should be provided at site (No Factory) for connection at the waffle side of chamber as per the site requirement. The Precast cover having size suitable to chamber sizes of 600 X 600 / 800 X 800 / 1000 X 1000 mm 744 X 744 / 944 X 944 / 1144 x 1144 mm of thickness 140/120/ 150 mm Respectively.
- 43.1.3** Cover should have conical shape of 50 mm to 30 mm respectively for storm water intake. The lid may have in-built specially designed lifting inserts of appropriate load carrying capacity & fixed at specific location to avoid the tilting of the lid for safe & fast installation. In no case the casting shall be allowed to be prepared at site. It should be casted in the stringent atmospheric & pre-defined condition, as per approved QAP as by Engineer In charge.

45.2 MATERIAL

M-40 cylinder strength/ M-50 cube strength Self compacting concrete using excellent quality River sand as per IS-383, MAS size 10 mm machine cut aggregates of approved quality & size as per IS-383, OPC -53 grade confirming to IS :269 of reputed brand having major cement plant , Super plasticizer as per IS-456, R.O water as per IS-456. Fe 500/ Fe 500D steel confirming to IS 1786 & releasing agent for the form work as per the industry standard. Excellent Quality of welding rods (IS code) for manufacturing reinforcement cage, for fixing the reinforcement in place High grade plastic spacers. High

quality lifting inserts of appropriate weight bearing capacity and all other required material to produce the complete precast Chamber in all the aspects and respects.

45.3 CAST IN SITU STORM MANHOLES

- 43.3.1** Concrete M30 Reinforced cement concrete including reinforcement complete as per drawings (For Specification refer section Mortar and Concrete Work)
- 43.3.2** Supplying, fitting and placing Fe 500D HYSD bar reinforcement complete as per drawing (For Specification refer section of RCC)
- 43.3.3** M15 PCC below Manhole (For Specification refer section of Mortar and Concrete work)
- 43.3.4** Rungs shall be provided in all manholes over 0.8 m in depth and shall preferably be of cast iron and of suitable dimensions as per Technical Specification Clause 4.8 in IS 4111 (Part-1)
- 43.3.5** Earthwork in excavation of foundation for Box Manholes in all types of soil complete as per drawings (For Specification refer section of Excavation)
- 43.3.6** Precast manhole SFRC (Steel Fiber Reinforced Cover slab) cover having size clear 750x750mm, designed for capacity of 20T load as per drawings and Technical Specification Clauses in IS 12592-2002 .

46 PIPE CULVERTS

46.1 NP-4 CLASS (HEAVY DUTY) R.C.C. PIPES

Material The pipes shall be with reinforcement as required and shall be of class not lesser than NP2. These shall conform to IS 458 and shall be capable of withstanding a test pressure of 0.07 MPa (7 m head). The reinforced cement concrete pipes shall be manufactured by centrifugal (or spun) process or vibrated casting process. All pipes shall be true to shape, straight, perfectly sound and free from cracks and flaws. The external and internal surface of the pipes shall be smooth and hard. The pipes shall be free from defects resulting from imperfect grading of the aggregate mixing or moulding. Specifications shall be as per clause 19.19 of CPWD Vol -II.

- 46.2** Concrete used for the manufacture of reinforced concrete pipes and collars shall be as per design mix. The concrete quality (concrete mix, maximum water-cement ratio, minimum cement content etc.,) shall be as per IS 456 for at least very severe environment exposure condition with minimum cement content 260 kg/m³. The maximum size of aggregate should not exceed one third of the thickness of the pipe or 20 mm whichever is smaller for pipes above 250 mm internal diameter. But for pipes of internal diameter 80 to 250 mm, the maximum size of aggregate should be 10mm. The reinforcement in the reinforced concrete pipes shall extend throughout the length of the pipe. The circumferential and longitudinal reinforcements shall be adequate to withstand the specified hydrostatic pressure and further bending stresses due to the weight of water when running full across a span equal to the length of pipe plus three times its own weight.

The minimum clear cover for reinforcement in pipes and collars shall be as given in Table

Sl. No.	Precast concrete	Minimum clear cover, mm
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	pipe/collar	
(i)	Barrel wall thickness	
	(a)Upto and including 75mm	8
	(b)Over 75mm	15
(ii)	At spigot steps	5
(iii)	At end of longitudinal	5

Note: An effective means shall be provided for maintaining the reinforcement in position and for ensuring correct cover during manufacture of the unit. Spacers for this purpose shall be of rust proof material or of steel protected against corrosion.

44.3.1 Earthwork in excavation for pipe bedding in all types of soil complete as per drawing (For Specification refer section of Excavation)

44.3.2 PCC below Pipe (For Specification refer section of Mortar and Concrete work)

44.3.3 Granular Bedding below pipe (For Specification refer section of Granular sub base)

44.3.4 M25 concrete over pipe for encasing slab (For Specification refer section of Mortar and Concrete Work)

44.3.5 HYSD steel for encasing slab (For Specification refer section of RCC and steel)

46.3 BOULDER APRON

1.1 The size of stone shall conform to Clause 5.3.7.2 of IRC: 89.

1.2 The size of stone shall be as large as possible and no stone shall weigh less than 40 kg. The specific gravity of stones shall be as high as possible and not less than 2.4.

1.3 The surface on which the apron is to be laid shall be levelled and prepared for the length and width, as shown on the drawings. In case the surface is below the low water level, the ground level may be raised upto low water level by dumping earth and the apron lay thereon. In such cases, the quantity of stone required in apron shall be re-worked by taking the toe of pitching at higher level. Specification shall be as per MORTH clause 2503.0

46.4 PITCHING AND FILTER MEDIUM (AS PER MORTH)

44.5.1 Pitching- The pitching shall be provided with stones of thickness and shape as indicated on the drawings.

44.5.2 The stones shall be obtained from quarries and shall be sound, hard, durable and fairly regular in shape. Round boulders shall not be allowed. Stones showing marked deterioration by water or weather shall not be accepted.

44.5.3 The size and weight of stone shall conform to Clause 5.3.5.1 of IRC: 89. No stone, shall weigh less than 40 kg. The size of spalls shall be a minimum of 25 mm and shall be suitable to fill the voids in the pitching.

44.5.4 Where the stones of required size are not economically available, cement concrete blocks in minimum M15 grade concrete. Specifications shall be as per MORTH clause 2504.2.

44.5.5 Filter Medium- The material for the filter shall consist of coarse sand, gravel or stone. One or more layers of graded materials, to act as a filter medium, shall be provided underneath the pitching, to prevent loss of the embankment material and buildup of uplift head on the pitching.

The gradation of the filter material shall satisfy the following requirements:

$D_{15}(\text{Filter})/D_{85}(\text{Base}) < 5$

$4 < D_{15}(\text{Filter})/D_{15}(\text{Base}) < 20$

$D_{50}(\text{Filter})/D_{50}(\text{Base}) < 25$

Notes:

44.5.6 Filter design may not be required if embankment consists of CH or CL soils with liquid limit greater than 30, resistant to surface erosion. In this case, if a layer of material is used as bedding for pitching, it shall be well graded and its D 85 size shall be at least twice the maximum void size in pitching

44.5.7 In the foregoing, D 15 means the size of that sieve which allows 15 percent by weight of the filter material to pass through it and similar is the meaning of D 50 and D85 (15 being replaced with 50 and 85 respectively).

44.5.8 If more than one filter layer is required, the same requirement as above shall be followed for each layer. The finer filter shall be considered as base material for selection of coarser filter.

44.5.9 The filter shall be compacted to a firm condition. The thickness of filter is generally of the order of 200mm to 300mm. Where filter is provided in two layers, thickness of each layer shall be 150 mm.

47 Reinforced Cement Concrete (RCC) Hume Pipes NP2 class

47.1 All pipes shall be centrifugally spun RCC pipes NP2. 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, prior to use on site, a certificate to that effect from the manufacturer.



47.2 The pipes shall be with or without reinforcement as required and of the class as specified. These shall conform to IS: 458-1971.

47.3 All pipes shall be true to shape, straight, perfectly sound and free from cracks and flaws. The external and internal surface of the pipes shall be smooth and hard. The pipes shall be free from defects resulting from imperfect grading of the aggregate mixing or moulding. These need to be laid and jointed as per the specifications.

Description	Up to 1.4 m Depth (5')	Up to 3 m Depth (10')	Beyond 3 m Depth (10')
Pipes in open ground (no sub soil water)	all round	in haunches	all round
RCC/C.I pipes in sub soil water	all round	in haunches	in haunches
RCC/C.I pipes (in all Conditions)	all round	in haunches	in haunches
RCC/C.I pipes under Road or building	all round	all round	all round

- i) R C C pipes or CI pipes may be supported on brick masonry or precast RCC or in situ cradles. Cradles shall be as shown on the drawings.
- ii) Pipes in loose soil or above ground shall be supported on brick or stone masonry pillars as shown on the drawings.

48 CPVC Pipes & Fittings

The pipes shall be CPVC (Chlorinated Poly Vinyl Chloride) material for hot & cold water supply piping system with pipes as per CTs SDR -13.5 at a working pressure of 320 PSI at 23 deg C and 80 PSI at 82 deg.C, using solvent welded CPVC fittings i.e. Tees, Elbows, Couplees, Unions, Reducers, Brushing etc. including transition fittings (connection between CPVC & Metal pipes / GI) i.e. Brass adapters (both Male & Female threaded and all conforming to ASTM D-2846 with only CPVC solvent cement conforming to ASTM F-441, with clamps / structural metal supports as required /directed at site including cutting chases & fitting the same with cement concrete / cement mortar as required, including painting of the exposed pipes with one coat of desired shade of enamel paint. All termination points for installation of faucets shall have brass termination fittings. Installation shall be to the satisfaction of manufacturer & Project Manager. The material shall have to be gotten approved from Chief Fire Officer.

Solvent cement set and cure times shall be strictly adhered to as per the below mentioned table.

Minimum Core prior to pressure testing at 150 PSI

Ambient Temperature during Core period	Pipe Size	
	½ " - 1 "	1.¼" - 2 "

Above 15 deg. C	1 Hr	2 Hrs
4-15 deg.C	2 Hrs	4 Hrs
Below 4 deg C	4 Hrs	8 Hrs

Special care shall be exercised when assembling flow guard systems in extremely low temperature (below 4°C) or extremely high temperature (above 45°C) In extremely hot temperatures, make sure that both surfaces to be joined are till wet with cement solvent when putting them together.

Diameter of pipe in inch (flowguard)	½”	¾”	1”	¼”	1½”	2”
Approx Approx. nos. of joints which can be mode per litre of solvent cement.	200 Nos	180 Nos	150 Nos	130 Nos	100 Nos	70 Nos

Supports should be as per the below mentioned table:

Size of Pipe	21°C	49°C	71°C	82°C
Inch	Ft.	Ft.	Ft.	Ft.
½”	5.5	4.5	3.0	2.5
¾”	5.5	5.0	3.0	2.5
1”	6.0	5.5	3.5	3.0
1¼”	6.5	6.0	3.5	3.5
1½”	7.0	6.0	3.5	3.5
2”	7.0	6.5	4.0	3.5

49 WEEP HOLES

49.1 Weep holes shall be provided on all plain concrete, reinforced concrete, brick masonry and stone masonry structures such as, abutment, wing wall and return walls as shown on the drawings or as directed by the Engineer to permit water to flow out without building up pressure in the back fill. Weep holes shall be provided with 100 mm diameter AC/PVC/HDPE pipe for structures in plain/reinforced concrete or brick masonry. In case of stone masonry, weep holes shall be of rectangular shape 80 mm wide, 150 mm high or circular with 150 mm diameter. Weep holes shall extend through the full width of concrete/masonry with slope of about 1 vertical: 20 horizontal towards the draining face. The spacing of weep holes shall be 1 m in either direction or as shown in the drawings with the lowest at 150 mm above the low water level or ground level whichever is higher or as directed by the Engineer.

50 UNPLASTICIZED PVC PIPES

- 50.1** The pipe should be given adequate support at all times. Pipes should be stored on a reasonably flat surface free from stones and sharp projections so that the pipe is supported throughout its length in storage, pipe racks should be avoided. Pipe should not be stacked in large piles, especially under warm temperature conditions as the bottom pipes may distort, thus giving rise to difficulty in jointing. Socket and spigot pipes should be stacked in layers with sockets placed at alternate ends of the stacks to avoid lopsided stacks.
- 50.2** On no account should pipes be stored in a stressed or bent condition or near the sources of heat.
- 50.3** Pipes should not be stacked more than 1.5 m high. Pipes of different sizes and classes should be stacked separately.
- 50.4** The ends of pipe should be protected from abrasion particularly those specially prepared for jointing either spigot or socket solvent welded joints or shouldered for use with couplings.
- 50.5** In tropical conditions, pipes should be stored in shade. In very cold weather, the impact strength of PVC is reduced making it brittle and more care in handling shall be exercised in wintry condition
- 50.6** If due to unsatisfactory storage or handling a pipe becomes kinked, the damaged portion should be cut out completely. Kinking is likely to occur only on very thin walled pipes.

51 GALVANISED CHAIN LINK

Providing and fixing Galvanised chain link 2 10x10 gauge including cutting, hoisting, fixing in position at all heights as per EIC

52 HORTICULTURE ITEMS – Horticultural Development Work:

52.1 General:

All kind of soil:










- Loose & soft soil -Any soil which generally yields to the application of pickaxes and shovels, phawaras, rakes or any such ordinary excavating implement or organic soil, gravel, silt, sand turf loam, clay, peat, etc. falls under this category.
- Dense & hard soil -Any soil which generally requires close application of pickaxes or jumpers or scarifiers to loosen it, stiff clay and cobble stone etc., fall under this category
- Hard murrum- The hard murrum shall be disintegrated rocks, which contain silicone Material and natural mixture of clay of calcareous origin. The size of hard murrum will not be more than 20 mm
- Black cotton soil- Soil which generally possesses typical characteristics of shrinkage and swelling due to moisture movement through it with atmospheric changes and soil which has its grains in the form of platelet or sheet is termed as Black Cotton Soil. It easily yields to the application of pick axes and shovels, phawaras, rakes or any such ordinary excavating implement. This soil type will have very low bearing capacity and will be blackish in color.
- For workmanship for earthwork and excavation, relevant specifications of safety from IS: 3764 shall be followed. The depth of the excavation shall be as per the item description.










52.2 Garden Soil Filling

- The good quality garden soil shall be obtained from outside which can be useful for all plants. Laying of soil shall be done in proper slope as per mention in drawing including watering, compacting and dressing etc. complete, as directed.

52.3 Trees Plantation, Shrubbery Plantation

S. No	Description	Reference image
1	Supply, stacking and plantation of 2.7 mtr height, Girth thick of 30 to 40 mm Pongamia Pinnata Tree.	
2	Supply, stacking and plantation of 2.7 mtr height, Girth thick of 50 to 80 mm Hokka palms Tree.	
3	Supply, stacking and plantation of 2.7 mtr height, Girth thick of 30 to 40 mm Thespesia populnea Tree.	
4	Supply, stacking and plantation of 2.7 mtr height, Girth thick of 30 to 40 mm Leucaena leucocephala Tree.	
5	Supply, stacking and plantation of 2.7 mtr height, Girth thick of 30 to 40 mm Delonix elata Tree	
6	Supply, stacking and plantation of 2.7 mtr height, Girth thick of 30 to 40 mm Cassia fistula Tree	
7	Supply, stacking and plantation of 2.7 mtr height, Girth thick of 50 to 80 mm Wodyetia bifurcata Tree	
8	Supply, stacking and plantation of 2.7 mtr height, Girth thick of 30 to 40 mm Cordia sebastiania Tree	

S. No	Description	Reference image
9	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 10 to 18 mm Nerium oleander pink Shrub.	
10	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 10 to 18 mm Hamelia patens Shrub.	
11	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 10 to 18 mm Plumbago capensis Shrub.	
12	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Tecoma gaudichaudi Shrub.	
13	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Polygala myrtifolia Shrub	
14	Supply, stacking and plantation of 0.6 mtr height, leafy structure Pennisetum alopecuroides Shrub	
15	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Bougainvillea glabra Shrub	
16	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Ficus nitida Shrub.	
17	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 10 to 20 mm Amaranthus tricolor Shrub	

S. No	Description	Reference image
18	Supply, stacking and plantation of 0.6 mtr height, leafy structure Liriope muscari Shrub.	
19	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 10 to 18 mm Thevetia peruviana Shrub	
20	Supply, stacking and plantation of 0.3 mtr height, leafy structure Ophiopogon variegated Shrub.	
21	Supply, stacking and plantation of 0.3 mtr height, leafy structure Pandanus variegated Shrub.	
22	Supply, stacking and plantation of Pennisetum alopecuroides leafy structure	
23	Supply, stacking and plantation of Liriope muscari leafy structure.	
24	Supply, stacking and plantation of Girth thick of 15 to 25 mm Cuphea hyssopifolia Shrub.	
25	Supply, stacking and plantation of 0.02 mtr height, Climbers Thunbergia grandiflora Shrub.	
26	Supply, stacking and plantation of Girth thick of 10 to 20 mm Lantana nivea Shrub.	

S. No	Description	Reference image
27	Supply, stacking and plantation of 0.3 mtr height, Girth thick of 10 to 20 mm Russelia juncea Shrub	
28	Supply, stacking and laying of 0.06 to 0.09 mtr height of Zoyasia matt.	
29	Supply, stacking and laying of 0.06 to 0.09 mtr height of Lawn.	
30	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Azardicta Indica Tree	
31	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Bauhinia X Blakeana Tree	
32	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Bismarkiya Palm	
33	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Caryota Urens	
34	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Cassia Javanica	
35	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Casurina Equisitifolia	

S. No	Description	Reference image
36	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Coccoloba Urifera	
37	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Cocos Nucifera	
38	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Conocarpus Erectus	
39	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Date Palm	
40	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Delonix Regia	
41	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Erythrina Indica Picta	
42	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Hyphaene Thebaica	
43	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Kigelia Pinata	
44	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Manilkara Hexandra	
45	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Mimopsus Ellengii	
46	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Mutangia Calabura	
47	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Plumeria Acutifolia	
48	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Plumeria Red	

S. No	Description	Reference image
49	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Samanea Saman	
50	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Spathodia Companulata	
51	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Taebubia Rosea	
52	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Terminalia Cattappa	
53	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Thespesia Populena	
54	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Alstonia Scholaris	
55	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Wodyetta Bifurcata	
56	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Ficus Elastica	
57	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Cassia fistula	
58	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Acacia auriculiformis	
59	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Bauhinia x blakeana	
60	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Tamarindus indica	
61	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Lagerstroemia speciose	

S. No	Description	Reference image
62	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Gliricidia sepium	
63	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Colvillea racemosa	
64	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Alstonia scholaris	
65	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Thespesia populnea	
66	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Delonix regia	
67	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Sterculia foetida	
68	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Samanea saman	
69	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Borassus flabellifer	
70	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Phoenix sylvestris	
71	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Tabebuia rosea	
72	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Hyphaene dichotoma	
73	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Erythrina indica 'variegata'	
74	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Holoptelea integrifolia	

S. No	Description	Reference image
75	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Spathodea campanulata	
76	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Caryota urens	
77	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Millingtonia hortensis	
78	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Alianthus excelsa	
79	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Kigellia pinnata	
80	Supply, stacking and plantation of 2.0 mtr height, Girth thick of 30 to 40 mm Bombax ceiba	
81	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Bougainvelia Orange	
82	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Bougainvelia Theema	
83	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Bougainvelia White	
84	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Budha Belly Bamboo	
85	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Calliandra	
86	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Carissa Carandas	
87	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Duranta Speciosa	

S. No	Description	Reference image
88	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Hibiscus Red	
89	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Ixora Pink	
90	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Ixora Red	
91	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Jatropha	
92	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Nerium Roseum	
93	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Nerium White	
94	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Phoenix Palm	
95	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Red Caesalpineae Pulcherima	
96	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Scavola Taccada	
97	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Tecoma Gaudichaudi	
98	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Thevetia Nerifolia	
99	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Nicordaviya	
100	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Cycas Revoluta	

S. No	Description	Reference image
101	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Raphis Palm	
102	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Araca Palm	
103	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Heliconia	
104	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Dracaena Colorama	
105	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Murrya Exotica	
106	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Ficus Panda	
107	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Umbrella Grass	
108	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Water Canna	
109	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Water Heliconia	
110	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Water Lilies	
111	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Aloe Vera	
112	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Asparagus	
113	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Cestrum Nocturnum	

S. No	Description	Reference image
114	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Citronella Species	
115	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Ocimum Scantum	
116	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Ivora brachiata	
117	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Pandanus odoratissimus 'variegated'	
118	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Stachytarpheta jamaicensis	
119	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Pennisetum setacem	
120	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Cymbopogon	
121	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Calliandra haematocephala	
122	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Thevetia peruviana	
123	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Pseuderanthemum reticulatum	
124	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Tabernaemontana 'dwarf' + quisqualis indica	
125	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Ixora singaporensis + cliloria ternatea	
126	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Hamelia pantens + allamanda cathartica	

S. No	Description	Reference image
127	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Saccharum munja	
128	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Erythemum Red	
129	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Varigated Pandanus	
130	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Spider Lily& Sudershan Lily	
131	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Lemon Grass	
132	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Catharanthus Roseus	
133	Supply, stacking and plantation of 0.6 mtr height, Girth thick of 15 to 25 mm Veronica Creeper	

53 Precast Cast Iron Tree Grating

53.1 Providing and fixing size of 1000 MM X 1000 MM x 500 MM Inner Dia Thickness 20 mm with frame Laser Cut With Akzonobel (Netherland) Powder Coating per the direction of the engineer-in-charge.



53.2 Precast RCC Tree Grating:

Providing and fixing size of 1000 X 1000 X 75 mm thk with High Performance/GFRC Concrete and manufactured with M30 Grade of concrete, Stain resistant coat, Color and finish customization possible to match Cobbles or pavers in the surroundings per the direction of the engineer-in-charge.

Specifications - As per Specifications of Mortar and Concrete work, RCC



54 E-Toilet 9007 LCS Model

54.1 Providing and installing the (E-Toilet 9007 LCS Model) prefabricated public toilet made of stainless steel platform & closet (Indian /western), having toilet vacant status display, coin/switch based automated entry, manual exit, automated interior light & exhaust fan, wash basins, health faucet & cloth hanger, voice assistance system, self-cleaning, washing mechanism, manual flush option, water low indication, power backup facility, sensor for water & electricity conservation, GPRS based remote monitoring control facility through mobile app or web and revenue through coil collection and advertisements including Transportation, Commissioning, Taxes, Insurance & Warranty. (Outer Dimensions including civil works 2.3 x 1.25x 2.8 mtr, inside Dimension - bottom 1.2x 0.8 x 2.1 mtr & total area 35 sq.ft. Built in water tank 300 ltr)



55 Precast Reinforced Concrete bench

55.1 Providing and fixing Precast Reinforced Concrete bench of M250 grade of size 1800 x 600 x 450 mm ht of minimum 480 kg full body cover finished with stone crete and seating area with seasoned teak wooden top with antitermite treatment and varnish weatherproof coating.

55.2 Also providing the hand rest with wooden top on the 40mm x 20mm MS plates coated with epoxy paint and back rests in seasoned teak wood supported by 60mm x 30mm MS Box coated with epoxy paint and UV resistant stabilise colour as per Architects choice including fixing, cleaning surfaces and including cost of loading -unloading and placing with Proper care.

55.3 Providing and fixing Precast Concrete designer backless bench of 1500x450x450 LBH & 100 mm thickness single cast mono element with terrazzo smooth finish made of Full Depth Terrazzo mix High Performance GlassFiber Reinforced Concrete 12 MPa flexural strength and 40MPa Compressive Strength, UV resistant stabilise colour pigment, colour as per Architects choice including fixing, cleaning.

56 Supply & Fixing of Play equipment :

56.1 Pinta: Providing and fixing Play equipments with finished products of Two Straight Slide, Tube Slide, Panels.

56.2 The raw virgin plastic material (LLDPE) is imported from SAMSUNG Company, Korea. Koochie's Roofs and panels are copyrighted and IP protected worldwide. All rotational moulding is carried out in state of the art, precision, bi axial roto moulding machines which helps achieve guaranteed uniform wall thickness, seamless joints, accurate process control, one part construction to make it stress free. Bolts, nuts, screws, washers and etc used for assembly shall be stainless steel 304 of tamper resistant stainless steel.

56.3 Providing and fixing of 25 mm thick EPDM flooring for Children's play area in multi-color with 6mm thick EPDM granule top layer, 19 mm thick SBR rubber layer, applied with fast curing polyurethane binder including wastage and complete as per EIC (Brands Ecoflex, Koochieplay, Ebaco)

56.4 Material :

SBR Buffing (Styrene-Butadiene Rubber)

56.5 INSTALLATION :

Shall be on min 75-100 mm base layer of prepared IPS or PCC surface. While laying the materials no outside interference shall be allowed, surface shall be free of moisture for minimum 24 hrs after the laying. Total Thickness is 25 MM (First Layer of 19 MM Thick Black SBR & Second Layer of 6 MM Thick Color EPDM). Laying shall be with PU binder, and having excellent weather properties, water resistance. The whole installation shall be strictly done under vendors guide line and specification.



56.6 Providing and fixing Double swing -10' 9" X 4' 3" X 9' 2" size Rubberized Swing Flap - 1nos, Rubberized Swing baby seat - 1nos, SS Chain coated with PVC - 4nos, Round clamps with barring system - 4nos. made from GI Pipes - 114mm with 3.2mm thickness, 75mm top rail, 25mm Bearings Description powder coated with about 100 Micron coating to withstand heavy wear & tear, almost rust-proof, weather-proof, with high quality FRP seats, all as per detail.



56.7 Providing & fixing 2 seater see-saw Size 6' 4" X 1' 6" X 2' 5" height with LLDPE Seats - 2nos, Plastic Bowl - 4nos and all structure will be of heavy duty. GI Pipe -114 mm with 3 mm thickness, PIPE - 25.4mm with 2mm thickness with minimum 100 micron powder coating to with stand heavy wear and tear, almost rust-proof, weather-proof with high grade plastic components are non-toxic, antistatic, fire retardant and the colors are U.V Stabilized. No sharp corners & rough surface in Metal Parts FRP seats complete as per specification of EIC.



56.8 Providing & fixing Multi Children-Eucalyptus play zone Size 38' 6" X 19' 0" X 14' 0" with 114mm galvanized poles - 13nos, Platform - 4nos, 7 step staircase with railing - 1nos, 3 step connecting staircase - 1nos, spider web - 1 nos, tree climber - 2nos, pole for spider web - 1nos, safety rail for climber - 2nos, climbing rail - 1nos, 3 candles frame - 1nos, Single bend climber - 1nos, triangular wave slide - 1nos, tri exit panel - 1nos, spiral slide 270 degree - 1nos, candles - 3nos, token ring bridge - 1nos, double wave spinner panel - 1nos, double wave line panel - 1nos, double wave round panel - 2nos, T-Pipe bridge - 1nos, Dome - 1nos, House panel - 1nos, Truck panel - 1nos, double slide exit panel - 1nos, Double left bend slide - 1nos, palm tree - 1nos, single arch roof - 4nos, Horizontal roof - 1nos. Made out of GI Pipes - 114mm with 3.2mm thickness, 31.8mm CRC pipe with 2mm thickness, 1.5mm solid steel punched sheet (for making of platform & stairs) powder coated for perfection. with minimum 100 micron powder coating to with stand heavy wear and tear, almost rust-proof, weather-proof with high grade plastic components are non-toxic, antistatic, fire retardant and the colors are U.V Stabilized. No sharp corners & rough surface in Metal Parts FRP seats complete as per specification of EIC.



56.9 Providing & fixing Merry-Go-Round Size 4' 0" (Dia) X 3' 9" (H) with GI Poles - 75mm with 3.2mm thickness, 31.8mm CRC pipe with 2mm thickness with minimum 100 micron powder coating to withstand heavy wear and tear, almost rust-proof, weather-proof with high grade plastic components are non-toxic, antistatic, fire retardant and the colors are U.V Stabilized. No sharp corners & rough surface in metal Parts FRP seats complete as per specification of EIC.



56.10 Providing & fixing Monkey bar with loops Size 8' 0" X 4' 3" X 8' 3" with Top rail 60mm, Climbing rail, Round Clamp with barring system 60 mm - 5nos, Cast Aluminium DELTA RING - 5nos. Made with GI Pipes - 114mm with 3.2mm thickness, 60mm with 3mm thickness, 31.8mm CRC pipe with 2mm thicknes including powder coating to withstand heavy wear and tear, almost rust-proof, weather-proof with high grade plastic components are non-toxic, antistatic, fire retardant and the colors are U.V Stabilized. No sharp corners & rough surface in metal Parts FRP seats complete as per specification of EIC.



56.11 Providing and fixing Air walker-Gym equipment -3' 5" X 1' 9" X 4' 9" size made from min. 80 NB GI C-CLASS PIPE with 25 NB GI C-CLASS PIPE let and handle frame powder coated with about 70-100 Micron coating to withstand heavy wear & tear, almost rust-proof, weather-proof, with high quality FRP seats all as per detail.



56.12 Providing and fixing Cycling fitness rider -Gym equipment -3' 1" X 1' 10" X 3' 10" size. 75mm dia C class GI pipe, powder coated with about 100 Micron coating to withstand heavy wear & tear, almost rust-proof, weather proof, with high quality FRP seats all as per detail.



56.13 Providing and fixing Double Surf board -Gym equipment -3' 7" X 2' 5" X 5' 1"size with GI 75mm dia C class GI pipe, powder coated with about 100 Micron coating to withstand heavy wear & tear, almost rust-proof, weather proof, with high quality FRP seats all as per detail.



56.14 Providing & fixing Multi Children-Caravella play zone- Size 10.51x4.91x3.8 m with Wavey slide, Sunroof, Coil pole, Swinging stones, Rock climber, Swing, Gear panel with structural posts Galvanized steel of 114mm OD {Outer Diameter} with powder coat finish. Decks are pre pressed, punched, and welded, powder coated to 2.2mm thickness or vinyl plastic coated to a thickness of 4mm . Handrail shall be welded unit, fabricated from 32 O.D. G.I steel pipes with powder coating finish. Spiral Climber, Piped walls shall be an all patent welded fabricated from 32 O.D. G.I steel pipes for the outer pipes and 25mm O.D. galvanized steel for the inner parallel bars with a powder coat finish. Bolts, nuts, screws, washers and etc used for assembly shall be stainless steel 304 grade and shall be of tamper resistant stainless steel. Exposed hardware shall be covered with UV stabilized plastic safety caps as a safety feature , aesthetic pleasing against ugly exposed hardware and prevention against vandalism as well. Roof, Slide, Panels, Plastic Components [super thick plastic] shall be rotationally molded from antistatic, copolymer, virgin linear low density UV stabilized polyethylene, with “color molded” in not “added in” with uniform wall thickness, seamless joints, accurate process control, one part construction to make it stress free complete.



56.15 Providing and fixing Volleyball sports nylon net of 100 mm grid with minimum 9.5x1m height including fixing with post in line and level, complete.



57 Precast Designer Dust Bin

57.1 Providing and fixing of Precast Designer Dust Bin Made of Special Composite Concrete with wooden front panel including excavation, base foundation & PCC M250 with Transport, Supply and installation as directed by engineer in charge.



58 Sign Boards

The sign boards shall be provided as per Ministry of Urban Development (MoUD) Code of Practice (Part 4) Signage's issued by Institute of Urban Transport and as per IRC 67-2012.

58.1 Regulatory/ Mandatory sign boards:-

- Providing and fixing sign boards made out of 2mm Aluminium sheet: 60 cms. diameter circle as per design if IRC - 67- 2012 pre treated with phosphating process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint; reflectorised with retro reflective sheeting as per latest MORTH Specification
- 3.1m long stand post and frame fabricated from suitable size iron angle of 35 x 35 x 3mm, 75 x 75 x 6mm as required; painted with best quality epoxy coating in black and white bends. The details of symbol for each board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60 cms. For each leg including excavation, curing etc. complete under the supervision of engineer in charge.



58.2 Cautionary /warning sign boards:-

- Providing and fixing sign boards made out of 2mm Aluminium sheet 90 x 90 x 90 cms. Equilateral triangle as per design if IRC - 67- 2012. Pre treated with phosphating process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint; reflectorised with retro reflective sheeting as per latest MORTH. Specification:
- 3.1m long stand post and frame fabricated from suitable size iron angle of 35 x 35 x 3mm, 75 x 75 x 6mm as required; painted with best quality epoxy coating in black and white bends. The details of symbol for each board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60 cms. For each leg including excavation, curing etc. complete under the supervision of engineer in charge.



58.3 Stop Sign boards:-

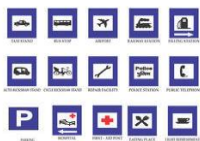
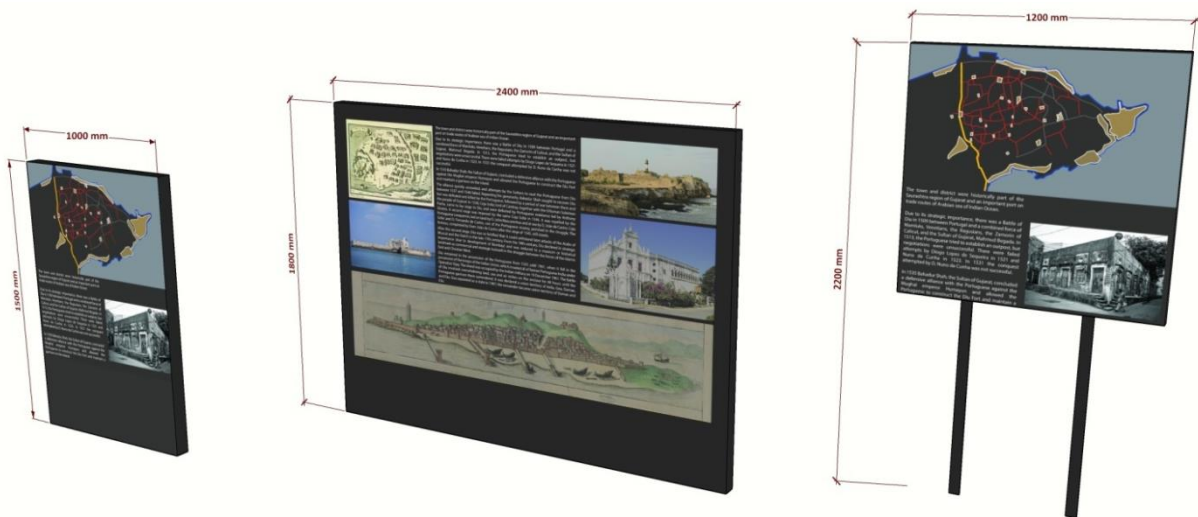
- Providing and fixing sign boards made out of 2mm Aluminium sheet 90 x 90 cms. rectangle as per design if IRC - 67- 2012. Pretreated with phosphating process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint; reflectorised with retro reflective sheeting as per latest MOST/ MORTH. Specification:

- 3.1m long stand post and frame fabricated from suitable size iron angle of 35 x 35 x 3mm, 75 x 75 x 6mm as required; painted with best quality epoxy coating in black and white bends. The details of symbol for each board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60 cms. For each leg including excavation, curing etc. complete under the supervision of engineer in charge.



58.4 Informatory boards:-

- Providing and fixing of Aluminium anodised frame of size 1500mm X 1000mm X 75mm, 1800mm X 2400mm X 75mm, 2200mm X 1200mm X 50mm made with the Aluminium panel and matte finish grey aluminium sheets with base and UV printed graphics with lamination double sided on it with M.S Base as per specified design required.



59 Pile Foundation

59.1 General

The piles shall be cast-in-situ reinforced concrete piles according to the approved drawings and specifications. The method of construction shall be with hydraulic drilling rigs with casing and/ or polymer slurry as decided by the Engineer.

The average basic length of the piles mentioned in the drawings is tentative. The final length of the pile shall be decided by the Engineer. It will be the responsibility of the Contractor to ensure by subsequent routine load tests that the installed length of piles is able to carry the specified safe load and the resulting deflections shall be within permissible limits. In case of

failure of any pile in routine load test, the remedial measures shall be provided by the Contractor as directed by the Engineer.

59.2 Piling plant and Methods

Suggested method for piling is cast in situ-bored piles with hydraulic drilling rigs using casing by oscillator or vibro hammer arrangement, with or without bentonite/polymer and equipments and methodology suitable for the purpose. Bailer and chisel method shall not be used except for socketing of the piles in rock.

56.2.1 Not less than 2 weeks before any piling work is commenced the Contractor shall submit to the Engineer for approval full details of his proposed piling plant, polymer mixing, handling, transporting and disposal scheme and detailed method statements for carrying out the Works.

Details of casings and concreting methods in respect of bored cast in place concrete piles are to be provided.

56.2.2 The Contractor shall not commence any piling until the plant and methods which he proposes to use including polymer mixing, handling, transporting and disposal scheme have been approved by the Engineer but such approval shall not relieve the Contractor from any of his obligations and responsibilities under the Contract. If for any reason the Contractor wishes to make any change in the plant and methods of working which have been approved by the Engineer, he shall not make any such change without having first obtained the Engineer approval thereof.

56.2.3 List and nos. of equipment's & accessories proposed to be used for the present job shall be submitted along with the bid and these should not be less than the list submitted for P.Q. tender. However, Contractor is bound to increase the plant & machinery to complete the work within the stipulated completion period.

Piling need to be done as per the latest specifications and relevant codes.

60 Providing & fixing imported Malaysian Hardwood sections

60.1 Material :

Shall be approved brand of Malaysian Hardwood with chemically treated and seasoned with minimum 3 mtr length with required size. Material shall comply with the CSA O-80 Series of standards.

61 Providing and laying 25mm thick non shrinkage grout including with transportation and loading & unloading having strength of 65Mpa which imparts controlled expansion in the plastic states with minimum water demand. The low water demand ensures high early strength, over the pedestal for fixing of base plate with bolts complete as per design & drawing.

61.1 Material:

Shall be Cement and water in the required proportion.

62 Providing and fixing or replacing 75x25 mm Indian teak wood hand rail including bend and French polishing complete.

62.1 Material:

Shall be teak wood in proper seasoned

63 Polishing with French polish on previously polished wood and wood based surface to give an even surface including cleaning, the surface of all dirt, dust and sand papered smooth and including a coat of wood filler.

63.1 Material:

Shall be wood polish as required for wood surface.

64 ALUMINIUM WORKS**64.1 Aluminum Sections**

Aluminum sections used for fixed/openable windows, ventilators, partitions, frame work & doors etc. shall be suitable for use to meet architectural designs to relevant works and shall be subject to approval of the Engineer-in- Charge for technical, structural, functional and visual considerations. The aluminum extruded sections shall conform to IS 733 and IS 1285 for chemical composition and mechanical properties. The stainless steel screws shall be of grade AISI 304.

The permissible dimensional tolerances of the extruded sections shall be as per IS 6477 and shall be such as not to impair the proper and smooth functioning/operation and appearance of door and windows.

Aluminum glazed doors, windows etc. shall be of sizes, sections and details as shown in the drawings. The details shown in the drawings may be varied slightly to suit the standards adopted by the manufacturers of the aluminum work, with the approval of Engineer-in-Charge. Before proceeding with any fabrication work, the contractor shall prepare and submit, complete fabrication and installation drawings for each type of glazing doors, windows, ventilators and partition etc. for the approval of the Engineer-in- Charge. If the sections are varied, the contractor shall obtain prior approval of Engineer-in-Charge and nothing extra shall be paid on this account.

64.2 Anodising

Standard aluminum extrusion sections are manufactured in various sizes and shapes in wide range of solid and hollow profiles with different functional shapes for architectural, structural glazing, curtain walls, doors, window & ventilators and various other purposes. The anodizing of these products is required to be done before the fabrication work by anodizing/electro coating plants which ensures uniform coating in uniform colour and shades. The extrusions are anodized up to 30 micron in different colours. The anodized extrusions are tested regularly under strict quality control adhering to Indian Standard.

64.3 Powder Coating

Material: The powder used for powder coating shall be Epoxy/polyester powder of make approved by the Engineer- in-Charge. The contractor shall give detailed programme for powder coating in advance, to facilitate the inspection by Engineer-in-Charge or his authorized representative.

Pre-treatment: Each aluminum alloy extrusion or performed section shall be thoroughly cleaned by alkaline or acidic solutions under the conditions specified by chemical conversion coating supplier and then rinsed. A chemical conversion coating shall be applied by treatment with a solution containing essentially chromate ions or chromate and phosphate ions as the active components as applicable. The amount of the conversion coating deposited depends on the type used by the conversion coating chemical supplier. The conversion coating shall be thoroughly rinsed either with the solution specified by the conversion coating chemical supplier or with demineralized water and then dried at the temperature for the time specified by the conversion coating chemical supplier. The contractor shall submit the detail specifications and application procedure for application of conversion coating for approval of Engineer-in-Charge. The metal surface after the conversion coating pretreatment and prior to the application of the coating shall be free from dust or powdery deposits.

Process: The polyester powder shall be applied by electrostatic powder spray method. Before start of powder coating the contractor shall submit detail specification for application of polyester powder from manufacturer of the polyester powder for approval of Engineer-in-Charge. The powder coating shall be applied as per the specification approved by Engineer-in-Charge.

Thickness: The thickness of the finished polyester powder coating measured by micron meter shall not be less than 50 micron nor more than 120 micron at any point.

64.4 Performance Requirements for the Finish

Surface appearance: The finish on significant surfaces shall show no scratches when illuminated and is examined at an oblique angle, no blisters, craters; pinholes or scratches shall be visible from a distance of about 1 m. There shall not be any visible variation in the colour of finished surfaces of different sections and between the colours of different surfaces of same section.

Adhesion: When a coated test piece is tested using a spacing of 2 mm between each of the six parallel cuts (the cut is made through the full depth of powder coating so that metal surface is visible) and a piece of adhesive tape, approximately 25 mm x 150 mm approved by the Engineer-in-Charge is applied firmly to the cut area and then removed rapidly by pulling at right angles to the test area, no pieces of the finish other than debris from the cutting operation shall be removed from the surface of the finish.

Protection of Powder Coated / Anodizing Finish: It is mandatory that all aluminium members shall be wrapped with self-adhesive non-staining PVC tape, approved by Engineer-in-Charge.

64.5 EPDM- Gaskets

The EPDM Gaskets shall be of size and profile as shown in drawings and as called for, to render the glazing, doors, windows, ventilators etc. air and water tight. Samples of gaskets shall be submitted for approval and the EPDM gasket approved by Engineer-in-Charge shall only be used. The contractor shall submit documentary proof of using the above material in the work to the entire satisfaction of Engineer-in-Charge.

- **Sealant**

The sealants of approved grade and colour shall only be used. The silicone for perimeter joints (between Aluminium section and RCC/Stone masonry) shall be of make approved by the Engineer in Charge.

65 Door, Window, Ventilator And Partition Frames

65.1 Frame Work

First of all the shop drawings for each type of doors/windows/ventilators etc. shall be prepared by using suitable sections based on architectural drawings, adequate to meet the requirement/specifications and by taking into consideration varying profiles of aluminium sections being extruded by approved manufacturers. The shop drawings shall show full size sections of glazed doors, windows, ventilators etc. The shop drawings shall also show the details of fittings and joints. Before start of the work, all the shop drawings shall be got approved from the Engineer-in-Charge.

Actual measurement of openings left at site for different type of door/window etc. shall be taken. The fabrication of the individual door/windows/ventilators etc. shall be done as per the actual sizes of the opening left at site. The frames shall be truly rectangular and flat with regular shape corners fabricated to true right angles. The frames shall be fabricated out of section which have been cut to length, mitered and jointed mechanically using appropriate machines. Mitered joints shall be corner crimped or fixed with self tapping stainless steel screws using extruded aluminium cleats of required length and profile. All aluminium work shall provide for replacing damaged/broken glass panes without having to remove or damage any member of exterior finishing material.

65.2 Fixing of Frames

The holes in concrete/masonry/wood/any other members for fixing anchor bolts/fasteners/screws shall be drilled with an appropriate electric drill. Windows/doors/ventilators etc. shall be placed in correct final position in the opening and fixed to Sal wood backing using stainless steel screws of star headed, counter sunk and matching size groove. of required size at spacing not more than 250 mm c/c or dash fastener. All joints shall be sealed with approved silicone sealants.

In the case of composite windows and doors, the different units are to be assembled first. The assembled composite units shall be checked for line, level and plumb before final fixing is done. Engineer -in-Charge in his sole discretion may allow the units to be assembled in their final location if the situation so warrants. Snap beadings and EPDM gasket shall be fixed as per the detail shown in the shop drawings.

Where aluminum comes into contact with stone masonry, brick work, concrete, plaster or dissimilar metal, it shall be coated with an approved insulation lacquer, paint or plastic tape to ensure that electrochemical corrosion is avoided. Insulation material shall be trimmed off to a clean flush line on completion.

The contractor shall be responsible for the doors, windows etc. being set straight, plumb, level and for their satisfactory operation after fixing is complete.

66 STAINLESS STEEL RAILING

Railing as per Architectural Design.

- Stainless steel of 304 grade is most common in 300 series of Austenitic stainless steel.
- It is still sometimes referred to by its old name 18/8 which is derived from the nominal composition of type 304 being 18% chromium and 8% nickel.

- Fabrication of all stainless steel sections should be done only with tools dedicated to stainless steel materials. Tooling and work surfaces must be thoroughly cleaned before use. These precautions are necessary to avoid cross contamination of stainless steel by easily corroded metals that may discolour the surface of the fabricated product. Some specific hints are as under:
 1. Remove all moisture by blowing with dry air or heating with a torch.
 2. Eliminate organic contaminants like oil, paints, anti-spatter compounds, grease, pencil marks, cutting compounds, adhesive from protective paper, soap used for leak testing etc.
 3. Stainless steels cannot be flame cut with a torch. Acceptable results are achieved with an arch plasma cutter.
 4. Be particularly careful to avoid zinc contamination. Do not use brushes or tools previously used on galvanized steel.
 5. Use only stainless steel wire brushes and use these brushes only on stainless steel.

Fixing

Fixing of railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc. of required size. on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge.

67 HARDWARE/ FITTINGS

Fitting shall be of mild steel brass, aluminum or as specified. Some mild steel fittings may have components of cast iron. These shall be well made, reasonably smooth, and free from sharp edges and corners, flaws and other defects. Screw holes shall be counter sunk to suit the head of specified wood screws. These shall be of the following types according to the material used.

- **Mild Steel Fittings:** These shall be bright finish black stone enamelled or copper oxidised (black finish), nickel chromium plated or as specified.
- **Brass Fittings:** These shall be finished bright satin finish or nickel chromium plated or copper oxidised or as specified.
- **Aluminum Fittings:** These shall be anodised to natural matt finish or dyed anodic coating not less than grade AC 10 of IS 1868.

The fittings generally used for different type of doors and windows. The fittings to be actually provided in a particular work shall, however, be decided by the Engineer-in-Charge.

Screws used for fittings shall be of the same metal, and finish as the fittings. However, chromium plated brass screws or stainless steel screws shall be used for fixing aluminum fittings. These shall be of the size as indicated in respective figures.

Fittings shall be fixed in proper position as shown in the drawings or as directed by the Engineer-in-Charge. These shall be truly vertical or horizontal as the case may be. Screws shall be driven home with screw driver and not hammered in. Recesses shall be cut to the exact size and depth for the counter sinking of hinges.

67.1 Mild Steel Butt Hinges

These shall be medium type manufactured from M.S. sheet. These shall be well made and shall be free from flaws and defects of all kinds. All hinges shall be cut clean and square and all sharp edges and corners shall be removed. These shall generally conform to IS 1341.

- **Hinge Pin**

Hinge pin shall be made of mild steel wire. It shall fit inside the knuckles firmly and riveted head shall be well formed so as not to allow any play or shake, and shall allow easy movement of the hinge, but shall not cause looseness.

- **Knuckles**

The number of knuckles in the hinges of different sizes shall be as per IS 1341. The size of knuckles shall be straight and at right angle to the flap. The movement of the hinges shall be free and easy and working shall not have any play or shake.

- **Screw Holes**

The screw holes shall be clean and counter sunk. These shall be suitable for counter sunk head wood screws and of the specified size for different types, and sizes of hinges. The size of the holes shall be such that when it is counter sunk it shall be able to accommodate the full depth of counter sunk head of the wood screws. The nos. of screw holes shall as specified in IS 1341.

- **Sampling and Criteria for Conformity**

The number of butt hinges to be selected from a lot shall be depend on size of lot and shall be in accordance with Table 9.11 below. Butt hinges for testing shall be selected at random from at least 10 per cent of the randomly selected packages subjected to minimum of three equal numbers of hinges being selected from each package. All butt hinges selected shall be checked for dimensions and tolerance requirements. Defects in manufacture and finish shall also be checked and lot shall be considered conforming to the requirement of these specifications, if the number of defective hinges among those tested does not exceed the corresponding number given in Table 9.11.

TABLE 9.11
Scale of Sampling and Criteria for Conformity

<i>Sl. No.</i>	<i>Lot size</i>	<i>Sample Size</i>	<i>Permissible No. of Defective hinges</i>
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
1.	Upto 150	5	0
2.	151 to 300	20	1
3.	301 to 500	32	2
4.	501 to 1000	50	3
5.	1001 and above	80	5

Tee Hinges

These shall be made from M.S. sheets and shall be either bright finished or stove enamelled black or as specified. These shall generally conform to IS 206 (Tee hinges shall be well made, free from burrs, flaws, and defects of any kind. The movement shall be square, and the working shall be free and easy without any play or shake. The hole for the hinge shall be central to the bore and shall be square.

The hinge pin shall be firm and riveted over, so that the heads are well formed. All screw holes shall be clear and counter sunk and shall be suitable for the counter sunk head of wood screws.

Sliding Door Bolts (Aldrops)

These shall be of mild steel, cast brass, aluminum or as specified, and shall be capable of smooth sliding action.

- **M.S. Sliding Door Bolts:** These shall be made of M.S. sheets and M.S. rods and shall generally conform to IS 281. M.S. sliding door bolts shall be copper oxidised (black finish) or as specified.
- **Sampling and Criteria for Conformity:** The number of sliding door bolt to be selected from a lot shall depend on the size of lot and shall be in accordance with Table 9.15. For testing shall be taken at random from at least 10 percent of the package subject to a minimum of three, equal number of door bolts being selected from each package. All door bolts selected from the lot shall be checked for dimensional and tolerance requirements. Defects in manufacture and finish shall also be checked. A lot shall be considered conforming to the requirement of this specification if the number of defects sliding door bolts among those tested does not exceed the corresponding number given in Table 9.15.

TABLE 9.15

<i>Lot size</i>	<i>Sample Size</i>	<i>Permissible speed Decorative sliding door bolts</i>
Upto 150	5	0
151 to 300	20	1
301 to 500	32	2
501 to 1000	50	3
1001 and above	81	5

Tower Bolts

These shall generally conform to IS 204 (Part. I) & IS 204 (Part. II). Tower bolts shall be well made and shall be free from defects. The bolts shall be finished to the correct shape and shall have a smooth action. All tower bolts made with sheet of 1.2 mm thickness and above shall have counter sunk screw holes to suit counter sunk head of wood screws. All sharp edges and corners shall be removed and finished smooth.

The height of knob of tower bolt when the door, window etc. is in closed position from the floor level shall be not more than 1.9 metre.

Tower bolts shall be of the following types:

- Aluminum barrel tower bolts with barrel and bolt of extruded sections of aluminum alloy. The knob shall be properly screwed to the bolt and riveted at the back.
- Brass tower bolts with cast brass barrel and rolled or cast brass bolt or Brass tower bolts with barrel of extruded sections of brass and rolled or drawn brass bolt. The knobs of brass tower bolts shall be cast and the bolt fixed with knob, steel spring and ball shall be provided between the bolt and the barrel.
- Mild steel barrel tower bolts with mild steel barrel and mild steel bolt or Mild steel tower bolts with mild steel barrel and cast iron bolts.

The plates and straps after assembly shall be firmly riveted or spot welded. The rivet head shall be properly formed and the rivet back shall be flush with the plate. These shall be made in one piece.

Door Latch

This shall be of mild steel, cast brass, or as specified and shall be capable of smooth sliding action. In case, of mild steel latch, it shall be copper oxidized (black finish) or as specified and in case of brass, it shall be finished bright, chromium plated or oxidized or as specified. The size of door latches shall be taken as the length of the latch.

Mortice Lock and Latch

- This should generally conform to IS 2209. The size of the mortice lock shall be denoted by the length of the body towards the face and it shall be 65 mm, 75 mm and 100 mm as specified. The measured length shall not vary more than 3 mm from the length specified.
- **Non-interchangeable Keys:** Testing of non-interchangeable keys shall be as per IS 2209.
- The clear depth of the body shall not be more than 15 mm. The fore end shall be firmly fitted to the body suitably by counter sunk head screw. The latch bolt shall be of specified material and of section not less than 12 x 16 mm for all sizes of locks. If made of two piece construction both parts shall be rivetted. Ordinary lever mechanism with not less than two levers shall be provided. False levers shall not be used. Lever shall be fitted with one spring of phosphor bronze or steel wire and shall withstand the tests as provided in IS 2209.
- Locking bolts, spring and strike plate shall conform to IS 2209.
- **Handles:** These shall conform to IS 4992.
- **Keys:** Each lock shall be provided with two keys.
- **Sampling, Criteria for Conformity:** It shall be the same as specified in clause 9.15.1.4.
- **Tests:** The finally assembled locks shall be tested as prescribed.

Door Handles (Doors and Windows)

These should generally conform to IS 208. The door handles shall be well made and free from defects. These shall be finished correct to shape and dimensions. All edges and corners shall be removed and finished smooth so as to facilitate easy handling. Cast handle shall be free from casting defects. Where the grip portion of the handle is joined with the base piece by mechanical means, the arrangement shall be such that the assembled handle shall have adequate strength comparable to that of integrally cast type handles.

Door handles shall be of the following types according to the material used:

- **Cast or Sheet Aluminum Alloy Handles:** These shall be of aluminum of specified size, and of shape and pattern as approved by the Engineer-in-Charge. The size of the handle shall be determined by the inside grip of the handle. Door handles shall be of 100 mm size and window handles of 75 mm size unless, otherwise specified. These shall be fixed with

25 mm long wood screws of designation No.6. Aluminum handles, shall be anodized and the anodic coating shall not be less than grade AC 15-IS 1868 as specified. The finish can be bright natural, matt or satin or dyed as specified.

- **Mild Steel Handles:** These shall be of mild steel sheet, pressed into oval section. The size of the handles will be determined by the inside grip of the handle. Door handles shall be 10 mm size and window handles of 75 mm size unless otherwise specified. These shall be fixed with 25 mm long wood screws of designation No. 6., Iron handles shall be copper oxidised (black finish) or stove enamelled black or as specified.
- **Stainless Steel Handles:** These shall be of stainless steel of specified size, shape and pattern as approved by Engineer-in-Charge for using in doors, windows and kitchen cabinets. Doors handles shall be of 125 mm or 100 mm size and window handles of 75 mm size unless, otherwise specified. Kitchen cabinet handles shall of 125 mm, 100 mm or 75 mm as specified. These shall be fixed with stainless steel screws 20 mm long. Stainless steel handles shall not be less than grade 304. The finish can be bright or matt finish as specified. 9.15.19.3 Sampling and Criteria for Conformity: The number of handles to be selected from a lot shall depend on the size of lot and shall be in accordance with Table 9.16. Handles for testing shall be selected at random for at least 10 percent of packages. Subject to a minimum 3, equal number of door handles being selected from each such package. All door handles shall be checked for dimensional requirement and finish. Any door handle which fails to satisfy the requirement of dimensions or finish or both shall be considered as defective.

A lot shall be considered as conforming to requirement of this specification, if the number of defective handles among those tested does not exceed the corresponding number of defectives is greater than or equal to rejection number given in column 4 of Table 9.16, the lot shall be deemed as not meeting the requirements of this specification.

TABLE 9.16
Scale of Sampling and Criteria for Conformity

<i>Lot size</i>	<i>Sample size</i>	<i>Acceptance no.</i>	<i>Rejection no.</i>
<i>(1)</i>	<i>(2)</i>	<i>(3)</i>	<i>(4)</i>
Upto 50	8	0	1
51 to 90	13	1	2
91 to 150	20	1	2
151 to 280	32	2	3
281 to 500	50	3	4
501 to 1200	80	5	6
1201 and above	125	7	8

Universal Hydraulic Door Closer (Exposed Type)

- These shall be made of cast iron/aluminum alloy/zinc alloy and of shape and pattern as approved by the Engineer-in-Charge.
- These shall generally conform to IS Specifications for door closers (Hydraulically regulated) IS 3564.
- The door closers may be polished or painted and finished with lacquer to desired colour. Aluminum alloy door closer shall be anodized and the anodic coating shall not be less

than grade AC 15 of IS 1868. All dents, burrs and sharp edges shall be removed from various components and they shall be pickled, scrubbed and rinsed to remove greese, rust, scale or any other foreign elements. After pickling, all the M.S. parts shall be given phosphating treatment in accordance with IS 3618.

- The nominal size of door closers in relation to the weight and the width of the door size to which it is intended to be fitted shall be given in Table 9.19.

TABLE 9.19
Type and Designation of Door Closers

Designation of closers	Mass of the door (kg)	Width of the door (mm)	Remarks
1.	Upto 35	Upto 700	For light doors such as double leaved and toilet doors.
2.	36 to 60	701 to 850	Interior doors, such as of bed rooms, kitchen and store
3.	61 to 80	851 to 1000	Main doors in a building, such as entrance doors

- Sampling and Criteria for Conformity:** All the door closer of the same nominal size and shape and from the same batch of manufacture, in one consignment shall constitute a lot. The number of door closers to be taken at random from a lot shall depend upon the size of the lot. (Table 9.20). The sample shall be tested for construction, finish, dimensions, interchangeability of parts and performance in accordance of Table 9.20. Any door closer failing in any one or more of these characteristics shall be considered as defective. If in the first sample, the number of defective door closer is less than or equal to corresponding acceptance number, the lot shall be declared as conforming to the requirement of these characteristics. If the number of defective door closer is greater than or equal to the rejection number, the acceptance number but less than the rejection number, lot shall be deemed as not meeting with requirements of these characteristics. If the number of defectives is greater than the acceptance number, but less than the rejection number, a second sample of the size equivalent to that of the first shall be taken to determine the conformity or otherwise of the lot. The number of defective door closers found in the first and the second sample shall be combined and if the combined number of defective thus obtained is less than or equal to the corresponding acceptance number, the lot shall be declared as conforming to the requirements of these characteristics.

68 PLASTERING WORK

68.1 Materials

The proportions of the cement mortar for plastering shall be 1:4 (one part of cement to four parts of sand) unless otherwise specified under the respective item of work. Cement and sand shall be mixed thoroughly in dry condition and then water added to obtain a workable consistency. The quality of water and cement shall be as per relevant IS. The quality and grading of sand for plastering shall conform to IS: 1542. The mixing shall be done thoroughly in a mechanical mixer unless hand mixing is specifically permitted by ENGINEER. If so desired by the ENGINEER sand shall be screened and washed to meet the specification requirements. The mortar thus mixed shall be used as soon as possible preferably within 30 minutes from the time water is added to cement. In case the mortar has stiffened due to evaporation of water this may be re-tempered by adding water as required to restore consistency but this will be permitted only upto 30 minutes from the time of initial mixing of water to cement. Any mortar which is partially set shall be rejected and removed forthwith from the site. Droppings of plaster shall not be re-used under any circumstances

68.2 Workmanship

Preparation of surfaces and application of plaster finishes shall generally confirm to the requirements specified in IS: 1661 and IS: 2402.

Plastering operations shall not be commenced until installation of all fittings and fixtures such as door/ window panels, pipes, conduits etc. are completed.

All joints in masonry shall be raked as the work proceeds to a depth of 10mm/20mm for brick/ stone masonry respectively with a tool made for the purpose when the mortar is still green. The masonry surface to be rendered shall be washed with clean-water to remove all dirt, loose materials, etc., Concrete surfaces to be rendered shall be roughened suitably by hacking or bush hammering for proper adhesion of plaster and the surface shall be evenly wetted to provide the correct suction. The masonry surfaces should not be too wet but only damp at the time of plastering. The dampness shall be uniform to get uniform bond between the plaster and the masonry surface.

Interior Plain Faced Plaster - This plaster shall be laid in a single coat of 13mm thickness. The mortar shall be dashed against the prepared surface with a trowel. The dashing of the coat shall be done using a strong whipping motion at right angles to the face of the wall or it may be applied with a plaster machine. The coat shall be trowelled hard and tight forcing it to surface depressions to obtain a permanent bond and finished to smooth surface. Interior plaster shall be carried out on jambs, lintel and sill faces, etc. as shown in the drawing and as directed by ENGINEER. Rate quoted for plaster work shall be deemed to include for plastering of all these surfaces.

Plain Faced Ceiling plaster - This plaster shall be applied in a single coat of 6mm thickness. Application of mortar shall be as stipulated in clause 30.2.

Exterior plain faced plaster - This plaster shall be applied in 2 coats. The first coat or the rendering coat shall be approximately 14mm thick. The rendering coat shall be applied as stipulated in clause 30.2 except finishing it to a true and even surface and then lightly roughened by cross scratch lines to provide bond for the finishing coat. The rendering coat shall be cured for at least two days and then allowed to dry. The second coat or finishing coat shall be 6 mm thick. Before application of the second coat, the rendering coat shall be evenly damped. The second coat shall be applied from top to bottom in one operation without joints and shall be finished leaving an even and uniform surface. The mortar proportions for the coats shall be as specified in the respective item of work. The finished plastering work shall be cured for atleast 7 days.

Interior plain faced plaster 20mm thick if specified for uneven faces of brick walls or for random/coursed rubble masonry walls shall be executed in 2 coats similar to the procedure stipulated in clause 30.2.

Exterior Sand Faced Plaster - This plaster shall be applied in 2 coats. The first coat shall be 14mm thick and the second coat shall be 6mm thick. These coats shall be applied as stipulated in clause 30.2. However, only approved quality white sand shall be used for the second coat and for the finishing work. Sand for the finishing work shall be coarse and of even size and shall be dashed against the surface and sponged. The mortar proportions for the first and second coats shall be as specified in the respective items of work.

Wherever more than 20mm thick plaster has been specified, which is intended for purposes of providing beading, bands, etc. this work shall be carried out in two or three coats as directed by

ENGINEER duly satisfying the requirements of curing each coat (rendering/floating) for a minimum period of 2 days and curing the finished work for atleast 7 days.

In the case of pebble faced finish plaster, pebbles of approved size and quality shall be dashed against the final coat while it is still green to obtain as far as possible a uniform pattern all as directed by ENGINEER.

Where specified in the drawings, rectangular grooves of the dimensions indicated shall be provided in external plaster by means of timber battens when the plaster is still in green condition. Battens shall be carefully removed after the initial set of plaster and the broken edges and corners made good. All grooves shall be uniform in width and depth and shall be true to the lines and levels as per the drawings.

Curing of plaster shall be started as soon as the applied plaster has hardened sufficiently so as not to be damaged when watered. Curing shall be done by continuously applying water in a fine spray and shall be carried out for atleast 7 days.

