

## **AMRITSAR SMART CITY LIMITED**

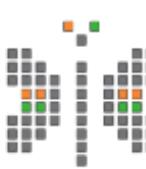
**NATIONAL COMPETITIVE BID (NCB)  
BID REFERENCE NO. 16/ASCL/2018-19**

**BIDDING DOCUMENT FOR  
DESIGN, BUILD, OPERATION AND MAINTENANCE FOR TEN YEARS OF  
MECHANIZED FULLY AUTOMATIC MULTI LEVEL CAR PARKING FACILITY IN  
KAIRON MARKET AMRITSAR (4th Call)**

February 2019

## **CHIEF EXECUTIVE OFFICER**

AMRITSAR SMART CITY LIMITED,  
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LEX,  
  
**Smart City**  
MISSION TRANSFORM-NATION

## DISCLAIMER

The information contained in this Request for Bids document (“**RFB**”) whether subsequently provided to the bidders, (“**Bidder/s**”) verbally or in documentary form by Amritsar Smart City Limited or any of its employees or advisors, is provided to Bidders on the terms and conditions set out in this RFB and any other terms and conditions subject to which such information is provided. This RFB is being issued by the Amritsar Smart City Limited for inviting tenders to shortlist Bidders for Design, Build, Operate and Maintain. This RFP is not an agreement and is not an offer or invitation to any party. The purpose of this RFP is to provide the Bidders or any other person with information to assist the formulation of their financial offers (“**Bid**”).

This RFB includes statements, which reflect various assumptions and assessments arrived at by Amritsar Smart City Limited in relation to this scope. This RFB does not purport to contain all the information each Bidder may require. This RFB may not be appropriate for all persons, and it is not possible for the Chief Executive Officer, Amritsar Smart City Limited and their employees or advisors to consider the objectives, technical expertise and particular needs of each Bidder. The assumptions, assessments, statements and information contained in the Bid documents, may not be complete, accurate, adequate or correct. Each Bidder must therefore conduct its own analysis of the information contained in this RFP and to seek its own professional advice from appropriate sources.

Information provided in this RFB to the Bidder is on a wide range of matters, some of which may depend upon interpretation of law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. Amritsar Smart City Limited accepts no responsibility for the accuracy or otherwise for any interpretation of opinion on law expressed herein. Amritsar Smart City Limited and their employees and advisors make no representation or warranty and shall incur no liability to any person, including the Bidder under law, statute, rules or regulations or tort, the principles of restitution or unjust enrichment or otherwise for any loss, cost, expense or damage which may arise from or be incurred or suffered on account of anything contained in this RFB or otherwise, including the accuracy, reliability or completeness of the RFB, and any assessment, assumption, statement or information contained therein or deemed to form part of this RFB or arising in any way in this Selection Process.

Amritsar Smart City Limited also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Bidder upon the statements contained in this RFB. Amritsar Smart City Limited may in its absolute discretion, but without being under any obligation to do so, can amend or supplement the information in this RFB.

The issue of this RFB does not imply that Amritsar Smart City Limited is bound to select a Bidder or to appoint the Successful Bidder (as defined hereinafter), for implementation and Amritsar Smart City Limited reserves the right to reject all or any of the Bidders or Bids without assigning any reason whatsoever. The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery fees, expenses associated with any demonstrations or presentations which may be required by Amritsar Smart City Limited or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and Amritsar Smart City Limited 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 for submission of the Bid, regardless of the conduct or outcome of the Selection process.

**AMRITSAR SMART CITY LIMITED****(An initiative of GoI, GoP & ULB)****Chief Executive Officer**

AMRITSAR SMART CITY LIMITED,  
SCO – 21, 2<sup>ND</sup> FLOOR DIST. SHOPPING COMPLEX,  
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– 143 001, PUNJAB TEL: +91 183501548  
Email: [ceoasclasr@gmail.com](mailto:ceoasclasr@gmail.com)

**NIB No. 16/ASCL/2018-19**

The Chief Executive Officer, Amritsar Smart City Limited invites online bids from eligible bidders under National Competitive Bidding (NCB) for the below mentioned Project / Work(s) detailed in the following table on Lump Sum basis:

<b>Sl. No . .</b>	<b>Name of Project / Work(s)</b>	<b>Bid Security (INR)</b>	<b>Cost of Document(INR)</b>	<b>Period of complet</b>
1.	Design, Build, Operation and Maintenance of MECHANIZED FULLY AUTOMATIC MULTILEVEL CAR PARKING SYSTEM for 10 (ten) years including Defect Liability Period for 2 (two) years, in Kairon market Amritsar under Smart City Mission (4th Call)	27,36,000/-	20,000/- Processing Fees as mentioned on web portal (Non-Refundable)	+ 12 (Twelve)

1. Detailed NIB & Bid Documents are available at the website <https://www.eproc.punjab.gov.in>
2. Any subsequent addendum/corrigendum shall be published only at the website <https://www.eproc.punjab.gov.in>

The right to accept/reject any or all bid(s) received is reserved without assigning any reason thereof.

(Komal Mittal, IAS)  
**Chief Executive Officer**  
**Amritsar Smart City Limited**

**Copy to following for information:**

1. PS to Principal Secretary, LG, GoP, Chandigarh & Chairman, ASCL, Amritsar.
2. Mayor, MCA & Vice Chairman, ASCL, Amritsar.
3. Chairman, AIT, ASCL, Amritsar.
4. PA to CEO, ASCL, Amritsar.
5. Director, NIUA, Delhi for publication on Smartnet.
6. Nodal Officer, Amritsar Smart City Limited, Amritsar.
7. Superintending Engineer, Amritsar Smart City Limited, Amritsar.
8. Concerning ExEn / AEn Amritsar Smart City Limited, Amritsar.
9. Library Incharge, MCA, Amritsar for vide publicity in state and National level paper.
10. Notice Board, MCA / ASCL Amritsar.

**AMRITSAR SMART CITY LIMITED**  
**INVITATION FOR ONLINE BIDS**

1. Chief Executive Officer, Amritsar Smart City Limited invites online bids on Lump Sum basis from eligible Bidders for the below mentioned Project / Work(s) detailed in the following table:-

S.No.	Name of Project / Work(s)	Bid Security (INR)	Cost of Document (INR)	Period of completion (Months)
1.	Design, Build, Operation and Maintenance of MECHANIZED FULLY AUTOMATIC MULTILEVEL CAR PARKING SYSTEM for 10 (ten) years including defect liability period for 2 (two) years, in Kairon market Amritsar under Smart City Mission (4th Call)	Rs 27,36,000/- through NEFT/RTGS/Online Banking	Rs 20,000/- + Processing Fees as mentioned on web portal (Non-Refundable)	12 (Twelve)

2. Period of availability of Tender Online / Date and Time of online Bid Submission and date and time of opening of Bids are as given below:-

Availability of tender online for bidding		Start Date & Time for Online submission of Bids	Last Date & Time for Online submission of Bids	Last Date & Time for physical submission of documents	Date & time of opening of tender	
From	To				Technical Bid	Financial Bid
19.02.2019 1500 hrs	26.02.2019 1500 hrs	19.02.2019 1500 hrs	26.02.2019 1500 hrs.	26.02.2019 1500 hrs	26.02.2019 1530 hrs	To be intimated later

1. The bidding documents can be downloaded from website <https://www.eproc.punjab.gov.in>
2. For participating in above e-tender the Bidders shall have to get themselves registered with <https://www.eproc.punjab.gov.in> and get user ID, password. The Bidders are required to obtain class 3, Digital Signatures for registering themselves on the portal. For any clarification / difficulty regarding e-tendering process they can contact on +91-183 – 5015048.
3. The Bidders should keep checking the website for any addenda / corrigenda to the notice / bidding documents till the date of online submission of bids and the Bidders should incorporate the same in their bid documents.
4. Bid must be submitted online through e-portal before the time specified in the table above (as per server clock). Amritsar Smart City Limited does not take any responsibility for the delay caused due to non-availability of internet connection or network traffic jam etc for online bids.
5. Bid documents consisting of qualification information and eligibility criterion of bidders, plans, specifications, drawings, the schedule of quantities of the various class of work to be done and set the terms and conditions of contract to be complied with by the bidder can be seen on <https://www.eproc.punjab.gov.in> and scanned copies of the required documents and information as per Section – IV (Bidding Forms) should be attached in the Technical Bid as prescribed in the Bidding Document.
6. Uploaded documents of valid Successful Bidder will be verified with the original before signing the agreement. The

valid Successful Bidder has to provide the originals to the concerned authority on receipt of such letter which will be sent through registered post / email.

7. Bidding Documents are not to be uploaded. The Bidder has to only agree / disagree on conditions in the Bidding Document. The Bidder who disagrees cannot participate in the Bidding process.
8. Technical Bids will be opened online on the day and time as specified in the above table in the presence of the Bidders who wish to attend. If the office happens to be closed on the date of receipt of the Bids, the bids will be received and opened on the next working day at the same time and venue.
9. Bids once submitted online cannot be resubmitted or withdrawn after completion of scheduled completion date and time.
10. Conditional bids and bids not meeting the qualifying criterion on the date of receipt of bids shall be summarily rejected.
11. The undersigned has the right to accept or reject any bid without assigning any reason thereto.

Chief Executive Officer  
Amritsar Smart City Ltd.  
Amritsar

**Standard Procurement Document**

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PART 1 – Bidding Procedures

## **PART 1 – Bidding Procedures**

**Section I - Instructions to Bidders**

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## Section I - Instructions to Bidders

<b>A. General</b>	
<b>1. Scope of Bid</b>	<p><b>1.1</b> In connection with the Specific Procurement Notice – Request for Bids (RFB), specified in the Bid Data Sheet (BDS), the Employer, as specified in the BDS, issues this bidding document for the provision of Works as specified in Section VII, Works' Requirements. The name, identification, of this RFB are specified in the BDS.</p>
	<p><b>1.2</b> Throughout this bidding document:</p> <ul style="list-style-type: none"> <li>(a) the term “in writing” means communicated in written form (e.g. by mail, e-mail, fax, including if specified in the BDS, distributed or received through electronic-procurement system used by the Employer) with proof of receipt;</li> <li>(b) if the context so requires, “singular” means “plural” and vice versa; and</li> <li>(c) “Day” means calendar day, unless otherwise specified as a “Business Day.” A Business Day is any day that is a working day of the Employer. It excludes the Employer official public holidays.</li> </ul>
<b>2. Source of Funds</b>	<p><b>2.1</b> Source of Fund is from Smart City Mission funds (Government of India and Government of Punjab)</p>
<b>3. Fraud and Corruption</b>	<p><b>3.1</b> The Employer requires compliance with the Employer's Anti- Corruption Guidelines and its prevailing sanctions policies and procedures as set forth in the GOI's Sanctions Framework, as set forth in Section VI.</p> <p><b>3.2</b> In further pursuance of this policy, Bidders shall permit and shall cause their agents (where declared or not), subcontractors, sub-consultants, service providers, suppliers, and their personnel, to permit the Employer to inspect all accounts, records and other documents relating to any initial selection process, prequalification process, bid submission, proposal submission, and contract performance (in the case of award), and to have them audited by auditors appointed by the Employer.</p>

Section I – Instructions to Bidders (ITB)

<p><b>4. Eligible Bidders</b></p>	<p><b>4.1</b> A Bidder may be an entity which may be a private entity / state-owned Enterprise or an institution —subject to ITB 4.6.</p> <p>The Bidder may be any combination of entities in the form of a Joint Venture (JV), subject to a limit of maximum 3 (three) JV members under an existing agreement, or with the intent to enter into such an agreement supported by a letter of intent. In case of a JV, all members shall be jointly and severally liable for the execution of the entire Contract in accordance with the Contract terms. The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the members of the JV during the Bidding process and, in the event the JV is awarded the Contract, during contract execution.</p>
	<p><b>4.2</b> A Bidder shall not have a Conflict of Interest. All Bidders found to have a Conflict of Interest shall be disqualified. A Bidder may be considered to have a Conflict of Interest for the purpose of this Bidding process, if the Bidder:</p> <ul style="list-style-type: none"> <li>(a) directly or indirectly controls, is controlled by or is under common control with another Bidder; or</li> <li>(b) receives or has received any direct or indirect subsidy from another Bidder; or</li> <li>(c) has the same legal representative as another Bidder; or</li> <li>(d) has a relationship with another Bidder, directly or through common third parties, that puts it in a position to influence the Bid of another Bidder, or influence the decisions of the Employer regarding this Bidding process; or</li> <li>(e) any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the Bid; or</li> <li>(f) or any of its affiliates has been hired (or is proposed to be hired) by the Employer as Project Manager for the Contract implementation; or</li> <li>(g) would be providing goods, works, or non-consulting services resulting from or directly related to consulting services for the preparation or implementation of the project specified in the BDS 2.1 that it provided or were provided by any affiliate that directly or indirectly controls, is controlled by, or is under common control with that firm; or</li> <li>(h) has a close business or family relationship with a professional staff of the Employer (or of the project implementing agency) who: <ul style="list-style-type: none"> <li>(i) are directly or indirectly involved in the preparation of the bidding document or specifications of the contract, and/or the Bid evaluation process of such contract; or</li> <li>(j) would be involved in the implementation or supervision of such contract unless the conflict stemming from such relationship has been resolved in a manner acceptable to the Employer throughout the procurement process and execution of the Contract.</li> </ul> </li> </ul>

Section I – Instructions to Bidders (ITB)

	<b>4.3</b> A firm that is a Bidder (either individually or as a JV member) shall not participate in more than one Bid, except for permitted Alternative Bids. This includes participation as a subcontractor in other Bids. Such participation shall result in the disqualification of all Bids in which the firm is involved. A firm that is not a Bidder or a JV member may participate as a subcontractor in more than one Bid.
	<b>4.4</b> A Bidder may have the nationality of any country, subject to the restrictions pursuant to ITB 4.8. A Bidder shall be deemed to have the nationality of a country if the Bidder is constituted, incorporated or registered in and operates in conformity with the provisions of the laws of that country, as evidenced by its articles of incorporation (or equivalent documents of constitution or association) and its registration documents, as the case may be. This criterion also shall apply to the determination of the nationality of proposed subcontractors or sub-consultants for any part of the Contract including related Services.
	<b>4.5</b> Bidders that are state-owned enterprises or institutions in the Employer's Country may be eligible to compete and be awarded a Contract(s) only if they can establish, in a manner acceptable to the Employer, that they <ul style="list-style-type: none"> <li>(i) are legally and financially autonomous</li> <li>(ii) operate under commercial law, and</li> <li>(iii) are not under supervision of the Employer.</li> </ul>
	<b>4.6</b> A Bidder shall provide such documentary evidence of eligibility satisfactory to the Employer, as the Employer shall reasonably request.
	<b>4.7</b> Firms of a country shall be excluded if, by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Borrower's country prohibits any import of goods from that country or any payments to persons or entities in that country.
	<b>4.8</b> In case a prequalification process has been conducted prior to the bidding process, this bidding is open only to prequalified Bidders.
<b>5. Eligible Materials, Equipment and Services</b>	<b>5.1</b> The materials, equipment and services to be supplied under the Contract may have their origin in any country subject to the restrictions specified in Section V, Eligible Countries, and all expenditures under the Contract will not contravene such restrictions. At the Employer's request, Bidders may be required to provide evidence of the origin of materials, equipment and services.



## Section I – Instructions to Bidders (ITB)

<b>B. Contents of Bidding Document</b>	
<b>6. Sections of Bidding Document</b>	<p><b>6.1</b> The Bidding Document consists of Parts 1, 2, and 3, which include all the Sections specified below, and which should be read in conjunction with any Addenda issued in accordance with ITB 8.</p> <p><b>PART 1 Bidding Procedures</b></p> <p>Section I - Instructions to Bidders (ITB)</p> <p>Section II - Bid Data Sheet (BDS)</p> <p>Section III - Evaluation and Qualification Criteria</p>
	<p>Section IV - Bidding Forms Section</p> <p>Section V - Eligible Countries</p> <p>Section VI - Fraud and Corruption</p> <p><b>PART 2 Works' Requirements</b></p> <p>Section VII – Works' Requirements</p> <p><b>PART 3 Conditions of Contract and Contract Forms</b></p> <p>Section VIII - General Conditions of Contract</p> <p>Section IX - Particular Conditions of Contract</p> <p>Section X - Contract Forms</p>
	<p><b>6.2</b> Unless obtained directly from the Employer, the Employer is not responsible for the completeness of the Bidding Document, responses to requests for clarification, the minutes of the Pre-Bid Meeting (if any), or Addenda to the Bidding Document in accordance with ITB 8. In case of any contradiction, documents obtained directly from the Employer shall prevail.</p>
	<p><b>6.3</b> The Bidder is expected to examine all instructions, forms, terms, and specifications in the Bidding Document and to furnish with its Bid all information and documentation as is required by the Bidding Document.</p>

Section II – Bid Data Sheet (BDS)

7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting	<p><b>7.1</b> A Bidder requiring any clarification of the Bidding Document shall contact the <i>Employer</i> in writing at the <i>Employer's</i> address specified in the BDS or raise its inquiries during the Pre-Bid Meeting if provided for in accordance with ITB 7.4. The <i>Employer</i> will respond in writing to any request for clarification, provided that such request is received prior to the deadline for submission of Bids within a period specified in the BDS. The <i>Employer</i> may forward copies of its response to all Bidders who have acquired the Bidding Document in accordance with ITB 6.2, including a description of the inquiry but without identifying its source. If so specified in the BDS, the Employer shall also promptly publish its response at the web page identified in the BDS. Should the clarification result in changes to the essential elements of the Bidding Document, the Employer shall amend the Bidding Document following the procedure under ITB 8 and ITB 22.2.</p>
	<p><b>7.2</b> The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.</p>
	<p><b>7.3</b> The Bidder and any of its personnel or agents will be granted permission by the <i>Employer</i> to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the <i>Employer</i> and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.</p>
	<p><b>7.4</b> If so specified in the BDS, the Bidder's designated representative may be invited to attend a Pre-Bid meeting and/or a Site of Works visit. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.</p>
	<p><b>7.5</b> The Bidder is requested, to submit any questions in writing, to reach the <i>Employer</i> not later than one week before the meeting.</p>

## Section I – Instructions to Bidders

	<b>7.6</b> Minutes of the Pre-Bid meeting, if applicable, including the text of the questions asked by Bidders, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ITB 6.2. If so specified in the BDS, the Employer shall also promptly publish the Minutes of the Pre-Bid Meeting at the web page identified in the BDS. Any modification to the Bidding Document that may become necessary as a result of the Pre-Bid meeting shall be made by the <i>Employer</i> exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-Bid meeting. In case representatives of the Bidder are not able to attend the pre-Bid meeting, it will not be a cause for disqualification of the Bidder.
<b>8. Amendment of Bidding Document</b>	<b>8.1</b> At any time prior to the deadline for submission of Bids, the <i>Employer</i> may amend the Bidding Document by issuing addenda or corrigenda.
	<b>8.2</b> Any addendum issued shall be part of the Bidding Document and shall be communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.2. The Employer shall also promptly publish the addendum on the Employer's web page in accordance with ITB 7.1.
	<b>8.3</b> To give prospective Bidders reasonable time to take an addendum into account during preparation of their Bids, the Employer may, at its discretion, extend the deadline for the submission of Bids, pursuant to ITB 22.2.
<b>C. Preparation of Bids</b>	
<b>9. Cost of Bidding</b>	<b>9.1</b> The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the Bidding process.
<b>10. Language of Bid</b>	<b>10.1</b> The Bid, as well as all correspondence and documents relating to the Bid exchanged by the Bidder and the Employer, shall be
	in the language specified in the BDS i.e. English. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the BDS i.e. English, in which case, for purposes of interpretation of the Bid, such translation shall govern.

## Section I – Instructions to Bidders

<b>11. Documents Comprising the Bid</b>	<p><b>11.1</b> The Bid shall comprise two (2) Parts, namely the Technical Part/ Technical Bid and the Financial Part/ Financial Bid. These two (2) Parts shall be submitted simultaneously in two (2) separate sealed envelopes (two-envelope Bidding process). One envelope shall contain only information relating to the Technical Part and the other, only information relating to the Financial Part. These two (2) envelopes shall be enclosed in a separate sealed outer envelope marked "ORIGINAL BID".</p> <p><b>11.2</b> The Technical Part shall contain the following:</p> <ul style="list-style-type: none"><li>(a) <b>Letter of Bid – Technical Part</b>, prepared in accordance with ITB 12;</li><li>(b) <b>Bid Security</b>, in accordance with ITB 19.1;</li><li>(c) <b>Authorization</b>: written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 20.3;</li><li>(d) <b>Bidder's Eligibility</b>: documentary evidence in accordance with ITB 17.1 establishing the Bidder's eligibility to Bid;</li><li>(e) <b>Qualifications</b>: documentary evidence in accordance with ITB 17.2 establishing the Bidder's qualifications to perform the Contract if its Bid is accepted;</li><li>(f) <b>Conformity</b>: a technical proposal in accordance with ITB 16; and</li><li>(g) any other document required in the BDS.</li></ul> <p><b>11.3</b> The <b>Financial Part</b> shall contain the following:</p> <ul style="list-style-type: none"><li>(a) <b>Letter of Bid – Financial Part</b>: prepared in accordance with ITB 12 and ITB 14; and</li><li>(b) any other document required in the BDS.</li></ul> <p><b>11.4</b> The Technical Part shall not include any information related to the Bid Price. Where material financial information related to the Bid Price is contained in the Technical Part the Bid shall be declared non-responsive.</p> <p><b>11.5</b> In addition to the requirements under ITB 11.2, Bids submitted by a JV shall include a copy of the Joint Venture Agreement entered into by all members. Alternatively, a letter of intent to execute a Joint Venture Agreement in the event of a successful Bid shall be signed by all members and submitted with the Bid, together with a copy of the proposed Agreement.</p>
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	11.6 The Bidder shall furnish in the Letter of Bid – Financial Part information on commissions and gratuities, if any, paid or to be paid to agents or any other party relating to this Bid.
<b>12. Letters of Bid and Schedules</b>	<b>12.1</b> The Letter of Bid – Technical Part/ Technical Bid, Letter of Bid – Financial Part/ Financial Bid shall be prepared using the relevant forms furnished in Section IV, the Bidding Forms. The forms must be completed without any alterations to the text, and no substitutes shall be accepted except as provided under ITB 20.3. All blank spaces shall be filled in with the information requested.
<b>13. Alternative Bids</b>	<b>13.1</b> The Alternative Bids shall not be allowed.
	<b>13.2</b> Alternative times for completion <b>shall not</b> be permitted as per the Bid Data Sheet.
	<b>13.3</b> Except as provided under ITB 13.4 below, the Bidders wishing to offer technical alternatives to the requirements of the Bidding Document must first price the Employer's design as described in the Bidding Document and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the Bidder with the Most Advantageous Bid conforming to the basic technical requirements shall be considered by the Employer.
	<b>13.4</b> When specified in the BDS, the Bidders are permitted to submit alternative technical solutions for specified parts of the Works: Automation & Design as specified in the BDS and described in Section VII, <i>Works' Requirements</i> . The method for their evaluation will be stipulated in Section III, Evaluation and Qualification Criteria.
<b>14. Bid Prices and Discounts</b>	<b>14.1</b> The prices and discounts quoted by the Bidder in the Letter of Bid Financial Part and in the Priced Activity Schedule shall conform to the requirements specified below.
	<b>14.2</b> The Bidder shall submit: <ol style="list-style-type: none"> <li><b>For construction period:</b> a Lump Sum total price (as provided in ITB 14.3) for all items of the Works, as described in ITB and identified in Section IV, Bidding Forms;</li> <li><b>For operation period:</b> a Bid Price which shall be a premium (the "Premium") to be calculated as the difference of the Annual License Fee payable by the Contractor to the ASCL and the CAPEX incurred (for the purposes of Bid Evaluation only).</li> </ol>

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	<p>14.3 The Lump Sum price to be quoted in the Letter of Bid – Financial Part, in accordance with ITB 12.1, shall be the total price of the Bid which shall include the costs to be incurred as CAPEX and OPEX, excluding any discounts offered. This total price of the Bid shall form the Contract Price in the terms of the Contract as set out below.</p> <p>14.4 The Bidder shall quote any discounts and indicate the methodology for their application in the Letter of Bid - Financial Part, in accordance with ITB 12.1.</p>
	<p>14.5 &lt;&gt;Deleted&gt;&gt;</p> <p>14.6 Not Applicable</p>
	<p>14.7 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date twenty eight (28) days prior to the deadline for submission of Bids, shall be included in the rates and prices and the total Bid Price submitted by the Bidder.</p>
<b>15. Currencies of Bid and Payment</b>	<p>15.1 The currency(ies) of the Bid and the currency(ies) of payments shall be Indian Rupees.</p>
	<p>15.2 Bidders may be required by the Employer to justify, to the Employer's satisfaction, their local and foreign currency requirements, and to substantiate that the amounts included in the unit rates and prices and shown in the Schedule of Adjustment Data are reasonable, in which case a detailed breakdown of the foreign currency requirements shall be provided by the Bidders.</p>
<b>16. Documents Comprising the Technical Proposal</b>	<p>16.1 The Bidder shall furnish a technical proposal in the Technical Part of the Bid including a statement of work methods, equipment, personnel, schedule and any other information as stipulated in Section IV, Bidding Forms, in sufficient detail to demonstrate the adequacy of the Bidders' proposal to meet the work's requirements and the completion time.</p>
<b>17. Documents Establishing the Eligibility and Qualifications of the Bidder</b>	<p>17.1 To establish the Bidder's eligibility in accordance with ITB 4, Bidders shall complete the Letter of Bid, – Technical Part, included in Section IV, Bidding Forms.</p> <p>17.2 In accordance with Section III, Evaluation and Qualification Criteria, to establish its qualifications to perform the Contract, the Bidder shall provide the information requested in the corresponding information sheets included in Section IV, Bidding Forms.</p>
	<p>17.3 If a margin of preference applies as specified in accordance with ITB 38.1, domestic Bidders, individually or in joint ventures,</p>

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	applying for eligibility for domestic preference shall supply all information required to satisfy the criteria for eligibility specified in accordance with ITB 38.1.
<b>18. Period of Validity of Bids</b>	<p>18.1 Bids shall remain valid for one hundred and twenty days (120) (the "Bid Validity period") as specified in the BDS. The Bid Validity period starts from the date fixed for the Bid submission deadline (as prescribed by the Employer in accordance with ITB 22.1). A Bid valid for a shorter period shall be rejected by the Employer as nonresponsive.</p>
	<p>18.2 In exceptional circumstances, prior to the expiry of the Bid validity period, the Employer may request the Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If Bid Security is requested in accordance with ITB 19, it shall also be extended for twenty-eight (28) days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request shall not be required or permitted to modify its Bid, except as provided in ITB 18.3.</p>
	<p>18.3 If the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial Bid validity period, the Contract Price shall be determined as follows:</p> <ul style="list-style-type: none"> <li>(a) in the case of fixed price contracts, the Contract price shall be the Bid Price adjusted by the factor specified in the BDS;</li> <li>(b) in the case of adjustable price contracts, no adjustment shall be made; or</li> <li>(c) in any case, Bid evaluation shall be based on the Bid Price without taking into consideration the applicable correction from those indicated above.</li> </ul>
<b>19. Bid Security</b>	<p>19.1 The Bidder shall furnish as part of its Technical Part the Bid, a Bid Security of amount INR 27.36 Lakh (Rupees Twenty Seven Lakh and Thirty Six Thousand only) through payment gateway facility available on <a href="http://www.eproc.punjab.gov.in">www.eproc.punjab.gov.in</a></p>
	<p>19.2 A Bid-Securing Declaration shall use the form included in Section IV, Bidding Forms.</p>