When the specification items of work calls for waterproofing plaster the CONTRACTOR shall provide the waterproofing compound as specified while preparing the cement mortar. Payment for water-proofing compound will be made separately if it is not included as a combined item of work.

Where lath plastering is specified, it shall be paid for at the same rate as for plaster work except that separate payment for metal lath will be made.

For external plaster, the plastering operations shall be commenced from the top floor and carried downwards. For internal plaster, the plastering operations for the walls shall commence at the top and carried downwards. Plastering shall be carried out to the full length of the wall or to natural breaking points like doors/ windows etc. Ceiling plaster shall be completed first before commencing wall plastering.

Double scaffolding to be used shall be as specified in clause 3.2.6.

The finished plaster surface shall not show any deviation more than 4mm when checked with a straight edge of 2m length placed against the surface.

To overcome the possibility of development of cracks in the plastering work following measures shall be adapted.

- (a) Plastering work shall be deferred as much as possible so that fairly complete drying shrinkage in concrete and masonry works takes place.
- (b) Steel wire fabric shall be provided at the junction of brick masonry and concrete to overcome reasonably the differential drying shrinkage/thermal movement. This steel item shall be measured and paid for separately.
- (c) Ceiling plaster shall be done, with a trowel cut at its junction with wall plaster. Similarly trowel cut shall be adopted between adjacent surfaces where discontinuity of the background exists.

68.3 Cement Pointing

a. Materials

The cement mortar for pointing shall be in the proportion of 1:3 (one part of cement to three parts of fine sand) unless otherwise specified in the respective items of work. Sand shall conform to IS: 1542 and shall be free from clay, shale, loam, alkali and organic matter and shall be of sound, hard, clean and durable particles. Sand shall be approved by ENGINEER and if so directed it shall be washed/screened to meet specification requirements.

b. Workmanship

Where pointing of joints in masonry work is specified on drawings/respective items of work, the joints shall be raked at least 15mm/ 20mm deep in brick/stone masonry respectively as the work proceeds when the mortar is still green.

Any dust/dirt in the raked joints shall be brushed out clean and the joints shall be washed with water. The joints shall be damp at the time of pointing. Mortar shall be filled into joints and well pressed with special steel trowels. The joints shall not be disturbed after it has once begun to set. The joints of the pointed work shall be neat. The lines shall be regular and uniform in breadth and the joints shall be raised, flat, sunk or 'V' as may be specified in the respective items of work. No false joints shall be allowed.

The work shall be kept moist for at least 7 days after the pointing is completed. Whenever coloured pointing is to be done, the colouring pigment of the colour required shall be added to cement in such proportions as recommended by the manufacturer and as approved by ENGINEER.

68.4 Water-Proofing Admixture

Water-proofing admixture shall conform to the requirements of IS: 2645 and shall be of approved manufacture. The admixture shall not contain calcium chloride. The quantity of the admixture to be used for the works and method of mixing etc., shall be as per manufacturer's instructions and as directed by ENGINEER. Payment shall be made for the actual quantity of such admixture used unless it is already covered in the rate for the relevant item of work.

69 WASHED STONE GRIT PLASTER

• Scaffolding

For all exposed brick work or tile work double scaffolding independent of the work having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed.

For all other work in buildings, single scaffolding shall be permitted. In such cases the inner end of the horizontal scaffolding pole shall rest in a hole provided only in the header course for the purpose. Only one header for each pole shall be left out. Such holes for scaffolding shall, however, not be allowed in pillars/columns less than one meter in width or immediately near the skew backs of arches. The holes left in masonry works for scaffolding purposes shall be filled and made good before plastering.

• Preparation of Surface

The joints shall be raked out properly. Dust and loose mortar shall be brushed out. Efflorescence if any shall be removed by brushing and scrapping. The surface shall then be thoroughly washed with water, cleaned and kept wet before plastering is commenced.

In case of concrete surface if a chemical retarder has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the retarders is left on the surface.

Projecting burrs of mortar formed due to the gaps at joints in shuttering shall be removed. The surface shall be scrubbed clean with wire brushes. In addition concrete surfaces to be plastered shall be pock marked with a pointed tool, at spacing's of not more than 5 cm. Centers, the pock being made not less than 3 mm deep. This is to ensure a proper key for the plaster. The mortar shall be washed off and surface, cleaned off all oil, grease etc. and well wetted before the plaster is applied.

- **Materials**

Stone chippings obtained by crushing hard stone shall be free of dust and deleterious material. 10 mm nominal size stone chippings, where specified, shall pass 100% through 12.5 mm sieve and fully retained on 6.3 mm sieve. Stone chippings shall be thoroughly washed with water and sieved before use.

Mortar: Cement mortar for under coat and cement mortar to be mixed with stone chippings for top coat. This shall be prepared by mixing cement and sand with or without the addition of pozzolana in specified proportions.

1. **Proportioning:** Proportioning on weight basis shall be preferred taking into account specific gravity of sand and moisture content. Boxes of suitable size shall be prepared to facilitate proportioning on weight basis. Cement bag weighting 50 kg shall be taken as 0.035 cubic metre. Other ingredients in specified proportion shall be measured using boxes of size 40 x 35 x 25 cm. Sand shall be measured on the basis of its dry volume in the case of volumetric proportioning.
2. **Mixing:** The mixing of mortar shall be done in mechanical mixers operated manually or by power as decided by Engineer-in-Charge. The Engineer-in-Charge may, however, permit hand mixing at his discretion taking into account the nature, magnitude and location of the work and practicability of the use of mechanical mixers or where item involving small quantities are to be done or if in his opinion the use of mechanical mixer is not feasible. In cases, where mechanical mixers are not to be used, the contractor shall take permission of the Engineer-in-Charge in writing before the commencement of the work.
3. **Mechanical Mixing:** Cement and sand in the specified proportions shall be mixed dry thoroughly in a mixer. Water shall then be added gradually and wet mixing continued for at least three minutes. Only the required quantity of water shall be added which will produce mortar of workable consistency but not stiff paste. Only the quantity of mortar, which can be used within 30 minutes of its mixing, shall be prepared at a time. Mixer shall be cleaned with water each time before suspending the work.
4. **Hand Mixing:** The measured quantity of sand shall be leveled on a clean masonry platform and cement bags emptied on top. The cement and sand shall be thoroughly mixed dry by being turned over and over, backwards and forwards, several times till the mixture is of a uniform colour. The quantity of dry mix which can be used within 30 minutes shall then be mixed in a masonry trough with just sufficient quantity of water to bring the mortar to a stiff paste of necessary working consistency.

5. **Precautions:** mortar shall be used as soon as possible after mixing and before it begins to set, and in any case within half hour, after the water is added to the dry mixture.

- **Application of Plaster**

12 mm Under Coat : Under coat of cement mortar 1:4 (1 cement : 4 coarse sand) shall be applied as specified in 13.1.3 except that the finishing, after the mortar has been brought to level with the wooden straight edge, shall be done with wooden float only. The surface shall be further roughened by furrowing with a scratching tool. Furrowing shall be done diagonally both ways and shall be about 2 mm deep to provide a key for the top coat. The scratched lines shall not be more than 10 cm apart. The surface shall be kept wet till top coat is applied.

Top Coat: Top coat comprising cement mortar and stone chippings shall have an overall proportion of 1:0.5:2 (1 cement : 0.5 coarse sand : 2 stone chippings 10 mm nominal size) or as specified. The top coat shall be applied a day or two after the under coat has taken the initial set. The surface of the under coat shall be cleaned and a coat of cement slurry at 2 kg of cement per sqm shall be applied before the application of coat. The top coat shall be applied in uniform thickness on the under coat after the application of slurry and sufficiently pressed with wooden float for proper bonding with the under coat. Vacant space, if any shall be filled with the specified mix.

- **Finish**

The top coat of plaster shall be finished to a true and plumb surface. The surface shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds. All the corners angles and junctions shall be truly vertical or horizontal as the case may be. Rounding or chamfering of corners junctions etc. Where required shall be true to template.

Finished surface of the top coat after the mix has taken the initial set, shall be scrubbed and washed with suitable brushes and plain water. Scrubbing and washing shall continue till the stone chippings are sufficiently exposed. Stone chippings which may come out while scrubbing shall be replaced using the specified mortar mix. A sample of the washed stone grit plaster shall be got approved from the Engineer-in-Charge.

- **Grooves**

Grooves of size 15 mm x 15 mm or as specified shall be provided as shown on the drawing or as required by the Engineer-in-Charge. Tapered wooden battens to match the size and shape of the grooves shall be fixed on the under coat with nails before the application of the top coat and these shall be removed carefully so that the edges of the panels of top coat are not damaged. Damage, if any, shall be made good by the contractor.

- **Curing**

Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for a period of seven days. During this period, it shall be suitably protected from all damages at the contractor's expense by such means as the Engineer-in-Charge may approve.

70 ROLLING SHUTTER

Rolling shutters shall conform to IS 6248. These shall include necessary locking arrangement and handles etc. These shall be suitable for fixing in the position as specified i.e. outside or inside on or below lintel or between jambs of the opening. The door shall be either push and pull type or operated with mechanical device supplied by the firm. Shutters upto 10 sq. metres shall be of push and pull type and shutters with an area of over 10 sq. metre shall generally be provided with reduction gear operated by mechanical device with chain or handle, if bearings are specified for each of operation, these shall be paid for separately.

Shutter

The shutter be built up of inter locking lath section formed from cold rolled steel strips. The thickness of the sheets from which the lath sections have been rolled shall be not less than 0.90 mm for the shutters upto 3.5 m width. Shutters above 9 metres width should be divided in 2 parts with provision of one middle fixed or movable guide channel or supported from the back side to resist wind pressure. The lath section shall be rolled so as to have interlocking curls at both edges and a deep corrugation at the centre with a bridge depth of not less than 12 mm to provide sufficient curtain of stiffness for resisting manual pressures and normal wind pressure. Each lath section shall be continuous single piece without any welded joint. When interlocked, the lath sections shall have a distance of 75 mm rolling centers. Each alternate lath section shall be fitted with malleable cast iron or mild steel clips securely riveted at either ends, thus locking in the lath section at both ends preventing lateral movement of the individual lath sections. The clips shall be so designed as to fit the contour of the lath sections.

Spring

The spring shall be of coiled type. The spring shall be manufactured from high tensile spring steel wire or strips of adequate strength conforming to IS 4454- Part I .

Roller and Brackets

The suspension shaft of the roller shall be made of steel pipe conforming to heavy duty as per IS 1161. For shutter upto 6 metre width and height not exceeding 5 metre, steel pipes of 50 mm nominal bore shall be used. The shaft shall be supported on mild steel brackets of size 375 x 375 x 3.15 mm for shutters upto a clear height of 3.5 metre. The size of mild steel brackets shall be 500 x 500 x 10 mm for shutters of clear height above 3.5 m and upto 6.5 m. The suspension shaft clamped to the brackets shall be fitted with rotatable cast iron pulleys to which the shutter is attached. The pulleys and pipe shaft shall connected by means of pretension helical springs to counter balance the weight of the shutter and to keep the shutter in equilibrium in any partly open position.

When the width of the opening is greater than 3.5 mtr. The cast iron pulleys shall be interconnected with a cage formed out of mild steel flats of at least 32 x 6 mm and mild steel dummy rings made of similar flats to distribute the torque uniformly. Self-aligning two row ball bearing with special cast iron casings shall be provided at the extreme pulley and caging rings shall have a minimum spacing of 15mm and at least 4 number flats running throughout length of roller shall be provided.

In case of shutters of large opening with mechanical device for opening the shutter the roller shall be fitted with a purion wheel at one end which in contact with a worm fitted to the racket plate, caging and pulley with two ball bearing shall be provided.

Guide Channel

The width of guide channel shall be 25 mm the minimum depth of guide channels shall be as follows:

<i>Clear width of shutters</i>	<i>Depth of guide channel</i>
Upto 3.5 m	65 mm
3.5 m upto 8 m	75 mm
8 m and above	100 mm

The gap between the two legs of the guide channels shall be sufficient to allow the free movements of the shutter and at the same time close enough to prevent rattling of the shutter due to wind.

Each guide channel shall be provided with a minimum of three fixing cleats or supports for attachment to the wall or column by means of bolts or screws. The spacing of cleats shall not exceed 0.75 m. alternatively, the guide channels may also be provided with suitable dowels, hooks or pins for embedding in the walls.

The guide channels shall be attached to the jambs, plumb and true either in the overlapping fashion or embedded in grooves, depending on the method of fixing.

Cover

Top cover shall be of mild steel sheets not less than 0.90 mm thick and stiffened with angle or flat stiffeners at top and bottom edges to retain shape.

Lock plates with sliding bolts, handles and anchoring rods shall be as per IS 6248.

Fixing

The arrangement for fixing in different situations in the opening shall be as per IS 6248.

- Brackets shall be fixed on the lintel or under the lintel as specified with rawl. Plugs and screw bolts etc. The shaft along with the spring shall then be fixed on the brackets.
- The lath portion (shutter) shall be laid on ground and the side guide channels shall be bound with ropes etc. The shutter shall then be placed in position and top fixed with pipe shaft with bolts and nuts. The side guide channels and cover frames shall then be fixed to the walls through the plate welded to the guides. These plates and bracket shall be fixed by means of steel screws bolts, and rawl plugs concealed in plaster to make their location invisible. Fixing shall be done accurately in workmen like manner that the operation of the shutter is easy and smooth.

STREET FURNITURE WORKS

71 GFRC- BOLLARDS

Providing and fixing Precast Concrete Cylindrical bollard of 450mm dia. x 1000mm height as single cast mono element with Sand blasted Texture finish made of Full Depth pigmented mix High Performance Glass Fiber Reinforced Concrete 12 MPa flexural strength and 40MPa Compressive Strength, UV



resistant stabilise colour pigment, colour as per Architects choice including fixing, cleaning surfaces and complete and including cost of loading -unloading and placing with crane.

- **Material**

Bollards shall be installed at pedestrian crossing, junctions & along the pedestrian as per drawing and specification. The bollards shall serve the purpose of defining the edge of the road and guide pedestrians. Concrete Bollards should be as mentioned specification above with exposed finish, with integrated colour pigment and the foundation slab shall be made.

- **Maintenance**

Quarterly checking should be done for bollards. Replacing of broken bollard should be done immediately as and when required. The furniture shall be maintained using soap water with pressured pump for washing.

- **Security & Safety parameter**

The foundation used shall be designed in order to take loads from pedestrians and parked cars and other factors. There should be no sharp edges visible or reachable by users. The bollards shall not be fragile and safely secured to its foundation.

- **Durability parameter**

The parts used shall be of better durability for all seasons. It should be shock resistant.

- **Design parameter**

The looks shall be simple and modular. All bollards shall be of uniform shape, size and colour.

- **Environment parameter**


As far as possible recyclable materials shall be used for Street Furniture.

- **Universal design**

The furniture should also cater to differently-abled users. Design and manufacture should comply with ISO requirements.

72 Precast Glass Fibre Reinforced Concrete Backless Bench

Providing and fixing Precast GFR Concrete designer backless bench of 1500x450x450 LBH & 100 mm thickness single cast mono element with terrazzo smooth finish made of Full Depth Terrazzo mix High Performance. Glass Fiber Reinforced Concrete 12 MPa flexural strength and 40MPa Compressive Strength, UV resistant stabilise colour pigment, colour as per Architects choice including fixing, cleaning surfaces and complete and including cost of loading -unloading and placing with crane.

1	weight-	95 Kg / Sq.ft	
2	Dimensions	450mm X 450mm X 1500mm	
3	Colors	Any Colors	

4	Materials	Pigmented glass fiber reinforced concrete	
5	Concrete strength	Flexible strength- 12MPa	
		Compressive strength- 40MPa	
6	Surface finish	Smooth or textured finish (optional)	
7	Surface Treatment	Sealed or weather proof coating (Optional)	
8	Application	Indoor and Outdoor	

- **Maintenance**

Twice in a year, Rinse the top with warm water to remove surface dirt and wipe dry with a clean, soft cloth for routine maintenance. Wash with a soft cloth and a mixture of a mild detergent and warm water. Rinse with warm water, and wipe dry with a clean, soft cloth. Do not use abrasive, acid, alcohol-based, or solvent-based cleaners; they will damage the surface. Fixing of damaged part and replacement if necessary.

- **Security & Safety parameter**

The finishing of the bench shall be such that it is safe for users and does not have any sharp edges that may cause injury; also, it shall be either bolted or fastened to ground as mentioned earlier. All the edges should be of smooth semicircular chamfer finish. The bench should be either bolted or installed with a foundation by anchor fasteners or chemical fasteners which will make the furniture more vandal proof.

- **Design parameter**

The design shall be elegant with smooth curves that make it aesthetically good and appealing for the users. It shall be innovative & contemporary. Modular design is recommended for Street Furniture. Modular design is recommended for Street Furniture.

- **Universal design**

The furniture should also cater to differently-abled users. Design and manufacture should comply with ISO requirements.

73 Precast Glass Fibre Reinforced Concrete Backless Cube

Providing and fixing Precast GFR Concrete Modular backless Cube Seating bench of 450x450x450 LBH & 100 mm thickness single cast mono element with terrazzo smooth finish made of Full Depth Terrazzo mix High Performance Glass Fiber Reinforced Concrete 12 MPa flexural strength and 40MPa Compressive Strength, UV resistant stabilise colour pigment, colour as per Architects choice including fixing, cleaning surfaces and complete and including cost of loading -unloading and placing with crane.

1	weight-	95 Kg / Sq.ft	
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2	Dimensions	450mm X 450mm X 450mm	
3	Colors	Any Colors	
4	Materials	Pigmented glass fiber reinforced concrete	
5	Concrete strength	Flexible strength- 12MPa	
		Compressive strength- 40MPa	
6	Surface finish	Smooth or textured finish (optional)	
7	Surface Treatment	Sealed or weather proof coating (Optional)	
8	Application	Indoor and Outdoor	

- **Maintenance**

Twice in a year, Rinse the top with warm water to remove surface dirt and wipe dry with a clean, soft cloth for routine maintenance. Wash with a soft cloth and a mixture of a mild detergent and warm water. Rinse with warm water, and wipe dry with a clean, soft cloth. Do not use abrasive, acid, alcohol-based, or solvent-based cleaners; they will damage the surface. Fixing of damaged part and replacement if necessary.

- **Security & Safety parameter**

The finishing of the cube shall be such that it is safe for users and does not have any sharp edges that may cause injury; also, it shall be either bolted or fastened to ground as mentioned earlier. All the edges should be of smooth semicircular chamfer finish.

The cube should be either bolted or installed with a foundation by anchor fasteners or chemical fasteners which will make the furniture more vandal proof.

- **Design parameter**

The design shall be elegant with smooth curves that make it aesthetically good and appealing for the users. It shall be innovative & contemporary. Modular design is recommended for Street Furniture. Modular design is recommended for Street Furniture.


- **Universal design**

The furniture should also cater to differently-abled users. Design and manufacture should comply with ISO requirements.

74 Precast Glass Fibre Reinforced Concrete Dust bin

Providing Precast Concrete dustbin of 600x600x1000 LBH single cast mono element with terrazzo Texture finish made of Full Depth Terrazzo mix High Performance Glass Fiber Reinforced Concrete 12 MPa flexural strength and 40MPa Compressive Strength, UV resistant

stabilise colour pigment, colour as per Architects choice including fixing, cleaning surfaces and complete and including cost of loading -unloading and placing with crane.

1	weight-	3 Kg / Sq.ft	
2	Dimensions	600mm X 600mm X 1000mm	
3	Colors	Any Colors	
4	Materials	Exposed grey glass fire reinforced concrete	
5	Concrete strength	Flexible strength- 12 MPa	
		Compressive strength- 40 MPa	
6	Surface finish	Smooth or textured finish (optional)	
7	Surface Treatment	Sealed or weather proof coating (Optional)	
8	Application	Indoor and Outdoor	

- **Maintenance**

Quarterly checking and cleaning at regular intervals should be done. Broken and missing bins should be replaced as and when required.

- **Security & Safety parameter**

The design shall be free of any sharp edges, surface shall be smooth & the material used to be non-flammable. Bins shall be secured by an anti-vandalism locking arrangement to prevent any mishaps. The supporting structure shall be safely secured to the ground by either bolting, or by a foundation with anchor fasteners.

- **Universal design**

The furniture should also cater to differently-abled users. Design and manufacture should comply with ISO requirements.

75 Precast Concrete Sphere bollard



Providing Precast Concrete Sphere bollard of 600mm Dia from finished level as single cast mono element with pose concrete or terrazzo Texture finish made of Full Depth Terrazzo mix High Performance GlassFiber Reinforced Concrete 12 MPa flexural strength and 40MPa Compressive Strength, UV resistant stabilise colour pigment, colour as per Architects choice including fixing, cleaning surfaces.

76 Precast Concrete Circular Seating



Providing Precast Designer backless Concrete circular seating bench of 3 separate unit circular seating of 7 feet diameter, 18” Height, each unit single

cast mono element with terrazzo smooth finish made of Full Depth Terrazzo mix High Performance GlassFiber Reinforced Concrete 12 MPa flexural strength and 40MPa Compressive Strength, UV resistant stabilise colour pigment, colour as per Architects choice including fixing, cleaning surfaces and complete and including cost of loading - unloading and placing with crane. (Brands AryaPrecast, The concrete shop)

77 Boom Barrier



Providing and fixing 4/6mtr. Boom barrier - AC Motors (Assembled Make) 4/6 meter / 6 sec double spring (HEAVY DUTY) 220 V AC +/- 13% / 50hz / 120 watts, with housing box, control PCB (aluminium hollow sections (4 to 6 meter long / hexagonal shape 100mm x 44 mm, telescopic type with reflectors; Push Button for activation complete with testing (Brands Swaraj secutech, New tech

automation)

78 Bicycle stand



Providing and Fixing Bicycle stand made from Stainless Steel 316 of 875x790mm length, 50 mm pipe dia and wall thickness of 1.5 mm with Glossy/ Matt finish, high quality grade including bending, by CNC hydro-pneumatic bends and fabrication including cutting, facing, welding, finishing, buffing , finishing in any shape and curvature with excavation and fixing in position, line and level complete as per EIC-

High quality grade. (Brand Cheveron Inc)

79 Stone-Corten Steel Signage



Providing and fixing sign boards made out of 2 mm Corten steel sheet; size 160 x 80cms with supports. Mounted on 75-100mm thick Chiseled cut Granite stone. The Granite slab size 250x90 cm to be anchored within R.C.C. foundation as per structural design. The granite slab should be 200 cm clear above the Ground level. The corten steel to be mounted on Granite slab with SS fixtures and baclit light with weatherproof LED rope light IP67. The corten steel to be occupied with 70% area with Laser cut signage text/arrows, and City Map Etching work. complete under the supervision of engineer in charge. Brands: Capsicum Wall ideas Pvt. Ltd., Colourzone Marketing, Chunilal Gandhi & Co.

80 Stainless Steel Signage



Providing and fixing sign boards made out of 2.5mm S.S 304 sheet; size 45 x 45cms individual letters , laser cut and fixed with studs or pin behind it as per fitting detail.All edges to be buffed, cleaned and stain free without scars or scratches. Letters to be fixed at a height of max 6meters including cost of erection of scaffolding. The rate to be inclusive of all to and fro transport and materials, complete

81 Tree pit Cover



Providing and fixing precast tree pit cover around the tree pit, factory made exposed /fare finish precast Tree pit cover block of two-four half in FRC concrete of size upto - 1.20 Mt x 1.20 Mt x 0.075mt thick including transporting, loading, unloading fixing etc. complete. The rate shall also include for erecting and fixing the pieces in position with necessary equipment without any damage. (Sample to be approved) (Brands: Vyara, Arya Precaset, Alcock)

82 Bus Shelter Specifications

Name of Work	Smart Bus shelters within ‘Coastal Promenade’ (including Fort road promenade) in Diu city.
<u>Design Objectives:</u>	The objective is design and installation of Smart bus shelters at the designated locations along the coastal promenade. Appropriate design options shall be worked out by contractor and presented to Authority. The design option approved by Authority will be implemented within the street network.
<u>Bus Shelter Specifications</u>	
Function & Sizing	<ul style="list-style-type: none"> • Bus Shelter – shall serve as all-weather shade for the bus commuters and the display area per shelter shall not exceed 10 sqmt. • The structure shall be designed to withstand wind load according to regulations. • The display systems can have fixed or scrolling faces with back light
Materials	<ul style="list-style-type: none"> • Bus shelter shall be made of stainless steel (SS 304 grade) frame work, rustproof coated metal roofing, metal seating, toughened glass/ acrylic and electronic circuit to control its lighting. • All the stainless steel parts shall be HDG –Hot dip galvanized and aluminum parts shall be anodized or powder coated to give longer life and better quality. The material used shall be unaffected by outdoor exposure • The material shall be Non-flammable. • The Foundation slab shall be made in min M25 concrete. • The cast iron nuts, bolts shall be rust proof and deep galvanized powder coated etc.
Advertisement Panel	<ul style="list-style-type: none"> • 3000 x 1800 main advertisement panel • SS 304 frame and LED fixture for uniform backlight
Information Panel and Variable	<ul style="list-style-type: none"> • 1500 x300 VMS board connected with WIFI to show bus schedules and bus Status

Name of Work	Smart Bus shelters within 'Coastal Promenade' (including Fort road promenade) in Diu city.
Message System	<ul style="list-style-type: none"> • 1500 x 1500 Route Map + information display (Backlit)
Maintenance	<ul style="list-style-type: none"> • The display shall be covered using toughened glass/ acrylic, with protective frames on its edges which shall be also cleaned periodically. • The poles and metal parts shall be coated for protection in case found damaged. • The furniture shall be maintained by washing and periodic servicing. • No leakage from roof to be permitted. • The lighting arrangement on Lit Shelters should be functional. Electrical safety is to be ensured for users. • All structural members, seating arrangements and advertisement panels are to be inspected and maintained in good condition
Vandalism-proof	<ul style="list-style-type: none"> • The Parts used shall not be fragile and safely secured to its foundation with anchor fasteners which makes the furniture more stable and joint fasteners not visible from outside. • None of the joints shall be visible from outside the furniture and it is completely sealed. Opening shall be by specialized key.
Security & Safety parameter	<ul style="list-style-type: none"> • There shall be no falling parts, no sharp edges involved in the furniture all the parts shall be well fastened. • The foundation used shall be designed in order to take loads from wind and persons leaning over the panel. • Provision for installation of CCTV camera for surveillance, which will be implemented as part of Command Control Centre module.
Durability parameter	<ul style="list-style-type: none"> • The parts used shall be of steel, aluminum, toughened glass or acrylic for better durability. • The stainless steel shall be treated to be resistant in all weathers.
Design Parameter	<ul style="list-style-type: none"> • The overall design of the shelter and aesthetic features shall be simple, modern and well designed to go with the Smart City Theme and match with the city's architectural language. • All bus shelters shall be of uniform shape, size, & colour. • Modular design is recommended
Universal design	<ul style="list-style-type: none"> • The furniture should also cater to differently abled users. • Design and manufacture should comply with ISO requirements.

Name of Work	Smart Bus shelters within 'Coastal Promenade' (including Fort road promenade) in Diu city.
Innovation	<ul style="list-style-type: none"> • The design should be innovative in terms of design & material & should also fit in the Smart City Theme • The display systems can have fixed or scrolling faces. The scrolling posters shall be driven by plastic belts in order to minimize the noise

83 BAMBOO FRAMEWORK OF CREEPER KATTA:

83.1 Materials

The framework of the bamboo installation (Creeper kata) shall be made using poles of Bamboo species *Dendrocalamus stocksii* having bamboo pole dia. of > 40mm at bottom and >25mm at top and with minimum wall thickness of 5 mm. (Avg. 35mm dia.)

83.2 These bamboos will be treated with pressure treatment method in an FRI (Forest Research Institute) Dehradun / NMBA (National Mission on Bamboo Application, Govt. of India) / INBAR (International Network on Bamboo and Rattan), certified 'pressure vacuum treatment plant' and using preservative CCB (Chromium Copper Boron) as per method and standards.

83.3 These bamboos shall be used for making bamboo columns, bamboo beam and bamboo arch including straitening or bending of bamboos, bunching of bamboos, assembly and its installation as per design using bamboo pegs and adhesive, SS Grade 304 studs / bolts, nuts and washers.

83.4 All bamboo poles shall be treated in accordance with IS code 9096:2006.

83.5 Preservative used –

Copper-chrome-boron (CCB) preservative containing boric acid, copper sulphate and sodium dichromate in 1.5:3:4 conforming to IS 10013 (Part 3) shall be used for treatment.

All bamboo poles shall be treated using vacuum-pressure treatment. Each Bamboo pole shall be drilled two 3 mm diameter holes at every internode to ensure penetration of preservative from inner walls. Water based preservative should have 6 to 8 % concentration at the time of treatment and the retention level of preservative in the bamboo pole after the treatment should not be less than 8 kg/m³

84 GFRC- BOLLARDS

Providing and fixing Cast Iron bollard of 200mm dia. x 1000mm height from finished level as single cast UV resistant stabilise colour pigment, colour as per Architects choice including fixing, cleaning surfaces and complete and including cost of loading -unloading and placing with crane.

- **Material**

Bollards shall be installed at pedestrian crossing, junctions & along the pedestrian as per drawing and specification. The bollards shall serve the purpose of defining the edge of the road and guide

pedestrians. Concrete Bollards should be as mentioned specification above with exposed finish, with integrated colour pigment and the foundation slab shall be made.

- **Maintenance**

Quarterly checking should be done for bollards. Replacing of broken bollard should be done immediately as and when required. The furniture shall be maintained using soap water with pressured pump for washing.

- **Security & Safety parameter**

The foundation used shall be designed in order to take loads from pedestrians and parked cars and other factors. There should be no sharp edges visible or reachable by users. The bollards shall not be fragile and safely secured to its foundation.

- **Durability parameter**

The parts used shall be of better durability for all seasons. It should be shock resistant.

- **Design parameter**

The looks shall be simple and modular. All bollards shall be of uniform shape, size and colour.

- **Environment parameter**

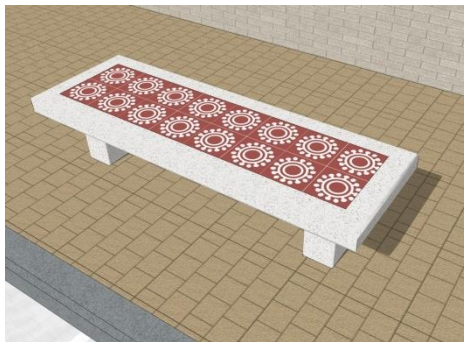
As far as possible recyclable materials shall be used for Street Furniture.

- **Universal design**

The furniture should also cater to differently-abled users. Design and manufacture should comply with ISO requirements.

85 Precast Glass Fibre Reinforced Concrete Backless Bench

Precast GFR Concrete designer backless bench of 1800x400x650 LBH single cast mono element with terrazzo smooth finish made of Full Depth Terrazzo mix High Performance concrete with texture of White cement base + tiles of heritage pattern on 25mm thick mortar. Glass Fiber Reinforced Concrete 12 MPa flexural strength and 40MPa Compressive Strength, UV resistant stabilise colour pigment, colour as per Architects choice including fixing, cleaning surfaces and complete and including cost of loading -unloading and placing with crane.

1	weight-	95 Kg / Sq.ft	
2	Dimensions	1800mm X 400mm X 650mm	
3	Colors	Any Colors	
4	Materials	Pigmented glass fiber reinforced concrete	
5	Concrete strength	Flexible strength- 12MPa Compressive strength- 40MPa	

6	Surface finish	Smooth or textured finish (optional)	
7	Surface Treatment	Sealed or weather proof coating (Optional)	
8	Application	Indoor and Outdoor	

- **Maintenance**

Twice in a year, Rinse the top with warm water to remove surface dirt and wipe dry with a clean, soft cloth for routine maintenance. Wash with a soft cloth and a mixture of a mild detergent and warm water. Rinse with warm water, and wipe dry with a clean, soft cloth. Do not use abrasive, acid, alcohol-based, or solvent-based cleaners; they will damage the surface. Fixing of damaged part and replacement if necessary.

- **Security & Safety parameter**

The finishing of the bench shall be such that it is safe for users and does not have any sharp edges that may cause injury; also, it shall be either bolted or fastened to ground as mentioned earlier. All the edges should be of smooth semicircular chamfer finish. The bench should be either bolted or installed with a foundation by anchor fasteners or chemical fasteners which will make the furniture more vandal proof.

- **Design parameter**

The design shall be elegant with smooth curves that make it aesthetically good and appealing for the users. It shall be innovative & contemporary. Modular design is recommended for Street Furniture. Modular design is recommended for Street Furniture.

- **Universal design**

The furniture should also cater to differently-abled users. Design and manufacture should comply with ISO requirements.

Material Specifications – Water Supply and Sanitary Works

Section – 1:

Designing, Providing, Laying, Jointing, Testing and Commissioning of Pressurized Water Supply System Using Ductile Iron Pipes Along with Valves, Fittings Etc.

1. General Specification & Standards- water supply

The specification specifies the requirements of Ductile Iron (DI) pipes and fittings equipped along with fittings, intended for transportation of water supply to various land uses.

1.1 References and Standards

Except where otherwise specified the works under this project shall comply with the requirements of relevant Indian Standards (IS), CPWD specifications and manufacturer's instruction manual. If required reference is not available, for any of the work(s) mentioned in the specifications and tender, in IS code(s) then relevant clauses of either British Standards (BS) or

ISO Standards shall be followed. The following standards and the amendments made thereto till date and any other IS code provisions found to be applicable to this work shall be binding on the bidders (bidding and executing the work). All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions and amendments of the standards indicated below, but not limited to these only:

Specifications for Centrifugally Cast (Spun)

D.I. Pipes for Water, Gas, and Sewage. 8329 – 1980

D. I. Fittings for pipes for water, gas and sewage. 9523 – 1980

A	D.I. AIR Valves	3896-1985
B	D.I. Valves	14846-2000
C	Surge Protection Valves	14846-2000
D	DI Pipes	8329-2000
E	DI Specials	9523-2000
F	DI Laying & Jointing	12288-1987
G	DI Rubber Rings	5382-1985

The bidders are therefore advised to refer and follow all relevant IS codes and amendments along with relevant ISO codes till date regarding supplying, testing, commissioning of DI pipes and fittings, their testing, dimensions and measurement, composition of raw material, physical properties, mechanical characteristics, laying, jointing and their performance requirements, sampling and conformity criteria, marking and certification, etc.

If there are varying or conflicting provisions made in any one document forming part of the contract, the Authority Engineer shall be the deciding authority with regard to the intention of the document and his decision shall be final and binding on the Contractor.

1.2 Ductile Iron Pipes and Specials:

The pipes required to be supplied for the works shall confirm to the I.S 8329:2000.

General

The following standards, specified herein shall be referred. In all cases, the latest revision of the codes shall be referred to. If requirements of specifications conflict with the requirements of the codes and standards, this specification shall govern.

- IS: 8329 Specification for Centrifugally Cast (spun) Ductile Iron pressure pipes for water, gas and sewage specification.

- IS: 1387 General requirements for supply of metallurgical materials.
- IS: 1500 Methods for Brinell hardness test for metallic materials.
- IS: 9523 Ductile Iron fittings for pressure pipes for water, gas and sewage.
- IS: 12820 Dimensional requirements. of rubber gaskets for mechanical Joints and push on joints for use with cast Iron pipes and fittings for carrying water, gas and sewage.
- ISO: 4179 Ductile iron pipes for pressure and no pressure- Centrifugal cement mortar lining - General requirements.
- ISO: 2531 Ductile iron pipes, fitting and accessories for pressure pipe lines.

The general requirements relating to the supply of material shall be as per IS: 1387.

Marking

Marking shall be done as per IS: 8329.

S.No	Type of Valve	Size	Construction	Ends
a.	Ball Valve (Isolation valve)	15 mm to 50 mm	Brass/ Bronze	Screwed
b.	Butterfly Valve	65 mm and above	Cast Iron	Flanged
c.	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

Table 1: Relevant Indian Standards & Specifications

S. No	Code or Standard	
1	Manual for Water Supply & Treatment	CPHEEO Manual for Water Supply & Treatment – 1999-MoUD, GoI
2	Manual on operation and Maintenance on water supply	CPHEEO Manual on Operation and Maintenance of water supply systems, 2005 MoUD, GoI
3	SP 7 (Part-9 Section-1) 1983	National Building Code of India
4	SP 35:1987	Hand book on water supply & drainage
5	IS 2065:1983	Code of practice for water supply in buildings

S. No	Code or Standard	
6	IS 1172 :1993	Code of Basic requirements for water supply, drainage and sanitation
7	IS 456-2000	Code of Practice for plain and reinforced concrete
8	IS 2309-1969	Code for Lighting arrestors
9	IS 1786-1985	High strength deformed steel bars and wires for concrete reinforcement
10	IS: 638	Specification for rubber and insertion jointing.
11	I.S. 1538 (Part I to XXII) 1976	Specification for cast Iron fittings for pressure pipes for water, gas and sewage
12	IS: 3658-1981	Code of practice for liquid penetrant flaw detection
13	IS. 226-1975	Specification for Structural steel
14	IS: 9523	Ductile iron fittings for pressure pipes for water, gas and sewerage
15	IS: 1500	Code for Hardness test for DI pipes
16	IS:909-1976	Code for C.I. Fire Hydrants
17	IS 7634 Part-2 (2012)	Code of practice for plastic pipework for potable water–Laying and jointing of polyethylene pipes
18	IS 11606-1986	Methods of sampling cast iron pipes and fittings
19	IS 3764-1966	Safety code of Excavation works and related Drilling Operations
20	IS 11906:1986	Recommendations for cement mortar lining for cast iron, Mild steel and Ductile Iron pipes and fittings for transportation of water
21	IS 9668:1980	Code of practice for provision and maintenance of water supply for fire fighting
22	IS 12288:1987	Code of practice for laying of ductile iron
23	IS 14846:2000	Sluice valves for water works purposes (50 to 1200 mm size)
24	IS 2906:1990	Sluice valves for water works purposes (350 to 1200 mm size)

S. No	Code or Standard	
25	IS 2685:1971	Code of practice for selection, installation and maintenance of sluice valves
26	IS 3950:1979	Surface boxes for sluice valves
27	IS 9739:1981	Pressure reducing valves for domestic water supply systems
28	IS 2692:1978	Ferrules for water services
29	IS 10446:1983	Glossary of terms relating to water supply and sanitation
30	IS 10500:2012	Drinking water quality
31	IS2951-1965	Recommendation for estimation of flow of liquids in closed conduits.
32	IS 904-1983	Specifications for two-way and three-way suction collecting heads for firefighting purposes
33	IS 1641-1988	Code of practice for fire safety of building (general) – General principles of fire grading and classification
34	IS 2871 – 2012	Branch Pipe, Universal for firefighting purpose - Specification
35	IS 2469 – 1988	Specifications for pumps for firefighting system
36	IS 13039 – 1991	External Hydrant systems – Provision and maintenance – Code of Practice
37	IS 15301 – 2003	Installation and maintenance of firefighting pumps – Code of Practice
38	SP-7: Part IV	National Building Code
39	A guideline notes on continuous water supply (24X 7 supply)	Guidelines for preparation of DPRs for water supply system by MoUD, 2013
40	Advisory note on improving Urban Water Supply & Sanitation Services	Guidelines for preparation of DPRs for water supply system by MoUD, 2013

Table 2: Relevant International Standards & Specifications

S No	Code or Standard	Description
1	ISO: 10803-1997	Design method for ductile iron pipes
2	ISO: 2531-1991	Ductile iron pipes, fittings and accessories for pressure pipelines
3	ISO: 4179-1985	Ductile iron pipes for pressure and non-pressure Centrifugal cement mortar lining – General requirements
4	BS 3416	Bitumen based coatings for cold application, suitable for use in contact with Potable water
5	ISO: 8179-1995	Ductile iron pipes-External Coating-Part-1 Metallic Zinc with finishing layer
6	ISO: 4633-1996	Rubber seals-Joint rings
7	AWWA C600	Installation of ductile iron water mains and their appurtenances
8	BSEN -545	Code for Ductile Iron Flanges and Specials
9	AWWA Manual M41	Ductile Iron Pipe and Fittings (Third Edition)
10	AWWA Manual M55	PE Pipe- Design and Installation (First Edition)

SECTION - 02: BASIS OF DESIGN AND INSTRUCTIONS

1. BASIS OF DESIGN

The Plumbing, Sanitary, Drainage & Rain water disposal System for the villa is designed keeping in view the following:

Requirement of adequate and equal pressure availability of water lines in Overhead tanks of Villas.

Adequate storage of water in Overhead water tanks, preferably for a day consumption.
Provision of Pressure pumps installation in case of uses of high end fixtures to be use.

The execution of works and materials used shall be as per the latest relevant I.S. specifications.

Wherever reference has been made to Indian Standard or any other specifications, the same shall mean to refer to the latest specification irrespective of any particular edition of such specification being mentioned in the specifications below or Schedule of Quantities.

2. CONCEPT OF THE SYSTEM

The following services are envisaged:

Domestic water and Flushing water shall be supply to Overhead tank of each Villa by Central Pressure Pumping system.

Sewage and Sludge collection system based on IS: 1742 and applicable standards for domestic drainage.

Storm / Rain water drainage system from various levels of the building and disposal to available in the storm water system.

Separate Garden water supply hydrant taps from Flushing water lines at required distance.

WATER STORAGE & DISTRIBUTION SYSTEM**Water Requirement**

The water requirement for the project is proposed to be based on the provisions of IS: 1172, SP 35 and prevalent practice. The estimated requirement of water per day for the Villas is based on the number of users. Landscape water demand based on Green area and water demand as per Landscape consultant.

Source of Water

Main source of water supply shall be Sardar Sarovar Narmada Nigam Ltd. (SSNNL) by Clients' own Pumping station. Water shall be supply 24x7.

Water Quality

Basic Supply water shall be treated by Society at Pump room or at Source water collection point. Treatment shall be done to remove heavy and floating particles.

Water Distribution

The water distribution for cold water supply for the Villa shall be designed on principle of availability of adequate residual head at Terminal. Provision of pressure reducing station and non-return valve shall be made for effective and efficient water distribution in the line if required.

Appurtenant

Following components shall be included in the water supply system for efficient functioning:

- i. Automatic air vent at each of the high point.
- ii. Pressure Release valve where abnormally high pressure is to be reduced.
- iii. Water meter.
- iv. Pressure Gauge.

SEWAGE, SULLAGE AND STORM WATER

Soil & waste stacks of different line shall be diverted & connected to sewer network which will be terminated at STP. Every cluster has own STP which shall be allocated at different place, this STP shall be packaged type.

Design Limitations

The system is designed considering the following:

- High thrust developed at soil & water pipe connections.
- Termination of vent cowl at terrace level.
- Provision of adequate slope for horizontal header pipes for achieving self-cleaning velocity in the pipes.
- Provision of cleanout plug.

WORKMANSHIP

The workmanship shall be best of its kind and shall conform to the specifications, as below or Indian Standard Specifications in every respect or latest trade practices and shall be subject to approval of the Owner's Site Representative. All materials and/or Workmanship which in the opinion of the Owner's Site Representative / Architect / Consultant is defective or unsuitable shall be removed immediately from the site and shall be substituted with proper materials and/or workmanship forthwith.

MATERIALS

All materials shall be best of their kind and shall conform to the latest Indian Standards.

All materials shall be of approved quality as per samples and origins approved by the Owner's Site Representative / Architect / Consultants.

As and when required by the Owner's Site Representative / Consultant, the contractor shall arrange to test the materials and/or portions of works at his own cost to prove their soundness and efficiency. If after tests any materials, work or portions or work are found defective or unsound by the Owner's Site Representative / Consultant, the contractor shall remove the defective material from the site, pull down and re-execute the works at his own cost to the satisfaction of the Owner's Site Representative / Consultant. To prove that the materials used are as specified the contractor shall furnish the Owner's Site Representative with original vouchers on demand.

PRECEDENCE

Any conflict between the technical requirements stated in the Data sheet or Purchase Order and the technical requirements of this specification shall be referred to Owner for clarification. The precedence of purchase documents is as follows:

- This specification / Data Sheet
- Documents referenced in this specification

The technical requirements specified in the Data sheet or Purchase Order including terms, conditions and legal requirements.

TEST CERTIFICATE

The contractor shall submit test certificates for all the relevant material / system installed. These shall be issued by a government recognized inspection office certify that all equipment, materials,

construction and functions are in agreement with the requirements of these specifications, ISI and when ISI is not applicable other approved certify agencies.

INSTRUCTION MANUAL:

The contractor shall prepare and produce instruction, operation and maintenance manuals in English for the use, operation and maintenance of the supplied equipment and installations, and submit hard copy to client.

PRODUCTS SAMPLES AND CATALOGUE:

Before ordering the material necessary for these installations, the contractor shall submit to consultant / client for approval, a sample of every material such as pipes, valves, accessories etc., along with the catalogues.

Prior to ordering any plumbing equipment/material/system, the contractor shall submit catalogues, along with the samples, at least from 2-3 different manufacturers to consultant / client. After the selection of manufacturer by consultant / client, the contractor shall arrange inspection and testing at the manufacturer's factory or assembly shop for final approval. No material shall be procured prior to the approval of the consultant / client.

SHOP DRAWINGS:

The contractor shall prepare and submit Shop drawing to Consultant/Client, for his approval, two sets of detailed drawings of all water supply drainage pipe route, valve arrangement, connection details, support details etc to be provide with respect to site condition by the contractor, or other vendor within 15 days of signing of the contract.

The consultant / client reserve the right to alter or modify these drawings if they are found to be insufficient or not complying with the established technical standards or if they do not offer the most satisfactory performance or accessibility for maintenance.

AS BUILT DRAWINGS

At the completion of work and before issuance of certificate of virtual completion the contractor shall submit to consultant / client., three sets of layout drawing drawn at appropriate scale indicating the complete wiring system "as installed" duly approved by Consultant. These drawings must provide with plan, elevation and section.

SECTION-03 : SANITARY FIXTURES & FITTINGS**SCOPE:**

Work under this section shall limited up to receiving , unloading, shifting, testing, safe keeping, storing, installing & commissioning etc. and all labor as necessary as required to completely install all sanitary fixtures, brass and chromium plated fittings and accessories as required by the drawings and specified hereinafter.

All the sanitary fixtures & C.P. fittings shall be check as per the specified / approved catalogue no. of specified manufacturer as per selected.

General Requirements

- All fixtures and fittings shall be fixed with all such accessories as are required to complete the

item in working condition whether specifically mentioned or not in the specifications, drawings or not.

- All fixtures and accessories shall be fixed in accordance with a set pattern matching the tiles or interior finish as per architectural design requirements. Wherever necessary the fittings shall be centered to dimensions and pattern desired.
- Fixing screws shall be half round head chromium plated brass / GI with C.P. washers wherever required as per directions of Client's Representative.
- All fittings and fixtures shall be fixed in a neat workmanlike manner true to levels and heights shown on the drawings and in accordance with the manufacturer's 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, wall or ceiling surfaces shall be made good at Contractors cost.
- All fixtures of the similar materials shall be by the same manufacturers.
- All fitting shall be of the chromium plated materials.
- Without restricting to the generally of the foregoing the sanitary fixtures shall include all sanitary fixtures, C.P. fittings and accessories etc. necessary and required for the building.
- Whether specifically mentioned or not all fixtures and appliances shall be provided with approved fixing devices, nuts, bolts, screws, and hangers as required. These supports shall have the necessary adjustment to allow for irregularities in the building area construction.
- For the installation of the CP fittings, Teflon tape shall be used.

EUROPEAN W.C.:

European W.C. of glazed vitreous china shall be wash down, single or double siphonic type, floor or wall mounted set (P trap or S Trap), flushed by means of concealed dual flush tank as specified in Bill of Quantities. Flush pipe/bend shall be connected to the W.C. by means of suitable rubber adopter. Wall hung W.C. shall be supported by C.I. floor mounted chair / Anchor Fastener.

Each W.C. quiet close seat cover shall be so fixed that it remains absolutely stationary in vertical position without falling down on the W.C. Seat cover shall be of approved color & type solid plastic, elongated open front with heavy duty hinges. Exposed fixture trims shall be Chrome plated, and trims of similar function shall be by the same manufacturer.

Dual concealed Flush tanks shall be of the best approved quality procurable within built C.P. control valve and C.P. flush pipe. The flush pipe/bend shall be connected to the WC by means of a suitable rubber adopter.

Alternatively if flushing cistern to be used shall conform to the requirements of IS: 774-1971. High level cisterns shall be of cast iron unless otherwise specified. Low level cistern shall be of the same material as the water closet or as instructed by the Owner/Architect/ Consultant. The cisterns shall be mosquito proof & shall fulfill the requirements of the local Authority.

The levels of the WC should be checked by placing strip level on the W.C. W.C. should be tested on completion of fixing by putting small paper balls and flushing out. If all the paper balls are not flushed out, the fixing will have to be rectified / re-aligned.

HEALTH FAUCET

The C. P. Health faucet shall be of best quality, as specified in BOQ item and of approved make. The chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958. Each health faucet provided with 1 mtr. Long flexible PVC tube and wall hook etc.

The health faucet Hook & health faucet shall be fixed in position as per drawings or as directed by Architect / EIC. The height shall be approx. 45cm from floor level if not mentioned in the drawing. The one end of 1.0 meter long pipe shall be connected to faucet & other end to the angle cock.

FLUSHING CISTERN

The Concealed Cistern material shall be of best of quality conforming to IS 776 -1979. It should be green building approved with low flow type with dual flush 2/4 liters capacity. Designed for low volume flushing from 3/6 or 2/4 liters of water, flushed by means of a porcelain flushing cistern or an exposed or concealed type (as detailed in the drawings or as directed by the Owner's Site Representative) and a low level cistern with maximum height of 30 cm between the top of the pan and under side of the cistern.

Low level cistern handle shall be Plastic cistern, operation of cistern shall be through Push Button at the top for dual system and beyond plastic handle.

SEAT AND COVER

The seat and cover shall be of the best Indian make conforming to I.S. 2548-1980. They shall be made of molded from PP heavy duty material which shall be tough and hard with high resistance to solvents and shall be free from blisters and other surface defects and shall have chromium plated brass hinges and rubber buffer of suitable size.

Installation of seat and cover to water closet- The seat shall be fixed to the pan by means of two corrosion resistant hinge bolts with a minimum length of shank of 65 mm and threaded to within 25 mm of the flange supplied by the manufacturer along with the seat. Each bolt shall be provided with two suitably shaped washers of rubber or other similar materials for adjusting the level of the seat while fixing it to the pans. In addition, one non-ferrous or stainless steel washer shall be provided with each bolt.

SQUATTING PANS (INDIAN TYPE W.C.)

Squatting pans shall be of white vitreous china conforming to IS 2556 Part-I for General Requirements and relevant IS codes for each pattern as described below: (i) Long pattern-conforming to IS 2556 (Part-3).

(ii) Orissa pattern-conforming to IS 2556 (Part-3).

(iii) Integrated type conforming to IS 2556 (Part-14).

Preferably Orissa type pan should be used.

Each pan shall have an integral flushing rim of suitable type. It shall also have an inlet or supply horn for connecting the flush pipes, as shown in Fig. 17.19, 17.20 & 17.21. 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.

WASH BASINS:

Wash basin shall be of approved color & type vitreous china of best quality manufactured by an approved firm and sizes as specified in the Bill of Quantities.

Wash basin shall be of required size, shape, type as specified in detailed BOQ shall be supported on a pair of C.I. brackets of approved design.

The wash basin shall be fixed in position as indicated in the drawing or as directed by Client's Representative. Basin shall be supported on a pair of C.I brackets which is embedded in cement concrete (1:2:4) block 100 x 75 x 150 mm.

Oval shape or round shape wash basins are required to be fixed in RCC platform with stone tapping either fully sunk in stone top or flush with stone topping.

The wall plaster on seat shall be cut to rest over the top edge of the basin so as not to leave any gap for water seepage through between wall plaster & skirting of basin. The gap between basin and wall shall be finished with white matching cement.

WASTE COUPLING

Waste Coupling shall conform to IS 3311. Waste fittings shall be of CP with thickness of CP coating not less than service Grade No.2 of IS 4827 which is capable of receiving polish and will not easily scale off. The fitting shall conform in all respect to IS 2963 and shall sound, free from laps below, holes and fittings and other manufacturing defects. External and internal surface shall be clean and smooth. They shall be neatly dressed. The waste fitting for wash basin shall be of nominal size of 32 mm and for sink shall be nominal size 50 mm.

Waste coupling shall be fixed to wash basin, sink or urinal as ordered with necessary specials. Jointing shall be done with white zinc, yarn etc. A few turns of fine hemp yarn dipped in the linseed oil shall be taken over the threaded ends to obtain complete water tightness. Leaky joint shall be remade to make it leak proof.

BOTTLE TRAP

Bottle trap shall be of C.P with thickness of CP coating not less than service grade No. 2 of IS 4827 which is capable of receiving polish and will not easily scale off. The fitting shall conform in all respect of IS 2963 and shall be sound, free from laps below, holes and fittings and other manufacturing defects. External and internal surface shall be clean and smooth. They shall be neatly dressed and be truly machined so that nut smoothly moves on the body. The Bottle trap for wash basin shall be of nominal size of 32 mm and for sink shall be nominal size 50 mm.

Bottle trap shall be 31mm single piece molded with height of 300 mm, effective length of tail pipe 200 mm from the centre of the waste coupling, 77 mm breadth with 25 mm minimum water seal, weighing not less than 260 gms.

Bottle trap shall be fixed to wash basin, sink or urinal as indicated in the drawing with necessary specials or as ordered by the Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness. Leaky joint shall remade to make it leak proof.

MIRROR

The mirror shall be of superior sheet glass with edges rounded off or beveled, size 600 x 450 mm unless specified in the schedule. It shall be free from flaws, specks or bubbles and thickness plated and should not be less than 5.0 mm. The back of mirror shall be uniformly silver plated and should be free from silvering defects. Silvering shall now have a protective uniform covering of red lid paint, where beveled edge mirror are not available. Fancy looking mirrors with PVC beading/border or aluminum beading on stainless steel beading/border based on manufacturer's specification, provided nothing extra shall be paid on this account. The backing of mirror shall be provided with 6mm thick marine plywood or environmentally friendly material other than asbestos cement sheet.

Mirror shall be fixed in position with 6mm thick marine ply wood backing. It shall be fixed by means of 4 nos. of CP brass screws & caps over rubber washers and roll plug or as per the manufacturer's specification unless specified otherwise the longer side shall be fixed horizontally.

PAPAR HOLDER

The C.P. Toilet paper roll holder shall be of chrome plated of specified size and design as approved by the Architect / Engineer-in-charge. Tissue roll holder shall conform as per IS standard and should have ISI mark. The chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958

Tissue roll holder shall be fixed in position as per drawings or as directed by Architect / EIC to the wall with C.P brass or SS screws as approved by Architect / EIC, with the help of PVC grip of Jaquar/Cera/Parryware/Hindware or equivalent.

TWO WAY BIB COCK

The item pertains to provide chromium plated brass combination tap assembly wall mounted for wc, sink, basin etc. including free flanges and fixing. Basin mixer shall be as specified in item, and as approved by Architect / EIC. PVC water inlet connections compatible for hot and cold water as specified in item, shall conform to IS specifications and shall be of standard pattern with braided hose of minimum 450 mm long with CP brass check nut at both the end and shall be able to withstand the testing pressure of 1 Mpa (10 kg/sq. cm.)The combination tap assembly shall be 15 mm nominal size or as specified in the schedule.

It shall be of C.P. brass approved and heavy quality, and shall conform to I.S. 8931. Combination tap assembly shall be chromium plated-brass and shall conform to IS 8931.The nominal size of combination tap assembly shall be 15 mm nominal size or as specified. Casting of combination tap assembly shall be sound and free from laps, blow hole and pitting. External and internal surface shall be clean, smooth and free from sand and be neatly dressed. All the parts fitted to pillar tap shall be axial, parallel and cylindrical with surfaces smoothly finished. Thickness of C.P

coating shall not be less than service grade no.2 of IS 4827 and plating should be capable of taking high polish which shall not easily tarnish or scale.

Combination tap assembly shall be fixed to the pipe line as indicated in the drawing with necessary special as required or as ordered by Engineer-in-charge. Jointing shall be done with Teflon tape, etc. Combination tap assembly shall withstand and internally applied hydraulic pressure of 1.6Mpa (16 kg/sq. cm) for period of 1 minutes during which, it shall neither leak nor sweat. Leaky joint shall be remade to make it leak proof.

PILLAR COCK

The item pertains to provide chromium plated brass combination tap assembly wall or floor mounted hot & cold mixing for sink, basin etc. including free flanges and fixing. Pillar cock shall be as specified in item, and as approved by Architect / EIC. The combination tap assembly shall be 15 mm nominal size or as specified in the schedule. It shall be of C.P. brass approved and heavy quality, and shall conform to I.S. 8931. Combination tap assembly shall be chromium plated-brass and shall conform to IS 8931. Casting of combination tap assembly shall be sound and free from laps, blow hole and pitting. External and internal surface shall be clean, smooth and free from sand and be neatly dressed. All the parts fitted to pillar tap shall be axial, parallel and cylindrical with surfaces smoothly finished. Thickness of C.P coating shall not be less than service grade no.2 of IS 4827 and plating should be capable of taking high polish which shall not easily tarnish or scale.

Combination tap assembly shall be fixed to the pipe line as indicated in the drawing with necessary special as required or as ordered by Engineer-in-charge. Jointing shall be done with teflon tape, etc. Combination tap assembly shall withstand and internally applied hydraulic pressure of 1.6Mpa (16 kg/sq. cm) for period of 1 minutes during which, it shall neither leak nor sweat. Leaky joint shall be remade to make it leak proof.

URINAL WITH SENSOR

The lipped type urinal shall be flat back and shall conform to I.S. 771-1979. It shall be of best Indian make, size and color as specified and approved by Architect / EIC. It shall be of the first class quality and free from any defects. The urinals shall have fixing arrangement 32 mm dia. CP domicile waste and CP pipes with a wall flange. The urinal shall be fixed to the wall by one CI bracket and two CI wall clips, as approved by the manufacture complete as directed. The auto flushing sensor and closing valve shall be fixed with inlet connection of urinal. The auto flushing sensor should be low flow green building approved fixture. Unit automatically serves (the range in about 40 cms.) and flushes in two steps. The pre flush is for 2 seconds duration and the final flushing is for 7 seconds duration.

The urinals shall be fixed in position by using fastener/CI brackets and shall be at a height 60 cms from the floor level to the top of the lip or urinal, unless otherwise directed. The bracket shall be 50 mm x 50 mm at base lapping to 38 mm x 38 mm at top and 50 mm in length shall be fixed in wall in cement mortar 1 : 3 (1 cement : 3 coarse sand). The urinal shall be connected to 50MM mm. dia. PVC waste pipe (through bottle trap) which shall discharge in the floor trap. The connection between the urinal bottle trap and flush or waste pipe shall be made by means of putty or white lead mixed with chopped hemp/rubber gasket of bottle trap.

ANGLE VALVE

Angle stop cock is a valve with a suitable means of connections for insertion in a pipe line for controlling or stopping the flow. These shall be of size 15 mm sizes or as specified and shall be of screw down type. The closing device shall work by means of disc. Carrying a renewable non-metallic washer with shuts against the water pressure on seating right angles to the axis of the threaded spindle which operates it. The handle shall be crutch, butterfly or fancy design type securely fixed to the spindle. The tap shall open anti clock wise direction.

Angle stop cocks shall conform to IS 781, they shall be polished bright. They shall be sound and free from taps, blow hole and fitting. Internal & External surface shall be clean, smooth and free from sand and neatly dressed. Taps shall be nickel chromium plated and thickness of coating shall not be less than service grade No.2 of IS 4827 and plating shall be capable of taking high polish which shall not be easily tarnished.

Every tap complete with its component shall with stand an internally applied hydraulic pressure of 2 MPa (20 kg/sq.cm) maintained for a period of 2 minutes during the period it shall neither leak nor sweat. Leaky joint shall be remade to make it leak proof without any extra cost from contractor.

The body of stop cock of 15mm diameter with adjustable flange shall be as specified above shall be fixed on water supply line keeping the arrow in the direction of flow as per drawing or as directed. Transition male /female adopter with shall be used on either side on PVC pipes. The threaded portion shall be smeared with white or red lead and around with a few turns of fine spun yarn round the screwed end of the cock. On completion the tiling work, the outer part of stop cock shall be fixed to the brass body.

CP BRAIDED HOSE PIPE

The CP braided hose pipe connection shall be of Make as specified / approved by architect/ consultant and of size and design as approved by the Architect / Engineer-in-charge. Hose pipe shall conform as per Manufacturer standard and should have ISI mark. The chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958

The CP braided hose pipe shall be fixed in position as per drawings or as directed by Architect / EIC to the wall with C.P brass or SS screws as approved by Architect / EIC

The hose pipe shall be 450 mm long Braided Hose pipe with M10X1 Nipple, 15mm Nut, O-Ring & Rubber Washer (Suitable for Wash Basin, Kitchen Sink etc) of approved make and conforming to Manufacturers Standards.

TOWEL RING

The Towel ring shall be of Make as specified and of size and design as approved by the Architect / Engineer-in-charge. Towel Ring shall conform as per Manufacturers standard and should have ISI mark. The chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958

Towel Ring shall be fixed in position as per drawings or as directed by Architect / EIC to the wall with C.P brass or SS screws as approved by Architect / EIC, with the help of PVC grip of HILTI/Fischer or equivalent.

SHOP DISPENSER

The Soap Dispenser shall be of Make as specified and of size and design as approved by the Architect / Engineer-in-charge. Towel Ring shall conform as per Manufacturers standard and

should have ISI mark. The chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958

Soap Dispenser shall be fixed in position as per drawings or as directed by Architect / EIC to the wall with C.P brass or SS screws as approved by Architect / EIC, with the help of PVC grip of HILTI/Fischer or equivalent.

COAT HOOK

The Robe Hook shall be of Make as specified and of size and design as approved by the Architect / Engineer-in-charge. Robe Hook shall conform as per Manufacturer standard and should have ISI mark. The chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958

The Robe Hook shall be fixed in position as per drawings or as directed by Architect / EIC to the wall with C.P brass or SS screws as approved by Architect / EIC, with the help of PVC grip of HILTI/Fischer or equivalent.

WATER COOLER

Water cooler shall be storage type heavy duty faster cooling unit suitable for installation. With in hot shop bay/ office premises The water coolers shall be conforming to IS:1475-1978 and energy performance shall be as per IS:1475(Part1).-2001 The Water cooler shall be SS body and SS Storage tank free from any corrosion and bacteria/algae formation. Necessary interconnecting water piping (having a maximum length of 20m) & fittings shall be included for connection of drinking water network within each of the places (Refer electrical portion of the TS –For location) to the water coolers. Water coolers shall be supplied with lead cable and industrial duty 240V, 15/5A switch socket unit suitable for installation

On shop columns of each of the above areas. The features of water cooler & water purifier are as follows.