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	<p>19.3 If a Bid Security is specified pursuant to ITB 19.1, the Bid Security shall be a demand guarantee, and in any of the following forms at the Bidder's option:</p> <p>NEFT/RTGS/ Net Banking or any other forms which are provided as per the e-portal.</p>
	<p>19.4 If a Bid Security or Bid-Securing Declaration is specified pursuant to ITB 19.1, any Bid not accompanied by a substantially responsive Bid Security or Bid-Securing Declaration shall be rejected by the Employer as non-responsive.</p>
	<p>19.5 If a Bid Security is specified pursuant to ITB 19.1, the Bid Security of unsuccessful Bidders shall be returned as promptly as possible upon the Successful Bidder's signing the Contract and furnishing the Performance Security.</p>
	<p>19.6 The Bid Security of the Successful Bidder shall be returned as promptly as possible once the Successful Bidder has signed the Contract and furnished the required Performance Security.</p>
	<p>19.7 The Bid Security may be forfeited or the Bid-Securing Declaration executed:</p> <ul style="list-style-type: none"> <li>(a) if a Bidder withdraws its Bid during the period of Bid validity specified by the Bidder on the Letter of Bid – Technical Part and repeated in the Letter of Bid – Financial Part or any extension thereto provided by the Bidder; or</li> <li>(b) if the Successful Bidder fails to: <ul style="list-style-type: none"> <li>(i) sign the Contract in accordance with ITB 49; or</li> <li>(ii) furnish a Performance Security.</li> </ul> </li> </ul>
	<p>19.8 The Bid Security of a JV shall be in the name of the JV that submits the Bid. If the JV has not been constituted into a legally enforceable JV, at the time of bidding, the Bid Security shall be in the name of the Representative of the JV as named in the letter of intent mentioned ITB 4.1.</p> <p>.</p>

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	<p>19.9 If a Bid Security is not required in the BDS, pursuant to ITB 19.1, and:</p> <p>(a) if a Bidder withdraws its Bid during the period of Bid validity specified by the Bidder in the Letters of Bid; or</p> <p>(b) if the successful Bidder fails to: sign the Contract in accordance with ITB 49; or furnish a Performance Security;</p> <p>the Employer may, if provided for in the BDS, declare the Bidder ineligible to be awarded a contract by the Employer for a period of time as stated in the BDS.</p> <p>NOTE: If the Bidder performs any of the actions prescribed in ITB 19.9 (a) or (b), the Employer will declare the Bidder ineligible to be awarded contracts by the Employer for a period of <b>1</b> year.</p>
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<b>20. Format and Signing of Bid</b>	<p>20.1 The Bidder shall prepare the Bid, in accordance with this Instruction, ITB 11 and ITB 21.</p> <p>20.2 Bidders shall mark as “CONFIDENTIAL” information in their Bids which is confidential to their business. This may include proprietary information, trade secrets or commercial or financially sensitive information.</p>
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## Section II – Bid Data Sheet (BDS)

	<p>20.3 The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified in the BDS and shall be attached to the Bid.</p> <p>The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Bid where entries or amendments have been made shall be signed or initialed by the person signing the Bid.</p>
	<p>20.4 In case the Bidder is a JV, the Bid shall be signed by an authorized representative of the JV on behalf of the JV, and so as to be legally binding on all the members as evidenced by a power of attorney signed by their legally authorized representatives.</p> <p>20.5 Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Bid.</p>
<b>D. Submission of Bids</b>	
<b>21. Sealing and Marking of Bids</b>	<p>21.1 The Bidder shall submit the Bids through e-portal. All the documents required for Technical qualification shall be submitted as per ITB and formats as per Section IV of the RFP documents.</p> <p>Bidder shall submit all the required documents and submit as per the standard procurement procedures of the e-portal  <a href="https://eproc.punjab.gov.in">https://eproc.punjab.gov.in</a></p> <p>21.2 Financial Part shall be uploaded in the given format in web portal.</p> <p>21.3 All the submission will be as mentioned in BDS.</p>
	<p>21.4 In addition, the Bidder shall submit one (1) hard copy of the Bid. All the required documents shall be uploaded in the e-portal and Employer shall not have any liability towards the failure in uploading of the documents by the Bidder.</p> <p>21.5 - Deleted-</p>
	21.6 - Deleted-

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	<p>(a) - Deleted-</p> <p>(b) - Deleted-</p> <p>(c) - Deleted-</p> <p>(d) - Deleted-</p>
	21.7 - Deleted-
<b>22. Deadline for Submission of Bids</b>	<p>22.1 Bids must be received by the Employer at the following address:  Address: Chief Executive Officer,  Amritsar Smart City Limited.  SCO – 21, II Floor, District Shopping Centre,  Block – B, Ranjit Avenue, Amritsar -  143001, INDIA, PIN Code: 143001,  Telephone: : +91-183-5015048</p> <p>Date: 26.02.2019 Time: 1500 hrs</p> <p>Bidders “shall” mandatorily submit all the copies of the Bid vide web portal.  The electronic bidding submission procedures shall be:</p> <p>The bidder would be required to register on the e-procurement market place <a href="https://www.eproc.punjab.gov.in">https://www.eproc.punjab.gov.in</a> and submit their bids online. Bidders are requested to submit the bid in two stages:</p> <p style="padding-left: 20px;">Stage – I: Eligibility and Technical Bid Stage.</p> <p style="padding-left: 20px;">Stage – II: Financial Bid Stage.</p> <p>The first stage will cover the qualifications and eligibility criteria and the technical bid. The bidder shall upload documents in support of the above. The bidder shall submit price bid online under second stage which may include proposals for financing to cover part of the Scope of Work as per bid documents before the bid submission closing date.</p> <p>Bidders shall submit a declaration without any reservation whatsoever that the submitted eligibility and qualification details, Techno - Commercial bid and financial bid are without any deviations and are strictly in conformity with the bid documents issued by the Employer. Declaration should be given by the bidder for the correctness of the credentials submitted by him.</p> <p>22.2 The Employer may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.</p>

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<b>23. Late Bids</b>	23.1 The Employer shall not consider any Bid that arrives after the deadline for submission of Bids, in accordance with ITB 22. Any Bid received by the <i>Employer</i> after the deadline for submission of Bids shall be declared late, rejected, and returned unopened to the Bidder.
<b>24. Withdrawal, Substitution, and Modification of Bids</b>	<p>24.1 A Bidder may withdraw, substitute, or modify its Bid after it has been submitted by sending a written notice, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 20.3, (except that withdrawal notices do not require copies). The corresponding substitution or modification of the Bid must accompany the respective written notice. All notices must be:</p> <ul style="list-style-type: none"> <li>(a) prepared and submitted in accordance with ITB 20 and ITB 21 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," "MODIFICATION;" and</li> <li>(b) received by the Employer prior to the deadline prescribed for submission of Bids, in accordance with ITB 22.</li> </ul>

	24.2 Bids requested to be withdrawn in accordance with ITB 24.1 shall be returned unopened to the Bidders.
	24.3 No Bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of Bids and the expiration of the period of Bid validity specified by the Bidder on the Letter of Bid or any extension thereof.

**E. Public Opening of Technical Parts of Bids**

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<b>25. Public Opening of Technical Parts of Bids</b>	<p>25.1 The Bid opening shall take place at:</p> <p><b><i>Chief Executive Officer, Amritsar Smart City Limited.</i></b></p> <p>SCO – 21, II Floor, District Shopping Centre, Block – B, Ranjit Avenue, Amritsar - 143001, INDIA, PIN Code: <b>143001</b>. Telephone: <b>+91-183-5015048</b></p> <p>Date: 26.02.2019, Time: 1530 hrs</p> <p>Except in the cases specified in ITB 23 and ITB 24.2, the Employer shall publicly open and read out all Bids received by the deadline, at the date, time and place specified in the BDS, in the presence of Bidders' designated representatives and anyone who chooses to attend. All Bidders, or their representatives and any interested party may attend a public opening. Any specific electronic Bid opening procedures required if electronic bidding is permitted in accordance with ITB 22.1, shall be as specified in the BDS.</p>
	<p>25.2 First, the written notice of withdrawal in the envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding Bid shall not be opened, but returned to the Bidder. No Bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at Bid opening.</p> <p>25.3 Next, envelopes marked "Substitution" shall be opened and read out and exchanged with the corresponding Bid being substituted, and the substituted Bid shall not be opened, but returned to the Bidder. No Bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at Bid opening.</p>
	<p>25.4 Next, envelopes marked "MODIFICATION" shall be opened and read out with the corresponding Bid. No Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at Bid opening.</p>

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	<p>25.5 Next, all other envelopes marked “TECHNICAL PART” shall be opened one at a time. On opening the envelopes marked “TECHNICAL PART” the Employer shall read out: the name of the Bidder, the presence or the absence of a Bid Security, or Bid- Securing Declaration, if required, and whether there is a modification; and Alternative Bid - Technical Part; and any other details as the Employer may consider appropriate.</p> <p>25.6 Only Technical Parts of Bids and Alternative Bid - Technical Parts that are read out at Bid opening shall be considered further for evaluation. The Letter of Bid- Technical Part: FINANCIAL PROPOSAL” are to be initialed by representatives of the Employer attending Bid opening in the manner specified in the BDS.</p>
	<p>25.7 At the Bid opening the Employer shall neither discuss the merits of any Bid nor reject any Bid (except for late Bids, in accordance with ITB 23.1).</p>
	<p>25.8 The Employer shall prepare a record of the Technical Parts of Bid opening that shall include, as a minimum:</p> <ul style="list-style-type: none"> <li>(a) the name of the Bidder and whether there is a withdrawal, substitution, or modification;</li> <li>(b) the receipt of envelopes that there are no “FINANCIAL PART” submitted in the Hard Copy;</li> <li>(c) the presence or absence of a Bid Security or Bid-Securing Declaration, if one was required; and</li> <li>(d) if applicable, any Alternative Bid – Technical Part.</li> </ul>
	<p>25.9 The Bidders’ representatives who are present shall be requested to sign the record. The omission of a Bidder’s signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.</p>
<b>F. Evaluation of Bids – General Provisions</b>	
<b>26. Confidentiality</b>	<p>26.1 Information relating to the evaluation of Bids and recommendation of contract award, shall not be disclosed to Bidders or any other persons not officially concerned with the Bidding process until information on Intention to Award the Contract is transmitted to all Bidders in accordance with ITB 44.</p>
	<p>26.2 Any effort by the Bidder to influence the Employer in the evaluation of the Bids or Contract award decisions shall result in the rejection of their Bid.</p>

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	26.3 Notwithstanding ITB 26.2, from the time of Bid opening to the time of Contract award, if a Bidder wishes to contact the <i>Employer</i> on any matter related to the Bidding process, it shall do so in writing.
<b>27. Clarification of Bids</b>	27.1 To assist in the examination, evaluation, and comparison of the Bids, and qualification of the Bidders, the Employer may, at its discretion, ask any Bidder for a clarification of its Bid given a reasonable time for a response. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change, including any voluntary increase or decrease in the prices or substance of the Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids, in accordance with ITB 36.
	27.2 If a Bidder does not provide clarifications of its Bid by the date and time set in the <i>Employer's</i> request for clarification, his Bid may be rejected.
<b>28. Deviations, Reservations, and Omissions</b>	28.1 During the evaluation of Bids, the following definitions apply: <ul style="list-style-type: none"> <li>(a) "Deviation" is a departure from the requirements specified in the Bidding Document;</li> <li>(b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and</li> <li>(c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.</li> </ul>
<b>29. Nonmaterial Nonconformities</b>	29.1 Provided that a Bid is substantially responsive, the Employer may waive any non-conformities in the Bid.
	29.2 Provided that a Bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.
	29.3 Not applicable

<b>G. Evaluation of Technical Parts of Bids</b>	
<b>30. Evaluation of Technical Parts</b>	<p>30.1 In evaluating the Technical Parts of each Bid, the Employer shall use the criteria and methodologies listed in this ITB and Section III, Evaluation and Qualification Criteria. No other evaluation criteria or methodologies shall be permitted.</p>
<b>31. Determination of Responsiveness</b>	<p>31.1 The Employer's determination of a Bid's responsiveness is to be based on the contents of the Bid itself, as defined in ITB 11.</p> <p>31.2 A substantially responsive Bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that:</p> <ul style="list-style-type: none"> <li>(a) if accepted, would: <ul style="list-style-type: none"> <li>(i) affect in any substantial way the scope, quality, or performance of the Works specified in the Contract; or</li> <li>(ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the Bidder's obligations under the proposed Contract; or</li> </ul> </li> <li>(b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive Bids.</li> </ul>
	<p>31.3 The Employer shall examine the technical aspects of the Bid submitted in accordance with ITB 16, in particular, to confirm that all requirements of Section VII, Works' Requirements have been met without any material deviation, reservation or omission.</p>
	<p>31.4 If a Bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.</p>
<b>32. Qualification of the Bidder</b>	<p>32.1 The Employer shall determine to its satisfaction whether the eligible Bidders that have submitted substantially responsive Bid - Technical Parts meet the qualifying criteria specified in Section III, Evaluation and Qualification Criteria.</p> <p>32.2 The determination shall be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to ITB 17. The determination shall not take into consideration the qualifications of other firms such as the Bidder's subsidiaries, parent entities, affiliates, subcontractors (other than Specialized Subcontractors if permitted in the Bidding Document), or any other firm different from the Bidder.</p> <p>32.3 If a Bidder does not meet the qualifying criteria specified in Section III, Evaluation and Qualification Criteria, its Bid shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.</p>

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	32.4 Only the Bids that are both substantially responsive to the Bidding Document, and meet all Qualification Criteria shall have their “FINANCIAL PART” submitted in e-portal opened at the second public opening.
<b>33. Subcontractors</b>	<p>33.1 Unless otherwise stated in the BDS, the Employer does not intend to execute any specific elements of the Works by subcontractors selected in advance by the Employer.</p> <p>33.2 The subcontractor’s qualifications shall not be used by the Bidder to qualify for the Works unless their specialized parts of the Works were previously designated by the Employer in the BDS as can be met by subcontractors referred to hereafter as ‘Specialized Subcontractors’, in which case, the qualifications of the Specialized Subcontractors proposed by the Bidder may be added to the qualifications.</p> <p>33.3 Bidders may propose subcontracting up to the percentage of total value of contracts or the volume of works as specified in the BDS. Subcontractors proposed by the Bidder shall be fully qualified for their parts of the Works.</p>
<b>H. Public Opening of Financial Parts of Bids</b>	
<b>34. Public Opening of Financial Parts</b>	<p>34.1 Following the completion of the evaluation of the Technical Parts of the Bids, and the Employer may notify in writing or upload the same in e-portal those Bidders whose Bids were considered non-responsive to the bidding document or failed to meet the Qualification Criteria, advising them of the following information:</p> <p>(a) the grounds on which their Technical Part of Bid failed to meet the requirements of the bidding document;</p> <p>(b) their “FINANCIAL PART” uploaded in web portal will be not be opened; and</p>
	<p>34.2 The Employer shall, simultaneously, notify in writing or upload in e-portal those Bidders whose Technical Part have been evaluated as substantially responsive to the bidding document and met all Qualifying Criteria, advising them of the following information:</p> <p>(a) their Bid has been evaluated as substantially responsive to the bidding document and met the Qualification Criteria;</p> <p>(b) their “FINANCIAL PART” uploaded in e-portal will be opened at the public opening of the Financial Parts; and</p> <p>(c) Following the completion of the evaluation of the Technical Parts of the Bids, the Employer will notify vide the e-portal mentioning of the location, date and time of the public opening of Financial Parts. The Employer shall publish a notice of the public opening of the Financial Parts on its website.</p>
	34.3 The opening date should allow Bidders sufficient time to make arrangements for attending the opening. The Financial Part of the Bid shall be opened publicly in the presence of Bidders’ designated representatives and anyone who chooses to attend.

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	34.4 At this public opening the Financial Parts will be opened by the Employer in the presence of Bidders, or their designated representatives and anyone else who chooses to attend. Bidders who met the Qualification Criteria and whose bids were evaluated as substantially responsive will have their "FINANCIAL PART" opened at the second public opening. The Employer shall read out the names of each Bidder, and the total Bid prices, per contract if applicable, and any other details as the Employer may consider appropriate.
	34.5 The Employer shall neither discuss the merits of any Bid nor reject "FINANCIAL PART".
	34.6 The Employer shall prepare a record of the Financial Part of the Bid opening that shall include, as a minimum: <ul style="list-style-type: none"> <li>(a) the name of the Bidder whose Financial Part was opened;</li> <li>(b) the Bid price, per contract if applicable, including any discounts; and</li> </ul>
	34.7 The Bidders whose "FINANCIAL PART" have been opened or their representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record. A copy of the record shall be distributed to all Bidders.
<b>I. Evaluation of Financial Parts of Bids</b>	
<b>35. Evaluation of Financial Parts</b>	35.1 To evaluate the Financial Part, the Employer shall consider the following:
	<ul style="list-style-type: none"> <li>(a) Not Applicable</li> </ul>
	<ul style="list-style-type: none"> <li>(b) price adjustment for correction of arithmetic errors in accordance with ITB 36.1;</li> </ul>
	<ul style="list-style-type: none"> <li>(c) price adjustment due to discounts offered in accordance with ITB 14.4;</li> </ul>
	<ul style="list-style-type: none"> <li>(d) converting the amount resulting from applying (a) to (c) above, if relevant, to a single currency in accordance with ITB 37;</li> </ul>
	<ul style="list-style-type: none"> <li>(e) price adjustment due to quantifiable nonmaterial nonconformities in accordance with ITB 29.3; and</li> </ul>
	<ul style="list-style-type: none"> <li>(f) the additional evaluation factors are specified in Section III, Evaluation and Qualification Criteria.</li> </ul>

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	35.2 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bid evaluation.
	35.3 If this bidding document allows Bidders to quote separate prices for different contracts, the methodology to determine the lowest evaluated cost of the contract combinations, including any discounts offered in the Letter of Bid – Financial Part, is specified in Section III, Evaluation and Qualification Criteria
<b>36. Correction of Arithmetical Errors</b>	<p>36.1 In evaluating the Financial Part of each Bid, the Employer shall correct arithmetical errors on the following basis:</p> <ul style="list-style-type: none"> <li>(a) Not Applicable ;</li> <li>(b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and</li> <li>(c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.</li> </ul>
	36.2 Bidders shall be requested to accept correction of arithmetical errors. Failure to accept the correction in accordance with ITB 36.1, shall result in the rejection of the Bid.
<b>37. Conversion to Single Currency</b>	37.1 For evaluation and comparison purposes, the currency(ies) of the Bids shall be converted in Indian Rupees. The date of the exchange rate shall be twenty eight (28) days before the Submission of Bid.
<b>38. Margin of Preference</b>	38.1 Unless otherwise specified in the BDS, a margin of preference for domestic Bidder shall not apply.
<b>39. Comparison of Financial Parts</b>	39.1 The Employer shall compare the evaluated costs of all responsive and qualified Bids to determine the Bid that has the lowest evaluated cost.

Section II – Bid Data Sheet (BDS)

<b>40. Abnormally Low Bids</b>	<p>40.1 An Abnormally Low Bid is one where the Bid price, in combination with other constituent elements of the Bid, appears unreasonably low to the extent that the Bid price raises material concerns as to the capability of the Bidder to perform the Contract for the offered Bid Price.</p>
	<p>40.2 In the event of identification of a potentially Abnormally Low Bid, the Employer shall seek written clarifications from the Bidder, including detailed price analyses of its Bid Price in correlation to the subject matter of the contract, scope, proposed methodology, schedule, allocation of risks and responsibilities and any other requirements of the bidding document.</p> <p>40.3 After evaluation of the price analyses, in the event that the Employer determines that the Bidder has failed to demonstrate its capability to deliver the contract for the offered tender price, the Employer shall reject the Bid.</p>
<b>41. Unbalanced or Front Loaded Bids</b>	<p>41.1 If the Bid which results in the lowest evaluated cost, in the Employer's opinion, seriously unbalanced or front loaded the Employer may require the Bidder to provide written clarifications. Clarifications may include detailed price analyses to demonstrate the consistency of the Bid Prices with the scope of works, proposed methodology, schedule and any other requirements of the Bidding Document.</p> <p>41.2 After the evaluation of the information and detailed price analyses presented by the Bidder, the Employer may as appropriate:</p> <ul style="list-style-type: none"> <li>(a) accept the Bid; or</li> <li>(b) require that the amount of the performance security be increased at the expense of the Bidder to a level not exceeding 20% of the Contract price; or</li> <li>(c) reject the Bid.</li> </ul>

<sup>3</sup> An individual firm is considered a domestic bidder for purposes of the margin of preference if it is registered in the country of the Employer, has more than 50 percent ownership by nationals of the country of the Employer, and if it does not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign contractors. JVs are considered as domestic bidders and eligible for domestic preference only if the individual member firms are registered in the country of the Employer or have more than 50 percent ownership by nationals of the country of the Employer, and the JV shall be registered in the country of the Work is executed. The JV shall not subcontract more than 10 percent of the contract price, excluding provisional sums, to foreign firms. JVs between foreign and national firms will not be eligible for domestic preference.

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<b>42. Most Advantageous Bid</b>	42.1 Having compared the evaluated costs of Bids, the Employer shall determine the Most Advantageous Bid. The Most Advantageous Bid is the Bid of the Bidder that meets the Qualification Criteria and whose Bid has been determined to be:  (a) substantially responsive to the bidding document; and (b) the lowest evaluated cost.
<b>43. Employer's Right to Accept Any Bid, and to Reject Any or All Bids</b>	43.1 The <i>Employer</i> reserves the right to accept or reject any Bid, and to annul the Bidding process and reject all Bids at any time prior to Contract Award, without thereby incurring any liability to Bidders. In case of annulment, all Bids submitted and specifically, Bid Securities shall be promptly returned to the Bidders.
<b>44. Standstill Period</b>	44.1 The Standstill period to award the contract shall not be applicable.
<b>45. Notice of Intention to Award</b>	45.1 When a Standstill Period applies, it shall commence when the Employer has transmitted to each Bidder (that has not already been notified that it has been unsuccessful) the Notification of Intention to Award the Contract to the Successful Bidder. The Notification of Intention to Award shall contain, at a minimum, the following information:  (a) the name and address of the Bidder submitting the successful Bid;  (b) the Contract price of the successful Bid;  (c) the names of all Bidders who submitted Bids, and their Bid Prices as readout, and as evaluated;  (d) a statement of the reason(s) the Bid (of the unsuccessful Bidder to whom the letter is addressed) was unsuccessful, unless the price information in c) above already reveals the reason;  (e) the expiry date of the Standstill Period; and  (f) instructions on how to request a debriefing and/or submit a complaint during the standstill period.
<b>J. Award of Contract</b>	
<b>46. Award Criteria</b>	46.1 Subject to ITB 43, the Employer shall award the Contract to the Successful Bidder. This is the Bidder whose Bid has been determined to be the Most Advantageous Bid as specified in ITB 42.

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<b>47. Notification of Award</b>	<p>47.1 Prior to the expiration of the Bid Validity Period and upon expiry of the Standstill Period, specified in BDS ITB 44.1 or any extension thereof, or upon satisfactorily addressing a complaint that has been filed within the Standstill Period, the Employer shall transmit the Letter of Acceptance to the Successful Bidder. The Letter of Acceptance shall specify the sum that the Employer will pay the Contractor in consideration of the execution of the contract (hereinafter, and in the Conditions of Contract and Contract Forms, called “the Contract Price”).</p> <p>47.2 At the same time, the Employer shall publish the Contract Award Notice which shall contain, at a minimum, the following information:</p> <ul style="list-style-type: none"> <li>(a) name and address of the Employer;</li> <li>(b) name and reference number of the contract being awarded, and the selection method used;</li> <li>(c) names of all Bidders that submitted Bids, and their Bid Prices as read out at Bid opening, and as evaluated;</li> <li>(d) names of all Bidders whose Bids were rejected either as nonresponsive or as not meeting qualification criteria, or were not evaluated, with the reasons therefore; and</li> <li>(e) the name of the Successful Bidder, the final total contract price, the contract duration and a summary of its scope.</li> </ul> <p>47.3 The Contract Award Notice shall be published on the Employer’s website with free access.</p> <p>47.4 Until a formal Contract is prepared and executed, the Letter of Acceptance shall not constitute a binding Contract.</p>
<b>48. Debriefing by the Employer</b>	<p>48.1 On receipt of the Employer’s Notification of Intention to Award referred to in ITB 45.1, an unsuccessful Bidder has three (3) Business Days to make a written request to the Employer for a debriefing. The Employer shall provide a debriefing to all unsuccessful Bidders whose request is received within this deadline.</p>
	<p>48.2 Where a request for debriefing is received within the deadline, the Employer shall provide a debriefing within five (5) Business Days, unless the Employer decides, for justifiable reasons, to provide the debriefing outside this timeframe. In that case, the standstill period shall automatically be extended until five (5) Business Days after such debriefing is provided. If more than one debriefing is so delayed, the standstill period shall not end earlier than five (5) Business Days after the last debriefing takes place. The Employer shall promptly inform, by the quickest means available, all Bidders of the extended standstill period</p>

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	<p>48.3 Where a request for debriefing is received by the Employer later than the three (3)-Business Day deadline, the Employer should provide the debriefing as soon as practicable, and normally no later than fifteen (15) Business Days from the date of publication of Public Notice of Award of contract. Requests for debriefing received outside the three (3)-day deadline shall not lead to extension of the standstill period.</p> <p>48.4 Debriefings of unsuccessful Bidders may be done in writing or verbally. The Bidder shall bear their own costs of attending such a debriefing meeting.</p>
<b>49. Signing of Contract</b>	<p>49.1 Promptly upon Notification of Award, the Employer shall send the Successful Bidder the Contract Agreement.</p> <p>49.2 Within twenty-eight (28) days of receipt of the Contract Agreement, the Successful Bidder shall sign, date, and return it to the Employer.</p>
<b>50. Performance Security</b>	<p>50.1 Within twenty-eight (28) days of the receipt of the Letter of Acceptance from the Employer, the Successful Bidder shall furnish the Performance Security, in accordance with the General Conditions of Contract, which shall be 5% (five percent) of the Project Cost, subject to ITB 41.2 (b), using for that purpose the Performance Security, Contract Forms, or another form acceptable to the Employer. If the Performance Security furnished by the Successful Bidder is in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the Successful Bidder to be acceptable to the Employer. A foreign institution providing a bond shall have a correspondent financial institution located in the Employer's Country, unless the Employer has agreed in writing that a correspondent financial institution is not required.</p> <p>50.2 Failure of the Successful Bidder to submit the above-mentioned Performance Security, or to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security. In that event the Employer may award the Contract to the Bidder offering the next Most Advantageous Bid.</p>
<b>51. Adjudicator</b>	<p>51.1 The Employer proposes the person named in the BDS to be appointed as Adjudicator under the Contract, at the hourly fee specified in the BDS, plus reimbursable expenses. If the Bidder disagrees with this proposal, the Bidder should so state in his Bid. If, in the Letter of Acceptance, the Employer does not agree on the appointment of the Adjudicator, the Employer will request the Appointing Authority designated in the Particular Conditions of Contract (PCC) pursuant to Clause 23.1 of the General Conditions of Contract (GCC), to appoint the Adjudicator.</p>
<b>52. Procurement Related Complaint</b>	<p>52.1 The procedures for making a Procurement-related Complaint are as specified in the BDS.</p>

## Section II – Bid Data Sheet (BDS)

<b>53. Successful Bidder</b>	53.1 The Bidder whose Financial Part of the Bid shall be evaluated to consist of the highest Premium to be calculated in terms of Clause 3.5 below shall be the Highest Bidder (H1 Bidder) and shall be declared to be evaluated as Successful Bidder.
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**Section II – Bid Data Sheet (BDS)**

<b>A. General</b>	
<b>ITB 1.1</b>	<p>The reference number of the Request for Bids (RFB) is: <b>16/ASCL/2018-19</b></p> <p>The Employer is: <b>Amritsar Smart City Limited.</b></p> <p>The name of the RFB/ RFP is: Design, Build, Operation and Maintenance for Ten years of Mechanized Fully Automatic Multi Level Car Parking Facility in Kairon Market, Amritsar.</p>
<b>ITB 1.2 (a)</b>	The number and identification of comprising this RFB is: <b>16/ASCL/2018-19</b>
<b>ITB 1.2(a)</b>	<p><b>Electronic –Procurement System</b></p> <p>The Employer shall use the following electronic-procurement system to manage this Bidding process:</p> <p style="text-align: center;"><b><a href="https://www.eproc.punjab.gov.in">https://www.eproc.punjab.gov.in</a></b></p> <p>The electronic-procurement system shall be used to manage the following aspects of the Bidding process:</p> <p style="margin-left: 40px;"><b>Technical Proposal</b> containing all the required documents in the required formats.</p> <p style="margin-left: 40px;"><b>Financial Proposal:</b> The Priced Bid shall be uploaded through web- portal only.</p>
<b>ITB 4.1</b>	Maximum number of members in the JV shall be: <b>3</b>
<b>B. Contents of Bidding Document</b>	
<b>ITB 7.1</b>	<p>For <u>clarification purposes</u> only, the Employer's address is:</p> <p>Attention: <b>Chief Executive Officer,</b> <b>Amritsar Smart City Limited.</b> SCO – 21, 2nd Floor, District Shopping Centre, Block – B, Ranjit Avenue, Amritsar -143001, Punjab, INDIA Telephone:: <b>+91-183-5015048</b></p> <p>Electronic mail address: <b>ceoasclasr@gmail.com</b></p>
<b>ITB 7.1</b>	Requests for clarification should be received by the Employer no later than: <b>15 days.</b> Web page: <b><a href="https://www.eproc.punjab.gov.in">https://www.eproc.punjab.gov.in</a></b>

Section II – Bid Data Sheet (BDS)

<b>ITB 7.4</b>	No Pre-Bid meeting will be held. All references to the Pre-Bid meeting shall be treated as non-existent.
<b>ITB 7.6</b>	Web page: <a href="https://www.eproc.punjab.gov.in">https://www.eproc.punjab.gov.in</a>
<b>C. Preparation of Bids</b>	
<b>ITB 10.1</b>	<p>The language of the Bid is: <b>English</b></p> <p>All correspondence exchange shall be in <b>English</b> language.</p> <p>Language for translation of supporting documents and printed literature is <b>English</b></p>
<b>ITB 11.2 (g)</b>	<ul style="list-style-type: none"> <li>(a) Experience in works of similar nature and size during the last five (5) years, and details of works underway or contractually committed with their certificates from the concerned officer not less the rank of Executive Engineer or Equivalent. A list of clients with their contact details, who may be contacted for further information on those contracts, shall also be provided.</li> <li>(b) Major items of construction equipment proposed to carry out the Contract;</li> <li>(c) Qualifications and experience of key site management and technical personnel proposed for Contract;</li> <li>(d) Reports on the financial standing of the Bidder, such as profit and loss statements and auditor's reports for the past five years;</li> <li>(e) Authority may seek references from the Bidder's bankers;</li> <li>(f) Information regarding any litigation, current or during the last Ten years, in which the Bidder is involved, the parties concerned, and disputed Amount.</li> </ul>

Section II – Bid Data Sheet (BDS)

<b>ITB 11.3 (d)</b>	<p>The following schedules shall be submitted with the Bid: <b><i>Construction Schedule (Including Implementation plan)</i></b></p> <p>The Bidder shall submit the following additional documents in its Bid:</p> <p>The following documents shall be submitted in Hard copy at Client office no later than last date of submission of online bids without which the <i>Bid shall be treated as Non-Responsive and Technical Bid shall not be opened.</i></p> <ul style="list-style-type: none"> <li>(a) Complete set of Technical Bid uploaded in the E-portal shall be hard bound/spiral (not in loose papers).</li> <li>(b) Copies of original documents defining the constitution or legal status, place of registration, and principal place of business.</li> <li>(c) written <b>notarized power of attorney</b> of the signatory to submit the Bid of an appropriate value.</li> <li>(d) Original Bank Guarantee submitted as Earnest Money Deposit for the submission of Bid.</li> <li>(e) <b>Copy of CA certificate</b> as per the Form FIN -3.2</li> <li>(f) If the Technical Bid hard copy is not submitted, the Bid shall be treated as non-responsive and shall not be evaluated.</li> </ul> <p><b>The Financial Bid shall be submitted in e-portal only.</b></p>
<b>ITB 13.1</b>	Alternative Bids <b>shall not</b> be permitted.
<b>ITB 13.2</b>	Alternative times for completion <b>shall not</b> be permitted.
<b>ITB 13.4</b>	Alternative technical solutions shall be permitted for the following parts of the Works: Automation & Design
<b>ITB 14.5</b>	- Deleted -
<b>ITB 15.1</b>	The price shall be quoted by the Bidder in: <b><i>Indian Rupees</i></b>
<b>ITB 18.1</b>	The Bid validity period shall be <b>120</b> days.

Section II – Bid Data Sheet (BDS)

<b>ITB 19.1</b>	<p>A Bid Security <b><i>shall be</i></b> required.</p> <p>A Bid-Securing Declaration <b><i>shall not be</i></b> required.</p> <p>If a Bid Security shall be required, the amount and currency of the Bid Security shall be: <u>INR 27.36 Lakh</u> (Rupees Twenty Seven lakh and Thirty Six thousand Only) to paid online through payment gateway as available on the procurement portal.</p> <p><u>Bid Processing fee or Transaction Fee shall be as mentioned on web portal to be paid vide NEFT/RTGS only.</u></p>
	<u>Bid Document Charges shall be INR 20,000 (Rupees Twenty thousand Only) Paid through eprocurement portal via Internet Banking/NEFT/RTGS etc.</u>
<b>ITB 19.3 (d)</b>	<p>Other types of acceptable securities:</p> <p><b><i>NEFT/RTGS</i></b>  <b><i>Net Banking</i></b>  <b><i>Over the Counter and any other forms which are provided as per the e-portal.</i></b>  <b><i>Demand Draft</i></b>  <b><i>Bank Guarantee</i></b></p>
<b>ITB 19.9</b>	If the Bidder performs any of the actions prescribed in ITB 19.9 (a) or (b), the Employer will declare the Bidder ineligible to be awarded contracts by the Employer for a period of <b>1</b> year.
<b>ITB 20.3</b>	The written confirmation of authorization to sign on behalf of the Bidder shall consist of; <b><i>Duly executed Power of Attorney in favour of person who is submitting the Bid</i></b>
<b>D. Submission of Bids</b>	
<b>ITB 21.4</b>	In addition to the original of the Bid, the number of copies is: <b>One.</b>

Section II – Bid Data Sheet (BDS)

ITB 22.1	<p>For <b><u>Bid submission purposes</u></b> only, the Employer's address is:</p> <p><b><i>Chief Executive Officer, Amritsar Smart City Limited.</i></b></p> <p>SCO – 21, 2nd Floor, District Shopping Centre, Block – B, Ranjit Avenue, Amritsar -143001</p> <p>Telephone:: <b>+91-183-5015048</b></p> <p>Date: 26.02.2019</p> <p>Time: 1500 hrs</p> <p>Bidders "<b><i>shall</i></b>" <b><i>mandatorily submit all the copies of the Bid vide web portal.</i></b></p> <p>The electronic bidding submission procedures shall be:</p> <p>The bidder would be required to register on the e-procurement market place <a href="https://www.eproc.punjab.gov.in">https://www.eproc.punjab.gov.in</a> and submit their bids online. Bidders are requested to submit the bid in two stages:</p> <p style="padding-left: 40px;">Stage – I: Eligibility and Technical Bid Stage.</p> <p style="padding-left: 40px;">Stage– II: Financial Bid Stage.</p> <p>The first stage will cover the qualifications and eligibility criteria and the technical bid. The bidder shall upload documents in support of the above. The bidder shall submit price bid online under second stage which may include proposals for financing to cover part of the Scope of Work as per bid documents before the <u>bid submission closing date</u>.</p>
	<p>Bidders shall submit a declaration without any reservation whatsoever that the submitted eligibility and qualification details, Techno- Commercial bid and financial bid are without any deviations and are strictly in conformity with the bid documents issued by the Employer. Declaration should be given by the Bidder for the correctness of the credentials submitted by him.</p> <p>Bidder should submit the hard copy of Technical proposal on or before 26.02.2019, 1500 hrs</p>

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<b>E. Public Opening of Technical Parts of Bids</b>	
<b>ITB 25.1</b>	<p>The Bid opening shall take place at:</p> <p><b><i>Chief Executive Officer, Amritsar Smart City Limited.</i></b></p> <p>SCO – 21, 2nd Floor, District Shopping Centre, Block – B, Ranjit Avenue, Amritsar - 143001, INDIA Telephone:: <b>+91-183-5015048</b></p> <p>Date: 26.02.2019 1530 hrs</p>
<b>F. Evaluation of Bids – General Provisions</b>	
<b>ITB 29.3</b>	<b><i>Not Applicable</i></b>
<b>G. Evaluation of Bids - Technical Parts</b>	
<b>ITB 33.1</b>	At this time the Employer to execute certain specific parts of the Works by subcontractors selected in advance- <b><i>None</i></b>
<b>ITB 33.3</b>	Contractor's proposed subcontracting: <b><i>None</i></b>
<b>H. Public Opening of Financial Parts</b>	
<b>ITB 34.2 (c)</b>	<p>Following the completion of the evaluation of the Technical Parts of the Bids, the Employer will notify vide the e-portal mentioning of the location, date and time of the public opening of Financial Parts.</p> <p>The Employer shall publish a notice of the public opening of the Financial Parts on its website.</p>
<b>I. Evaluation of Bids - Financial Parts</b>	
<b>ITB 37.1</b>	<p>The currency that shall be used for Bid evaluation and comparison purposes to convert at the selling exchange rate all Bid prices expressed in various currencies into a single currency is: <b><i>Indian Rupees</i></b></p> <p>The source of exchange rate shall be: <b><i>Reserve Bank of India</i></b></p>
	The date for the exchange rate shall be: <b><i>28 days before the Submission of Bid</i></b>
<b>ITB 44 Standstill Period</b>	<b><i>Not Applicable</i></b>
<b>J. Award of Contract</b>	
<b>ITB 51 Adjudicator</b>	The Adjudicator proposed by the Employer is: <b><i>The Adjudicator shall be named later with mutual consent.</i></b>

## **Section III - Evaluation and Qualification Criteria**



### **3.1 EVALUATION PROCESS**

- a. The EMPLOYER will constitute a Bid Evaluation Committee ("BEC") to evaluate the responses of the Bidders
- b. The BEC constituted by the Employer shall evaluate the responses to the RFB and all supporting documents/ documentary evidence. Inability to submit requisite supporting documents / documentary evidence, may lead to rejection.
- c. The decision of the BEC in the evaluation of responses to the RFB shall be final. No correspondence shall be entertained outside the process of negotiation/ discussion with the Committee.
- d. The BEC may ask for meetings with the Bidders to seek clarifications on their proposals and may visit Bidder's client site to validate the credentials/ citations claimed by the Bidder.
- e. The BEC reserves the right to reject any or all proposals on the basis of any deviations.
- f. Each of the responses shall be evaluated as per the criterions and requirements specified in this RFB.
- g. Please note that BEC may seek inputs from their professional, external experts in the Bid evaluation process.

### **3.2 BID OPENING**

- a) Total transparency shall be observed and ensured while opening the Bids. All Bids shall be opened in the presence of Bidder's representatives who choose to attend the Bid opening sessions on the specified date, time and address.
- b) The Employer reserves the rights at all times to postpone or cancel a scheduled Bid opening.
- c) Bid opening shall be conducted in 2 (Two) Stages:  
Stage 1 - RFB Document fee & Bid Security/EMD, Pre-Qualification Proposal and Technical Proposal  
Stage 2- Financial Proposal
- d) The venue, date and time for opening the Pre-Qualification Proposal are mentioned in the Tender Notice in the RFB. The date and time for opening the Financial Proposals would be communicated to the qualified Bidders.
- e) The Financial Proposals of only those Bidders will be opened who scores equal to or more than 70 (seventy) marks in Final Technical Evaluation.
- f) The Bidder's representatives who are present shall sign a register evidencing their attendance. In the event of the specified date of Bid opening being declared a holiday for the Employer, the Bids shall be opened at the same time and location on the next working day. In addition to that, if their representative of the Bidder remains absent, the Employer will continue process and open the Bids of the all the Bidders
- g) During Bid opening, preliminary scrutiny of the Bid documents shall be made to determine whether they are complete, whether required EMD has been furnished, whether the Documents have been properly signed, and whether the Bids are generally in order. Bids not conforming to such preliminary requirements shall be *prima facie* rejected. The Employer has the right to reject the Bid after due diligence is done.

### **3.3 Evaluation of Pre-Qualification Proposals**

- (a) Employer shall open "**RFP Document Fee and Bid Security**". If the contents are as per requirements of the RFP, Employer shall mark "**Pre-Qualification Proposal**". Each of the Pre-Qualification condition mentioned in the RFP is "**Mandatory**". In case the Bidder does not meet any one of the conditions, the Bidder will be disqualified.
- (b) The Pre-Qualification proposal must contain all the documents in compliance with instructions given in the RFP.
- (c) Response to the Pre-Qualification Requirements shall be evaluated in accordance with the requirements specified in this RFP and in the manner prescribed in the RFP.
- (d) The proposal failing to meet all of the below pre-qualification eligibility criteria shall be disqualified and will not be considered for technical evaluation process.

S No	Basic Requirement	Specific Requirements	Documents Required
1	Legal Entity	The Sole Bidder or the Lead Member of Consortium should be registered/incorporated under applicable of India or in his country of operation and should have been in operation for at least three (3) years as on date of submission of the Bid.	Attested proof of Registration/Incorporation as per the applicable laws of India or of their county of operation and apostiled. <b>Forms ELI – 1.1 and 1.2</b> , with attachments
	History of Non-Performing Contracts	Non-performance of a contract did not occur as a result of contractor default since April 2013.	<b>Form CON-2</b>
	Pending Litigation and litigation history	Bidder's financial position and prospective long term profitability sound according to criteria established in 3.1 below and assuming that all pending litigation will be resolved against the Bidder	<b>Form CON – 2</b>
2	Turnover	Minimum average annual turnover should be equal to or more than Rs <b>13.68</b> Crore certified payments received for contracts in progress and/or completed within the last 3 years, starting from 1st April 2015 -16 till 31st March 2017-18. In case of JV, Lead partner should meet at least 60% of the requirement and other partners should meet atleast 20% of the requirement.	As documentary proof, attested copy of the Audited Balance Sheet is to be submitted. The Bidder also has to provide the CA certificate specifying calculation of average annual turnover
3	Financial Experience	A minimum number of similar contracts specified below that have been completed/partially completed as a prime contractor, joint venture member, management contractor or nominated sub-contractor during the last 7 years:  <b>(The Similar Contracts/ Works is defined as Design, Build &amp; operation of fully automatic MLCP/ Electromechanical Parking)</b> One similar completed work of minimum Contract value of Rs 14.60 Crore in a single contract OR Two similar completed work of minimum each Contract value of Rs 9.12 Crore in two different contract OR Three similar completed work of minimum each Contract value of Rs 7.30 Crore in three different contract	Copy of Work Order and Copy of completion certificate issued by client, work order number should be mentioned in the completion certificate.
4 a	Technical Experience	The Sole Bidder or the consortium should have successfully implemented at least one project of automatic multi-level car parking of capacity 50 ECS as per scope of RFP.	Customer reference on their official letter head





S No	Basic Requirement	Specific Requirements	Documents Required
4 b		Operating and maintaining fully automatic multi-level car parking system for a minimum of 100 cars for at least 2 years in one single project <b>OR</b> 2 projects of 50 cars each for 2 years <b>OR</b> Operating and maintaining at-least one fully automatic multi-level car parking system for at-least 5 years	Copy of Work Order and Copy of completion/ performance certificate issued by client, work order number should be mentioned in the completion certificate.
5	Blacklisting	The Sole Bidder or Lead Member or any member of its consortium should not have blacklisted by Central/State Government/ PSU 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.	Undertaking by the authorized signatory as per the format given.

### 3.4 Evaluation of Technical Proposal

- a) The evaluation of the Technical Proposals will be carried out in the following manner:
- b) Employer will review the technical bids of the short-listed bidders to determine whether the technical proposals are substantially responsive. Bids that are not substantially responsive are liable to be disqualified at Evaluation Stage I by Employer's discretion.
- c) Bidders' **Project Design Capability or Technical Bid Evaluation Stage-II** will be evaluated as per the requirements and guidelines specified in the RFP and technical evaluation criteria as mentioned in the RFP.
- d) Bidders shall make the technical presentation and showcase proposed products to Employer as per the parameters mentioned in the table no. 2.
- e) Each Technical Proposal shall be assigned a technical score out of a maximum of 100 points. In order to qualify for the opening of financial proposal, the Bidder must get a minimum overall technical score of 70 (Seventy).
- f) The Bidders are required to submit all required documentation in support of the evaluation criteria specified (e.g. Detailed Project citations and copy of work order, client contact information for verification, and all others components) as required for technical evaluation.
- g) At any time during the Bid evaluation process, BEC may seek oral / written clarifications from the Bidders. The Committee may seek inputs from their professional and technical experts in the evaluation process.
- h) Employer reserves the right to do a reference check of the past experience stated by the Bidder. Any feedback received during the reference check shall be taken into account during the technical evaluation process.
- i) The Financial Proposals of Bidders who do not qualify technically shall be kept unopened in the e-Tendering system.
- j) EMPLOYER reserves the right to accept or reject any or all bids without giving any reasons thereof.
- k) EMPLOYER shall inform to the technically shortlisted Bidders about the date and venue of the opening of the financial proposals.

#### 3.4.1 Technical Evaluation Criteria

Proposals of only those applicants who satisfy the conditions of eligibility will only be considered for detailed technical evaluation. In the first stage, the technical capability of the applicant will be evaluated and short listed for consideration of their presentation.

The Bidder's competence and capability is proposed to be established by the following parameter:

- a) Technical Capacity;
- b) Financial Capacity;
- c) O&M Experience; &
- d) Project Design Capability (to be evaluated upon Individual presentation & design submission call after submission of technical Bid)

The Technical Score criteria for detailed evaluation of Technical Bid is as tabulated below:-

Table No 1: Technical & financial capability parameter

Sl. No.	Particulars	Max. Marks	Marking Criteria
<b>T1</b>	<b>TECHNICAL BID QUALIFICATION-Stage I</b>	<b>85</b>	Minimum Pass marks A+B+C = 59 marks (70%)
<b>A</b>	<b>Technical capacity:</b> Automated MLCP Project Executed during last five Years W.r.t ECS capacity <i>[Authority shall consider maximum of 25 (twenty five) Eligible Projects]</i>	<b>40</b>	Above 50 to 100 ECS : 15 marks Above 100 to 200 : 20 marks Above 200 to 300 : 25 marks Above 300 to 400 : 30 marks Above 400 to 500 : 35 marks Above 500 : 40 marks
<b>B</b>	<b>Financial capacity:</b> Average annual Turn Over from executed MLCP project (including O&M) during last 5 years.	<b>15</b>	Rs 5 Crs to 10 Crs : 05 marks Above Rs 10 to 15 Crs : 07 marks Above Rs 15 to 20 Crs : 10 marks Above Rs 20 to 25 Crs : 12 marks Above Rs 25 Crs : 15 marks
<b>C</b>	<b>O&amp;M Requirements (C=C1+C2)</b>	<b>30</b>	Minimum Pass Marks = 21
<b>C1</b>	Experience (in years) of operations and Maintenance of Automated Multi-level Car parking facility having minimum of 100 (hundred) at a single project /location. <b>Or</b> 2 Projects equivalent to 50 ECS each <b>Or</b> Operating and maintaining at-least one fully automatic multi-level car parking system for at-least 5 years	15	Years of Experience in last five years 2 (two) years : 05 marks 3 (three) years : 07 marks 4 (four) years : 10 marks 5 (five) years : 15 marks
<b>C2</b>	Experience (in no of ECS) of operations and Maintenance of Multi-level Car parking facility at a single project /location.	15	Above 50 to 100 ECS : 05 marks Above 100 to 200 ECS : 07 marks Above 200 to 400 ECS : 10 marks Above 400ECS : 15 marks

**Individual projects shall be considered for marking subject to max marks as assigned against each criterion**

Only those Bidders shall be called to give their presentation on Project Design capability, on the date to be notified later, who score minimum 70% (seventy percent) marks in Technical and financial capability parameter as per above table no. 1.

Table no 2: **Project Design Capability**

<b>T2</b>	<b>TECHNICAL BID QUALIFICATION- Stage II</b>	<b>15</b>	Minimum Pass marks D = 10 marks (70%)	
<b>D*</b>	<b>Project Design Capability (D=D1+D2)</b>	<b>15</b>	D=D1+D2	
			<b>Documentation</b>	<b>Presentation</b>
<b>D1</b>	<b>Proposed Concept Design</b>	<b>10</b>	<b>8</b>	<b>2</b>
	Evaluation parameters include, inter-alia <ul style="list-style-type: none"> <li>• Design configuration/Matrix- wrt ECS and Area Utilization</li> <li>• Conceptual planning, Design Features &amp; architectural layouts of the facilities.</li> <li>• Design attractiveness – Aesthetics, façade, Environment friendliness, energy efficiency.</li> <li>• Contingency plans – safety &amp; disaster management plans</li> <li>• Sequencing and activity time schedule.</li> <li>• Detailed methodology for construction.</li> <li>• Detailed methodology for operation and maintenance</li> </ul>			
<b>D2</b>	<b>Traffic Management Plan</b>	<b>5</b>	<b>3</b>	<b>2</b>
	Evaluation parameters include, inter-alia <ul style="list-style-type: none"> <li>• Adequacy of traffic management plan during construction</li> <li>• Efficiency of circulation plan within and around Parking facility</li> <li>• Efficiency of Pedestrian movement plan</li> <li>• Adequacy emergency traffic plan</li> </ul>			
	<b>FINAL TECHNICAL BID QUALIFICATION TOTAL= T1+T2</b>	<b>100</b>	Minimum pass marks= 70 Marks (70%)	

Marks for **Project Design Capability** In table 2 will be evaluated after Call for submission and Presentation of all Eligible Technical Bidder.

The Final Technical Score of the Bidders shall be the arithmetic sum of the marks/scores assigned to the Bidders under each of the parameters listed above in Table 1 & 2.

Final Technical Score of the Bidder shall be the sum of all marks scored under different heads of table 1 & 2 i.e. = A+B+C+D.

### 3.5 Financial Bid Evaluation

The financial bids of only those Bidders, who have scored at least 70 (seventy) marks in the final technical evaluation process, will be opened. The Financial Bids will be opened, in the presence of Bidders' representatives who choose to attend the Financial Bid opening. The date and time of the Financial Bid opening will be communicated to all the technically qualified Bidders.

**For construction period (including operation and maintenance during defect liability period), a Lump Sum total price**

(as provided in ITB 14.3) for all items of the Works, inclusive of all taxes including GST ("Capital Expenditure") as described in ITB and identified in Section IV, Bidding Forms;

**For operation and maintenance period**, the Financial Bid shall comprise of Bid Price to be quoted by the Bidder which shall be a Premium to be paid to ASCL derived in the following manner (the "Premium"):

**(A)** Annual Guaranteed License Fee; to be paid annually to ASCL as quoted by the Bidder.

(Minimum annual guaranteed license fee to be quoted by bidder shall be INR 25 lakhs (Rupees Twenty Five Lakh) in 1st year and escalated at 10% (ten percent) every year. The Bidder has to share either 18% of annual revenue or pay annual guaranteed license fee as quoted above whichever is higher. This has been explained in subsequent section)

**(B)** Capital expenditure: to be paid by ASCL during construction period as quoted by bidder

"Bid Price" shall be difference of (A) & (B) calculated as below mentioned formula:

$$\text{Bid Price} = \text{NPV of value (A) for 10 years} - (\text{subtract}) \text{ Current value of (B)}$$

**Note:**

NPV: The Net Present Value (NPV) will be calculated assuming a discount factor of 10%

Period: Project period to be used for NPV calculation shall be (1+10 ~ 11 years) as below

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Construction year	O&M Year 1	O&M Year 2	O&M Year 3	O&M Year 4	O&M Year 5
	Year 7	Year 8	Year 9	Year 10	Year 11
	O&M Year 6	O&M Year 7	O&M Year 8	O&M Year 9	O&M Year 10

The Annual License Fee to be quoted by the Bidder shall be mandatorily paying the license fee as per the below mentioned criteria:

Sl. No.	Description		Payment Time period
1)	Revenue Share	<p>The Bidder shall pay higher of the following:</p> <p>a) Revenue Share as 18% (eighteen percent) of Annual Gross Revenue from parking operations*</p> <p>OR</p> <p>b) Annual Guaranteed License Fee</p>	<p>The Revenue Share of the achieved Annual Gross Revenue from parking operations shall be due and payable latest by the first working day of 10th day of next financial year. This would be positive difference of 18% (eighteen percent) Annual Gross Revenue from parking operations and Annual Guaranteed License fee which already paid in advance for the applicable year</p>
2)	Annual Guaranteed License fee as defined by the Authority in the bidding documents escalated at the rate of 10% every year	<p>To be quoted by bidder. Minimum annual guaranteed license fee to be quoted by bidder shall be INR 25 lakhs in 1st year and escalated at the rate of 10% every year</p>	<p>Annual Guaranteed License fee shall be due and payable, in advance, latest by the first working day of each financial year. It is clarified that the payment of the first installment of the Annual Guaranteed license fee period between COD and last day of the Financial Year shall be payable on pro-rata basis.</p>

\*This excludes possible revenue from leasing out visitor facilitation space

The cost indicated in the Financial Proposal shall be deemed as final and reflecting the total cost of services and should be stated in INR only. Omissions, if any, in costing of any item shall not entitle the Bidder to be compensated and the liability to fulfill its obligations as per the Terms of Reference within the total quoted price shall be that of the Bidder. The Bidder shall bear all taxes, duties, fees, GST, levies and other charges imposed under the law.

### **3.6 Key Personnel**

The Bidder must demonstrate that it will have a suitably qualified (and in adequate numbers) minimum number of Key Personnel, as described in the table below, that are required to perform the Contract.

The Bidder shall provide details of the Key Personnel and such other Key Personnel that the Bidder considers appropriate, together with their academic qualifications and work experience. The Bidder shall complete the relevant Forms in Section IV, Bidding Forms.

The Contractor shall require the Employer's consent to substitute or replace the Key Personnel (reference the Particular Conditions of Contract 9.1).

During Construction Phase

S No.	Position / Number of Experts required / Educational Qualifying Criteria	Total Work Experience [years]	Experience In Similar Work [years]
1	Project Manager – 1 B. E. Civil / Mechanical / Electrical	10 years	3 years
2	Material / Quality Engineer – 1; B.E	7 years	3 years
3	Installation Engineer–1;B.E (Mech./Elect./Electronics) (Having experience in car parking systems)	7 years	3 years
4	Supervisors - 2; Diploma (Mech./Elect./Electronics/Civil)	5 years	2 years
5	Technicians (ITI) Trained – 2 Nos.	2 years	1 year

S No.	Position / Number of Experts required / Educational Qualifying Criteria during entire Operation	Total Work Experience [years]	Experience In Similar Work [years]
1	Asset Manager cum Supervisor –at least One during entire Operations of Facility- Graduate	5 years	2 years
2	Electrician & Technician, ITI trained- 2 Nos.	2 Years	3 years
3	Security cum Traffic Controller, 12 <sup>th</sup> pass – 02 Nos	5 Years	2 years
4	Ticketing Assistants – at each entry /exit as per Design, 10 <sup>th</sup> pass	3 years	1 years
5			

During O & M Phase

*Note: Bidder shall follow the Labor Law applicable in the state of Punjab.*

### **3.7 Equipment**

The Bidder to demonstrate that it has the key equipment listed hereafter:

No.	Equipment Type and Characteristics	Min. Quantity Required
1	Excavator	1 No.
2	Concrete weigh batchers	1 No.
3	Needle/ plate vibrator	2 No.
4	Tipplers	3 No.
5	Total station survey equipment set	1 No.
6	Water tanker (with sprinkling arrangements)	2 No.
7	Tower Crane of suitable capacity	1 No.
8	Generator of suitable capacity	1 No.
9	Laboratory apparatus & equipment as per MoRTH Standard.	As Required
10	Hoisting Crane upto 36 M height	1
11	Bar bending & cutting machine	2
12	Electrical Testing Kit (Megger, Voltmeter etc. of Various ranges)	As Required
13	Welding Units	As Required
14	Safety Equipment for personnel	As per legal requirement

The Bidder may provide further details of proposed items of equipment using Form EQU in Section IV, Bidding Forms.