Cooling Capacity - 40 Litres/Hr and 80 Litres/Hr

Water Flow Rate - Not less than 1 LPM

Compressor - Energy efficient hermetically sealed Compressor with Suction gas cooled, equipped with over load protector, Relay and other accessories

Refrigerant Non-CFC, Non-toxic, Non-inflammable preferably R-134a/R-22

Input Power Supply - 180-230 Volts, 50 Hz, Single Ph. AC supply with 3 Pin plug top and proper earth connection

Body Material Tank - stainless Steel

No of Taps/Faucets - 1 for 40 litres capacity and 2 /3 for 80 liters capacity

Make - Voltas/Blue star/Usha/Eureka Forbes/Kent/Electrolux/Approved equivalent

Mounting - Floor

Standard - IS /ISO certified IS1475 (PART 1):2001 Application - Industrial

REVERSE OSMOSIS WATER PURIFICATION

The water purifier shall be connected to the Water cooler of 40/ 80 Litres/hr cooling capacity. It must have advanced 3 stage purification processes deploying last point purification process to ensure delivery of 100 % safe drinking water. Other specification shall be as follows

Safety Mechanisim - Built-in Electronic monitoring system to ensure complete purification of water before allowing the flow.

Purification Processes - 3 stage Purification process. Should meet drinking water quality as per IS – 10500 (1991)

Integration with Water cooler - Either inbuilt or from outside,

No of Taps/ Faucets - 1 for 40 liters units and 2/3 for the 80 litre units (same nos. and type as in water cooler)

Make - Eureka Forbes/Kent/Voltas/Blue star/Electrolux/Usha/ Approved equivalent

Standard - IS/ISO certif. Application - Industrial

LAWN/ GARDEN HYDRANTS

Lawn hydrants shall be of 15mm size unless otherwise indicated. All hydrants shall be provided with ball valves and threaded nipple to receive hose pipes. Also the GI hydrant pipe support with base plate and clamp, Lawn hydrant valves shall be of approved make and design. Where called for lawn hydrants shall be located in masonry chambers of appropriate size.

Hydrant shall be provided Note board “NO DRINKING WATER” to prevent use Sewage treatment plant recycled water for drinking.

SECTION-04 : WATER SUPPLY

1. SCOPE

The scope of this section comprises the supply, installation, testing and commissioning of piping network for water supply for external services as follows:

Domestic Water Supply – Cold

Flushing Water Supply – Cold

1. PIPING MATERIALS

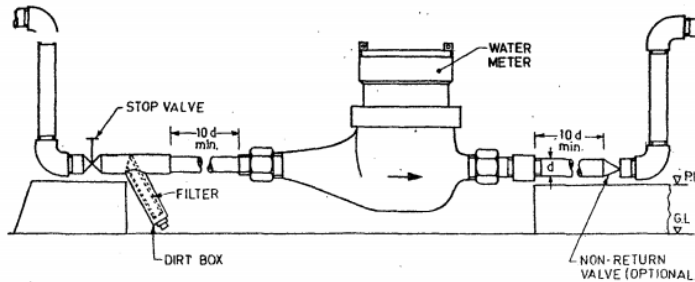
The piping system shall also consist of uPVC pipes Sch-40/80 conforming to ASTM D-1785, for flushing water supply & expose pipe with solvent /screwed based fittings conforming to ASTM D-2467.

Outside the building the piping shall be installed at least 1.0 m below the finished grade level.

2.1 CPVC Pipes & Fittings

The pipes shall be CPVC (Chlorinated Poly Vinyl Chloride) material for hot & cold water supply piping system wth pipes as per CTs SDR -13.5 at a working pressure of 320 PSI at 23 deg C and 80 PSI at 82 deg.C, using solvent welded CPVC fittings i.e. Tees, Elbows, Couplees, Unions, Reducers, Brushing etc. including transition fittings (connection between CPVC & Metal pipes / GI) i.e. Brass adapters (both Male & Female threaded and all conforming to

ASTM D-2846 with only CPVC solvent cement conforming to ASTM F-441, with clamps / structural metal supports as required /directed at site including cutting chases & fitting the same with cement concrete / cement mortar as required, including painting of the exposed pipes with one coat of desired shade of enamel paint. All termination points for installation of faucets shall have brass termination fittings. Installation shall be to the satisfaction of manufacturer & Project Manager. The material shall have to be gotten approved from Chief Fire Officer



d = nominal size of water meter.

FIG. 1 POSITIONING OF WATER METER

1. Joining Pipes & Fittings

a. Cutting:

Pipes shall be cut either with a wheel type plastic pipe cutting or hacksaw blade and care shall be taken to make a square cut which provides optimal bonding area within a joint.

b. Deburring / Beveling:

Burrs and fittings should be removed from the outside and inside of pipe with a pocket knife or file otherwise burrs and fittings may prevent proper contact between pipe and fittings during assembly.

c. Fitting preparation:

A clean dry rag/cloth should be used to wipe dirt and moisture from the fitting sockets and tubing end. The tubing should make contact with the socket wall 1/3 or 2/3 of the way into the fitting socket.

d. Solvent Cement Application

Only CPVC solvent cement confirming to ASTM-F493 should be used for joining pipe with fittings. An even coat of solvent cement should be applied on the pipe end and a thin coat inside the fitting socket, otherwise too much of cement solvent can cause clogged water ways.

e. Assembly:

After applying the solvent cement on both pipe and fitting socket, pipe should be inserted into the fitting socket within 30 seconds, and rotating the pipe $\frac{1}{4}$ to $\frac{1}{2}$ turn while inserting so as to ensure even distribution of solvent cement with the joint. The assembled system should be held for 10 seconds (approximately) in order to allow the joint to set up.

An even bead of cement should be evident around the joint and if this bead is not continuous remake the joint to avoid potential leaks.

Set & Cure times:

Solvent cement set and cure times shall be strictly adhered to as per the below mentioned table.

Minimum Core prior to pressure testing at 150 PSI

Ambient Temperature during Core period	Pipe Size	
	½ " - 1"	1.¼" - 2"
Above 15 deg. C	1 Hr	2 Hrs
4-15 deg.C	2 Hrs	4 Hrs
Below 4 deg C	4 Hrs	8 Hrs

Special care shall be exercised when assembling flow guard systems in extremely low temperature (below 4°C) or extremely high temperature (above 45°C) In extremely hot temperatures, make sure that both surfaces to be joined are still wet with cement solvent when putting them together.

f. Testing

Once an installation is completed and cored as per above mentioned recommendations, the system should be hydrostatically pressure tested at 150 psi (10 Bar) for one hour. During pressure testing, the system should be fitted with water and if a leak is found, the joint should be cut out and replacing the same with new one by using couplers.

2. Transition of Flow guard CPVC to Metals

When making a transition connection to metal threads, special Brass / plastic transition fitting (Male and female adapters) should be used. Plastic threaded connections should not be over torqued Hard tight pluts one half turn should be adequate.

3. Threaded Sealants

Teflon tape shall be used to make threaded connections leak proof.

4. Solvent Cement

Only CPVC solvent cement conforming to ASTM F 493 should be used for joining pipe with fittings and valves. Flowguard CPVC cement solvents have a minimum shelf life of 1 year. Aged cement solvent will often change colour or being to thicken and become gelatinous or jelly like and when this happens, the cement should not be used. The cement solvent should be used within 30 days after opening the company's seal and tightly close the seal after using in order to avoid its freezing. The frozen cement solvent should be discarded immediately and fresh one should be used. The CPVC solvent cement usage should be adhered to as given in table below

Diameter of pipe in inch (flowguard)	½"	¾"	1"	1¼"	1½"	2"
Approx Approx. nos. of joints which can be mode per litre of solvent cement.	200 Nos	180 Nos	150 Nos	130 Nos	100 Nos	70

5. Hangers and supports

For Horizontal runs, support should be given at 3 foot (90 cm) intervals for diameters of one inch and below and at 4 foot (1.2m) intervals for larger sizes.

Hangers should not have rough or sharp edges which come in contact with the tubing.

Supports should be as per the below mentioned table:

Size of Pipe	21°C	49°C	71°C	82°C
Inch	Ft.	Ft.	Ft.	Ft.
½"	5.5	4.5	3.0	2.5
¾"	5.5	5.0	3.0	2.5
1"	6.0	5.5	3.5	3.0
1¼"	6.5	6.0	3.5	3.5
1½"	7.0	6.0	3.5	3.5
2"	7.0	6.5	4.0	3.5

A. UPVC PIPES & FITTING:

I. General Specifications for Execution

- a. The pipes shall be UPVC (Ultra Poly Vinyl Chloride) material for cold water supply piping system.
- b. uPVC Sch. 80 pipes and fittings for cold water supply shall be conforming to ASTM D 1785 for pipe at a working pressure of 19.3 Kgf/cm² at 23 deg C.
- c. Solvent welded uPVC fittings i.e. Tees, Elbows, Couplers, Unions, Reducers, Brushing etc. including transition fittings (connection between uPVC & Metal pipes / GI) i.e. Brass adapters (both Male & Female threaded) conforming to ASTM D-2467 to be used.
- d. U PVC solvent cement conforming to ASTM F-2564 shall be used.

- e. G.I. Heavy class pipe sleeves of specified diameter corresponding to the pipe size 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 on either end, all as per E-I-C's requirement.
- f. Expansion Loop shall be provided for the thermal expansion and contraction for all the long straight runs above 15 meters in the piping system.
- g. The pipes shall be fixed / installed with clamps / structural metal supports as required /directed at site including cutting chases & fitting the same with cement concrete / cement mortar as required, including painting of the exposed pipes with one coat of desired shade of enamel paint.
- h. All pipes and fittings for the entire project shall be sourced from the single manufacturer (one of the approved manufacturer)
- i. All termination points for installation of faucets shall have brass termination fittings.
- j. Installation shall be to the satisfaction of Engineer in charge.

II. Joining Pipes & Fittings

a. Cutting –

Pipes shall be cut either with a wheel type plastic pipe cutting or hacksaw blade and care shall be taken to make a square cut which provides optimal bonding area within a joint.

b. Deburring / Beveling –

Burrs and fittings should be removed from the outside and inside of pipe with a pocket knife or file otherwise burrs and fittings may prevent proper contact between pipe and fittings during assembly.

c. Solvent Cement Application –

Only uPVC solvent cement confirming to ASTM F-2564 should be used for joining pipe with fittings. An even coat of solvent cement should be applied on the pipe end and a thin coat inside the fitting socket, otherwise too much of cement solvent can cause clogged water ways.

d. Assembly:

After applying the solvent cement on both pipe and fitting socket, pipe should be inserted into the fitting socket within 30 seconds, and rotating the pipe $\frac{1}{4}$ to $\frac{1}{2}$ turn while inserting so as to ensure even distribution of solvent cement with the joint. The assembled system should be held for 10 seconds (approximately) in order to allow the joint to set up.

An even bead of cement should be evident around the joint and if this bead is not continuous remake the joint to avoid potential leaks.

e. Set & Cure times

- i. 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.

- ii. It requires 10 to 20 minutes for a perfect joint.
- iii. Special care shall be exercised when assembling flow guard systems in extremely low temperature (below 4°C) or extremely high temperature (above 45°C) In extremely hot temperatures, make sure that both surfaces to be joined are till to wet with cement solvent when putting them together.

III. Transition of Flow guard CPVC to Metals:

- a. When making a transition connection to metal threads, special Brass / plastic transition fitting (Male and female adapters) should be used.
- b. Plastic threaded connections should not be over torque Hard tight pluts one half turn should be adequate.
- c. The place at which the transition is to be done shall be pre-approved by the engineer in charge.

IV. Threaded Sealants:

Teflon tape shall be used to make threaded connections leak proof.

V. Solvent Cement

- a. Only uPVC solvent cement conforming to ASTM F-2564 should be used for joining pipe with fittings and valves.
- b. Aged cement solvent will often change colour or being to thicken and become gelatinous or jelly like and when this happens, the cement should not be used.
- c. The cement solvent should be used within 30 days after opening the company's seal and tightly close the seal after using in order to avoid its freezing.
- d. The freeze cement solvent should be discarded immediately and fresh one should be used.
- e. The uPVC solvent cement usage should be adhered to as given in table below

Diameter of pipe in inch	½ "	¾ "	1"	1 ¼"	1 ½"	2"	2 ½"	3"	4"	6"
Approx. nos. of joints which can be made per liter of solvent cement.	12 00	75	50 0	45 0	32 5	22	50	40	30	10

VI. Hangers and supports

- a. For Horizontal runs, support should be given at 3 foot (90 cm) intervals for diameters of one inch and below and at 4 foot (1.2m) intervals for larger sizes.
- b. Hangers should not have rough or sharp edges which come in contact with the tubing.
- c. Vertical Supports for all the pipe should be as per the below mentioned table:

Size of Pipe	21°C	49°C	71°C	82°C
Inch	Ft.	Ft.	Ft.	Ft.
½" (15mm)	5.5	4.5	3.0	2.5
¾" (20mm)	5.5	5.0	3.0	2.5
1" (25mm)	6.0	5.5	3.5	3.0
1¼"(32mm)	6.5	6.0	3.5	3.5
1½"(40mm)	7.0	6.0	3.5	3.5
2" (50mm)	7.0	6.5	4.0	3.5
2½" (65mm)	8.0	7.5	4.5	4.0
3" (75mm)	8.0	7.5	4.5	4.0
4" (100mm)	9.0	8.5	5.0	4.5
6" (150mm)	10.0	9.0	5.5	5.0

(1) HIGH DENSITY POLYETHYLENE PIPE

MATERIALS FOR HDPE PIPE

Materials used the manufacture of polyethylene pipe and fittings shall be made from a PE 3408 high density polyethylene resin compound meeting cell classification 345434C per ASTM D3350; and meeting Type III, Class C, Category 5, Grade P34 per ASTM D1238.

High Density Polyethylene (HDPE) pipe shall comply with AWWA Specifications C906 for 4-inch diameter and larger and C901 for 2-inch and less in diameter.

If rework compounds are required, only those generated in the Manufacturer's own plant from resin compounds of the same class and type from the same raw material supplier shall be used.

Dimensions and workmanship shall be as specified by ASTM F714. HDPE fittings and transitions shall meet ASTM D3261. HDPE pipe shall have a minimum density of 0.955 grams per cubic centimeter. All HDPE pipe and fittings shall have a Hydrostatic Design Basis (HDB) of 1,600 psi.

HDPE pipe and accessories 4-inch diameter and larger, shall be 160 psi at 73.4° F meeting the requirements of Standard Dimension Ration (SDR) 17 as MINIMUM STRENGTH.

HDPE pipe and accessories 2" and less in diameter, shall be 160 psi at 73.4° F meeting the requirements of Standard Dimension Ration (SDR) 9 as MINIMUM STRENGTH.

The pipe Manufacturer must certify compliance with the above requirements.

FITTING

All molded fittings and fabricated fittings shall be fully pressure rated to match the pipe SDR pressure rating to which they are made. All fittings shall be molded or fabricated by the manufacturer. No Contractor fabricated fittings shall be used unless approved by the Engineer.

The manufacturer of the HDPE pipe shall supply all HDPE fittings and accessories as well as any adapters and/or specials required to perform the work as shown on the Drawings and specified herein.

All fittings shall be installed using butt-fused fittings, thermo-fused fittings/couplings, or flanged adapters and must be approved by the Engineer. NO size on size wet taps shall be permitted.

All transition from HDPE pipe to ductile iron or PVC shall be made per the approval of ASPA Engineer and per the HDPE pipe manufacturer's recommendations and specifications. A molded flange connector adapter within a carbon steel back-up ring assembly shall be used for pipe type transitions. Ductile iron back-up rings shall mate with cast iron flanges per ANSI B16.1. A 316 stainless steel back-up ring shall mate with a 316 stainless steel flange per ANSI B16.1.

Transition from HDPE to ductile iron fittings and valves shall be approved by ASPA Engineer before installation.

No solid sleeves shall be allowed between such material transitions.

Fittings and transitions shall be as manufactured by Phillips DRISCOPIPE, Inc., 1000 Series Pressure Pipe, Chevron Chemical Company Plexco/Spiralite pipe, or equal.

The pipe supplier must certify compliance with the above requirements.

JOINING METHOD

The pipe shall be joined with butt, heat fusion joints as outlined in ASTM D2657 and conform to the Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe, Technical Report TR-33/2005, published by the Plastic Pipe Institute (PPI). All joints shall be made in strict compliance with the manufacturer's recommendations. A factory qualified joining technician as designated by pipe manufacturer or experienced, trained technician shall perform all heat fusion joints in the presence of the ASPA inspector.

Lengths of pipe shall be assembled into suitable installation lengths by the butt- fusion process. All pipes so joined shall be made from the same class and type of raw material made by the same raw material supplier. Pipe shall be furnished in standard laying lengths not to exceed 50 feet and no shorter than 20 feet.

On days butt fusions are to be made, the first fusion shall be a trial fusion in the presence of an ASPA Inspector. The following shall apply:

Heating plate surfaces shall be inspected for cuts and scrapes and shall be free of dirt and residue. Heater surfaces should be between 400 F (minimum) to 450 F (maximum). Measure the temperature @ 12:00, 3:00, 6:00 and 9:00 o'clock positions using a pyrometer or infrared thermometer at locations where the heating plate will contact the pipe/fitting ends. The maximum temperature difference between any two points on a single heating surface must not exceed 24 F. If this temperature is exceeded, the heating plate shall be cleaned per the manufacturer's recommendations.

The fusion or test section shall be cut out after cooling completely for inspection.

The test section shall be 12" or 30 times (minimum) the wall thickness in length and 1" or 1.5 times the wall thickness in width (minimum).

The joint shall be visually inspected as to continuity of "beads" from the melted material, and for assurance of "cold joint" prevention (i.e. – joint shall have visible molded material between walls of pipe). Joint spacing between the walls of the two ends shall be a minimum of 1/16" to a maximum 3/16".

The polyethylene flange adapters at pipe material transitions shall be backed up by stainless steel flanges conforming to ANSI B16.1 and shaped as necessary to suit the outside dimensions of the pipe. The flange adapter assemblies shall be connected with corrosion resisting bolts and nuts of Type 316 Stainless Steel as specified in ASTM A726 and ASTM A307. All bolts shall be tightened to the manufacturer's specified torques. Bolts shall be tightened alternatively and evenly. After installation, apply a bitumastic coating to bolts and nuts.

INSTALLATION

High Density Polyethylene (HDPE) Pipe shall be installed in accordance with the instruction of the manufacturer, as shown on the Drawings and as specified herein. A factory qualified joining technician as designated by the pipe manufacturer shall perform all heat fusion joints.

HDPE shall be installed either by Open Trench Construction or Directional Bore Method.

Care shall be taken in loading, transporting and unloading to prevent damage to the pipe. Pipe or fitting shall not be dropped. All pipe or fitting shall be examined before installation, and no piece shall be installed which is found to be defective. Any damage to the pipe shall be repaired as directed by the Engineer. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner by the contractor, at his own expense.

Under no circumstances shall the pipe or accessories be dropped into the trench or forced through a directional bore upon "pull-back".

Care shall be taken during transportation of the pipe such that it will not be cut, kinked or otherwise damaged.

Ropes, fabric or rubber protected slings and straps shall be used when handling pipes. Chains, cables or hooks inserted into the pipe ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe.

Pipes shall be stored on level ground, preferably turf or sand, free of sharp objects, which could damage the pipe. Stacking of the polyethylene pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperature conditions. Where necessary due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

Pipe shall be stored on clean level ground to prevent undue scratching or gouging. The handling of the pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. The maximum allowable depth of cuts, scratches or gouges on the exterior of the pipe is 5 percent of wall thickness. The interior pipe surface shall be free of cuts, gouges or scratches.

Pipe shall be laid to lines and grade shown on the Drawings with bedding and backfill as shown on the Drawings.

When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by fabricated plugs, or by other approved means.

Sections of pipe with cuts, scratches or gouges exceeding 5 percent of the pipe wall thickness shall be removed completely and the ends of the pipeline rejoined.

The pipe shall be joined by the method of thermal butt fusion. All joints shall be made in strict compliance with the manufacturer's recommendations.

Mechanical connections of the polyethylene pipe to auxiliary equipment such as valves, pumps and tanks shall be through flanged connections which shall consists of the following:

A polyethylene flange shall be thermally butt-fused to the stub end of the pipe.

A 316 stainless steel back up ring shall mate with a 316 stainless steel flange.

A 316 stainless steel bolts and nuts shall be used.

Flange connections shall be provided with a full-face neoprene gasket.

All HDPE pipe must be at the temperature of the surrounding soil at the time of backfilling and compaction.

If a defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional cost to the Owner. All pipe and fittings shall be thoroughly cleaned before installation, shall be kept clean until they are used in the work and when laid, shall conform to the lines and grades required. kinked or otherwise damaged.

OPEN TRENCH INSTALLATION:

ASPA Standards and Specification, Section 02200 – Utility Excavation, Trenching, and Backfilling shall apply in its entirety.

The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16-in per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.

Good alignment shall be preserved during installation. Deflection of the pipe shall occur only at those places on design drawings and as approved by the Engineer.

Fittings, in addition to those shown on the Drawings, shall be used only if necessary or required by the Engineer.

Each length of the pipe shall have the assembly mark aligned with the pipe previously laid and held securely until enough backfill has been placed to hold the pipe in place. Joints shall not be "pulled" or "cramped".

Precautions shall be taken to prevent flotation of the pipe in the trench.

When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or

supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the backfill. Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below top of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, pipe bedding shall be placed to fill any voids created and the backfill shall be recompacted to provide uniform side support for the pipe.

Restrained joints shall be installed where shown on the Drawings or as directed by the Engineer.

CLEANING

At the conclusion of the work, thoroughly clean all of the new pipe lines to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period by forcing a cleaning swab through all mains 4" or greater. Flushing velocities shall be a minimum of 2.5 feet per second. All flushing shall be coordinated with ASPA Inspector and Water Resources Department. Debris cleaned from the lines shall be removed from the job site.

TESTING

Pressure testing shall be conducted per Manufacturer's recommendations and as approved by the ASPA Engineer.

All HDPE water mains shall be disinfected prior to pressure testing as per ASPA specification.

All HDPE mains shall be field-tested. Contractor shall supply all labor, equipment, material, gages, pumps, meters and incidentals required for testing. Each main shall be pressure tested upon completion of the pipe laying and backfilling operations, including placement of any required temporary roadway surfacing.

All mains shall be tested at 150 percent of the operating design pressure of the pipe unless otherwise approved by the Engineer.

Pressure testing procedure shall be per Manufacturer's recommendations or as follows:

Fill line slowly with water. Maintain flow velocity less than 2 feet per second.

Expel air completely from the line during filling and again before applying test pressure. Air shall be expelled by means of taps at points of highest elevation.

Apply initial test pressure and allow to stand without makeup pressure for two to three hours, to allow for diametric expansion or pipe stretching to stabilize.

After this equilibrium period, apply the specified test pressure and turn the pump off. The final test pressure shall be held for one to three hours.

Upon completion of the test, the pressure shall be bled off from a location other than the point where the pressure is monitored. The pressure drop shall be witnessed by the resident project representative and ASPA representative at the point where the pressure is being monitored and shall show on the recorded pressure read-out submitted to the Engineer of Record.

Allowable amount of makeup water for expansion during the pressure test shall conform to Chart 6, Allowance for Expansion Under Test Pressure, Technical Report TR 31/9-79, published by the Plastic Pipe Institute (PPI). If there are no visual leaks or significant pressure drops during the final test period, the installed pipe passes the test.

If any test of pipe laid disclosed leakage significant pressure drop greater than the manufacturer's recommended loss, the Contractor shall, at his/her own expense, locate and repair the cause of leakage and retest the line. The amount of leakage, which will be permitted, shall be in accordance with AWWA C600 Standards.

All visible leaks are to be repaired regardless of the amount of leakage.

The Contractor must submit his plan for testing to the Engineer for review at least 10 days before starting the test and shall notify ASPA Inspector a minimum of 48 hours prior to test.

(2) MDPE PIPES AND FITTINGS:

Pipes, fittings & valves shall be supplied which are to be produced with thermoplastic piping (MDPE) conforming to the notification of Petroleum and Natural Gas Regulatory Board (Technical Standards and Specifications including Safety Standards for City or Local Natural Gas Distribution Networks) Regulation 2008 and its latest updation / revision if any and as per ISO 4437 and IS 14885 with yellow MDPE-80 material in manufacturing units., The bidder also must mention the names of such production/manufacturing units from where the pipes, fittings, valves will be procured for the projects, who is having experience in production and supply of MDPE pipe etc. as per specification mentioned above. The bidder must produce/enclosed the copies supply orders of such manufacturing units from any PSU or Govt. Sector. In any case the Bidder will not be allowed to supply pipes, fittings, valves etc other than the list submitted by the Bidder. In addition, the bidder must submit the license issued by BIS/ISO for the manufacturer for manufacturing of Natural Gas pipe as per required standard in support of the list submitted by the Bidder. Reprocessed materials shall not be used. The colour of pipes used for gas service shall be yellow for PE 80 grade. MDPE pipes shall be permanently marked (either impressed or embossed to a depth / height of 0.02 to 0.15 mm). Marking shall show Owner's name as AGCL on each pipes. The marking shall also show manufacturer's name or trade name, material & designation, batch no. or lot no., internal fluid, SDR, reference of standard and marking shall be repeated at the interval of 1 (one) Mtr. Tensile yield strength of the pipes shall be minimum 15 MPa and Elongation at break shall be 350% or more.

Size of the pipes with wall thickness shall be as specified in the Petroleum and Natural Gas Regulatory Board (Technical Standards and Specifications including Safety Standards for City or Local Natural Gas Distribution Networks) Regulation 2008 and ISO 4437 for the following :

- i) Pipe size from 20mm to 63mm – as per SDR 11.
- ii) Pipe size from 75mm to 225mm – as per SDR 17.6.

All fittings shall be manufactured conforming to the notification of Petroleum and Natural Gas Regulatory Board (Technical Standards and Specifications including Safety Standards for City or Local Natural Gas Distribution Networks) Regulation 2008 and its latest updation / revision if any. All fittings used shall be of electro-fusion type. Other types of fittings are not permitted. All MDPE fittings shall conform to ISO 8085 Part 3. The wall thickness of the fittings shall be more or equal to the wall thickness of the pipe jointed. MDPE thermoplastic fittings conforming to ISO 8085 Part 3 shall meet the following requirements.

a) Polyethylene resin used for manufacturing of thermoplastic fittings shall be virgin, cadmium free pigmented compound.

- b) Anti-oxidant and UV stabilizers used in PE resin shall not exceed 0.3 and 0.5 percent respectively.
- c) Reprocessed materials shall not be used.
- d) Grade of PE compound used for the fittings shall not be less than that of PE pipes. In case fittings are of different grade than that of pipes, compatibility of the same with the pipes shall be established prior to their use. However, in case of higher grade fittings separate compatibility test shall not be required.
- e) Heating element shall not be exposed and all coils are embedded in to the body of the fittings.
- f) Colour of the fittings shall be yellow.
- g) Electrofusion fittings complying with ISO 8085 Part 3 shall be used for all sizes of PE pipes.
- h) Fittings fabricated from pipe shall not be used.
- i) Only injection molded fittings are recommended.
- j) For electro-fusion fittings external alignment clamp and tolling approved by the fitting manufacturer shall be used during welding.
- k) All Electro-Fusion fittings shall be bar coded and the control unit shall be equipped with bar code reader to directly transfer fusion data to control unit. Bar coding shall be long lasting even when the joint is buried in corrosive soil, alternatively each fitting shall have a data card which can be read by the computer and thereafter the card is positioned with the joint. Fusion fittings shall have permanent fusion indicator or a data card conforming to ISO-7810/ISO-7811. The fusion jointing shall be carried out as per the procedure outlined in the standard DVS 2202 or equivalent. Carbon steel part of transition fittings used for connecting PE system with Carbon Steel System may have butt weld/plain/flanged ends.
- l) Mechanical fittings for making hot taps on pipelines and mains shall not be used. Fittings for hot taps shall be welded type (for steel pipelines and mains) and electro-fusion type (for thermoplastic mains and service lines).

All MDPE pipes and fittings shall have type tested by an internationally recognized testing agency prior to their use. The manufacturing of pipes and the fittings as per ISO 4437 shall be inspected by AGCL approved internationally recognized Third Party Inspection Agency (TPIA) during the entire process of manufacturing and only on receipt of dispatch clearance from the Third Party Inspection Agency (TPIA), the materials shall be sent to AGCL (The cost for Inspection shall be borne by the Contractor).

The grade of material offered by the bidder must conform to the notification of PNG Regulatory Board, ISO 4437, IS 14885 and ISO 8085 Part 3.

TESTING & INSPECTION OF PIPES & FITTINGS AT PLANT:

Bidder shall have to provide a list of 5 (five) internationally well known Third Party Inspection Agency (TPIA) for inspection of pipes and fittings manufactured in their plant. Only one agency out five agency may be approved by the Owner to perform the inspection work. The Bidder shall have to carry out inspection work at their own cost. This agency shall have to submit to Owner all relevant certificates as per specifications and codes before despatch of the materials.

INSTALLATION AND LAYING:

The entire pipeline shall be an all welded electro-fusion system conforming to the Notification of Petroleum and Natural Gas Regulatory Board (Technical Standards and Specifications including Safety Standards for City or Local Natural Gas Distribution Networks) Regulation 2008 and its latest updation / revision if any. Plastic piping joints shall be made by Electro-Fusion method only. For electro-fusion fittings, pipe fixation shall be done with external alignment clamp and tolling approved by the fitting manufacturer during welding. The welding must be done with required pressure, temperature and allowable cooling time. Before welding, all foreign materials shall have to be removed from the pipe end and welding shall be made with utmost care. For any deviation occurred, the contractor should be responsible for the same. The entire pipeline network shall be pneumatically tested at a pressure of 6 kg/cm² (g) for a continuous period of 24 hours, any uneven behaviour /leakage in the pipeline shall have to be detected and to be repaired by the contractor immediately at their own cost.

Adequate nos. of experienced welders must be provided by the contractor for scheduled completion of the work. Welder engaged for the proposed work should have similar type of electro-fusion welding experience in MDPE gas pipeline network. Proper documents of experience of the welders with name and work performed at site (name of the site and relevant documents) must be submitted to the company along with the tender paper. Company reserves the right to reject or accept the offer depending upon the work experience.

TESTING AND COMMISSIONING:

The pipeline network after completion of installation and laying in all respect is to be tested pneumatically at a pressure of 6 kg/cm² (g) for continuous 24 hours. Any defect/leakage occurred during testing shall have to be detected and repaired by the contractor at his own cost. After successful completion of testing work, the pipeline network shall have to be commissioned by purging the pipeline with natural gas considering all safety aspects by the contractor.

The necessary work to connect the intake of the PE pipe with the main mild steel pipeline shall have to be completed by the contractor as per the Company's directive at his own cost.

(3) VALVES**GENERAL**

Valves shall be provided on branch pipe connections to mains and at connection to equipment where indicated. All valves are to be located for easy access.

All valves shall be supported wherever necessary with MS brackets. Generally comply with IS 780 (Class I) for C.I sluice valves and IS778 for G.M valves, C.I Sluice valves shall comply with IS 780(class 1) & G.M valves shall comply with IS 778.

Gate valves or butterfly valves are used for shut-off or sectionalizing service and globe or ball valves are used for flow modulation.

For on-site control gate valves are used. Pressure regulating valves are used for equipment requiring lower- than-available system pressure etc.

Valves in accessible locations, not more than six feet above the floor, if the valves are frequently used then each valves is associated with a flange on the downstream side of the valves.

All valves shall have identification mark for on/off status with pressure rating engraved on the body of the valve. All valves shall be manufactured as per relevant IS code & shall have ISI mark.

INSTALLATION OF VALVES

Valves should be installed in true tolerance of +/-5mm with respect to the center line of the pipe.

Where threaded joints are encountered the threads should be initially sealed with UPVC tape to avoid leakage due to improper tightening and leakage from threading.

Proper care has to be taken in welded installation so that the centerline of valve should not deviate from the pipe causing uneven load on the pipe and further stress during its operation. The welding should be done only after proper inspection of the joint by the Client/PMC/Consultants in the tacked position of the joint.

Before putting the line in operative mode the valves should be checked for free and easy operation of the hand wheel. Any burrs or foreign materials should be removed by flushing before final operation so that no choking in the valves should occur which might damage the valve seat.

BALL VALVES

The ball valve shall be of high-pressure type and shall be of sizes as specified and/or shown in the drawings the normal size of a ball valve shall be that, corresponding to the size of the pipe to which it is fixed.

Ball valves shall have body of carbon steel. The ball and the shaft shall be of stainless steel.

The seat shall be of PTFE.

The valve shall be complete with socket weld ends and the float of copper sheet. The minimum thickness of copper sheet used for making the float shall be 0.45mm for a float exceeding 115mm dia.

The body of the high pressure ball valve when assembled in working condition with the float immersed to not more than half of its diameter shall remain closed against a test pressure of 3.5kg/sqcm.

The ball valve shall generally conform to IS specification No.1703:1977.

The weight of ball cock and the size of the ball cock shall be as per IS specification.

Body	:	Brass
Bore size	:	Full bore
Ball seal	:	PTFE
O Ring seal	:	Nitrile rubber / viton
Threads	:	BS 21 taper threads
Finish	:	Chrome plated
Pressure rating	:	PN 10 / 16 / 25
Application	:	water / Air / Oil.

BALL FLOAT VALVE

- i. The ball float valve shall be of cast Brass as specified conforming to IS 1703 The ball float Valve shall be of following two classes:—
- ii. High pressure float valves are indicated by the abbreviation 'HP' and are designed for use on mains having pressure of 0.175 MPa or above.
- iii. 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.
- iv. Valves shall either be of screwed type or flanged type, as specified, with suitable flanges and non-corrosive bolts and gaskets.
- v. Tail pieces as required shall be supplied along with valves.
- ii. 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.

S.No	Type of Valve	Size	Construction	Ends
a.	Ball Valve (Isolation valve)	15 mm to 50 mm	Brass/ Bronze	Screwed
b.	Butterfly Valve	65 mm and above	Cast Iron	Flanged
c.	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.

BUTTERFLY VALVES

Valves 65 mm dia and above shall be cast iron butterfly valve to be used for isolation. The valves shall be bubble tight, resilient seated suitable for flow in either direction and seal in both direction. Valves shall be provided with matching flanges with neoprene insertion gasket 3 mm thick.

The butterfly valve shall be flanged type or as specified conforming to IS 13095 & BS - 5155. The valve shall be bubble tight, resilient sealed suitable for flow in either direction with accompanying flanges and steel handle. The butterfly valve shall be suitable for waterworks and rated for 150 PSI 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 elastomeric or nitrile rubber. The valve in closed position shall have complete contact between the seat and the disc throughout the perimeter. The elastomeric 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

All valves 65mm dia and above shall be C.I double flanged or wafer type single flanged.

The butterfly valve shall be fixed to the pipe line in position as indicated in the drawing and as directed by the Engineer-In-Charge. TESTING: The valve and the joints shall be tested to a minimum hydraulically pressure of 16 kg/sq.cm for a duration of two hours or as per testing clause of piping work. The testing shall be done along with the testing of pipe line. The leaky joints shall be rectified to the satisfaction of the Engineer-in-Charge.

PRESSURE REDUCING VALVE SET

Each pressure reducing valve set for cold and hot water supply shall comprise of 3 nos GM / brass ball valves on inlet, outlet, and bye-pass, 1 No Gun metal pressure reducing valve with flanged connection, 1 No. 'Y' strainer, 2 Nos Pressure gauge on inlet & outlet, and 1 No. 15 mm dia safety valve. The upstream pressure will be up to 16 Bars and the downstream pressure may be as low as 1.0 Bars.

Each pressure reducing valve shall contain loading neoprene diaphragm and a full floating, self aligning, ignition resistant seat and shall be of the single stage, pressure reduction type with provision for manually adjusting the delivery pressure. The valve shall fail safe to the low pressure.

Valves shall be capable of operating at the maintaining automatically the respective delivery pressure and flow rates as indicated and shall not be liable to creep. Valves shall also be capable of maintaining the pre-set down stream pressure under static condition.

The filter on each inlet to a pressure reducing valve shall be of replaceable porous sintered metal type.

For pipe sizes 15 mm to 32 mm dia direct acting pressure reducing valves shall be provided with integral strainer and have an adjustable pressure range from 1.0 Bar to 16 bars.

Automatic diaphragm actuated, pilot controlled, hydraulically operated pressure reducing valve shall be provided for pipe sizes 40 mm dia and above

Suitable insulation shall be provided, wherever required, when used for hot water applications.

AIR RELEASE VALVE

Double acting, of approved make, having 2 chambers with ebonite ball, small and large orifices with isolating stop screw down valve, GM seats, high tensile brass spindle with cap.

At least 501 m³/hr of air is released when fully open.

Released air volume is at least 0.026 m³/hr at 5 psi with 225.

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.

(4) POLYETHYLENE WATER STORAGE TANKS

MATERIAL

Polyethylene used for manufacture of tanks and manhole lids may be high density (HDPE), low density (LDPE) or linear low density (LLDPE) and shall conform to IS 10146. Polyethylene shall be compounded with carbon black so as to make the tank resistant to ultra violet rays from the sun. The percentage of carbon black content in polyethylene shall be 2.5 ± 0.5 percent and it shall be uniformly distributed. The materials used for the manufacture of tank, manhole lid and fittings shall be such that they neither contaminate the water nor impart any taste, colour, odour or toxicity to water.

MANUFACTURE AND FINISH

The tanks shall be manufactured by rotational moulding process. Each tank and the manhole lid shall be single piece having arrangement for fixing and locking the manhole lid with the tanks. Excess material at the mould parting line and near the top rim shall be neatly cut and finished. The internal and external surface of the tanks shall be smooth, clean and free from hidden internal defects like air bubbles, pit and metallic or other foreign material inclusion. Capacity of the tank, minimum weight of the empty tank (without manhole lid) and the manufacture brand name shall be embossed on the top surface of the tank near manhole.

SHAPE, SIZE AND CAPACITY

The tank shall be cylindrical vertical with closed top having a manhole. Diameter and height of the tank of various capacities shall be as per manufacturer's specifications and a clearance of ± 3 percent shall be permitted on these dimensions. Capacity of the tank or up to the bottom of the inlet location whichever is less. Capacity of the tank shall be specified. Extra capacity if any shall be ignored.

WEIGHT AND WALL THICKNESS

Minimum weight of the empty tank (exclusive of manhole lid fittings) and the minimum wall thickness of top, bottom and sides shall be specified in Table 18.23. Wall thickness shall be checked beyond 150 mm of the edge where the direction the plane of tank surface changes.

INSTALLATION AND FITTINGS

The flat base of the tank shall be fully supported over its whole bottom area on a durable rigid flat and level platform sufficiently strong to stand without deflection the weight of the tank when fully filled with water. Depending upon the capacity and location tanks may be suitably anchored as per the directions of the Engineer-in-Charge. For inlet, outlet and other connections fully threaded GI, HDPE or PVC connections with hexagonal check nuts and washers on either side of the tank wall shall be provided. Holes for threaded connections shall be drilled and not punched. Pipes entering or leaving the tank shall be provided with unions and suitably supported on a firm base to avoid damage to the tank walls.

MANHOLE LID

The lid shall rest evenly and fit over the rim of the manhole so as to prevent the ingress of any foreign matter into the tank. The lid shall be provided with suitable arrangement for locking it with the tank.

RATES

The rate shall include the cost of the tank, manhole lid, carriage and delivery at the place specified. Hoisting, installation, fittings, platform and anchoring shall be payable separately.

(5) LAWN/ GARDEN HYDRANTS

Lawn hydrants shall be of 20 mm size unless otherwise indicated. All hydrants shall be provided with ball valves and threaded nipple to receive hose pipes. Also the GI hydrant pipe support with base plate and clamp, Lawn hydrant valves shall be of approved make and design. Where called for lawn hydrants shall be located in masonry chambers of appropriate size.

Hydrant shall be provided Note board "NO DRINKING WATER" to prevent use Sewage treatment plant recycled water for drinking.

(6) PRE-CAST CHAMBERS

Providing & Laying of factory made Precast Chamber, having size (in to in) of 600(L) X 600 (B) / 800(L) X 800 (B)/ 1000 mm (L) X 1000 mm (B)/ 1200 mm (L) X 1200 mm (B), Variable in height of H: 600,800,1000,1200,1400,1600,1800,2000 mm T-25 load carrying capacity - 10 T Axle Load - 5 T Wheel Load, conforming to Japanese Industrial Standards (JIS) & meeting IS requirements, having High Performance Self Compacting Concrete of M-40 cylinder strength/M-50 cube strength & Fe 500/ Fe 500D shall be used for reinforcement. The contractor shall prepare & provide the base using PCC/Foundation concrete as a levelling course as per drawing / as recommended by the consultant depending upon the foundation soil strata. The precast Chamber unit should consist of special in built insert of suitable load carrying capacity at appropriate location for fixing De-shackle (Hanging hole) for safe & fast mechanical installation. Hole should be provided at site (No Factory) for connection at the waffle side of chamber as per the site requirement. The Precast cover having size suitable to chamber 600 X 600/ 800 X 800/ 1000 X 1000 mm 744 X 744/ 944 X 944/1144 x 1144 mm 140/120/ 150 mm thick Respectively. Cover should have conical shape of 50 mm to 30 mm respectively for storm water intake. The lid may have in-built specially designed lifting inserts of appropriate load carrying capacity & fixed at specific location to avoid the tilting of the lid for safe & fast installation. In no case the casting shall be allowed to be prepared at site. It should be casted in the stringent atmospheric & pre-defined condition, as per approved QAP as by Engineer In charge.

MATERIAL

M-40 cylinder strength/ M-50 cube strength Self compacting concrete using excellent quality River sand as per IS-383, MAS size 10 mm machine cut aggregates of approved quality & size as per IS-383, OPC -53 grade confirming to IS :269 of reputed brand having major cement plant , Super plasticizer as per IS-456, R.O water as per IS-456. Fe 500/ Fe 500D steel confirming to IS 1786 & releasing agent for the form work as per the industry standard. Excellent Quality of welding rods (IS code) for manufacturing reinforcement cage, for fixing the reinforcement in place High grade plastic spacers. High quality lifting inserts of appropriate weight bearing capacity and all other required material to produce the complete precast Chamber in all the aspects and respects.

WORKMANSHIP AT PRECAST FACTORY:

The entire precast Chamber shall be produced using excellent workmanship as per the detail and quality of the workmanship given below.

M-40 cylinder strength/M-50 cube strength High Performance - Self Compacting Concrete is mix created by using state of the art computer controlled customised batching plant within the factory. Fresh concrete will be taken to the assembly line & gently poured into the mould by remote control disposal in place. The mould is made out of using high grade automobile steel without any dent or damage.

The required reinforcement as per drawing by using Fe 500D steel is cut in to proper sizes by using proper re bar cutting machine. The separate steel member are combined together using excellent quality of welding done by welding machines to create the steel frame work/cage. The cage is given the appropriate shape by automatic bending machine which in reference the mould size and shape and as per the design to be put inside the mould. The entire steel assembly is kept into place inside the mould by using high grade necessary plastic spacers.

After pouring of SCC into the mould, the mould with filled in concrete shall be kept inside the factory. The entire assembly shall be kept for the minimum time period of 3 to 6 hrs for steam curing to attain the desired strength of the product. The product will be kept for the period of approximately 14 days at production site prior to the dispatch from the production site. While pouring the concrete in to the mould the concrete samples are taken in the cylindrical mould as per JIS/IS code. Each precast unit should have date of manufacturing for traceability. The factory should provide concrete compressive test results along with dispatch of product from factory.

The stacking of precast unit shall be carried out as per the prescribed manner using wooden planks to avoid any damages. If any type of damage during the process of loading & unloading, lowering into trench, fixing at the location, takes place the contractor shall repair or remove & replace the same with the brand new piece without any extra cost as decided by consultant/client.

Product surfaces should have excellent quality smooth finish without any cracks, honeycombing or perforation & each piece should be certified by QC engineer of the factory. The bottom is kept slightly unsmooth finish for proper binding with bedding mortar.

This product is designed to take care of the forces generated while lifting it & placing it at the desire location at depth using the machinery like Hydra/Flanna. To facilitate the lifting of the precast Chamber inserts are provided for the fixing the De-shackle & lifting belts.

WORKMANSHIP AT INSTALLATION SITE:

The excavation shall be carried out in proper manner as per the required depth and width for easy installation and fixing of Chamber considering de-shackle (Hanging Hole) removal and working space to install.

The contractor shall do cast in situ foundation work as per drawing / as recommended by the consultant depending upon soil strata. Quarry dust or metal soiling may be done before levelling concrete in case of poor soil strata as advised by structural consultant / client. The dry bedding mortar cement mortar 1:3 of about 0 to 20 mm should be provided as levelling course.

The contractor shall use Total station survey / auto level equipment's to derive the line level as well as level of the bedding mortar. In case of the flooding of the water in the excavated area it shall be responsibility of the contractor to carry out the dewatering without charging any extra

cost. Any dirty water, garbage, shrubs, thorny bush etc shall be removed by the contractor as & when required to carry out the work in complete satisfactory manner.

Any obstructions & any water supply,sewage, drainage, electrical, telephone,internet cables which need to be shifted due to lying of the precast chamber shall be carried out by the contractor in consultation with client and engineer in charge. Complete and total care shall be taken by contractor not to damage any of the existing services and infrastructure while carrying the work at site.

The entire assembly should be in line level & perfectly carried out at site as per the design, drawing & instruction given by engineer in charge.

After Installation of Chamber contractor shall do cast in situ 100 mm thick PCC inside the chamber at bottom for water proofing & sliding check.

Contractor shall do core cutting of chamber wall of appropriate diameter for fixing Hume pipes. The holes shall be grout with cement mortar/suitable grout material after installation of Hume pipes.

In case of chamber to be placed on the underground box drain, after placing of Chamber on Box Culvert, Contractor shall do proper jointing of Chamber and Box Culvert using suitable grout / Concrete as guided by engineer in-charge for avoiding sliding and making the it water tight.

The backfilling shall be carried out using the approved quality of soil/sand as directed by engineer in charge. Layer wise backfilling of soil shall be carried out simultaneously on both the sides using appropriate plate compactor in such way that it should not displace the Precast Chamber from original line & level. In case of sand filling in sides also, the appropriate care shall be taken.

Precast Lid shall be placed on chamber by fixing eye bolt of appropriate lifting capacity into the lifting insert embedded in the lid.

SECTION - 05: SOIL, WASTE, VENT, RAIN WATER PIPES AND CHAMBERS

SCOPE OF WORK

Work under this section consists of furnishing all labour, materials, equipment and appliances necessary and required to completely install soil, waste, vent pipes and rain water as required by the drawings, specified herein after and given in the bill of quantities.

Without restricting to the generality of the foregoing, the soil waste and vent piping system shall include the following.

Vertical and Horizontal Soil & Waste centrifugal CI pipes and fittings, joints, clamps and connections to fixtures.

Connection of all pipes to sewer lines as shown on the drawings.

Floor and urinal traps cleanout plugs and inlet fittings.

Testing of all pipelines.

GENERAL REQUIREMENTS

Materials shall be of the approved make and quality specified. They shall conform to the respective Bureau of Indian Standards Specifications and supported by Manufacturing test certificate.

Pipes and fittings shall be fixed truly aligned to vertical, horizontal or on slopes as required for proper functioning of the system. Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.,

Pipes shall be fixed securely to walls and ceilings by suitable clamps at intervals specified.

Access door for fittings and cleanouts shall be so located that they are easily accessible for repair and maintenance.

1. INTERNAL SEWERAGE (UPVC PIPES AND FITTINGS)

SPECIFICATION OF PIPES:

POLYVINYL CHLORIDE (PVC) PIPES AND FITTINGS MATERIAL Soil, waste & vent pipes shall be PVC pipes & fittings.

PVC (SWR) class pipes of dia 75mm, 110mm and 160mm, of Type A for use in rain water, and ventilation system (unless otherwise specified) and of Type B for soil, waste water system and conforming to IS 13592: 1992, shall be used.

The pipes shall be supplied in nominal lengths of 2,3,4 or 6 meters.

Any physical test requirements shall be as per IS13592-1992.

HANDLING:

Because of their lightweight, there may be a tendency for the PVC pipes to be thrown much more.

Reasonable care should be taken in handling and storage to prevent damage to the pipes.

The pipes shall be stored as per manufacturer's specification. The contractor will hold full responsibility in this case. On no account the pipes should be dragged on the ground. Pipes should be given adequate supports at all times.

LAYING

The PVC pipes shall be laid under the floors below slab or on walls either buried or exposed as the case may be, as shown in the drawings.

The minimum thickness of fittings shall be of 3.2 mm. the fittings shall be of injection mould type with solvent cement joint or rubber ring joint.

The pipes and fittings shall be capable of withstanding sun's rays. PVC pipes laid below slab or suspended in ceiling shall be supported by angle brackets /supports as detailed in the drawings.

All pipes laid under Floor/ Suspended Ceiling shall be solvent Cement Joint.

All Pipes laid vertically in shafts and other areas shall be rubber Ring Joint.

JOINTING

The jointing of pipes to fittings shall be done as per the manufacturer's instructions / recommendations.

The PVC pipes and fittings shall be joined with Solvent Cement and jointing shall be carried out as follows

Cut the spigot end of the pipe square.

All burrs from the internal and external surfaces should be removed.

The spigot should be marked with a pencil line and a distance equivalent to the socket depth. Clean the surface within the marked area.

Apply uniform coat of solvent cement on the external surface to the pipe and a lighter coat on the internal surface of the fitting.

Insert the pipe end into the socket of the fitting and push it in upto the mark.

Remove the excess solvent cement and hold the joint firmly in position for 30seconds to dry. Gluing should be avoided in a rainy or foggy weather.

The other method of jointing shall be by rubber rings.

The material of rubber ring should conform to IS 5382-1969. The ring is housed in groove formed in a plastic or metallic housing. The rubber is compressed and makes a seal between the pipe and housing.

Lubricating paste should be applied before compressing the rubber. Where natural rubber rings are used, mineral oil or petrol or grease should be used.

TESTING

PVC pipes and fittings assembled shall be tested in accordance with IS 13592 - 1992. The openings of the pipes shall be sealed for the section to be tested.

The water column of 5m and shall be maintained for a maximum of 15 minutes.

The contractor with the attendance of the Client team shall examine carefully all the joints for leakage.

2. PVC PRESSURE PIPES AND FITTINGS

The PVC pressure pipes and fittings shall be used for conveying wastewater from washbasins, kitchen sinks etc., to floor drains.

The pipes shall be class III, 6 Kg/cm². PVC pipes and fittings shall be jointed with solvent cement.

The pipes shall conform to IS 4985 - 2000. Fittings shall be of injection moulded PVC conforming to IS 7634 (Part1) -1975.

LAYING AND FIXING

The pipe laying and jointing shall be done in accordance with IS 7634 (Part 3) – 1975. Pipes shall be cut to size and chamfered well.

Burrs if any shall be removed. Pipes and fittings shall be jointed using solvent cement or rubber ring joints.

The pipes and fittings shall be jointed accurately without any stress to achieve leak proof joints.

TESTING

Testing procedure will comply with the relevant IS code for testing of such pipelines.

The rate shall be for a unit of One Rmt.

TRAPS:

Nahani traps or floor traps/P-TRAP shall be cast iron/Low noise PVC (SKYRISE), deep seal with an effective seal of 50 mm.

The trap and waste pipes shall be set in cement concrete blocks firmly supported on the structural floor.

The blocks shall be in 1:2:3 mix (1 cement: 2 coarse sand: 4 stone aggregate 20 mm nominal size) mixed with water proof compound and extended to 40 mm below finished floor level.

Contractor shall provide all necessary shuttering and cantering for the blocks. Size of the block shall be 30 x 30 cms of the required depth.

The trap shall be installed at lowest point ensure no pending occurs at perimeters of the drain.

Floor traps gratings shall be in two pieces. Outer frame 150mm square with round SS-316 grating with hinge or without hinge as approved by Architect / EIC shall be used.

The grating shall be embedded in white cement sand mortar 1:2. The joint shall be leakage proof as per drawings and as directed. Rate shall be inclusive of cutting of floor in best workmanship manner. Centre of jali and center of the floor trap shall be coinciding. The trap shall be installed at lowest point to ensure no pending occurs at perimeters of the drain.

3. UNDER GROUND DRAINAGE DOUBLE WALL CORRUGATED PIPES:

All underground sewer lines where specified Double wall corrugated pipes SN8 for general. Pipes shall be true and straight with uniform bore throughout. Cracked, wrapped, Bend pipes shall not be used on the work. All pipes shall be tested by the manufacturer and the Contractor shall produce, prior to use on site, a certificate to that effect from the manufacturer.

These shall conform to IS: 16098 Part II and ISO – 21138 Part III of Stiffness class SN 8. Pipes shall be Rodent prevent.

All pipes shall be true to shape, straight, perfectly sound and free from cracks, Bend and flaws. The external and internal surface of the pipes shall be smooth and hard.

LAYING:

Pipes shall be laid on cement concrete bed or cradles as specified and shown on the detailed drawings. The cradles may be pre-cast 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 and properly placed on the soil to prevent any disturbance. The pipe shall then be placed on the bed concrete or cradles and set for the line and gradient by means of sight rails and boning rods, etc. Cradles or concrete bed may be omitted, if directed by the Client's Representatives.

JOINTING:

Pipes shall be one time joint by interlocking jointing system with Rubber ring, all joints shall be water tested.

PIPE SUPPORTS:

Unless otherwise directed by the Client's Representative cement concrete for bed, all round or in haunches shall be laid as follows:

	Upto 1.5m depth (5')	Upto 3m depth (10')	Beyond 3m depth (10')
Pipes in open ground (no sub soil water)	all round (1:5:10)	in haunches (1:3:6)	all round (1:5:10)
Pipes in sub soil water	all round (1:3:6)	in haunches (1:3:6)	in haunches (1:3:6)
Pipes (in all conditions)	all round (1:3:6)	in haunches (1:3:6)	in haunches (1:3:6)
Pipes under road or building	all round (1:3:6)	all round (1:3:6)	all round (1:3:6)

Pipes may be supported on brick masonry or pre-cast RCC or in situ cradles. Cradles shall be as shown on the drawings.

Pipes in loose soil or above ground shall be supported on brick or stone masonry pillars as shown on the drawings.

TESTING:

All lengths of the sewer and drain shall be fully tested for water tightness by means of water head maintained for not less than 30 minutes. Testing shall be carried out from manhole to manhole. All pipes shall be subjected to a test pressure of at least 1.5 metres head of water at the highest point of the section under test. The pipes shall be plugged preferably with standard drain plugs (with rubber rings) on both ends. The upper end shall, however, be connected to a pipe for filling with water and getting the required head.

There should not be any pressure drop in pipe.

4. FLOOR TRAPS

Nahani traps or floor traps/P-TRAP shall be cast iron/Low noise PVC (SKYRISE), deep seal with an effective seal of 50 mm.

The trap and waste pipes shall be set in cement concrete blocks firmly supported on the structural floor.

The blocks shall be in 1:2:3 mix (1 cement: 2 coarse sand: 4 stone aggregate 20 mm nominal size) mixed with water proof compound and extended to 40 mm below finished floor level.

Contractor shall provide all necessary shuttering and cantering for the blocks. Size of the block shall be 30 x 30 cms of the required depth.

The trap shall be installed at lowest point ensure no pending occurs at perimeters of the drain.

Floor traps gratings shall be in two pieces. Outer frame 150mm square with round SS-316 grating with hinge or without hinge as approved by Architect / EIC shall be used.

The grating shall be embedded in white cement sand mortar 1:2. The joint shall be leakage proof as per drawings and as directed. Rate shall be inclusive of cutting of floor in best workmanship manner. Centre of jali and center of the floor trap shall be coinciding. The trap shall be installed at lowest point to ensure no pending occurs at perimeters of the drain.

5. CLEAN OUTS:

PVC collar ring shall be fitted to the spigot end of the PVC pipe by means of solvent cement.

The spigot end of the pipe to be joined shall then be inserted into the socket and aligned.

Tarred spun yarn shall be caulked into the angular space between the spigot and socket upto a height of 20mm.

The remaining space shall be filled with CM 1:2 using very little water and well caulked using wooden caulking tool and finished off neatly.

Joints shall be kept for 24 hours. Alternatively, if so directed by Architects the following method may be adopted. The spigot end of the PVC pipe should be jointed to a PVC collar using solvent cement as detailed.

The other end of the collar is then jointed to the socket of the CI pipe using solvent cement.

6. GULLY TRAP

Gully traps shall conform to IS 651. These shall be sound, free from visible defects such as fire cracks, or hair cracks. The glaze of the traps shall be free from crazing. They shall give a sharp clear tone when struck with light hammer. There shall be no broken blisters.

Each gully trap shall have one C.I. grating of square size corresponding to the dimensions of inlet of gully trap. It will also have a water tight C.I. cover with frame inside dimensions 300 x 300 mm the cover weighing not less than 4.50 Kg and the frame not less than 2.70 Kg. The grating, cover and frame shall be of sound and good casting and shall have truly square machined seating faces.

Excavation: The excavation for gully traps shall be done true to dimensions and levels as indicated on plans or as directed by the Engineer-in-Charge.

Fixing: The gully traps shall be fixed on cement concrete foundation 65 cm square and not less than 10 cm thick. The mix for the concrete will be 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40 mm nominal size). The jointing of gully outlet to the branch drain shall be done similar to jointing of S.W. pipes described above.

Brick Masonry Chamber : After fixing and testing gully and branch drain, a brick masonry chamber 300 x 300 mm (inside) in brick work of specified class in cement mortar 1:4 (1 cement: 4 fine sand) shall be built with a half brick thick brick work round the gully trap from the top of the bed concrete up to ground level. The space between the chamber walls and the trap shall be filled in with cement concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40 mm nominal size). The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with cement mortar 1:3 (1 cement: 3 coarse sand), finished with a floating coat of neat cement. The corners and bottom of the chamber shall be rounded off so as to slope towards the grating.

C.I. cover with frame 300 × 300 mm (inside) shall then be fixed on the top of the brick masonry with cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) and rendered smooth. The finished top of cover shall be left about 4 cm above the adjoining ground level so as to exclude the surface water from entering the gully trap.

7. SEWER TRAP CHAMBER

The item includes supplying, laying and fixing the Stone ware sewer trap of specified diameter including fixing, jointing and embedding.

Sewer trap shall be made from Pvc of specified diameter and shall be approved quality.

Sewer trap should be free from pin holes, cracks and other imperfections.

Any material found damaged or cracked shall not be used in the work and contractor has to replace the same from the site at his own cost and charge.

Sewer trap shall be laid carefully to the correct alignment, levels and gradient and care shall be taken to prevent for entering the sand, earth or other free material into the trap during laying. The trap shall be on bedded in CC 1:2:4 including necessary form work.

The testing shall be done along the testing of sewer line with the same specification.

The contract rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

The measurement shall be for each unit of sewer trap fixed.

All the RCC NP3/NP4 Class pipes shall have ISI mark on it. At the time of Supply Contractor has to produce ISI licence of manufacture from where pipe are supposed to be purchase.

8. RCC NP3 HUME PIPE

MATERIALS:

R.C.C. NP3 Class spigot and socket rubber ring pipes of various diameters of required length shall be supplied by the contractor as per terms and condition attached herewith at end of this item.

Water shall conform to M-1, Cement shall conform to M-3, Sand shall conform to M-6, and Cement mortar of required proportion shall conform to M-11 all the required materials for completing the items shall conform to relevant Indian Standard specification requirements.

Rubber Ring shall confirm to IS: 5382-1985.

STACKING OF MATERIALS:

Reasonable care shall be exercised in loading, transporting and unloading of the pipes and specials. Gradual unloading shall be done by inclined plane or by chain block. Handling shall be done such as to avoid impact.

Before, the actual laying of pipe line started, the pipes and fittings in required quantity shall be arranged lengthwise, by the site of the excavated trench without causing any obstacles to the traffic. If necessary, the pipe shall be got cut by the contractor at his own cost to accommodate specials or fittings or for any other reason.

The contractor shall be fully responsible for safety of materials at site.

LAYING:

Before laying, the trench section shall be got checked for its level and uniform grade as per L-section and plan and finished with proper bedding if required as directed, with the help of sight rails and boning rods and shall be got approved from the Engineer-in-charge.

Drainage pipes are always laid with the socket at the higher and consequently, it is necessary to beginning at the lower end of drains and to work upwards laying pipes shall confirm to I.S. 783-1967 or its latest version.

The contractor shall provide and maintain leveling instruments. The pipes shall be laid in a complete straight line with centre lines ranged accordingly by means of string stretched between sight centers of cross rails and no deviation will be permissible between the manholes. The pipe shall be laid from manhole started from the lower end. The bottom concrete of the manhole must be finished simultaneously with laying joints of pipes in that section.

Temporary Bench mark shall be provided by the contractor at a minimum distance of every 150 meters without any extra claim. These B.Ms. shall be either of stone masonry or mass concrete not less than 0.14 Cu.mt. The site of B.M. kept will be directed by the Engineer-in-charge.

The pipe shall be laid in reasonably dry condition and under no circumstances they shall be rest on slushy bedding.

The pipe shall be lowered by means of wooden bull and rope in case of light pipe up to 225 mm dia. while tripped and chain pulley block of sufficient capacity shall be used for heavy pipes above 250 mm dia.

No brick bats or hard stone or kapachi bigger than 20 mm size shall be allowed beneath the pipe line directly in touch with the pipe. Murrum bedding shall be provided if only directed by the Engineer-in-charge.

The pipe shall be laid in such a way that their longitudinal joints shall always come on the top and quite centre. The long collar than shall first slipped over after cleaning the ends of pipes. The wedge shape groove at the end of the pipe shall be slipped with required quantity of jute dipped in hot tar or bitumen. The bitumen for this shall be heated till it is sufficiently plastic.

The next pipe shall than be brought forward and pressed till the jute ring in recess of first pipes sets in to the recess of the second pipe. The process shall be repeated for two three pipes, which shall than the packed up in usual manner by jack and in doing so, care shall be taken to see that there shall be no deflection from the alignment.

LAYING (SPIGOT AND SOCKET RUBBER RING ROLL ON JOINT)

In various the pipes and fittings/specials the centre for each manhole/chamber or pipeline shall be marked by a peg. Contractor shall dig holes for and set up two posts (about 100 x 100 x 1800 mm) at each manhole/chamber or junction of pipelines at nearly equal distance from the peg and at sufficient distances there from to be well clear of all intended excavation. So arranged that a sight rail when fixed at a certain level against the post shall cross the centre line of the manhole/chamber or pipelines. The sight rail shall not in any case be more than 30 m apart; intermediate rails shall be put up if directed by Engineer-in-charge.

Boning staves of 75 mm x 50 mm size shall be prepared by contractor in various lengths. Each length being of a certain whole number of meters and with a fixed tee head and fixed intermediate cross pieces, each about 300 mm long. The top-edge of the gross piece must be fixed below the top-edge of the tee-head at a distance equal to the outside. Diameter of the pipe or the thickness of the concrete bed to be laid as the case may be. The top of cross pieces shall indicate different levels such as excavation for pipe line, top of concrete bed, top of the pipe etc. as the case may be.