## **Section IV - Bidding Forms**

***Table of Forms***

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Form EXP - 4.2(a) .....
Form EXP - 4.2(a) (cont.) .....
Form EXP - 4.2(b) .....
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Format Of Detail Area Statement .....
Non Discloser agreement .....
Deed of Indemnity .....

**Power of Attorney****(to be executed on the Stamp paper of value of Rs 500/-)****Power of Attorney for Authorized Representative**

The firm M/s..... authorize the following Representative to sign and submit the tender document, negotiate terms and conditions for the contract, to sign the contract, to deal with the, to issue and receive correspondence related to all matters of the tender "Design, Build, Operation and Maintenance of MECHANIZED FULLY AUTOMATIC MULTILEVEL CAR PARKING SYSTEM for 10 (ten) years including Defect Liability Period for 2 (two) years, in Kairon market Amritsar under Smart City Mission". We / M/s undertake the responsibility due to any act of the representative appointed hear by.

**For Partnership Firm**

S.No	Name of All the Partners	Signature of Partner with Seal
1.		
2.		
3.		
4.	Name and Designation of the person Authorized	
5.	Attested Signature of the Authorized Representative	

**For Company (supported by Board Resolution)**

Name and Designation of the person Authorized	
Company	
Address	
Telephone No.	
Fax No.	
Telex No.	
Authority By which the Powers is delegated	
Attested Signature of the Authorized Representative	
Name and Designation of person attesting the signatures	

**Letter of Bid – Technical Part**

**Date of this Bid submission:** [insert date (as day, month and year) of Bid submission]

**Request for Bid No.:** 16/ASCL/2018-19

To:

*The Chief Executive Officer,  
Amritsar Smart City Limited  
SCO – 21, II Floor, District Shopping Centre,  
Block – B, Ranjit Avenue,  
Amritsar - 143001, Punjab, INDIA*

I/ We, the undersigned, hereby submit our Bid, in two parts, namely:

- (a) the Technical Part, and
- (b) the Financial Part

In submitting my/ our Bid, I/ we make the following declarations:

- (a) **No reservations:** We have examined and have no reservations to the bidding document, including Addenda issued in accordance with Instructions to Bidders (ITB 8);
- (b) **Eligibility:** We meet the eligibility requirements and have no conflict of interest in accordance with ITB 4;
- (c) **Bid-Securing Declaration:** We have not been suspended nor declared ineligible by the Employer based on execution of a Bid-Securing Declaration or Proposal-Securing Declaration in the Employer's country in accordance with ITB 4.7;
- (d) **Conformity:** We offer to execute in conformity with the Bidding Document the following Works: Design, Build, Operation and Maintenance of MECHANIZED FULLY AUTOMATIC MULTILEVEL CAR PARKING SYSTEM for 10 (ten) years including Defect Liability Period for 2 (two) years, in Kairon market Amritsar under Smart City Mission;
- (e) **Bid Validity Period:** Our Bid shall be valid for a period of 120 days (or as amended if applicable) from the date fixed for the Bid submission deadline specified in BDS 22.1 (or as amended if applicable), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (f) **Performance Security:** If our Bid is accepted, we commit to obtain a Performance Security in accordance with the Bidding Document;
- (g) **One Bid Per Bidder:** We are not submitting any other Bid(s) as an individual Bidder or as a subcontractor, and we are not participating in any other Bid(s) as a Joint Venture member, and meet the requirements of ITB 4.3, other than alternative Bids submitted in accordance with ITB 13;

- (h) **State-owned enterprise or institution:** [select the appropriate option and delete the other] [ We are not a state-owned enterprise or institution] / [ We are a state-owned enterprise or institution but meet the requirements of ITB 4.6];
- (i) **Binding Contract:** We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance, shall constitute a binding contract between us, until a formal contract is prepared and executed;
- (j) **Not Bound to Accept:** We understand that you are not bound to accept the lowest evaluated cost Bid, the Most Advantageous Bid or any other Bid that you may receive; and
- (k) **Fraud and Corruption:** We hereby certify that we have taken steps to ensure that no person acting for us or on our behalf engages in any type of Fraud and Corruption;

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

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

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

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

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

Date signed \_\_\_\_\_ day of \_\_\_\_\_,

\* In the case of the Bid submitted by Joint Venture specify the name of the Joint Venture as the Bidder

\*\* Person signing the Bid shall have the Power of Attorney given by the Bidder to be attached with the Bid

### **Appendix A to Technical Part: Technical Proposal**

**Site Organization**

*[insert Site Organization Information]*

**Method Statement**

*[insert Method Statement]*

**Mobilization Schedule**

*[insert Mobilization Schedule]*

**Construction Schedule**

*[insert Construction Schedule]*

### **Appendix B to Technical Part: Equipment**

The Bidder shall provide adequate information to demonstrate clearly that it has the capability to meet the requirements for the key equipment listed in Section III, Evaluation and Qualification Criteria. A separate Form shall be prepared for each item of equipment listed, or for alternative equipment proposed by the Bidder.

<b>Item of equipment</b>			
Equipment information	Name of manufacturer		Model and power rating
	Capacity		Year of manufacture
Current status	Current location		
	Details of current commitments		
Source	Indicate source of the equipment		
	(a)      Owned	Rented	Leased
			Specially manufactured

Omit the following information for equipment owned by the Bidder.

Owner	Name of owner	
	Address of owner	
	Telephone	Contact name and title
	Fax	Telex
Agreements	Details of rental / lease / manufacture agreements specific to the project	

**Appendix C to Technical Part: Key Personnel**

### Form PER -1: Key Personnel Schedule

Bidders should provide the names and details of the suitably qualified Key Personnel to perform the Contract. The data on their experience should be supplied using the Form PER-2 below for each candidate.

#### **Key Personnel**

1.	<b>Title of position:</b>  <b>Name of candidate:</b>	
	<b>Duration of appointment:</b>	[insert the whole period (start and end dates) for which this position will be engaged]
	<b>Time commitment: for this position:</b>	[insert the number of days/week/months/ that has been scheduled for this position]
	<b>Expected time schedule for this position:</b>	[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]
2.	<b>Title of position:</b>  <b>Name of candidate:</b>	
	<b>Duration of appointment:</b>	[insert the whole period (start and end dates) for which this position will be engaged]
	<b>Time commitment: for this position:</b>	[insert the number of days/week/months/ that has been scheduled for this position]
	<b>Expected time schedule for this position:</b>	[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]
3.	<b>Title of position:</b>  <b>Name of candidate:</b>	
	<b>Duration of appointment:</b>	[insert the whole period (start and end dates) for which this position will be engaged]
	<b>Time commitment: for this position:</b>	[insert the number of days/week/months/ that has been scheduled for this position]
	<b>Expected time schedule for this position:</b>	[insert the expected time schedule for this position (e.g. attach high level Gantt chart)]

**Form PER-2: Resume and Declaration****Key Personnel****Name of Bidder:**

<b>Position [#1]:</b> [title of position from Form PER-1]		
<b>Personnel information</b>	<b>Name:</b>	<b>Date of birth:</b>
	<b>Address:</b>	<b>E-mail:</b>
	<b>Professional qualifications:</b>	
	<b>Academic qualifications:</b>	
	<b>Language proficiency:</b> [language and levels of speaking, reading and writing skills]	
<b>Details</b>	<b>Address of employer:</b>	
	<b>Telephone:</b>	<b>Contact (manager / personnel officer):</b>
	<b>Fax:</b>	
	<b>Job title:</b>	<b>Years with present employer:</b>

Summarize professional experience in reverse chronological order. Indicate particular technical and Managerial experience relevant to the project.

<b>Project</b>	<b>Role</b>	<b>Duration of Involvement</b>	<b>Relevant experience</b>
[main project details]	[role and responsibilities on the project]	[time in role]	[describe the experience relevant to this position]

**Declaration**

I, the undersigned Key Personnel, certify that to the best of my knowledge and belief, the information contained in this Form PER-2 correctly describes myself, my qualifications and my experience.

I confirm that I am available as certified in the following table and throughout the expected time schedule for this position as provided in the Bid:

<b>Commitment</b>	<b>Details</b>
<b>Commitment to duration of contract:</b>	[insert period (start and end dates) for which this Key Personnel is available to work on this contract]
<b>Time commitment:</b>	[insert the number of days/week/months/ that this Key Personnel will be engaged]

I understand that any misrepresentation or omission in this Form may:

(a) be taken into consideration during Bid evaluation; (b) my disqualification from participating in the Bid; (c) my dismissal from the contract.

**Name of Key Personnel:** [insert name]

Signature: \_\_\_\_\_

Date: (day month year): \_\_\_\_\_

**Countersignature of authorized representative of the Bidder:**

Signature: \_\_\_\_\_

Date: (day month year): \_\_\_\_\_

**Appendix D to Technical Part: Bidder's Qualification**

To establish its qualifications to perform the contract in accordance with Section III (Evaluation and Qualification Criteria) the Bidder shall provide the information requested in the corresponding Information sheets included here under:

**Form ELI - 1.1**

**Bidder Information Form**

Date: \_\_\_\_\_ RFB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

Bidder's name
In case of Joint Venture (JV), name of each member:
Bidder's actual or intended country of registration: <i>[indicate country of Constitution]</i>
Bidder's actual or intended year of incorporation:
Bidder's legal address [in country of registration]:
Bidder's authorized representative information
Name: _____
Address: _____
Telephone/Fax numbers: _____
E-mail address: _____
<p>1. Attached are copies of original documents of</p> <ul style="list-style-type: none"> <li>i. Articles of Incorporation (or equivalent documents of constitution or association), and/or documents of registration of the legal entity named above, in accordance with ITB 4.4.</li> <li>ii. In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1.</li> <li>iii. In case of a State-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and that they are not under the supervision of the Employer, in accordance with ITB 4.6.</li> </ul> <p>2. Included are the organizational chart, a list of Board of Directors, and the beneficial ownership.</p>

**Form ELI 1.2**

**Bidder's JV Information Form**

**(Applicable in case of Joint Ventures: to be provided by each member of Bidder's JV)**

Date: \_\_\_\_\_ RFB No. and title: \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_ pages

Bidder's JV name:
JV member's name:
JV member's country of registration:
JV member's year of constitution:
JV member's legal address in country of constitution:
JV member's authorized representative information
Name: _____
Address: _____
Telephone/Fax numbers: _____
E-mail address: _____
<ol style="list-style-type: none"><li>1. Attached are copies of original documents of Articles of Incorporation (or equivalent documents of constitution or association), and/or registration documents of the legal entity named above, in accordance with ITB 4.4.</li><li>2. In case of a State-owned enterprise or institution, documents establishing legal and financial autonomy, operation in accordance with commercial law, and that they are not under the supervision of the Employer, in accordance with ITB 4.6.</li><li>3. The organizational chart, a list of Board of Directors, and the beneficial ownership.</li></ol>

**Joint Venture Agreement**

(to be executed on a Stamp Paper of value Rs 1000/- )

**Memorandum of Understanding for JOINT VENTURE**

This Memorandum of Understanding (hereinafter referred to as "MOU") is made and entered into this -----  
----- ("Effective Date").

**BETWEEN**

M/s \_\_\_\_, a [company/ partnership firm/ proprietorship] incorporated/ registered under the [name of the applicable legislation] and having its registered/ head office at \_\_\_\_\_(hereinafter referred to as the "First Part" which expression shall, unless repugnant to the context include its successors and permitted assigns)  
(Hereinafter referred to as the "First Party"/ "One Partner");

M/s \_\_\_\_, a [company/ partnership firm/ proprietorship] incorporated/ registered under the [name of the applicable legislation] and having its registered/ head office at \_\_\_\_\_(hereinafter referred to as the "Second Part" which expression shall, unless repugnant to the context include its successors and permitted assigns)  
(Hereinafter referred to as the "Second Party"/ "Second Partner");

M/s \_\_\_\_, a [company/ partnership firm/ proprietorship] incorporated/ registered under the [name of the applicable legislation] and having its registered/ head office at \_\_\_\_\_(hereinafter referred to as the "Third Part" which expression shall, unless repugnant to the context include its successors and permitted assigns)  
(Hereinafter referred to as the "Third Party"/ "Third Partner");

<<Remove the options which are not applicable and modify this part as per the number of members of the Joint Venture>>

Hereinafter jointly referred to as the "Parties" and individually as "Each Party" or "a Party" as the case may be.

**WHEREAS,**

A) **Amritsar Smart City Limited. AMRITSAR or Procuring entity invited bid** for Design, Build, Operation and Maintenance of MECHANIZED FULLY AUTOMATIC MULTILEVEL CAR PARKING SYSTEM for 10 (ten) years including Defect Liability Period for 2 (two) years, in Kairon market Amritsar under Smart City Mission

(B) The **Parties** hereto formed a Joint Venture or will form a joint venture (hereinafter referred to as the "JV") to jointly execute the above project in all respect **NOW THEREFORE IT IS HEREBY AGREED** as follows

**ARTICLE 1: JOINT VENTURE:**

1.1. The Parties hereto agree to form the Joint Venture with \_\_\_\_\_ designated as throne Partner and First Partner.

1.2. \_\_\_\_\_ shall be the Second Member – or Second Partner

**ARTICLE 2: JOINT VENTURE NAME:**

2. The JV shall do business in the name of “ \_\_\_\_\_ joint venture”

**ARTICLE 3: JOINT AND SEVERAL LIABILITIES:**

3. The Parties hereto shall, for the above-referred Projects, be jointly and severally liable to the Employer for the execution of the Projects in accordance with the Contract till the actual completion of Contract including defect liability period and operation & maintenance as per bid conditions.

**ARTICLE 4: PROPORTIONATE SHARE:**

4.1 Each member of the Joint Venture agrees to place at the disposal of the Joint Venture, the benefit of all its experience, technical knowledge and skill, and shall in all respects bear its share of responsibility and burden of completing the contract. The parties herein shall be responsible for physical and financial distribution of work as under.

## Section-IV Bidding Form

Physical responsibility: -----

Other Partners: Financial responsibility: -----

Physical responsibility: -----

4.2 All rights, interests, liabilities, obligations, risks, costs, expenses and pecuniary obligations and all net profits or net losses arising out of the Contract shall be shared or borne by the Parties in the above Proportions.

4.3 The members in the proportion as mention in article 4.1 shall contribute sufficient Initial fixed capital for timely execution of the project including commissioning & operating period as per the contract.

### **ARTICLE 5: JOINT EFFORT AND MANAGEMENT:**

5.1 The Parties shall participate as a JV in the submission of bids and further negotiations with the Employer and shall co-operate and contribute their respective expertise and resources to secure and execute the Projects.

5.2 On award of Projects, the First Partner in consultation with the other members of JV will decide on the final management structure for the successful execution of the Projects as per the terms of Contract.

5.3 All the Parties hereby agree to pool in their financial, administrative, managerial, technical and material resources for execution of the Projects, including commissioning & operation for the period as stipulated in the contract. The share of interest of the JV shall be as per the mutual understanding for the successful completion of the project.

### **ARTICLE 6: EXCLUSIVITY:**

6.1 The co-operation between the Parties hereto shall be mutually exclusive i.e. none of them shall without the other Party's consent & prior approval of Amritsar Smart City Limited Amritsar, approach or cooperate with any other parties in respect of the Project.

6.2 In the course of working as associates, the parties to the JV will be sharing information with each other which may be proprietary /confidential information /knowledge acquired by each other. It is hereby agreed that the parties will maintain complete secrecy regarding such information / knowledge and will not divulge to any party for any other purpose except for the success of the joint execution of the contract. All parties will also indemnify each other against any claim that may arise out of using information, which are being claimed proprietary.

### **ARTICLE 7: Memorandum of Understanding:**

7.1 This Memorandum of Understanding shall be terminated:-

- a. If the Parties mutually confirm that the JV's bid proposal has not been finally accepted by Employer and all rights and obligations of the Parties under or in connection with this Memorandum of Understanding have ceased, or
- b. After successful completion of the project including commissioning & Maintenance and defect liability period from the date of this Memorandum of Understanding unless extended for further period on demand of Amritsar Smart city limited Amritsar & mutual consent of the Parties, or

7.2 The Memorandum of Understanding can be modified by mutual consent of the Parties to suit the efficient and expeditious execution of Projects including commissioning & Maintenance or to make this agreement more meaningful to suit the requirements of Employer after the consent of the Employer.

### **ARTICLE 8: ARBITRATION:**

8.1 Any dispute resulting from this Agreement shall be settled amicably by mutual Consultation by the Managing Directors/Chairman of \_\_\_\_\_ & \_\_\_\_\_. In the event that an amicable settlement is not reached within 60 days in any particular case, the dispute shall be referred to arbitration and shall be resolved in accordance with and subject to the provisions of the \_\_\_\_\_ and any statutory modifications and enactment hereof for the time being in force. The decision of the arbitrators shall be final and binding upon both parties. The venue of arbitration will be Amritsar.

### **ARTICLE 9: GOVERNING LAWS:**

9.1 This Agreement shall in all respects be governed by and interpreted in accordance with the

**ARTICLE 10: CONFIDENTIALITY:**

10.1 No Party hereto shall disclose to any other party any information of a confidential nature including but not limited to trade secrets, know-how acquired from any Party in connection with the subject matter of this Agreement.

**ARTICLE 11: ADDRESS OF CONSORTIUM:**

Any and all correspondence from the Employer to the JV shall be addressed to (name of JV) at the address stated herein below— (any one of the partners). The address of the Consortium office of the partner companies will be deemed to be the address for the purpose of communication. The notice, if any required to be served on the party by the other party, will be deemed to be served, if the said notice / communication is delivered by Registered Post at the respective address (name of JV)

**ARTICLE 12: Authorized Representative:**

The JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution.

Authorized Representative of JV:

**ARTICLE 13: ASSIGNABILITY:**

13.1 The interests and rights of a Party in the Contract and as a Party of the Joint Venture shall not be transferable or assignable without the written consent of the Employer & other party.

**ARTICLE 14: INTERPRETATION OF HEADINGS:**

14. The headings of each of the Articles herein contained are inserted merely for convenience of reference and shall be ignored in the interpretation and construction of any of the provisions herein contained.

**ARTICLE 15: OTHERS**

15.1 Any other matters not contained in this Agreement shall be discussed and amicably agreed upon by the Parties in the spirit of mutual trust and cooperation for timely completion of project including commissioning & Maintenance of project. Notwithstanding anything above all the Parties are severally and jointly responsible to the Employer for execution of the Contract:

IN WITNESS WHEREOF the Parties hereto have caused this Agreement to be executed by each of the duly authorized representatives as appearing below:-

Name:

Designation:

Signed by)

For and on behalf of)

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---

Name:

Designation:

Signed by)

For and on behalf of)

---

---

Name:

Designation:

Signed by)

For and on behalf of)

---

---

Name:

Designation:

Signed by)

For and on behalf of)

---

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Name:

Designation:

Signed by)

For and on behalf of)

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**Bid Security (Not applicable as it is to be paid online)**

(in the form of unconditional Bank Guarantee)\*

**Form of Bid Security**

**[Insert Bank's Name and Address of Issuing Branch or Office]**

**Beneficiary:** Beneficiary: Chief Executive Officer  
Amritsar Smart City Limited  
II Floor, SCO-21, Block-B, Ranjit Avenue, Amritsar, Punjab, 143001

**Date: [insert date]**

**BID GUARANTEE No.: [insert number]**

We have been informed that [insert name of the Bidder] (hereinafter called "the Bidder") has submitted to you its bid dated [insert date] (hereinafter called "the Bid") for the execution of Design, Build, Operation and Maintenance of MECHANIZED FULLY AUTOMATIC MULTILEVEL CAR PARKING SYSTEM for 10 (ten) years including Defect Liability Period for 2 (two) years, in Kairon market Amritsar under Smart City Mission under Notice Inviting Bids No. 16/ASCL/2018-19 ("the NIB").

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Bidder, we [insert name of Bank] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ----- [insert amount in figures] [insert amount in words] upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

- (a) has withdrawn its Bid during the period of bid validity specified by the Bidder in the Letter of Technical Bid; or
- (b) having been notified of the acceptance of its Bid by the Procuring Entity during the period of bid validity,
  - (i) fails or refuses to execute the Contract Agreement,
  - (ii) fails or refuses to furnish the performance security, in accordance with the Instructions to Bidders (hereinafter "the ITB")
- (c) has not accepted the correction of mathematical errors in accordance with the ITB, or
- (d) has breached a provision of the Code of Integrity specified in the TB;

This guarantee will expire: (a) if the Bidder is the Successful Bidder, upon our receipt of copies of the contract signed by the Bidder and the Performance Security issued to you upon the instruction of the Bidder; and (b) if the Bidder is not the Successful Bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder of the name of the Successful Bidder; or (ii) thirty (30) days after the expiration of the validity of the Bidder's bid. Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

Signed: \_\_\_\_\_

**[Insert signature of person whose name and capacity are shown]**

Section-IV Bidding Form

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***NOTE: Scheduled Bank Only***

Name: \_\_\_\_\_

***[Insert complete name of person signing the Bid Security]***

In the capacity of: \_\_\_\_\_

***[Insert legal capacity of person signing the Bid Security]***

Duly authorized to sign the Bid Security for and on behalf of \_\_\_\_\_

***[Insert name of the Bank]***

Dated on day of

***[Insert date of signing]***

Bank's Seal \_\_\_\_\_

***[Affix seal of the Bank]***

***[Note: In case of a Joint Venture, the Bid-Security must be in the name of all partners to the Joint Venture/Lead member that submits the Bid.]***



**Form CON – 2****Historical Contract Non-Performance, Pending Litigation and Litigation History**

Bidder's Name: \_\_\_\_\_

Date: \_\_\_\_\_

JV Member's Name \_\_\_\_\_

RFB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

**Non-Performed Contracts in accordance with Section III, Evaluation and Qualification Criteria**

Contract non-performance did not occur since 1<sup>st</sup> January [insert year] specified in Section III, Evaluation and Qualification Criteria, Sub-Factor 2.1

Contract(s) not performed since 1 January [insert year] specified in Section III, Evaluation and Qualification Criteria, requirement 2.1

Year	Non-performed portion of contract	Contract Identification	Total Amount (current value, currency, exchange rate and INR equivalent)
[insert year]	[insert amount and percentage]	Contract Identification: [indicate complete contract name/number, and any other identification] Name of Employer: [insert full name] Address of Employer: [insert street/city/country] Reason(s) for non-performance: [indicate main reason(s)]	[insert amount]

**Pending Litigation, in accordance with Section III, Evaluation and Qualification Criteria**

No pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3.

Pending litigation in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.3 as indicated below.

Year of dispute	Amount in dispute (currency)	Contract Identification	Total Contract Amount (currency), INR Equivalent (exchange rate)
		Contract Identification: _____ Name of Employer: _____ Address of Employer: _____ Matter in dispute: _____ Party who initiated the dispute: _____ Status of dispute: _____	
		Contract Identification: Name of Employer: Address of Employer: Matter in dispute: Party who initiated the dispute: Status of dispute:	
Litigation History in accordance with Section III, Evaluation and Qualification Criteria			
No Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4.			
Litigation History in accordance with Section III, Evaluation and Qualification Criteria, Sub-Factor 2.4 as indicated below.			
Year of award	Outcome as percentage of Net Worth	Contract Identification	Total Contract Amount (currency), INR Equivalent (exchange rate)
[insert year]	[insert percentage]	Contract Identification: [indicate complete contract name, number, and any other identification] Name of Employer: [insert full name] Address of Employer: [insert street/city/country] Matter in dispute: [indicate main issues in dispute] Party who initiated the dispute: [indicate "Employer" or "Contractor"] Reason(s) for Litigation and award decision [indicate main reason(s)]	[insert amount]

**Form FIN – 3.1****Financial Situation and Performance**

Date: \_\_\_\_\_

Bidder's Name: \_\_\_\_\_ JV Member's Name \_\_\_\_\_  
 RFB No. and title: \_\_\_\_\_ Page \_\_\_\_\_ of \_\_\_\_\_ pages

**1. Financial data<sup>#</sup>**

Type of Financial information in (currency)	Historic information for previous _____ years, (amount in currency, currency, exchange rate*, in INR equivalent)				
	Year 1	Year 2	Year 3	Year 4	Year 5
Statement of Financial Position (Information from Balance Sheet)					
Total Assets (TA)					
Total Liabilities (TL)					
Total Equity/Net Worth (NW)					
Current Assets (CA)					
Current Liabilities (CL)					
Working Capital (WC)					
Information from Income Statement					
Total Revenue (TR)					
Profits Before Taxes (PBT)					
Cash Flow Information					
Cash Flow from Operating Activities					

\*Refer to ITB 15 for the exchange rate

# The Financial Certificate shall be certified by the Chartered Accountant.

**2. Sources of Finance**

Specify sources of finance to meet the cash flow requirements on works currently in progress and for future contract commitments.

No.	Source of finance	Amount (INR equivalent)
1		
2		
3		

**2. Financial documents**

The Bidder and its parties shall provide copies of financial statements for \_\_\_\_\_ years pursuant Section III, Evaluation and Qualifications Criteria, Sub-factor 3.1. The financial statements shall:

- (a) reflect the financial situation of the Bidder or in case of JV member, and not an affiliated entity (such as parent company or group member).
- (b) be independently audited or certified in accordance with local legislation.
- (c) be complete, including all notes to the financial statements.
- (d) correspond to accounting periods already completed and audited.

Attached are copies of financial statements for the \_\_\_\_\_ years required above and complying with the requirements

If the most recent set of financial statements is for a period earlier than 12 months from the date of bid, the reason for this should be justified

**Form FIN – 3.2**

**Average Annual Turnover**

(See Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2)

Bidder's Name: \_\_\_\_\_  
Date: \_\_\_\_\_

S. No.	Financial Year	Annual Construction Turnover (INR)
1	Financial Year 2012-13	
2	Financial Year 2013-14	
3	Financial Year 2014-15	
4	Financial Year 2015-16	
5	Financial Year 2016-17	
6	Financial Year 2017-18	

Note: The audited Financial Statements for the corresponding year has to be attached.

Name of the auditor issuing the certificate

Name of the auditor's Firm:

Seal of the auditor's Firm:

Date:

**Note: Signature, name and designation of the authorized signatory for the Auditor's Firm**

\* See Section III, Evaluation and Qualification Criteria, Sub-Factor 3.2.

**Form FIN –  
3.3**

**Financial Resources**

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as specified in Section III (Evaluation and Qualification Criteria)

<b>Financial Resources</b>		
<b>No.</b>	<b>Source of financing</b>	<b>Amount (INR equivalent)</b>
1		
2		
3		

**Form FIN – 3.4****Current Contract Commitments / Works in Progress  
(to be executed on the Stamp Paper of Rs. 500/-)**

Bidders and each member to a JV should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

**Bidding Capacity = 2 A X N – B**

**STATEMENT FOR WORK IN HAND (for calculation of value of B)**

This is to certify that the status of the present works in hand as on date of publication of NIT of order value more than Rs. 10.00 lacs for Which either order is received or the work is under execution but which are still not completed is as under:

Amount in Lac Rs.

S. No	Brief Description of Work	Stipulated Date of Start	Stipulated Date of Completion	Time left for execution after date of publication of NIT, in months	Cost of awarded work	Cost of work executed up to date of publication of NIT	Balance Cost of un-executed work as on date of publication of NIT in 30 month from and date of submission
1	2	3	4	5	6	7	8=6-7

1. If the value of Balance work goes beyond 30 months from the date of bid submission then client certificate mentioning the amount of work to be executed beyond 30 months, otherwise full balance work shall be accounted for calculation of 'B' value.
2. This is certified that this is true in all respect and can be used for calculation of the bidding capacity as per the formula given in ITB. This is also certified that other orders under execution by the firm shall not materially affect the bidding capacity of the firm as required in this tender. (**Format should be on Rs 500/- stamp paper**)

Signatures with Seal of Authorized Signatory for tender

**Form EXP - 4.1****General Experience**

Bidder's Name: \_\_\_\_\_

Date: \_\_\_\_\_

JV Member's Name \_\_\_\_\_

RFB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

<b>Starting Year</b>	<b>Ending Year</b>	<b>Contract Identification</b>	<b>Role of Bidder</b>
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	
		Contract name: _____ Brief Description of the Works performed by the Bidder: _____ Amount of contract: _____ Name of Employer: _____ Address: _____	

**Form EXP - 4.2(a)**

**Specific Construction and Contract Management Experience**

Bidder's Name: \_\_\_\_\_

Date: \_\_\_\_\_

JV Member's Name \_\_\_\_\_

RFB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages.

Similar Contract No.	Information					
Contract Identification						
Award date						
Completion date						
Role in Contract	Prime Contractor	Member in JV	Management Contractor	Sub-contractor		
Total Contract Amount			INR			
If member in a JV or sub-contractor, specify participation in total Contract amount						
Employer's Name:						
Address:						
Telephone/fax number						
E-mail:						

**Form EXP - 4.2(a) (cont.)**

**Specific Construction and Contract Management Experience (cont.)**

<b>Similar Contract No.</b>	<b>Information</b>
Description of the similarity in accordance with Sub-Factor 4.2(a) of Section III:	
1. Amount	
2. Physical size of required works items	
3. Complexity	
4. Methods/Technology	
5. Construction rate for key activities	
6. Other Characteristics	

**Form EXP - 4.2(b)****Experience in Key Activities**

Bidder's Name: \_\_\_\_\_

Date: \_\_\_\_\_

Bidder's JV Member Name: \_\_\_\_\_

Sub-contractor's Name<sup>10</sup> (as per ITB 34.2 and 34.3): \_\_\_\_\_

RFB No. and title: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

All Sub-contractors for key activities must complete the information in this form as per ITB 33.2 and 33.3 and Section III, Qualification Criteria and Requirements, Sub-Factor 4.2

1. Key Activity No One: \_\_\_\_\_

<b>Information</b>				
Contract Identification				
Award date				
Completion date				
Role in Contract	Prime Contractor	Member in JV	Management Contractor	Sub-contractor
Total Contract Amount			INR	
Quantity (Volume, number or rate of production, as applicable) performed under the contract per year or part of the year	Total quantity in the contract (i)	Percentage Participation (ii)	Actual Quantity Performed (i) x (ii)	
Year 1				
Year 2				
Year 3				
Year 4				
Employer's Name:				

10 If applicable

## Section-IV Bidding Form

	<b>Information</b>
Address:	
Telephone/fax number	
E-mail:	

2. Activity No. Two

3. .....

	<b>Information</b>
Description of the key activities in accordance with Sub-Factor 4.2(b) of Section III:	

**Letter of Bid - Financial  
Part**

**Date of this Bid submission:** [insert date (as day, month and year) of Bid submission]

**Request for Bid No.:**16/ASCL/2018-19

To:

*The Chief Executive  
Officer, Amritsar Smart  
City Limited,  
SCO – 21, II Floor, District Shopping Centre, Block – B, Ranjit  
Avenue, Amritsar - 143001, Punjab, INDIA*

We, the undersigned, hereby submit the second part of our Bid, the Bid Price for the construction period (which shall include the cost or and the operation and maintenance period . This accompanies the Letter of Technical Part.

In submitting our Bid, we make the following additional declarations:

- (a) **Bid Validity Period:** Our Bid shall be valid for a period specified in BDS 18.1 i.e. 120 days (or as amended if applicable) from the date fixed for the Bid submission deadline specified in BDS 22.1 (or as amended if applicable), and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (b) **Bid Price:** The Bid Price of our Bid, excluding any discounts offered in item (c) below is:

**For the construction period (including operation and maintenance during defect liability period):**

*[CAPEX i.e insert the total lump sum price for all the items of Works in words and figures, indicating the various amounts and the respective currencies];*

**For operation and maintenance period :**

*[Insert the value of NPV in terms of ITB 14 read with section III sub section 3.5 of RFB]*

*[insert the value of the Premium derived after subtracting the Annual License Fee quoted and CAPEX in terms of this RFB]*

- (c) **Discounts:** The discounts offered and the methodology for their application is: (i) The discounts offered are: [Specify in detail each discount offered]
  - (ii) The exact method of calculations to determine the net price after application of discounts is shown below: [Specify in detail the method that shall be used to apply the discounts];
- (d) **Commissions, gratuities and fees:** We have paid, or will pay the following commissions, gratuities, or fees with respect to the Bidding process or execution of the Contract: [insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity].

Name of Recipient	Address	Reason	Amount

(If none has been paid or is to be paid, indicate "none.")

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

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

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

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

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

**NOTE:**

\*: In the case of the Bid submitted by a Joint Venture specify the name of the Joint Venture as Bidder.

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

### **Format for assured revolving line of credit facility**

*(To be submitted by a Scheduled Bank on the Bank's Letter head)*

**Date:** (Insert Date-

**To:**

Chief Executive Officer  
Amritsar Smart City Limited,  
SCO – 21, II Floor, District Shopping Centre,  
Block-B, Ranjit Avenue, Amritsar - 143001,  
INDIA  
Subject: Letter of Assurance for Revolving line of credit facility for INR ----  
Dear Sir,

---

WHEREAS \_\_\_\_\_ [name and address of Bidder] (hereinafter called the "Bidder") intends to submit a bid for "Design, Build, Operation and Maintenance of MECHANIZED FULLY AUTOMATIC MULTILEVEL CAR PARKING SYSTEM for 10 (ten) years including Defect Liability Period for 2 (two) years, in Kairon market Amritsar under Smart City Mission" under the Amritsar Smart City Limited, Amritsar (hereinafter called the "Employer") in response to the Invitation for Bids issued by the Amritsar smart City Limited Amritsar through NIB no. 16/ASCL/2018-19; and

WHEREAS the Bidder has requested that an assured revolving line of credit be provided to it for executing the Design, Build, Operation and Maintenance of MECHANIZED FULLY AUTOMATIC MULTILEVEL CAR PARKING SYSTEM for 10 (ten) years including Defect Liability Period for 2 (two) years, in Kairon market Amritsar under Smart City Mission. In the event that the Contract is awarded to it then

KNOW ALL THESE PEOPLE by these presents that We \_\_\_\_\_ [name of Bank] of \_\_\_\_\_ [name of Country] having our registered office at \_\_\_\_\_ [address of registered office] are willing to provide to

\_\_\_\_\_ (the Bidder) a sum of up to \_\_\_\_\_

[Amount of guarantee in figures and words] as an assured revolving line of credit for executing the Works under --- ----- --- (name of contract package) -----should the Bidder be awarded the contract based on its tendered prices.

We understand that this assurance may be taken into consideration by the Employer during evaluation of the Bidder's financial capabilities, and further assure that we intend to maintain this revolving line of credit until such time as the Works are completed and taken

over by the Employer.

SEALED with the Common Seal of the said Bank on the \_\_\_\_\_ day of \_\_\_\_\_/2019

Date \_\_\_\_\_ Signature of the Bank: \_\_\_\_\_

Witness: \_\_\_\_\_ Seal \_\_\_\_\_

[Signature, name and address]

---

*(Bidders shall fill up this format and submit the same with Technical Bid)*

**Format for Minimum Development Obligations**

S.No	Minimum Development Obligations to be met by the bidders	Proposed development obligations met by the bidder
1.	ECS Requirement – 415 nos.	ECS Proposed _____ nos.
2.	Two Wheeler Parking – 50 nos	Two Wheeler Parking Proposed _____ nos
3.	Visitors facilitation centre & public amenities etc – 80 sq.m	Visitors facilitation centre & public amenities: _____ sq.m

**Note: The Bidders shall calculate the ECS Requirement and the commercial space in their proposed design of the MLCP taking into consideration the Municipal Corporation Amritsar (MCA) norms and other various statutory norms.**

We hereby declare that we have calculated the ECS Requirement and the commercial space in our proposed design of the MLCP taking into consideration the Municipal Corporation Amritsar (MCA) norms and other various statutory norms.

*(Signature, name and designation of the authorized signatory)*

**FORMAT OF DETAIL AREA STATEMENT***(Bidders shall fill up this format and submit the same in Technical Bid)*

<b>Sl. No</b>	<b>Details</b>
1	Plot Area (in sq. m)
2	Area under circulation (in sq. m)
3	Ground Coverage (in % )
4	Total area under car parking floors (in sq. m.)
4	Total area under two wheeler parking (in sq. m.)
5	Total area under Visitors facilitation centre & public amenities (in sq. m.)
6	Area under utilities (in sq. m.)
7	Common area statement in sq. m. (Entry / Exit areas, Lobby area with lifts and staircases, fire escape staircase, toilets and other common facilities)
8	F.A.R achieved

**Parking and Commercial Floor Details**

<b>Sl. No</b>	<b>Floors</b>	<b>Area under Parking/ Commercial</b>	<b>ECS</b>	<b>ECS efficiency in sq.m</b>
1	L-3 Basement			
2	L-2 Basement			
3	L-1 Basement			
4	Ground Floors			
5	1 <sup>st</sup> Floor			
6	2 <sup>nd</sup> Floor			
7	3 <sup>rd</sup> Floor			
8	4 <sup>th</sup> Floor			
9	5 <sup>th</sup> Floor			
10				
11				

*(Signature, name and designation of the authorized signatory of the Bidder)*

## **Section V - Eligible Countries**

### **Eligibility of Procurement for the Provision of Goods, Works and Non-consulting Services in the projects financed by Government of India and/or State Government Punjab**

In reference to ITB 4.8 and ITB 5.1, the Bidders are requested to check the eligibilities of the countries for procurement of goods, works and Non-consulting Services whether declared prohibited/ ineligible for trade and/or procurement by the Government of India (GoI). During the Contract agreement, if at any time GoI declares the prohibition of trade/procurement of goods, works, Non-consulting services from country/countries, the same shall be applicable w.e.f. the date of enforcement declared by the Government of India

## **Section VI - Fraud and Corruption**

- 6.1 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 Letter of Acceptance and/or Letter of Award and during the subsistence of the Contract Agreement. Notwithstanding anything to the contrary contained herein, or in the Letter of Acceptance and/or Letter of Award or the Contract Agreement, the Employer shall reject a Bid, withdraw the Letter of Acceptance and/or Letter of Award, or terminate the Contract Agreement, as the case may be, without being liable in any manner whatsoever to the Bidder or Contractor or Concessionaire, as the case may be, if it determines that the Bidder or Contractor or Concessionaire, as the case may be, has, 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 Employer shall forfeit and appropriate the Bid Security or Performance Security, as the case may be, as mutually agreed genuine pre-estimated compensation and damages payable to the Employer towards, inter alia, time, cost and effort of the Employer, without prejudice to any other right or remedy that may be available to the Employer hereunder or otherwise.
- 6.2 Without prejudice to the rights of the Employer under Clause 6.1 hereinabove and the rights and remedies which the Employer may have under the Letter of Acceptance and/or Letter of Award or the Contract Agreement, if a Bidder or contractor or Concessionaire, as the case may be, is found by the Employer 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 Letter of Acceptance and/or Letter of Award or the Contract Agreement or the execution of the Contract Agreement, such Bidder or Contractor or Concessionaire shall not be eligible to participate in any tender or RFP issued by the Employer during a period of 2 (two) years from the date such Bidder or Contractor or Concessionaire, as the case may be, is found by the Employer 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.
- 6.3 For the purposes of this Clause 6, the following terms shall have the meaning hereinafter respectively assigned to them:
  - (a) "corrupt practice" means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the actions of any person connected with the Bidding Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of the Employer who is or has been associated in any manner, directly or indirectly with the Bidding Process or the Letter of Acceptance and/or Letter of Award or has dealt with matters concerning the Contract Agreement or arising therefrom, before or after the execution thereof, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of the Employer, shall be deemed to constitute influencing the actions of a person connected with the Bidding Process); or (ii) engaging in any manner whatsoever, whether during the Bidding Process or after the issue of the Letter of Acceptance and/or Letter of Award or after the execution of the Contract Agreement, as the case may be, any person in respect of any matter relating to the Project or the Letter of Acceptance and/or Letter of Award or the Contract Agreement, who at any time has been or is a legal, financial or technical adviser of the Employer in relation to any matter concerning 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;

## **Section VI - Fraud and Corruption**

- (d) “undesirable practice” means (i) establishing contact with any person connected with or employed or engaged by the Employer 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; and
- (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 VII – Employer's Requirement**

## Section VII – Employer's Requirement

### Section VII – Employer's Requirement

**This Section-VII contains the Scope of Services, Specifications of Work, Supplementary Information Drawings, Personnel Requirement and Equipment Requirements.**

*It is recommended that the Bidders physically visit the site of the proposed work before bidding in order to assess the quantum and nature of works.*

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##### 7.1 SCOPE OF SERVICES

- Annexure – A: Scope of Works for Civil and Steel Components including Sanitary & Plumbing works, Drainage & Sewage Works, Road Works
- Annexure – B: Scope of Works for Mechanical Components including Fire Fighting & Car Parking System
- Annexure – C: Scope of Works for Electrical Components, Ventilation and Solar Power Plant
- Annexure – D: Scope of Works for Car Parking Management System and Instrumentation
- Annexure – E: Scope of Works for Operation & Maintenance

##### 7.2 SPECIFICATIONS.....

- 7.2.1 Technical Specifications
- 7.2.2 Operation and Management Requirement .....
- 7.3 Drawings .....
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## Section VII – Employer's Requirement

### 7.1 SCOPE OF SERVICES

#### 7.1.1 Preamble

The Overall objective of the Construction of Car Parking Facility in Kairon Market, Amritsar is to bring about decongestion of traffic in the adjoining area of city by reducing on street parking. This will not only help in providing safe, secure and efficient vehicular circulation / passage but will also enhance public safety & security. The proposed car parking facility is to be constructed Smart city proposals Amritsar. The bidder has to quote for Design, Build, Operation and Maintenance for ten years of Mechanized Fully Automatic Multi Level Car Parking Facility (including 2 years of DLP) near Kairon Market, Amritsar for Minimum 415 ECS and 50 two wheeler spaces. The broader Scope of Services to be provided by the Contractor under this Contract is as follows:

**Planning & Design** of Civil & structural work for the automated MLCP building including Plumbing, Drainage & Sewerage, Rain Water Harvesting, Landscaping, Mechanical, Fire Prevention & Fire Fighting, Car Parking System, Electrical, Ventilation, Solar Power Plant, Car Parking Management and Instrumentation Components for Fully-Automatic Car Parking Facility.

**Demolition work:** All existing encumbrances and establishment at site needs to be carried out by Successful bidder like demolition of existing sulabh sauchalya, existing transformer area etc. however ASCL will assist in all necessary NOCs to carry out work. There is existing underground tubewell, which can be shifted if required by bidder as per his design and same may be then included in the scope of bidder.

**Construction of Facility** including Civil & structural work for the automated MLCP building including Plumbing, Drainage & Sewerage, Rain Water Harvesting, Landscaping, Mechanical, Fire Prevention & Fire Fighting, Car Parking System, Electrical, Ventilation, Solar Power Plant, Car Parking Management and Instrumentation Components for Fully-Automatic Car Parking Facility

**Operation & Maintenance of whole Facility** for Ten (10) years after the date of commissioning including the defect liability period of two year. (Operational manpower namely operators , watch and ward, traffic regulators, health and safety, fuel and lubricants for DG sets, or any other requirement to Operate the system 24x7 shall be borne by the contractor) The electricity and water supply charges shall be paid by the contractor during Operation and maintenance period.

**Conducting Training Program** during 6 months of last year of Operation & Maintenance for the staff of ASCL/MCA Authorized agency by ASCL.

The eligible payments for Planning, Design and Construction of all the components of this Facility shall be reimbursed to the Contractor by ASCL and the License fees during the operation & maintenance for Ten (10) years shall be payable by the Contractor to ASCL / MCA as per the price schedule.

- 7.1.1.1 The general Scope of Services described hereunder is neither exhaustive nor complete and is indicative only. The Contractor shall undertake its own detailed investigations regarding the to-be-built Facility to determine the complete Scope of Services for performance of all obligations as stipulated in various clauses of this Bid Document.
- 7.1.1.2 The Scope of Services shall include all technical, managerial, administrative, commercial, environmental, and social interventions as required in accordance with all the provisions of this Bid Document and good engineering and management practices ensuring safe and secure parking solutions to the end users.

## 7.1.2 Definitions

The words, terms and expressions beginning with capital letters and defined under this Section 7, Clause 1.2 including those in Section 8 - General Conditions of Contract and those in Section 9 – Particular Conditions of Contract shall, unless the context otherwise requires, have the meanings ascribed thereto / herein :

**"BIS"** means Bureau of Indian Standard Specification;

**"BOQ"** means Bill of Quantity;

**"Contract Commencement Date"** shall mean the date on which the Contract Agreement is signed and Design Services shall be commenced by the Contractor.

**"Commissioning Date"** shall mean the date on which the created Facility is commissioned for the purpose of use.

**"Construction Completion Date"** shall mean the date on which the Construction of Facility is complete in all respects and the Facility is commissioned.

**"Construction Period"** shall mean the period commencing from the Site Takeover Date and up to the Construction Completion Date;

**"Contract Completion Date"** shall mean the date on which all the Contractual obligations (including Operation & Maintenance Period) will be completed by the Contractor and the Contract expires.

**"Contract Period or TotalContract Period"** means the period of Contract spread over 11 years from the Commencement Date up to the

Contract Completion Date;

**"Contractor Personnel"** means those personnel hired and deployed by the Contractor for the purpose of fulfilling his contractual obligations.

**"CPHEEO"** means the Central Public Health and Environmental Engineering Organization under the Ministry of Urban Development, Government of India;

**"Design Period"** is the period of Contract commencing on the Commencement Date and up to a maximum of 60 days, during which time the Contractor will prepare and get approved his Planning, Design and Drawings of all components of work necessary for construction of the Facility under this contract.

**"Project Management consultant"** means the agency appointed by the Employer to provide design and construction supervision services under a separate Contract;

**"DLP"** means Defects Liability Period, which for this contract is 2 year after the successful commissioning of the Facility.

**"Electricity Department"** means the local service provider supplying electrical energy for Operation Services of the Car Parking Facility;

**"ASCL"** means Amritsar Smart City Limited .

**"Existing Assets"** means those infrastructure components, plant, machinery, equipment and any other units existing at the Site of construction as on Commencement Date;

**"FAS"** means Fire Alarm Systems;

**"FFS"** means Fire Fighting Systems;

**"FPS"** means Fire Prevention Systems;

**"Government Agencies"** means all those agencies comprising of local, state and Central Government authorities directly or indirectly connected to provision of Car Parking Facility at Kairon market, Amritsar.

**"VENTILATIONS"** means Heating, Ventilation and Air Conditioning System.

**"IFB"** means Invitation for Bids;

**"MCA"** means the Municipal Corporation Amritsar including all its successors, assignees;

**"Major Maintenance"** means large capital maintenance works requiring replacement of any part, component, machinery with their allied accessories and civil works constructed under this Contract.

**"Mandatory Works"** means those works which are listed in the Activity Schedule/Bill of Quantities and are required to be constructed, installed or erected as the case may be and commissioned in line with the provisions of this Contract unless such works may require change of scope or design as agreed by the Parties.

**"Milestones"** means the targets to be achieved during the concurrency of the Contract and at the end of the Contract Completion Period.

**"Minor Maintenance"** means routine preventive or corrective maintenance works such as minor repair, reconditioning, or replacement of spare parts to ensure serviceability of the created assets under this

contract.

**"Non-Performance Adjustment"** means the adjustment in Payments made by the Employer from the Contractor Payment due to failure of the Contractor to perform as per contract stipulations to the satisfaction of the Engineer/Employer.

**"Operation & Maintenance Service Period"** is the period of contract commencing from the next date of Commissioning of the Facility and spreading over a period of 10 years.

**"PCC"** means Plain Cement Concrete

**"Parking Charge"** shall mean the charge per car parked in the created Facility for a specified time as decided by ASCL.

**"Planned Maintenance"** means activities required to undertake preventive maintenance of all assets created under the Contract;

**"Project Management Consultant"** means the agency appointed by the Employer to provide project management advisory services to the Employer.

**"QA"** means Quality Assurance; **"QC"** means Quality Control;

**"RCC"** means Reinforced Cement Concrete

**"RCCS"** means Reinforced Cement Concrete Specifications;

**"SEP"** means Site Environmental Plan

**"Schedules or Schedule"** means the schedules forming part of this contract, or any one of them, as the context requires;

**"Scope of Services"** shall mean all those services to be provided by the Contractor in accordance to the obligations, activities, responsibilities and tasks in implementing the Project.

**"Services"** means all those activities, interventions, actions and tasks required as part of creating the Facility under this Contract including all planning, design, detailed engineering, procurement, construction, Operations, maintenance, and management in providing best possible car parking facility to the end users.

**"TMP"** means Traffic Management Plan;

**"W/C Ratio"** means Water / Cement Ratio

### 7.1.3 Site Assessment – Kairon Market



Site Picture



Site Google Imagery

#### 7.1.3.1 Physical conditions

- The identified site is a part of the demarcated ABD area
- The entire area is a part of the walled city which over the years has developed and grown as an organic

~~settlement with hardly any open spaces, no setbacks have been provided by the individual plot owners – the entire area is being used for retail commercial; a hotel (Ramada) has come up just opposite the road in the~~

East

- c) The neighboring areas on all sides are established and recognized commercial areas with independent plots built up to 4 (four) storey, exception being the Ramada Hotel just opposite the proposed site in the East
- d) The neighboring area is being used for “Mixed Land use” with shops (retail) limited mostly on the Ground floor and residential on floors above (3 to 4 floors). The site is surrounded by about 25-30 shops and about an equal number of households
- e) The site is vacant and open on all four sides with roads of varying widths - about 12.0 M wide road towards East, about 5.0 M wide road in North, South and West out of which 2.5 m carriage is encroached by on street parking
- f) The site has ease of connectivity, ease of approach and central location with confirmed and identified users (both shop owners and shoppers / tourists) from neighboring shopping area in established and approved commercial area – positive impact on viability of the project
- g) The main Hall road in the East has been declared by the authorities as a “One way road” starting from the Hall Gate in the North to the Partition Museum in the South.



#### 7.1.3.2 Present Condition

- a) The site is used as a parking for cars & operated by a parking contractor authorized by the municipal corporation. Area being used to its maximum – vehicles being parked bumper to bumper with minimum gaps; no parking norms being observed – vehicles parked in a form of “puzzle”



- b) About 60-70 four wheel vehicles at one time - about 300 vehicles parked during the day. Four and two wheelers are being parked also on the main and secondary roads (both 900 and parallel parking) which reduce and congest the moveable area creating bottlenecks
- c) A public toilet (Sulabh Sauchalaya) and a water pump building exists on the Eastern side, facing the road; an electricity transformer with transmission switch yard is located on the Western side.

**Clockwise: Pump house, Sulabh Sauchalaya, Transformer pictures**



The Amritsar Municipal Corporation has awarded a contract to a Parking Contractor to run a paid parking on the said site as following:

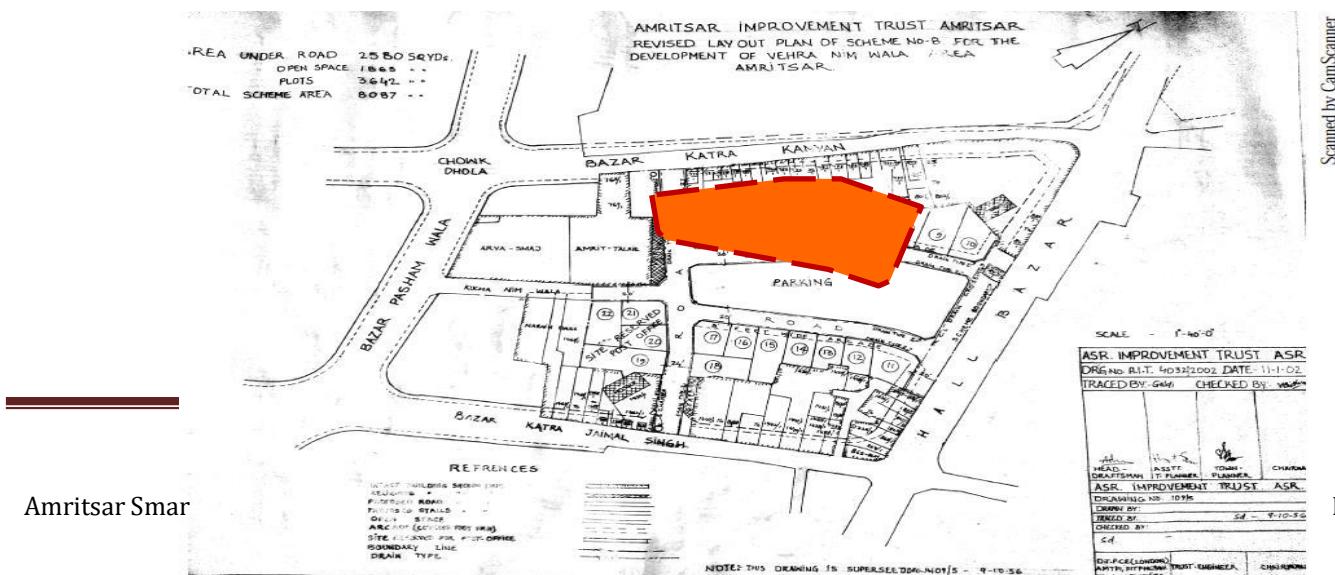
Authority	Annual Tender Value	Validity till	Approx. Space for Parking	% of Monthly Pass	% of Daily Users	Turn Around for daily users	Pricing
Municipal Corporation Amritsar	12.0 lacs	March 2018	80	40%	60%	4	30 Rs for daily for 12 hours & 700 Rs for Monthly

Source: *Tender for parking management for the year 2017-18 from MCA*

#### 7.1.3.3 Land use & ownership

As the site is part of walled city, the site was demarcated as Open space / park in the records available. Later the site has been covered under development scheme of Amritsar Improvement Trust and as per the land use map available this site is now marked as "Parking".

**Map showing the site land use:** Source: *Copy of letter from Estate Officer, MCA confirming the land use at Annexure I*



#### **7.1.3.4 Geotechnical Analysis**

In order to determine the type of foundation and structure for Multi-Level Car Parking at Kairo Market, Geotechnical investigation was conducted at these 2 (two) sites. The survey was conducted by Compass Solutions Pvt. Ltd. in February 2017 and the soil samples were tested at Engineering Training Testing and Calibration Laboratory, Jaipur.

At Kairon Market, a basement was also envisaged, 2 bore holes with 25m depth were drilled to take out samples. Field investigation at the site were planned to determine the required characteristics of underlying soil to design the foundations of the proposed structure, the data obtained from these investigations were analyzed to arrive at the required parameters, mainly the safe bearing capacity of the soil at various depth with respect to the existing ground level.