The sight rail of size 250 mm x 40 mm shall be screwed with the top edge resting against the level marks. The centre line of the pipe shall be marked on the rail and this mark shall denote also the meeting point of the centre lines of any converging pipes. A line drawn from the top edge of one rail to the top edge of the next rail shall be vertically parallel with the bed of the pipe, and the depth of the bed of pipe at any intermediate point may be determined by letting down the selected boning staff until the tee head comes in the line of sight from rail to rail.

The post and rails shall be perfectly square and planed smooth on all sides and edges. The rails shall be painted white on both sides and the tee heads and cross piece of the boning staves shall be painted black.

For the pipes converging to a manhole / chamber at various levels. There shall be a rail fixed for every different level when a rail comes within 0.50 m of the surface of the ground. A higher sight rail shall be fixed for use with the rail over the next point. The posts and rails shall in no case be removed until the trench is excavated. The pipes are laid and Engineer gives permission to proceed with the backfilling.

Laying of Pipes and fittings shall be carefully cleaned before installation. Whenever pipe laying is interrupted for any reason. The open end of the pipeline shall be sealed with a suitable expanding

stopper or a properly fitted temporary wooden stopper and exposed pipes shall be suitably protected from stones and other objects falling into the trench from above.

The permissible tolerance for pipe lines in trenches shall be 6 mm in level and 25 mm in line between manholes. After the laying of a length of a pipeline but before testing the crown of the pipe shall be checked for level and alignment and any necessary adjustment made by un-jointing and removing the pipes concerned. Adjusting the

bedding, relaying the pipes and rechecking for line and level. In addition, where a gravity pipeline is shown on the drawings as being straight between manholes it will not be accepted unless a light can be sighted directly through the length concerned.

For pipeline jointing systems incorporating flexible jointing rings, pipes shall be laid with the spigot and pointing in the direction of flow and with a gap between the end of the spigot and the base of the socket, or between spigots rubber rings shall comply to IS-5382.

JOINTING:

General:

Pipe section shall be joined utilizing spigot and socket flexible joint with rubber ring, as per IS-783. After jointing extraneous material, if any, shall be removed from the inside of the pipe and the newly made joints shall be thoroughly cured. The rubber sealing rings used for jointing shall conform to IS-5382.

SPIGOT AND SOCKET JOINT (FLEXIBLE)

The RCC pipe with the rubber ring accurately positioned on the spigot shall be pushed well home into the socket of the previously laid pipe by means of uniformly applied pressure with the aid of a jack or similar appliance. The RCC pipes shall be of spigot and socket type and rubber rings shall be used, and the manufacturer's instructions shall be deemed to form a part of these engineer's requirements. The rubber rings shall be lubricated before making the joint and the lubricant shall be soft soap water or an approved lubricant supplied by the manufacturer.

HYDRAULIC/FLOW TEST OF PIPES:

The contractor shall give at his own cost necessary hydraulic/flow test of pipe line laid.

Each section of drain shall be tested for water tightness preferably between manholes. To prevent change in alignment and disturbance after the pipes have been laid, it is desirable to back fill the pipes up to the top, keeping at least 90 cm. length of pipe open at the joints. It is necessary at the pipe line are filled up with water for about a week before commencing the application of pressure to allow for the absorption by pipe wall. Pipes shall be tested after the cement mortar joints have been made.

The line shall be tested as per I.S.8127-1967 (code of practice for laying for glazed stone-ware pipes) or its latest edition.

The contractor shall provide at his own testing equipment of approved make. This shall be approved by the Engineer-in-charge.

All pipes, specials, joints found to be leaking or cracked or busted or observed unsuitable shall be removed and repaired. Contractor shall see that no end of any pipe length is kept open even temporarily and that all open ends are immediately at the end of every days work covered up

either layer gunny bag cloth bided, properly by means of mild steel wires without any claim for extra cost.

Filling above the drains to a depth of twice the diameter of the pipe line shall be completely free from boulders, stones, or brick bats and shall be composed of selected hard variety of Murrum well consolidated but not heavily tempered. In the remaining depth, the trench shall be filled up by the selected stuff and Murrum as ordered by the Engineer-in-charge.

For crossing of obstacles, natural or built up, such as culvert drains bridges etc. the contractor shall approach respective authorities to obtain permission for crossing them. Such work left remaining to be carried out due to want of permission shall be carried out at any later stage or period within a time to the satisfaction of the Engineer-in-charge.

GENERAL:

After the satisfactory test of draining line the rubber plugs fitted to Y or T branches shall be taken out and ends shall have to be closed with cement concrete plugs or bricks bats as directed by the Engineer-in-charge. These plugs shall be fixed with mud mortar or cement mortar over the mud mortar of about 6 mm to 12 mm thick shall be plastered. All those works shall be done strictly as per instructions of the Engineer-in-charge. If directed, alternatively the branches of Y or T after fixing plugs shall be properly closed with a place of gunny bag and the same shall be tied with M.S. wire. The rate shall include the cost of all these materials and labor etc. complete.

If pipe-lines are laid in separate detached sections and not in continuous length due to any reasons, such as non-availability of pipes or due to obstacles or due to non-availability of permission etc., the contractor shall complete the work after words at the same rate as originally provided for the tenderer, without any claim for extra or compensation due to non-respect of permission or any other natural or unforeseen reasons and until the date of completion of work, shall be treated as in-complete.

Complete arrangements for water supply requirements for complete construction of work, hydraulic testing and for layout shall be done by the Contractor at his own cost. The water shall potable.

The contractor shall appoint a qualified site supervisor who can take the responsibilities and fixing the inner levels of the drains.

Temporary bench marks shall be provided and protected by the contractor at a minimum distance of every 150 meter at site without any extra cost. These bench marks shall be either of masonry or mass concrete or not less than 0.140 Cu.mt. The location of bench marks shall be kept as directed by the Engineer-in-charge.

The rate includes crossing of all obstacles such as electric wire, telephone cable, water pipes sewer, drains, manholes walls, culverts, khalkuvas, etc. coming in the laying of pipe lines work. Any damage done to this may be restored by the contractor without any extra claim. Any work of removing, repair of such structures or constructed in the process of laying pipe lines etc. shall be carried by the contractor without any claim for extra cost. Arrangements for dewatering and cleaning the khalkuvas shall be done by the contractor without any extra claim.

9. SEPTIC TANK

In unsewered area, every house shall have arrangements for its sewage being treated in septic tank, effluent from which should be given secondary treatment either in a biological filter or on the land, or in a sub-surface disposal system.

Surface and sub-soil water should be excluded from finding way into the septic tank. Waste water may be passed into the septic tank provided the tank and the means for effluent disposal are designed to cope up with this extra liquid. Depending on the location of the water table and the nature of the strata, the type of disposal for the effluent from the septic tank shall be decided.

Dimensions

Septic tanks shall have minimum width of 75 cm, minimum depth of one metre below water level and a minimum liquid capacity of the one cubic metre. Length of tanks shall be 2 to 4 times the width. Suitable sizes of septic tanks for use of 5, 10, 15, 20 and 50 persons based on certain assumptions are given in Appendix II.

Cover and Frame

Every septic tank shall be provided with C.I. cover of adequate strength. The cover and frames shall be 500 mm dia. (M.D.) minimum or 610 mm x 455 mm (LD). The specification for frames and cover given in 19.3.1 shall apply.

Ventilating Pipe

Every septic tank shall be provided with C.I. ventilating pipe of at least 50 mm diameter. The top of the pipe shall be provided with a suitable cage of mosquito proof wire mesh.

The ventilating pipe shall extend to a height which would cause no smell nuisance to any building in the area. Generally the ventilating pipe may extend to a height of about 2 m, when the septic tank is at least 15 m away from the nearest building and to a height of 2 m. above the top of the building when it is located closer than 15 metres. The ventilating pipe may also be connected to the normal soil ventilating system of the building where so desired. CPWD SPECIFICATIONS 2019 1034

Disposal of Sludge

The sludge from septic tanks may be delivered into covered pit or into a suitable vehicle for removal from the site. Spreading of sludge on the ground in the vicinity shall not be allowed.

Testing

Before the tank is commissioned for use, it shall be tested for water-tightness by filling it with water and allowing it to stand for 24 hours. It shall then be topped up, if necessary, and allowed to stand for a further period of 24 hours during which time the fall in the level of the water shall not be more than 1.5 cm.

Commissioning of Septic Tank

The tank shall be filled with water to its outlet level before the sewage is let into the tank. It shall, preferably, be seeded with small quantities of well digested sludge obtained from septic tanks or sludge digestion tanks. In the absence of digested sludge a small quantity of decaying organic matter, such as digested cow-dung, may be introduced.

Sub-Surface Absorption System

The effluent from septic tank shall be disposed of by soak pit or dispersion trench depending on the position of the sub-soil water level, soil and sub-soil conditions and the size of the installation.

10. SOAK PITS

Construction

The earth excavation shall be carried out to the exact dimensions as shown in the figure. In the soak pit shall be constructed a honey-comb dry brick shaft 45 x 45 cm and 292.5 cm high. Round the shaft and within the radius of 60 cm shall be placed well burnt brick bats. Brick ballast of size from 50 to 80 mm nominal size shall be packed round the brick bats up to the radius of 90 cm. The remaining portion shall be filled with brick ballast of 40 mm nominal size. The construction of shaft and filling of the bats and the ballast shall progress simultaneously.

Cover and Drain

Over the filling shall be placed single matting which shall be covered with minimum layer of 7.5 cm earth. The shaft shall be covered with 7.5 cm thick stone or R.C.C. slab 10 cm wide and 10 cm deep brick edging with bricks of class designation 75 shall be provided round the pit. The connection of the open surface drain to the soak pit shall be made by means of 100 mm diameter S.W. pipe with open joints.

11. STORM WATER DRAIN CHANNEL

MATERIAL

M40 cylinder strength/ M50 cube strength Self compacting concrete using excellent quality River sand as per IS-383, maximum aggregate size <15 mm machine cut aggregates of approved quality & size as per IS-383, OPC -53 grade cement confirming to IS :269 of reputed brand having major cement plant, Super plasticizer as per IS-456, R.O water as per IS-456. Fe 500 / Fe 500D steel confirming to IS 1786 & releasing agent for the form work as per the industry standard. Excellent Quality of welding rods (IS code) for manufacturing reinforcement cage, for fixing the reinforcement in place High grade plastic spacers. High quality lifting inserts of appropriate weight bearing capacity and all other required material to produce the complete precast U shape surface storm water drain in all the aspects and respects.

WORKMANSHIP AT PRECAST FACTORY:

The entire precast U shape surface storm water drain shall be produced using excellent workmanship as per the detail and quality of the workmanship given below.

M-40 cylinder strength/ M-50 cube strength Self compacting concrete is mix created by using state of the art computer controlled customised batching plant within the factory. Fresh concrete will be taken to the assembly line & gently poured into the mould by remote control disposal in place. The mould is made out of using high grade automobile steel without any dent or damage.

The required reinforcement as per drawing by using Fe 500 / Fe 500D steel is cut in to proper sizes by using proper re bar cutting machine. The separate steel member are combined together using excellent quality of welding done by welding machines to create the steel frame work/cage. The cage is given the appropriate shape by automatic bending machine which in reference the mould size and shape and as per the design to be put inside the mould. The entire steel assembly is kept into place inside the mould by using high grade necessary plastic spacers.

After pouring of SCC into the mould, the mould with filled in concrete shall be taken for controlled temperature and steam curing process. The entire assembly shall be kept for the minimum time period of 3 to 6 hrs for steam curing to attain the desired strength of the product. The product will be kept for the period of approximately 14 days at production site prior to the dispatch from the production site.

While pouring the concrete in to the mould the concrete samples are taken in the cylindrical mould as per IS code. Each precast unit should have date on manufacturing for traceability. The factory should provide concrete compressive test results before dispatch of material from factory.

The stacking of Precast U shape drain shall be carried out as per the prescribed manner using wooden planks to avoid any damages. If any type of damage during the process of loading & unloading, lowering into trench, fixing at the location, takes place the contractor shall remove & replace the same with the brand new piece without any extra cost as decided by consultant/client.

Product surfaces should have excellent quality smooth finish without any cracks, honeycombing or perforation & each piece should be certified by QC engineer of the factory. The bottom is kept slightly unsmooth finish for proper binding with bedding mortar.

This product is designed to take care of the forces generated while lifting it & placing it at the desire location at depth using the machinery like Hydra/Flanna. To facilitate the lifting of the precast U shape drain inserts are provided for the fixing the De-shackle & lifting belts. The Agency has to provide separate QAP along with tender documents.

WORKMANSHIP AT INSTALLATION SITE:

The excavation shall be carried out in proper manner as per the required depth and width for easy installation and fixing of U shape Drain considering de-shackle removal and working space to install.

The contractor shall prepare & provide the base using PCC as a levelling course as per drawing / as recommended by the consultant depending upon the foundation soil strata. The dry bedding mortar cement mortar 1:3 of about 0 to 20 mm should be provided as levelling course.

The contractor shall use Total station survey / auto level equipment's to derive the line level as well as level of the bedding mortar. The level should be taken as interval of every 2 to 3 meters & shall be recorded properly & deposited with the client. In case of the flooding of the water in the excavated area it shall be responsibility of the contractor to carry out the dewatering without charging any extra cost. Any dirty water, garbage, shrubs, thorny bush etc shall be removed by the contractor as & when required to carry out the work in complete satisfactory manner.

The joints between two U shape precast drain adjoining each other shall be filled by rich Cement mortar (1:3) proportion / non shrink material into joints.

Any obstructions & any water supply, sewage, drainage, electrical, telephone, internet cables which need to be shifted due to laying of the precast drain shall be carried out by the contractor in consultation with client and engineer in charge. Complete and total care shall be taken by contractor not to damage any of the existing services and infrastructure while carrying the work at site.

The entire assembly should be in line level & perfectly carried out at site as per the design, drawing & instruction given by engineer in charge.

The backfilling shall be carried out using the approved quality of soil/sand as directed by engineer in charge. The backfilling of soil shall be carried out simultaneously on both the sides using plate compactor in stages of max 30 cm thickness with proper compaction in such way that it should not displace the Precast U shape drain from original setting & location. In case of sand filling in sides also, the same care shall be taken.

12. STORM WATER DRAIN CHANNEL LIDS

MATERIAL

M-40 cylinder strength/ M-50 cube strength Self compacting concrete using excellent quality River sand as per IS-383, maximum aggregate size <15 mm machine cut aggregates of approved quality & size as per IS-383, OPC -53 grade cement conforming to IS :269 of reputed brand having major cement plant, Super plasticizer as per IS-456, R.O water as per IS-456. Fe 500 / Fe 500D steel conforming to IS 1786 & releasing agent for the form work as per the industry standard. Excellent Quality of welding rods (IS code) for manufacturing reinforcement cage, for fixing the reinforcement in place High grade plastic spacers. High quality lifting inserts of appropriate weight bearing capacity and all other required material to produce the complete precast lid for U shape surface storm water drain in all the aspects and respects.

WORKMANSHIP AT PRECAST FACTORY:

The entire precast lid of U shape surface storm water drain shall be produced using excellent workmanship as per the detail and quality of the workmanship given below.

M-40 cylinder strength/M-50 cube strength Self compacting concrete is mix created by using state of the art computer controlled customised batching plant within the factory. Fresh concrete will be taken to the assembly line & gently poured into the mould by remote control disposal in place. The mould is made out of using high grade automobile steel without any dent or damage.

The required reinforcement as per drawing by using Fe 500D steel is cut in to proper sizes by using proper re bar cutting machine. The separate steel member are combined together using excellent quality of welding done by welding machines to create the steel frame work/cage. The cage is given the appropriate shape by automatic bending machine which in reference the mould size and shape and as per the design to be put inside the mould. The entire steel assembly is kept into place inside the mould by using high grade necessary plastic spacers.

After pouring of SCC into the mould, the mould with filled in concrete shall be taken for controlled temperature and steam curing process. The entire assembly shall be kept for the minimum time period of 3 to 6 hrs for steam curing to attain the desired strength of the product. The product will be kept for the period of approximately 14 days at production site prior to the dispatch from the production site.

While pouring the concrete in to the mould the concrete samples are taken in the cylindrical mould as per IS code. Each precast unit should have date on manufacturing for traceability. The factory should provide concrete compressive test results before dispatch of material from factory.

The stacking of precast lid of U shape drain shall be carried out as per the prescribed manner using wooden planks to avoid any damages. If any type of damage during the process of loading & unloading, lowering into trench, fixing at the location, takes place the contractor shall remove & replace the same with the brand new piece without any extra cost.

The top surface of the precast lid should have uniform anti skid texture of appropriate design and along with hole for storm water intake. The lid should have excellent quality finish without any cracks, honeycombing or perforation & each piece should be certified by QC engineer of the factory.

This product is designed to take care of the forces generated while lifting it & placing it at the desire location at depth using the machinery like Hydra/Flanna. To facilitate the lifting of the precast lid of U shape drain lifting belt should be used. The Agency has to provide separate QAP along with tender documents.

WORKMANSHIP AT INSTALLATION SITE:

All the precast lid of U Shape Drain to be installed in such a manner to minimize the joint width between to two adjoin lid. Four lid units per 2 m long Precast U-Shape drain unit are required to be in place on top of the U-Shape Drain in the specified manner.

The lid should be installed only after jointing of U-Shape drain units completed at site and in consultation / approval of client / consultant. Any obstructions, garbage etc if any in the U-Shape Drain, the same shall be removed prior to installation of the lid on the U Shape drain.

The entire assembly should be in line level & perfectly carried out at site as per the design, drawing & instruction given by engineer in charge.

13. RAIN WATER FILTERS

Rainwater filter made out of ABS plastics material, designed to operate on gravity of rainwater from roof through down pipe, having inlet (id) of 110 mm, outlet (id) of 110 mm; provided with SS 304 wire mesh filter element having diameter of not less than 90 mm and height not less than 500 mm with cap of not less than 70 mm height with two holes of not less than 10 mm on cap as a safety feature. Element must have back wash cap at bottom for cleaning dried particles. Filter must have flush outlet of not less than 60 mm moulded opposite to inlet connection. Flush valve must be supplied along with filter. Rainwater filter must be manufactured from injection moulding process, blended with uv stabilizers. Rainwater filter's width to be not less than 400 mm, depth to be not less than 140 mm and height must not be less than 600 mm overall. Moulded projection to be given at bottom to fix on wall and a clamp to fix at top.

14. STORM WATER DRAIN CHANNEL

MATERIAL

M-40 grade Cylinder strength/ M-50 grade cube strength Self compacting concrete using excellent quality River sand as per IS-383, maximum aggregate size 15 mm machine cut aggregates of approved quality & size as per IS-383, OPC -53 grade cement conforming to IS :269 of reputed brand having major cement plant, Super plasticizer as per IS-9103, R.O water as per IS-456. Fe 500/500D steel conforming to IS 1786. Excellent Quality of welding rods (IS code) for manufacturing reinforcement cage, for fixing the reinforcement in place High grade plastic spacers. High quality lifting studs of appropriate weight bearing capacity and all other required material to produce the complete precast BOX culvert in all the aspects and respects.

WORKMANSHIP AT PRECAST FACTORY:

The entire precast Box culvert shall be produced using excellent workmanship as per the detail and quality of the workmanship given below.

M-40 cylinder strength/ M-50 Grade Cube strength Self compacting concrete is mix created by using state of the art computer controlled customised batching plant within the factory. M-40 grade concrete will be taken to the assembly line & gently poured into the mould by remote control disposal in place. The mould is made out of using high grade automobile steel without any dent or damage.

The required reinforcement as per drawing by using Fe 500/500D steel is cut in to proper sizes by using proper re bar cutting machine. The separate steel member are combined together using excellent quality of welding done by welding machines to create the steel frame work/cage. The cage is given the appropriate shape by automatic bending machine which in reference the mould size and shape and as per the design to be put inside the mould. The entire steel assembly is kept into place inside the mould by using high grade necessary plastic spacers.

After pouring of M-40 grade SCC into the mould, the mould with filled in concrete shall be taken for controlled temperature and steam curing process. The entire assembly shall be kept for the minimum time period of 4 to 8hrs before de-molding. The product will be kept for the period of approximately 14 days at production site prior to the dispatch from the production site. While pouring the concrete in to the mould the concrete samples are taken in the cylindrical mould as per IS code. Each precast unit should have date on manufacturing for traceability. The factory should provide concrete compressive test results before dispatch of material from factory.

The stacking of precast unit shall be carried out as per the prescribed manner using wooden planks to avoid any damages. If any type of damage during the process of loading & unloading, lowering into trench, fixing at the location, takes place the contractor shall remove & replace the same with the brand new piece without any extra cost.

All the surfaces should have excellent quality smooth finish without any cracks, honeycombing or perforation & each piece should be certified by QC engineer of the factory.

This product is designed to take care of the forces generated while lifting it & placing it at the desire location at depth using the machinery i.e crane of suitable capacity. To facilitate the lifting of the precast box culvert, in-built lifting studs of appropriate load capacity for the fixing the hooks & lifting belts.

WORKMANSHIP AT INSTALLATION SITE:

The excavation shall be carried out in proper manner as per the required depth and width for easy installation and fixing of Box culvert considering male & female jointing system, groove for fixing rubber gasket, flange coupling jointing arrangements and special in-built hanging brackets at appropriate locations for faster & safe installation of the product.

The contractor shall prepare & provide the base using PCC as a levelling course as per drawing / as recommended by the consultant depending upon the foundation soil strata. The bedding dry mortar CM 1:3 placing on top of the PCC as a levelling course.

The contractor shall use Total station survey / auto level equipment's to derive the line level as well as level of the bedding mortar. The level should be taken as interval of every 2 to 3 meters & shall be recorded properly & deposited with the client. In case of the flooding of the water in the excavated area it shall be responsibility of the contractor to carry out the dewatering without charging any extra cost. Any dirty water, garbage, shrubs, thorny bush etc shall be removed by the contractor as & when required to carry out the work in complete satisfactory manner.

Any obstructions & any water supply ,sewage, drainage, electrical, telephone,internet cables which need to be shifted due to laying of the precast drain shall be carried out by the contractor in consultation with client and engineer in charge. Complete and total care shall be taken by contractor not to damage any of the existing services and infrastructure while carrying the work at site.

The jointing of two precast Box culvert should be done by bolting in the in-built flanges to minimize the joints between two precast units as approved by engineer in-charge / client / consultant.

The entire assembly should be in line level & perfectly carried out at site as per the design, drawing & instruction given by engineer in charge.

15. C.I. COVER WITH FRAME

Manhole covers and frame shall be manufactured from appropriate grade of grey cast iron not inferior than FG150 grade of IS 210.

They shall be cleanly cast and shall be free from air and sand holes, cold shuts and warping.

Covers shall have on its operative top a raised chequered design to provide for an adequate no-slip grip. The rise of chequers shall be not less than 4mm.

Key holes, keys and lifting devices shall be provided in the manhole cover to facilitate their placement in the frames and their operative maintenance.

Manhole covers and frames shall be coated with materials having base with a black bituminous composition. The coating shall be smooth and tenacious. It shall not flow when exposed to temperature of 63°C and shall not be so brittle as to chip off at temperature of 0°C.

Size and shape and performance requirement of manhole covers and frames shall conform to IS 1726.

Each manhole covers and frame shall have cast on them the following information:
Manufacturer's name or trade-mark

Grade designation

Date of manufacturer

The words SWD or 'Sewer' to denote 'storm water drain' or 'sewer' respectively Identification marks as required by Engineer-in-Charge.

The cover shall be gas tight and water tight.

The sizes of covers specified shall be taken as the clear internal dimensions of the frame.

The approximate weight of the various type of manhole covers and frames shall be as per IS 1726.

The cover shall be capable of easy opening and closing and it shall be fitted in the frame in workmanship like manner.

16. FOOT RESTS

All manholes deeper than 0.8 m shall be provided with M.S/C.I. foot rests. These shall be embedded 20 cm deep in 20 x 20 x 10 cm blocks of cement concrete 1:3:6 (1 cement: 3 coarse sand 6 graded stone aggregate 20 mm nominal size). The concrete block with M.S. foot rest placed in its centre 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. M.S. bars as shown in Fig. 19.8 shall be fixed 40 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 manhole cover and frame.

SECTION - 06: PUMPING EQUIPMENTS & PUMP ROOM

a. PUDDLE FLANGE

Puddle Flanges shall be fabricated from MS pipe, Heavy duty conforming to IS 1239 part 1 and 6mm thick MS plate of specified dimension and flange shall be welded at one end of the puddle for connection with header the complete arrangement shall be made as per typical details drawings provided by consultant and the complete arrangement shall be galvanized post fabrication of set as required. Installation of puddle flanges under RCC tank should be done as per drawing provided by consultant / approved drawings. In any case no puddle flange should be installed prior approval of drawings from engineering consultant

b. PUMPING SYSTEM

SCOPE

This section of the contract involves the design, supply, installation, testing and commissioning of the complete Hydro-pneumatic pumping system and other pumping systems complete with all controls and electrical work for domestic water supply / water supply for flushing / for cooling tower make-up. All submersible water re-circulation, drainage and ejector pumps for the project are also included in this contract. It also involves testing and commissioning of the pumping system with the domestic water and flushing water supply & distribution. This specification described the particulars of the contract, designs and systems chosen, and mode of operation. All installation work shall comply with the latest rules and regulations. The work embraced by this specification covers the design, submission to authorities, supply, and delivery on site, installation, testing, commissioning and maintenance of the Hydro-pneumatic pumping system, other pumping system installation of the building in accordance with this specification and associated drawings. The scope of work shall include the following (list is indicative and not exhaustive):

Variable speed pumping unit's domestic water & flushing water supply & distribution.

Suitably sized food grade quality, non-toxic diaphragm type pressure vessels complete with necessary interconnections and controls.

Control panel for pump control complete with variable speed drives, circuit breakers, fuses, pressure transmitters etc. complete with all interconnections to pumps and electrical supply panels.

Pump control units complete with pre-programmed micro-processor chip.

Pump monitoring units to monitor operation of pumps.

Skid mounting arrangement including supports for piping and valves of complete system

Each Hydro-pneumatic Pumping unit shall be supplied as a complete set including variable speed pumps, pressure vessels suction and discharge common manifolds, non-return valves, isolating valves, pressure transmitters on the discharge side and level electrode at the suction tank. Each unit shall be provided with electronic microprocessors for unit control and all necessary electrical work for the unit.

All the pipe work etc. shown in the system drawings is meant for information only and shall be carried out by others. The Hydropneumatic system supplier shall provide the pumping units in the designated pump rooms as complete units included all necessary piping within plant such that only discharge connections are required to be connected into the unit's discharge manifolds just inside the plant room, by the Plumbing contractor. The Hydro-pneumatic system contractor shall guarantee specified pump performance at various pump speeds and Hydro-pneumatic pumps must be able to supply at least 2 bar pressure at the highest/farthest fitting.

Electrical equipment and installation work including the PLC in Control panel.

Painting and labeling of pipe work and equipment;

Provision of all hold down bolts, spigots struts and the like required to be built in during construction;

Provision of dry contacts to BMS indicating the status of the pumps and pressure vessel in form of hardware interfacing panels inside each pump room and control panels of all pumps.

Provision of all level switches, flow switches and other sensing devices for status indication.

All interfacing work with other trades.

Testing & commissioning and balancing of the Hydro-pneumatic & Pumping system;

Provision of twenty four (24) months operational maintenance and breakdown services;

Provisions of operating instructions and maintenance manuals;

Provision of spare parts; - Training of the employer's staff for proper operation of the entire systems;

Liaison with Local Authorities to obtain all necessary certificates and approvals, including the completion of all submission drawings, forms and payment of any fees and charges. All the costs for all the tests required by Local Authorities shall be included. To attend to any Authorities inspection regardless of whether this inspection is carried out after the defect liability period;

Provisions of the necessary installation which include pumping works, pipe work within the pumping unit up to suction and discharge manifolds, conduit and control wiring, etc. to form a workable system required;

All other works and systems as specified in the Contract document and or shown on the drawings.

All cutting, patching, framing up, furring in, chasing and making good associated with the building construction for the passage of pipes, conduits and the like including providing GI pipes sleeves of required size corresponding to pipe dia., wherever pipes crossing fire rated walls and floors and sealing with glass wool in between and fire sealant compound on either end. Details on shop drawings shall also be provided.

GENERAL

Equipment offered for supply and installation shall include the following: All minor items and incidental work, equipment accessories and materials may not be specifically mentioned but are required for the proper completion of the installations in accordance with the true intent and meaning of this Specification. All necessary safety devices for the protection of personnel against injury and the protection of plant and equipment against damage including relief valves, belt guards, fan inlet and/or discharge guards, safety railing, effective earthing of electrical components, electrical interlocks, warning lights and alarms. Readily accessible, dust-proof lubricating facilities on all moving parts and equipment including provision for cleaning all lubricating lines and bearings and charging same with the correct lubricants after installation but prior to testing and commissioning. Clearly visible and robust manufacturer's name-plates permanently fitted each and every item of equipment and showing the manufacturer's name, type and/or model number, serial number, and all essential operating data such as speed, capacity, voltage, current draw, etc. The Contractor also shall allow provision for the inspection of all plant and equipment by the Manufacturer or his licensed representative, at least twice during the course of the installation.

PIPING

The pipes and fittings shall be GI class 'C' (heavy class) conforming to IS: 1239 (Part-I) for pipes and IS: 1879 (Part 1 to 10) for malleable cast iron galvanized fittings.

PUMPS

Pumps shall be vertical, centrifugal, multistage directly coupled to motor. Provision of pump with pump head & base of cast iron and other parts in SS 304 shall be made for pumps required in Hydro-pneumatic System and water fountain re-circulation system. Impeller shall be hydraulically balanced and keyed to shaft. Pump shall be mounted on a concrete foundation, projecting at least 15 CM above finished floor level. The pumps base shall be set on a vibration elimination pad. The pump shall be lubricated in strict accordance with the manufacturer's instructions and shall be factory aligned prior to shipment. All motors and bases shall be painted with approved finish shop coat of paint. The pump shall be selected for the lowest operating noise level and shall be complete with flexible connections, valves, and pressure gauges. The pumps shall include cost of foundation channel complete.

The Contractor shall supply and install pumps of the type and performance as shown on the drawings. All duties of pumps given in the Tender Drawings shall be checked and where necessary corrected before ordering. All the parts of the pumps that are in contact with water e.g. shaft, impeller etc. shall be of stainless steel construction. Pumps shall be so selected that the design duty point is within 5% of the maximum efficiency point.

The pump casing so selected shall have ample space to take an impeller one size larger than that capable of performing the design duty. The pump shall have a speed of not more than 1500 rpm. However pumps of 2900 rpm with high efficiency and low noise motor can be selected and noise data submitted for approval. All pumps and motors shall be of minimum vibration and noise level

during operation. Vibration isolators shall be provided for all pump sets. Facilities shall be provided to prevent starting of pumps when the water tank is at low water level. An indicator for this low water level alarm shall be provided.

Facilities to select which pump to be duty pump and standby pump shall be provided and be interchangeable. Leakage from pump gland shall be drained to the nearest floor waste.

Pump curves for all pumps offered shall be submitted. All curve indicating excessive shut-off head will not be approved.

Each pump shall be provided with a gate valve at suction and discharge, approved check valve at discharge, approved strainer at suction, flexible connections at pump suction and discharge, eccentric reducer at suction, concentric reducer at discharge, pressure gauges at suction and discharge, circulation relief valve and automatic air relief valve.

Appropriate neoprene vibration isolation mountings shall be provided for each pump sets.

Local Motor Control Panel

The motor control panel shall be equipped with all the necessary electrical components including a microprocessor control unit and a frequency drive. The control panel and the microprocessor shall cover the followings functions:

Flexibility and simplicity in allowing the necessary re-adjustment of the pumping system preset delivery pressure to operate the pumps within the specified maximum and minimum Delivery ranges.

Built-in frictional loss compensation factor which will automatically increase the delivery Pressure setting, in collaboration with the increase in flow demand. This shall be able to minimize the system pressure differences and provide a more constant pressure along the Supply line and also to save the energy consumption of the motor when running at low speed.

Automatic changeover of the pumps to be controlled by the microprocessor which dictates the duty and standby pumps to run at variable speed.

Built-in clock functions with weekly programming and with switch on system to operate at least 10 different pre-set pressure points as required

When the system has not been operated for more than 24 hours, it shall automatically start the pumps for a few seconds/day to ensure the pumps readiness at all times. The standby pumps shall be activated upon failure of duty pump(s). In event of control failure, the pumps shall be able to be start/stopped manually at the local panel by means of pressure switches.

The microprocessor control panel shall be able to cut-off the pumping system when excess pressure is registered in the discharge common manifold.

The system shall have the capability of receiving input signal concerning reduced water level in suction tanks and shall have control mechanisms to prevent the pumps form running dry.

Automatically starting the pumps when the water level is back to normal.

In case of pump failure due to motor overload, the standby pump is switched on automatically. Alarm signal is displayed on the LCD Display unit and alarm lights are activated.

Functions to limit the no. of start/stop of pumps per hour.

c. BORE WELL

Borewells are drilled for tapping the water from the deeper aquifer.

In hard rock areas, 150mm DTH Rigs shall be used for drilling of borewells for power pump schemes. The location of borewell and depth of borewell are to be decided based on the geophysical survey by the Employer.

In sedimentary areas, Rotary rigs shall be used for drilling tubewells. The pilot well has to be drilled to the depth recommended through geophysical survey by the Employer. For the location of screen pipe, electrical logging has to be done. After erection of the casing pipes in the tube well, proper packing has to be done as per IS 4097/1967.

For shallow depth tubewells, conventional calyx drills and hand bore sets may be deployed, if so directed by the Engineer in charge.

In certain parts of the State, where the depth of drilling extends to 60m and above and some areas where the boulder bed formation is encountered, ODEX drilling rigs (simultaneous casing and drilling) are to be deployed

GENERAL SPECIFICATION

Confirmatory borings have to be put down along the proposed alignment of radial arms and at collector well point and detailed sieve analysis of the sample of soil is to be made at the proposed site before taking up the work by the contractor.

The location of collector well, radial arms should be suitably checked based on results of confirmatory borings and sieve analysis of soil samples of ensure the potentially of acquire by the contractor himself.

Detailed sieve analysis of the sample of soil is to be made before taking up the work. The contractor should submit a detailed report to the department and get the clearance from the Executive Engineer for proceeding with the work further. CONTRACTOR 16 CHIEF ENGINEER /TWAD /ER

Reduced levels of various components of collector well cum pump house should be maintained very carefully at every point.

True vertically of collector well and true horizontal position of radial arms should be ensured during execution. The tolerance limit of vertically of well sinking as per BIS is allowable.

“Design Mix” should be verified by the contractor at his own cost by conducting laboratory tests using the actual materials at site. The extra charges will not be paid by the Employer.

Cube test should be conducted for every work during execution in the nearby laboratory and the results shall be communicated to Engineer in charge then the there. The unit rates quoted in the price bid includes these types of tests also.

The results of tests conducted as above should be furnished to the Engineer concerned before carrying out the work and clearance to be obtained then and there before proceeding with the above items of work.

Plugging the bottom of collector well should be done effectively with special tools and plants to ensure water tightness.

The contractor should conduct necessary pumping tests to prove that the radial arms are driven on to correct alignment, levels and without any gap or damage to radial pipes and to prove that required quantity of water could be abstracted during summer. The required pumps, tools and plants etc. should be used by the contractor himself. No separate charges will be paid to the contractor on this account.

d. CONTROL PANEL

Supplying & erecting approved make 3 phase motor control cubical panel (Star - Delta) made from 16 G. CRCA sheet duly painted with epoxy powder painted inside and outside with hinged doors and locking arrangement, consisting of suitable size of ON- OFF isolator (AC - 3/23 duty) main fuses, single phasing preventer cum water level. Guard (Complete unit), Toggle switch to by pass Single phase preventer cum WLG, indicating lamps for R- Y- B phases, over load relay, Automatic water level controller, Ammeter & Voltmeter each with two way selector switch incoming wires duly socket Crimped, Panel to be erected on angle iron frame grouted on wall as directed. Star Delta & main connector, overload relay, thermal / Electronic Star delta cutoff timer, start - stop push buttons. The isolator overload relay & contactors of L& T, Siemens or Cuttler Hamer make only. Panel to be erected on angle iron frame ground on wall. (a) S/D up to 7.5 H.P.

SECTION - 07: IRRIGATION WORKS

SCOPE OF IRRIGATION SYSTEM CONTRACTOR

- A. Scope of works listed below shall not be considered as comprehensive description of the Contract, but only as an indication of the extent of works.
- B. Design verification, Selection, supply, installation, testing, commissioning and handing over of following System / Equipment for the satisfactory operation of the plant.
 - 1. Complete installation of sprinkler heads, section valves, isolation valves, quick coupling valves, etc.
 - 2. Complete installation of automation units including direct burial cables, solenoid valves, irrigation controllers, central controls, cables in conduits, trench, tray and trucking etc. with all fixtures.
 - 3. Complete installation of pumps, filtration units, etc. with all fixtures.
- C. Provision of Design Verification, detailed calculation, selection of equipment, verification of pipe sizing, working drawings, builder work drawings, supply, installation, testing, commissioning and handing over for the complete Irrigation System to the requirement as stipulated in this specification and local government authority shall be in the contractor's scope.
- D. The pump heads indicated in the tender documents are tentative. The contractor shall estimate the actual pump head required based on final coordinated shop drawings and submit the pump head calculation and pump selection for approval by consultant.

- E. Contractor's tank and equipment layout must comply with the space allocated for the same and as allocated in the Tender drawings.
- F. Testing and commissioning of installation under normal operational conditions shall be conducted.
- G. As-built drawings and operation / maintenance manual shall be provided.

PERFORMANCE REQUIREMENTS

- A. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100% irrigation coverage of areas indicated.
- B. Refer to soil investigation reports for soil conditions. Including:
 - 1. Type,
 - 2. Texture,
 - 3. Density,
 - 4. Moisture content,
 - 5. Infiltration rate
- C. Minimum Working Pressures and flow rates:
 - 1. For pipe sizing, mean velocity of flow in main or lateral pipes shall not exceed 1.5 m/sec.
 - 2. The total head loss in main line shall not exceed 2.5 metre/100metre and not to exceed 4.0m for sub-main.
 - 3. Contractor shall provide ring main with suitable number of tapping points and isolation valves to the approval of The Engineer.
 - 4. Total friction loss from the far end of the lateral up to solenoid valve shall not exceed 2.5m. The total head loss in solenoid valve assembly shall not exceed 3.0m.
 - 5. The total head loss in pump station shall not exceed 7.0m.
- D. The Contractor shall provide detailed calculations for head loss including all necessary breakdowns for Engineer review.
- E. Type of irrigation for each type of plantation shall be as per the contract drawing for installation details.
- F. Water requirement for the plantation at maximum (peak) demand shall be as follows:
 - 1. Palm trees 180 ltr./day
 - 2. Ornamental trees 80 ltr./day
 - 3. Shrubs 15 ltr./day

4. Ground covers & Ornamental Grass 16 ltr./day
 5. Lawn 12 ltr./day
 6. Hedges 13 ltr./M/day
 7. Cactus & Succulents 7 ltr./plant/day
- G. All materials shall be as per the proposed suppliers list (or equal and approved) and execution of works shall be to the approval of The Engineer. **Any deviations without prior approval will disqualify the contractor.**

SUBMITTALS

- A. Shop Drawings: The Contractor shall carefully check and verify all dimensions on the tender drawings and shall prepare shop drawings for approval by The Engineer. Non submission of Shop Drawings will result in the disqualification of contractor. Shop drawings to include but not limited to:
1. Detailed layout of main, sub-main and lateral pipes, valves, irrigation heads and other typical connections, including hydraulic pressure loss calculation
 2. Wiring diagram including conduits, pull boxes, sizing and calculations to verify that cable sizing is in accordance with cable and valve manufacturer's recommendations.
 3. Details for connection to the main line network and control system.
 4. Electric power and control wiring diagrams system for irrigation controller, site wiring and grounding and computerized system control components.
 5. Shop drawings shall incorporate approved materials and equipment that will be shown to scale.
- B. Construction Programme: Contractor should submit a construction Programme for the whole of the works in a detailed format in MS Project or Primavera, latest editions for the approval of the engineer before starting works at site.
- C. Product Catalogue/Data: For each type of product indicated, Include rated capacities, operating characteristics, electrical characteristics & furnished specialties and accessories.
- D. Coordination Drawings: Irrigation systems, drawn to scale, on which components are shown and coordinated with each other, using input from Installers of the items involved. Also include adjustments necessary to avoid plantings and obstructions such as signs and light standards.
- E. Pre-qualification Data: For qualified Installer.
- F. Zoning Chart: Show each irrigation zone and its control valve.
- G. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.
- H. Site quality-control reports.

- I. Equipment/Material Test Reports from approved laboratory.
- J. Operation and Maintenance Data: For sprinklers, controllers, and automatic control valves to include in operation and maintenance manuals.
- K. A detailed valve schedule shall be prepared to show the daily timing for irrigation system and to ensure achievement of the daily water requirement for each plant type.
- L. All materials shall be as described in the specifications. The Contractor shall submit samples of all materials, which are proposed to be used in the system to the Engineer, for approval, prior to their installation. Any materials used which are neither approved nor to the satisfaction of the Engineer, may be rejected and the Contractor shall replace them, at his own cost, with acceptable items and will result in blacklisting of the contractor.
- M. As Built Drawings: The Contractor shall maintain one set of contract drawings for the sole purpose of recording "As-Built" conditions of the irrigation system as a whole. All changes, previously approved, and all completed work shall be recorded on these drawings. All valve locations and piping shall be dimensioned and recorded (except cable routes, common to pipe runs, need not be dimensioned).
 1. The As-Built drawings shall be supplied to the Engineer for approval prior to the issue of the Completion Certificate.
 2. On approval of the As-Built drawings the Contractor shall forward following for the Engineer's retention:
 3. Three (3) complete sets of As-Built drawings properly folded and provided in the plastic folders as part of the Operations and Maintenance manual.
 4. One set of computer discs (CAD Format) properly labeled and marked
- N. Operation and Maintenance Manual: The Contractor shall provide three copies of the operation and maintenance manual for the Engineer's approval prior to issuing of the completion certificate. Manuals shall contain comprehensive operational schedules, recommended spare parts lists, manufacturer's operating data, catalogues, warranties and exploded parts diagrams where applicable for the entire irrigation scheme. The material used for the irrigation system shall be listed in the manual. Draft, manuals shall be submitted for approval prior to commencement of commissioning and shall be revised in accordance with Engineer's instructions and reflect and record the results of the commissioning procedures described above. Non Submission of O & M Manual will disqualify the contractor.

QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers that include a certified irrigation designer qualified by The Indian Irrigation Association.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Arrange for Factory Visit during the assembly of Pump Control Panel

- D. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

PROJECT CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Client or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - B. Notify the Engineer no fewer than three (3) days in advance of proposed interruption of water service.
 - C. Do not proceed with interruption of water service without Engineer's written permission.

EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Pop-up Sprayers: Equal to 1% of amount installed for each type and size indicated, but no fewer than 10 units.
- C. Rotary Sprinklers: Equal to 1% of amount installed for each type and size indicated, but no fewer than 10 units.
- D. Bubblers: Equal to 1% of amount installed for each type indicated, but no fewer than 10 units.

DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, according to the following:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends and flange faces.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, according to the following:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use hand wheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, specialties and equipment from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

Transport, delivery, storage, safe handling and necessary logistic shall be in contractor's scope. Storage space will be provided by client.

SECTION - 08: PRODUCTS

PVC PIPES AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Supreme - pipes
 - 2. Finolex – pipes
 - 3. Polypack – pipes
 - 4. Swastik – pipes
 - 5. Jain - pipes
 - 6. George Fischer - fittings up to 150mm dia
 - 7. Dura pipe – fittings up to 150mm dia
 - 8. FIP – fittings up to 100mm dia
 - 9. Atlas – fittings up to 75mm dia
 - 10. Contractor to submit any equal or alternative proposals for Engineers approval.
- B. All pipes and fittings shall be sized according to Indian Standard (BIS)
- C. All pipes shall be manufactured from new materials
- D. Main pipelines sized 12 inch or larger shall be GRP pipes while main pipelines sized 10 inch or smaller shall be uPVC class D
- E. Pipes class shall be as follow:
 - 1. Pressure pipes: Class D (less than 25mm dia. pipes) and Class E (for 25mm dia. pipes)
 - 2. Non pressure pipes: Class C (for conduits & ducts)
- F. Joints and fittings for pipes sized 50mm and less shall generally be solvent welded type while for 75mm or larger will generally be integral bell socket with rubber ring
- G. All uPVC fittings shall be Class E (15 bar working pressure)

POLYETHYLENE PIPES AND FITTINGS.

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Jain
2. Dura line
3. Emco
4. Finolex
5. Oriplast
6. Reliance
7. Aaram
8. Pioneer
9. Hunter (with built in emitters)
10. Euro drip (with built in emitters)
11. Toro Ag. (with built in emitters)

Contractor to submit any equal or alternative proposals for Engineers approval.

- B. Polyethylene pipes and fittings for emitter lines shall be manufactured from linear low density polyethylene incorporating a minimum of 2.8% carbon black and shall have a working pressure of 4kg/cm²
- C. PE risers connecting the secondary uPVC pipe with the PE tertiary pipe shall be as follows:
- D. Be of a 12mm size for sprayers, sprinklers and bubblers and 16mm for drippers
- E. An independent riser shall be allowed for each sprayer, sprinkler bubbler and for drippers if used for irrigating palm tree
- F. A common riser shall be allowed for ornamental trees, shrubs, ground covers, seasonal flowers, rockery plants and succulents. Such riser shall be extended to the allowable length as per irrigation design.
- G. All PE fittings shall be compression fitting suitable for pressure rating up to 10 bar, barbed type fittings secured by plastic ratchet clips shall not be allowed.
- H. Pipe suppliers have to be pre-qualified and approved by The Engineer.

CONTROL VALVES

- A. Valves in this article are typically available as "normally closed" valves that open on signal from the controller and are the recommended type. "Normally open" valves that automatically close if power failure occurs are also available.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Solenoid Valves:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a) Hunter
 - b) Toro
 - c) Hit
 - d) Weathermatic
 - e) Contractor to submit any equal or alternative proposals for Engineers approval.
2. Automatic remote control valves shall be of the sizes prescribed on the plan.
3. Be a normally closed 24 volts 50 cycles, unless otherwise specified, solenoid actuated globe pattern with a balanced pressure diaphragm design.
4. The valve pressure rating shall not be less than 200 PSI.
5. Have both internal and external manual open/close control (internal and external bleed) for manually opening and closing the valve without electrically energizing the solenoid. The internal manual bleed shall prevent flooding of the valve box.
6. Have a captured plunger with a removable retainer for easy servicing and leverage handle for easy turning.
7. Have a stainless steel flow control stem and cross handle for regulating or shutting off the flow of water.
8. Must open or close in less than one minute at 200 psi, and less than 30 seconds at 20 psi.
9. Shall be constructed such as to provide removable tops for all internal parts of the valve without disturbing the valve installation. It shall have a contamination-proof (CP) self-flushing nylon filter screen located at the valve inlet to filter out grit and prevent clogging of hydraulic control ports and assure reliable operation.
10. Shall be capable of working under dirty (Treated sewage) water conditions, inlet and outlet shall be threaded B.S.P.

11. Shall be provided with a pressure regulator capable of regulating downstream pressure between 15 to 100 PSI (within an accuracy of +or- 5 PSI) regardless of upstream pressure. IT shall provide full and accurate pressure regulating capabilities irrespective of whether it is operated electrically or manually.
12. Rated working pressure shall be equal to or greater than 16 bars (PN16). The valve body shall be Hybrid (Brass and Plastic) or Glass Reinforced filled Nylon. Gate valves of the solenoid valve assembly shall be brass gate valves up to 3" and Kite marked.
13. Valve assembly shall be equipped with PRS.
14. Solenoid valves suppliers have to be pre-qualified and approved by The Engineer.

C. Isolation Gate Valves:

1. Gate valves 75mm dia and above:
 - a) Be double flange, ductile iron waterworks valves, with wedge type gate and non-rising stem
 - b) Coated with epoxy internally and externally to average DFT 300 microns for protection against corrosion of body components
 - c) Valves installed below ground shall be provided with stem cap for key operation while the valves above ground shall be provided with hand wheel.
 - d) Stem shall be stainless steel and stem nut is brass or cast aluminum bronze with gunmetal
2. **Gate valves 50mm dia. and smaller:**
 - a) Have a non-rising stem manufactured from brass or bronze according to (BS 5154)
 - b) Inlet and outlet shall be screwed BSP
 - c) Pressure nominal rating at PN 16

Table No. 2

Sr. No.	Type of Valve	Size	Body Construction	Ends/Joint	Pressure Rating
A	Isolating Valve (Ball Valves)	Up to 63 mm)	UPVC/PVC	Solvent welded joint	10 Bar (Working Pressure)
B.	Isolation Valve (Butterfly Valve)	above 63mm)	Cast Iron	Flanged	10 Bar (Working Pressure)
C.	Y Strainers	Up to 50mm	Brass /	Screwed/	8 Bar (Working

		above 50mm	cast iron	Flanged	Pressure)
D	Pressure Relief valve	Upto 50 mm.	Gun Metal	Screwed / Flanged	8 Bar (Working Pressure)
E	Pressure reducing valve	Above 50 mm	Ductile Iron	Flanged	8 Bar (Working Pressure)
F	Foot Valve	(15-50mm) (above 50mm)	Brass / Cast Iron	Screwed / Flanged	8 Bar (Working Pressure)
G	Non return valve	(15-50mm) (above 50mm)	Brass/ Cast Iron	Screwed / Flanged	8 Bar (Working Pressure)
H	Solenoid Valve		FRP		10 Bar (Working Pressure)
I	Sprinklers		Gun Metal	Screwed / Flanged	10 Bar (Working Pressure)

- i. All valves and strainers shall be of the particular duty and design as specified. Valves and strainers shall either be of screwed type or flanged type, as specified, with suitable flanges and non-corrosive bolts and gaskets.
- ii. Tail pieces as required shall be supplied along with valves. Gate, Butterfly, Ball, Balancing and PRV shall conform to Indian Standard IS: 778 and non-return valves and swing check type reflux to IS: 5312.
- iii. All valves PN rating shall be 1.5 times of system working pressure

D. Quick Coupling Valves:

1. Made of solid red brass with a rubber or thermoplastic cover marked with "DO NOT DRINK "warning.
2. Lockable, Used for non-potable water.
3. Made of a strong corrosion-resistant stainless steel spring to prevent leakage.
4. Sized 12mm or 25mm and shall be operated at pressure ranging from 5 to 125 psi.
5. For every five valve assemblies, contractor shall provide one set of key, swivel elbow and 50 mtr of 19mm reinforced garden hose.

E. Check Valves:

1. Check valves 75mm and above :
 - a) Be double flanged single door swing type having ductile iron body and gun metal seat (BS 1400)

- b) Pressure nominal rating 16 bars
 - c) Coated with epoxy internally and externally to average DFT 300 microns for protection against corrosion of body components
 - d) Nut bolts made of a stainless steel type 316.
2. Check valves of 50mm dia and smaller:
- a) To be of spring type manufactured from Brass or Bronze
 - b) Inlet and outlet to be BSP female threaded
 - c) The spring shall be a stainless steel
 - d) Pressure nominal rating 16 bars

F. Air Valve:

Air valves shall be provided at all high points on the pressure mains as per the following specifications:

1. Have automatic double orifice air vents.
2. Have non-corrosive floats in chambers with clear space ensuring blockage free operation.
3. All actuating mechanism components including lever shall be stainless steel The body and cover should be of bronze or ductile iron with phenolic primer coating.
4. Nozzles with seals and actuating mechanism shall be located in the removable upper plate connected to the valve body using stainless steel (grade 316/A4-70) bolts.
5. Coated with epoxy internally and externally to average DFT 300 microns for protection against corrosion of body components.
6. Nut bolts and internal components shall be stainless steel grade 316/A4-70.
7. Pressure nominal rating at PN 16

G. Electrically Actuated Butterfly Valve:

1. Comply in all respects with DIN 3354-PN 16 Body of ductile iron SG GGG-50 with stainless steel grade 316 valve discs.
2. Coated with epoxy internally and externally to average DFT 300 microns for protection against corrosion of body components.
3. Nut bolts shall be stainless steel grade 316.
4. Open and close of at least 60 seconds and shall be provided with an auxiliary operating wheel. The motor control should allow for stepped closing of valve pausing at $\frac{1}{2}$ closed and $\frac{1}{4}$ closed.

5. Motors shall be rated to operate at an ambient temperature of 50 degrees centigrade and a relative humidity of 100%.
6. Electrical component shall be protected from condensation.

H. Pressure Relief Valve:

1. Flanged and of ductile iron body, diaphragm type, hydraulically operated, pilot control and modulating type.
2. The pilot shall be brass and tubing of copper/brass.
3. Fast opening and slow closing.
4. All internal and external exposed surfaces shall be FDA approved epoxy coated to minimum DFT 300 microns.
5. Nut bolts shall be stainless steel grade 316

I. Wash-Out Valve:

1. Wash-out valves shall be installed at the lowest point of the irrigation main pipe in order to clean the pipe periodically. The size of the valve shall match the pipe size

J. Strainers.

- a. "Y" strainers (according sizes as specified in Table 2, Point D) shall be of Brass/ Cast iron body and of suitable class as indicated in drawings & schematics or higher as required.
- b. Strainers shall incorporate removable stainless steel screen with 3.175 mm (1/8") perforations and permanent magnet.
- c. Strainers shall be provided with flanges at both inlet and outlet.
- d. Strainers shall be designed to enable blowing out of accumulated dirt and replacement of the screen without disconnection of the main pipe.
- e. Strainers shall be provided with equal size isolating butterfly valves of approved brands as shown in drawings so that the strainer may be cleaned without draining the system.

K. Ball Valves

For manual operation of the system, imported PVC ball valves are provided to form a group of sprinklers and thus to form a section, also to regulate the flow in the irrigation system. Working pressure shall be 10kg/cm² or above, with a Solvent welded joint. The body shall be of rigid PVC / uPVC. All ball valves shall be enclosed in 10" Round valve boxes with openable lid if fixed in earth.

- Compact Single Union (SU) design.
- Manufactured from high performance rigid PVC compound.

- Excellent chemical & corrosion resistance.
- Low frictional losses.
- Easy to install and dismantle.

L. Butterfly Valves

- b. Butterfly valves (according sizes as specified in Table 2, Point B) used in high pressure (head) piping shall be made of C.I material of ANSI class 125 as indicated in specifications, drawings & schematics or higher as required.
- c. Butterfly valves shall be slim seal, wafer type with standard finish. Valves shall be suitable for mounting between flanges drilled to ANSI 125.
- d. Valve shall consist of disc pivot and driving stem shall be in one piece centrally located. Disc shall move in bearings on both ends with 'O' ring to prevent leakage.
- e. Seat shall be stainless steel/ductile iron based on working pressure classification and molded with EPDM and shall line the whole body. Spindle shall be AISI 41 steel.
- f. Valve for normal application shall be suitable for a working pressure to suit the application and service and shall be complete with flow control lever and notches, factory machined companion flanges and bolts and nuts.
- g. Valves shall conform to BS 5155/ ASTM F1098 - 87(2015) with electro steel nickel coated SG Iron (N) and seat material EPDM.
- h. The disc shall be of bronze alloy and shaft from SS 316 Grade stainless steel.
- i. All valves shall be enclosed in suitable size valve boxes with openable lid if fixed in earth.
 - Excellent flow control in quarter turn operation.
 - compact, space saving design.
 - Bi-directional 100% tight shut off.
 - Low weight, low maintenance, long service life,
 - Easy automation / retrofit possible.
 - Stream lined valve disc for lower pressure drop.
 - Both shatsmounted in bearing supports for easy operating torques.
 - Suitable for mounting between all standard flanges.
 - Gasket packing not required to install between flanges.

MISCELLANEOUS PIPING SPECIALTIES

- A. Water Hammer Arresters: ASSE 1010 or PDI WH 201, with bellows or piston-type pressurized cushioning chamber and in sizes complying with PDI WH 201, Sizes A to F.

- B. Pressure Gages: ASME B40.1. Include 115mm diameter dial, dial range of two times system operating pressure and bottom outlet.
- C. Underground Warning Tape:
1. Warning tape shall be laid above the irrigation main and sub-main pipes. Tapes shall be of laminated polyethylene, durable and flexible with at least 15cm wide and 250 microns thick and shall have the phrase "CAUTION – IRRIGATION PRESSURE MAIN BELOW" stamped in black letters and repeated at maximum intervals of 1.0m
 2. The text of tape shall be made using a permanent ink bonded to resist prolonged chemical attack by corrosive acids and alkaline. The text shall be in Hindi and English. The tape shall be laid continuously over pipelines and at joints and there shall be a minimum of 1.0m overlapping. Tape shall be terminated inside valve boxes to allow clipping of detector equipment to the tape

IRRIGATION FIXTURES

General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.

A. Bubblers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a) Hunter
 - b) Toro
 - c) Hit
 - d) Weathermatic
 - e) Contractor to submit any equal or alternative proposals for Engineers approval.
2. The bubbler shall be a pressure compensating type capable of providing a consistent flow rate
3. The bubbler shall have a "trickle" pattern or an "umbrella" pattern discharge
4. The bubbler assembly shall have a plastic inlet filter screen to protect the nozzle against clogging
5. The pressure compensating bubbler shall be of a permanently assembled design constructed of durable, UV-resistant plastic with an integral rubber flow washer for regulating the flow rate at an operating pressure range of 1.5 to 6.0 Bars
6. The pressure compensating bubbler shall have a ½" inch female threaded inlet for connection to the piping system riser

7. When used for the irrigation of palms it should be used at a rate of 2 nr. Bubblers for each palm tree with a flow of 1 GPM each
8. Stakes for bubblers shall be constructed from strong temperature resistant polypropylene plastic construction with protective stop collar, length shall be 12 inches each side of inlet with barbed side inlet suitable for class C polyethylene pipes, and outlet shall be ½" inch external male thread
9. Bubbler suppliers have to be pre-qualified and approved by The Engineer.

B. Emitters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a) Hunter
 - b) Toro
 - c) Jain
 - d) Weathermatic
 - e) Contractor to submit any equal or alternative proposals for Engineers approval.
2. All emitters shall be pressure compensating with different flow 0.5, 1, 2, 4 and 8 (GPH) gallons per hour or equivalent
3. The capacity and spacing of emitters shall be as follows:
 - a) Palm 22 nr. X 1 GPH in-line drip tube per palm (Only If not Bubbler)
 - b) Trees 15 nr. X 1 GPH in-line drip tube per tree (Only If not Bubbler)
 - c) Shrubs ≥1.0 m spacing 3 nr. X 1 GPH in-line drip tube per plant
 - d) Shrubs 0.75 m spacing 2 nr. X 1 GPH in-line drip tube per plant
 - e) Shrubs ≤0.6 m spacing 4 nr. X 0.5 GPH in-line drip tube per m2
 - f) Groundcover & Seasonal 4 nr. X 0.5 GPH in-line drip tube per m2
 - g) Shrub Hedge 2 nr. X 1 GPH in-line drip tube per L.M.
4. When palms & trees are planted in planting beds, 20% of daily water requirement shall be reduced for both.

C. Pop-up Sprayers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a) Hunter

- b) Toro
 - c) Weathermatic
 - d) Contractor to submit any equal alternative proposals for Engineers approval.
2. The sprayers shall have a high level impact strength corrosion body, stem and nozzle
 3. Pop up height shall be 100mm.
 4. The sprayer shall have a heavy-duty stainless steel retraction spring and piston with step clutch to facilitate nozzle positioning
 5. Either standard or rotary nozzle could be used and both shall be capable of covering 4.5m radius at 2.0 bar pressure
 6. Spacing for the sprayers with standard nozzle shall be 4m. For small areas, sprayers with low flow nozzles shall be used.
 7. Sprayers should be installed in such a way that water will not hit stems of the trees or any other structure or the Electric panel. Sprayers shall be installed 150mm from heel/edge of the footpath
 8. Sprayer shall have a pressure-activated co-molded wiper seal to clean debris from the pop up stem as it retracts
 9. Sprayer shall be provided with built-in seal-a-matic check valve when installed on mounds or slope areas
 10. Sprayer shall also have PRS pressure regulator built into the stem and matched precipitation rates nozzles
 11. Sprayer suppliers have to be pre-qualified and approved by The Engineer.

D. Rotor Sprinklers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a) Hunter
 - b) Toro
 - c) Weathermatic
 - d) Contractor to submit any equal or alternative proposals for Engineers approval.
2. The sprinkler body, stem and nozzle shall be constructed of heavy duty, UV resistant ABS plastic material

3. Rotor shall be a closed water lubricated gear drive, rotary type and capable of covering a radius of 6.7 to 15.9 m (depending on design requirement) at a pressure range of 2.1 to 4.8 bars with discharge rate of 1.9 to 54.5 ltr. Per minute.
4. The sprinkler shall be available with 8-12 standard interchangeable nozzles or 8 built-in different nozzles
5. The sprinkler shall have a strong stainless steel retraction spring and adjustable arc with radius reduction capabilities by means of a stainless steel nozzle retainer/radius adjustment screw or by choosing the appropriate nozzle that is equipped with the sprinkler
6. It is preferable to have a friction-clutch mechanism to allow for 360 degrees + forward or reverse movement of nozzle turret without damage to the internal gear components
7. **It is also preferable to incorporate an “arc recall” feature to allow original arc pattern to be automatically resumed following any disturbance of nozzle setting.**
8. Sprinkler shall be provided with built-in seal-a-matic check valve when installed on mounds or slope areas
9. A screen shall be provided in the pop-up stem to filter inlet water to protect the drive from clogging and simplify its removal for cleaning and flushing of the system
10. The sprinkler shall have minimum 100mm pop-up height and exposed surface diameter of not more than 40mm
11. Shall have a pressure-activated co-molded wiper seal to keep debris out of the rotor and to clean debris from the pop up stem as it retracts. All adjustment shall be made from the top of the sprinkler
12. Sprinkler suppliers have to be pre-qualified and approved by The Engineer.

IRRIGATION PUMPS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. KIRLOSKAR
2. KSB
3. GRUNDFOS
4. BEAKON WEIR
5. FLOW MORE
6. JYOTHI

7. KISHORE
8. WPIL
9. MATHER & PLATT
10. MBH
11. TEXMO
12. Contractor to submit any equal or alternative proposals for Engineers approval.

PUMP

1. The packaged pump system shall have 1no. of pumps as indicated on schedule. The maximum duty of pump shall be as indicated on drawings, schematics and schedules.
2. Control panel shall be dust and damp proof steel cabinet supplied by the pump manufacturer and shall include a built-in-anti-condensation heater.
3. Pump head in Equipment schedule and BOQ needs to be verified by contractor based on final shop drawings and final head to be submitted for approval prior to procurement and supply.

B. Filters:

1. Disc Type Filter
 1. JAIN
 2. MAIS
 3. KIMPLASS
 4. FINOLEX
 - a) Disk type shall be made of epoxy coated or stainless steel units with Anodized Aluminum body.
 - b) Work only during the irrigation hours of the system.
 - c) Shall have a maximum operating pressure of 140-150 PSI and a maximum operating temperature of 150-160 F.
 - d) Shall have a minimum back-flushing operating pressure of 45 PSI.
 - e) Shall have a flow and size as per the drawings, tender specifications and BOQ.
 - f) Shall have a short back flush cycle with regulated volume.
 - g) Shall be specially designed for use with organic contaminants.
 - h) Shall have isolation valves in the suction as well as delivery side for easy maintenance.