In order to achieve the stated objectives, the stipulated scope of work included following operations:

- Drilling two boreholes of 100 mm diameter from the ground level to 12.0 / 25.0 meter depth or up to refusal strata.
- Conducting Standard Penetration Test in borehole as per Indian standard specification (IS-2131)
- Extracting undisturbed soil samples and sealing, numbering and preserving them as per (IS-2132)
- Carrying out following necessary test on the soil samples to establish its characteristics:
  - Sieve analysis
  - Bulk density
  - Specific gravity
  - Atterberg limits
  - Shear Strength Parameters
  - Consolidation Properties

#### **7.1.3.5 Bearing Capacity**

Based on the boreholes on site / laboratory tests for Kairon Market site, the results have been presented in the table below:

**Kairon Market: safe Bearing Capacity BH-1**

Depth (meter)	Settlement Criteria (Table -8)	Lab Findings			Recommended Safe Bearing Capacity (T / m <sup>2</sup> ) (Lower of columns 2 & 5 & rounded down)
		Local Shear Failure Criteria (Tables-4)	General Shear Failure Criteria (Tables-6)	Interpolated Value from Column 3 & 4 (As per IS 6403- 1981)	

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>3.00</b>	8.17	13.24	26.61	21.93	8.17
<b>4.50</b>	10.77	19.09	37.56	31.10	10.77
<b>6.00</b>	15.59	24.95	53.34	43.41	15.00*
<b>7.50</b>	21.31	30.81	65.32	53.24	15.00*
<b>9.00</b>	26.68	36.66	77.31	63.08	15.00*
<b>10.50</b>	29.28	42.52	89.29	72.92	15.00*
<b>12.00</b>	33.26	52.00	111.44	90.64	15.00*
<b>13.50</b>	37.65	58.28	124.59	101.38	15.00*
<b>15.00</b>	41.10	69.49	151.86	123.03	15.00*
<b>16.50</b>	45.95	76.68	167.28	135.57	15.00*
<b>18.00</b>	49.84	83.47	181.83	147.40	15.00*
<b>19.50</b>	55.12	90.25	212.22	169.53	15.00*
<b>21.00</b>	59.58	97.04	227.90	182.10	15.00*
<b>22.50</b>	66.93	103.83	243.57	194.66	15.00*
<b>24.00</b>	70.50	110.61	259.25	207.23	15.00*
<b>25.00</b>	73.26	115.14	269.70	215.60	15.00*

**Kairo Market: safe Bearing Capacity BH-2**

Depth (meter)	Settlement Criteria (Table -8)	Lab Findings			Recommended Safe Bearing Capacity (T / m <sup>2</sup> ) (Lower of columns 2 & 5 & rounded down)
		Local Shear Failure Criteria (Tables-4)	General Shear Failure Criteria (Tables-6)	Interpolated Value from Column 3 & 4 (As per IS 6403- 1981)	
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>1.50</b>	7.79	7.34	17.30	12.82	7.50
<b>3.00</b>	10.37	13.16	29.21	21.99	10.37

<b>4.50</b>	16.07	20.48	41.13	31.84	15.00*
<b>6.00</b>	20.32	26.72	58.51	44.21	15.00*
<b>7.50</b>	23.86	32.58	70.75	53.58	15.00*
<b>9.00</b>	27.80	38.76	83.67	63.46	15.00*
<b>10.50</b>	32.14	44.93	96.59	73.34	15.00*
<b>12.00</b>	35.55	55.03	120.80	91.20	15.00*
<b>13.50</b>	40.33	62.02	135.81	102.60	15.00*
<b>15.00</b>	45.65	68.69	150.10	113.47	15.00*
<b>16.50</b>	53.99	75.36	164.40	124.33	15.00*
<b>18.00</b>	56.55	82.03	193.15	143.15	15.00*
<b>19.50</b>	58.92	88.18	207.34	153.72	15.00*
<b>21.00</b>	61.47	94.81	222.66	165.13	15.00*
<b>22.50</b>	66.03	101.44	237.97	176.53	15.00*
<b>24.00</b>	69.54	108.07	253.29	187.94	15.00*
<b>25.00</b>	73.36	112.49	263.50	195.55	15.00*

Section VII – Employer's Requirement  
**Kairon Market: Results of Laboratory Tests (Bore-1 and 2)**

B.H. No.	Depth (m)	Type of Sample	Field Density (gm/cc)	Natural Moisture Content (%)	Void Ratio	Specific Gravity	Grain Size Analysis				Consistency limits			Soil Classification	Shear Parameter		SPT N Value	
							Gravel (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt & Clay (%)	Liquid Limits (%)	Plastic Limits (%)	Plasticity Index (%)	C (Kg/cm <sup>2</sup> )	ϕ (Degree)		
1	3.0	SP T	1.73	6.28	0.62	2.63	1.13	1.37	1.796	78.2	17.45	23.91	NP L	NPI	SM	0.00	25	5
	4.5	SP T	1.73	7.12	0.62	2.63	2.62	1.27	1.775	81.2	13.09	23.98	NP L	NPI	SM	0.00	25	6
	6.0	SP T	1.73	6.77	0.62	2.64	2.91	1.71	2.761	80.2	12.41	23.92	NP L	NPI	SM	0.00	26	9
	7.5	SP T	1.73	6.32	0.62	2.63	1.52	1.23	1.652	83.6	11.98	23.14	NP L	NPI	SM	0.00	26	11
	9.0	SP T	1.73	6.58	0.62	2.63	0.62	1.65	1.491	85.2	11.03	23.89	NP L	NPI	SM	0.00	26	15
	10.50	SP T	1.73	6.89	0.62	2.63	2.35	1.24	2.018	81.9	12.42	24.00	NP L	NPI	SM	0.00	26	16
	12.00	SP T	1.73	6.45	0.62	2.64	2.56	1.89	1.736	81.5	12.26	23.10	NP L	NPI	SM	0.00	27	19
	13.50	SP T	1.73	6.89	0.62	2.64	1.64	0.30	0.806	82.5	14.70	23.81	NP L	NPI	SM	0.00	27	21
	15.00	SP T	1.73	6.97	0.62	2.64	1.68	0.07	2.002	81.3	13.93	23.95	NP L	NPI	SM	0.00	28	24
	16.50	SP T	1.74	5.98	0.62	2.63	2.65	0.99	4.003	80.2	12.13	23.10	NP L	NPI	SM	0.00	28	28
	18.00	SP T	1.74	6.52	0.62	2.62	1.98	0.62	3.827	81.0	11.51	23.65	NP L	NPI	SM	0.00	28	30
	19.50	SP T	1.74	6.87	0.62	2.63	2.75	0.51	4.202	79.3	12.22	23.69	NP L	NPI	SM	0.00	29	36
	21.00	SP T	1.74	6.55	0.62	2.62	2.62	0.01	3.418	77.6	14.28	23.01	NP L	NPI	SM	0.00	29	41
	22.50	SP T	1.74	6.74	0.62	2.62	2.15	0.83	3.660	79.2	13.16	23.15	NP L	NPI	SM	0.00	29	45
	24.00	SP T	1.74	6.57	0.62	2.63	2.64	0.91	4.115	78.2	13.09	23.87	NP L	NPI	SM	0.00	29	49
2	25.00	SP T	1.74	5.79	0.62	2.64	1.45	0.01	4.238	76.9	16.33	23.10	NP L	NPI	SM	0.00	29	52
	1.50	SP T	1.72	7.25	0.64	2.60	0.16	0.89	2.653	84.2	12.07	23.57	NP L	NPI	SM	0.00	26	6
	3.0	SP	1.	8.15	0.6	2.61	0.2	0.	3.00	83.2	12.54	24.08	NP	NPI	SM	0.00	26	7

**Section VII – Employer's Requirement**

0	T	72		4		1	99		6		L					
4.5	SP	1.	7.15	0.6	2.61	0.3	1.	2.54	83.6	12.48	24.51	NP L	NPI	SM	0.00	26
0	T	72		4		4	02		2							9
6.0	SP	1.	8.64	0.6	2.62	0.6	1.	2.13	84.1	11.89	23.85	NP L	NPI	SM	0.00	27
0	T	72		4		5	21		2							12
7.5	SP	1.	6.85	0.6	2.62	1.2	1.	1.85	82.3	13.03	23.42	NP L	NPI	SM	0.00	27
0	T	70		4		6	56		0							14
9.0	SP	1.	6.57	0.6	2.62	0.2	0.	1.65	88.9	8.34	23.56	NP L	NPI	SM	0.00	27
0	T	70		4		1	85		5							16
10.	SP	1.	7.08	0.6	2.61	0.5	1.	1.87	84.0	12.33	23.98	NP L	NPI	SM	0.00	27
50	T	70		4		4	20		6							19
12.	SP	1.	6.81	0.6	2.62	0.1	2.	1.09	85.0	11.70	23.10	NP L	NPI	SM	0.00	28
00	T	70		4		4	01		6							21
13.	SP	1.	6.97	0.6	2.63	0.1	1.	2.65	84.2	11.98	23.44	NP L	NPI	SM	0.00	28
50	T	71		4		1	00		6							25
15.	SP	1.	6.52	0.6	2.62	0.6	0.	2.37	84.5	11.40	23.01	NP L	NPI	SM	0.00	28
00	T	71		4		5	99		9							29
16.	SP	1.	7.71	0.6	2.63	1.2	2.	3.26	81.2	11.63	23.21	NP L	NPI	SM	0.00	28
50	T	71		4		3	62		6							37
18.	SP	1.	6.81	0.6	2.63	0.3	1.	1.89	85.0	11.74	23.78	NP L	NPI	SM	0.00	29
00	T	71		4		1	06		0							38
19.	SP	1.	7.05	0.6	2.62	1.6	0.	2.42	81.2	14.05	23.27	NP L	NPI	SM	0.00	29
50	T	70		4		2	65		6							40
21.	SP	1.	6.98	0.6	2.62	1.6	0.	2.37	80.3	14.72	23.41	NP L	NPI	SM	0.00	29
00	T	70		4		5	94		2							42
22.	SP	1.	6.57	0.6	2.63	1.5	1.	2.00	81.2	13.99	23.20	NP L	NPI	SM	0.00	29
50	T	70		4		2	23		6							45
24.	SP	1.	8.07	0.6	2.61	0.4	1.	2.19	79.9	15.61	23.38	NP L	NPI	SM	0.00	29
00	T	70		4		1	81		8							49

The following conclusions have been derived from geotechnical investigation:

- The soil stratum consists of sand with silt (SM).
- The SPT 'N' value indicates that soil stratum is medium loose
- Water table was not encountered
- No Plasticity index Present in soil

#### 7.1.4 Site Description

## **Section VII – Employer's Requirement**

The existing road network in City is already experiencing severe congestion due to on-street parking. There is very limited scope to widen the roads in adjacent built-up area. The existing on surface parking facilities in City area is insufficient for the present demand.

Available Parking area for Kairon Market = 1,450 Sqm

In order to cater to the parking demand and decongest the Kairon Market area, a mechanized Fully-automatic parking facility for Kairon Market is proposed under this contract package.

The parking capacity in the proposed Kairon Market shall be Minimum 415 ECS & 50 two wheeler surface parking spaces through fully-automatic parking of 5 parking levels above the Ground Floor and 3 below ground floor (3B + G + 5).

### **7.1.5 Project Requirements**

The Scope of Services under this Contract include all planning, survey, investigations, design, detailed engineering, supply, construction, Operation, maintenance and management activities required to Construct, Operate and Maintain the Mechanized Fully Automated Multi Level Car Parking Facility at the ear marked site for Kairon Market, Amritsar. Topographical survey of site, if already executed, may be made available to the bidder by the employer. However it will be the responsibility of the bidder to verify it by its own means.

The proposed site for this Car Parking Facility has area of about 1450 sqm for Kairon Market. The parking capacity in the proposed Kairon market should be Minimum 415 ECS spaces through Fully-automatic parking of 6 levels from the Ground Floor for standard cars, and 3 below ground floor for SUV & Sedan, designed bay should meet the standard as per IRC.

### **Summary of Contractual Key Obligations**

The key obligations of the Contractor under the Contract are summarized as follows: –

- i. Topographical Survey of the Site area
- ii. Geo-tech Investigation of the Site area.
- iii. Demolition of existing structures
- iv. Dismantling, relocation & installation of existing substation to identified location
- v. Planning & Design of the Civil Works, Plumbing Works, Drainage & Sewage Works, Road Works, Landscaping Works, Mechanical Works, Fire Protection & Fire Fighting Systems, Car Parking System Works, Electrical Works, Ventilation System and Solar power plant, Car Parking Management System and Instrumentation Works, for Parking Facility as per Employer's Requirement.
- vi. Providing and Constructing all the required Civil Works, Plumbing Works, Drainage & Sewage
- vii. Road Works, Landscaping works.
- viii. Supply & Installation of all the required Mechanical Works, Fire Protection & Fire Fighting Systems, Electrical Works, Instrumentation Works, Ventilation System, Car Parking System and Car Parking Management System
- ix. Operation & Maintenance of whole Facility for Ten (10) years after the date of commissioning including the defect liability period of two (2) year. (Operational manpower namely operators, watch and ward, traffic regulators, health and safety, fuel and lubricants for DG sets, or any other requirement to Operate the system 24x7 shall be borne by the contractor) The electricity and water supply charges shall be paid by the contractor during Operation and maintenance period.
- x. Training Program for ASCL/MCA/ Authorized agency from ASCL staff during last six (6) months of O&M period.

## **7.1.6 Section VII – Employer's Requirement**

### **7.1.6 Phasing of Contract**

The total contract period is **132 calendar months** which includes Phase I- Design and construction period of 12 months and Phase II - 120 months Operation and maintenance period including 24 months of defect liability period.

- i. **Design and Construction Period of (12 months):** It shall be counted from the Contract Commencement Date and will be spread over for 12 months or as extended by the Employer on mutual agreement. The Contractor shall submit all the design related documents, as specified under this Section, within 60 days from the Contract Commencement Date to allow the Engineer / Employer to undertake a thorough review of the documents and suggest amendments if any. The Employer and the Contractor shall sign off the approved documents within 75 days from the Commencement Date or by such date permitted by the Employer and under no circumstances should it be more than 90 days from the Commencement Date.
- ii. **Operation & Maintenance Service Period (120 months):** This phase is spread over 10 years or 120 months including 24 months of defect liability period, commencing from the date of issue of completion certificate. During defect liability period the cost of Operation (Operational manpower namely operators, watch and ward, traffic regulators, health and safety, fuel and lubricants for DG sets, or any other requirement to Operate the system 24x7 shall be borne by the contractor) The electricity and water supply charges shall be borne by the contractor during Operation and maintenance period.

### **7.1.7 Contract Key Dates**

The following key dates govern the term of the Contract:

- i. The Contract Commencement Date shall be the date on which the Contract Agreement is signed by the Parties;
- ii. The Construction Completion Date or Date of Commissioning shall be the date on completion of 12 calendar months from the Contract Commencement Date;
- iii. Defect liability period is 24 months from the date of issue of completion certificate.
- iv. Operation and maintenance period starts from the date issue of completion certificate .
- v. The Contract Completion Date shall be the final date on which the Contract expires.

### **7.1.8 Contractor to Inspect Site:**

The Contractor should visit and examine the site of work and satisfy himself as to the nature of existing roads and other means of communication and other details pertaining to the work and local conditions and facilities for obtaining his own information on all matters affecting the execution of the work. No extra charge made in consequence if any misunderstanding or incorrect information on any of these points or on grounds of insufficient description will be allowed.

### **7.1.9 Costs for Mobilization and Temporary Works**

## Section VII – Employer's Requirement

No payment above the unit prices quoted shall be made to the Contractor for mobilization costs, i.e. for providing transportation, light, power, tools, and equipment, or for furnishing building and maintaining construction plant, access roads, sanitary conveniences, disposal, work, water supply, fire protection, guards, trestles, telephone system and other temporary structures, plant and materials, or for medical attention or health protection, or for watchmen or guards, or for any other services, facilities, or materials necessary or required to execute the work in accordance with the provisions of the Contract as these shall be considered as having been included in the prices stipulated for the various items of the Bill of Quantities containing lump sum price.

### **7.1.10 Contractor's Offices, Stores and Equipment**

The Contractor shall make his own arrangements for renting or acquiring sufficient land for the erection of his offices and stores plus parking / maintenance area for vehicles and equipment to be used on the Works at his own expense. The contractor shall establish and maintain these utilities at his own cost and no additional payment shall be made.

The contractor shall establish a laboratory with equipment and all other facilities for carrying out tests at site.

### **7.1.11 Contractor's Water and Power Supply:**

The Contractor shall make his own arrangements for a hygienically clean and potable water supply for labor and construction work during Construction Period.

The Contractor shall make his own arrangements at his own expense for the supply of electricity services either using a metered connection from local mains or by providing his own generating plant to meet the requirements during Construction Period.

### **7.1.12 Site Office for the Engineer**

The Contractor will also provide a minimum 25 sq.m area of air conditioned office space furnished with 2 desks, 10 chairs, filing cabinet, shelves, 1 computer with accessories, including washing and toilet facilities, within the vicinity of the sub-project stretch, for the use of the Engineer and supervisory staff. The daily cleaning and maintenance of Engineer's Site office shall be arranged by the Contractor at his own cost.

### **7.1.13 Sign Board**

The Contractor shall provide a sign board at the site of the Works of approved size and design which provides (i) the name of the Project and the source of its finance; (ii) the names and addresses of the Employer, the Contractor and the Consultant; (iii) the name and short description of the Project, (iv) the amount of the Contract Price; and (v) the starting and completion dates. It shall be deemed to be part of contract and no extra payment shall be made for the same.

### **7.1.14 Other Contracts and Contractors**

The Contractor must ascertain to his own satisfaction the scope of the sub – project and the nature of other contracts that have been or may be awarded by the Employer in the execution of the project to the end that the Contractor may perform the Contract in the light of such other contracts.

Nothing herein contained shall be interpreted as granting to the Contractor exclusive occupancy of the sites in the project area. The Contractor shall not cause any unnecessary hindrance or delay to any other contractor working in the project area. If the performance of any contract for the project is likely to be interfered with by the simultaneous execution of some other contract or contracts, the Employer shall decide which contractor may proceed.

## Section VII – Employer's Requirement

The Employer shall not be responsible for any damages suffered or extra costs incurred by the Contractor resulting directly, or indirectly, from the award or performance or attempted performance of any other contracts or line departments related to the project, or caused by any decision or omission of the Employer respecting the order of precedence in the performance of the contracts awarded for completion of the project.

### 7.1.15 Transportation and Storage of Materials

Transportation of any material by the Contractor shall be by suitable vehicle which when loaded does not cause spillage and all loads shall be suitably secured. Any vehicle which does not comply with this requirement or local traffic regulation and law shall be removed from the Site. All heavy materials which are not permitted to transport by traffic and police department during day time shall be transported at night time with required permissions from local authorities. All materials when brought to site by the Contractor shall be stacked and stored in a manner suitable to protect against, spillage, damage, breakage, pilferage etc., and readily available for checking by the Engineer at any time. The Contractor shall arrange for watch and ward of the materials at all times in a suitable manner satisfactory to the Engineer, all at his own expense.

### 7.1.16 Documents and Drawings

- a) For the purpose of bidding only, a few basic drawings of proposed Facility have been provided in this document.
- b) However, the contractor will prepare the detailed design and drawings for execution at site. These designs and drawings shall be got approved from the Engineer/Employer before execution of work.
- c) The Contractor shall assume all responsibilities for the making of estimates of the sizes, kinds and quantities of materials and equipment included in the work to be done under the Contract.
- d) He shall not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer/Employer if any such errors or omissions be discovered.

### 7.1.17 Works Program

The Contractor should note that the work should be executed and completed within the stipulated time frame. The Contractor will accordingly submit a comprehensive Period-wise works program and Implementation Schedule of works at site along with Job Safety Analysis for approval of the Engineer/Employer within 15 days after Commencement date. The works program shall be in the form of the Bar Chart / PERT chart / Microsoft Project office along with S-curve. **For delay beyond 15 days, a penalty of Rs 1000 per day on day basis shall be imposed on bidder.**

To monitor the progress of work, weekly review meetings will be held with the Contractor.

### 7.1.18 Setting Out of the Works

The setting out of the works should avoid un-necessary disturbance or removal of plants and trees. Only the removal of plants and trees that is absolutely necessary for the construction of the works will be permitted following the approval of the competent authority.

The Contractor shall at his own expense establish working or construction lines and grades as required and shall furnish and maintain stakes and other such materials and give such assistance including qualified staff as may be required by the Employer for checking setting out lines and grade marks. The Contractor shall be solely responsible for the accuracy thereof.

## **Section VII – Employer's Requirement**

The Contractor shall safeguard all points, stakes, grade marks and bench marks made or established for the work, bear the cost of re-establishing them if disturbed, and bear the entire expense of rectifying work improperly done due to not maintaining or protecting, or removing without authorization, such established points, stakes and marks.

Any work done beyond the lines, levels and limits shown on the drawings or not agreed by the Engineer shall not be paid for and the Contractor shall make good any extra excavation as directed by the Engineer, at his own expense.

### **7.1.19 Site Order Book**

Site order Book shall be kept by the Contractor at the project site. Orders entered in this Book by the Engineer / Employer or their authorized representative shall be held to have been formally communicated to the contractor. The Engineer / Employer or their authorized representative shall sign each order as it is entered and will hand over the duplicate to the contractor or his agent, who shall sign the original in acknowledgment of having received the order.

### **7.1.20 Protection of Works and Public**

The contractor shall exercise precautions at all times for the protection of labor employed and public life and property at and around the sites of work. The safety provisions of applicable laws, building and construction codes shall be observed. Machinery, equipment and all hazards shall be guarded or eliminated in accordance with safety provisions.

During the execution of the work, the contractor shall put up and maintain during the night time such barriers and lights as will effectively prevent accidents. The contractor shall provide suitable barricades, red light "Danger" or "Caution" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public.

### **7.1.21 Environmental Protection**

The contractor will ensure that all actions are taken to ensure that the local environment of the site is protected and that surface and groundwater, soil and air are kept free from pollution (including noise) due to the works being undertaken.

### **7.1.22 Protection of Environment & Natural Habitat**

#### **(a) Site Environmental Plan (SEP)**

The contractor shall carry out the work for fulfilling the requirement of environmental impact assessment and management plan as related to construction of work as per the EMP provided in the document.

The Contractor shall prepare a detailed Site Environmental Plan (SEP) for the work site, base camp, etc., showing arrangements for disposal of sanitary and other waste, location of fuel, oil and lubricant depots, sheds for equipment, labour and housing facilities, etc., prior to the construction for approval of the Engineer.

#### **(b) Safety, Security and Protection of the Environment**

## **Section VII – Employer's Requirement**

The Contractor shall take all necessary precautions against pollution or interference with the supply or obstruction of the flow of, surface or underground water. These precautions shall include but not be limited to physical measures such as earth bunds of adequate capacity around fuel, oil and solvent storage tanks and stores, oil and grease traps in drainage systems from workshops, vehicle and plant washing facilities and service and fueling areas and kitchens, the establishment of sanitary solid and liquid waste disposal systems, the maintenance in effective condition of these measures, the establishment of emergency response procedures for pollution events, and dust suppression, all in accordance with normal good practice and to the satisfaction of the Engineer. Should any pollution arise from the Contractor's activities he shall clean up the affected area immediately at his own cost and to the satisfaction of the Engineer, and shall pay full compensation to the affected parties.

### **(c) Protection of Trees and Vegetation**

The Contractor shall ensure that no trees or shrubs are felled or harmed except for those required to be cleared for execution of the Works. No tree shall be removed without the prior approval of the Engineer and any competent authorities.

### **(d) Use of Wood as Fuel**

The Contractor shall not use wood as a fuel for the execution of any part of the Works, including but not limited to the heating of bitumen and bitumen mixtures and the manufacture of bricks for use in the Works, and to the extent practicable shall ensure that fuels other than wood are used for cooking, and water heating in all his camps and living accommodations.

### **(e) Water Supply**

The Contractor shall make his own arrangements at his own expense for water supply for construction and other purposes. Only clean water free from deleterious materials and of appropriate quality for its intended use shall be used. In providing water the Contractor shall ensure that the rights of and supply to existing users are not affected either in quality, quantity or timing. In the event of a dispute over the effect of the Contractor's arrangements on the water supply of others, the Engineer shall be informed immediately and shall instruct the Contractor as to appropriate remedial actions to be undertaken at the Contractor's expense.

### **(f) Power Supply**

The Contractor shall make his own arrangements at his own expense for power supply for construction and other purposes. Only power from authorized connections or from well Operational generator sets shall be used. In case of work in night shifts the Engineer shall be informed well in advance and all arrangements should be get approved by the Engineer in charge.

### **(g) Relations with Local Communities and Authorities**

In sitting and Operating his plant and facilities and in executing the Works the Contractor shall at all time bear in mind and to the extent practicable minimize the impact of his activities on existing communities. Where communities are likely to be affected by major activities such as road widening or the establishment of a camp, large borrow pit or haul road, he shall liaise closely with the concerned communities and their representatives and if so directed, shall attend meetings arranged by the Engineer or Employer to resolve issues and minimize impacts on local communities.

### **(h) Fire Prevention**

## Section VII – Employer's Requirement

The Contractor shall take all precautions necessary to ensure that no vegetation along the line of the road outside the area of the permanent works is affected by fires arising from the execution of the Works. The Contractor shall obtain and follow any instructions of the competent authorities with respect to fire hazard when working in the vicinity of gas installations. Should a fire occur in the natural vegetation or plantations adjacent to the road for any reason the Contractor shall immediately suppress it. In the event of any other fire emergency in the vicinity of the Works the Contractor shall render assistance to the civil authorities to the best of his ability. Areas of forest, scrub or plantation damaged by fire considered by the Engineer to have been initiated by the Contractor's staff or labor shall be replanted and otherwise restored to the satisfaction of the Engineer at the Contractor's expense.

### 7.1.23 Protection of Utilities

The Contractor is required to carefully examine the location of the Works and their alignments and to make special enquiries with all authorities or service suppliers concerning all utility lines such as water supply, sewers, gas pipe, telephone (underground and/or overhead) lines, electric cable (underground and/or overhead), cable TV lines, etc.; and to determine and verify to his own satisfaction the character, sizes, position and lengths of such utilities from authentic records. The Contractor shall be wholly responsible for the protection and/or facilitating relocation of such utilities as may be required, and shall not make any claim for extra work that may be required to protect or facilitate relocating such utilities or services. If any major shifting or realignment of water supply, sewers, drains, electric and telephone lines are necessary due to their interference with the proposed Works, the same will be arranged through the line agencies. The cost of such relocations will be paid by the Contractor which will be reimbursed under the Provisional Sum provided in the Contract, following approval by the Engineer.

### 7.1.24 Maintaining Utility Services

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

No clearance or alterations to the utility shall be carried out unless specially ordered by the Engineer.

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

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

The work of temporarily supporting and protecting the public utility services during execution of the Works shall be deemed to be part of the Contract and no extra payment shall be made for the same. Adequate arrangements shall be made by Contractor to protect and support other services during all phases of the work. If the Contractor fails to protect the other services/utilities and any damage occurs to any services/material, Contractor shall reinstate such utilities to existing conditions at his own cost or pay for the rectification of damages so caused.

### 7.1.25 Arrangement for Traffic during Construction

The Contractor shall at all-time carry out work in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. The Contractor shall, in

## **Section VII – Employer's Requirement**

accordance with the directions of the Engineer, provide and maintain, during execution of the work, a passage for traffic either along a part of the existing carriageway, or along a temporary diversion. The cost of temporary diversion shall be deemed to be included in the quoted rates. The Contractor shall take prior approval of the Engineer regarding traffic arrangements during construction.

On road sides, suitable regulatory/warning signs as approved by the Engineer shall be installed for the guidance of road users. The signs shall be of approved design and of reflectors type, if so directed by the Engineer.

### **7.1.26 Cooperation at Site**

Construction may be carried out in areas of restricted circulation. The Contractor's attention is particularly drawn to;

The need to maintain existing services and reasonable access for local residents and traders during the construction period; and

The probable presence of other contractors on site is to be coordinated by the main Contractor.

Heavy Materials shall preferably be transported to site during night time with necessary permissions from all concerned authorities.

All works shall be carried out in such a way as to allow access and afford all reasonable facilities for any other contractor and his workmen and for workmen of the Employer and any other person who may be employed in the execution and / or Operation at or near the site of any work in connection with the Contract or otherwise.

In the preparation of his program of work, the Contractor shall at all times take full account of and co – Operate with the programming of the work of other contractors so as to cause the minimum interference to them and to the public.

### **7.1.27 Access to Abutting Properties**

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

In addition to the above, in order to ensure uninterrupted traffic flow, the Contractor has to provide and maintain suitable arrangement for the existing traffic to move across the construction work during the entire period of construction or till such time that alternative arrangements for the traffic are made.

### **7.1.28 Access for Inspection:**

The Contractor shall provide at all times during the progress of the works and the maintenance period, proper facilities and necessary attendance for inspection or measurement of the work by the Engineer / Employer or their representatives.

## Section VII – Employer's Requirement

### **7.1.29 Use of Equipment on Works**

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

1. The Contractor shall be required to give a trial run of the equipment(s) to be deployed at site or establishing their capability to achieve the required Specifications and tolerance to the satisfaction of the Engineer before commencement of the work.
2. All equipment(s) provided shall be of proven efficiency and shall be Operated and maintained at all times in a manner acceptable to the Engineer.
3. No equipment or personnel will be removed from the site without permission of Engineer.

### **7.1.30 Surveying and measuring equipment**

Equipment for surveying and measurement of the work shall be procured by the Contractor for his use at the Site. The same shall also be made available to the Engineer at site for any work connected with the Contract without any additional charge.

### **7.1.31 Site Photographs and Videos**

The contractor shall arrange to take color photographs and videos at locations of the works to demonstrate conditions of the site before work commences / progresses during the construction period and after completion of the works. The photographs / videos may be required as evidence in defense of claims against the contractor for damage to buildings and property due to the execution of the works. Contractor will take all necessary work photographs and videos as per directions of Engineer. All site photographs and videos shall be submitted to the Engineer in three sets each which will become property of the Employer.

Nothing extra shall be paid to the Contractor on account of above requirements.

### **7.1.32 Record Drawings**

The contractor shall prepare reproducible drawings of the whole works "as built". The drawings shall be produced to a standard similar to that of the Approved Drawings for execution.

Record drawings shall be prepared to the Engineer's approval as the work proceeds and shall be handed over to the Engineer as and when asked for. The completion drawing for individual component of works shall be updated periodically during the contract period as the work progresses.

On completion of work, Contractor shall submit to the Engineer Six sets along with soft copies in three C.Ds of as built drawings indicating all works with complete information as may be required for reference. The Record Drawings shall then become the property of the Employer.

The cost of all above shall be borne by the Contractor and nothing extra shall be paid on this account.

### **7.1.33 Periodic Reports**

## **Section VII – Employer's Requirement**

The Contractor shall prepare and submit periodic reports on different plans, progress of Works, etc., The Contractor shall develop the required formats for the periodic reports and also identify any critical reporting requirements in order to enable timely decision making by the Engineer/Employer.

### **7.1.34 Final Clearance of the Site**

On completion of work, wherever applicable, the contractor shall clear away and remove from the site all constructional plant, surplus materials, rubbish, scaffolding and temporary works of every kind and leave the whole of the site and works in a clean condition. Final contract payment shall be withheld until this has been done, to the satisfaction of the Engineer.

### **7.1.35 Technical Requirements**

#### **7.1.35.1 Specification Standards and Codes**

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise stated in the Contract. Where such standards and codes are national or related to a particular country or region other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be acceptable subject to the Engineer's prior review and written approval. Differences between the standards specified and the proposed alternative standards must be fully described in writing by the Contractor and submitted to the Engineer at least 28 days prior to the date when the Contractor desires the Engineer's approval. In the event the Engineer determines that such proposed deviations do not ensure equal or higher quality, the Contractor shall comply with the standards specified in the Bid Document.

The design criteria like loading standards, permissible stresses and quality standards, to be followed for the preparation of design and drawings will be as per the latest standards, codes and recommendations of the Indian Bureau of Standards. The design shall not only satisfy the functional requirements but also consider the service condition and provision is to be made for future expansion.

In case of absence of suitable IS specifications and code of practice, reference may be made to other recognized international standards and codes such as International Standards' Organization (ISO), Euro Norm (EN), British Standards Institution (BSI), ASTM or AASHTO, Deutsche Industries Norm (DIN), ANSI, AFNOR or equivalent standards. Where even these are silent, the construction and completion of the works shall conform to sound Engineering practice as approved by the Engineer and in case of any dispute arising out of the interpretation of the above, the decision of the Engineer shall be final and binding on the Contractor

#### **7.1.35.2 Samples and Tests during Construction**

For ensuring the requisite quality of construction, the Materials and Works shall be subject to the quality control tests as per IS codes as applicable. The testing frequencies set forth are desirable minimum and the Engineer shall have full authority to get the additional tests carried out by the Contractor as frequently as he may deem necessary, to satisfy himself that the Materials and Works comply with the appropriate Specifications.

## **Section VII – Employer's Requirement**

The materials to be incorporated in the permanent works shall be subjected to Third Party Inspection as decided / directed by the Engineer, the cost of which will be reimbursed to the Contractor out of the Provisional Sum of the Contract.

Where no specific testing procedure is mentioned, the tests shall be carried out as per the prevalent accepted Engineering practice to the satisfaction of the Engineer.

The Contractor shall be responsible to develop a quality control program and to provide all necessary materials, apparatus, instruments, equipment, facilities and qualified staff for sampling, testing and quality control of the materials and the works under the Contract. Without limiting the generality of the foregoing, the Contractor shall establish either (i) establish a testing laboratory at the site of Works which is adequately equipped and staffed to carry out all sampling and testing in accordance with the requirement set out in the General Specifications and / or these Specifications and provide all field equipment and apparatus as necessary to conduct all specified in-situ tests and/ or any Tests on Completion, or (ii) arrange for routine sampling, testing and reporting, as required, through a certified independent testing laboratory acceptable to the Engineer. The Engineer may also direct the Contractor to arrange additional independent sampling and laboratory testing under the supervision of the Engineer, the cost of which shall be borne by the contractor. The Contractor shall furnish certified copies of all test reports to the Engineer within 3 days of completion of the specified tests.

The Contractor shall, within 14 days after the Site taking over date, submit to the Engineer for his consent, a detailed description of the arrangements for conducting the quality control program during execution of the Works, including details of his testing laboratory, equipment, staff and general procedures. If following submission, or at any time during the progress of Works, it appears to the Engineer that the Contractor's quality control program is not adequate to ensure the quality of the Works, the Contractor shall produce a revised program which will be adequate to ensure satisfactory quality control.

### **7.1.35.3 Workmanship**

All workmanship shall be in conformance with the best trade practices. Particular attention shall be given to the appearance of exposed work without compromising on the Quality Standards.

All defective works shall be demolished, rebuilt and defective materials replaced by the Contractor at his own cost. In the event of such Works being accepted by carrying out repairs/rectification etc. as specified by the Engineer, the cost of repairs/rectification shall be borne by the Contractor. Contractor shall depute competent Engineers for supervision of works from his end and ensure that the quality of work is carried out as per the specifications and quality standards specified in the tender.

### **7.1.35.4 Approval of Materials**

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

Quality assurance plan shall be submitted before the dispatch of the material from the works for the approval of the Engineer.

Samples of cement, sand, aggregate, bricks, steel, and any other material to be used in permanent works of the contract shall be submitted for the approval of the Engineer.

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### **Quality Control on Works and Materials**

- i. The Contractor shall be responsible for the quality of the work for all the works carried out by him for this contract. He shall, therefore, have his own independent and adequate set-up for ensuring the same.
- ii. The Engineer shall inspect the work from time to time during and after construction and ascertain the quality of the work after testing (by himself, by his Testing and Quality Control Units or by any other agency deemed fit by him). All the procedures and tests as directed by the Engineer shall be followed.
- iii. The Contractor shall provide necessary cooperation and assistance in conducting the tests and obtaining the samples for tests and carrying out the field tests as required by the Engineer from time to time. This may include provision of labor, attendance, assistance in packing and dispatching and any other assistance considered necessary in connection with the tests.
- iv. The Contractor shall carry out modification in procedure of work, if any, as directed by the Engineer during inspection.
- v. Works falling short of quality as per test standards shall be rectified by the Contractor as directed by the Engineer at his own cost.
- vi. Where the Engineer considers that in the interest of the control of the quality on materials or workmanship, modifications, if any, are necessary, such modifications shall be carried out by the Contractor at no extra cost.
- vii. The lump sum price quoted as Contract rate in the Bill of Quantities shall be deemed to be inclusive of all costs of the provisions indicated in the above mentioned clauses.

#### **7.1.35.5 Quality Assurance and Quality Control**

The contractor shall execute all the works and perform tests as per QA & QC Manual (to be submitted by Contractor as per approved work plan), as approved by the Engineer / Employer.

##### **General responsibilities**

Contractor shall be responsible for providing:

- All necessary plant, labor, equipment and construction materials to be used in the works;
- All plant, equipment, materials and labor for temporary and auxiliary works;
- All equipment and components to be installed or incorporated in the works;
- Transportation and storage facilities for all materials and equipment;
- Office and accommodation for staff and labor; and
- for consultants and client's staff Sanitation facilities at the site; and
- All necessary staff and equipment for testing and quality control including site office laboratories.

Contractor shall also be responsible for executing and completing the works in accordance with the specified standards and specifications, within the contractual time allowed, and within the agreed price for these works. The contractor shall be responsible for preparing detail design/drawings/documents and obtaining their approval.

#### **7.1.35.6 Quality Assurance/Quality Control Duties**

The contractor's QA/QC duties are summarized below in the Table. Other duties shall be performed as per Page 115

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stipulated in the contract and as per IS codes or as directed by the Engineer/Employer.

**Table for List of Contractor's QA/QC Duties**

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<b>Activity / Item</b>	<b>Contractor's QA/QC Duties</b>
Designs & Drawings	Maintain design register at site Use only approved drawings for construction
Test laboratory and equipment	Intimate PMC the details, date of completion with requisite manufacturers' and calibration certificates Maintain the equipment in good condition and calibrate as necessary
Material receipts	Enter receipts in material register Intimate PMC in writing
Materials testing	Prepare mix designs as required by contract and submit test results to PMC Take test samples in presence of PMC when requested; Perform materials tests, Submit test reports to PMC with monthly reports; Maintain test log
Rejected materials	Enter in material register at site Intimate PMC in writing the proposed date of removal from site and confirm after removal
Material consumption	Enter daily consumption of materials in material register and indicate balance quantity
Construction equipment	Intimate PMC the details, date of mobilization along with requisite insurance certificate Maintain equipment in good working condition
Construction	Intimate PMC in writing when construction is going to commence and what activities are proposed to be undertaken. Intimate PMC in advance when critical works, such as concreting, embankment, paving, pipeline laying and jointing, testing, etc., would be undertaken, along with the test certificates of the materials proposed to be used in these works. No critical activity shall start unless the material test certificates are verified and approved by the Engineer. Provide necessary QA/QC manuals.
Daily work progress	Maintain in daily log
Testing of works in progress	Perform tests as per contract requirements Submit test reports to and PMC Maintain test log
Rejected work items	Intimate PMC in writing the proposed date of removal from site and confirm after removal, or (if so agreed by and PMC) Rectify defective work and invite and PMC for re-inspection.
Instructions from Engineer	Enter change orders, site instructions, letters and minutes of meetings issued by the Engineer and Consultants in the Instruction Log
Inspection of Engineer	Take instructions in Site Order Book. Advise and PMC of compliance
Progress scheduling and control	Prepare and maintain project schedules and undertake work in accordance with approved schedule



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Reporting	Prepare and submit Monthly Progress Reports
Records	<p>Maintain the following records on site:</p> <p>Material Register Site Order Book Hindrance Register Daily Log</p> <ul style="list-style-type: none"> <li>- Design Register</li> <li>- Test Log</li> <li>- Instruction Log</li> <li>- Equipment Register</li> <li>- Labor Register</li> <li>- Approved Construction Drawings</li> <li>- Test Reports</li> <li>- Site Laboratory Record</li> <li>- Permissions Issued by Departments</li> <li>- Correspondence Record</li> <li>- Copies of Monthly Progress Reports</li> <li>- Any other records as specified in the Contract and/or as instructed by the Engineer</li> </ul>

### 7.1.36 Detailed Scope of Services

#### 7.1.36.1 Design Period

Design Period shall be reckoned from Date of Contract Commencement. During this period, the Contractor shall prepare a holistic and comprehensive Parking Plan, minimum of specified capacity, for providing the latest Parking Facility to the users. If available, Employer will provide the topographical survey & Geo Technical investigation report to the contractor, however, it will be responsibility of the contractor to verify it by site investigation. The Contractor will also get the Topographical Survey & Geo-tech investigation done during this period. Accordingly the Contractor will prepare the Planning and Design of all the components of the Car Parking Facility for required Car Parking Spaces. All the designs and drawings shall be submitted to the Engineer / Employer for approval. Contractor will get the complete structural design of automated MLCP vetted from any of the following Indian Institute of Technology (Delhi, Roorkee, Mumbai, Kharagpur) or as approved by the Employer. The Contractor will incorporate all the necessary corrections in his Planning, design and drawings in compliance to the observations made by the Engineer / Employer and it will remain the responsibility of the Contractor to obtain the necessary approval of the Planning, design and drawings, submitted by him, from the Engineer / Employer / Competent Authority within this Preparatory Period.

The Contractor will submit, within seven days of start of this period, a separate comprehensive work & implementation schedule for this period reflecting the planned dates / time for submission of various documents of each component of Facility, Time required for the Engineer / Employer to check and verify the documents, Time required to incorporate the observations of the Engineer / Employer, Date / Time of Re-submission of corrected documents, Date/Time of approval from the Engineer/Employer/Competent Authority.

The fee, if any, for approval of drawings by Competent Authority shall be borne by the Contractor.

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### **General**

- a) The Contractor shall establish contact with all relevant stakeholders, including the designated consultants under Amritsar Smart City Limited, Amritsar and become familiar with the place, site and type of the work required for creating the Mechanized Fully-Automatic Multi Level Car Parking Facility. The Contractor shall also be in know-how of the applicable standards and guidelines for providing Fully Automated Car Parking Facility.
- b) The Contractor shall satisfy himself about the nature and scope of work and the prevailing site Conditions.
- c) In order to undertake studies and construction activities under this Contract, the Contractor shall keep liaison with Amritsar Smart City Limited, (ASCL), Municipal Corporation Amritsar (MCA), Traffic Police Department and other government agencies regarding governing Laws and regulations such as:
  - i. Environmental and social impact assessments and prevention, mitigation and monitoring of impacts during construction;
  - ii. Compensation for damages to nearby properties;
  - iii. Occupational health and safety including workers' compensation;
  - iv. Prevailing Labor Laws and
  - v. Building / Construction Bye-laws
  - vi. Signage for construction works

### **Preparatory Surveys**

- a) The Contractor shall undertake a detailed topographical survey covering the entire Site Area. The survey data shall depict all the physical features like adjoining structures, roads, drains, existing utilities and other relevant features which would influence the constructional activities of the Facility.
- b) The Survey Plan drawing and Contour Plan of the site at 0.25 m interval shall be prepared and submitted to the Engineer/Employer in three sets of hard copies along with the soft copy. The Survey levels should be taken with reference to GTS Bench Mark.
- d) The Contractor shall fix 2 No. Temporary Bench Marks at selected locations on the site with their levels encrypted. The Contractor shall be responsible for keeping these TBMs undisturbed till the completion of defects liability period.
- e) The Contractor shall carry out geo-tech investigation by conducting min 2 Nos. of Plate Load Tests of Kairon market Parking area site at the required depth as per IS specifications.
- f) The findings of geo-tech investigation shall be submitted to the Engineer of the Contractor in the form of a complete report along with the recommendation for adopting SBC of the soil. The submission shall be in three sets of hard copies along with a soft copy.

### **Documents to be submitted by the Contractor for approval:**

The following documents along with inception report are required to be submitted by the Contractor for approval of the Engineer / Employer:

#### **Part I – Baseline Reports:**

- a) The Topographical survey data.
- b) The Geo-tech investigation report.

#### **Part II – Constructional Plan:**

- a) Planning of Multi-level Fully - Automated Car Parking System for the required No. of Car Parking

## **Section VII – Employer's Requirement**

- b) Detailed designs, drawings and cost estimates of all the components of the Facility including the proposed Car Parking Management Systems.
- c) Plan for Construction of the Office Building for the contractor, store room and detailed plan of installing various components of the fully automatic multi-level parking systems in the said building.
- d) Layout Plan and area allocation for each facility such as:
  - i. Layout and Flow Diagram for Cars
  - ii. Architectural design
  - iii. Building Structure
  - iv. Structural drawings
  - v. Entry and Exit Area for Parking Structure
  - vi. Pedestrian paths and landscaping areas as applicable to the project
  - vii. Public convenience facilities
  - viii. Other facilities
- e) Methodology and timelines for implementation;
- f) Contractor Personnel deployment plan;
- g) Item-wise individual cost breakup of all BOQ items for the purposes of payment only.
- h) Investments required for the Complete Development of the Facility.
- i) Cash-flow plan during the contract periods; and
- j) Detailed methodology for continuous monitoring of the performance of the Contractor in achieving and maintaining the Performance Standards for release of the eligible Payments.

## **Part III – Operating and Management Procedures and Policies:**

- a) Annual Operating Plan (AOP) covering all Operations, maintenance and management Requirements with watch & ward;
- b) Operation and Maintenance Manuals.
- c) Emergency Response Plan (ERP);
- d) Customer Management and Public Relations Plan;
- e) Standard Operating Procedures (SOPs) for routine Operations and emergency responses;
- f) Energy and space optimization program;
- g) Detailing of an Integrated Management Information System (IMIS) including its architecture, data capture, management and reporting structures, protocols including all related hardware, software, installation, and Operation and maintenance requirements; and
- h) Periodic reporting plan including the formats for different performance reports.

IMP.: The Contractor shall submit the above documents, at the maximum, within 60 days from the Contract Commencement Date to allow the Engineer / Employer to undertake a thorough review of the documents and suggest amendments if any. The Employer and the Contractor shall sign off the approved documents within 75 days from the Commencement Date or by such date permitted by the Employer and under no circumstances should it be more than 90 days from the Commencement Date.

### **7.1.36.2      Construction Period**

- a) The Scope of Services during the Construction Period shall essentially comprise of implementing the

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procurement, supply, construction, and installation activities of all the components of the Facility as per approved design and drawings.

- b) The implementation of these activities shall be in accordance to international best practice and industry standards and sufficient care shall be taken by the Contractor in minimizing supply interruptions, traffic disruptions and ensuring good and timely communications with the Engineer/Employer. All the Works and interventions proposed in the approved design and drawings shall be in conformity with the Specifications as set out in the Employer's Requirements. The components relating to this Construction period essentially comprise of but are not limited to the following mandatory works.

### **Mandatory Works:**

The Contractor shall Supply, Construct or install the Mandatory Works as detailed hereunder, which are included in the Bill of Quantities (BOQ) for the purposes of pricing only. The Works as per the BOQ essentially constitute of the following:

- a) Construction of the Parking Facility as per detailed surveys, planning, design and drawings.
- b) Construction of Sanitary & Plumbing Works,
- c) Construction of Drainage & Sewage Works,
- d) Construction of Road Works,
- e) Construction of Landscaping Works,
- f) Supply and Installation of Mechanical works
- g) Supply & Installation of Fire Protection & Fire Fighting Systems
- h) Supply & Installation of Car Parking Systems,
- i) Supply & Installation of Electrical works
- j) Supply and Installation of Ventilation System, Supply and Installation of Instrumentation Works,
- k) Supply and Installation of Car Parking Management System
- l) Supply and installation of Solar System
- m) Commissioning of created Car Parking Facility

The Works proposed in the BOQ as summarized above are indicative only. The Contractor shall investigate, conduct various surveys, and shall design and propose the actual Works to be implemented / constructed. Any deviations and cost implications due to changes in the proposed Works when compared to the Works included in the BOQs should be explicitly included in the documents submitted by the Contractor for approval with adequate justification. The Contractor shall take over the proposed site in an "as is" condition on the date as specified in the Contract Data and implement the Works in accordance with the approved design and drawings. Based on a preliminary Surveys, certain lists of Works have been included as part of the Section 7 – Employer's Requirements under Mandatory Works.

These works have been envisaged for constructing the Car Parking Facility for Minimum 415 ECS car spaces at Kairon Market through 6 level above ground and 3 below fully automatic parking. The Contractor may suggest measures for the improvement, if any.

### **7.1.36.3 Operation and Maintenance Period:**

#### ***Integrated Management Information System***

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A month before the commissioning of the created facility, the Contractor, shall develop, establish, Operate and manage during the remaining Contract Period a comprehensive integrated management information system (IMIS) in respect of all matters including but not limited to:

- a) The billings and collection systems for the collection of revenue on hourly / 24 hours /monthly / half yearly / yearly basis for parking of cars as well as two wheelers;
- b) Services for users, including data bases relating to complaints and questions, response times and resolution;
- c) Financial management, including accounting systems;
- d) Performance information systems; and
- e) Asset registers from the perspective of maintaining a computerized maintenance management system (CMMS) linked to financial and inventory systems.

### ***Billing and Collection Systems***

The billing and revenue collection shall be managed by the contractor during the entire contract period.

### ***Operation and Maintenance Obligations***

The contractor has to operate and maintain the constructed facility for the entire contract period. The cost of Operation & Maintenance during this period shall be borne by the contractor through the revenue generated from the parking facility and advertising. Year on year rates for parking and advertising shall be approved by the authority.

### ***Training***

The Contractor shall plan and develop the course content, and implement on-the-job and classroom based training, for ASCL/MCA deputed staff of at least 15 personnel in 3 batches of 5 personnel each, during first 6 months of the Operation & Maintenance period. The Contractor shall organize training for identified managers from amongst the ASCL/MCA deputed staff in technical aspects of automatic car parking systems to enable ASCL/MCA to build sufficient capacity and skills to manage the said car parking systems at a later date if required.

#### **7.1.36.4 Clearances/NOCs**

The Proposed Automated Multi-level Car Parking shall be planned in accordance with the Development Control Regulations applicable on the site in Walled city zone and all relevant permissions or no objection certificate to build MLCP needs to be obtained.

**Permission:** Clearance from Town Planning / Municipal Corporation & any other competent authority needs to be obtained for constructing the Automated MLCP and use of Building for the same. Presumably MCA has approved for the development of MLCP on the said premise. A copy of same will be given by ASCL

**Land Use & Building Use:** Confirmation of Building for use as MLCP development with all control regulations (w.r.t Ground Coverage, FAR, setbacks and height) to be approved by MCA and

**Demolition** of the external Structure of existing pump house, Sulabh Shauchalya & relocation of Transformers and creation of the same in the new MLCP facility (in Kairon Market site) has to be done with all necessary approvals from concerned departments/Authorities. Presumably electricity board and MCA agreed for demolition and relocation of same on the proposed facility .

**Geotechnical survey** has been conducted to confirm existence of underground infrastructure / services. Presumably the site is cleared for any such underground utilities except a sewerage line which runs outside the site boundary below the adjoining roads and not through the site or excavation areas on site.

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All Necessary **Environmental Clearance** from Punjab Pollution control Board or concerned Authority need to be obtained by bidder as per his site development plan.

**Structural Safety:** The proposed building structure having multiple basements or heights up to 15m or more in walled city shall acquire structural safety certificate from IITs (Roorkee, New Delhi, Kharagpur, Madras, Kanpur, Bombay). Load Bearing Capacity needs to be established for detailed structural designing and drawings. Presumably the strata is solid and firm.

**Fire & Safety:** No objection Certificate from Fire Department shall be obtained after taking care of disaster management measures as per NBC-2016 and provision of sufficient Fire tank on site.

**Heritage Conservation & Aesthetics:** the proposals shall complied with *Galiara scheme, HRIDAY, Smartcity, Façade Control Byelaws* etc wherever applicable.

**Green Walls and Soft-Scaping:** The proposed building Façade should incorporate Green walls on its façade and adequate plantation around the building & soft-scaping.

**Environmental Assessment Plan:** The Developer has to submit an environmental assessment/Impact plans for the proposed automated system and site development and necessary approval of same has to be submitted.

### Byelaws-Parking Policy

The Government of Punjab has issued a draft Parking Policy for the entire state in around November 2017 for inviting public suggestions and objections. As per the said Parking Policy there has been a steady growth of about 10% per year in the last 3-4 years necessitating creation of parking spaces equal to around 2.25 lac Sq.M in Amritsar alone.

The said Parking Policy is based on the National Urban Transport Policy, 2006, that has recognized parking demand, entails enormous cost. Unconditional parking supply encourages car dependency. It has recommended use of parking as a restraint measure.

**The Parking Policy states:** *Multi-story parking structures may only be considered and planned if the local area parking plans require them or surface area parking cannot meet the demand or else to free up surface areas to restore green area and parks.* Such structures, **if needed, should not be based on the floor area ratio** but take into account the capacity of access road and adjoining streets so that the entry and exit from the parking lot does not create congestion.

*According to the byelaws and development Control Rules in Punjab,* in this case Amritsar specifically, does not categorically contain relevant rules for the conceptualization and development of automated Public Parking. The DCR is limited to private parking, to be provided within residential and/or commercial properties. There do not appear relevant rules / byelaws for the Multi-Level automated Car Parking to be developed by the Municipal Corporation.

In addition, apparently there are no byelaws or DCR which govern or limit any MLCP projects. The Bidder will propose his design which needs to be confirmed and approved by the relevant and competent authorities.

However as precedence, the prevailing building norms for commercial plots infers

Ground Coverage = 100%

Building Heights: 15 mtrs max or G+5 floors whichever is less (walled city)

Setbacks: No setbacks for Buildings on road width of <6m and applicable setbacks apply on roads width of road >6m.

Basements: The prevailing byelaws permit 2 or more basements on a site with necessary approval from MCA

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### 7.1.36.5      **Automated Multi Level Parking System:**

The design criteria like loading standards, permissible stresses and quality standards, to be followed for the preparation of design and drawings will be as per the latest standards, codes and recommendations of the Indian Bureau of Standards. The facilities will include but not limited to the followings:

- Automated Parking Facility
- Toll Booths adequately computerized
- All spaces (like motor rooms, service /utility areas etc) as permissible under the bye-laws
- Full automatic scanning including living beings.
- Design shall include all reasonable precautions and provisions for the safety of operating and maintenance personnel
- All basic necessity like drinking water, toilets, DG sets, Firefighting facility, security should be provided

**CAPACITY:** The design shall meet the Multilevel Parking with a capacity of minimum 415 ECS & min 50 two wheeler parking (and any additional capacity will be preferred)

**STANDARDS:** The parking system shall be designed for permitting cars with the following characteristics: Max Length 5.20 M, Max Height 2.1 M, Max Width 2.10 M, Weight 2500 Kg (atleast 3 floors with SUVs & Luxury cars provision)

**ENTRY/EXIT:** To reduce waiting and vehicular queuing on roads the design should consider for faster pick and place thereby a minimum number of 4 car lifting platforms should be considered (entry and exit) with at least one lift as stand by for entry and exit each.

**RETREIVAL TIME:** The system proposed must not allow more than 2-3 min actual time of retrieval.

**MECHANIZED PARKING TICKETS/RFID:** Issuing Machine shall be designed for computation and collection of toll. The toll shall be collected from the vehicles at the exit point. A mechanized barrier gate shall be designed and synchronized with the toll collection system for regulating entry/exit of vehicles into and out of the parking area. The Ticketing Station or access system shall be located outside the Entry and Exit Areas on the right side of the inbound traffic.

The entry/exit point shall be located away from the traffic junctions and exit locations. The entry/exit of vehicles shall be provided in a way that it does not hinder any Vehicular or human movement. The minimum clear width of Entry Area shall be designed according to the respective needs and leaving adequate space to the left and right of the car for passengers to leave/enter the car. Adequate area for queuing of the inbound and out bound vehicles shall be provided.

**SECURITY AND SAFETY:** The Entry areas shall be equipped with sensors to ensure the right positioning of the vehicle to be transported as well as to determine the presence of oversized vehicles, protruding mirrors or racks, which exceed the size limitations of the system.

Motion detectors and CCTV cameras or similar devices shall be installed inside the Entry and Exit areas to ensure that no person or animals are inside the Entry and Exit Areas or the vehicle when the machine starts moving. Cameras shall be installed to record digital photos of the physical condition of the car entering and exiting the premises. The images are also helpful to locate cars for drivers with a lost ticket and to validate damage claims. All Entry and Exit Areas must comply with disability requirements.

**WAITING AREAS:** All the Service Rooms, Control Rooms, Waiting Rooms, Collection Booths and other related facilities shall be provided at the Ground Floor level. Also water coolers need to be installed at the ground floor level for the provision of drinking water.

#### **DROP OFF & HOP IN ISLANDS**

Separate areas/islands is to be provided at the entry and exit of vehicles so that it does not hinder vehicular movements and shall under no circumstances be unsafe for passengers movement apart from pedestrian movement.

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### **TOLL PLAZA**

'Closed' system of toll collection shall be required to be adopted for the Project. Toll collection is proposed to be fully automatic/semi-Multi-level tolling system comprising registering of vehicle classification, ticket issuing, data processing etc. The multiple numbers of toll lanes shall be provided so that no more than 3 vehicles per lane queue up during the peak hours. The design for toll plaza shall conform to the standards. The toll plaza/booths layout shall be prepared by Developer and approved from the Development Authority.