C. Electrical Equipment:

1. Electrical equipment shall be in accordance with authority regulations and the Electrical Specification.
2. Enclosures shall be protected in accordance with IP55 for equipment installed above ground and IP58 for equipment installed below ground.
3. Wiring to and from control panels shall be routed in conduits below floor after getting NOC.
4. The size of conduits is dependent on the total wires available.
5. All equipment shall be provided with earth leakage circuit breakers in accordance with HUDA regulations.

IRRIGATION CONTROL SYSTEMS

A. Manufacturers:

Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hunter
2. Toro
3. Griswold
4. Motorola
5. K Rain
6. Weather Tec
7. Weathermatic
8. Waterman
9. Contractor to submit any equal alternative proposals for Engineers approval.

B. Irrigation Controllers:

1. The Field Controller shall be a hybrid type that combines electromechanical and microprocessor-based circuitry capable of fully automatic and manual operation.
2. Have four fully independent programs and each with separate day cycles and 8 start times.
3. Have a 365-day calendar with Event day off option to set any day of the month as a non-watering day for all programs. Programs will run on an ODD/EVEN day cycle, day-of-the-week ON/OFF cycle, or in cycles from 1 to 99 days.
4. Capable of running a variable system test program without affecting the normal program and have Cycle + Soak water management software which is capable of operating each station for a maximum cycle time and a minimum soak time to reduce water run-off.

5. Have an internal nonvolatile memory that shall retain the irrigation program and the programmed date and time for a minimum of 100 years without power. A 9-VDC rechargeable batteries and recharging circuit shall also be included for counting down the program-in-progress during a power outage and shall allow programming of the controller when it is disconnected from the main power supply.
6. Shall be pedestal mounted in lockable stainless steel weatherproof cabinets and UL listed and tested.
7. The controllers shall be installed onto concrete basis, control wire shall be color coded and provided with tags.
8. Controller suppliers have to be pre-qualified and approved by The Engineer.

C. Electric Wiring:

1. All control wires for underground use for Solenoid Valves and Satellites shall be single core; #14 AWG for valve wires and #12 AWG for common cable
2. Power supply cable shall be 6mm² x 3 core armored XLPE/SWA/PVC insulated
3. Power cables and signal cables for satellites shall be laid in separate PVC conduits
4. The cables shall be suitable for direct burial in the earth; however it is required to be installed in ducts or conduits as follows:
 - a) Less than 25mm dia up to 4 wires
 - b) 25mm dia up to 8 wires
 - c) 50mm dia up to 15 wires
 - d) 75mm dia up to 30 wires
 - e) 100mm dia more than 30 wires
5. One spare cable shall be provided for every five cables and it shall run up to the last valve on each main / sub-main

D. Valve Boxes

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a) Ecorain/Ecoaqua
 - b) APPLIED ENGINEERING
 - c) SUPREME
 - d) AMITEX.
 - e) COSMOPLAST

- f) Contractor to submit any equal alternative proposals for Engineers approval.
2. Air valves (50mm dia or smaller), QCV, Solenoid valves and Wire Pull Boxes shall be installed in an access box of sufficient size to permit readily removal of the valve inner assemblies without removing the box from the ground.
 3. Valve name and numbers must be clearly marked inside and outside of the box with permanent plastic tag.
 4. Installation of plastic valve boxes in paved areas and Sikkas is not allowed.
 5. Valve boxes shall be fabricated from reinforced plastic and recommended size shall be as follows:

Description	Cover	Depth
QCV Round Valve Box	254 mm	260 mm
Pull Box, Air Valve 25mm and Flush Valve	430 x 295 mm	300 mm
Solenoid Valves up to 50mm	650 x 406 mm	380 mm
Solenoid Valves 75mm and above	825 x 495 mm	457 mm

6. Valve box suppliers have to be pre-qualified and approved by The Engineer.

SECTION - 09: EXECUTION

EARTHWORK

- A. Install warning tape directly above pressure piping, 300mm below finished grades, except 150mm below subgrade under pavement and slabs.
- B. Drain Pockets: Excavate to sizes indicated. Backfill with cleaned gravel or crushed stone, below grade. Cover gravel or crushed stone with sheet of asphalt-saturated felt and backfill remainder with excavated material.
- C. Provide minimum cover over top of underground piping according to the following:
 1. Irrigation Main Piping: Minimum depth of 900mm below finished grade, or not less than 450mm below average local frost depth, whichever is deeper.
 2. Circuit Piping: 300mm.
 3. Drain Piping: 300mm
 4. Sleeves: 600mm.

PREPARATION

- A. Set stakes to identify locations of proposed irrigation system. Obtain Architect's approval before excavation.

- B. Protection of existing services: Particular care is to be taken to avoid damage to underground electricity, telephone and water mains, drains, roads and other underground services during the progress of the works. The Contractor shall be responsible for any damage caused to building works supplies or services and shall fully indemnify. The Client of the services or his representatives shall decide the method of execution of repairs.
- C. Prior to starting any work at the site, the contractor has to check existing as built services drawings. Copies of these drawings shall be submitted to the engineer before starting the actual work at site.

TRENCH EXCAVATION

- A. Trench excavation shall be carried out after getting all necessary NOCs (No objection Certificates). Excavation shall be by hand wherever required to ensure the safety of utilities encountered during excavation work. Excavation shall be in accordance with line size as per the following:
 - 1. Main lines: 200mm dia @ 1.2 meter deep, 200mm dia @ 1.0m deep measured from the crown of the pipe to the finish grade. Width shall be pipe diameter +minimum 100mm on each side of pipe
 - 2. Laterals: 600mm deep measured from the crown of the pipe to the finish grade and 400mm wide
 - 3. Storage in streets of excavated material not to be immediately reused in the backfill of trenches will not permitted
 - 4. The selected material for pipe surround and to 300mm above the top of the pipe shall be suitable material selected from the excavated material

PIPING INSTALLATION

- A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.
- B. Install piping at minimum uniform slope of 0.5% down toward drain valves.
- C. Install piping free of sags and bends.
- D. Install groups of pipes parallel to each other, spaced to permit valve servicing.
- E. Install fittings for changes in direction and branch connections.
- F. Install unions adjacent to valves and to final connections to other components with NPS 2" (DN 50) or smaller pipe connection.
- G. Install flanges adjacent to valves and to final connections to other components with NPS 2½" (DN 65) or larger pipe connection.
- H. Install underground thermoplastic piping according to ASTM D 2774 and ASTM F 690.
- I. Install expansion loops in control-valve boxes for plastic piping.

- J. Lay piping on solid sub-base, uniformly sloped without humps or depressions.
- K. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet. Install aboveground or in control-valve boxes.
- L. Water Hammer Arresters: Install between connection to building main and circuit valves aboveground or in control-valve boxes.
- M. Install piping in sleeves under parking lots, roadways, and sidewalks.
- N. Install sleeves made of Schedule 80 PVC pipe and socket fittings, and solvent-cemented joints.
- O. Install transition fittings for plastic-to-metal pipe connections according to the following:
 - 1. Underground Piping:
 - a) Nominal Pipe Size 1½" (Diameter Nominal 40) and Smaller: Plastic-to-metal transition fittings.
 - b) NPS 2" (DN 50) and Larger: AWWA transition couplings.
 - 2. Aboveground Piping:
 - a) NPS 2" (DN 50) and Smaller: Plastic-to-metal transition fittings/unions.
 - b) NPS 2" (DN 50) and Larger: Use dielectric flange kits with one plastic flange.
- P. Install dielectric fittings for dissimilar-metal pipe connections according to the following:
 - 1. Underground Piping:
 - a) NPS 2" (DN 50) and Smaller: Dielectric coupling or dielectric nipple.
 - b) NPS 2½" (DN 65) and Larger: Prohibited except in control-valve box.
 - 2. Aboveground Piping:
 - a) NPS 2" (DN 50) and Smaller: Dielectric union.
 - b) NPS 2½" to NPS 4" (DN 65 to DN 100): Dielectric flange.
 - c) NPS 5" (DN 125) and Larger: Dielectric flange kit.
 - d) Piping in Control-Valve Boxes:
 - e) NPS 2" (DN 50) and Smaller: Dielectric union.
 - f) NPS 2½" to NPS 4" (DN 65 to DN 100): Dielectric flange.
 - g) NPS 5" (DN 125) and Larger: Dielectric flange kit.

JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- E. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.
- F. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain-End PE Pipe and Fittings: Use butt fusion.
 - 2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
- G. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 3. PVC Non-pressure Piping: Join according to ASTM D 2855.

VALVE INSTALLATION

- A. Underground Curb Valves: Install in curb-valve casings with tops flush with grade.
- B. Underground Iron Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44. Install in valve casing with top flush with grade.
- C. Install valves and PVC pipe with restrained, gasketed joints.
- D. Aboveground Valves: Install as components of connected piping system.
- E. Pressure-Reducing Valves: Install in boxes for automatic control valves or aboveground between shutoff valves.
- F. Throttling Valves: Install in underground piping in boxes for automatic control valves.

- G. Drain Valves: Install in underground piping in boxes for automatic control valves.

SPRINKLER INSTALLATION

- A. Install sprinklers at manufacturer's recommended heights.
- B. Locate part-circle sprinklers to maintain a minimum distance of 100mm from walls and 50mm from other boundaries unless otherwise indicated.

AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION

- A. Equipment Mounting: Install interior controllers on either floor, concrete bases or wall as indicated.
 - 1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
- B. Equipment Mounting: Install exterior freestanding controllers on precast concrete bases.
 - 1. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
- C. Install control cable in same trench as irrigation piping and at least 50mm below or besides piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.

CONNECTIONS

- A. Comply with requirements specified in MEP consultants specification
- B. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.
- C. Connect wiring between controllers and automatic control valves.

IDENTIFICATION

- A. Identify system components. Comply with requirements specified in MEP consultant's specification.
- B. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.
 - 1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

- C. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches.

SITE QUALITY CONTROL

Manufacturer's Site Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

Arrangement for Owners representative to visit assembly/manufacturing facility as required.

Perform tests and inspections.

Manufacturer's Site Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

A. Tests and Inspections:

Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.

Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

Any irrigation product will be considered defective if it does not pass tests and inspections.

Prepare test and inspection reports.

STARTUP SERVICE

- A. Perform startup service.
- B. Complete installation and startup checks according to manufacturer's written instructions.
 - 1. Verify that controllers are installed and connected according to the Contract Documents.
 - 2. Verify that electrical wiring installation complies with manufacturer's submittal.

TESTING AND COMMISSIONING

- A. Electrical Tests: Each electrical equipment, cable and complete system shall be thoroughly inspected and tested before finally placing in service under the full responsibility of the Contractor. All tests shall be made in compliance with respective regulations, recommendations and standards. All testing shall be demonstrated to the Engineer in a manner to be agreed later.
- B. Irrigation System Auto Run Test.

- C. All pipes shall be pressure tested within two weeks of installation. Pipes shall be tested after center loading with joints exposed. Length of pipe tested at any time shall not exceed 500 meters and the rate at which pipelines are successfully tested shall be of the same order of magnitude as the rate of pipe laying. Center loading shall be sufficient to prevent buckling or deformation due to application of pressure.

CUTTING CHASES IN MASONRY WALLS

Where pipes pass through ROAD or structural walls, subject to the approval of the Structural Consulting Engineer, the Contractor shall ensure that sizes and locations of openings required are formed in when the relevant beams or walls are cast.

Automatic Irrigation System Commissioning:

1. Commissioning of fieldwork and equipment shall include all works required to bring the system into service and to make sure that the system is operating efficiently and shall include but not be limited to the following:
2. Flushing of system
3. Adjustment of valve pressure $\pm 10\%$ of normal
4. Replacement of all clogged or partially clogged lines
5. Adjustment of sprayers / sprinklers and replacement of clogged / broken sprayers/ sprinklers
6. Replacement of all clogged or partially clogged emitters/ Bubblers
7. Preparation of Irrigation Schedules
8. Adjustment of controllers to give an optimal flow regime
9. Assurances that all valves and sprayers/sprinklers are flushed with finished grade and after all valves' pressures have been adjusted.

ADJUSTING

- A. Adjust settings of controllers.
- B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.
- C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than 13mm above, finish grade.

CLEANING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.

DEMONSTRATION

Train Client's maintenance personnel to adjust, operate, and maintain automatic control valves and controllers.

SECTION-10: EXTERNAL DRAINAGE (SEWAGE & STORM WATER DISPOSAL)

1. SCOPE

The scope of this section comprises the supply, installation, testing and commissioning of external drainage & sewage disposal services.

1.1 General Scheme

The contractor shall install a drainage system to effectively collect; drain and dispose all soil and waste water from various parts of the buildings, appurtenances and equipment. The piping system shall finally terminate and discharge into the STP. The piping work mainly consists of laying of Foam core pipes or reinforced cement concrete pipes as called for on the drawings. All piping shall be installed at depth greater than 80 cm below finished ground level. The disposal system shall include construction of gully traps, manholes, intercepting chambers as indicated. The piping system shall be vented suitably at the starting point of all branch drains, main drains, and the highest/lowest point of drain and at intervals as shown. All ventilating arrangements shall be unobstructive and concealed. The work shall be executed strictly in accordance with IS: 1742. The sewage system shall be subject to smoke test for its soundness as directed by the Project Manager. Wherever the sewerage pipes run above water supply lines, same shall be completely encased in cement concrete 1:2:4 all round with the prior approval of the Project Manager.

Without restricting to the generality of the foregoing, the drainage system shall inter-alia include:

- a. Sewer lines including earth work for excavation, disposal, back filling and compaction, pipe lines, manholes, drop connections and connections to the municipal or existing sewer.
- b. Storm water drainage, earth works for excavation, disposal, backfilling and compaction, pipe lines, manholes, catch basins and connections to the STP or existing municipal storm water drain or connected as indicated by the Project Manager.

General Requirements

All materials shall be new and of quality conforming to specifications and subject to the approval of the Owner's site representative. Wherever particular makes are mentioned, the choice of selection shall remain with the Architect / Consultant / Owner's site representative.

Drainage lines and open drains shall be laid to the required gradients and profiles.

All drainage work shall be done in accordance with the local municipal bye-laws.

Contractor shall obtain necessary approval and permission for the drainage system from the municipal or any other competent authority.

Location of all manholes, etc shall be got confirmed by the Project Manager before the actual execution of work at site. As far as possible, no drains or sewers shall be laid in the middle of road unless otherwise specifically shown on the drawings or directed by the Project Manager in writing.

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

SECTION – 11 : COMMISSIONING & GUARANTEE**1. SCOPE OF WORK**

Work under this section shall be executed without any additional cost. The rates quoted in this tender shall be inclusive of the works given in this section.

Contractor shall provide all tools, equipment, metering and testing devices required for the purpose.

On award of work, Contractor shall submit a detailed proposal giving methods of testing and gauging the performance of the equipment / systems to be supplied and installed under this contract.

All tests shall be made in the presence of the Architect or his representative or any inspecting authority. At least five working days notice in writing shall be given to the inspecting parties before performing any test.

Water flow rates of all equipment and in pipe lines through valves shall be adjusted to design conditions. Complete results of adjustments shall be recorded and submitted.

Contractor shall ensure proper balancing of the hydraulic system and for the pipes / valves installed in his scope of work by regulating the flow rates in the pipe line by valve operation. The contractor shall also provide permanent Tee connection (with plug) in water supply lines for ease of installing pressure gauge, temperature gauge & rotameters. Contractor shall also supply all required pressure gauge, temperature gauge & rotameter for system commissioning and balancing. The balancing shall be to the satisfaction of Consultant / Project Manager.

Four copies of all test results shall be submitted to the Engineer in A4 size sheet paper within two weeks after completion of the tests.

2. PRECOMMISSIONING

On completion of the installation of all pumps, piping, valves, pipe connections, insulation etc. the Contractor shall proceed as follows:

- a. Prior to start-up and hydraulic testing, the Contractor shall clean the entire installation including all fitments and pipework and the like after installation and keep them in a new condition. All pumping systems shall be flushed and drained at least once through to get rid of contaminating materials. All pipes shall be rodded to ensure clearance of debris, cleaning and flushing shall be carried out in sections as the installation becomes completed.
- b. All strainers shall be inspected and cleaned out or replaced.
- c. When the entire systems are reasonably clean, a pre-treatment chemical shall be introduced and circulated for at least 8 hours. Warning signs shall be provided at all outlets during pre-treatment. The pre-treatment chemical shall:

Remove oil, grease and foreign residue from the pipe work and fittings;

- Pre-condition the metal surfaces to resist reaction with water or air.

- Establish an initial protective film;
 - After pre-treatment, the system shall be drained and refilled with fresh water and left until the system is put into operation.
 - Details and procedures of the pre-treatment shall be submitted to the Architect for approval.
- d. Check all clamps, supports and hangers provided for the pipes.
- e. Check all the equipment, piping and valves coming under hot water system and operate each and every valve on the system to see if the valves are functioning properly. Thereafter conduct & hydrotest of the system as for (b) above.
- f. Fill up pipes with water and apply hydrostatic pressure to the system as given in the relevant section of the specification. If any leakage is found, rectify the same and retest the pipes.

3. STATUTORY AUTHORITIES' TESTS AND INSPECTIONS

As and when notified in writing or instructed by the Architect, the Contractor shall submit shop drawing and attend all tests and inspections carried out by Local Authorities, Water Authority and other Statutory Authorities, and shall forthwith execute free of charge any rectification work ordered by the Architect as a result of such tests and inspections where these indicate non-compliance with Statutory Regulations. Some of these tests may take place after the issue of Practical Completion of the Main Contract and the Contractor shall make all allowances in this respect.

The Contractor shall be responsible for the submission of all necessary forms and shop drawings to the Statutory Authorities which shall conform in layout to the latest architectural plans submitted to and kept by these Authorities.

The submission shall comply with the requirements set forth in the current Codes of Practice and circular letters of the Statutory Authorities. The shop drawings to be submitted shall be forwarded to the Architect for checking before submission.

The Contractor shall allow for at least two submissions of complete sets of shop drawings to the Authorities, one to be made within six months after the award of the Contract but not less than six weeks before the inspection. The Architect may at his discretion instruct the Contractor for additional submissions to the Local Authorities whenever necessary.

The Contractor shall notify the Architect at least seven days in advance of his application for local Authority tests and inspections. On receipt of a confirmed date for test and inspection the Contractor shall inform the Architect without delay.

4. FINAL ACCEPTANCE TESTS

Following commissioning and inspection of the entire installation, and prior to issue of the Completion Certificate, the Contractor shall carry out final acceptance tests in accordance with a programme to be agreed with the Architect.

Should the results of the acceptance tests show that plant, systems and/or equipment fail to perform to the efficiencies or other performance figures as given in this Specification, the

Contractor shall adjust, modify and if necessary replace the equipment without further payment in order that the required performance is obtained.

Where acceptance tests are required by the relevant Authorities having jurisdiction, these tests shall be carried out by the Contractor prior to the issue of Completion Certificate to the acceptance of the Authorities.

5. WARRANTY AND HANDOVER

The Contractor shall warrant that all plant, materials and equipment supplied and all workmanship performed by him to be free from defects of whatsoever nature before handover to the Owner.

6. HANDING OVER OF DOCUMENTS

All testing and commissioning shall be done by the Contractor to the entire satisfaction of the Owner's site representative and all testing and commissioning documents shall be handed over to the Owner's site representative.

The Contractor shall also hand over all maintenance and operation manuals, all certificates and all other documentation as per the terms of the contract to the Owner's site representative.

7. COLOUR CODING & LABELING

Pipe Work Identification:

All pipes and the like shall be identified in accordance with Indian Standard IS:2379-1990.

Circumferential bands of standard ground colours shall be not less than 100mm wide on pipes up to 50mm nominal diameter and not less than 150mm wide on pipes greater than 50mm nominal diameter.

Supplementary colours shall be displayed as bands not less than 25mm wide in the centre of the ground colour bands.

Where lettering is required it shall be painted in contrasting colours in accordance with the Indian Standard, in block letters not less than 15mm high for pipes up to 50 mm nominal diameter, and in block letter not less than 40mm high for larger pipes.

Identification bands shall be located where they are clearly visible in each room or compartment through which the pipe runs, and shall be placed at centres not exceeding 6m.

Direction of flow shall be indicated by an arrow painted on the pipe adjacent to each colour band. Arrows shall be 75mm long on pipes up to 50mm nominal diameter, and 150mm long on large pipes.

The pipe colour:

Code shall be in accordance to IS: 2379,

Sr.No.	Contents	Ground Color	First Color Band	Second Color Band
1	Potable	Sea Green	French Blue	Signal red

Sr.No.	Contents	Ground Color	First Color Band	Second Color Band
2	Non potable	Sea Green	Light Green	----
3	Fire Water	Fire Red	Crimson red	----
4	Raw water	Sea Green	White	
5	Soft Water	Sea Green	Light Brown	Signal red
6	Sprinkler & Hydrant Water	Sea Green	White	Signal red
7	Waste Water	Sea Green	Canary Yellow	Signal red
8	Drainage / soil water	Black	----	----
9	Light Diesel Fuel	Light Brown	Brilliant Green	----
10	High speed diesel fuel	Light Brown	----	----

Labelling:

All plant and equipment provided under this Specification shall be labelled in English as to duty or services, all such labelling to correspond to schedules, diagrams, and the like to be provided as part of the as-fitted drawings. Labels shall be of traffolyte with black engraved lettering not less than 20mm high or as otherwise required and approved by the Architect.

Manufacturers' nameplate shall generally be provided for all plant and equipment and shall show serial and model numbers and date of manufacture.

The following refer to specific items (but not be limited to) requiring labelling:

All valves, motor starters, distribution boards, gauges, contractors, cable terminals in switchboards, circuit breakers.

Labels shall be attached to valves (or pipe adjacent thereto) with a light gauge metal band or alternatively to be screwed to the insulated valve boxes where provided. The labels shall state the valves number.

SECTION-12: FIRE PROTECTION SYSTEM

1. SCOPE

The scope of this section consists of but is not necessarily limited to supply, installation, testing and commissioning of the fire protection system. The philosophy of the system is as follows :

- a. The Fire Suppression System shall comprise the Fire Hydrants System, the Sprinkler System (Wet type) and Hand Appliances.

- b. Water from the underground 2 nos RCC Fire Water Storage Tanks, each of 100cum capacity, shall be supplied for the uses listed below.
- i. Fire Hydrant System (Pressurised) both for the external hydrants, the internal landing valves and the hose reels at landings.
- ii. Sprinkler System (Wet Type)
- c. The Hydrant System and the Sprinkler System, under normal conditions, shall be lowest pressurized by means of the electric motor driven Jockey Pump.
- d. The Sprinkler System shall be provided with an electric motor driven pump set.
- e. The piping and valve connections shall be done so that the water from the discharge of the Hydrant Pump sets is able to supply water, automatically to the Sprinkler System whenever, the Sprinkler Pump is unable to maintain the pressure or fails and not vice versa.
- f. The starting and stopping of the Jockey pump shall be automatic based on the pressure switches at preset low and high pressure.
- g. The electric motor driven Hydrant Pump starts automatically at a preset pressure by means of a pressure switch. As soon as the Hydrant Pump starts, the Jockey Pump Stops.
- h. The Hydrant Pump shall be stopped only manually.
- i. The Sprinkler Pump shall be started automatically at a preset pressure but shall be stopped only manually.
- j. Contractor shall ensure that all false ceiling voids greater than 800 mm are provided with sprinklers.
- k. Contractor shall ensure Hydro Testing for the complete system.
- l. The Contractor shall obtain the necessary approval of the drawings and the schemes from the local authority / TAC as called for. The contractor shall also take care of any other requirement so that insurance cover can be obtained, if required at minimum premium at a later date.
- m. The contractor shall design and after approval of Project Manager display near each staircase landing at floor levels, a glass covered framed floor plan clearly showing the locations of all landing valves, hose reels, hand appliances, as well as the DO's and DON'T's for the personnel and the exit direction in case of an emergency. The dimensions of the floor plan, its scale, lettering size, colour scheme etc shall be as directed by the Project Manager.

2. PIPE WORK

2.1 GENERAL REQUIREMENTS

All materials shall be of the best quality conforming to the specifications and subject to the approval of the Consultants.

Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

Pipes shall be securely fixed to walls and ceilings by suitable clamps and supports (galvanised after fabrication) at intervals specified. Only approved type of anchor fasteners shall be used for RCC slabs and walls / floors etc.

Valves and other appurtenances shall be so located that they are easily accessible for operations, repairs and maintenance.

Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workman like manner.

Pipe accessories such as gauges, meters, control devices, etc. shall have the same working pressure rating as the associated pipe work. All pipe work shall be free from burrs, rust and scale and shall be cleaned before installation. All personnel engaged on welding operations must possess a certificate of competence issued by an acceptable / recognized authority.

2.2 PIPING

Pipes of following types are to be used:

Mild steel black pipes as per IS: 1239 heavy grade (for pipes of sizes 150 mm N.B. and below) suitably lagged on the outside to prevent soil corrosion. M.S. pipes buried below ground shall also be suitably be lagged with 2 layers of 400 micron polythene sheet over 2 coats of bitumen.

Steel pipelines upto 150 mm dia shall be as per IS: 1239, Part-II (heavy grade) while pipelines above 150 mm dia shall be as per I.S.:3589.

Il pipe clamps and supports shall be fabricated from MS steel sections and shall be factory galvanised before use at site. Welding of galvanised clamps and supports shall not be permitted.

Pipes shall be hung by means of expandable anchor fastener of approved make and design. The hangers and clamps shall be fastened by means of galvanised nuts and bolts. The size/diameter of the anchor fastener and the clamps shall be suitable to carry the weight of water filled pipe and dead load normally encountered.

Hangers and supports shall be thoroughly galvanised after fabrication. The selection and design of the hanger & support shall be capable of carrying the sum of all concurrently acting loads. They shall be designed to provide the required supporting effects and allow pipeline movements as necessary. All guides, anchor braces, dampener, expansion joint and structural steel to be attached to the building/structure trenches etc. shall be provided. Hangers and components for all piping shall be approved by the Consultants.

The piping system shall be tested for leakages at 2 times the operating pressure or 1.5 time shut-off pressure, which ever is highest including testing for water hammer effects.

Flanged joints shall be used for connections for vessels, equipment, flanged valves and also on two straight lengths of pipelines of strategic points to facilitate erection and subsequent maintenance work.

For pipes under ground installation the pipes shall be buried at least one meter below ground level and shall have 230 mm x 230 mm masonry or concrete supports at least 300 mm high at 3m

intervals. Masonry work to have plain cement concrete foundation (1 cement: 4 coarse sand: 8 stone aggregate) of size 380x380x75 thick resting on firm soil.

2.3 PIPING INSTALLATION & SUPPORT

Tender drawings indicate schematically the size and location of pipes. The Contractor, on the award of the work, shall prepare detailed working drawings, showing the cross-sections, longitudinal sections, details of fittings, locations of isolating and control valves, drain and air valves, and all pipe supports. He must keep in view the specific openings in buildings and other structure through which pipes are designed to pass.

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 so as to permit free expansion and contraction. Risers shall be supported at each floor with Galvanised steel clamps. To permit free movement of common pipingsupport shall be from a common hanger bar fabricated from Galvanised steel sections.

Pipe hangers shall be provided at the following maximum spacings:

Pipe Dia (mm)	Hanger Rod Dia (mm)	Spacing between Supports (m)
Up to 25	6	2
32 to 50	10	2.7
80 to 100	12	2.7
125 to 150	16	3.6
200 to 300	19	5.3

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 floor slab for installing the various pipes area are indicated in the drawings. Contractor shall carefully examine the cut-outs provided and clearlypoint 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 fibreglass and finished with retainer rings.

The contractor shall make sure that the clamps, brackets, saddles and hangers provided for pipe supports are adequate or as specified / approved by Consultants. 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 reducers shall be used for the piping to drain freely. In other locations, concentric reducers 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. Automatic air valves shall be provided on hot water risers.

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 as shown on the approved drawings. Care shall be taken to protect pressure gauges during pressure testing.

2.4 PIPE FITTINGS

Pipe fittings mean tees, elbows, couplings, unions, flanges, reducers etc and all such connecting devices that are needed to complete the piping work in its totality.

Forged steel fittings of approved type with "V" groove for welded joints. Forged steel fittings shall be screwed type only and shall be used for pipes of 50 mm dia & below.

Fabricated fittings shall not be permitted for pipes diameters 50mm and below.

When fabricated fittings are used, they shall be fabricated, welded in workshops. They shall be inspected by Project Manager before dispatch from the workshop. The welding procedures of the workshop should have been approved by the rules for sprinkler system and applicable to hydrant and sprinkler system. For "T" connection, pipes shall be drilled and reamed. Cutting by gas or electrical welding shall not be permitted.

2.5 PROCEDURE FOR PYPKOTE / COATEK APPLICATION

- A) Surface Preparation - The pipe surface shall be cleaned by a wire brush.
- B) Application of Primer - Pypkote / Coatek primer is to be applied on pipes immediately after cleaning. This is to prevent any further accumulation of rust on the pipe. This is a cold applied primer and is applied by brush.
- C) Application of Pypkote / Coatek 4 mm Tape - After the primer is applied on the pipe, it is allowed to dry for about 30 min. till it becomes touch dry. Before adhering the tape to the pipe, it is advisable to gently heat the primer coated pipe by a run of LPG torch. Remove the bottom polyethylene from the tape & then heat bottom surface of the tape by LPG torch or any heat source & start wrapping the tape to the pipe by heating the primer coated pipe & by removing the bottom polyethylene from the tape before wrapping better adhesion between the tape & pipe is obtained. Overlaps are maintained with a minimum of 12.5 mm.
- D) Tape coating of weld joints - The tape is applied over the weld joints after the necessary welding & testing methods of the joints is completed. The procedure for application of tape shall be the same as bare pipe procedure. Overlaps on each side of the weld joints shall be 50 mm.
- E) A final coat of White wash with water based cement paint is done immediately over the entire coated pipe.

2.6 JOINTING

2.6.1 Welded Joints:

Joints between MS pipes and fittings shall be made with the pipes and fittings having "V" groove and welded with electrical resistance welding in an approved manner. But welding without "V" groove shall not be permitted.

All joints in the pipe line with screwed fittings shall be seal welded after testing and the weld plus the adjoining portion shall be given two coats of zinc rich primer.

2.6.2 Flanged joints (65 mm dia and above)

Flanged joints with flanges conforming to IS: 6392 shall be provided on

- a. Straight runs at intervals not exceeding 25-30m on pipe lines of 50 mm dia and above and as directed by the Project Manager.
- b. For jointing all types of valves, appurtenances, pumps, connections with other type of pipes, to water tanks and other places necessary and as required for good engineering practice and as shown/noted on the drawings.
- c. Flanges shall be with GI bolts and nuts and 3mm insertion gasket of natural rubber conforming to IS: 11149.

2.6.3 Unions (upto 50 mm dia)

Approved type of dismountable unions shall be provided on pipe lines of 40 mm dia and smaller dia, in locations similar to those specified for flanges.

3. AIR VESSEL

The air vessel shall be provided to compensate for slight loss of pressure in the system and to provide an air cushion for counter-acting pressure, surges, whenever the pumping sets come into operation. Air vessel shall conform to IS: 3844. It shall be normally half full of water, when the system is in normal operation. Air vessel shall be fabricated with 8 mm thick M.S. plate with dished ends and suitable supporting legs. It shall be provided with one 100 mm dia flanged connection from pump, one 25 mm drain with valve, one water level gauge and 25 mm sockets for pressure switches. The air vessel shall be tested to pressure for 12 hours at 2 times the operating pressure or 1.5 times the shut-off.

4. AIR CUSHION TANK

Every wet riser shall be provided with an air cushion tank at its top most point. The air cushion shall be provided with an automatic air release cock, 20 mm dia drain pipe, drain valve and shut off valve.

5. FIRE BRIGADE CONNECTION

The storage tank shall be provided with a 150 mm fire brigade pumping connection to discharge at least 2275 litres / minute into it. This connection shall not be taken directly into the side of the storage tank, but arranged to discharge not less than 150 mm above the top edge of the tank such that the water flow can be seen. The connection shall be fitted with stop valve in a position

approved by the Project Manager. An overflow connection discharging to a drain point shall be provided from the storage tank.

The fire brigade connection shall be fitted with four numbers of 63mm instantaneous inlets in a glass fronted wall box at a suitable position at street level, so located as to make the inlets accessible from the outside of the building. The size of the wall box shall be adequate to allow hose to be connected to the inlets, even if the door cannot be opened and the glass has to be broken. Each box shall have fall of 25mm towards the front at its base and shall be glassed with wired glass with "FIRE BRIGADE INLET" painted on the inner face of the glass in 50 mm size block letter. Each such box shall be provided with a steel hammer with chain for breaking the glass.

In addition to the emergency fire brigade connection to the storage tank, a 150mm common connection shall be taken from the four 63mm instantaneous inlets direct to hydrant main so that the fire brigade may pump to the hydrants in the even of the hydrant pumps being out of commission. The connection shall be fitted with a sluice valve and reflux valve. Location of these valve shall be as per the approval of the Project Manager.

Two way collecting head with two numbers 63 mm instantaneous type inlets shall be connected to the sprinkler header. All other details shall be as described above.

6 SYSTEM DRAINAGE

The system shall be provided with suitable drainage arrangement with drain valves complete with all accessories.

7 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.

8. VALVES

8.1 SLUICE VALVES

Sluice valves shall be double flanged valves with cast iron body. The spindle, wall seat and wedge nuts shall be of bronze. They shall generally have non-rising spindle and shall be of the particular duty and design called for.

The valves shall be supplied with suitable flanges, non- corrosive bolts and asbestos fibre gaskets. Sluice valves shall conform to Indian Standard IS: 780-1969 and IS:2906.

8.2 BUTTERFLY VALVE

The butterfly valve shall be suitable for waterworks and rated for 300 P.S.I

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 in 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.

8.3 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.

8.4 GUN METAL VALVES

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.

8.5 NON-RETURN VALVE

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

8.6 PRESSURE RELIEF VALVE

Each System shall be provided with a Pressure Relief Valves. The Valve shall be spring actuated and set to operate as per field requirement. The Valve shall be constructed of bronze and provided with an open discharge orifice for releasing the water. The Valve shall be open lift type.

9. PRESSURE SWITCH

The pressure switches shall be employed for starting and shutting down operation of pumps automatically, dictated by line pressure. The Pressure Switch shall be diaphragm type. The housing shall be die cast aluminium, with SS 316 movement, pressure element and socket. The set pressure shall be adjustable.

The Switch shall be suitable for consistent and repeated operations without change in values. It shall be provided with IP: 55 water and environment protection.

10. PRESSURE GAUGE

Pressure gauge shall be provided near all individual connections of the hydrant system with isolation valves and near each flow switch assembly of the sprinkler system. Pressure gauge shall be 50 mm dia gunmetal bourdon type with gunmetal isolation ball valve, tapping and connecting pipe and nipple. The gauge shall be installed at appropriate height for easy readability.

11. PAINTING

All Hydrant and Sprinkler pipes shall be painted with post office red colour paint. All M S pipes shall first be cleaned thoroughly before application of primer coat. After application of primer coat two coats of enamel paint shall be applied. Each coat shall be given minimum 24 hours drying time. No thinners shall be used. Wherever required all pipe headers shall be worded indicating the direction of the pipe and its purpose such as "TO RISER NO.1" etc.

Painting shall be expertly applied, the paint shall not over run on surfaces not requiring painting such as walls, surfaces etc. Nuts and bolts shall be painted black, while valves shall be painted blue.

12. EXCAVATION

Excavation for pipe lines shall be in open trenches to levels and grades shown on the drawings or as required at site. Pipe lines shall be burried with a minimum cover of 1 meter or as shown on drawings.

Wherever required Contractor shall support all trenches or adjoining structures with adequate timber supports, shoring and strutting

On completion of testing in the presence of the Project Manager and pipe protection, trenches shall be backfilled in 150 mm layers and consolidated.

Contractor shall dispose off all surplus earth as directed by the Project Manager.

13. ANCHOR / THRUST BLOCK

Contractor shall provide suitably designed anchor blocks in cement concrete/steel support to cater to the excess thrust due to work hammer and high pressure

Thrust blocks shall be provided at all bends, tees and such other location as determined by the Project Manager.

Exact location, design, size and mix of the concrete blocks/steel support shall be as shown on the drawings or as directed by the Project Manager prior to execution of work.

14. FIRE HYDRANTS

14.1 EXTERNAL HYDRANTS

- a. Contractor shall provide external hydrants. The hydrants shall be controlled by a cast iron sluice valve. Hydrants shall have instantaneous type 63mm dia outlets. The hydrants shall be double outlet conforming to IS: 908 with CI duck foot bend and flanged riser or required height to bring the hydrant to correct level above ground.

- b. Contractor shall provide for each external fire hydrant two numbers of 63mm dia. 15 m long controlled percolation hose pipe with gunmetal male and female instantaneous type couplings machine wound with GI wire (hose to IS:636 type certification) , gunmetal branch pipe with nozzle to IS:903. This shall be measured and paid for separately.
- c. Each external hydrant hose cabinet shall be provided with a drain in the bottom plate.
- d. Each external hydrant hose cabinet containing items as above shall also be provided with a nozzle spanner and a Fireman's Axe. This shall be measured and paid for separately.
- e. Each hose cabinet shall be conspicuously painted with the letters "FIRE HOSE".

14.1.2 Internal Hydrants

- a. Contractor shall provide on each landing and other locations as shown on the drawings double headed gunmetal landing valve with 100 mm dia inlet as per IS:5290, with shut off valves having cast iron wheels as shown on the drawings. Landing valve shall have flanged inlet and instantaneous type outlets as shown on the drawings.
- b. Instantaneous outlets for fire hydrants shall be standard pattern and suitable for fire hoses.
- c. Contractor shall provide for each internal fire hydrant station two numbers of 63 mm dia. 15 m long rubberized fabric lined hose pipes with gunmetal male and female instantaneous type coupling machine would with GI wire (hose to IS: 636 type 2 and couplings to IS: 903 with IS certification), fire hose reel, gunmetal branch pipe with nozzle to IS: 903. This shall be measured and paid for separately.
- d. Contractor shall provide standard fire hose reels of 20mm dia high pressure Dunlop rubber hose 36 m long with gunmetal nozzle, all mounted on a circular hose reel of heavy duty mild steel construction having cast iron brackets. Hose reel shall be connected directly to the wet riser with an isolating valve. Hose reel shall conform to IS: 884 and shall be mounted vertically. This shall be measured and paid for separately.
- e. Each internal hydrant hose cabinet shall be provided with a drain in the bottom plate. The drain point shall be lead away to the nearest general drain.
 - f. Each internal hydrant hose cabinet containing items as above shall also be provided with a nozzle spanner and a Fireman's Axe. The cabinet shall be recessed in the wall as directed. This shall be measured and paid for separately.
 - g. Each hose cabinet shall be conspicuously painted with the letters "FIRE HOSE".

14.1.3 Hose Reel

Hosereel shall conform to IS : 884, heavy duty, 20 mm dia length shall be 36 metre long fitted with gun metal chromium plated nozzle, mild steel pressed reel drum which can swing upto 170 degree with wall brackets of cast iron finished with red and black enamel complete.

14.1.4 Fire Hose

All hose pipes shall be of 63 mm diameter RRL/ CP as required, conforming to IS : 636 or IS : 8423. The hose shall be provided with copper alloy delivery coupling. The hose shall be capable

of withstanding bursting pressure of 35.7 Kg/Sq.cm without undue leakage or sweating. Hose shall be provided with instantaneous spring-lock, type couplings.

14.1.5 Branch Pipe, Nozzle

Branch pipes shall be of gun metal with loaded tin bronze ring at the discharge and to receive the nozzle and provided at the other with a loaded tin bronze ring to fit into the instantaneous coupling. Nozzle shall be of spray type of diameter of not less than 16 mm and not more than 25 mm. Nozzle shall be of loaded tin bronze branch pipe and nozzle shall be of instantaneous pattern conforming to Indian Standard - 903.

14.1.6 Hose Cabinet

Hose cabinet shall be provided for all internal and external fire hydrants. Hose cabinets shall be fabricated from 16 gauge MS powder coated sheet of fully welded construction with hinged double front door partially glazed (3 mm glass panel) with locking arrangement, stove enamelled fire red paint (shade No. 536 of IS:5) with "FIRE HOSE" written on it prominently (size as given in the schedule of quantities). Cabinet surfaces in contact with the walls shall not be powder coated but instead given two coats of anti-corrosive bitumastic paint.

14.1.7 Internal Hose Cabinet

Hose cabinet shall be of glass fronted with hinged door & lock. The cabinet shall be made of 16 gauge thick MS sheet and spray painted to shade No. 536 of IS:5. The hose cabinet shall be of size to accommodate the following:

- i. Landing Valves (Single/double headed)
- ii. Hose pipe
- iii. Hose reel (36.5 mtr.)
- iv. Branch pipes, nozzles (2 sets)
- v. Fire man's axe and hand appliances

14.1.8 External Hose Cabinet

The hose cabinet shall be of size to accommodate the following:

- i. Single/Double headed yard hydrant valve
- ii. Hose pipe (2 length of 15 m)
- iii. Branch pipes, nozzles (2 sets)
- iv. Fire man's axe

15. HAND HELD FIRE EXTINGUISHERS

15.1 HAND APPLIANCES

15.1.1 Scope

Work under this section shall consist of furnishing all labour, materials, appliances and equipment necessary and required to install fire extinguishing hand appliances as per relevant specification of various authorities.

Without restricting to the generality of the foregoing, the work shall consist of the following:

Installation of fully charged and tested fire extinguishing hand appliances of A B C powder type as required and specified in the drawings and schedule of rates.

15.2 GENERAL REQUIREMENTS

Hand appliances shall be installed in easily accessible locations with the brackets fixed to the wall by suitable anchor fasteners.

Each appliance shall be provided with an inspection card indicating the date of inspection, testing, change of charge and other relevant data.

All appliances shall be fixed in a true workmanlike manner truly vertical and at correct locations.

Distribution / installation of fire extinguisher to be in accordance to IS: 2190..

15.4. ABC TYPE DRY POWDER EXTINGUISHER

The Extinguisher shall be filled with ABC grade 40, Mono Ammonium Phosphate 40% from any approved manufacturer.

The capacity of the extinguisher when filled with Dry Chemical Powder (First filling) as per IS 4308, Part II, shall be 5 Kg +/-2% or 10 Kg +/- 3%.

The distribution of fire extinguishers to be as per IS 2190 – 1992.

It shall be operated upright, with a squeeze grip valve to control discharge. The plunger neck shall have a safety clip, fitted with a pin, to prevent accidental discharge. It shall be pressurised with Dry Nitrogen, as expellant. The Nitrogen to be charged at a pressure of 15 Kg/cm²

Body shall be of mild steel conforming to relevant IS Standards. The neck ring shall be also mild steel and welded to the body. The discharge valve body, shall be forged brass or leaded bronze, while the spindle, spring and siphon tube shall be of brass. The nozzle shall be of brass, while the hose shall be braided nylon. The body shall be cylindrical in shape, with the dish and dome welded to it. Sufficient space for Nitrogen gas shall be provided inside the body, above the powder filling.

The Neck Ring shall be externally threaded - the threading portion being 1.6 cm. The filler opening in the neck ring shall not less than 50 mm. Discharge nozzle shall be screwed to the hose. The design of the nozzle shall meet the performance requirement, so as to discharge at least 85% of contents upto a throw of 4 mtrs, continuously, at least for 15 seconds. The hose, forming part of discharge nozzle, shall be 500 mm long, with 10 mm dia internally for 5 Kg capacity and 12 mm for 10 Kg capacity. It shall have a pressure gauge fitted to the valve assembly or the cylinder to indicate pressure available inside. The extinguisher shall be treated with anti-corrosive paint, and it shall be labelled with words ABC 2.5 cm long, within a triangle of 5 cm on each face. The extinguisher body and valve assembly shall withstand internal pressure of 30 Kg/cm² for a minimum period of 2 minutes. The pressure gauge shall be imported and suited for the purpose.

15.5 WATER TYPE EXTINGUISHER (Gas Pressure Type)

The Extinguishing medium shall be primarily water stored under normal pressure, the discharge being affected by release of Carbon Dioxide Gas from a 120 Gms cylinder.

The capacity of Extinguisher, when filled upto the indicated level, shall be 9 ltr +/- 5%

The skin thickness of the Cylinder shall be minimum 4.0 mm, fabricated from Mild Steel sheet, welded as required, with dish and dome, being of same thickness, and of size not exceeding the diameter of body. The diameter of body to be not less than 150 mm and not exceeding 200 mm. The neck shall be externally threaded upto a minimum depth of 16 mm, and leaded tin bronze.

The cap shall be of leaded tin bronze, and screwed on the body upto a minimum of 1.6 cm depth, with parallel screw thread to match the neck ring. The siphon tube to be of brass or G.I. and the strainer of Brass. The cartridge holder, knob, discharge fittings and plunger to be of Brass/Leaded tin bronze, and plunger of stainless steel, spring of stainless steel. The cap to have handle fixed to it. The discharge hose shall be braided nylon, of 10 mm dia and 600 mm long, with a nozzle of brass fitted at end.

The extinguisher shall be treated for anti-corrosion internally and externally, and externally painted with Fire Red paint. The paint shall be stove enamelled/powder coated. The cartridge shall be as per IS, and have 60 gm net carbon dioxide gas for expelling. The extinguisher, body and cap shall be treated to an internal hydraulic pressure of 25 Kg/cm². It shall have external marking with letter A, of 2.5 cm height, in block letters within a triangle of 5 cm each side. The extinguisher shall be upright in operation, with the body placed on ground and discharge tube with nozzle held in one hand to give a throw of not less than 6 mtr, and continue so for atleast 60 secs. The extinguisher body shall be clearly marked with ISI stamp (IS 940).

15.6 CARBON DIOXIDE EXTINGUISHER

The Carbon Dioxide Extinguisher shall be as per IS: 2878

The body shall be constructed of seamless tube conforming to IS: 7285 and having a convex dome and flat base. Its dia shall be maximum 140 mm, and the overall height shall not exceed 720 mm.

The discharge mechanism shall be through a control valve conforming to IS: 3224. The internal syphon tube shall be of copper aluminium conforming to relevant specifications.

Hose Pipe shall be high pressure braided Rubber hose with a minimum burst pressure of 140 Kg/cm² and shall be approximately 1.0 meter in length having internal dia of 10 mm. The discharge horn shall be of high quality unbreakable plastic with gradually expanding shape, to convert liquid carbon dioxide into gas form. The hand grip of Discharge horn shall be insulated with Rubber of appropriate thickness.

The gas shall be conforming to IS: 307 and shall be stored at about 85 Kg/cm². The expansion ratio between stored liquid carbon dioxide to expanded gas shall be 1:9 times and the total discharge time (effective) shall be minimum 10 secs and maximum 25 secs.

The extinguisher shall fulfill the following test pressures:

Cylinder: 236 Kg/cm²/ Control Valve: 125 Kg/cm²/ Burst Pressure of Hose: 140 Kg/cm² minimum

It shall be an Upright type. The cylinder, including the control valve and high pressure Discharge Hose must comply with relevant Statutory Regulations, and be approved by Chief Controller of Explosives, Nagpur and also bear IS marking.

The Extinguisher including components shall be IS marked.

16. FIRE PUMPS AND ALLIED EQUIPMENTS

16.1 SCOPE

Work under this section shall consist of furnishing all labour, materials, equipment and appliances necessary and required to completely install electrically operated and diesel driven pumps and as required by drawings and specified hereinafter or given in the schedule of rates.

- a. Electrically operated pumps with motors and diesel engine driven pumps with diesel engine, common base plates, coupling, coupling guard and accessories.
- b. Automatic starting system with all accessories, wiring and connections and pressure switches.
- c. Motor control centre.
- d. Annunciation system with all accessories wiring and connections.
- e. Pressure gauges with isolation valves and piping, bleed and block valves.
- f. Suction strainers and accessories.
- g. Vibration eliminator pads and foundation bolts.
- h. Leak-off drain shall be led to the nearest floor drain.

16.2. GENERAL REQUIREMENTS

Pumps shall be installed true to levels on suitable concrete foundations. Base plate shall be firmly fixed by properly grouted foundation bolts.

Pumps and motors shall be truly aligned by suitably instruments. Record of such alignment shall be furnished to the Project Manager.

All pump connections shall be standard flanged type with number of bolts as per relevant standard requirement for the working pressure. Companion flanges shall be provided with the pumps.

Manufacturers' instructions regarding installation, connections and commissioning shall be strictly followed.

Contractor shall provide necessary test certificates, type test certificates, performance curves and NPSH curves of the pumps from the manufacturer when called for. The contractor shall provide facilities to the Project Manager & Consultant for inspection of equipment during manufacturing and also to witness various tests at the manufacturer's works without any cost to the Project Manager or Consultant.

Seismic isolation and clamping for each pump and flexible connection on the suction as well as the discharge side shall be provided.

The contractor shall submit with this tender a list of recommended spare parts for three years of normal operation and quote the prices for the same as a separate submittal / annexure.

16.3. ELECTRIC FIRE PUMP

General

The electric fire pump shall be suitable for automatic operation complete with necessary electric motor and automatic starting gear, suitable for operation on 415 volts, 3 phase and 50 Hz. A.C. systems. Both the motor and the pump shall be assembled on a common base plate, fabricated M.S. channel type or cast iron type.

Drive

The pump shall be direct driven by means of a flexible coupling. Coupling guard shall also be provided.

16.4. FIRE PUMP

The fire pump shall be horizontally mounted multistage, multioutlet centrifugal type. It shall have a capacity to deliver 2280 lpm as specified, and developing adequate head so as to ensure a minimum pressure of 3.5 Kg/Sq.cm at the highest and the farthest outlet.

The pump shall be capable of giving a discharge of not less than 150 per cent of the rated discharge, at a head of not less than 65 per cent of the rated head. The shut off head shall be within 120 per cent of the rated head.

The pump casing shall be of cast iron to grade FG 200 to IS: 210 and parts like impeller, shaft sleeve, wearing ring etc. shall be of non-corrosive metal like bronze/brass/gun metal. The shaft shall be of stainless steel. Provision of mechanical seal shall also be made.

Bearings of the pump shall be effectively sealed to prevent loss of lubricant or entry of dust or water. The pump shall be provided with a plate indicating the suction lift, delivery head, discharge, speed and number of stages. The pump casing shall be designed to withstand 1.5 times the working pressure.

Provision of Jockey Pump for low and high zone shall be made. The pump shall be vertical SS type and of detail as in schedule of quantity. Contractor shall verify that the capacity of the Jockey pump shall not be less than 3% (Minimum 180 LPM) and not more than 10% of the installed pump capacity.

Motor

The motor shall be squirrel cage A.C. induction type suitable for operation on 415 volts 3 phase 50 Hz. system. The motor shall be totally enclosed fan cooled type conforming to protection clause IP 55. The class of insulation shall be F. The synchronous speed shall be 1500 RPM as specified. The motor shall be rated for continuous duty and shall have a horse power rating necessary to drive the pump at 150 per cent of its rated discharge with at least 65 per cent rated head. The motor shall conform to I.S.325-1978.

Motor Starter

The motor starter shall be as per detail in MCC. The unit shall include suitable current transformer and ammeter of suitable range on one line to indicate the current. The starter shall not

incorporate under voltage, no voltage trip overload or SPP. The starter assembly shall be suitably integrated in the power and control panel for the wet riser system & sprinkler system.

16.5. PUMP SETS ASSEMBLY

On the main fire sprinkler and hydrant headers near pump sets a 150 mm dia by-pass valve located in an accessible location shall be provided along with a rate of flow rota meter calibrated in 1 pm and able to read 200% of the rated pump capacity. The delivery shall be connected to the fire tank.

Each and every pump set assembly shall be provided with suction valve (only for positive suction head), discharge valve, non-return valve and 150 mm dia Bourdon type pressure gauge with isolation valve.

16.6. FLEXIBLE CONNECTORS

On all suction and delivery lines double flanged reinforced neoprene flexible pipe connectors shall be provided. Connectors should be suitable for maximum working pressure of each pipe line on which it is mounted and tested to a test pressure of 1:5 time the operating pressure. Length of the connector shall be as per manufacturer's standard.

16.7. INTERLOCKING

The following inter-locking between the two main fire pumps (i.e. wet riser pump & sprinkler pump), the jockey pump and the diesel engine driven pump.

Only one category of pumps will work at a time i.e. either jockey pump or main fire pumps (wet riser and sprinkler, both the wet riser and sprinkler can come up at a time) or diesel driven pump.

	JOCKEY PUMP	WET RISER PUMP	SPRINKLER PUMP
i.	ON	OFF	OFF
ii.	OFF	ON	OFF
iii.	OFF	OFF	ON
iv.	OFF	ON	ON

16.8. ANNUNCIATION PANEL

One solid state electronic annunciation panel, fully wired with visual display and audible alarm unit shall be provided to indicate:

- a. Flow condition in any flow switch indicating the area of distress and fire alarm.
- b. Starting and stopping of each hydrant pump.
- c. Starting and stopping of each jockey pump.
- d. Starting and stopping of each sprinkler pump.
- e. Failure of Hydrant / Sprinkler pump to start.

- f. High level in fire water storage tank compartment.
- g. Low level in fire water storage tank compartment.

The panel shall be factory fabricated, wired and tested. All details shall be submitted with the tender.

The annunciation panel shall be located in the security office / reception on the ground floor or as instructed by the Project Manager.

16.9. VIBRATION ISOLATION

The pumpset shall be mounted on rolled steel channels and 150 mm thick inertia block spring and ribbed neoprene vibration isolation mounting shall support the inertia block onto a 100 mm thick concrete plinths. The spring mountings shall have a maximum deflection of 15 mm. Reference shall be made to the section on "Noise and Vibration" for further technical requirements.

Material Specifications – Electrical Works

Electrical Scope

Design, detailed engineering, preparation of construction drawing, manufacture, acceptance testing at manufacturer's works or at any accredited agency, supply, packing, forwarding and delivery from manufacturer's works/ place of storage to erection site including transit insurance, unloading, storage at site, assembly, erection, testing, installation, commissioning & performance demonstration and handing over of electrical works as per the direction of the engineer, new wiring and illumination of entire area (Landscape Lighting) related to the landscape development within the project area as of original ratings & specifications.

The scheme covers the complete Electrification in form of street lights, side walkway lights and High mast light in the proposed development. The utility shifting and electric works to be supervised by Diu electricity department. All Electrical work shall be done as per code of practice for Electrical installations and meeting the requirements of Indian Electricity Rules/Act, applicable

CODES & STANDARDS

The design, construction, manufacture and performance of equipment shall conform to latest applicable standards and comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve the BIDDER of this responsibility.

Equipment shall conform to the latest applicable Standards as mentioned. In case of conflict between the Standards and this specification, this specification shall override.

I.S. Codes/Rules and relevant I.S. Specifications as below.

- Indian Electricity Act & Rules
- Standard practices of Diu, Electricity Department
- IS:732 Code of practice for Electrical Wiring Installations
- Special requirements of Diu Electricity board.

- IS:13947 (Part 2&5), 1993 -Low voltage switchgear & control gears
- IS:2147, 1966-Degree of protection
- IS:13947 (Part 4, Sec.I),1993
- BS:60947-4-1, 1992:IEC:158-Contactor for voltage not exceeding 1000V AC.
- IS:375, 1993-Marking and arrangement of bus bars
- IS:694, 1990 & IS:8130, 1984-PVC Insulated cables and aluminium conductor
- IS:1248,1991-Direct acting electrical indicating instruments
- IS:13703, 1991 -Low voltage fuses
- IS:13118 (All parts), 1991 -Alternating current circuit breakers
- IS:2705 (Part 1 to 4), 1992-Current transformers
- IS:3156 (Part 1 to 3), 1992-Voltage transformers

ELECTRICAL ITEM SPECIFICATION

1.0 INTERNAL WIRING

Nominal Dia of wires	Nominal Cross sec. Area	20 mm		25 mm		32 mm		38 mm	
		S	B	S	B	S	B	S	B
1/2.40	1.50	4	3	8	6	15	9	--	--
1/1.80	2.50	4	2	6	4	10	8	--	--
1/2.24	4.00	2	2	4	3	8	6	--	--
1/2.80	6.00	1	--	4	3	6	6	--	--
1/3.55	10.00	1	--	3	2	5	4	6	5

S - runs of conduits which have distance not exceeding 4.25 m. between draw boxes & which do not deflect from the straight by an angle more than 15 degree.

B - runs of conduits which deflect from the straight by more than 15°.

B) Conduits shall be kept at a minimum distance of 100 mm. from the pipes of other non-electrical services. And maintain minimum 300 mm distance between telephones, TV & Computer piping.

2) Testing

The entire installation shall be tested for:

- a) Insulation resistance.
- b) Earth continuity.
- c) Polarity of single pole switches.

General

All the wiring switch board, outlet points shall be done in a concealed manner in wall & slab in PVC conduit of minimum 25 mm dia. (medium gauge) when laid in ground the PVC pipe will be Heavy gauge & with 650v / 1100v grade PVC insulated flexible copper conductor wire. The switches should be modular with moulded cover plates, blank plates for outlet boxes. The accessories, connectors, sockets, should be fixed with brass chrome / cadmium plated machine screw. For fan points the rates should be inclusive of 300 W regulators as required to complete the point wiring. The wiring shall be as per IS: 732 and IS: 4648. The wiring shall be done in a looping manner so as to avoid junction boxes at any place. All the looping shall be done only in the switch board and outlet points. The size of the wire shall be as per the specification. Colour code shall be strictly followed. Heavy gauge PVC pipe shall be laid for ground.

The size of wires shall as follow:

10 Amp. metal clad points:

Phase / Neutral	2.5 mm ²
Earth	1.5 mm ²

6 Amp. out let points:

Phase / Neutral	1.5 mm ²
Earth	1.5 mm ²

Two nos. of 16 Amp. socket out let connected in parallel from DB to first outlet

Phase / Neutral	4.0 mm ²
Earth	2.5 mm ²

Two nos. of 16 Amp. socket out let connected in parallel from first outlet to second outlet.

Phase / Neutral	2.5 mm ²
Earth	1.5 mm ²

Light, fans, exhaust fan, 6 Amp. plug point, two-way light point, bell point etc.

Distribution Board to SB

Phase / Neutral	2.5 mm ²
Earth	1.5 mm ²
SB to outlet (P/N/E)	1.5 mm ²

15/20 Amp. Socket outlet for appliances / AC (Single Phase/Three Phase) / Geyser

Phase / Neutral 4.0 mm²

Earth 2.5 mm²

Separate pipes shall be laid for off wires and circuit mains.

Circuit mains of same phase shall be drawn in one pipe with prior permission/discussion with the consultant.

Separate phase, neutral and earthing wire of sizes recommended by consultant shall be drawn for each and every circuit mains.

All wires shall have proper size Cu. Lugs when connected to any MCB, Plug etc.

CONDUIT WORKS:

CEILING / WALL OUTLET BOXES FOR LIGHTS / FANS:

- Outlet boxes shall be of steel with cover and so installed as to maintain continuity throughout. These shall be protected at the time of laying by filling with jute / earth / cotton etc. so that no cement mortar finds its way inside during concreting or plastering etc. In beams conduit socket shall be provided in place of outlet boxes. The same shall be used for installation of luminaries.
- For fixing light fixtures / brackets, outlet boxes complete with knock out for holding conduits shall be used. For lighting fixture suitable for 40/20 watts fluorescent tubes / incandescent lamps / mercury vapour lamps, only one outlet box is required.
- For fixing ceiling fans, circular outlet boxes, 100 mm. diameter, complete with 12 mm. dia. Mild Steel rod 300 mm. long, for holding 12 mm. dia. Mild Steel cover 125 mm. dia. at bottom shall be used.

DRAW OUT JUNCTION BOXES:

Steel draw out boxes at angle dimensions shall be provided at a convenient point on walls / ceilings to facilitate pulling of long runs of cables / wires. The location of these boxes is to be decided prior to fixing, as per site requirement and following should be treated as general guidance for deciding the location of these:

- a) These should be provided at a place where these are not in direct view. Recommended place is 400 / 450 mm. below ceiling, if conduits are running vertically.
- b) Junction box in the offset of bottom of RCC beam and vertical wall should not be provided.
- c) If junction boxes are coming side by side for two or more conduits, one common M.S. box of proper size can be used to act as junction box.
- d) If junction box is to be provided in ceiling, its position should be so located that it is in line with other light / fan points.
- e) Junction boxes should never be used for splitting one conduit into two or more. Junction box for such functions is avoidable and for this, number of conduits to be connected to one switch board should be calculated correctly as per drawing before laying conduits in ceiling.

- f) Locating junction boxes on outer surface of exterior walls of building should be avoided as these are in direct view and are also exposed to weather.

TESTING OF INSTALLATION:

Before a completed installation is put into service, the following tests shall be complied with:

(a) INSULATION RESISTANCE:

The insulation resistance shall be measured by applying 500-volt megger with all fuses in places, circuit breaker and all switches closed.

The insulation resistance in megohms of an installation, measured shall not be less than 50 megohms divided by the number of points on the circuit.

The insulation resistance shall be measured between

- EARTH TO PHASE
- EARTH TO NEUTRAL
- PHASE TO NEURAL
- PHASE TO PHASE

(b) EARTH CONTINUITY PATH:

The earth continuity conductors shall be tested for electrical continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuit-breaker, measured from the connection, with the earth electrode to any point in the earth continuity conductor in the completed installation and shall not exceed one ohm.

IS-7098,(Part-I)	Cross linked polyethylene insulated PVC sheathed cables for working voltages upto 1100V.
IS-3961	Recommended current ratings for cables
IS 8130-1984	Specification for conductors for insulated electric cables and flexible cords.
IS-3975, 1999	Low Carbon galvanized steel wires, formed wires & tapes for armouring of cables
IS-4759	Specifications for Hot dipped galvanized coating on round steel wires
IS-5831	PVC insulation and sheath of electric cables.
IS-10418	Drums for electric cables.
IS-10810 (Part 0 to 64)	Method of test for cables.

2. DISTRIBUTION BOARD

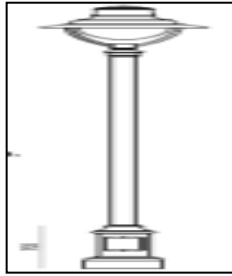

Supplying, assembling, grouting, leveling, Connecting & testing D.B of specified make as per Standards IS 8623 of VTPN Distribution Board, TPN distribution Board, S.P Distribution Board. Also including the M.C.Bs/ELCBs/ Isolators of various rating in boards

3. LIGHT FIXTURES

3.1 Supply, Installing, Testing, commissioning of Light fixtures of various types and of specified make

3.1.1 Installation Of External Post Top Lights:

Technical Specification:

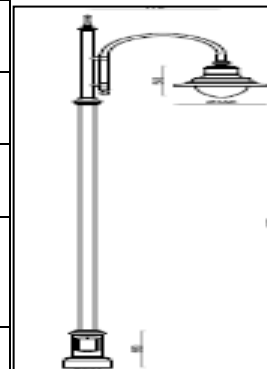
Input voltage	240 V ac supply	 
Source	LED	
Wattage of the luminary	45W	
Post Top pole height	6 meters single arm	
IP Protection	IP66	
Lumen	7500 Lm	
Color Temperature	3000K with test certificate	
Beam Angle	Type II	
Accessories	Mounting clip, gel connectors	
LED type	High power LED (1 Watt)	
Working Humidity	0 to 95%	

3.1.2 Installation Of External Single Arm Street Lights:

Street Light Technical Specifications:

Input voltage	120 V to 277 V	
LED lamp efficacy	> 110 Lm/W for 65/70 watt and 80 Lm/W for 20 W	
Power factor	>0.90	
Life expecting (L70B50)	50,000 burning hours	


No of hours usage / day	10 to 12 hours/day
Rated watt	10/20/70 W (cool white)
Luminous flux	1000 to 9000 Lm
LED type	High power LED (1 Watt)
Working Humidity	0 to 95%
Colour Temperature	4000K with test certificate
Ingress protection	IP 65 as per IS/IEC60529-2001 or up to date amendment with test certificate. (silicon gasketing)
Impact Resistance (IK Rating)	Min IK08
Total harmonic distortion (THD)	< 15% with test certificate
Surge Protection	Min. 4kV inbuilt and 10kV external
Colour rendering index	Ra > 70
Working Temperature	-5 deg to 55 deg C outdoor
Average lighting/ beam angle	120 to 140 deg
Avg. Horizontal illuminances (lux) on 0.0 m level	As per IS1944
Overall Uniformity (Emin/Eavg)	As per IS1944
Transverse Uniformity (Emin/Emax)	As per IS1944
Control Circuit	Integrated individual control driver, Compatible to LED
Lamp starting time	Not more than 5 second
System power efficiency	> 85 %



Driver Type	BIS approved Potted LED Driver	
Luminary Casing	Pressure die cast Aluminum with toughened glass cover and water proof fixture	
LED thermal management	LED shall be mounted on heat sink conductive aluminum with fins to dissipate the heat to ambient air	
Pole entry/ Retro fitting	Suitable for fixing in existing lighting pole (30 mm to 60 mm dia with bracket and locking bolt & nut.	
Applicable Standard	IESNA LM 79 for fixture and with stand to wind velocity 150 mph with test certificate	
Electrical connector	Connecting wires with minimum one meter length	
Fixture	CE compliance.	


3.1.3 Installation Of Wall Mounted Lights:

Technical Specifications:


Input voltage	240 V ac supply	
Source	LED	
Wattage of the luminary	2W	
IP Protection	IP65	
Lumen	20Lm	
Color Temperature	4000K with test certificate	
Beam Angle	Asymmetric	
Accessories	Mounting clip ,gel connectors	
LED type	High power LED (1 Watt)	
Working Humidity	0 to 95%	

3.1.4 Installation Of Bollard Lights

Technical Specifications


Input voltage	220 V-240 V single phase ac supply	
Source	LED	
Wattage of the luminary	9W	
IP Protection	IP54	
Dimensions	130mm x 800mm & 170mm x 130mm x 200mm	

3.1.5 Installation Of Led Strip:

Input voltage	240 V ac supply	
Source	LED	
Wattage of the luminary	28W	
IP Protection	IP68	
Lumen	1878Lm	
Color Temperature	3000K with test certificate	
Beam Angle	120 degrees	
Accessories	Mounting clip ,gel connectors	
LED type	High power LED (1 Watt)	

3.1.6 Installation Of Inground Coloumn Uplights

Technical specifications of light:

Input voltage	240 V ac supply	
Source	LED	
Wattage of the luminary	43.6W	
IP Protection	IP67	
Lumen	3120Lm	
Color Temperature	3000K with test certificate	
Beam Angle	61 degrees	
Accessories	Mounting clip ,gel	

	connectors	
LED type	High power LED (1 Watt)	


3.1.7 Installation Of Led Strip:

Technical Specifications:

Input voltage	240 V ac supply
Source	LED HONGLITRONIC
Wattage of the luminary	4.8W
IP Protection	IP68
Lumen	225Lm
Color Temperature	3000K with test certificate
Beam Angle	120degrees
Accessories	Mounting clip ,gel connectors
LED type	High power LED (1 Watt)


3.1.8 Installation Of External Spyke Lights:

Technical Specifications:

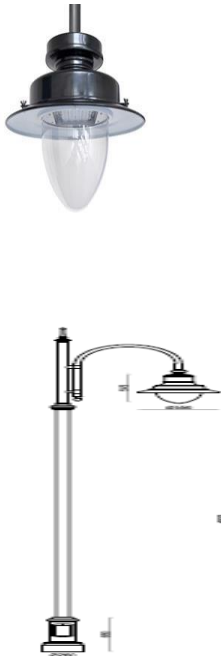
Input voltage	240 V ac supply	
Source	LED HONGLITRONIC	
Wattage of the luminary	13.1W	
IP Protection	IP65	
Lumen	72Lm	
Color Temperature	3000K with test certificate	
Beam Angle	10 & 33 degrees	
Accessories	Mounting clip ,gel connectors	
LED type	High power LED (1 Watt)	

3.1.9 Installation Of Exterior Projection 500:

Technical Specifications:

Input voltage	415V ac supply	
Source	LED	
Wattage of the luminary	230W	
IP Protection	IP66	
Lumen	72Lm	
Color Temperature	6700K with test certificate	
Typical half-cycle RMS inrush current	8.4A	
Surge protection	4KV	
Orientation	any side (vertical)	
Mounting	Adjustable yoke	
Idle power (zero intensity, no effects applied)	32 W, 0.3 A	
Housing	Cast aluminum	
LED type	High power LED (1 Watt)	

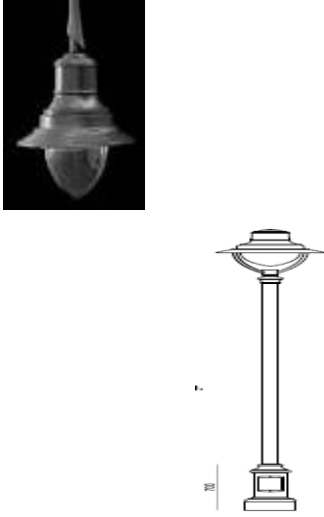
Technical Specification:

Input voltage	240 V ac supply	
Source	LED	
Wattage of the luminary	73W	
Post Top pole height	7.5/ 6.0 meters single arm	
IP Protection	IP66	
Lumen	7500 Lm	
Color Temperature	3000K with test certificate	
Beam Angle	Type II	
Accessories	Mounting clip ,gel connectors	
LED type	High power LED (1 Watt)	

Working Humidity	0 to 95%	
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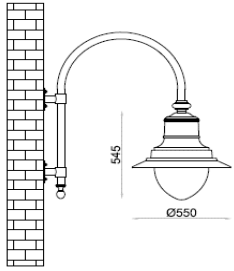
3.1.10 Installation Of External Post Top Lights:

Technical Specification:


Input voltage	240 V ac supply	
Source	LED	
Wattage of the luminary	45W	
Post Top pole height	3.5 meters single arm	
IP Protection	IP66	
Lumen	4500 Lm	
Color Temperature	3000K with test certificate	
Beam Angle	Type V	
Accessories	Mounting clip ,gel connectors	
LED type	High power LED (1 Watt)	
Working Humidity	0 to 95%	

3.1.11 Installation Of Decorative design bracket :


Technical Specifications:

Input voltage	240 V ac supply	
Source	LED	
Wattage of the luminary	45W	
Type of pole	Wall Mounted Bracket	
IP Protection	IP66	
Lumen	4500 Lm	
Color Temperature	3000K with test certificate	
Beam Angle	Type V	
Accessories	Mounting clip ,gel connectors	
LED type	High power LED (1 Watt)	


3.1.12 Installation of Bollard Lights**Technical Specifications**

Input voltage	220 V-240 V single phase ac supply	
Source	LED	
Wattage of the luminary	9W	
IP Protection	IP68	
Dimensions	130mm x 800mm & 170mm x 130mm x 200mm	

3.1.13 Installation Recessed in Ground Diffused Light:

Input voltage	240 V ac supply	
Source	LED	
Wattage of the luminary	0.5W	
IP Protection	IP68	
Lumen	1878Lm	
Color Temperature	6500K with test certificate	
Beam Angle	Diffused	
Accessories	Mounting clip ,gel connectors	
LED type	High power LED (1 Watt)	

3.1.14 Installation of Pole Mounted Multispot Light**Technical specifications of light:**

Input voltage	240 V ac supply	
Source	LED	
Wattage of the luminary	63W	
Luminary Mounting type	Pole Mounted	
IP Protection	IP66	
Lumen	4959Lm	

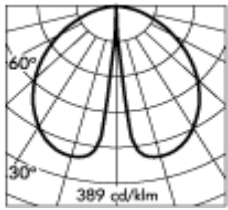
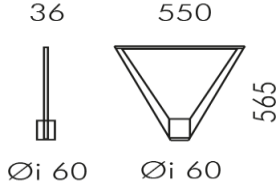
Color Temperature	3000K with test certificate	
Beam Angle	23 degrees	
Accessories	Mounting clip ,gel connectors	
LED type	High power LED (1 Watt)	

NOTE:

A) The contractor shall also provide complete with all items including junction boxes, MCB's, anchor fasteners, screws, bolts, nuts, washers, cable glands and lugs etc. And carry out associated minor works for successful completion of works.

B) Any other items that are not indicated but form part of the execution shall be deemed to be included in the scope and vendor shall include the cost of such items in their offer

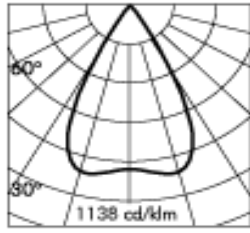
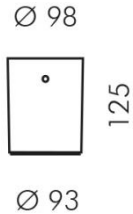
3.1.15 Installation post off Pole Mount- 5.5 mts:

Sr.no	Category	Parameter	Details
1		Product Code	S,7045W.14
2	Mounting		POLE MOUNT-5.5 MTR
3	Painting process	Bonderite or equivalent	BONDERITE
4		Illuminance Cone Diagram with lux level and beam diagram	
5	Physical	Dimensions (L X W X H)	
6		Housing Material with Heat Sink type	ENAB 47100, Body Heat Sink
7		Fixture finish protection details	IP 65
8	Lamp Source	Lamp Source (LED chip details)	LED
9		Color Temperature	4000K
10		Color Rendering Index	<90

Sr.no	Category	Parameter	Details
11		Rated luminaire luminous flux	1720
12		SDCM@50,000 hrs	L70B20
13		Efficacy	57
14	Optics	Beam Angle	SYMMETRIC-DLETA PO OPTICS-AZIMUTH<=30 DEGREE
15		Tilting/ Fixed	FIXED
16		L70/ L80 Criteria	L70B20
17		Ingress Protection	65
18		IK Rating	7
19		LM80 report	L70B20
20		Total Harmonic Distortion	<15%
21	Macadam step		3
22	Ballast Details	System Wattage (Precise)	30
23	REPORTS	LM 79 reports	yes
24		LM 80 reports	yes
25		Test certificate reports verifying IK & IP	yes


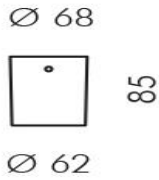
3.1.16 Installation Surface Mount light:

Sr.no	Category	Parameter	Details
1		Product Code	S,1416W.14
2	Mounting		SURFACE
3	Painting process	Bonderite or equivalent	BONDERITE

Sr.no	Category	Parameter	Details
4		Illuminance Cone Diagram with lux level and beam diagram	
5	Physical	Dimensions (L X W X H)	
6		Housing Material with Heat Sink type	ENAB 47100, Body Heat Sink
7		Fixture finish protection details	IP 66
8	Lamp Source	Lamp Source (LED chip details)	LED
9		Color Temperature	3000K
10		Color Rendering Index	<90
11		Rated luminaire luminous flux	1074
12		SDCM@50,000 hrs	L70B20
13		Efficacy	96
14	Optics	Beam Angle	58 DEGREE
15		Tilting/ Fixed	FIXED
16		L70/ L80 Criteria	L70B20
17		Ingress Protection	65
18		IK Rating	7
19		LM80 report	L70B20
20		Total Harmonic Distortion	<15%
21	Macadam step		3
22	Ballast Details	System Wattage (Precise)	11.2

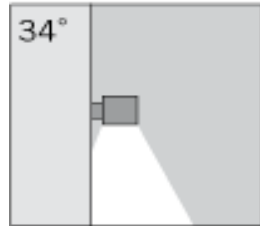
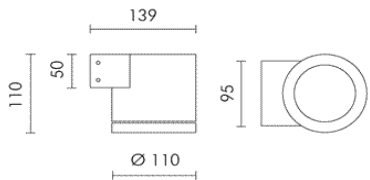
Sr.no	Category	Parameter	Details
23	REPORTS	LM 79 reports	yes
24		LM 80 reports	yes
25		Test certificate reports verifying IK & IP	yes

3.1.17 Installation Surface Mount light:

Sr.no	Category	Parameter	Details
1		Product Code	S,1405W.14
2	Mounting		SURFACE
3	Painting process	Bonderite or equivalent	BONDERITE
4		Illuminance Cone Diagram with lux level and beam diagram	
5	Physical	Dimensions (L X W X H)	
6		Housing Material with Heat Sink type	ENAB 47100.....Body Heat Sink
7		Fixture finish protection details	IP 66
8	Lamp Source	Lamp Source (LED chip details)	LED
9		Color Temperature	3000K
10		Color Rendering Index	<90
11		Rated luminaire luminous flux	284
12		SDCM@50,000 hrs	L70B20
13		Efficacy	60
14	Optics	Beam Angle	34 DEGREE

Sr.no	Category	Parameter	Details
15		Tilting/ Fixed	FIXED
16		L70/ L80 Criteria	L70B20
17		Ingress Protection	65
18		IK Rating	7
19		LM80 report	L70B20
20		Total Harmonic Distortion	<15%
21	Macadam step		3
22	Ballast Details	System Wattage (Precise)	4.2
23	REPORTS	LM 79 reports	yes
24		LM 80 reports	yes
25		Test certificate reports verifying IK & IP	yes


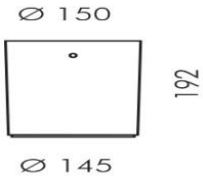
3.1.18 Installation Surface Mount light:

Sr.no	Category	Parameter	Details
1		Product Code	S,6628W.14
2	Mounting		SURFACE
3	Painting process	Bonderite or equivalent	BONDERITE
4		Illuminance Cone Diagram with lux level and beam diagram	
5	Physical	Dimensions (L X W X H)	
6		Housing Material with Heat	ENAB 47100.....Body Heat

Sr.no	Category	Parameter	Details
		Sink type	Sink
7		Fixture finish protection details	IP 65
8	Lamp Source	Lamp Source (LED chip details)	LED
9		Color Temperature	3000K
10		Color Rendering Index	<90
11		Rated luminaire luminous flux	398
12		<u>SDCM@50,000 hrs</u>	L70B20
13		Efficacy	50
14	Optics	Beam Angle	34 DEGREE
15		Tilting/ Fixed	FIXED
16		L70/ L80 Criteria	L70B20
17		Ingress Protection	65
18		IK Rating	7
19		LM80 report	L70B20
20		Total Harmonic Distortion	<15%
21	Macadam step		3
22	Ballast Details	System Wattage (Precise)	8
23	REPORTS	LM 79 reports	yes
24		LM 80 reports	yes
25		Test certificate reports verifying IK & IP	yes

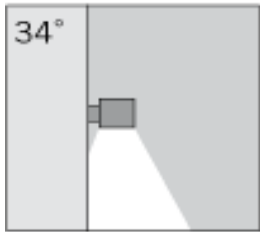
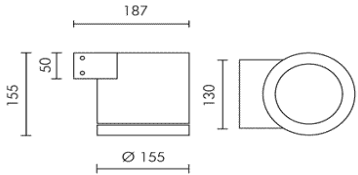
3.1.19 Installation Surface Mount light:

Sr.no	Category	Parameter	Details
1		Product Code	S,1425W.14
2	Mounting		SURFACE

Sr.no	Category	Parameter	Details
3	Painting process	Bonderite or equivalent	BONDERITE
4		Illuminance Cone Diagram with lux level and beam diagram	
5	Physical	Dimensions (L X W X H)	
6		Housing Material with Heat Sink type	ENAB 47100,,,,,Body Heat Sink
7		Fixture finish protection details	IP 66
8	Lamp Source	Lamp Source (LED chip details)	LED
9		Color Temperature	3000K
10		Color Rendering Index	<90
11		Rated luminaire luminous flux	3095
12		<u>SDCM@50,000 hrs</u>	L70B20
13		Efficacy	84
14	Optics	Beam Angle	30 DEGREE
15		Tilting/ Fixed	FIXED
16		L70/ L80 Criteria	L70B20
17		Ingress Protection	65
18		IK Rating	7
19		LM80 report	L70B20
20		Total Harmonic Distortion	<15%
21	Macadam step		3

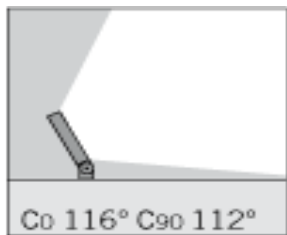
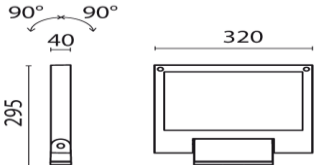
Sr.no	Category	Parameter	Details
22	Ballast Details	System Wattage (Precise)	37
23	REPORTS	LM 79 reports	yes
24		LM 80 reports	yes
25		Test certificate reports verifying IK & IP	yes

3.1.20 Installation Surface and wall Mount light:

Sr.no	Category	Parameter	Details
1		Product Code	S,6680W.14
2	Mounting		SURFACE/WALL
3	Painting process	Bonderite or equivalent	BONDERITE
4		Illuminance Cone Diagram with lux level and beam diagram	
5	Physical	Dimensions (L X W X H)	
6		Housing Material with Heat Sink type	ENAB 47100.....Body Heat Sink
7		Fixture finish protection details	IP 65
8	Lamp Source	Lamp Source (LED chip details)	LED
9		Color Temperature	3000K
10		Color Rendering Index	<90
11		Rated luminaire luminous flux	1089
12		<u>SDCM@50,000 hrs</u>	L70B20

Sr.no	Category	Parameter	Details
13		Efficacy	51
14	Optics	Beam Angle	34 DEGREE
15		Tilting/ Fixed	FIXED
16		L70/ L80 Criteria	L70B20
17		Ingress Protection	65
18		IK Rating	6
19		LM80 report	L70B20
20		Total Harmonic Distortion	<15%
21	Macadam step		3
22	Ballast Details	System Wattage (Precise)	21.5
23	REPORTS	LM 79 reports	yes
24		LM 80 reports	yes
25		Test certificate reports verifyng IK & IP	yes

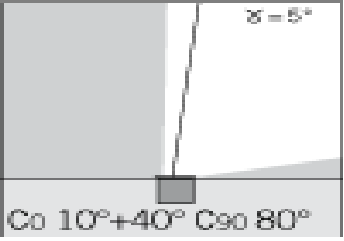
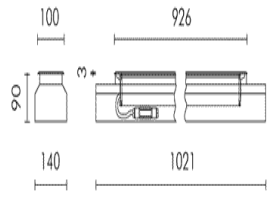
3.1.21 Installation Surface and wall Mount light:

Sr.no	Category	Parameter	Details
1		Product Code	S,3075W.14
2	Mounting		SURFACE/WALL
3	Painting process	Bonderite or equivalent	BONDERITE
4		Illuminance Cone Diagram with lux level and beam diagram	
5	Physical	Dimensions (L X W X H)	

Sr.no	Category	Parameter	Details
6		Housing Material with Heat Sink type	ENAB 47100.....Body Heat Sink
7		Fixture finish protection details	IP 65
8	Lamp Source	Lamp Source (LED chip details)	LED
9		Color Temperature	3000K
10		Color Rendering Index	<90
11		Rated luminaire luminous flux	3915
12		<u>SDCM@50,000 hrs</u>	L70B20
13		Efficacy	93
14		Optics	Beam Angle
15	Tilting/ Fixed		FIXED
16		L70/ L80 Criteria	L70B20
17		Ingress Protection	65
18		IK Rating	10
19		LM80 report	L70B20
20		Total Harmonic Distortion	<15%
21	Macadam step		3
22	Ballast Details	System Wattage (Precise)	42
23	REPORTS	LM 79 reports	yes
24		LM 80 reports	yes
25		Test certificate reports verifying IK & IP	yes

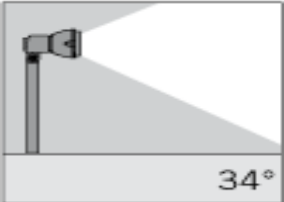
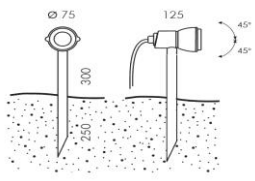
3.1.22 Installation of Ground Recessed light:

Sr.no	Category	Parameter	Details
1		Product Code	S,5942W.19

Sr.no	Category	Parameter	Details
2	Mounting		GROUND RECESSED
3	Painting process	Bonderite or equivalent	BONDERITE
4		Illuminance Cone Diagram with lux level and beam diagram	
5	Physical	Dimensions (L X W X H)	
6		Housing Material with Heat Sink type	ENAB 47100.....Body Heat Sink
7		Fixture finish protection details	IP 67
8	Lamp Source	Lamp Source (LED chip details)	LED
9		Color Temperature	3000K
10		Color Rendering Index	<90
11		Rated luminaire luminous flux	2028
12		<u>SDCM@50,000 hrs</u>	L70B20
13		Efficacy	66
14	Optics	Beam Angle	C0-10+40; C90-80 DEGREE
15		Tilting/ Fixed	FIXED
16		L70/ L80 Criteria	L70B20
17		Ingress Protection	67
18		IK Rating	10
19		LM80 report	L70B20
20		Total Harmonic Distortion	<15%

Sr.no	Category	Parameter	Details
21	Macadam step		3
22	Ballast Details	System Wattage (Precise)	30.5
23	REPORTS	LM 79 reports	yes
24		LM 80 reports	yes
25		Test certificate reports verifying IK & IP	yes

3.1.23 Installation of Surface /On Pole light:

Sr.no	Category	Parameter	Details
1		Product Code	S,1102W.14
2	Mounting		SURFACE/ ON POLE
3	Painting process	Bonderite or equivalent	BONDERITE
4		Illuminance Cone Diagram with lux level and beam diagram	
5	Physical	Dimensions (L X W X H)	
6		Housing Material with Heat Sink type	ENAB 47100.....Body Heat Sink
7		Fixture finish protection details	IP 66
8	Lamp Source	Lamp Source (LED chip details)	LED
9		Color Temperature	3000K
10		Color Rendering Index	<90
11		Rated luminaire luminous flux	153
12		SDCM@50,000 hrs	L70B20

Sr.no	Category	Parameter	Details
13		Efficacy	59
14	Optics	Beam Angle	34 DEGREE
15		Tilting/ Fixed	FIXED
16		L70/ L80 Criteria	L70B20
17		Ingress Protection	66
18		IK Rating	6
19		LM80 report	L70B20
20		Total Harmonic Distortion	<15%
21	Macadam step		3
22	Ballast Details	System Wattage (Precise)	2.6
23	REPORTS	LM 79 reports	yes
24		LM 80 reports	yes
25		Test certificate reports verifyng IK & IP	yes

NOTE:

A) The contractor shall also provide complete with all items including junction boxes, MCB's, anchor fasteners, screws, bolts, nuts, washers, cable glands and lugs etc. And carry out associated minor works for successful completion of works.

B) Any other items that are not indicated but form part of the execution shall be deemed to be included in the scope and vendor shall include the cost of such items in their offer

4. CABLE TRENCH

4.1 Excavation and back filling of cable trenches required for laying the cables directly buried in the ground. This includes supplying and providing cable markers at an interval of 10 meters. The depth shall be app 1mtr and the width shall be as per requirement.

4.2 . Supplying and spreading fine sand for a thickness of 100 mm. and providing and laying bricks for cable protection on all the three sides.

Activity for underground Cable Laying

- Site cleanup.
- Transportation of site cleanup materials/debris, if any

- Transportation of dismantled material to central plant for recycling or approved disposal location
- Cable Pull out & pilling into cable duct over rollers using pulling machine
- Testing of cables prior to pull out
- Laying cable in cable duct/HDPE pipe
- Testing of cable after pullout
- Cable jointing at cable jointing chamber along Cable route
- Testing of joints
- Connection and termination etc of cable
- Dismantling of existing overhead infrastructures (poles, conductors, transformers etc)
- Stacking of reusable infrastructure at designated stores for redeployment in other area where overhead system.
- Disposal of non-reusable or scrapped infrastructure (with no reuse value)

5. CABLES

Supply, Installation, Testing, Laying, Commissioning of following 1100 volt grade XLPE insulated PVC sheathed aluminum / Copper conductor armored cables as per specification in trenches, cable trays, ducts, over bed of sand, clamped to wall with suitable clamps including, saddles fixing bolts, connecting testing and commissioning with identification tags at every 10 mtr. & both ends with All the fixing accessories, excavation Back filling & Cable

5.1 Workmanship

5.1.1 Installation

Cables can be laid through the pvc pipes throughout the wall as shown in the drawing

- a) Cables shall be laid in the routes marked in the drawings. Where the route is not marked, the contractor shall mark it out on the drawings and also on the site and obtain the approval of the Architect/Consultant before laying the cable. Procurement of cables shall be on the basis of actual site measurements and the quantities shown in the schedule of work shall be regarded as a guide only.
- b) The general arrangement of cable laying is shown on drawings. All cables shall be full runs from panel to panel without any joints or splices. Cables shall be identified at end termination indicating the feeder number and the Panel/Distribution board from where it is being laid. cable termination for conductors up to 4 sq.mm. may be insertion type and all higher sizes shall have tinned copper compression lugs. Cable termination shall have necessary brass glands. The end termination shall be insulated with a minimum of six half-lapped layers of PVC tape. Cable armoring shall be earthed at both ends.

- c) In case of cables entering the buildings. It would be done duly only through pipes. The pipes shall be laid in slant position. So, that no rain water may enter the building. After the cables are tested. The pipes shall be sealed with M. seal & then tarpaulin, shall be wrapped around the cable for making the entry of water light.
- d) All cables shall be provided with stainless steel/Aluminum cable identification tags at a maximum distance of 10 m
- e) Cables, running indoors shall be laid on walls, ceiling, inside shafts or trenches. Single cables laid shall be laid in GI/PVC pipe and not to fix on wall slab directly or drawn through GI / PVC pipes fixed on wall or ceiling and supported at not more than 500 mm. Where numbers of cables are run, necessary perforated cable trays shall be provided wherever shown. Perforated trays shall be mild steel or Aluminum as specified in the schedule of work and supported on mild steel frame work as shown on drawings or as approved. Cables laid in built-up trenches shall be on steel supports. Plastic / Aluminum identification tags shall be provided at every 30 m. All cables laid shall be properly dressed and atleast 50 mm space shall be kept between the cables.
- f) Cables shall be bent to a radius not less than 12 (twelve) times the overall diameter of the cable or in accordance with the manufacturer's recommendations whichever is higher.
- g) In the case of cables buried directly in ground, the cable route shall be parallel or perpendicular to roadways, walls etc. Cables shall be laid on an excavated, graded trench, over a sand or soft earth cushion to provide protection against abrasion. Cables shall be protected with brick or cement tiles on all the three sides as shown on drawings. Width of excavated trenches shall be as per drawings. Back fill over buried cables shall be with a minimum earth cover of 750 mm to 1000 mm. The cables shall be provided with cables markers at every 20 meters and at all loop points.
- h) The general arrangement of cable laying is shown on drawings. All cables shall be full runs from panel to panel without any joints or splices. Cables shall be identified at end termination indicating the feeder number and the Panel/Distribution board from where it is being laid. cable termination for conductors upto 4 sq.mm. may be insertion type and all higher sizes shall have tinned copper compression lugs. Cable termination shall have necessary brass glands. The end termination shall be insulated with a minimum of six half-lapped layers of PVC tape. Cable armoring shall be earthed at both ends.
- i) In case of cables entering the buildings. It would be done duly only through pipes. The pipes shall be laid in slant position. So, that no rain water may enter the building. After the cables are tested. The pipes shall be sealed with M. seal & then tarpaulin, shall be wrapped around the cable for making the entry of water light.
- j) All cables shall be provided with stainless steel/Aluminum cable identification tags at a maximum distance of 10 m.
- k) All cables to be laid should be properly dress and atleast 50 mm space should be kept between the cables.

INSTALLATION OF CABLE NETWORK:

Cable network shall include power, control and lighting cables which shall be laid in underground trenches, cable trays, G.I. pipes, or on building structures as detailed in the relevant drawings,

cable schedules or as per the client / consultant's instructions. Supply & installation of cable trays, G.I. pipes / conduits, cable glands and sockets of both end isolators, junction boxes, remote push button stations, etc. shall be under the scope of the contractor.

General requirements for handling cables:

- a) Before laying cables, this shall be tested for physical damage, continuity, absence of cross phasing, insulation resistance to earth and between conductors. Insulation resistance tests shall be carried out with 500 / 1000 V megger.
- b) The cables shall be supplied at site, wound on wooden drums as far as possible. For smaller length and sizes, cables in properly coiled form can be accepted. The cables shall be laid by mounting the drum of the cable on drum carriage. Where the carriage is not available, the drum shall be mounted on a properly supported axle, and the cable laid out from the top of the drum. In no case the cable will be rolled on as it produces kinks which may damage the conductor.
- c) Sharp bending of cable shall be avoided. The bending radius for PVC insulated and sheathed, armoured cable shall not be less than 10 D, where "D" is overall diameter of the cable.
- d) While drawing cables through HDPE pipes, ensure that size of pipe is such that, after drawing cables, 40% area is free. After drawing cables, the end of pipe shall be sealed with cotton / bituminous compound.
- e) High voltage (11 kV and above), medium voltage (240 V and above) and other control cables shall be separated from each other by adequate spacing or running through independent pipes / trays.
- f) Armoured cables shall never be concealed in walls / floors / roads without G.I. pipes, conduits or HDPE pipes.
- g) Joints in the cable throughout its length of laying shall be avoided as far as possible and if unavoidable, prior approval of site engineer shall be taken. If allowed, proper straight through epoxy resin tight joint shall be made, without any additional cost.
- h) A minimum loop of 3 mtr. shall be provided on both ends of the cable, and on both ends of straight through cable joint. This additional length shall be used for fresh termination in future. Cable for this loop shall be paid for supply and laying.
- i) Cable shall be neatly arranged in the trenches / trays in such manner so that crisscrossing is avoided and final take off to the motor / switchgear is facilitated. Arrangement of cable within the trenches / trays shall be the responsibility of the contractor.
- j) All cable routes shall be carefully measured and cable cut to the required lengths and undue wastage of cables to be avoided. The routes indicated in the drawings are indicative only and the same may be rechecked with the client / consultant before cutting of cables. While selecting cable routes interference with structures, foundations, pipelines, future expansion of buildings etc. should be avoided.
- k) All temporary ends of cables must be protected against dirt and moisture to prevent damage to the insulation. For this purpose, ends of all PVC insulated cables shall be taped with an

approved PVC or rubber insulating tapes. Use of friction type or other fabric type tape is not permitted. Lead sheathed cables shall be plumbed with lead alloy.

- l) Wherever cable rises from underground / concrete / masonry trenches to motors / switchgears / push buttons, these shall be taken in G.I. pipes of suitable size, for mechanical protection upto 300 mm. distance of concerned cable gland or as instructed by the client / consultant.
- m) The cable pass through foundation / walls of other underground structures, the necessary ducts for opening will be provided in advance for the same. However, should it become necessary to cut holes in existing foundation of structures the electrical contractor shall determine the location and obtain approval of the client / consultant before cutting is done.

LAYING OF CABLES (UNDERGROUND SYSTEM)

- a) Cables shall be so laid in trench that this will not interfere with other underground structure. All water pipes, sewage lines or other structures which become exposed by excavation shall be properly supported and protected from injury until the filling has been rammed solidly in places under and around them. Any telephone or other cables coming in the way are to be properly shielded / diverted as directed by the owner / consultant.
 - b) Cable shall be laid at minimum depth of 750 mm. in case of L.T. and 1200 mm. in case of H.T. from ground level. Excavation will be generally in ordinary soil. The width of trench shall be sufficient for laying of required no. of cables.
 - c) Sand bedding 75 mm. thick shall be made below and above the cables. Layer of bricks (full size) shall be laid above sand bedding on the sides and above the cables to cover cables completely. More than one cable can be laid in the same trench. However, the relative location of cables in trench shall be maintained till termination. The surface of the ground after back filling the earth shall be made good so as to confirm in all respects to the surrounded ground and to the entire satisfaction of the client / consultant.
- D) For all underground cables, route markers should be used:
- i) Separate route markers should be used for LT, HT and telephone cables.
 - ii) Route markers should be grounded in ground with 1:2:4 cement concrete pedestal size 230 x 230 x 300 mm.
 - iii) Cable markers should be installed at an interval not exceeding 30 mtr. along the straight routes of cables at a distance of 0.5 mtr. away from centre of cable with the arrow marked on the cable marker plate indicating the location of cable. Cable markers should also be used to identify change in direction of cable route and for location of every joint in underground cable.
 - iv) No deduction shall be made for cable laying in Hume pipe for not providing bricks, sand and excavation. RCC hump pipe at the ends shall be sealed by bituminous compound after laying and testing of cables by electrical contractor without any extra charge.

5.1.2 TESTING OF CABLES:

- a) Before energizing, the insulation resistance of every circuit shall be measured from phase to ground. This requires 3 measurements if one side is grounded and 6 measurements for 3 phase circuits.
- b) Where splices or terminations are required in circuits rated above 650 volts, measure insulation resistance of each length of cable before splicing and/or terminating. Repeat measurements after splices and/or terminations are complete.
- c) DC high voltage test shall be made after installation on the following:
 - i. All 1100 volts grade cables in which straight through joints have been made.
 - ii. All cables above 1100 V grade.

For record purpose test data shall include the measured values of leakage current versus time. The DC high voltage test shall be performed as detailed below:

Cables shall be installed in final position with all the straight through joints complete. Terminations shall be kept unfinished so that motors, switchgear, transformer etc. are not subjected to test voltage.

The test voltage and duration shall be as per relevant codes and practices of Indian Standards Institution.

5.1.1 PROFORMA FOR TESTING CABLES:

- a) Date of Test
- b) Drum No. from which cable taken.
- c) Cable from to
- d) Length of run of this cable meter

5.1.2 INSULATION RESISTANCE TEST

- i) between core-1 to earth mega-ohm
- ii) between core-2 to earth mega-ohm
- iii) between core-3 to earth mega-ohm
- iv) between core-1 to core-2 mega-ohm
- v) between core-2 to core-3 mega-ohm
- vi) between core-3 to core-1 mega-ohm
- vii) duration used: 1 kV
- viii) High voltage test

Voltage	Duration
---------	----------

- i) between core an earth.
- ii) between individual cores

[This proforma shall be jointly signed by the CLIENT / CONSULTANT and the contractor in duplicate].

All test readings shall be recorded and shall form part of the completion documentation.

6 CABLE TERMINATION

Supplying & fixing heavy gauge compression type Brass glands & making joint with necessary crimping socket of long neck type connecting the same to various equipment like section pillar, switch, starter, motor etc. sizes of cables specified in BOQ CUPAL washers shall be provided for copper busbars to aluminum connection as per IS 1255 (1983):

Cable joints shall be done as per regular practice and check shall be carried out for loose connections and leakages. Insulation cutting shall be done properly taking care that no area of the conductor remains exposed. Crimping shall be done with the help of hydraulic tool.

6.1 TERMINATION AND JOINTING OF CABLES

6.1.1 USE OF GLANDS

All PVC cables up to 1.1 kV grade, armoured or Unarmoured shall be terminated at the equipment / junction box / isolators / push buttons / control accessories, etc. by means of suitable size single compression type cable glands. Armour of cable shall be connected to earth point. The contractor shall drill holes for fixing glands wherever necessary. Wherever threaded cable gland is to be screwed into threaded opening of different size, suitable galvanized threaded reducing bushing shall be used of approved type.

In case of termination of cables at the bottom of the panel over a cable trench having no access from the bottom, a close fit holes should be drilled in the bottom plate for all the cables in one line, then bottom plate should be split in two parts along the centre line of holes. After installation of bottom plate and cables with glands, it shall be sealed with cold sealing compound.

6.1.2 USE OF LUGS:

All cable leads shall be terminated at the equipment terminals, by means of crimped type solderless connectors unless the terminals at the equipment ends are suitable for direct jointing without lugs / sockets

The following is the recommended procedure for crimped joints and the same shall be followed:

- a) Strip off the insulation of the cable and with every precaution, not in severe or damage any strand. All insulation's to be removed from the stripped portion of the conductor and ends of the insulation should be clean and square.
- b) The cable should be kept clean as far as possible before assembling it with the terminal / socket. For preventing the ingress of moisture and possibility of re-oxidation after crimping of the aluminum conductors, the socket should be filled with corrosion inhibiting compound. This compound should also be applied over the stripped portion of the conductor and the palm surface of socket.
- c) Make the crimped joint by suitable crimping tool.

- d) If after crimping the conductor in socket / lug, some portion of the conductor remains without insulation the same should be covered sufficiently with PVC tape.

6.1.3 DRESSING OF CABLE INSIDE THE EQUIPMENT:

After fixing of cable glands, the individual cores of cable shall be dressed and taken along the cable ways (if provided) or shall be fixed to the panels with polyethylene straps. Cable shall be dressed in such a manner that small loop of each core is available inside the panel.

6.1.4 IDENTIFICATION OF CABLES / WIRES / CORES:

Power cables shall be identified with red, yellow and blue PVC tapes. For trip circuits identification, additional red ferrules shall be used only in the particular cores of control cable at the termination points in the switchgear / control panels and control switches.

In case of control cables all cores shall be identified at both ends by their wire numbers by mean of PVC ferrules or self-sticking cable markers, wire numbers shall be as per schematic / connection drawing. For power circuit also, wire numbers shall be provided if required as per the drawings of switchgear manufacturer / supplier.

7 HDPE CONDUIT PIPE

7.1 Material:

The raw material used for the HDPE pipe shall meet the following requirements

- i. the anti-oxidant establishes, Color master batch and other additive used shall be physiologically harmless and shall be used only to minimum extent necessary to meet the specification.
- ii. Usage of any additives used separately or together should not impair the long-term physical and chemical properties of the HDPE pipe.
- iii. Suitable Ultra-Violet stabilizers may be used for manufacture of the HDPE pipe to protect against UV degradation when stored in open for a minimum period of 8 months.
- iv. In case of HDPE pipe of three concentric layer construction, the friction reducing, polymeric material to be used as the inner layer lubrication material shall be integral with HDPE layer.

7.2 Tests on Material of HDPE pipe:

The base HDPE resin material shall be subjected to following tests and shall satisfy

- i. Melt flow Index: ISO 1133
- ii. Density: ISO 1183

7.3 Dimension of pipe

- i) Duct shall have Nominal Diameter of either 110mm,160mm 200mm and 225mm and shall have a dimensional ratio of 13.5 (SDR).
- ii) Pipe Length shall be 6 or 12 meters, length of supply preferred to be 12 metres

- iii) HDPE Ducts should be sourced from the manufacturer with ISO 9001 accredited manufacturing facility.

7.4 7.4 Accessories:

The following accessories are required for jointing the pipe and shall be supplied along with the pipe. The manufactures shall provide complete design details, procedure for method of installation and type of the material used for the accessories.

7.5 Plastic coupler:

The coupler shall be used to join two HDPE pipes. The coupling shall be able to provide a durable water tight joint between two pipes without deteriorating the strength of the pipes. The strength of coupler shall match the primary strength of the HDPE pipe. It should either snap fit or Split type. The jointing shall meet the air pressure test of 2 kg/cm² for a minimum period of 2 hours without any leakage.

7.6 Tests on finished HDPE pipe:

7.6.1 Visual Inspection: The external surfaces of the pipes shall be smooth and inner surface of the pipe shall be ribbed, clean and free from grooving and other defects. The pipe shall be cleanly cut and shall be square with axis of the pipes.

Slight shallow longitudinal grooves or irregularities in the wall thickness shall be permissible, if the wall thickness remains within the permissible limits.

7.6.2 Dimensions: The wall thickness and diameter of the pipe, shall be measured by a dial Vernier or ball ended micrometer. The diameter shall be measured with circometer and shall conform to the figures given in the clause 1.4.1.

7.6.3 Reversion Test: This test shall be carried out as per IS: 4984. The dimension of inner layer or outer layer shall not change by more than 3% in the longitudinal direction when a sample pipe placed (sample length 200mm approx.) horizontally in an air-oven at 110+/-2o C for 60 minutes and cooled to the room temperature.

7.6.4 Tensile Strength at yield and Elongation at break Test: The tensile strength and elongation of the HDPE pipe shall be carried out as per ISO: 6259 1& 3. The tensile strength for finished material shall be minimum 18 N/mm² and elongation at break shall be 350%.

7.6.5 Environmental Stress Crack Test: The test shall be conducted as per ASTM

D 1693 with the specimen prepared from HDPE pipe after making compression moulding sheet. The specimen shall be immersed in 10% IGPAL (CO 630) Solution at 50± 1o C for 96 hrs. There shall be no crack or split.

7.6.6 Impact Strength Test: The test shall be carried out as per IS:12235 (Part 9). A sample HDPE pipe 150mm in length shall be conditioned at 0°C for one hour and placed on a heavy rigid block whose faces are at angle of 120o. A striker with a total weight of 10kg shall be allowed to fall freely in a suitable vertical guide through a height of 1.5m. The HDPE pipe shall not crack or split.

7.6.7 Crush Resistance: The test shall be in a sample of 200± 2 mm length of HDPE pipe which shall be subjected to crush load as specified below with compression speed 12.5 mm per minute. The deflection with crush load on period shall not exceed 5%.

- i) **225 mm:** 1700 N Minimum
- ii) **200 mm:** 1500 N Minimum
- iii) **160 mm:** 1200 N Minimum
- iv) **110 mm:** 800 N Minimum

7.6.8 Ovality test: The ovality is the difference between maximum outside diameter and the minimum outside diameter of the HDPE pipe at same cross section of the duct at 300mm away from the cut end. The same shall be measured as per IS- 4984 as described above.

7.6.9 Raw Material: HDPE Virgin material shall be used. No other reworked or recycled material shall be used

a. HDPE Chambers / Manholes for Power Supply Network (M40)

Power Distribution networks comprise chambers for connections to/from feeder pillars and house service connections. All details will be in accordance with relevant standards

Manhole Locations and at intervals of not more than 50m (c/c) and at Junctions, Bend, change of alignment etc.

Specifications – HPSCC 40 grade precast concrete chamber (1200x600x2200 mm) (L x B x H)

7.7 SPACERS for HDPE Power DUCTS Laying.

There are a few commercially manufactured ducts spacers available for assembling duct banks. These products maintain the desired separation between ducts and provide the required support during assembly and concrete encasement.

The placement of these spacers varies in accordance with the conduit material and installation specification. Typically, spacers are placed 5 feet (1.5 m) to 8 feet (2.4 m) apart.

In power duct banks, individual conduits should be separated from one another for the following reasons:

- To provide adequate dissipation of the normal build-up of heat from cables within the conduit;
- To provide void space to allow the encasement material to fully surround each conduit;

8 LIGHTING PANEL DISTRIBUTION BOARD

Supplying, unloading at site, shifting to site, assembling, leveling, grouting, erecting, Testing, & Commissioning main L.T. panel board, fabricated from M.S. sheet & folded channel totally enclosed cubical type compartmentalized.

8.1 FEEDER PILLER BOX DESCRIPTION

Sl.	Items Description	Nos.
1	14/16SWG 70-micron Powder Coating (RAL-7032) after 7 tank chemical pretreatment, outdoor type	1

Sl.	Items Description	Nos.
1.1	main incommer feeder	
	100A 4P 30kA MCCB, TMD (Fixed Thermal Magnetic) Release, Type: Easy Pact EZC	
	EXTENDED ROTARY HANDLE FOR MCCB	
	100/5A 5VA Tape Wound Acc. Cl: 1 Current Transformer, ID: 30mm	
	INDICATING LAMP RED, YELLOW, BLUE 230 VAC	
	3 Phase Multi-Function meter	
	6A 1P 10kA C-Curve MCB, Type: xC60	
1.2	Aluminium Busbars 3 Phase And Neutral For 500 A Incommer Current Denisty: 0.8a/Sq.Mm	
1.3	Outgoing Feeder	
	32A 4P 10kA C-Curve MCB, Type: xC60 (QTY: 06 NOS)	
	Power Terminals	
	End Plate For Above Terminals	

8.2 TESTING:

Before electrical panel is energized, the insulation resistance of each bus shall be measured from phase to ground. Measurement shall be repeated with circuit breakers in operating positions and contacts open.

Before switchgear is energized, the insulation resistance of all control circuits shall be measured from line to ground.

1. The following tests shall be performed on all circuit breakers during erection.
2. Contact alignment and wipe shall be checked and adjustment where necessary in accordance with the breaker manufacturer's instructions.
3. Each circuit breaker shall be drawn out of its cubicles, closed manually and its insulation resistance measured from phase to phase and phase to ground.
4. All adjustable direct acting trip devices shall be set using values given by the consultant/ manufacturer.
5. The dielectric strength of insulating oil wherever applicable shall be checked before switchgear is energized, the following tests shall be performed on each circuit breaker in its test position.

- Close and trip the circuit breaker from its local control switch push button or operating handle. Switchgear control bus may be energised to permit test operation of circuit breaker with A.C. closing with prior permission of the client / consultant.
- Test tripping of the electrically operated circuit breaker by operating mechanical trip device.
- Test proper operation of circuit breakers latch, check carriage limit switch if provided. Test proper operation of lockout device in the closing circuit. Wherever provided by simulating conditions which would cause a lockout to occur.
- Trip breaker either manually or by applying current or voltage to each of its associated protective release.
- Before switchgear is energized, the tests covered above shall be repeated with each breaker in its normal operating position.
- Capacitor banks shall be tested as per manufacturer's instructions. In addition, test for output and/or capacitance, insulation resistance test and test for efficiency of discharge device shall be carried out.

9 EARTHING

9.1 Providing earthing stations for equipment earthing as shown and specified in IS:3043 and drawing for equipment complete with Chemical Earthing

Following activities shall be carried out for the earthing station

- i) Excavation in hard marram.
- ii) laying Watering pipe.
- iii) brick masonry with hinged covers.
- iv) Charcoal and Salt fill.
- v) Keep minimum 2 mt. distance between two earth pits.
- vi) The pit should be minimum 4 mt. deep.
- vii) The earth resistance should not exceed 1 ohm.
- viii) All earth pits of same category shall be interlinked with strip.

Following tests shall be carried out:

The entire earthing installation shall be tested as per requirements of Indian Standard Specification IS: 3043.

- a) The following earth resistance values shall be measured with an approved earth meager and recorded.
 - i) Each earthing stations
 - ii) Earthing system as a whole

iii) Earth continuity conductor

- b) Earth conductor resistance for each earthed equipment shall be measured which shall not exceed 3 Ohm in each case.
- c) Measurements of earth resistance shall be carried out before earth connections are made between the earth and the object to be earthed.
- d) All tests shall be carried out in presence of the Site Engineer.

10 MV SWITCH GEAR & POWER PANELS**A. SCOPE**

This specification covers manufacturing, assembly factory test, supply, delivery, field test and installation of L.T. Switchgear panel of voltage not exceeding 1000 V AC complete in all respect with all equipment fittings and accessories for efficient and trouble free operation as required here in under.

B. CODES & STANDARDS

The design, construction, manufacture and performance of equipment shall conform to latest applicable standards and comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve the BIDDER of this responsibility.

Equipment shall conform to the latest applicable Standards as mentioned. In case of conflict between the Standards and this specification, this specification shall override.

IS:13947 (Part 2&5)-1993	:	Low voltage switchgear & control gears
IS:2147-1966	:	Degree of protection
IS:13947 (Part 4, Sec.I)-1993	:	
BS:60947-4-1, 1992	:	IEC:158-Contactor for voltage not exceeding 1000V AC.
IS:375-1993	:	Marking and arrangement of bus bars
IS:694-1990 & IS:8130-1984	:	PVC Insulated cables and aluminium conductor
IS:1248-1991	:	Direct acting electrical indicating instruments
IS:13703-1991	:	Low voltage fuses
IS:13118 (All parts)-1991	:	Alternating current circuit breakers
IS:2705 (Part 1 to 4)-1992	:	Current transformers
IS:3156 (Part 1 to 3)-1992	:	Voltage transformers

C. POWER SUPPLY SYSTEM

The incoming power supply shall be 415V, 3 phase, 4 wire, 50 Hz, effectively earthed AC system. The fault level for the switchgear shall be as indicated in BOQ and drawings.

Variation of voltage and frequency from their rated values are as below:

Variation of voltage $\pm 10\%$

Variation of frequency $\pm 3\%$

Combined voltage and frequency variation $\pm 10\%$

D. AMBIENT CONDITIONS

The following site conditions shall be considered for the design of panels:

Reference temperature : 45°C

E. SHEET METAL WORK

The switchgear frame shall be fabricated using suitable mild steel structural sections or pressed and shaped cold rolled sheet steel of thickness not less than 2.0 mm.

Frames shall be enclosed by sheet steel of thickness not less than 2 mm cold rolled, smoothly finished, levelled, and free from flaws. Doors and covers shall be made of sheet steel of thickness not less than 1.6mm cold rolled. Stiffeners shall be provided wherever necessary.

All panel edges and door edges shall be reinforced against distortion by rolling, bending or by the addition of welded reinforcement members.

Cut-outs shall be true in shape and avoid sharp edges. The complete structure shall be rigid, self-supporting, free from vibration, twists and bends.

• PAINTING

All sheet steel work shall be phosphated in accordance with the following procedure and in accordance with applicable standards

Oil, grease and dust shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying. After phosphating, thorough rinsing shall be carried out with clean water, followed by final rinsing with dilute dichromate solution and oven drying. A smooth coat of powder coating to be provided of approved colour. Finished painted appearance of equipment shall present an aesthetically pleasing appearance like light grey, free from dents and uneven surfaces.

• CONSTRUCTIONAL FEATURES

Switchgear panel shall be:

- a) of the metal enclosed, indoor, floor mounted modular type
- b) made up of the requisite vertical sections
- c) of dust and vermin proof construction

- d) provided with a degree of protection of IP-42
- e) easily extendable on both sides by the addition of vertical sections after removing the ends covers.
- f) provided with a metal sill frame made of structural steel channel section properly drilled for mounting the Switchgear along with necessary mounting hardware. Hardware shall be zinc plated and passivated.
- g) provided with labels on the front indicating the switchgear designation.
- h) of uniform height of not more than 2400mm(nominal). Operating handle, levers etc. of highest unit shall not be higher than 1.70 metres
- i) of single front execution
- j) provided with neoprene gaskets all round the perimeter of adjacent panels, panel and base frame, removable covers and doors.
- k) provided with aluminium bus bars running at the top or bottom, as required, all along the length of the switchgear in a separate sheet steel enclosure.
- l) Feeder pillars/kiosk should be fabricated from 2.5 mm thick CRCA steel and conform to IP:54 degree of protection.

Operating devices shall be incorporated only in the front of the Switchgear: The switchgear shall be provided in distinct vertical sections each comprising:

- a) A completely metal enclosed bus bar compartment running horizontally.
- b) Individual feeder modules arranged in multi-tier formation. It is essential that the modules are integral multiples of the basic unit size to provide for flexibility in changes, if any, at site.
- c) ACB shall be in single tier formation.
- d) A vertical cable alley covering the entire height. The cable alley shall be minimum 300mm wide for motor control modules and 500 mm wide for circuit breaker controlled modules.
- e) A horizontal separate enclosure for all auxiliary power and control buses, as required, shall be located so as to enable easy identification, maintenance and segregation from the main power buses. Tap-off connections from these buses shall be arranged separately for each vertical section.

Each vertical section shall be equipped with space heaters which may be located in the cable alley.

One metal sheet shall be provided between two adjacent vertical sections running to the full height of the switchgear except for the horizontal bus bar compartment. However, each shipping section shall have metal sheets at both ends.

Current transformers shall not be directly mounted on the buses. Current transformers on circuit breaker controlled circuits shall be mounted on the fixed portion of the compartment.

In breaker compartments, suitable barriers shall be placed between circuit breakers and all control, protective and indication circuit equipment including instrument transformers. External cable connections shall be carried out in separate cable compartments for power and control cables.

After isolation of power and control connections of a circuit, it shall be possible to safely carry out maintenance in a compartment with the bus bars and adjacent circuits live.

Cable alleys shall be provided with suitable hinged doors. Adequate number of slotted cable support arms shall be provided for dressing the cables.

All doors shall be provided with concealed type hinges and captive screws with padlocking arrangement & shall be earthed with 2.5 sq.mm copper flexible.

Interchange ability

Switchgear shall be designed in such a way that all component equipment and bus-bars operate satisfactorily without exceeding their respective maximum permissible rise in temperature under ambient temperature conditions prevailing within the switchgear cubicle, with reference ambient temperature outside the switchgear cubicles.

No equipment/devices associated with a particular circuit shall be mounted in any other circuit module.

F. MAIN BUSES & TAPE

Switchgear shall be provided with three phase bus bars and neutral.

Bus bars shall be of uniform cross section throughout the length of the switchgear

The bus bars shall be made of high conductivity electrolytic Aluminium, suitable to withstand a fault current as specified in BOQ and SLD.

Bus bars shall be provided with at least the minimum clearances in air as per applicable standards for a 500V, 3 phase, 4 wire system.

All bus-bars, bus-taps shall be insulated with close fitting sleeve of hard, smooth, dust and dirt free plastic insulation of high dielectric strength (450 V/mil) to provide a permanent high dielectric non-ageing and non-tracking protection; impervious to water, tropical conditions and fungi. The insulation shall be non-inflammable and self-extinguishing and in fast colours to indicate phases. The dielectric strength and properties shall hold good for the temperature range of 0°C to 90°C.

Bus bar shall be adequately supported and braced to withstand the stresses due to the specified short circuit currents for the associated switchgear. Bus bar supports shall be made of glass reinforced moulded plastic material (DMC/SMC).

Separate supports shall be provided for each phase of the bus bars. If a common support is provided for all three phases, anti tracking barriers shall be incorporated.

Bus bar joints shall be complete with high tensile steel bolts, washers and nuts. Bus bars shall be thoroughly cleaned at the joint locations and suitable contact grease shall be applied just before making a joint.

G. AUXILIARY BUSES

Auxiliary buses for control power supply, space heater power supply or any other specified service shall be provided. These buses shall be insulated, adequately supported and sized to suit specific requirements. The material of control power supply buses shall be electrolytic copper. The material for space heater power supply buses shall be same as that for the main power buses. Supply

transformer(s), auxiliary bus bars and necessary connections to the supply transformers and associated circuits shall be in the Bidder's scope.

H. MOULDED CASE CIRCUIT BREAKER

The Moulded case circuit breaker (MCCB) shall conform to latest IEC-60 947-2/ IS13947- 2. The MCCBs should have test certificates for breaking capacities from recognized independent test authorities. The circuit breaker shall comply with the isolation function requirement of IEC 60 947-2 section 7.1.2 to marked as suitable for isolation/ disconnection to facilitate safety of operating personnel while the breaker is in use.

Moulded case circuit breakers shall be fixed type, microprocessor release having adjustable settings with trip-free, manually closing mechanism, accommodated in a Moulded housing of robust and vermin-proof construction matching with switchboards. All MCCBs shall be designed and tested to IS - 13947 Part II to breakers shall be provided with an inverse time delay electronic over current trip device. The trip device shall be direct acting. MCCB shall have inbuilt earth fault protection release at the incomer level.

MCCB shall be provided with Class II insulation between from cover & internal power circuits to avoid any accidental contact with live current carrying path with the front cover open.

The tripping devices shall be ambient temperature compensated type. The insulating case and cover shall be made of high strength heat resistant and flame retardant thermosetting insulating material.

They shall be of the single break type. 3-phase breakers shall be designed to break all the poles simultaneously and they shall have a single mechanism.

They shall have auxiliaries and accessories whenever required for signalling, interlocking, shunt trips, under voltage release, castle lock, etc.

All the circuit breakers used shall have guaranteed breaking capacities sufficient for the maximum short circuit duties that could possibly be imposed on the different breakers. The MCCBs fixed in main switchboard shall have breaking capacity as indicated in BOQ & SLD.

MCCB shall have $I_{cu}=I_{cs}$ for the entire range.

The short circuit breaking capacity and operation of MCCB shall be supported by test certificates. Certificates of neutral independent authority (CPRI/ERDA).

MCCB shall be supplied with spreader links and phase barriers as standard feature.

The MCCB's shall be compatible for reliable protection and accurate measurement. The rated Service breaking capacity (kArms) shall be 100% of Ultimate breaking capacity (kArms). All MCCB's shall be current limiting type with features as per relevant IS codes and CPWD specification.

MCCB's shall be used with terminal spreaders and all terminals shall be shrouded to avoid direct contact.

Where ever MCCB are used as incomer, these shall be provided with earth fault protection. For outgoing MCCB, earth fault protection is not required.

For MCCB,s the rated insulation voltage shall be equal to or greater than 1000 volts and rated operational voltage should be 415 or 690 volts. The rated impulse withstand voltage shall be equal to 8 KV and up to 12 KV.

Electrical/Mechanical Endurance: Should be as per Apendix- V of CPWD General Specifications for Electrical works-2007 (Part – iv Sub- station)

I. MINIATURE CIRCUIT BREAKERS (MCB)

MCBs shall be hand operated, air break, quick make, quick break type conforming to applicable standards.

MCB shall be provided with overload/short-circuit protective device for protection under overload and short-circuit conditions. The minimum breaking capacity of MCBs shall be 10 kA r.m.s. at 415V AC. It should comply to Class III energy limiting class.

MCBs shall be provided with locking facility.

J. MEASURING INSTRUMENTS, METERING & PROTECTION

• GENERAL

Direct reading electrical instruments shall be in conformity with IS-1248. The accuracy of direct reading shall be 1.0 for voltmeter and ammeters. The errors due to variations in temperature shall be limited to a minimum. The meter shall be suitable for continuous operation between -10 degree Centigrade to + 50 degree Centigrade. All meters shall be of flush mounting type of 96mm square pattern. The meter shall be enclosed in a dust tight housing. The housing shall be of steel or phenolic mould. The design and manufacture of the meters shall ensure the prevention of fogging of instruments glass. Instruments meters shall be sealed in such a way that access to the measuring element and to the accessories within the case shall not be possible without removal of the seal.

The specifications herein after laid down shall also cover all the meters, instrument and protective devices required for the electrical work. The ratings type and quantity of meters, instruments and protective devices shall be as per the schedule of quantities.

• DIGITAL AMMETERS

Ammeters shall be digital type 7 segment LED display. Ammeter shall be suitable for accuracy class 1.0 and burden 0.5 VA approx. The ammeters shall be capable of carrying sustained overloads during fault conditions without damage or loss of accuracy.

• DIGITAL VOLTMETERS

Voltmeter shall be digital type 7 segment LED display. Voltmeter shall be suitable for accuracy class 1.0 and burden 0.5 VA approx. The range for 3 phase voltmeters shall be 0 to 500 volts. The voltmeter shall be provided with protection fuse of suitable capacity.

• CURRENT TRANSFORMERS

Current transformers shall be in conformity with IS: 2705 (part I,II & III) in all respects. All current transformers used for medium voltage applications shall be rated for 1kv. Current transformers shall have rated primary current, rated burden and class of accuracy as required. However, the

rated secondary current shall be 5A unless otherwise specified. The acceptable minimum class of various applications shall be as given below:

Measuring: Class 0.5 to 1.

Protection: Class 5P10.

Current transformers shall be capable of withstanding without damage, magnetic and thermal stresses due to short circuit fault of the system. Terminals of the current transformers shall be marked permanently for easy identification of poles. Separate CT shall be provided for measuring instruments and protection relays. Each C.T. shall be provided with rating plate.

Current transformers shall be mounted such that they are easily accessible for inspection, maintenance and replacement. The wiring for CT's shall be copper conductor, PVC insulated wires with proper termination lugs and wiring shall be bunched with cable straps and fixed to the panel structure in a neat manner.

- **MISCELLANEOUS**

Control switches shall be of the heavy duty rotary type with escutcheon plates clearly marked to show the operating position. They shall be semi-flush mounting with only the front plate and operating handle projecting.

Indicating lamps shall be of LED type.

Push buttons shall be of the momentary contact, push to actuate type fitted with self-reset contacts & provided with integral escutcheon plates marked with its functions.

- **CABLE TERMINATIONS**

Cable entries and terminals shall be provided in the Distribution Boards to suit the number, type and size of aluminium conductor power cables and copper conductor control cable specified.

Provision shall be made for top or bottom entry of cables as required. Generous size of cabling chambers shall be provided, with the position of cable gland and terminals such that cables can be easily and safely terminated.

Barriers or shrouds shall be provided to permit safe working at the terminals of one circuit without accidentally touching that of another live circuit.

Cable risers shall be adequately supported to withstand the effects of rated short circuit currents without damage and without causing secondary faults.

- **LABELS**

Labels shall be anodised aluminium with white engraving on black background shall be provided for each incoming and outgoing feeder of Distribution Boards. Labels shall be properly secured with fasteners.

- **TESTS AT MANUFACTURING FACILITY**

All routine tests specified in IS: 8623-1977 shall be carried out and test certificates produced to the Department.

- **TESTING AND COMMISSIONING**

Commissioning checks and tests shall be included all wiring checks and checking up of connections. Primary/secondary injection tests for the relays adjustment/setting shall be done before commissioning in addition to routine meggar test. Checks and tests shall include the following.

- a) Operation checks and lubrication of all moving parts.
- b) Interlocking function check.
- c) Continuity checks of wires, fuses etc. as required.
- d) Insulation test : Testing shall be as per CPWD specification.
- e) Trip tests & protection gear test

- **PUSH BUTTONS**

Push buttons shall be:

- of the momentary contact, push to actuate type rated to carry 10A at 240V AC and 1A (inductive breaking) at 220V DC.
- fitted with self reset, 2 NO and 2 NC contacts.
- provided with integral escutcheon plates marked with its function.

'Start', 'Open', 'Close' push buttons shall be green in colour.

'Stop' push buttons shall be red in colour.

All other push buttons shall be black in colour.

Emergency stop' push buttons shall be of the lockable in the pushed position type and shall be shrouded to prevent accidental operation. Key shall not be required for the operation of the push button.

K. **INTERNAL WIRING**

Wiring inside the switchgear shall be carried out with 1.1 kV grade, zero halogen FR insulated, stranded conductor wires. Minimum size of conductor for power circuits is 4 sq mm copper. Control circuits shall be wired with copper conductor of at least 2.5 sq. mm for CT circuits and 1.5 sq.mm for other circuits.

Engraved identification ferrules, marked to correspond with the wiring diagrams shall be fitted to each wire. Ferrules shall be of yellow colour with black lettering.

Wires forming part of a tripping circuit of circuit breaker shall be provided with an additional red ferrule marked 'T'.

Spare auxiliary contacts of all equipment forming part of the switchgear shall be wired up to the terminal blocks.

Spare and unassigned modules shall be complete with internal wiring.

Wiring shall be terminated on preferably stud type terminal blocks such that the wires are connected by cable lugs with nuts and washers/lock-nuts. Not more than two connections shall be made on any one terminal.

L. TERMINAL BLOCKS

Terminal blocks (both for power and control circuit) shall be of reputed make especially for CT and VT circuit. It shall comprise of finely threaded pairs of brass studs of at least 6mm diameter, links between each pair of studs, washers, nuts and locknuts. The studs shall be securely locked within the mounting base to prevent their turning. Insulated barriers shall be provided between adjacent terminals.

Terminals for circuits with voltage exceeding 125 V shall be shrouded. Terminal blocks shall be grouped depending on circuit voltage. Different voltage groups of terminal blocks shall be segregated.

Terminal blocks shall be adequately rated to carry the current of the associated circuit. Minimum rating of the terminal block is 10A.

Terminals shall be numbered for identification. Engraved white-on-black labels shall be provided on the terminal blocks, describing the function of the circuit.

Where duplication of a terminal block is necessary it shall be achieved by solid bonding links.

Terminal blocks for CT secondary lead wires shall be provided with shorting and disconnecting/earthing facilities.

Terminal blocks shall be arranged with at least 100mm clearance between two sets of terminal blocks.

Control terminals for external connections shall be suitable for terminating at least two conductors each of 2.5 sq mm size.

M. EARTHING

Each Panel shall be provided with an earth bus bar running along the entire length of the board. Material and size of the earth bus bar shall be as per IS. At either end of the earth bus, one (1) clamp type terminal with nuts, bolts and washers shall be provided for bolting the Engineer's earthing conductor of size and material indicated in data sheets. In case the earth bus is provided near top of the switchgear, one down comer at either end shall be provided for connection to the Engineer's earthing conductor.

Earth bus bars shall be supported at suitable intervals.

Positive connection between all the frames of equipment mounted in the switchboard and earth bus bar shall be provided by using insulated copper wires/bare bus bars of cross section equal to that of the bus bar, or equal to half the size of circuit load current carrying conductor, whichever is smaller.

All instrument and relay cases shall be connected to the earth bus bar using 650 V grade, 2.5 sq. mm stranded, copper, earthing conductor.

N. TESTS

Switchgear shall be subjected to following tests:

- Temperature rise test on power circuits.
- Short time current tests on power circuits.
- Mechanical operation test.
- High voltage test
- Electrical control interlock and sequential operation tests.
- Verification of wiring as per approved schematic.

All tests shall be carried out on all associated equipment as per relevant standards.

Certified copies of all test certificates shall be submitted for the approval of Engineer-in-Charge before despatch of the switchgear.

Routine test shall be witnessed at the manufacturer's works by the representative of Engineer- in-Charge.

DATA SHEET FOR LT PANELS

a. SWITCHGEAR PARTICULARS

- | | | |
|----------------------|---|-------------|
| i) Designation | : | |
| ii) Bus Bar Material | : | Aluminium |
| iii) Tp/Tpn | : | 4 Pole/Tpn |
| iv) Type | : | Outdoor |
| v) Cable Entry | : | From Bottom |

b. SWITCHGEAR AND BUS BAR RATING

- | | | |
|------------------------|---|---|
| i) Supply System | : | 415v, 3-Phase, 4w, 50hz Effectively Earthed |
| ii) Max System Voltage | : | 433 ± 10% |
| iii) Bus Bar Rating | : | As Per Sld |
| iv) One Minute Power | | |

Frequency Voltage

Power Circuits	:	V
----------------	---	---

Control Circuits	:	V
------------------	---	---

Aux. Circuits	:	V
---------------	---	---

Connected To

Secondary Of Cts

Reference Ambient

Temperature	:	45°C
-------------	---	------

Max. Temperature Of

Bus Bars And Droppers : 85°C

Short Circuit Withstand

Short Time (1 Sec) : 65/50 Ka (Rms) As Required.

c. SWITCHGEAR CONSTRUCTION REQUIREMENTS

i) Thickness Of Sheet Steel (Cold Rolled)

Frame : 2.0 mm

Doors : 1.6 mm

Covers : 1.6 mm

ii) Degree Of Protection : Ip-54 Of Is-2147

iii) Colour Finish As Per Is-5 : Powder Coated, Siemens Grey

iv) Clearances In Air Of Live Parts

Phase To Phase : 25.4 mm

Phase To Earth : 19.4 mm

O. TRANSFORMER

The scope includes supply, installation, testing & commissioning of 250KVA, 11000/433 volts ONAN Plinth mounted outdoor type transformer with off Load Tap Changer and as per latest IS norms.

1	Make	
2	KVA Rating	250KV A
3	HV Voltage	11000 Volts
4	LV Voltage	433 Volts
5	No. of Phases	3 (Three)
6	Frequency	50 Hertz
7	Type	Double Copper Wound, Oil Immersed
8	Installation	Outdoor
9	Cooling	Naturally Oil Cooled ONAN
10	HV Connection	Delta
	LV Connection	Star
	Vector Group	Dyn11
11	Tapping (on HV Side)	(+5%) to (-5%) in steps of 2.5%

12	Tap Switch	Off Circuit, Externally Operated
13	No Load Losses at Rated Voltage & Frequency	as per IS 1180
14	Load Loss at Rated Current & 75°C	
15	Impedance at 75°C	
16	(a) Regulation at U.P.F.	
	(b) Regulation at 0.8 P.F.	
17	Efficiency at 100% Load	
	75% Load	
	50% Load	
18	Temperature rise (in Oil)	
	Temperature rise (in Winding)	
19	Terminal Arrangement	
	HV Side	Cable box
	LV Side	Cable box
20	Reference Standard	IS 1180

(a) ERECTION:

Before erection of transformer, the level of rails on foundation shall be checked and minor corrections if necessary shall be carried out. After the completion of erection, necessary stoppers shall be provided at the wheels. All loosely supplied fittings / accessories shall be cleaned and mounted on the transformer and connections made. After completely assembling & installation, the transformer shall be cleaned and touched up with a paint supplied by the manufacturer applied wherever necessary. All cover bolts shall be checked for proper tightness. All the civil foundation work required shall be in the scope of contractor.

(b) TESTING:

Winding insulation resistance shall be measured from primary and secondary to ground and between primary and secondary. Check the polarity of terminals and the phase sequence.

(c) PROFORMA FOR TRANSFORMER TEST:

- Transformer name plate.
- Insulation resistance test with 1000 V meagre.
 - a) between primary to earth

- b) between secondary to earth
- c) between primary and secondary

➤ Operation of the tap changer.

Operation of the tap at tap No. 1

Operation of the tap at tap No. 2

Operation of the tap at tap No. 3

Operation of the tap at tap No. 4

Operation of the tap at tap No. 5

- Polarity marking and phase sequence.
- Earth resistance: Body as well as Neutral link.

[This proforma shall be jointly signed by the CLIENT / CONSULTANT and the contractor in duplicate].

TEST REPORTS

a)	Type of Cable and Make	
b)	Voltage Grade	
c)	Reference Standards	
d)	System Earthing	
e)	Conductor	
f)	Conductor Screening	
g)	Insulation Properties & Process of Application	
h)	Nominal thickness of XLPE Insulation	
i)	Insulation screening	
	i) Non-Metallic Part	
	ii) Metallic Part	
J)	Inner Sheath	
k)	Core Identification	
l)	Armouring	
m)	Outersheath thickness	

n)	Manufacturing Practice	
	i. Type of Cable and Make	
	ii. Voltage Grade	
	iii. Reference Standards	
	iv. Nominal cross sectional area of the Conductor	
	v. Insulation Properties and Process of Application	
	vi. Nominal thickness of the Insulation	
	vii. Inner Sheath	
	viii. Core identification	
	ix. Armouring	
	x. Outer Sheath thickness	
	xi. Manufacturing Practice	

CABLE ACCESSORIES

I	Sealing End	
a)	Bidder's Name	
b)	Type & Description of material used	
c)	Size (mm and shape)	
d)	Rated voltage	
e)	Rated continuous current (Amps.)	
f)	Maximum conductor size (Sq. mm.)	
g)	Rated impulse withstand voltage	
h)	Impulse wave shape	
i)	Power Frequency withstand voltage	
	i) Dry ((KV rms)	
	ii) Wet (KV rms)	
j)	Flashover voltage	

	i) Dry ((KV rms)	
	ii) Wet (KV rms)	
k)	Impulse (KV Peak)	
l)	Mounting details of	
	i) Sealing end/Switchyard	
	ii) Link Box	
m)	Details of terminal connector	
n)	Other details	
II	Jointing Termination Kits	
	a) Name of Bidder	
	b) Material of the coffin	
	c) Details of materials used in	

CABLE TRAYS

1.	Make	
2.	Code followed	
3.	NEMA - ASTM - IS.	
4.	Method of Fabrication (Full details required).	
5.	Strength of Tray for concentrated load	
6.	Load	
7.	Standard lengths	
8.	Testing facilities available with the manufacture for	
	a. Destruction	
	b. Deflection	
9.	Drawings for	
	a. Trays	
	b. Fish plates	

	c. Bends/Tees/Reducers	
10.	Details of S.S. Bolts, nuts, fixing bolts etc.	

U.P.S. SYSTEM

1.	KVA rating	
2.	Technology	
3.	Inversion Frequency	
4.	Input Voltage Range	
5.	Input Frequency	
6.	Output Voltage	
7.	Output Frequency	
8.	Load capacity	
9.	Total Harmonic Distortion	
10.	Output Waveform	
11.	Efficiency	
12.	Inverter Type	
13.	Transient response	
14.	Over load capacity	
15.	Cooling	
16.	Noise Level	
17.	Protections	
18.	Monitoring / Metering (Digital type)	
19.	Display	
20.	Remote Indication	
21.	Audible Alarm	
22.	Cooling	
23.	Switch Gear	
24.	Temperature	
25.	D C Voltage	
26.	Type of Battery	
27.	Back up	
28.	Software	
29.	Testing	
30.	Backup Time	

31.	Enclosure	
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(b) TESTING:

Before electrical panel is energised, the insulation resistance of each bus shall be measured from phase to ground. Measurement shall be repeated with circuit breakers in operating positions and contacts open.

Before switchgear is energised, the insulation resistance of all control circuits shall be measured from line to ground.

The following tests shall be performed on all circuit breakers during erection.

- Contact alignment and wipe shall be checked and adjustment where necessary in accordance with the breaker manufacturer's instructions.
- Each circuit breaker shall be drawn out of its cubicles, closed manually and its insulation resistance measured from phase to phase and phase to ground.
- All adjustable direct acting trip devices shall be set using values given by the consultant/ manufacturer.
- The dielectric strength of insulating oil wherever applicable shall be checked.
- Before switchgear is energised, the following tests shall be performed on each circuit breaker in its test position.
- Close and trip the circuit breaker from its local control switch push button or operating handle. Switchgear control bus may be energised to permit test operation of circuit breaker with A.C. closing with prior permission of the client / consultant.
- Test tripping of the electrically operated circuit breaker by operating mechanical trip device.
- Test proper operation of circuit breakers latch, check carriage limit switch if provided. Test proper operation of lockout device in the closing circuit. Wherever provided by simulating conditions which would cause a lockout to occur.
- Trip breaker either manually or by applying current or voltage to each of its associated protective release.
- Before switchgear is energised, the tests covered above shall be repeated with each breaker in its normal operating position.
- Capacitor banks shall be tested as per manufacturer's instructions. In addition, test for output and/or capacitance, insulation resistance test and test for efficiency of discharge device shall be carried out.
- All electrical equipment alarms shall be tested for proper operation by causing alarms to sound under simulated abnormal conditions.

11 MEASURING INSTRUMENTS, METERING & PROTECTION

GENERAL

Direct reading electrical instruments shall be in conformity with IS-1248. The accuracy of direct reading shall be 1.0 for voltmeter and ammeters. The errors due to variations in temperature shall be limited to a minimum. The meter shall be suitable for continuous operation between -10 degree Centigrade to + 50 degree Centigrade. All meters shall be of flush mounting type of 96mm square pattern. The meter shall be enclosed in a dust tight housing. The housing shall be of steel or phenolic mould. The design and manufacture of the meters shall ensure the prevention of fogging of instruments glass. Instruments meters shall be sealed in such a way that access to the measuring element and to the accessories within the case shall not be possible without removal of the seal.

The specifications herein after laid down shall also cover all the meters, instrument and protective devices required for the electrical work. The ratings type and quantity of meters, instruments and protective devices shall be as per the schedule of quantities.

- DIGITAL AMMETERS
- DIGITAL VOLTMETER
- CURRENT TRANSFORMERS

12 LIGHT FIXTURES & FANS

12.1 Supply, Installing, Testing, commissioning of Light fixtures of various types and of specified make:

Installation Of Lighting Fixtures / Fans:

i) Installation of lighting fixtures:

Scope of work under this item shall start from light point, with 3 nos. 1.5 mm.² PVC insulated wires from connector to the connector inside the lighting fixture, connections, fixing of lighting fixture complete with all accessories, lamps on wall / roof / steel truss etc. testing the lighting fixture and commissioning. If wire length of light point is enough to reach connector of light fitting, connector in light point can be deleted.

ii) Installation of external light fixtures:

Street lighting installation shall be carried out as per details shown in the drawing. The poles shall be erected in perfect plumb with concrete foundation at a location shown in the drawing. The foundation shall be designed to withstand the static load as well as wind velocity and bending moment of the pole and shall be approved by the client prior to execution.

On completion of the installation, the street light poles shall be painted with two coats of metal primer (Red Oxide) followed by two coats of Synthetic enamel of the shade as approved by the Engineer-in-charge.

The brackets shall be made of 38 mm. NB MS class "B" pipe approx. 1.8 mtr. long bent at the centre at an angle 120° C. with necessary holding brackets, hold fasts etc.

with special reducer at the end to accommodate type of street light fitting to be fixed. Bracket shall have 1 coat of anti-corrosion paint before despatch to site and 2 coats of approved make and shade of aluminium paint. This bracket shall also be provided with one M.S. water tight box complete with the connector, neutral link, rewirable fuse etc. See enclosed drawings of street light poles.

Installation of poles shall be done as per enclosed drawings of street light poles. The depth of pole to be buried in ground shall be 1/5th of the total pole length or as specified in drawing, whichever is more. Special care shall be taken in erecting poles so that these are not strained or damaged during erection and are firmly stayed till the foundation are secured. The pole shall be grouted inside ground pit (cross-section 600 x 600 mm.) with cement concrete 1:2:4. Before the placement of concrete around pole in the pit, necessary conduit pipes (not less than 25 mm. dia.) shall be placed for facilitating drawing of cables. Separate conduit shall be provided for incoming and outgoing cables. The cement concrete shall be protected from premature drying by curing for atleast 7 days after pouring. All concrete surface from 150 mm. below ground level to top shall be finished smooth with cement mortar 1:4.

12.2 Supply, Installing, Testing, commissioning of ceiling fan of various types and of specified make:

12.3 Supply, Installing, Testing, commissioning of Exhaust fans of various types and of specified make:

13 EARTHING

13.1 Providing earthing stations for equipment earthing as shown and specified in IS:3043 and drawing for equipment complete with :

13.1.1 600 x 600 x 3 mm tinned cu. plate.

13.1.2 450 x 450 x 3 mm tinned cu. plate.

13.1.3 Chemical Earthing

13.2 Earth wire/strips:

Supply and laying cu. earthing strips for interconnecting the earthing stations, panels, DB's etc. in built-up trenches, on walls/ceiling, buried in ground generally as specified and shown on drawings complete with:

a) Fixing accessories.

b) Corrosion protection of buried conductors with bituminous coating and covered with PVC tapes.

13.2.1 50 x 6 mm tinned cu. strips.

13.2.2 32 x 6 mm tinned cu. strips.

13.2.3 25 x 3 mm tinned cu. strips.

13.2.4 No.8 Gauge bare cu earth wire.

13.3 Earth Link:

40mm x 6 mm earth link fixed by necessary screws on wall.

13.4 Earth Plate:

Earth Plate: 600 mm L x 300 mm H x 6 mm Thick earth link fixed by necessary Insulators & Clamps on wall / Floor with Anchor Fastners.

13.5 Earthing Wire:

1 no. of 6 sq mm Cu. PVC insulated flexible wire (Green Colour Only).

13.6 Junction Box:

Water Tight Junction Box of Hensel make Cat. No. KG9003IN or equivalent. With necessary clamp for mounting of the J.B. (All the cable / wire connections to the JB shall be with the Water tight Glands only

14 TELEPHONE DISTRIBUTION

Supply, installation, connection, testing and commissioning of telephone system with supplying of telephone cables as per specification and drawings. The unit rate considered on running meter basis includes supply, laying, connection, testing and commissioning of multipair telephone cables through rigid PVC conduit from tag block of each floor / of specific area to MDF located in the reception area / near EPABX system. The cable shall be installed in a surface manner in the vertical riser shaft and/or laid in a cable tray including supply & fixing tag block with KRONE type terminal Junction box of specified make.

a. Tag Blocks

Supply & fixing of various ranges from 5 to 100 pair tagblock with KRONE terminal.

PVC Conduits:

14.1.1 Supply & laying of 25 mm dia. rigid PVC conduit of Heavy gauge.

14.1.2 Supply & laying of 40 mm dia. rigid PVC conduit of Heavy gauge.

b. CABLING :

Telephone cables of following sizes :

0.51 mm dia tinned copper 2 to 20 armoured cables

The final branch connections with single pair cables in conduits and the maximum number of cables in each conduit shall be as follows :

Conduit	diameter	Max Nos of cables
inch	mm.	
3/4"	20	2 Nos. single pair
1"	25	6 Nos. single pair

1¼"	32	12 Nos. single pair
1½"	40	18 Nos. single pair

c. Data CABLING :

Cat-6 wires:

The final branch connections with single pair cables in conduits and the maximum number of cables in each conduit shall be as follows :

Conduit	diameter	Max Nos of cables
inch	mm.	
¾"	20	2 Nos.
1"	25	3 Nos.
1¼"	32	5 Nos.
1½"	40	6 Nos.

14.4 Telephone outlet socket

14.4.1 Supply, Installing, testing and commissioning of one telephone point to be done with telephone outlet socket (jack type) and box of the specified make.

14.4.2 One Data I/O point to be done with data outlet socket of RJ-45 and Face Plate, box of the specified make.

15 P. A. SYSTEM

15.1 Supply & Laying of RG 6 TV wire with PVC Pipe With all accessories

15.2 SITC of 6W- 8 ohms 6" dia ceiling mounted music speakers with line matching transformer for 100/70 V output line, with bottom grill. (Philips make LDB 8353 + B377or equivalent from specified make).(Philips / Bosch make).

15.3 SITC of recess / Surface wall mounting speaker with 5W rated input power 3.3 K. Ohms / 3W impedance, 100 - 10000 Hz frequency response with 6 inch dia. cone type 8 ohms speakers duly fitted in ABS plastic cabinet of colour match with wall or ceiling of following size and as directed by engineer in charge

15.4 SITC OF microphone with press to call switch for Public address system, (Philips / Bosch make)

15.5 SITC of local volume control -cum ON-OFF switch with flush mounting metal boxes, mounting plate matching with electrical switches (Same make as switch)

15.6 Supply and laying of core twin twisted 40/36 ATC multi strand, over all PVC sheathed speaker wire in PVC Pipe.

15.7 SITC of the TV Socket with with the Concealed box, Face plate etc

15.8 Splitter

15.9 SITC of 600 watt power Audio amplifiers including all necessary control desk and microprocessor based control unit with microphone, BGM, Call Station & PC input including providing necessary rack for mounting the Amplifier (with Rack) .Contractor to decide on the number, depending upon his amplifiers capacity. Contractor shall furnish quantity and unit rate for each type of amplifier considered by him. The system should have capability to integrate with EPABX, audio Message Generator & Fire Panel

15.10 SITC of 480 watt power Audio amplifiers including all necessary control desk and microprocessor based control unit with microphone, BGM, Call Station & PC input including providing necessary rack for mounting the Amplifier (with Rack)

15.11 SITC of 6 zone Switcher

16 CCTV SYSTEM

16.1 to 16.4 SITC of various types of Cameras

16.5 Supply and Installation of 32" Colour LCD Flat Screen Monitor

16.6 Supply, installation, testing and commissioning of IP digital video management software complete with compatible server grade PC for the software, complete with licenses equal to the number of cameras, client licenses, and all other licenses required to integrate keyboards with PTZ controllers, monitors, etc. The set shall come with RAID backup device sufficient to store all cameras at 4CIF/D1 resolution for minimum 30 Days Backups & should be enable client to monitor.

16.7 Cisco Layer 3 switch with number of ports as to support all cameras and having 20% spare ports complete with SITC & Rack.

16.8 Supply and laying of 2c x 1.0 Sq.mm FRLS Shielded wire with cable connections with Glands & Lugs.

16.9 SITC of 75 Ohms copper conductor copper screen co-axial cable.:

16.10 Supply, installation, testing and commissioning of CAT 6e UTP data cable with connections:

The final branch connections with single pair cables in conduits and the maximum number of cables in each conduit shall be as follows :

Conduit	diameter	Max No. of cables
inch	mm.	
3/4"	20	2 Nos.
1"	25	3 Nos.
1¼"	32	5 Nos.
1½"	40	6 Nos.

16.11 SITC of FRLS PVC Conduits with all accessories of following sizes (Medium duty).

17 JUNCTION BOX

- 17.1 SITC of Water Tight Junction Box of Hensel make Cat. No. KG9003IN (for poles) / KF 9500 (for others) or equivalent. With necessary clamp for mounting of the J.B. (All the cable / wire connections to the JB shall be with the Water tight Glands only)

18 UNITISE SUBSTATION

Supply, Unloading, Shifting at site, installation, testing and commissioning of 11 / 0.433 KV compact package sub station comprising 11 KV 400 A, 350 MVA SF6 breaker as incomer with dual core CT & PT of appropriate rating for metering and protection, with 500 KVA 11 / 0.433 KV Dry type cast resin transformer +/- 10 % off load tap change & LT panel consisting of 1 no.800 A 4 Pole manually operated air circuit breaker of 50 KA breaking capacity (ICU = ICS) with 1 no. of 160 Amp TP MCCB with 160 MAP. Capacitor Duty Contactor with Time delay relay with 50 KVAR MPP Heavy Duty Capacitor as outgoing. All ACB shall have Microprocessor based release 6.0 A unit with all kind of communicable accessories with metering as shown in the SLD . Package sub-station shall be complete as per specification. Metering must be as per the SLD. (Scope also includes all kind of testing before installation)

DRY TYPE TRANSFORMER

(a) ERECTION

Before erection of transformer, the level of rails on foundation shall be checked and minor corrections if necessary shall be carried out. After the completion of erection, necessary stoppers shall be provided at the wheels. All loosely supplied fittings / accessories shall be cleaned and mounted on the transformer and connections made. After completely assembling & installation, the transformer shall be cleaned and touched up with a paint supplied by the manufacturer applied wherever necessary. All cover bolts shall be checked for proper tightness. All the civil foundation work required shall be in the scope of contractor.

(b) TESTING :

Winding insulation resistance shall be measured from primary and secondary to ground and between primary and secondary. Check the polarity of terminals and the phase sequence.

(c) Proforma for transformer tests :

- Transformer name plate.
- Insulation resistance test with 1000 V meagre.
 - a) between primary to earth
 - b) between secondary to earth
 - c) between primary and secondary
- Operation of the tap changer.
 - Operation of the tap at tap No. 1
 - Operation of the tap at tap No. 2

Operation of the tap at tap No. 3

Operation of the tap at tap No. 4

Operation of the tap at tap No. 5

- Polarity marking and phase sequence.
- Earth resistance : Body as well as Neutral link.

[This proforma shall be jointly signed by the CLIENT / CONSULTANT and the contractor in duplicate].

18.1 11 KV H. T. Cable:

3 C x 240 sq.mm 11 KV XLPE cable (between metering panel room to HT panel and HT panel to transformers).

HV cables shall be tested upon installation with a 1000 V insulation resistance tested and the following readings established.

- i) Continuity on all phases.
 - ii) Insulation Resistance
 - a) between conductors.
 - b) all conductors and ground.
 - iii) High Potential Testing if required by the local electrical Inspectorate.
- For each lot of cables the Contractor shall supply a certificate issued by the manufacturer stating its original date of manufacture, constitution and standard to which it complies and the test certificate
 - Earthing values shall be measured with an approved earth meggar and shall be recorded.

19 Supplying and making H.T.outdoor type cable end connection for 11 KV XLPE cable including jointing materials of Heat shrinkable type, H.T. tape flux, suitable size Al. Crimping type lugs, brass cable glands of suitable size with ICC make para compound for 11 KV XLPE cable.

20 Supply, Installation, Testing and Commissioning of Control cable.

21 Supply, Installation, Testing and Commissioning of cable end termination.

22 Miscellaneous

22.1 Providing & erecting conventional type CO2 based fire extinguishers "Safex" or Approved make of 2.0 Kg.

22.2 Supplying & erecting automatic emergency light with maintenance free battery for 20 watts tube.

22.3 Supplying & erecting rubber mat of 1.1 KV 1000 x 2000 x 6 mm.

- 22.4 Supplying & erecting rubber mat of 1.1 KV 1000 x 2000 x 10 mm.
- 22.5 Providing & erecting danger notice board of 150 x 150 mm.
- 22.6 Providing printed instruction chart both in English & REGIONAL LANGUAGE & duly framed out on glass for treatment of person suffering from Electric shock, or should be laminated.
- 22.7 Providing the Various size Colour print of the Final Plan / SLD duly framed out on Glass for Electrical room & BMS Room.
- 22.8 SITC of various sizes PVC / DWC Pipes
- 22.9 Filling the necessary application to supply co. following up and getting the supply filling the necessary test report to the supply co. inclusive. All official fees including security deposits will be paid by the client and out of pocket expenses shall be of contractor.

23 TRANSFORMER

The scope includes supply, installation, testing & commissioning of 250KVA, 11000/433 volts ONAN Plinth 2 mounted outdoor type transformer with off Load Tap Changer and as per latest IS norms.

1	Make	-
2	KVA Rating	250KV A
3	HV Voltage	11000 Volts
4	LV Voltage	433 Volts
5	No. of Phases	3 (Three)
6	Frequency	50 Hertz
7	Type	Double Copper Wound, Oil Immersed
8	Installation	Outdoor
9	Cooling	Naturally Oil Cooled ONAN
10	HV Connection	Delta
	LV Connection	Star
	Vector Group	Dyn11
11	Tapping (on HV Side)	(+5%) to (-5%) in steps of 2.5%
12	Tap Switch	Off Circuit, Externally Operated

13	No Load Losses at Rated Voltage & Frequency	as per IS 1180
14	Load Loss at Rated Current & 75°C	
15	Impedance at 75°C	
16	(a) Regulation at U.P.F.	
	(b) Regulation at 0.8 P.F.	
17	Efficiency at 100% Load	
	75% Load	
	50% Load	
18	Temperature rise (in Oil)	
	Temperature rise (in Winding)	
19	Terminal Arrangement	
	HV Side	Cable box
	LV Side	Cable box
20	Reference Standard	IS 1180

(a) ERECTION:

Before erection of transformer, the level of rails on foundation shall be checked and minor corrections if necessary shall be carried out. After the completion of erection, necessary stoppers shall be provided at the wheels. All loosely supplied fittings / accessories shall be cleaned and mounted on the transformer and connections made. After completely assembling & installation, the transformer shall be cleaned and touched up with a paint supplied by the manufacturer applied wherever necessary. All cover bolts shall be checked for proper tightness. All the civil foundation work required shall be in the scope of contractor.

(b) TESTING:

Winding insulation resistance shall be measured from primary and secondary to ground and between primary and secondary. Check the polarity of terminals and the phase sequence.

(d) PROFORMA FOR TRANSFORMER TEST:

- Transformer name plate.
- Insulation resistance test with 1000 V meagre.

- a) between primary to earth
 - b) between secondary to earth
 - c) between primary and secondary
-
- Operation of the tap changer.
 - Operation of the tap at tap No. 1
 - Operation of the tap at tap No. 2
 - Operation of the tap at tap No. 3
 - Operation of the tap at tap No. 4
 - Operation of the tap at tap No. 5
 - Polarity marking and phase sequence.
 - Earth resistance: Body as well as Neutral link.

[This proforma shall be jointly signed by the CLIENT / CONSULTANT and the contractor in duplicate].

LIST OF APPROVED BRANDS (ELECTRICAL WORK)

S No	Item description	Specified make
1	Rigid PVC Conduit	BEC, Precision. Presto Plast, AKG
2	Accessories for conduit	Same make as of pipe
3	Flexible Copper Wires	FRLS type: Avocab/ Finolex/Polycab
4	Switches & its accessories	CLIPSAL (OPAL)/ Legrand (Mosaic)
5	MCCB/MCB/ELMCB/Iso/ SPDs & Accessories	Schneider/ L&T /Legrand (Lexic)/ Siemens/GE/ABB/Hager
6	Distribution Boards	Schneider / L&T /Legrand (Lexic)/D-MAK
7	Lighting Panel	Schneider / L&T /Legrand (Lexic)/D-MAK
8	PVC tape	Steel grip/ Anchor
9	LT Cables	Avocab/ RR Kabel/ Finolex/Polycab/ Anchor/, Havells/L&T
10	Glands: Double Compression type, Heavy duty and deep threading with rubber ring and double washers. (Sample to be approved)	HMI/ Comet
11	Cable Lugs	Dowels/ 3-D
12	Connectors	Elmex/ Connect-well
13	Light Fixture	Neri Lighting/ United Lighting Technology /K Lite/ /schneider/LED C4 Lighting /Litolux Lighting/Martin Harman/Keselec/Havells
14	Decorative Street Light Pole with Cast Iron Base.	Neri Lighting/ United Lighting Technology / K Lite/schneider/Martin Harman
15	Panel Fabricators (Metallic)	Only approved & registered system house of Schneider/ L&T/ CPRI Approved
16	Panel Fabricators (Thermoplastic)	Hensel/Spelsberg/Havell's/Legrand/Schneider, Siemens
17	Timer	Legrand/ Schneider
18	Raceway	MK (Ega)/ Legrand

S No	Item description	Specified make
19	DWC Pipes	Rex/ Dutron
20	UPVC Raceway	Legrand/ MK
21	HDPE Pipes	Rex/ Dutron
22	HDPE Pipes Spacers	Plastolin polymers

Make of various items offered by the tenderer shall clearly be marked in the above list. However, the final choice of the selection of particular make solely lies with Client / Consultant which shall mutually be agreed upon before finalization of order. If these brands is not available equivalent brand may be accepted after due approval of Authority

Material Specifications – Fire Fighting Works

1.0 FIRE PROTECTION SYSTEM:

1.1 SCOPE:

The scope of this section consists of but is not necessarily limited to supply, installation, testing and commissioning of the fire protection system. The philosophy of the system is as follows:

- a. The Fire Suppression System shall comprise the Fire Hydrants System, the Sprinkler System (Wet type) and Hand Appliances.
- b. Water from the underground 2 nos RCC Fire Water Storage Tanks, each of 100cum capacity, shall be supplied for the uses listed below.
 - i. Fire Hydrant System (Pressurised) both for the external hydrants, the internal landing valves and the hose reels at landings.
 - ii. Sprinkler System (Wet Type)
- c. The Hydrant System and the Sprinkler System, under normal conditions, shall be lowest pressurized by means of the electric motor driven Jockey Pump.
- d. The Sprinkler System shall be provided with an electric motor driven pump set.
- e. The piping and valve connections shall be done so that the water from the discharge of the Hydrant Pump sets is able to supply water, automatically to the Sprinkler System whenever, the Sprinkler Pump is unable to maintain the pressure or fails and not vice versa.
- f. The starting and stopping of the Jockey pump shall be automatic based on the pressure switches at preset low and high pressure.
- g. The electric motor driven Hydrant Pump starts automatically at a preset pressure by means of a pressure switch. As soon as the Hydrant Pump starts, the Jockey Pump Stops.
- h. The Hydrant Pump shall be stopped only manually.

- i. The Sprinkler Pump shall be started automatically at a preset pressure but shall be stopped only manually.
- j. Contractor shall ensure that all false ceiling voids greater than 800 mm are provided with sprinklers.
- k. Contractor shall ensure Hydro Testing for the complete system.
- l. The Contractor shall obtain the necessary approval of the drawings and the schemes from the local authority / TAC as called for. The contractor shall also take care of any other requirement so that insurance cover can be obtained, if required at minimum premium at a later date.
- m. The contractor shall design and after approval of Project Manager display near each staircase landing at floor levels, a glass covered framed floor plan clearly showing the locations of all landing valves, hose reels, hand appliances, as well as the DO's and DON'T's for the personnel and the exit direction in case of an emergency. The dimensions of the floor plan, its scale, lettering size, colour scheme etc shall be as directed by the EIC.

GENERAL REQUIREMENTS

All materials shall be of the best quality conforming to the specifications and subject to the approval of the Engineer in charge.

Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

Pipes shall be securely fixed to walls and ceilings by suitable clamps and supports (galvanised after fabrication) at intervals specified. Only approved type of anchor fasteners shall be used for RCC slabs and walls / floors etc.

Valves and other appurtenances shall be so located that they are easily accessible for operations, repairs and maintenance.

Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workman like manner.

Pipe accessories such as gauges, meters, control devices, etc. shall have the same working pressure rating as the associated pipe work. All pipe work shall be free from burrs, rust and scale and shall be cleaned before installation. All personnel engaged on welding operations must possess a certificate of competence issued by an acceptable / recognized authority.

This system includes the following but not limited to these.

- Piping material and installation
- Pipe fittings
- Pypkote / Coatek Application
- Jointing
- Air vessels

- Air cushion tank
- Fire Brigade connection
- System drainage
- Valve chambers
- Valves
- Pressure switch
- Pressure gauge
- Anchor & Thrust Blocks
- Fire Hydrants
- Hand held Fire Extinguishers
- ABC Type Dry Powder Extinguisher
- Water type Extinguisher
- Carbon dioxide Extinguisher
- Fire pumps and allied Equipment's

1.2 APPLICABLE CODES AND STANDARDS

All equipment, supply, erection, testing and commissioning shall comply with the requirements of Indian Standards and code of practice given below as amended up to the date of submission of Tender. All equipment and material being supplied shall meet the requirements of BIS and other relevant standard and codes.

IS 636	:	Non – percolating flexible fire fighting delivery hose
IS 903	:	Specification for fire hose delivery couplings, branch pipe nozzle and Nozzle spanner
IS 904	:	Specification for two – way and three way suction collecting head for Firefighting purpose
IS 901	:	Specification for couplings, double male & double female nstantaneous pattern for firefighting purpose
IS 940	:	Specification for portable fire extinguisher water type (gas cartage)
IS 2171	:	Specification for portable extinguisher, dry powder
IS 2878	:	Specification for fire extinguisher, carbon dioxide type
IS 3582	:	Specification for basket strainer for firefighting purpose
IS 4927	:	Specification for unlined flex canvas hose for firefighting purpose
IS 5290	:	Specification for hydrant valve (Landing valve)
IS 13849	:	Specification for portable fire extinguisher (Dry powder type)

IS 14609	:	Specification for ABC dry powder for fire fighting
IS 884	:	Specification for first aid hose reel for firefighting purpose
IS 11101	:	Specification for extended branch pipe for fire brigade use
IS 14846	:	Specification for gate valve
IS 1239 / 3589	:	G.I. Pipe / M.S. pipe
BS 5155/ IS 13095	:	Butterfly valves
IS 5312/API 594/598	:	Non Return valves
IS 778	:	Gun Metal valves
IS 6595 / 12469	:	Pumps
IS 325	:	Motors
IS 10001 / 10002	:	Diesel Engine
IS 10221	:	Coating / wrapping of underground M.S. Pipe
BS 336	:	Specification for hydrant, standpipe for fire fighting
NBC	:	National Building Code -2005
NFPA 13	:	Sprinkler System
NFPA 14	:	Stand Pipe System

List of Makes**Item List with Make (Civil Work)**

Sr.No.	Item	Brands
1	Concrete Work: PCC or RCC	
a	Cement	Ambuja, Ultra Tech, ACC, Siddhi, JK Laxmi, Binani, Jaypee, Birla super, Raajshree, Vasavdatta
b	TMT Reinforcement Bar Fe - 415 or Fe - 500/500D	Tata, SAIL, VIZAG, RINL, Jindal Confirming to IS - 1786:1985 (reaffirmed 2004) or IS 432 Part -I & II : 1982)
c	Sand	As per Mix design for concrete work or zone-II. For Masonary and plaster work zone - III
d	Concrete Additive, admixtures	Sika/ STP/CICO/Pidilite/ Fosroc/Fairmate/ MC Bouchemie
e	Precast RCC utility channels	Fuji Silver tech or equivalent brands as approved by Engineer - in - Charge
f	Water Proofing Compounds, Plasticizer, Super Plasticizer, Grouts, Polymers, Polyexpanse, Other construction.	ChowguleKoster, Fosroc, Sika, Huntsman (Ciba Geigy), Sunanda Specialty Coating, Shivalik Agro Poly Product Ltd.(Water Proofing liner).
2	Masonry Work	
a	Brick Masonary	Having crushing strength not less than 35 Kg/ Sqcm of Localy Available
b	Aerated Light Weight Concrete Block Masonary (AAC Block Masonary)	Xtralite from Ultratech, Aerocon, Cyporox, Magicrete, Ecolight
c	AAC block joining mortar	Fixoblock xtralite from Ultratech, Smartfix from Aerocon, MYK Laticrete, Ardex Endura
3	Structural Steel Work	
a	Structural Rolled Steel sections-beams (all forms of sections including all ISMB, ISWB H-section, Universal Column/beam), channels, tee, flats, angles, bars(round,	Tata, SAIL, RINL, Jindal

Sr.No.	Item	Brands
	square, hexagonal)	
b	Structural Hollow steel sections (Square & Rectangular)	Tata, Asian, Jindal, Surya, Appolo
c	Structural tubular sections	Tata, Asian, Jindal, Surya, Appolo
d	Pressed Steel Doors Frame	West Wind Concepts Pvt. Ltd., Gurgaon/ Shiva Steel Pvt. Ltd. , NOIDA/ AGEW Steel Manufacturing, Ahmedabad/ Sukri/ Godjej/ Gurdian/ Navair
4	Wood Work (Door, Window & Interior)	
a	Teak Wood	Ghana, Nagpur (Indian Teak)
b	Sal Wood	Indian or Imported (First Class)
b-1	Canadian/Malaysian wood	Imported (First Class)
c	Flush Door (decorative / non decorative)	Green, Duro, Century, Swastik, Kit Ply, Anchor, Uniply, Archid ply, Bhutan Board, Hindustan Board/equivalent.
d	Ply Wood	
	Plywood/Block Board/ Soft Board	Anchor, Duro, Merino, Century, Kitply
	Shuttering plywood	Kitply, Anchor, Green, Pragati, Mayur.
	Water proof/Marine grade plywood as per – IS – 710 (BWP)	Green, Archid, Kitply, Anchor, Uniply
	Commercial Plywood – IS – 303 (BWR)	Green, Archid, Kitply, Anchor, Uniply.
e	Decorative ply (Veneer)	Green, Durian, Century, Archid
f	Natural Veneer	Timex, Durian, Century Ply
g	MDF	Nuwood, Duratuff (exterior grade only)
h	Prelam particle board	Novapan, Anchor, Merino, Bhutan. (exterior grade only)
i	Laminate sheet	Duro/ Century/ Greenlam/ Formica/ Decolam/

Sr.No.	Item	Brands
		Euro, Sungolss, Sunmica, Backelite hylem
j	Liquor /Melamine /PU polish	MRF, Asian, ICI, Taralac
k	Wooden Adhesives	Fevicol, Blue coat, Araldite, Pidilite, Dunlop.
5	Aluminum Work (Door, Window & Interior)	
a	Aluminium Sections	Jindal, Indian Aluminium section, Hindalco (Indal), Banco, Royal touch, Jindal, Hindalco, Bhoruka, Pankaj, Alufit, Gulf extrusion.
b	Aluminium finish	
	Interior works	Super durable powder coated (Akzonobel, Jotun, Fuller AG)
	Façade exteriors	PVDF finish (Valspar, PPG, Akzonobel)
	Non visible surface	Chromatizing
c	Aluminum Window Locks , Handle, Friction Stays	Alualpha, Securestyle, Giessee, Roto, Geze, Savio, Frikstay, Kich, Orbit
d	Oxidised Aluminum Fitting	Dorma, Ebco, Doorline, Classic ,Kich, Orbit
e	Aluminum Operable Louvers	Technal, Domal
f	Anodising	Bhoruka alum, Alufit alum, Ajit India, Alufin
g	Gasket of infill panel for Aluminum	Amee Rubber, Gold Seal, Osaka rubber, Maharashtra Polymer, Maharashtra Tyre & Rubber Industries.
h	Rough ground for Aluminum works	IS 710 ply, 6mm to 8mm thick or Ghana teak.
6	Compact sheet	Alfiaca, Sundek, Vir, Bloom, Formica, Merino
7	Cement bonded particle board	Shera ,NCL (Bison board), Everest (Eternite).
8	Calcium silicate board / Gypsum Board.	Saint Gobain (India Gypsum), Hilux ,Lafartz, Aerolite.
9	Dead Locks/ Mortise locks/Narrow stile dead	Kich, Dorma, Dorset, Yale, Godraj, Enerite, Sigma, Opel, Doorset, Europa

Sr.No.	Item	Brands
	locks/ Tubular locks	
10	Glass Work	
a	Float Glass / Wired Glass, Mirror	Modi Guard, Saint Gobain, Float Glass India Ltd., Asahi, HNG.
b	Reflective Glass	Saint Gobain, PPG, Asahi, Emirates, Pilkington, Sejal.
c	Glass Processor For HS/HT, Bulletproof, DGU, Toughness, lamination etc.	Impact Safety, Sejal, Glasstech, GSC, Asahi, FG Glass, Goldplus, Emirates
11	Tile Work	
a	Precast Terrazo Tiles (Mosaic)	Royal (Rajkot) ,Alcock, Vyara, Nitco
b	Ceramic Tiles	Asian, Euro, Bell Ceramic, Johnson, Somani, Nitco, Kajaria, Restiles, Varmora.
c	Glazed Tiles	Asian, Euro, Bell Ceramic, Johnson, Somani, Nitco, Kajaria, Restiles, Varmora.
d	Vitrified Tiles	Asian, Euro, Bell Ceramic, Johnson, Somani, Nitco, Kajaria, Restiles, Varmora, Pavit
e	Glass Mosaic	Bisazza, Palladio, Italia
f	Paver Block	Vyara, Basant Betton, Pavit, Pavcon
g	Grass Paver Block	Amdavad Enviro, Pavcon
h	Non-Metallic Floor Hardener	Ironite, Fosroc, STP, CICO, SIKA
i	Cement Concrete Tiles Designer Tiles	Ultra, Eurocon, Nitco, Modern Tiles Group of Industries
j	Tile Adhesives & Grouting material	BAL, Laticrete, Kerakoll
k	Ethylene propylene diene monomer rubber (EPDM) flooring	Ecoflex, Koochieplay, Ebaco
12	Paint Work	

Sr.No.	Item	Brands
a	Paint, Primer, Putty	Johnson & Nicholson, Asian, Berger, ICI, Birla (putty), JK (Putty) Nerolac
b	Synthetic Enamel Paints	Berger, Asain, Nerolac, Duco
c	Acrylic Distemper	Asian, Berger, Nerolac
d	Cement Paint	Snowcem Plus, Berger, Nerolac
e	Plastic Emulsion Paint/ PU/Epoxy paint	Asian, Nerolac, Berger, ICI, Jotun
f	Low VOC Paint/ Emulsion Paint	Asian, Nerolac, Berger, ICI, Jotun
g	Texture External Plaster	Spectrum, Coral, Terre Palette
h	Heritage Surface Texture	Bakelite Hylam
14	ACP (Aluminium Composite Panel)	Alu Décor, Flexibond, Durabuild, Indobond, Alstone, Viva, Eurobond
15	Construction Chemicals (Plasticisers, Bonding agents, SBR Latex, Micro Concrete)	BASF, Fosroc, Sika India Pvt. Ltd., CICO Tech Ltd., MC Bauchemie, Sunanda chemicals, Pidilite
16	Water Proofing Chemicals	
a	Chemical Water proofing & Integral water proofing compound	Chryso, CICO, Fosroc, Kryton, Sika, Dr. FIXIT, Plastocrete plus, F Airmate, Pidilite Ind Ltd
b	Crystalline water proofing	Penetron or Kryton
17	Silicon Sealant/ Silicon Paint	Sika, Wacker, Dowcorning, GE, Soudal, Bostik, Chryso
18	Polysulphide Sealant	Pidilite, Chawksey
19	P.U sealant	Sika (Exterior grade - UV resistant)
20	PVC Water Stop	Arti Cables Baroda, Fixopan, Maruti
21	Door Window Hardware	Kich, Dorma, EPPW, Palladium, Magnum
22	Floor Spring	Dorma, Mab, Hafle, Doorset, Everite, Omega, Hardwyn

Sr.No.	Item	Brands
23	Hydraulic Door Closer	Dorma, Yale, Hafle, Hardwyn, Trium, Everite,Hyper
24	Pre-coated Steel Roofing/ Walling Sheets 550 Mpa	Tata Bluescope, Interarch, Nippon Dendro (poly steel) Shree Precoated (Meta color)
25	Polypropylene Fibers	Nina Concrete, Reliance
26	Fire Door	Shaktimat, AGEW, Radiant
27	PVC Door	Rajshri, Sintex
28	Anchor Fasteners	Axel, Hilti, Fischer, Kundan, Mungo, Corroshield, Buildex
29	Spandrel Insulation	Glass Wool
30	Wool Felt/Weather Strip	Anand, Reddiplex Ltd.
31	Stainless Steel Railing/ Fittings	D Line, Dorma
32	Rust Remover/Converter	Feovert (Krishna Conchem), Roff Rust Clear (Pidilite Industries)
33	Non-shrink General Purpose Grout	Fosroc, BASF
34	Anchoring Chemical for Rebar Dowell Bar	Hilti, Fischer, Axel
35	Roll Down Mosquito Curtain	Netmos
36	SS clamps for cladding	Hilti, Axel.
37	MS Rolling Shutter	Sona, Sagar, Suryoday, Gandhi, standard, swastik, shudhwar
38	Pre-cast RCC /Glass fiber reinforce street furniture	TDW Ahmedabad, Arya Precast Ahmedabad
39	Play /Gym equipments	Ok Play, Play Global, Koochie, Arihant
40	Street/ Building signages from Corten steel/ SS steel	Capsicum Wall ideas, Colourzone marketing, Chunilal Gandhi & Co.
41	Concrete Sphere bollard s	Swaraj Secutech, New tech automation
42	Tensile roof structure	Divya Structure, Solanki Engineering works, Vintex tensile solutions

Sr.No.	Item	Brands
List Of Approved Makes For Water Supply And Sanitary Works		
1	Vitreous China Sanitaryware	Jaquar, Hindware, Parryware, Cera, Kohler
2	Plastic W. C. Seat Cover	Jaquar, Hindware, Parry ware, Cera, Kohler, Commander
3	Stainless Steel sinks	Nirali, Jayna, Kingston, Neelkanth, Johnson, Prestige, Parry, Franke, Salem
4	C. P. Fittings & Accessories	Jaquar, Hindware, ESCO, Parco, Cera, MARC, PLUMBER
5	Ultra Violet Water Purifier	Alfa Waterpurifiers, Eureka Forbes
6	Hydro pneumatic System and Water Supply Pumps	Wilo, Grundfos, Calpeda
7	G. I. Fittings	RV' & 'R' Mark, Unik, DRP, UNCO, R BRAND, UNIK, ZOLOTO, TATA, BANSAL OR EQUIVALENT.
8	G. I. Pipe/M. S. Pipes	Tata, Jindal, Prakash, Zenith, Surya, Asian, Gujarat Steel Tube, Bansal
9	C. P. V. C. Pipes & Fittings	Astral, Supreme, Prince, Ashirvad, Finolex
10	U. P. V. C. Pipes & Fittings	Astral, Supreme, Prince, Ashirvad, Finolex
11	P. V. C. Pipes & Fittings	Astral, Supreme, Prince, Ashirvad, Finolex, Garware, Kissan
12	Gun metal valves	Zoloto, L&T, Leader, Sant, L&K, Premier, Aatco, VTC
13	CI Sluice Valves, Check valves	Kirloskar, IVC, Burn, William Jacks, Indian
		Valve(IVC), Advance, Leader, VTC
14	Ball Cocks/ BALL VALVES (Brass)	GPA, Sant, L&T, L&K, AUDCO, ZOLOTO ,LEADER, VTC
15	UPVC Bore well Column pipe	Astral, Supreme, Prince, Ashirvad Pipes, Duke, Kissan, Precision
16	HDPE Pipes	Duralinr, Penwalt Agru, Nocil, Jain, Supreme.

Sr.No.	Item	Brands
17	Fiber reinforced R.C.C. Manhole Cover/ grating	Pratibha, CIDCO, THERMODRAIN,
18	C. I. Manholes Covers and Frames	Ashok Iron , Raj, Neco, R. I. F., B. C., Neer, GMGR Approved ISI Marked
19	Submersible Drainage Pumps	Wilco, Grundfos, Mather & Platt, Calpeda
20	Liquid Level Controllers Liquid Level Indicators	Hema, Minilec, Radar, TECHNIKA
21	Bore well Pump	Wilco, Grundfos , KSB, Calpeda
22	Mirror	Modi, Asahi, Saint Gobin
23	Drinking Water Cooler	Usha. Bluestar, Voltas
24	Chlorine Dosing System	Toshcon, Chloromax, Astalm
25	Seat Cover (heavy duty)	Cera, Parryware, Somany, Jaquar
26	Butterfly Valve	AUDCO/ZOLOTO/ INTERVALVE/VTC
27	Gunmetal Non Return Valve	Leader, Audco, Zoloto, AIP, Sant, VTC
28	Water Meter	Kranti, Sant, Kapstan Bombay, Voltas Kent, Calcutta
29	P.V.C. / H.D.P.E Water Tanks	Syntax, Reno, Ashirvad Pipes,Purvee,Kaveri, KAKA
30	SWR Pipe	Astral, Supreme, Prince, Finolex, Ashirvad Pipes, Jain, Kisan/KSR
31	Copper Pipe	IBP-Neco, Rajco
32	Hot Pipe Insulation	Armacel, Champion & Charminar, ARMAFLEX, THERMAFLEX
33	RCC Hume Pipe and Fittings	Patel Hume Pipes, Alcock, Indian Hume Pipe, PRANALI/ JK
34	Polyethylene Composite Pressure Pipe	KITEC/ASTRAL
35	Stoneware Pipes & Fittings	Mahavir, Taya & Unique

Sr.No.	Item	Brands
36	Pump Set	KSB, Kirlosker, Wasp, Crompton, Beacon, Grundfos, Beacon
37	PRESSURE REDUCING VALVE	ZOLOTO/ HONEYWELL
38	FOOT VALVE	ZOLOTO/ SANT
39	UNDER GROUND DRAIN PIPE	D-Rex/ Ashirvad(Foam core)/ Astral
40	STRAINER	ZOLOTO/ SANT
41	AIR RELEASE VALVES	VARIES, HONEYWELL, VB
42	BALL FLOAT VALVE	PRAYAG/ BEE
43	HDPE OVERHEAD TANK	SINTEX/ KAKA

NOTES:

Make of various items offered by the tenderer shall clearly be marked in the above list. However the final choice of the selection of particular make solely lies with Client / Consultant which shall mutually be agreed upon before finalization of order.

Approval must be needed for the all material; sample will be submitted to consultant along with detail catalogue.

Make of any other items required but not specifically mentioned shall be got approved by Client / Consultant.

LIST OF APPROVED MAKES FOR ELECTRICAL WORKS

Sr. No	Item Description	Specified Make
1	Rigid PVC Conduit	ISI & FIA approved & manufactured from virgin material, Vraj/ Precision
2	Accessories for conduit	Same make as of pipe
3	Flexible Copper Wires	FRLS type: Avocab/ Finolex/Polycab
4	Switches & its accessories	CLIPSAL (OPAL)/ Legrand (Mosaic)
5	Fan Box	Maxell
6	Switch fuse Units 60 Amps -AC 23 duty	L&T/ Schneider/ L&T
7	HRC Fuses	Schneider / L&T/ Indo-Asian.

Sr. No	Item Description	Specified Make
8	MCCB/MCB/ELMCB/Iso/ SPDs & Accessories	Schneider/ L&T /Legrand (Lexic)/ Siemens/ GE/ABB/Hager
9	Distribution Boards	Schneider / L&T /Legrand (Lexic)/
10	PVC tape	Steel grip/ Anchor
11	LT Cables	Avocab/ RR Kabel/ Finolex/Polycab/ Anchor/, Havells/L&T
12	Glands: Double Compression type, Heavy duty and deep threading with rubber ring and double washers. (Sample to be approved)	HMI/ Comet
13	Cable Lugs	Dowels/ 3-D
14	Industrial Plug-socket	Legrand/ Indo-Asian
15	Connectors	Elmex/ Connect-well
16	Button holder, Angle Holder, ceiling rose	Anchor/ CPL
17	Multi-Function Meter	Schneider/ El Measure
18	Light Fixture	Simes, Neri, Ligman, Erco, Zumtobel, K-Lite/ Ligman/ Schreder, Havell's/ Bajaj/ Wipro (Sample to be approved from the Electrical Consultant) (all the Tube Lights shall be of 5star rating of BEE)
19	Ceiling Fans	Crompton/ Bajaj (all the Fans shall be of 5star rating of BEE & High Speed + type / equi.)
20	High end outdoor illumination	Simes, Neri, Ligman, Erco, Zumtobel. All outdoor illumination fixture to be minimum IP 67 and above.
21	For general lighting: Decorative Street Light Pole with Cast Iron Base.	Neri Light, K-lite, Ligman, Kesselec Scheder, Havell's, Bajaj. Illumination fixture to be minimum IP 65 and above.
22	Exhaust Fan	Crompton/ Almonard
23	Call bell	Anchor Ding Dong type
24	Cable Tray	Indiana/ Power Control/ M.M. Engg

Sr. No	Item Description	Specified Make
25	Panel Fabricators (Metallic)	Only approved & registered system house of Schneider/ L&T/ CPRI Approved
26	Panel Fabricators (Thermoplastic)	Hensel/Spelsberg/Havell's/Legrand/Schneider, Siemens
27	Anchor Fasters	Hilti
28	On Load Changeover	L&T/ Schneider
29	Meters(V,A,PF etc)	AE/ RISHABH/ EIMeasure
30	Timer	Legrand/ Schneider
31	Raceway	MK (Ega)/ Legrand
32	LT CT	KAPPA/ AE
33	DWC Pipes	Rex/ Dutron
34	Control Cables	Avocab/ Polycab
35	HT Breaker	Schneider/ Crompton
36	UPVC Raceway	Legrand/ MK

Note: - The Engineer-in-charge, reserves the right to add or delete any materials and Brands in the list of approved materials/brands.

LIST OF APPROVED MAKES FOR FIRE FIGHTING WORKS

S.NO.	DESCRIPTION	MAKES
	Wet Riser/Fire Hydrant/Sprinkler System/Fire Extinguishers:	
1.	Fire Pump	Wilo/ Kirloskar / Grundfos
2	Main Control Panel (All electrical components)	Siemens/L&T
3.	M.S. Black/G.I Pipes	Tata/Jindal Hissar
4.	Forged Fittings	V.S. Engg./J.K. Forging/Rapidrop
5.	Malleable Iron Fittings	Crescent/ 'R' Brand/Rapidrop
6.	Butterfly Valve	Audco/ Advance/ Intervolve/ Kirloskar/ Raidrop
7.	Non Return Valves (CI)	Audco/ Advance/ Intervolve/ Kirloskar/

S.NO.	DESCRIPTION	MAKES
		Rapidrop
8.	Landing Valves	Newage/ Aaag/Swati/ Safex
9.	Fire Brigade Inlets	Newage/Aaag/Swati/Safex
10.	F.A. Hose Reel (Drum and Bracket)	Newage/Aaag/Swati/Safex
11.	Rubber Hose for above	Dunlop/Newage
12.	G.M. Gate/Globe/Check Valves	Leader/Zoloto/Sant
13.	Flax Canvas Hose	Indian Rayon/Newage
14.	C.P. Hose	Indian Rayon/Newage
15.	R.R.L Hose	Indian Rayon/Newage
16.	Hose Couplings Branch Pipe & Nozzles	Minimax//Newage/Indian Rayon (G.M.)
17.	Pressure Switches	Danfoss/Switzer/Indfoss
18.	Pressure Gauge	H. Guru/Fiebig
19.	Quartz Bulb Sprinkler Head	Tyco/HD/Vikings/Rapidrop
20.	Alarm Valve and Hydraulic Alarm Motor with GONG	Viking/HD
21.	PVC insulated and PVC Sheathed Aluminium Conductor Armoured Power Cable of 1.1 K.V. Grade	Polycab/Gloster/National
22.	Flow Switch	Potter/System Sensor
23.	Water Type (Gas Pressure): Portable Extinguishers	Minimax/Ceasefire /Firex
24.	CO2 Portable and Trolley: Mounted Extinguishers	Minimax/Ceasefire /Firex
25.	Portable ABC-Powder Type: Fire Extinguishers	Minimax/Ceasefire /Firex
26.	Anticorrosive Tape (Pypkote)	IWL India Limited
27.	Welding Rod	Advani
28.	Anchor Fasteners	Fischer, Hilti.

LIST OF APPROVED MAKES (IRRIGATION WORKS) IN ORDER OF PREFERENCE

S.NO.	DESCRIPTION	MAKES
1.	G.I. & M.S. PIPES	JINDAL/ TATA/ APL APOLLO / SURYA PRAKASH
2.	G.I. FITTINGS (Malleable CAST IRON)	UNIK/ ZOLOTO'M'/ DRP'M'
3.	GUNMETAL VALVE (Full way, check and globe valves)	LEADER/ ENOLGAS/ SANT
4.	CAST IRON NON RETURN VALVES (Swing check type reflux valve)	KIRLOSKAR/ IVC/ ADVANCE/ INTERVALVE/ SANT
5.	IN LINE DRIPPER	HUNTER/ TORO/ K RAIN/ JAIN/ EURO DRIP
6.	SLUICE VALVES	KIRLOSKAR/ IVC/ KSB/ AUDCO
7.	FLOAT VALVE (gunmetal) up to 50mm	LEADER/ SANT
8.	FLOAT VALVE (C.I) 50mm and above	IVC/ LEADER/ DANFOSS
9.	P.V.C. PIPES Class	SUPREME/ FINOLEX/ POLYPACK/ JAIN
10.	ROTORS	HUNTER/ TORO/ NELSON
11.	DUCTILE IRON PIPES & FITTINGS	ELECTRO STEEL/ JINDAL SAW/ KESORAM
12.	POLY PROPYLENE PIPES	JAIN/ SUPREME/ FINOLEX/ AMITEX
13.	HDPE PIPES & FITTINGS	JAIN/ SUPREME/ FINOLEX/ ORIPLAST
14.	BUTTERFLY VALVES	LP,KARTAR/ IVC/ KIRLOSKAR
15.	AIR RELEASE VALVES	BERMAD/ IVC/ ENOLGAS/ ACCUTECH/ AUDCO
16.	PRESSURE RELIEF VALVES	BERMAD/ LEADER/ HONEYWELL/ DANFOSS/ SANT/ ENOLGAS
17.	WATER METERS	BE METERS/ ROCKWIN
18.	VALVE BOXES	ECOAQUA/ECORAIN/ APPLIED ENGG/ SUPREME/ CARSONS
19.	EPDM GASKETS & RUBBER 'O' RINGS	DURABLE/ PRABHAT/ AMALGAMATED/ J.D.Rubber/ APP

S.NO.	DESCRIPTION	MAKES
20.	R.C.C PIPES	Aggarwal Spun Pipe/ Pragati Concrete Udyog/ Jain Spun Pipe/ Daya Spun
21.	PRECAST MANHOLE COVERS (SFRC)	KK Manhole & Co., Pragati etc.
22.	PLASTIC ENCAPSULATED STEPS	KGM, KK India
23.	DUCTILE IRON MANHOLE COVERS	CRESENT/ RIF/ BIC
24.	SOLENOID VALVE (Nylon Reinforced Plastic)	HUNTER/ TORO/ NELSON
25.	LOW VOLTAGE CABLE (Direct Burial Type)	MACROTHERM
26.	LOW VOLTAGE WIRE CONNECTOR (with grease & closure Cap)	3M, HUNTER
27.	PUMPING UNITS (WITH VFD, PLC etc.)	KIRLOSKAR/ GRUNDFOS/ ITT/ DP HOLLAND/ KSB/ MATHER & PLATT
28.	CHLORINATORS	-
29.	BLEACHING POWDER & PAC	-
30.	IRRIGATION CONTROLLER (with pedestal)	HUNTER/ TORO/ NELSON/ MOTOROLA
31.	PVC SOLVENT CEMENT & PIPE CLEANER	TANGIT/ PARABOND
32.	PE PIPES (LLDPE)	RAIN BIRD/ TORO/ HUNTER/ K RAIN/ JAIN
33.	QUICK COUPLING VALVES (BRASS)	RAIN BIRD/ TORO/ HUNTER/ K RAIN
34.	BUBBLERS & EMITTERS (PC)	HUNTER/ TORO/ NELSON/ K RAIN
35.	CENTRAL CONTROL SYSTEM(with CPU, Monitor, Printer, BMS compatible)	RAIN BIRD/ TORO/ HUNTER/ K RAIN
36.	MANUAL SCREEN FILTERS (SS 316 L)	JAIN/ FINOLEX/ KIMPLASS/ ORIVAL

Schedule E **Applicable Permits**

(See Clause 3.1.7(a))

1 Applicable Permits¹⁶

1.1 The Contractor shall obtain, as required under Applicable Laws, the following Applicable Permits:

- (a) Permission of the UT of Dadra and Nagar Haveli and Daman and Diu/ State Government of Gujarat for extraction of boulders from quarry;
- (b) License from inspector of factories or other competent Authority for setting up batching plant;
- (c) Clearance of Pollution Control Board for setting up batching plant;
- (d) Clearance of Village Panchayats and Pollution Control Board for setting up asphalt plant;
- (e) Permission of Village Panchayats and UT of Dadra and Nagar Haveli and Daman and Diu / State Government of Gujarat for borrow earth; and
- (f) Any other permits or clearances required under Applicable Laws.

1.2 Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority in accordance with the provisions of this Agreement.

Schedule F Form of Bank Guarantee

(See Clauses 7.1.1, 7.5.3 and 19.2)

Annex-I

(See Clause 7.1.1)

Form of Guarantee for Performance Security

.....,

.....,

.....,

WHEREAS:

(A) (insert name and address of the contractor)

(hereinafter called the "Contractor") and (insert name and address of the project authority), (hereinafter called the "Authority") have entered into an agreement (hereinafter called the "Agreement") for the construction of the "Design, Construction, Operation & Maintenance of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu including Operation & Maintenance in Defects Liability Period of Five (05) Years" on Engineering, Procurement and Construction (the "EPC") basis, subject to and in accordance with the provisions of the Agreement

(B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the Construction Period and Defects Liability Period (as defined in the Agreement) in a sum of Rs..... cr. (Rupees crore) (the "Guarantee Amount").

(C) We, through our branch at (the "Bank") have agreed to furnish this bank guarantee (hereinafter called the "Guarantee") by way of Performance Security.

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

1. The Bank hereby unconditionally and irrevocably guarantees and undertakes to pay to the Authority upon occurrence of any failure or default in the due and faithful performance of all or any of the Contractor's obligations, under and in accordance with the provisions of the Agreement during the {Construction Period/ Defects Liability Period} on its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank of a Chief Executive Officer of the Authority that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfilment and/ or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfilment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on.....\$. Unless a demand or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

[§] Insert date being 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 7.2 of the Agreement).

- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Annex – II

(Schedule - F)

(See Clause 7.5.3)

Form of Guarantee for Withdrawal of Retention Money

.....,

.....,

.....,

WHEREAS:

- (A) (insert name and address of the contractor) (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with the (insert name and address of the project authority), (hereinafter called the “**Authority**”) for the construction of “**Design, Construction, Operation & Maintenance of Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu including Operation & Maintenance in Defects Liability Period of Five (05) Years**” on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement.
- (B) In accordance with Clause 7.5.3 of the Agreement, the Contractor may withdraw the retention money (hereinafter called the “**Retention Money**”) after furnishing to the Authority a bank guarantee for an amount equal to the proposed withdrawal.
- (C) We, through our branch at (the “**Bank**”) have agreed to furnish this bank guarantee (hereinafter called the “**Guarantee**”) for the amount of Rs. cr. (Rs. crore) (the “**Guarantee Amount**”).

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

1. The Bank hereby unconditionally and irrevocably undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of a Chief Executive Officer of the Authority, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for under and in

accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Retention Money and any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Retention Money.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect 90 (ninety) days after the date of the Completion Certificate specified in Clause 12.4 of the Agreement.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to

do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code

Number)

(Address)

NOTES:

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

Annex – III

(Schedule - F)

(See Clause 17.2)

Form of Guarantee for Advance Payment

.....,

.....

, WHEREAS:

(A) (insert name and address of the contractor)

(hereinafter called the “**Contractor**” has executed an agreement (hereinafter called the “**Agreement**”) with the (insert name and address of the project authority), (hereinafter called the “**Authority**”) for the construction of the “**Design, Construction, Operation & Maintenance of Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu including Operation & Maintenance in Defects Liability Period of Five (05) Years**” on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement

(B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest free advance payment (herein after called “**Advance Payment**”) equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in three instalments subject to the Contractor furnishing an irrevocable and unconditional guarantee by a scheduled bank for an amount equivalent to 110% (one hundred and ten per cent) of such instalment to remain effective till the complete and full repayment of the instalment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of

{first/second/third} instalment of the Advance Payment is Rs..... cr. (Rupees crore) and the amount of this Guarantee is Rs cr. (Rupees crore) (the “**Guarantee Amount**”)¹.

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

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and

¹ The Guarantee Amount should be equivalent to 110% of the value of the applicable instalment.

affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid instalment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of a Chief Executive Officer of the Authority, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the instalment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on^{\$} Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:
(Signature)

(Name)
(Designation)
(Code Number)
(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

(ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

§ Insert a date being 90 (ninety) days after the end of one year from the date of payment of the Advance payment to the Contractor (in accordance with Clause 19.2 of the Agreement).

Schedule G Contract Price Weightages

(See Clauses 7.1 and 17.2)

1.0 The Contract Price for This Agreement is INR..... Break up is attached an annexure to the Price Bid Letter.

2.0 Proportions of the Contract Price for different stages of Construction of the Project be as specified below;

S.No	Item	% of weightage in the contract price	Stage for Payment	% of weightage	Measuring Unit	Procedure for estimating the value
1	Dismantling, Excavation & Filling	3%	Dismantling and demolishing	23%	Sqm	Payment shall be made on completion of a stage on pro rata basis in all aspects for a minimum length of 500mts.
			Excavation	37%	Sqm	
			Filling and Compacting	40%	Sqm	
2	Road Works	10%	Sub Base (Sub grade)	3%	Sqm	Payment shall be made on completion of a stage on pro rata basis for minimum length of 500mts. For example, if the total length of work to be done is L km and full width (W) mtr. as per cross section, the cost per sqm of work shall be determined as follows; Cost per sqm of work = P x weightage for road work x weightage for work x weightage of particular items x L x W P= Contract Price; L = Total length of work in km; W = width as per cross section
			Base courses such as (GSB)	23%	Sqm	
			Base courses such as (WMM)	12%	Sqm	
			Bituminous Work (DBM, Prime coat, Tack Coat, BC)	28%	Sqm	
			Kerb (median kerb, junction & Island kerb)	10%	Rmt	
Road furniture (Benches , Bus Stops, Bollards, Dust bins, signboards, Thermoplastic paint marking,	23%	Nos				

S.No	Item	% of weightage in the contract price	Stage for Payment	% of weightage	Measuring Unit	Procedure for estimating the value
			pavement markers etc)			
3	Paving & Flooring	21%	PCC	16%	Sqm	Payment shall be made on completion of a stage on pro rata basis in all aspects for a minimum length of 500m
			Cycle Track	10%	Sqm	
			Granite Cobble stones, Paver Blocks & Tiles and flooring works	35%	Sqm	
			Rajula Cobble stones	39%	Sqm	
4	Civil, Wooden and steel works	30%	RCC works (Retaining walls at other location, parapet wall, jacketing & widening of culverts etc.)	39%	Rmt	Payment shall be made on completion of a stage on pro rata basis in all aspects for a minimum length of 200mts
			Retaining walls in Tidal condition	48%	Rmt	
			Plastering Works	5%	Sqm	
			Wood and Cortern steel works	8%	Sqm	
5	Storm Water Drainage	7%	Base layer including sand bed and PCC	2%	Rmt	Payment shall be made on completion of a stage on pro rata basis in all aspects for a minimum length of 200mts
			Laying Precast Drain and Saucer Drain	58%	Rmt	
			Precast and Cast In situ Chambers & Rainwater harvesting pits	20%	Nos	

S.No	Item	% of weightage in the contract price	Stage for Payment	% of weightage	Measuring Unit	Procedure for estimating the value
			Testing	10%	Rmt	
			Commissioning of the storm water drain	10%	Rmt	
6	Internal, External Water supply, Recycle water supply, Sanitary and Firefighting	2%	Water Supply, and Plumbing	43%	Rmt	Payment shall be made on completion of a stage on pro rata basis in all aspects for a minimum length of 500 mts
			Recycle water supply	17%	Rmt	
			Firefighting	15%	Nos	
			House service connections	15%	Nos	
			Testing & Commissioning of complete facility/system	10%	Rmt	Payment shall be made on full completion
7	Landscaping, Horticulture and Play Equipment	4%	Trees, Shrubs, Creeper Kata, Lawn & Landscape etc.	58%	Sqm	Payment shall be made on completion of a stage on pro rata basis in all aspects for a minimum area of 500 sqm.
			Sculptures	17%	Sqm	
			E-Toilet	6%		
			Play Equipment (at various location	15%	Sqm	
			Artificial water fall (5%)	4%	Sqm	
8	Electrical	21%	Electrical Duct	15%	Rmt	Payment shall be made on completion of

S.No	Item	% of weightage in the contract price	Stage for Payment	% of weightage	Measuring Unit	Procedure for estimating the value
	Duct & Electrical fixtures		Laying of LV & MV Cables	10%	Rmt	a stage on pro rata basis in all aspects for a minimum length of 500 mts
			Laying of Cables for street Lighting	14%	Rmt	
			Supply and Fixing of Fixtures and appliances	41%	Nos	
			House hold connections	10%	Nos	
			Commissioning of complete facility/system	10%	Rmt	Payment shall be made on full completion
9	Submission and approval of "Data, Drawings and analysis of Surveys & Investigations" and "Designs, Drawings and Reports	2%	Data, Drawings and analysis of Surveys & Investigations	20%		50% Payment shall be made on Completion of a stage and remaining 50% Payment shall be made on approval of an Engineer – In Charge of each stage
			Designs, drawings and reports of Roads	20%		
			Designs, drawings and reports of Area development	20%		
			Designs, drawings and reports of Portable Water supply, recycle water supply and Firefighting	20%		
			As built Drawings	10%		
			3-D model of all Project components	10%		

3.0 Procedure of Estimating the Value of Work Done

- 3.1 All the works shown in the cross sectional, plan and elevational drawings are to be executed and completed within the tendered amount. Payment shall be made for the maximum length of 500 m or as decided and directed by the Authority, as per the item mentioned in the Schedule-G. However any item not covered in the said Schedule but required for the execution of the work as per the cross sectional, plan and elevational drawings the same are to be executed and the payment of such works shall also be considered included in the payment of that particular section for all such works. No separate payment shall be made of all such works.
- 3.2 The Procedure of Estimating the Value of Work Done provided in the above table may be modified and shall be submitted by the selected Contractor and may be agreed by Authority based on Justifications to be provided by Contractor.

4.0 Procedure for payment for Maintenance

- 4.1 The cost for Maintenance shall be as stated in Clause 26.1.1 of the EPC agreement.
- 4.2 Payment for Maintenance shall be made in quarterly instalments in accordance with the provisions of Clause 17.18 of the EPC agreement

Schedule H Drawings

1 Drawings

In compliance of the obligations set forth in Clause 10.2 of this Agreement, the Contractor shall furnish to the Authority's Engineer, free of cost, all Drawings listed in Annex-I of this Schedule-H.

2 Additional Drawings

If the Authority's Engineer determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed in Annex-I, it may by notice require the Contractor to prepare and furnish such drawings forthwith. Upon receiving a requisition to this effect, the Contractor shall promptly prepare and furnish such drawings to the Authority's Engineer, as if such drawings formed part of Annex-I of this Schedule-H.

Annex - I

(Schedule - H)

List of Drawings

[**Note:** The Authority shall describe in this Annex-I, all the Drawings that the Contractor is required to furnish under Clause 10.2.]

- Horizontal and Vertical Alignment with details of reference pillars.
- Horizontal Intersection Point, Vertical Intersection Points, elements of curves, and sight distances.
- Cross-section at 20 m interval along the alignment within ROW
- Typical Cross-section with details of pavement structures.
- Drawings for Road sign, Markings.
- Detailed Drawings of the junction development
- Street Lighting and necessary drawings
- Landscaping & Tree Plantation.
- Detailed drawings of the paving surface pattern.
- Traffic Management drawings for safety in construction zones
- Detailed drawings of road side furniture and other facilities (E-toilets, Play area, Creeperkatta etc.)
- Detailed drawings of protection works like retailing wall in Tidal condition.
- Detailed drawing of all activity Zones, Kiosk and plazas area with their structural details.
- Detailed design of Pile foundation with structural details
- Detailed drawings of Storm water Drainage including RCC covered drains as per standard specifications.
- Detailed drawings of Utility Trenches (Buried) with Manhole chamber as per standard specifications.
- Detailed drawings of water supply and recycle water as per standard specifications
- Detailed drawing of MEP, firefighting and sanitary fittings.
- Detailed drawing of viewing deck and arches with their structural details.
- Detailed drawings of Ramps at the Beaches
- Detailed drawings for the Parking Areas

- Detailed drawings for the Bus Shelters
- Detailed Retrofitting Drawing for the Bridge Near the Heritage Wall
- Detailed drawings for the Corten Steel Arches
- Detailed drawings for the Sculptures
- Detailed Drawings for the Retaining Wall

Any other drawings required for Construction/completion of work.

Annex – II

(Schedule H)

CAD Drawings and the sizes

1 OVERVIEW

1.1 Purpose

The primary goal is to create an environment for seamless integration/collaboration between all disciplines & business lines of all consultants/contractors regarding the use of CAD for production of any Drawing. The document will achieve this through setting out the Guideline for drawing data production. This will then enable Drawing data to be incorporated into the GIS Platform.

1.2 Units

All general Drawing work (e.g. Xrefs) are to be in model space and be produced in meters to three decimal places. Drawing borders to be in paper space and in millimeters.

e.g. **54.000**

78.720

0.325

Dimensions in meters and using whole numbers, can be expressed using the m' (meter) suffix as in the following

45.000m

The position of the decimal point shall be the same as a full stop and no space shall be left between the number and its units, to ensure clarity, as in the following example:

5.800m

All other non-linear measurements, e.g. areas and volumes, shall be followed by the unit symbol. The most common non-linear measurements are as follows

Square meter - **m²**

Cubic meter - **m³**

All detail Drawing work (e.g. standard details) is to be in model space and be produced in millimeters in whole numbers (i.e. no decimal places).

e.g. **10000787**

Dimensions in millimeters using whole numbers, can be expressed using the mm' (millimeter) suffix as in the following

250mm

Chainages shall be in meters and written as shown

0+100 (Chainages in whole numbers can be written without the decimal accuracy)

15+255.345

Chainages are plan measurements taken along a setting out line, and provide a horizontal distance not taking into account slope lengths.

1.3 Drawing Sizes

Drawing sizes shall conform to the International Standards Organisation (ISO). Sizes

(in mm) are as follows: -

A0	–	1189 x 841
A1	–	841 x 594
A2	–	594 x 420
A3	–	420 x 297
A4	–	297 x 210

In general, all Drawings shall be produced at the preferred A1 original size. The use of A0 size Drawings shall be avoided wherever possible.

Each group or set of Drawings shall use only one Drawing size unless situations make this impractical.

1.4 Scales

Scales used on Drawings shall be selected as indicated in the table below. Only standard metric scales shall be used. In all cases, the selected scale shall be large enough to permit easy and clear interpretation of the information depicted.

1:1	1:2		1:5	2:1
1:10	1:20	1:25	1:50	5:1
1:100	1:200	1:250	1:500	10:1
1:1000	1:2000	1:2500	1:5000	20:1
1:10000	1:20000	1:25000	1:50000	50:1

In exceptional cases where for functional reasons the recommended scale cannot be applied, intermediate scales may be chosen, provided that the required scale is of a whole number, such as 1:125, 1:150, etc.

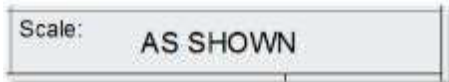
The following scale notes shall be considered:

i. Number of scales on any one Drawing shall be kept to a minimum.

ii. CAD entities shall be drawn at full scale (1 Drawing unit = 1 Measurement unit). Final plotted scale shall be established during composition of the Drawing layout for plotting.

iii. Originators using AutoCAD shall employ the PAPER SPACE/MODEL SPACE facility to establish Drawing layout and scales. All Drawing entities shall reside in MODEL SPACE with the exception of view ports, general notes, revision clouding and its labels, title block and border.

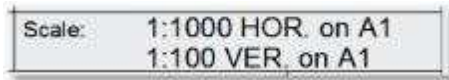
iv. Where different scales exist, each scale shall be specified under the title of the area of the Drawing to which it applies and noted in the Title Block field as shown below:



v. Where a single scale is used on a Drawing, it shall be specified within the title block only. (See the object area and shall be large enough to below). The scales selected shall depend on the object area and shall be large enough to permit easy and clear interpretation of information and ensure clarity of prints on the original as well as reduced copies i.e. A3 versions of A1 Drawings.



vi. Where different scales are used for horizontal and vertical dimensions, such as in profiles, each scale shall be clearly indicated on the Drawing as shown below:



vii. When the Drawing is not drawn to any scale, '=NTS' (Not to Scale) shall be placed in the title block as shown below:



Scale bars shall be shown on all Drawings containing plans.

1.5 Other Points to be followed:

Drawings notes shall be incorporated for all the submissions where ever applicable. Drawing Revision shall be clearly mentioned. Revision code and stage of submission shall be clearly mentioned.

Other aspects as per the best industrial standards shall be followed in the submission of the drawings.

Schedule I Project Completion Schedule

(See Clause 10.3.2)

1 Project Completion Schedule

During Construction period, the Contractor shall comply with the requirements set forth in this Schedule-I for each of the Project Milestones and the Scheduled Completion Date. Within 15 (fifteen) days of the date of each Project Milestone, the Contractor shall notify the Authority of such compliance along with necessary particulars thereof.

2 Project Milestone-I

2.1 Project Milestone-I shall occur on the date falling on the 180th (one hundred and eightieth) day from the Appointed Date (the “**Project Milestone-I**”).

2.2 Prior to the occurrence of Project Milestone-I, the Contractor shall have commenced construction of the Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 10% (ten per cent) of the Contract Price.

3 Project Milestone-II

3.1 Project Milestone-II shall occur on the date falling on the 365th (three hundred and sixty fifth) day from the Appointed Date (the “**Project Milestone-II**”).

3.2 Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with construction of the Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 30% (thirty per cent) of the Contract Price.

4 Project Milestone-III

4.1 Project Milestone-III shall occur on the date falling on the [550th (five hundred and fiftieth)] day from the Appointed Date (the “**Project Milestone-III**”).

4.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Project and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 60% (sixty per cent) of the Contract Price.

5 Scheduled Completion Date

5.1 The Scheduled Completion Date shall be the [730th (Seven hundred and Thirtieth)] day from the Appointed Date.

5.2 On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

6 Project Milestones

The Contractor shall construct the Project milestones as per table given below

S. No.	Description of Milestone	Time Allowed in day (from date of start)	Amount to be with-held in case of non-achievement of
1.	10% (ten percent) of the Contract Price	180 th	In the event of non-achieving the necessary progress as assessed from the running payments, 1% of tendered value of work will be withheld for failure of each mile stone.
2.	30% (thirty percent) of the Contract Price	365 th	
3.	60% (sixty percent) of the Contract Price	550 th	
4.	100% (one hundred percent) of the Contract Price	730 th	

7 Extension of time

Upon extension of any or all of the aforesaid Project Milestones or the Scheduled Completion Date, as the case may be, under and in accordance with the provisions of this Agreement, the Project Completion Schedule shall be deemed to have been amended accordingly.

Schedule J Tests on Completion

(See Clause 12.1.2)

1 Schedule for Tests

- 1.1 The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority's Engineer and the Authority of its intent to subject the Project to Tests, and no later than 10 (ten) days prior to the actual date of Tests, furnish to the Authority's Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Works.
- 1.2 The Contractor shall notify the Authority's Engineer of its readiness to subject the Project to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority's Engineer shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority's Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule-J.

2 Tests

- 2.1 Visual and physical test: The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include [***].
- 2.2 Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a calibrated bump integrator and the maximum permissible roughness for purposes of this Test shall be [2,000 (two thousand)] mm for each kilometer.
- 2.3 Other tests: The Authority's Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Project with Specifications and Standards.
- 2.4 Environmental audit: The Authority's Engineer shall carry out a check to determine conformity of the Project with the environmental requirements set forth in Applicable Laws and Applicable Permits.
- 2.5 Safety Audit: The Authority's Engineer shall carry out, or cause to be carried out, a safety audit to determine conformity of the Project with the safety requirements and Good Industry Practice.

3 Agency for conducting Tests

All Tests set forth in this Schedule-J shall be conducted by the Authority's Engineer or such other agency or person as it may specify in consultation with the Authority.

4 Completion Certificate

Upon successful completion of Tests, the Authority's Engineer shall issue the Completion Certificate in accordance with the provisions of Article 12.

Schedule K Provisional /Completion Certificate

(See Clause 12.2 and 12.4)

PROVISIONAL CERTIFICATE

1 I/We, (Name of the Authority’s Engineer), acting as the Authority’s Engineer, under and in accordance with the Agreement dated

(the “Agreement”), for construction of “Design, Construction, Operation & Maintenance of Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu including Operation & Maintenance in Defects Liability Period of Five (05) Years on Engineering, Procurement, Construction (“EPC”) basis.

(EPC) basis through.....(Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been undertaken to determine compliance of the Project with the provisions of the Agreement.

2 Works that are incomplete on account of Time Extension have been specified in the Punch List appended hereto, and the Contractor has agreed and accepted that it shall complete all such works in the time and manner set forth in the Agreement. In addition, certain minor works are incomplete and these are not likely to cause material inconvenience to the Users of the Project Highway or affect their safety. The Contractor has agreed and accepted that as a condition of this Provisional Certificate, it shall complete such minor works within 30 (thirty) days hereof. These minor works have also been specified in the aforesaid Punch List.

3 In view of the foregoing, I/We am/are satisfied that the Project from km to km can be safely and reliably placed in service of the Users thereof, and in terms of the Agreement, the Project is hereby provisionally declared fit for entry into operation on this the day of 20.....

ACCEPTED, SIGNED, SEALED
AND AND DELIVERED

SIGNED, SEALED
DELIVERED

For and on behalf of

For and on behalf of

CONTRACTOR by:

AUTHORITY’S ENGINEER by:

(Signature)

(Signature)

(Name and Designation)

(Name and Designation)

(Address)

(Address)

COMPLETION CERTIFICATE

1 I/We, (Name of the Authority’s Engineer), acting as the Authority’s Engineer, under and in accordance with the Agreement dated

(the “Agreement”), for construction of “**Design, Construction, Operation & Maintenance of Development of Coastal Promenade (i) Diu Ghoghla Bridge to Diu Fort and (ii) Summer House to Fudam Ghousala and extended to Gangeshwar Temple with Night Lighting and Landscaping & Beautification of Summer House Garden and Development of Urban Design of Selected Streets and Public Areas in walled City Diu & Ghoghla and Development of Portuguese Street at Diu including Operation & Maintenance in Defects Liability Period of Five (05) Years** on Engineering, Procurement, Construction (“EPC”) basis through (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Highway with the provisions of the Agreement, and I/We am/are satisfied that the Project Highway can be safely and reliably placed in service of the Users thereof.

2 It is certified that, in terms of the aforesaid Agreement, all works forming part of Highway have been completed, and the Project Highway is hereby declared fit for entry into operation on this the day of 20.....

SIGNED, SEALED AND DELIVERED

For and on behalf of

the Authority’s Engineer by:

(Signature)
(Name)
(Designation)
(Address)

Schedule L Selection of Authority's Engineer

(See Clause 16.1)

1 Selection of Authority's Engineer

- 1.1 The provisions of the Model Request for Proposals for Selection of Technical Consultants, issued by the Ministry of Finance, Government of India vide OM 24(23)/PF-II/2008 dated 21, May 2009, or any substitute thereof shall apply for selection of an experienced firm to discharge the functions and duties of an Authority's Engineer. Provided, however, that no entity which is owned or controlled by the Authority shall be eligible for appointment as the Authority's Engineer hereunder.

To assist in due discharge of Authority/Engineer-In-Charge's obligation, the Authority has appointed Project Management Consultant (PMC). The PMC will be responsible for conceptualization of Projects and further, during the design and Construction stage, overseeing the work of contractors, including reviewing, monitoring, resolution of interface issues, and reporting to the Authority/Engineer-In-Charge on the Project progress. All communications relating to contract management on this Project shall be submitted through PMC to the Engineer-In charge for final approval of Authority. Engineer-In charge will act as a Authority's representative and PMC assist with end to end support in carrying out review of preconstruction activities, construction supervision, progress monitoring, quality control, testing, test check of invoices, resolution of claims, change in design, taking over and safety management for all contracts and post construction supervision of contractors work. As such, the Engineer-in-Charge of the Authority is vested with all such powers and responsibilities as are entrusted with the Authority's Engineer and is fully competent to issue any instructions for proper monitoring and supervision of the project and the agreement, either by himself (including his authorised person) or through the Authority's Engineer. Instructions issued by the Engineer-in-Charge of the Authority shall have the same effect as that of the Authority's Engineer in terms of this Agreement. Wherever such Engineer-in-Charge issues any instructions or notice to the Contractor, he shall endorse a copy thereof to the Authority's Engineer.

- 1.2 In the event of termination of the Technical Consultants appointed in accordance with the provisions of Paragraph 1.1, the Authority shall appoint another firm of Technical Consultants forthwith and may engage a government-owned entity in accordance with the provisions of Paragraph 3 of this Schedule-L.

2 Terms of Reference

The Terms of Reference for the Authority's Engineer (the "TOR") shall substantially conform with Annex 1 to this Schedule L.

3 Appointment of Government entity as Authority's Engineer

Notwithstanding anything to the contrary contained in this Schedule, the Authority may in its discretion appoint a government-owned entity as the Authority's Engineer; provided that such entity shall be a body corporate having as one of its primary functions the provision of consulting, advisory and supervisory services for

engineering projects; provided further that a government-owned entity which is owned or controlled by the Authority shall not be eligible for appointment as Authority's Engineer.

Annex – I

(Schedule - L)

Terms of reference for Authority's Engineer¹⁹

1 Scope

- 1.1 To assist in due discharge of its obligation, the Authority's has appointed Project Management Consultant (PMC). The PMC will be responsible for conceptualization of Projects and further, during the design and Construction stage, overseeing the work of contractors, including reviewing, monitoring, resolution of interface issues, and reporting to the Authority on the Project progress. All communications relating to contract management on this Project shall be submitted to the PMC for final approval of Authority
- 1.2 The TOR shall apply to construction of the Project.

2 Definitions and interpretation

- 2.1 The words and expressions beginning with or in capital letters and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.
- 2.2 References to Articles, Clauses and Schedules in this TOR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.
- 2.3 The rules of interpretation contained in Clauses 1.2, 1.3 and 1.4 of the Agreement shall apply, *mutatis mutandis*, to this TOR.

3. General

- 3.1 The Authority's Engineer shall discharge its duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.
- 3.2 The Authority's Engineer shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, but subject to obtaining prior written approval of the Authority before determining:
 - (a) any Time Extension;
 - (b) any additional cost to be paid by the Authority to the Contractor;
 - (c) the Termination Payment; or
 - (d) any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party.
- 3.3 The Authority's Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this Agreement.

Such reports shall be submitted by the Authority's Engineer within 10 (ten) days of the beginning of every month.

- 34 The Authority's Engineer shall inform the Contractor of any delegation of its duties and responsibilities to its suitably qualified and experienced personnel; provided, however, that it shall not delegate the authority to refer any matter for the Authority's prior approval in accordance with the provisions of Clause 16.1
- 35 The Authority's Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.
- 36 In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the Authority's Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.

4 Construction Period

- 4.1 During the Construction Period, the Authority's Engineer shall review the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of Clause 10.1.6. The Authority's Engineer shall complete such review and send its observations to the Authority and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however, that in case of a Major Structure, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.
- 4.2 The Authority's Engineer shall review any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.
- 4.3 The Authority's Engineer shall review the Quality Assurance Plan submitted by the Contractor and shall convey its comments to the Contractor within a period of 21 (twenty-one) days stating the modifications, if any, required thereto.
- 4.4 The Authority's Engineer shall complete the review of the methodology proposed to be adopted by the Contractor for executing the Works, and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor.
- 4.5 The Authority's Engineer shall grant written approval to the Contractor, where necessary, for interruption and diversion of the flow of traffic in the existing lane(s) of the Project for purposes of maintenance during the Construction Period in accordance with the provisions of Clause 10.4.
- 4.6 The Authority's Engineer shall review the monthly progress report furnished by the

- Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.
- 4.7 The Authority's Engineer shall inspect the Construction Works and the Project and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Safety Consultant.
- 4.8 The Authority's Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Authority's Engineer may require.
- 4.9 For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 4.9, the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works issued by MORTH (the "Quality Control Manuals") or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.
- 4.10 The Authority's Engineer shall test check at least 20 (twenty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.
- 4.11 The timing of tests referred to in Paragraph 4.9, and the criteria for acceptance/rejection of their results shall be determined by the Authority's Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.
- 4.12 In the event that results of any tests conducted under Clause 11.11 establish any Defects or deficiencies in the Works, the Authority's Engineer shall require the Contractor to carry out remedial measures.
- 4.13 The Authority's Engineer may instruct the Contractor to execute any work which is urgently required for the safety of the Highway, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event; the provisions of Clause 19.6 shall apply.
- 4.14 In the event that the Contractor fails to achieve any of the Milestones, the Authority's Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Authority's Engineer shall determine that completion of the Project is not feasible within the time specified in the Agreement, it shall require the Contractor to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Contractor, the Authority's Engineer

shall review the same and send its comments to the Authority and the Contractor forthwith.

- 4.15 The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.4.
- 4.16 Authority's Engineer may recommend to the Authority suspension of the whole or part of the Works if the work threatens the safety of the Users and pedestrians. After the Contractor has carried out remedial measures, the Authority's Engineer shall inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked.
- 4.17 In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Authority's Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.
- 4.18 The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-J and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 4.18 and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-J.

5 Determination of costs and time

- 5.1 The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.
- 5.2 The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.
- 5.3 The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 16.4.

6. Payments

- 6.1 The Authority's Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2.4 (d).
- 6.2 Authority's Engineer shall -
- (a) within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 17.4, determine the amount due to the Contractor and recommend the release of 90 (ninety) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate; and

- (b) within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 17.4, deliver to the Authority and the Contractor an Interim Payment Certificate certifying the amount due and payable to the Contractor, after adjustments in accordance with the provisions of Clause 17.9.

7. Other duties and functions

The Authority's Engineer shall perform all other duties and functions as specified in the Agreement.

8 Miscellaneous

- 8.1 A copy of all communications, comments, instructions, Drawings or Documents sent by the Authority's Engineer to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Authority's Engineer thereon, shall be furnished by the Authority's Engineer to the Authority forthwith.
- 8.2 The Authority's Engineer shall retain at least one copy each of all Drawings and Documents received by it, including 'as-built' Drawings, and keep them in its safe custody.
- 8.3 Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film format or in such other medium or manner as may be acceptable to the Authority, reflecting the Project as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.
- 8.4 The Authority's Engineer, if called upon by the Authority or the Contractor or both, shall mediate and assist the Parties in arriving at an amicable settlement of any Dispute between the Parties.
- 8.5 The Authority's Engineer shall inform the Authority and the Contractor of any event of Contractor's Default within one week of its occurrence.

Schedule M Payment Reduction for Non-Compliance

(See Clauses 26.6, 27.2)

1.0 Payment reduction for non-compliance with the Maintenance Requirements

1.1 Quarterly lump sum payments for Maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-O.

1.2 Any deduction made on account of non-compliance with the Maintenance Requirements shall not be paid even after compliance subsequently. The deduction shall continue to be made every month until compliance is done.

1.3 The Authority's Engineer shall calculate the amount of payment reduction on the basis of weightage in percentage assigned to non-conforming items as given in Paragraph 2.

2.0 Percentage reductions in lump sum payments

2.1 The following percentages shall govern the payment reduction:

Table 1: Percentage reductions for Road Works, Structures Works and other Road Works

S. No.	Item/Defect/Deficiency	Percentage
1	(a) + (b) (of the applicable Quarterly Maintenance amount)	35%
(a)	Road Works (Carriageway/Pavement, Road, Embankment, Cuttings, Shoulders etc.)	60%
(i)	Potholes, cracks, other surface defects	30%
(ii)	Repairs of Edges, Rutting	10%
(iii)	Edge drop, inadequate cross fall, undulations, settlement, potholes, ponding, obstructions	10%
(iv)	Deficient slopes, rain cuts, disturbed pitching, vegetation growth, pruning of trees	10%
(b)	Other Road Works (Road Furniture, Miscellaneous Items)	40%
(i)	Cleaning, painting, replacement of road signs, road marking, cateye,	10%
(ii)	collection and disposal of solid waste, trees	10%
(iii)	Maintenance of Plazas area, drainage and protective Works	10%
(v)	Defects in Other Project Facilities related to road works	10%

Table 2: Percentage reductions for Storm Water Drain Works, water supply network, Recycled water supply network & Collection Sump Works.

S. No.	Item	Percentage
1	Storm Water Drain Works (of the applicable Quarterly	10%
(i)	De-silting, Manhole cleaning, overflows in surrounding areas	50%
(ii)	De-silting at outfall, outfall Maintenance & hygiene conditions	50%
2	Potable water supply network & Distribution Pipe Leakage Works (of the applicable Quarterly Maintenance amount)	2%
(i)	Rising and distribution network repairs, valve and flow meters repairs and calibrations, refilling of trenches	75%
(ii)	Distribution Pipe leakages, valves & flow meters repairs and calibrations	25%
3	Recycled water supply network, collected tank & Sump Works (of the applicable Quarterly Maintenance amount)	3%
(i)	Rising and distribution network repairs, valve and flow meters repairs and calibrations, refilling of trenches	75%
(ii)	Collection Tank & Sump valves & flow meters repairs and calibrations	25%

Table 3: Percentage reductions for Street Lighting and Area Illumination

S. No.	Item	Percentage
1	Street Lighting and Area Illumination	25%
(i)	Non-Compliance of power factor	50%
(ii)	Tripping of Feeder Pillar/power failure for continuous period of 2hours	30%
(iii)	Cables faults not repaired within 24 hours for electrification work	20%

Penalty due to Power Factor

In the event during operation in any operating month the Contractor maintains a power factor which is lower than a power factor of 0.95, penalty @ 1.25 times the penalty as charged by Diu Electricity Department to the Authority during the said month shall be charged to the Contractor.

This shall be in addition to the above penalty.

The amount to be deducted from Quarterly lump-sum payment for non-compliance of particular item mentioned in Table-1 & 2 shall be calculated on a pro-rata basis for each of the above items as under

$$R = P/100 * Q * L1/L \text{ Where}$$

P= Percentage of particular item/non- compliance/Defect/deficiency for deduction.

For example in Road Works, if pot hole is not repaired within 24 hours in one kilometer, the percentage of non-compliance item P is $71\% \times 20\% = 14.2\%$

Q= Quarterly lump-sum payment for Maintenance in accordance with the Contract Agreement.

L1= Non-complying length of the particular Item

L= Total length of the particular Item,

R= Reduction (the amount to be deducted for noncompliance for a particular item/Defect/deficiency

The total amount of reduction shall be arrived at by summation of reductions for such items/Defects/deficiency or noncompliance.

For any Defect in a part of one kilometer, the non-conforming length shall be taken as one kilometer.

Table 4: Percentage reductions for Retaining wall

S. No.	Item	Percentage
1.	Construction of Retaining wall	5%
(i)	Structural defects	60%
(ii)	Defects in Expansion joints, weep holes	10%
(iii)	Defects in Paint, Plaster, Cladding works.	20%
(iv)	Defects in Steel works, Welding, Joinery, Cutting, Hoisting- Railing works	10%

Table 5: Percentage reductions for Flooring/Hardscape works

S. No.	Item	Percentage
1.	Flooring/Hardscape works	9%
(i)	Defects in flooring/ Cladding works	65%
(ii)	Defects in polishing, edging, treatment works	35%

Table 6: Percentage reductions for Horticulture/ Softscape works

S. No.	Item	Percentage
1.	Horticulture/ Softscape works	8%
(i)	Defects in plantation, growth of horticulture species	75%
(ii)	Defects in lawn work area	25%

Table 7: Percentage reductions for Street furniture/Play equipments/ Gates/Railings

S. No.	Item	Percentage
1.	Street furniture/Play equipments/ Gates/Railings	2%
(i)	Defects in plastic, steel, EPDM, SS Steel works	55%
(ii)	Defects in polishing, edging, treatment works	45%

Table 8: Percentage reductions for Firefighting system

S. No.	Item	Percentage
1.	Firefighting system	1%
(i)	Defects in workmanship, pipes, valves, fire extinguisher	100%

Schedule N Insurance

(See Clause 18.1)

1. Insurance during Construction Period

1.1 The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the Completion Certificate, the following insurances for any loss or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:

- (a) insurance of Works, Plant and Materials and an additional sum of [15% (fifteen per cent)] of such replacement cost to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; and
- (b) Insurance for the Contractor's equipment brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

1.2 The insurance under paragraph 1.1 (a) and (b) above shall cover the Authority and the Contractor against all loss or damage from any cause arising under paragraph 1.1 other than risks which are not insurable at commercial terms.

2. Insurance for Contractor's Defects Liability

The Contractor shall effect and maintain insurance cover for the Works from the date of issue of the Completion Certificate until the end of the Defects Liability Period for any loss or damage for which the Contractor is liable and which arises from a cause occurring prior to the issue of the Completion Certificate. The Contractor shall also maintain other insurances for maximum sums as may be required under Applicable Laws and in accordance with Good Industry Practice.

3. Insurance against injury to persons and damage to property

3.1 The Contractor shall insure against its liability for any loss, damage, death or bodily injury, or damage to any property (except things insured under Paragraphs 1 and 2 of this Schedule or to any person (except persons insured under Clause 20.9), which may arise out of the Contractor's performance of this Agreement. This insurance shall be for a limit per occurrence of not less than the amount specified below with no limit on the number of occurrences.

The insurance cover shall be not less than: Rs. [.....]

3.2 The insurance shall be extended to cover liability for all loss and damage to the Authority's property arising out of the Contractor's performance of this Agreement excluding:

- (a) the Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and

- (b) Damage which is an unavoidable result of the Contractor's obligations to execute the Works.

4. Insurance to be in joint names

The insurance under paragraphs 1 to 3 above shall be in the joint names of the Contractor and the Authority.

Schedule O Maintenance Requirements

(See Clauses 2.1 and 26.2)

1. Maintenance Requirements

- (i) The Contractor shall, at all times maintain the Project Coastal Promenade Road in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits.
- (ii) The Contractor shall repair or rectify any Defect or deficiency set forth in Paragraph 2 of this Schedule-O within the time limit specified therein and any failure in this behalf shall constitute non-fulfilment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lump sum payment as set forth in Clause 26.6 of this Agreement, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.
- (iii) All Materials, works and construction operations shall conform to the MORTH Specifications for Road and Bridge Works, and the relevant IRC publications. Where the specifications for a work are not given, Good Industry Practice shall be adopted.
- (iv) All relevant Materials, Works and Construction operations shall conform to CPHEEO Manual on Operation and Maintenance of water supply systems, 2005, MoUD, GOI and Good Industry Practice to the satisfaction of Authority's Engineer for Potable water supply rising mains and distribution Networks, Recycle rising mains and distribution networks including valves, specials, flow meters etc.
- (v) All relevant Materials, Works and Construction operations shall conform to CPHEEO (Central Public Health and Environmental Engineering Organisation) Manual on Operation and Maintenance of water supply systems, 2005, MoUD, GOI and Good Industry Practice to the satisfaction of Authority's Engineer for Potable and Recycle Underground/Ground Service Reservoirs.
- (vi) All relevant Materials, Works and Construction operations shall conform to CPHEEO Manual on Sewerage and Sewage treatment systems 2013 Part-B; Operation and Maintenance and Good Industry Practice to the satisfaction of Authority's Engineer for storm water drain networks and outfalls.
- (vii) Maintenance of street lighting is inclusive of all roadway illumination equipment. The equipment consists of poles, luminaries, brackets, photocells, lamps, relays, conductors, ducts, hand wells, vaults and associated hardware.
- (viii) The Contractor shall submit with his tender to the Authority the methodology for the operation and maintenance of **facility/works** with the Schedule of Manpower and Organization Chart showing the structure of the organization for his administration and operation of the Contract. The contractor shall depute a project manager for execution and operation and maintenance contract.

- (ix) Contractor has to incur all the cost, taxes & duties, cess or another tax or cess levied for Operations and maintenance of the said facility, including but not limited to transportation, labors repairing & replacing making good any part or all part of equipment's, consumable, motors, pumps, gear unit, Capacitor, HT/LT Switchgear, Control Panel, roads, road side furniture etc in totality as per scope of works called in Schedule-B of the said agreement.
- (x) The Contractor shall at his own cost provide and maintain at the Site of Works standard first aid boxes at minimum six locations as directed and approved by the Authority for the use of his own as well as the Authority's staff on Site as stipulated by local regulations. Contractor shall arrange to train all their staff in first aid treatment within 3 months.
- (xi) Maintenance covers all the techniques and systems which by means of regular monitoring of equipment and scheduled maintenance procedures, prevent failures and, in the event of problems, enable repairs to be carried out with the minimum disruption of the process. Maintenance is therefore a combination of technical, administrative, and management activities. Maintenance consists of preventive and corrective procedures.
- (xii) Administrative maintenance policies shall be prepared and implemented by the Contractor, based on the developed maintenance programme. The policies shall be approved by the Authority's representative and shall include, but not be limited to:
- Preventive maintenance,
 - Overhauls and half-overhauls plan,
 - Failures and unexpected repair works plan.

A basic maintenance management system shall be implemented after approval by the Authority Representative. It shall include, but not be limited to:

- Planning and Scheduling,
 - Maintenance Personnel,
 - Maintenance Instructions,
 - Inventory Control of Items,
 - Equipment Records,
 - Forms for Costs and Budgets.
- (xiii) The Contractor shall periodically carry out maintenance. It shall include, but not be limited to the provision of all required spare parts, material and personnel. All items of equipment shall be inspected and maintained in accordance with the manufacturer's specifications and to the local conditions. Replacements, repairs and painting shall be carried out immediately and when necessary. Maintenance records showing all maintenance work carried out on each item of equipment shall be updated daily and shall be made available at any time for examination by the Authority's Engineer. The

installed equipment/unit shall be checked and serviced daily during working days.

- (xiv) The operating conditions of any instrument shall be maintained by function checks and services. Calibration shall be checked and corrected whenever necessary. After submission of the calibration data for approval, the instruments shall be calibrated as required and directed by the Employers Engineer. The electrical and sanitary installations shall be kept clean and continuously maintained in a proper and orderly manner. All interior and exterior structures, structural elements, equipment, installations, infrastructural elements and others shall be maintained, repaired, painted and replaced if necessary and/or as directed by the Employer's Representative. The maintenance of site works shall include, but not be limited to the repair, painting and the replacement of defective items due to wear and tear for traffic areas, pipes and fittings (including protection), cables, channels, roads, lighting poles, power equipment's and fences etc.

2. Repair/rectification of Defects and deficiencies

The obligations of the Contractor in respect of Maintenance Requirements shall include repair and rectification of the Defects and deficiencies specified in Annex - I of this Schedule – O within the time limit set forth therein.

3. Other Defects and deficiencies

In respect of any Defect or deficiency not specified in Annex - I of this Schedule – O, the Authority's Engineer may, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards, and any deviation or deterioration beyond the permissible limit shall be repaired or rectified by the Contractor within the time limit specified by the Authority's Engineer.

4. Extension of time limit

Notwithstanding anything to the contrary specified in this Schedule – O, if the nature and extent of any Defect or deficiency justifies more time for its repair or rectification than the time specified herein, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Authority's Engineer and conveyed to the Contractor and the Authority with reasons thereof.

5. Emergency repairs/restoration

Notwithstanding anything to the contrary contained in this Schedule – O, if any Defect, deficiency or deterioration in the Project Coastal Promenade Road poses a hazard to safety or risk of damage to property, the Contractor shall promptly take all reasonable measures for eliminating or minimizing such danger.

6. Daily inspection by the Contractor

The Contractor shall, through its engineer, undertake a daily visual inspection of the Project Coastal Promenade Road and maintain a record thereof in a register to be kept in such form and manner as the Authority's Engineer may specify. Such

record shall be kept in safe custody of the Contractor and shall be open to inspection by the Authority and the Authority's Engineer at any time during office hours.

7. Pre-monsoon inspection / Post-monsoon inspection

The Contractor shall carry out a detailed pre-monsoon inspection of all structures, culverts and drainage system before 1st June every year in accordance with the guidelines contained in IRC: SP35. Report of this inspection together with details of proposed maintenance works as required on the basis of this inspection shall be sent to the Authority's Engineer before the 10th June every year. The Contractor shall complete the required repairs before the onset of the monsoon and send to the Authority's Engineer a compliance report. Post monsoon inspection shall be done by the 30th September and the inspection report together with details of any damages observed and proposed action to remedy the same shall be sent to the Authority's Engineer.

8. Repairs on account of natural calamities

All damages occurring to the Project of coastal Promenade on account of a Force Majeure Event shall be undertaken by the Authority at its own cost. The Authority may instruct the Contractor to undertake the repairs at the rates agreed between the Parties.

Annex – I*(Schedule-O)****Repair/rectification of Defects and deficiencies***

The Contractor shall repair and rectify the Defects and deficiencies specified in this Annex-I of Schedule-O within the time limit set forth in the table below.

Table -1: Maintenance Criteria for Flexible Pavements:

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools / Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
Flexible Pavement for Carriageway	Potholes	Nil	< 0.1 % of area and subject to limit of 10 mm in depth	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA 2003 (http://www.tfrc.com/pavement/ltp/reports/03031/)	24-48 hours	MORT&H Specification 3004.2
	Cracking	Nil	< 5 % subject to limit of 0.5 sqm for any 50 m length	Daily			7-15 days	MORT&H Specification 3004.3
	Rutting	Nil	< 5 mm	Daily	Straight		15 -30 days	MORT&H

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools / Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
					Edge			Specification 3004.2
	Corrugations and Shoving	Nil	< 0.1 % of area	Daily			2-7 days	IRC:82- 2015
	Ravelling / Stripping	Nil	< 1 % of area	Daily			7-15 days	IRC:82-2015 read with IRC SP 81
	Edge Deformation on/ Breaking	Nil	< 1 m for any 100 m section and width < 0.1 m at any location, restricted to 30 cm from the edge	Daily	Length Measurement Unit like Scale, Tape, odometer etc.		7- 15 days	IRC:82- 2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools / Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
	Roughness BI	2000 mm/km	2400mm/km	Bi-Annually	Class I Profilometer SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)	Class I Profilometer : ASTM E950 (98) :2004 –Standard Test Method for measuring Longitudinal Profile of Travelled Surfaces with Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000-Standard Guide for Classification of Automatic Pavement Condition Survey Equipment	180 days	IRC:82- 2015
	Skid Number	60SN	50SN	Bi-Annually			180 days	BS: 7941-1: 2006
	Pavement Condition Index	3	2.1	Bi-Annually			180 days	IRC:82- 2015
	Other Pavement Distresses			Bi-Annually			2-7 days	IRC:82- 2015
	Deflection/ Remaining Life			Annually	Falling Weight Deflectometer	IRC 115: 2014	180 days	IRC:115- 2014
Embankment/ Slope	Edge drop at shoulders	Nil	40mm	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC	7-15 days	MORT&H Specification 408.4
	Slope of camber/cross fall	Nil	<2% variation in	Daily			7-15 days	MORT&H Specification

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools / Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
			prescribed slope of camber /cross fall					408.4
	Embankment Slopes	Nil	<15 % variation in prescribe side slope	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Protection	Nil	Nil	Daily	NA		7-15 days	MORT&H Specification
	Rain Cuts/ Gullies in slope	Nil	Nil	Daily Specially During Rainy Season	NA		7-15 days	MORT&H Specification
Cobble Stone	Corrugations and Shoving	Nil	< 0.1 % of area	Daily			2-7 days	As per best industry practices

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools / Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
	Edge Deformation/ Breaking	Nil	< 1 m for any 100 m section and width <0.1 m at any location, restricted to 30 cm from the edge	Daily			2-7 days	As per best industry practices

Maintenance Criteria for Cobble Stones:

Like any other road work, cobble stones pavement also required to be maintained to get long service. Cobblestone paver driveways and walkways require very little maintenance. The maintenance requirement of this pavement is minimal. The pavement requires initial maintenance soon after its laying. Subsequently, the maintenance is in the form of replacing any damaged blocks if any.

After about a week of laying the blocks there is a need to inspect the surface to check for any loss of material at the joints. It should be checked that the mortar that has been filled in the grooves need to be cured properly else it may result in reduced bonding strength. During rains these joints may allow weeds to grow but these normally should get eliminated with the traffic. In case it does not get eliminated these may have to be controlled by spraying herbicide or by normal removal. However annual inspection will also be required. Regular inspection and re-grouting can keep the surface performing well.

Storage of Cobble stones:

For the purpose of reinstating damaged blocks it is necessary to stockpile a small percentage of cobble stones from the lots used in the construction. The size and colour of the blocks may be difficult to obtain at a later date matching with the original blocks. For important projects, it is normal to stock pile the blocks from 1% to 3 % of initial supply for subsequent use.

Maintenance Criteria for Paver Blocks:

Like any other road work, block pavement also required to be maintained to get long service. The maintenance requirement of block pavement is minimal. The block pavement requires initial maintenance soon after its laying. Subsequently, the maintenance is in the form of replacing any damaged blocks or raising the selected section, if any.

Initial Maintenance:

After about a week of laying the blocks there is a need to inspect the surface to check for any loss of material at the joints. Whenever sand levels has dropped down it should be reinstated. This type of inspection should continue for two to three months till the sand level is stabilized and topping up is no more required. With time the joints receive fine dust and thus making them waterproof. During rains these joints may allow weeds to grow but these normally should get eliminated with the traffic. In case it does not get eliminated these may have to be controlled by spraying herbicide or by normal removal. However annual inspection will also be required.

Storage of Blocks:

For the purpose of reinstating damaged blocks it is necessary to stockpile a small percentage of blocks from the lots used in the construction. The size and colour of the blocks may be difficult to obtain at a later date matching with the original blocks. For important projects, it is normal to stock pile blocks from 1% to 3 % of initial supply for subsequent use.

Coating and Cleaning:

As part of preventive maintenance, blocks can be sealed using compounds like silicone, acrylics and silica fluorides for enhancing the colour, reducing absorptive nature of the blocks and for improving surface toughness. These coating have life of 1 to 3 years and hence they have to be repeated as per the requirement. The most durable of these chemicals is solvent borne acrylics which are abrasion resistant and also minimize chemical effect of spillage even at 60°C.

Cleaning of block pavement cab be done by mechanical brooms, compressors or even by manual means. For removing certain strains, chemicals like oxalic, acetic and phosphoric acids etc. are used. Sometimes it may be expedient to replace the blocks where strains have penetrated to a greater depth.

Table -3: Maintenance Criteria for Safety Related Items and Other Furniture Items:

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards									
Coastal Promenade Road	Availability of Safe Sight Distance	As per IRC SP: 84 – 2019, a minimum of safe stopping sight distance shall be available throughout.	Monthly	Manual Measurements with Odometer along with video/ image backup	Removal of obstruction within 24 hours, in case of sight line affected by temporary objects such as trees, temporary encroachments. In case of permanent structure or design deficiency: Removal of obstruction/improvement of efficiency at the earliest Speed Restriction boards		IRC:SP 84-2019									
		<table border="1"> <thead> <tr> <th>Design Speed, kmp/h</th> <th>Desirable Minimum Sight Distance (m)</th> <th>Safe Stopping Sight Distance (m)</th> </tr> </thead> <tbody> <tr> <td>60</td> <td>180</td> <td>90</td> </tr> <tr> <td>40</td> <td>90</td> <td>45</td> </tr> </tbody> </table>						Design Speed, kmp/h	Desirable Minimum Sight Distance (m)	Safe Stopping Sight Distance (m)	60	180	90	40	90	45
		Design Speed, kmp/h						Desirable Minimum Sight Distance (m)	Safe Stopping Sight Distance (m)							
60	180	90														
40	90	45														
Pavement Marking	Wear	<70% of marking remaining	Bi- Annually	Visual Assessment as per Annexure-F of IRC:35-2015	Re - painting	Cat 1 Defect within 24 hours Cat-2 Defect within 2 months	IRC 35-2015									

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards								
	Day time Visibility	During expected life Service Time Cement Road - 130mcd/m ² /lux Bituminous Road - 100mcd/m ² /lux	Monthly	As per Annexure-D of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect – within 2 months	IRC:35- 2015								
	Night Visibility	Initial and minimum performance for dry retro reflectivity during night time: <table border="1"> <thead> <tr> <th>Design Speed, kmph</th> <th colspan="2">(RL) Retro Reflectivity (mcd/m² /lux)</th> </tr> </thead> <tbody> <tr> <td></td> <td>Initial (7 days)</td> <td>Minimum Threshold level (TL) & warranty period required up to 2 years</td> </tr> <tr> <td>Upto 65</td> <td>200</td> <td>80</td> </tr> </tbody> </table>	Design Speed, kmph	(RL) Retro Reflectivity (mcd/m ² /lux)			Initial (7 days)	Minimum Threshold level (TL) & warranty period required up to 2 years	Upto 65	200	80	Bi- Annually	As per Annexure-D of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect – within 2 months
Design Speed, kmph	(RL) Retro Reflectivity (mcd/m ² /lux)														
	Initial (7 days)	Minimum Threshold level (TL) & warranty period required up to 2 years													
Upto 65	200	80													

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		65-100	2 5 0	120					
	Skid Resistance	Initial and Minimum performance for Skid Resistance: Initial (7days): 55BPN Min. Threshold: 44BPN *Note: shall be considered under urban/city traffic condition encompassing the locations like pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markings etc.			Bi-Annually	As per Annexure-G of IRC:35-2015	-	Within 24 hours	IRC:35-2015

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Road Signs	Shape and position	Shape and Position as per IRC:67-2012. Signboard should be clearly visible for the design speed of the section.	Daily	Visual with Video/image Backup	Improvement of shape in case if shape is damaged. Relocation as per requirement	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs)	IRC :67-2012
	Retro reflectivity	As per specifications in IRC 67-2012	Bi-Annually	Teasing of each Sign board using Retro Reflectivity Measuring Device. In accordance with ASTM	Change of Sign board	48 hrs in case of mandatory	IRC :67-2012
Kerb	Kerb height	As per IRC 86:1983 depending upon type of Kerb	Bi-Annually	Use of distance measuring	Raising Kerb Height	Within Month 1	IRC 86:1983

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				tape			
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	IRC 35:2015
Other Road furniture	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP:84-2019 and IRC:35-2015, unless specified in RFP	Daily	Counting	New Installation	Within months 2	IRC:SP:84-2019, IRC:35-2015
	Pedestrian Guardrail	Functionality: Functioning of guardrail as intended	Daily	Visual with video/image backup	Rectification	Within days 15	IRC:SP:84-2019
	Traffic Safety Barriers	Functionality: Functioning of Safety Barriers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2019, IRC:119-2015
	End Treatment of Traffic Barriers	Functionality: Functioning of End Treatment as intended	Daily	Visual with video/image	Rectification	Within 7 days	IRC:SP:84-2019 IRC:119-2015

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Road Lighting System	Road Lights	Illumination: Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2019
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC:SP:84-2019
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC:SP:84-2019
Trees and Plantations	Obstruction in a minimum head-room of 5.5 m above carriageway or obstruction in visibility of road signs	No obstruction due to trees	Monthly	Visual with video/image backup	Removal of trees	Immediate	IRC:SP:84-2019

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Deterioration in health of trees and bushes	Health of plantation shall be as per requirement of specifications & instructions issued by Authority from time to time	Daily	Visual with video/image backup	Timely watering and treatment. Or Replacement of Trees and Bushes.	Within 90 days	IRC:SP:84-2019
	Vegetation affecting sight line and road structures	Sight line shall be free from obstruction by vegetation	Daily	Visual with video/image backup	Removal of Trees	Immediate	IRC:SP 84-2019
	Cleaning of toilets	-	Daily	-	-	Every 4 hours	
Public Amenities Facilities	Defects in electrical, water and Sanitary installations	Maintenance / repair of sanitary and water supply connections to toilet blocks and water supply connections for cleaning activity and repair of damaged sanitary and choked lines etc., Maintenance/repair of Power supply to the entire site/buildings. Regular maintenance of equipment like light post, Street lighting, Façade lighting,	Daily	-	Rectification	24 hours	

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		Illumination of Signages, common area lighting etc.,					
Architectural buildings/civil works	Defects in paint, plaster, façade treatment. Structural elements	Maintenance of all buildings structures, painting, re-plaster, RCC structures. Filling of cracks, defects, painting, re-plastering. Maintenance of brick/stone cladding, copings of compound wall. Maintenance of all Building/Interior Hardware items for Doors, windows, glass, locks etc.	Monthly	-	Rectification	Within 7 days	CPWD 2019 Technical specification Vol I, II
Temporary structures/element	Paint, plaster, steel works	Maintenance of all architectural/sculptural structures, painting of gates, steel elements, RCC structures. Filling of cracks, defects, painting, re-plastering. Repainting steel structures every 2 years exposed due to coastal corrosion. If steel structures found corrosive then needs to be replaced.	Monthly	-	Rectification. Replacement in steel structures	Within 7 days	CPWD 2019 Technical specification Vol I, II
Retaining wall-New/Propos	Defects in structure, paint,	Maintenance/ repair of retaining wall from sea side exposed to tidal condition. Repair of expansion	Monthly	-	Rectification	Immediately	CPWD 2019 Technical specification

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
ed	plaster.	joints, weep holes etc.					Vol I, II
Firefighting systems	Defects in Firefighting systems and accessories	Checking/ testing/ maintenance / repair of all fire equipments, pumps, valves, Hydrant, Extinguisher etc, Regular checking of machinery and pump rooms	Daily	-	Replacement	24 hours	
Flooring/Hardscape	Defects in flooring works	Defect or damage in all hardscape items like granite, kota, rajula, etc. A defect in all cladding items needs to rectify.	Daily	-	Replacement	24 hours	CPWD 2019 Technical specification Vol I, II
Softscape/Gardens		Complete maintenance of the landscape areas/ entire garden i.e. lawn trees, shrubs, herbs, edge, flower beds, foliage, creepers etc. including hoeing, weeding, pruning, replacement of plants, gap filling, watering, mowing of lawn, grass cutting by lawn mover and brush cutter, removal of garden waste, applying insecticide, pesticide & fertilizers(whenever required) top dressing of lawn with good earth and manure and maintenance of other garden	Daily	-	Replacement of ungrown, damaged	Within 7 days	

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		related works as directed by office-in-charge including lawn mover and brush cutter with fuel and other T & P material.					
Pipe Culverts / Drains	Free waterway/ unobstructed flow section	85% of culvert normal flow area to available.	2 times in a year (before and after rainy season)	Inspection by Bridge Engineer as per IRC SP: 35-1990 and Recording of depth of silting and area of vegetation.	Cleaning silt up soils and debris in culvert barrel after rainy season, removal of bushes and vegetation, U/s of barrel, under barrel and D/s of barrel before rainy season.	15 days before onset of monsoon and within 30 days after end of rainy season.	IRC 5-2015, IRC SP:40-1993 and IRC SP:13-2004
	Leak-proof expansion joints if any	No leakage through expansion joints	Bi-Annually	Physical inspection of expansion joints as per IRC SP: 35-1990 if any,	Fixing with sealant suitably	30 days or before onset of rains whichever comes earlier	IRC SP:40-1993 and IRC SP:69-2011

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				for leakage strains on walls at joints.			
	Structurally sound	Spalling of concrete not more than 0.25 sqm	Bi-Annually	Detailed inspection of all components of culvert as per IRC SP:35-1990 and recording the defects	Repairs to spalling, cracking, delamination, rusting shall be followed as per IRC: SP: 40-1993.	15 days	IRC SP 40-1993 and MORTH Specifications clause 2800
Delamination of concrete not more than 0.25 sq.m.							
Cracks wider than 0.3 mm not more than 1m aggregate length							
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron (concrete apron) not more than 1 sqm	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-1993 and IRC: SP: 13-2004.

Note: Any Structure during the entire contract period which is found that does not comply with all requirements shall be rehabilitated or even reconstructed under the scope of the contractor.

Table 4: Maintenance of the various layers

Nature of Defect or deficiency		Time limit for repair/ rectification
(b) Granular earth shoulders, side slopes, drains and culverts		
(i)	Variation by more than 1 % in the prescribed slope of camber/cross fall (shall not be less than the camber on the main carriageway)	7 (seven) days
(ii)	Edge drop at shoulders exceeding 40 mm	7 (seven) days
(iii)	Variation by more than 15% in the prescribed side (embankment) slopes	30 (thirty) days
(iv)	Rain cuts/gullies in slope	7 (seven) days
(v)	Damage to or silting of culverts and side drains	7 (seven) days
(vi)	Desilting of drains in urban/semi- urban areas	24 (twenty four) hours
(vii)	Railing, parapets, crash barriers	7 (seven) days (Restore immediately if causing safety hazard)
(c) Road side furniture including road sign and pavement marking		
(i)	Damage to shape or position, poor visibility or loss of retro- reflectivity	48 (forty eight) hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/ Once every year
(iii)	Damaged/missing replacement signs road requiring	7 (seven) days

Nature of Defect or deficiency		Time limit for repair/ rectification
(iv)	Damage to road mark ups	7 (seven) days
(v)	Damage pre-cast street/garden furniture and play equipments along road side/parks/plazas	7 (seven) days
(d) Road lighting		
(i)	Any major failure of the system	24 (twenty four) hours
(ii)	Faults and minor failures	8 (eight) hours
(e) Trees and plantation		
Nature of Defect or deficiency		Time limit for repair/ rectification
(i)	Obstruction in a minimum head- room of 5 m above carriageway or obstruction in visibility of road signs	24 (twenty four)hours
(ii)	Removal of fallen trees from carriageway	4 (four) hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
(iv)	Trees and bushes requiring replacement	30 (thirty) days
(v)	Removal of vegetation affecting sight line and road structures	15 (fifteen) days
(f) Other Facilities		
(i)	Cleaning of toilets	Every 4 (four) hours
(ii)	Defects in electrical, water and sanitary installations	24 (twenty four) hours

Nature of Defect or deficiency		Time limit for repair/ rectification
(iii)	Defects in building/ civil works related to finishes	7 (seven) days
(iv)	Defects in Temporary structure/element	7 (seven) days
(v)	Defects in Retaining wall- New/Proposed	Immediately
(vi)	Firefighting systems	24 (twenty four) hours
(vii)	Flooring/Hardscape	24 (twenty four) hours
(viii)	Softscape/Gardens	7 (seven) days

[Note: Where necessary, the Authority may modify the time limit for repair/rectification, or add to the nature of Defect or deficiency before issuing the bidding document, with the approval of the competent authority.]

Schedule P Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

- (a) The estimated amount for the Works executed in accordance with Clause 17.3.1 subsequent to the last claim;
- (b) Amounts reflecting adjustments in price for the aforesaid claim;
- (c) The estimated amount of each Change of Scope Order executed subsequent to the last claim;
- (d) Amounts reflecting adjustment in price, if any, for (c) above in accordance with the provisions of Clause 13.2.3 (a);
- (e) Total of (a), (b), (c) and (d) above;
- (f) Deductions:
 - (i) Any amount to be deducted in accordance with the provisions of the Agreement except Taxes;
 - (ii) Any amount towards deduction of Taxes; and
- (a) Total of (i) and (ii) above. (g) Net claim: (e) – (f) (iii);
- (b) The amounts received by the Contractor up to the last claim:
 - (i) For the Works executed (excluding Change of Scope orders);
 - (ii) For Change of Scope Orders, and
 - (iii) Any deductions
 - (iv) Taxes deducted

2. Quarterly Maintenance Payment Statement

The Quarterly Statement for Maintenance Payment shall state:

- (a) the Quarterly payment admissible in accordance with the provisions of the Agreement;
- (b) the deductions for Maintenance work not done;
- (c) net payment for Maintenance due, (a) minus (b);
- (d) amounts reflecting adjustments in price under Clause 17.12; and
- (e) amount towards deduction of Taxes

3. Contractor's claim for Damages

Note: The Contractor shall submit its claims in a form acceptable to the Authority / PMC.