### **SERVICES AND FACILITIES**

Adequate underground water storage shall be provided to cater for one day requirement of domestic flushing requirements. An additional separate underground storage shall be provided exclusively for firefighting purposes. The design and detailing for the provision of plumbing and sanitary facilities for the parking complex shall be done in accordance with National Building Code & Hand Book of Water Supply & Drainage

Waiting room with proper seating arrangement should be provided for the People coming to the MLCP to park and take away their vehicles. Adequate public convenience and drinking water facility should be provided for the support staff as well as the drivers. Drainage facilities shall be constructed and designed in such a manner that there is no stagnation of water in the Project Site. The internal drainage system shall be connected to main common drain at an appropriate location in accordance with the existing network. Worker/ employee amenities shall be provided in accordance with Good Industry Practice.

Safety barriers, at appropriate locations, shall be provided to effectively manage pedestrian and vehicular traffic. Illuminated signage in accordance with National Building Code (NBC)/ Indian Road Congress (IRC) Norms shall be provided at suitable locations within the Parking Facility.

### **FIRE FIGHTING FACILITIES**

The developer shall provide the required firefighting equipment and facilities conforming to relevant standards and the applicable rules and regulations. Fire safety measures as recommended in applicable codes (Indian as well as international) listed in Point 3 shall be implemented. Specifically, the firefighting system shall be adequate to control petroleum fires. Construct the Parking Facilities structure with non-combustible material without a specified fire resistance. In addition, those portions of the facility used for the transport or storage shall have a finish of non-absorbent, non-combustible material. Specifically, the fire fighting system shall be adequate to control petroleum fires. Provisions shall be made in a Mechanized Parking Facility that leakage of gasoline tanks or other flammable fluids are collected during transportation and storage of the vehicle.

Where the Mechanized Parking Facility is located below a building, a 2-hour fire resistance rated separation shall be provided between the Mechanized Parking Facility and the adjacent space use.

As the nature of a Mechanized Parking Facility provides the means to transport a vehicle without human interference, provisions shall be provided to detect a vehicle on fire and to transport it to a fire extinguishing cell at a space on ground floor, easily accessible for fire-fighters.

### **LIGHT AND VENTILATION**

Proper ventilation should be provided for all parking floors. Mechanical ventilation must be provided to permit a minimum of 15 air-changes per hour for normal ventilation and 30 air-changes per hour in case of fire or distress call. Adequate lighting system in parking facility area will have to be provided to achieve a minimum lux level of 70 for ramps, parking and pedestrian movement area and a minimum lux level of 100 for stairways, toilets, entrance and exit areas of parking.

The Entry Areas for Parking shall be provided with auxiliary emergency lighting system such that in the event of failure in general power supply the auxiliary emergency lighting system is activated immediately.

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Power back-up adequate for 100% of the designed power load of the Parking Facility (except Walkways) and Toilet Area shall be provided. The generator shall be equipped to have a switch-over mechanism so as to be activated automatically in the event of power failure. The generator shall be installed in a separate sound-proof enclosure.

### **SOLAR ROOF SYSTEMS**

Solar energy can be used to generate electricity in almost any part of the world and in Amritsar it is well available throughout the year. To generate electricity from sun, we need a solar photovoltaic system. A solar PV system is a long lasting system and can last for 20-30 years. There are 2 types of Solar PV system assemblies that are available:

1. **Off Grid solution:** An Off-Grid solution is a system that works independently and is not connected to the Grid. The cost of this system is 150000 per kW + battery life is only 5 to 7 years.
2. **Grid supply net metering solution:** In this system Electrical energy is generated from Solar through PV cells and directly transmitted to Grid Panel through inverters. This system is battery free and more durable. There are little maintenance problems of this system. Direct supply to Grid reduces our electricity bills.

### **AUTOMATION AND PROCESS CONTROL**

The automation system shall be suitable for acquiring data / information from various systems / sub-systems and process them to execute the functions as required for the operations.

The level of automation shall satisfy the requirements of the promised specification for the Parking system like human interface, ticketing, tracking of the car, choice of least time critical path for parking, retrieval and metering etc. A computer CPU with appropriate software will act through the PLC. The software will be based on the state-of-the art operating system and will be time tested for the type of parking installed.

The required UPS (Uninterrupted Power Supply) will be provided. The equipment and component parts shall conform to the relevant standards by Bureau of Indian Standards wherever available. They shall further conform to the latest Indian

### **MAINTENANCE AND PERFORMANCE STANDARD**

During the period of operation, the Developer would be required to maintain all the Facilities in accordance with performance standards and maintenance requirements, as mentioned below:

- Perform maintenance on a routine and periodic basis. Identify potential problems early within the context of the planned maintenance system so that corrective action may be planned and completed in a timely manner.
- Establish a maintenance list for planned operation and maintenance. Follow an orderly program so that maximum operational efficiency is attained.

The Parking Facility may have an installed and real time, on-line connection to the manufacturer/ technical operator which allows for resolution of most errors remotely with a short response time in reaction to any trouble alarms generated by the system.

The Parking Facility shall be capable of reporting alarms in different classes according to their severity for the System functionality. Preferably, a hotline support line shall be implemented to enable a remote system support.

### **MAINTENANCE / OPERATOR**

Adequate steps shall be taken for regular maintenance of the equipments. In order to avoid System interruptions as much as possible and to remedy such interruptions in a reasonable time.

Under all circumstances without any exception, trained personnel must be available round the clock at short notice. A contract with manufacturer shall be entered into to provide a trained technician for the prevention and remedy of interruptions during the all hours of operation of the Parking Facility. Explicit provisions relating to training and know-

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how transfer, including sharing of manuals and procedures would have to be reflected in the agreement that may be entered into with the manufacturer.

The system shall be required to be designed such, that maintenance personnel has access to all Parking Facility, machinery and electrical and electronic components in a safe manner.

The Developer shall perform routine and periodic maintenance activities for the project infrastructure viz, civil, mechanical and electrical works and equipment, furniture for meeting the specified performance standards.

### **7.1.36.6 Design Standards**

The design shall not only satisfy the functional requirements but also consider the service condition and provision is to be made for future expansion. The developer would be required to design, finance, construct, maintain and operate the proposed Multilevel Parking strictly conforming to the relevant Indian Standards, the best Industry practices and internationally acceptable norms

#### **Design Basis**

All equipment should be rated for ambient temperature of 45°C for indoor and 50°C for outdoor. Maximum relative humidity to be considered is 90% or as specified. Continuity of power supply is the first consideration. The design shall be such as to provide facilities to simplify inspection, testing, maintenance, cleaning, and general repairs at site.

Special care to be taken to make the enclosed equipment proof against entry of rats, lizards and other creeping reptiles, which may create electrical, short- circuit. All ventilation opening shall have suitable screen protection. All equipment shall be complete with approved safety devices wherever a potential hazard to personnel exists and with provision for safe access of personnel to and around equipment for operational and maintenance functions. Design shall include all reasonable precautions and provisions for the safety of operating and maintenance personnel.

#### **Multi-level Parking**

Multilevel Parking with a required capacity and additional parking space to accommodate the parking requirements for permissible commercial space as per the building bye-laws. The Multi-level Parking would be required to be planned in accordance with the Development Control Regulations applicable on the site.

Retrieval Time: Not more than 2-3 minutes.

#### **Equivalent Car Space (ECS) Detail Kairon Market**

S.No	ECS as per calculation	ECS considered
1	414 nos (5 x 2.5 m)	415 nos (5 x 2.5 m)

#### **Net Area Detail used for MLCP Kairon Market**

S.No	Location	Area in Sq. Meter per Floor	Total Floors	Clear Floor Height

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1	Kairon Market	880 Sqm.Appox.	Above Ground 05 levels & Below Ground 03 levels Total 9 levels incl. Ground	2.1-2.4m for Basements 1.8-2.1m for Ground and above floors
2		148 Sq m approx..	Ground Floor for min 50 Nos. two wheeler parking	3-3.2m for GF cover slab
3		80 sqm approx.	Utility Area (Visitors Facility centre, Public Toilet)	On GF

## Section VII – Employer's Requirement

### 7.1.36.7 Civil and Structural Requirements for MLCP

#### A. During Design Phase:

The building shall be designed in accordance with the latest Indian Standard Codes and shall be designed to resist wind and seismic forces. RCC Structures shall be designed as per **IS 456: 2000, IS-13920:1993, IS-1893: Part 1**& other relevant codes. Steel Structures shall be designed in accordance with the provision of **IS 800-1984** & other relevant codes. Structural steel shall conform to IS 20627 & other relevant Codes. Tubular section shall conform to **IS 4923** & other relevant Codes. Architectural design norms as per NBC (**National Building Code – 2005**) & other relevant Codes. Structural Design norms as per NBC and **BIS (Bureau of Indian Standards)**. The said project comes in Seismic zone IV and the same has been analysed and designed for earthquake by both Static and Response spectrum method as stated in IS:1893-2002. Structure is analysed as space frames and design of beams and columns has been carried out using standard software STAAD PRO and STAAD PRO has done analysis of foundation. All other structural elements like slabs, stairs, RCC walls are designed by excel sheets. The prefabricated Steel structure to be used for stacking of the vehicles.

#### B. During Construction Phase & Maintenance Phase:

It needs to ensure that casting of RCC foundation is in accordance with different Indian Standard Code Provision. Fabrication & Erection of Steel Structure are to be in compliance with specified codes of Indian Standards. Periodic maintenance of steel structure, as mandated by IS and BIS standard needs to be undertaken for safety and upkeep of steel structure. The construction is carried out in following phases:

- i. **Excavation & Sheet Pile:** Earth is to be excavated to a depth of 5.5m. In order to retain the soil, sheet piling is necessary. Excavation will be carried out both manually as well as mechanically. Earth excavators and Piling Rig will be used for excavating the soil. Excavation will be carried out providing adequate side slopes and dressing of excavation bottom. The soil present beneath the surface is loose sand (SM). Cast in Situ Sheet Piles of 400 mm dia. will be bored 3-4 meters deeper than the basement level. The piles will be placed adjacent to each other. Auger boring is done for cast-in situ piles.
- ii. **Laying of the Plain Cement Concrete:** After the process of excavation, laying of plain cement concrete (PCC) is done. A layer of 4 inches was made in such a manner that it was not mixed with the soil. It provides a solid base for the raft foundation and a mix of 1:3:6 that is, 1 part of cement to 3 parts of fine aggregates and 6 parts of coarse aggregates by volume were used in it. Plain concrete is vibrated to achieve full compaction. Concrete placed below ground should be protected from falling earth during and after placing .Concrete placed in ground containing deleterious substances should be kept free from contact with such a ground and with water draining there from during placing and for a period of seven days. When joint in a layer of concrete are unavoidable, and end is sloped at an angle of 30 and junctions of different layers break joint in laying upper layer of concrete.
- iii. **Foundation:** Foundation provides support for structures, transferring their load to layers of soil or rock that have sufficient bearing capacity and suitable settlement characteristics. Here, 1 m thick raft foundation will be provided. Typically, raft foundations are slabs that cover wide area, often the entire footprint of a building, and are suitable where ground conditions are poor, settlement is likely, or where it may be impractical to create

## Section VII – Employer's Requirement

individual strip or pad foundation for a large number of individual loads. Raft foundations may incorporate beams or thicken areas to provide additional supports for specific loads. A RCC retaining wall will be placed after the sheeting piles.

- iv. **Reinforcement:** Steel reinforcements are used, generally, in the form of bars of circular cross Section in concrete structure. They are like a skeleton in human body. Plain Concrete without steel or any other reinforcement is strong in compression but weak in tension. Steel is one of the best forms of reinforcements, to take care of those stresses and to strengthen concrete to bear all kinds of loads Mild steel bars conforming to IS: 432(Part I) and cold –worked steel high strength deformed bars conformed to IS:1876 (grade Fe 415 and grade Fe 500, where 415 and 500 indicate yield stresses  $415 \text{ N/mm}^2$  and  $500 \text{ N/MM}^2$  respectively.) are commonly used. Grade Fe 500 is being used most commonly nowadays. This has limited the use of plain mild steel bars because of higher yield stress and bond strength resulting in saving of steel quantity.
- v. **Concrete & Steel:** M25 grade of concrete & Fe 500D grade of steel will be used for the construction.
- vi. **Insulation Concrete to Roofs:** The Contractor is responsible for the Insulation Concrete to roofs top with required grade will be used for the construction as per approved design & drawing and as directed by the Engineer-In-Charge and his satisfaction.
- vii. **Roof truss:** Roof truss will be provided to cover the entire area of the building selected for car parking. Over which GI sheet will be used for the covering of roof truss. To provide safety to GI sheet, 50 mm M20 special insulating screeding will be done over which solar panel system can be placed to generate some amount of electricity.
- viii. **Paver Blocks** as per approval of desired colors, shapes and texture are to be laid for the surface parking of 2-wheelers.

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**7.1.36.8 Project Layouts Plans & Drawings:**

This section deals with the Architectural, Structural and Other drawings for Kairon Market MLCP site for referral purpose only. The Bidder will submit his own proposal for approval meeting the desired requirement.

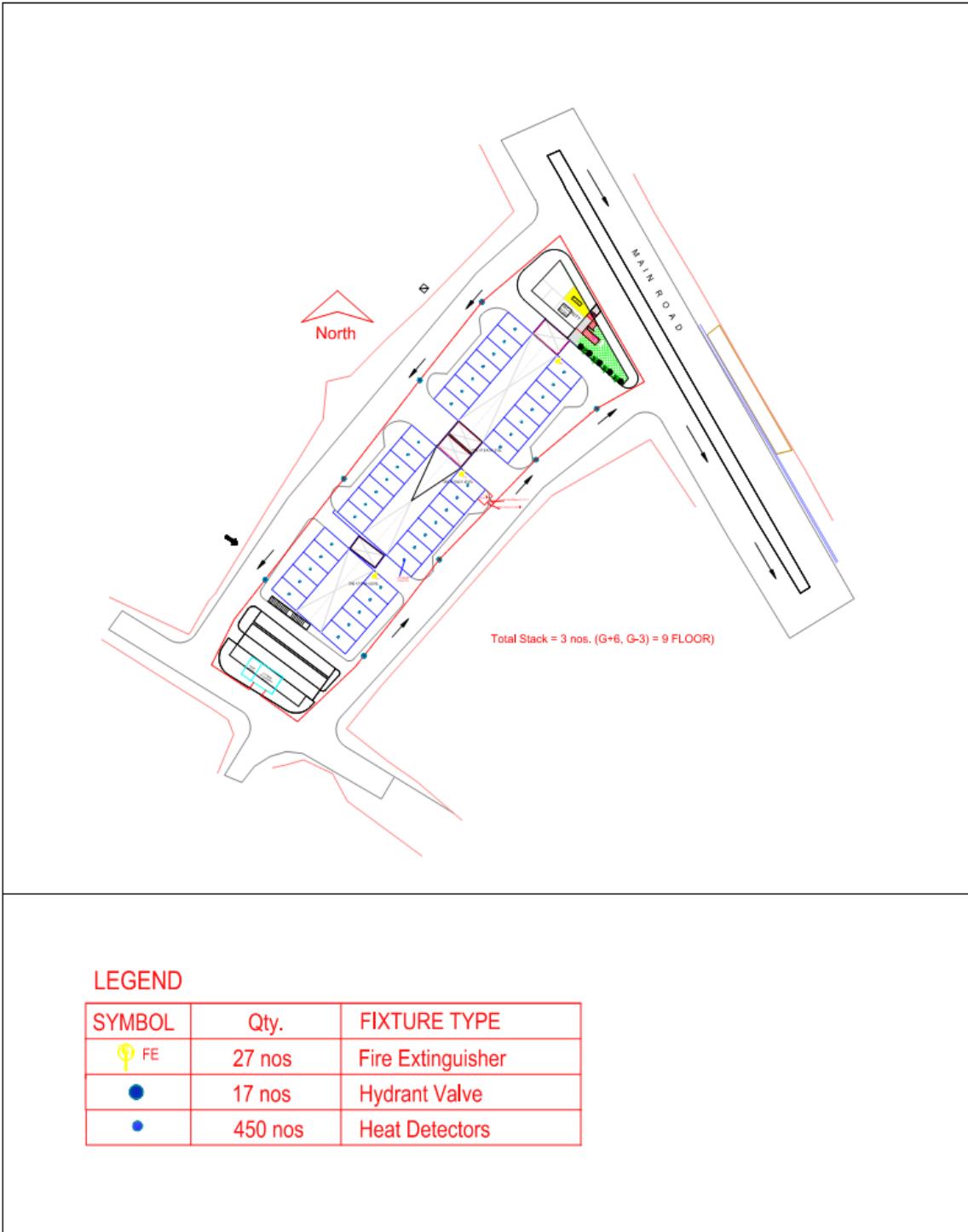
## Section VII – Employer's Requirement



	<b>AMRITSAR SMART CITY LIMITED (ASCL)</b>	<b>PROJECT</b> <b>KAIRON MARKET MLCP</b>		<b>DATE</b> 08/08/2014
		<b>DRAWING NO.</b> <b>GROUND FLOOR PLAN</b>		<b>DRAWING NO.</b> MLCP-GFP REV 00

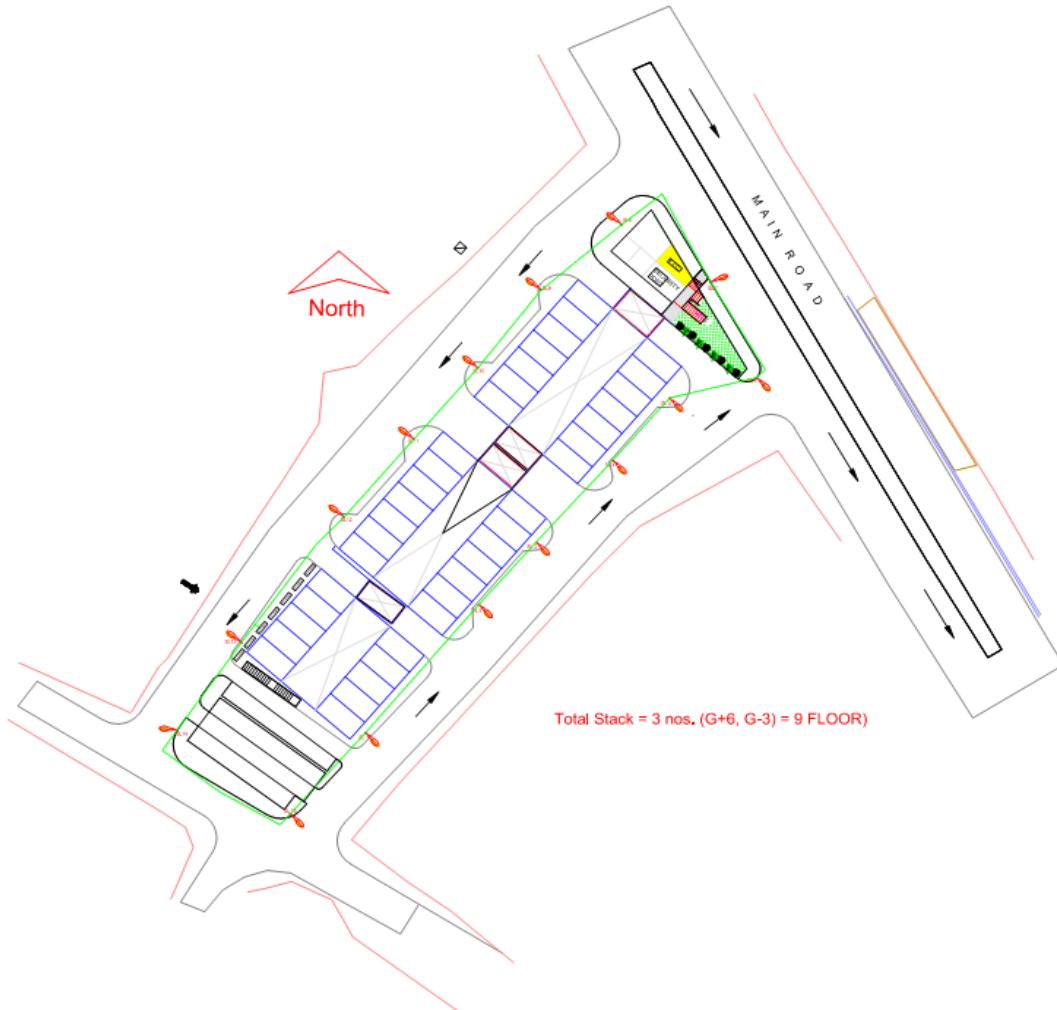
## Section VII – Employer's Requirement

## Section VII – Employer's Requirement



 Smart City	<b>CLIENT</b> AMRITSAR SMART CITY LIMITED (ASCL)	<b>PROJECT</b> KAIRON MARKET MLCP	 NORTH	<b>DATE</b> 08 APRIL, 2018
 PNC	<b>DRAWING TITLE</b> FIRE FIGHTING PLAN		<b>DRAWING NO.</b> MCHM-FIRE-FIGHTING-PLN <b>REV.</b> R.0.0	

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LIGHTING LEGEND

SYMBOL	Qty.	Fixture Type	Mounting Height
	15 nos	Street Light	6 mts

LEGEND	
	L.T CABLE

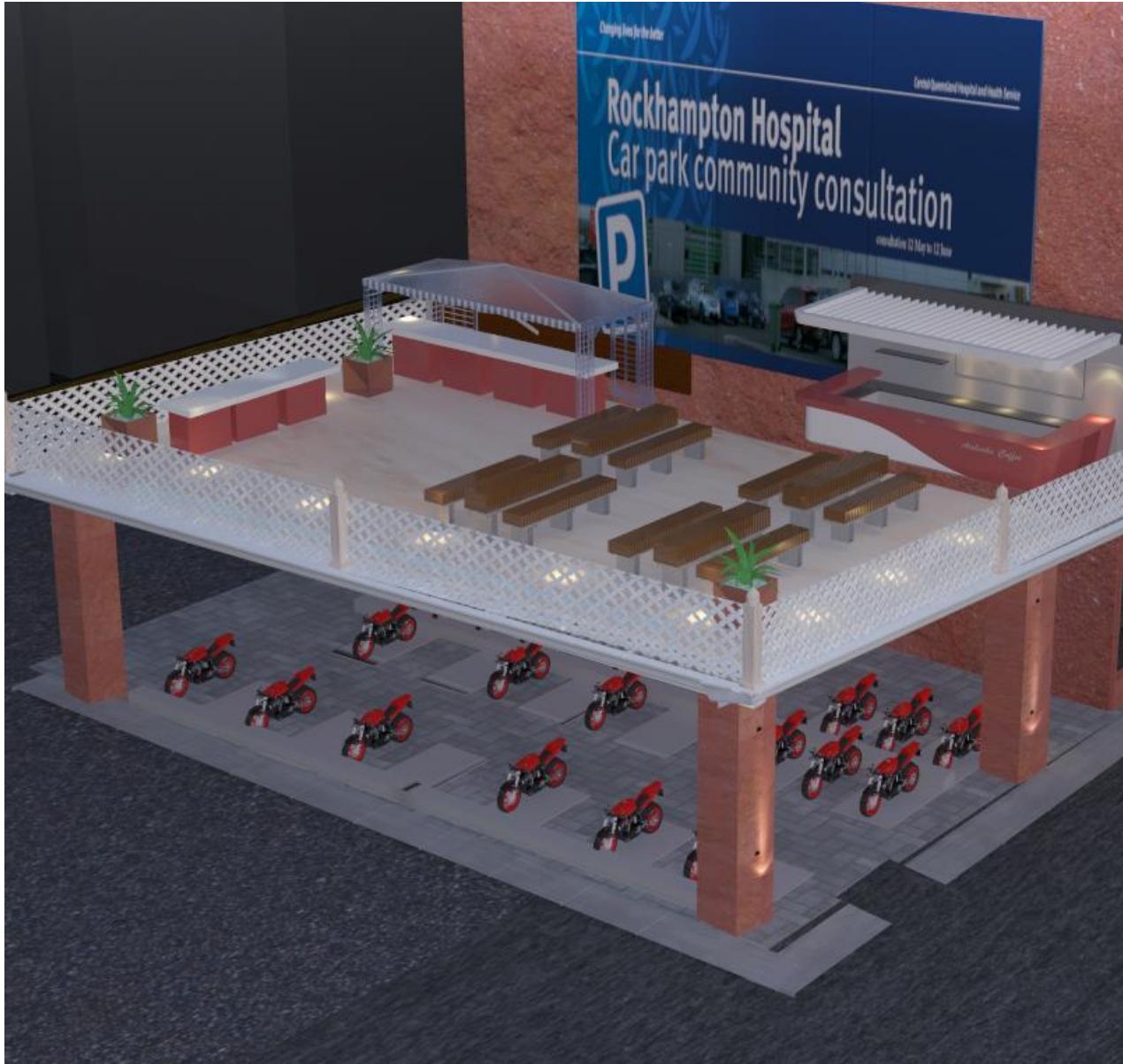
 Smart City MISSION TRANSFORMATION	<b>CLIENT</b> <b>AMRITSAR SMART CITY LIMITED (ASCL)</b>	<b>PROJECT</b> <b>KAIRON MARKET MLCP</b>		<b>DRAWING NO.</b> <b>AEKLNWMLCP-MLCP</b>
	<b>PNC</b> <b>Amritsar Smart City Limited</b>	<b>DRAWING TITLE</b> <b>ELECTRICAL PLAN</b>		<b>REV. R 0.0</b>

## Section VII – Employer's Requirement



Conceptual View

Section VII – Employer's Requirement



**Annexure – A :**

**Scope of Works for Civil and Steel Components including Sanitary & Plumbing works, Drainage & Sewage Works, Rain Water Harvesting System, Road Works and Landscaping**

## Section VII – Employer's Requirement

### General

Based on surveys and investigations conducted by the Contractor, the Contractor will plan and frame a comprehensive proposal for providing the desired Car Parking Facility.

The broader scope of civil work will be as offered by the Contractor including the modification and additions accepted. However, a brief description of scope for civil works along with few fixed parameters is detailed here under:

#### (a) Car Parking Systems and General Works :

1. The Fully Automatic Car Parking Building will be constructed in the Kairon Market area and will house Minimum 415 ECS parking spaces through 9 levels including ground level.
2. The Parking System will have a maximum height upto 15 meters above finished plinth level.
3. The bay on the Ground Floor of the Parking facility shall be utilized for getting the cars parked in the system (for entry, exit, and vehicle movements). However, all the Service Rooms, Control Rooms, Waiting Rooms, Collection Booths and other related facilities shall be provided at the Ground Floor level.
4. All three basement levels shall be proposed to accommodate SUVs / cars with carriers.
5. Proper space must be kept aside on the ground floor for Car Parking Management Systems, DG Sets and other services.
6. Server Rooms and Control Rooms of appropriate size along with approved finishing as per specifications shall be provided at ground floor level of the Premises.
7. Service Stair cases of adequate size along with approved finishing, for Maintenance & Service purpose shall be provided incorporated in the design.
8. False ceiling of approved design shall be provided in Visitor's Waiting Lounge and Control Rooms by the Contractor.

#### (b) Other Civil Works

1. Collection / Dispensing / Security Booths of appropriate size, properly finished as per directions of the Engineer / Employer shall be constructed at each Exit / Entry as per approved plan and shall be furnished with standard approved furniture along with boom barriers. These booths shall be constructed as load bearing brick masonry structures with RCC slab.
2. Construction of all approach Roads including Footpaths Drive in Lanes with proper turning from carriageway within and outside the complex building from the adjoining Main Roads along with necessary traffic signs, markings & other road appurtenances shall be in the scope of the Contract.
3. The Contractor has to design and provide the Rain Water Harvesting System i.e. its collection and utilization of the collected water in Toilets, Landscaping and washing.
4. It will be in the scope of the Contract to provide a 50 mm dia. G.I. Pipe connection from water main pipe of PHE department up to sump tanks at the Ground Floor. A provision of 100 mm dia. G.I. pipe from main road up to sump tanks for the purpose of filling the Sump Tanks by Water Tankers shall also be kept. All pipes are to be laid

## **Section VII – Employer's Requirement**

underground. The G.I. pipes shall be of 'B' Class

5. Contractor shall insert, at no extra cost, all the necessary sleeves fabricated out of G.I. 'B' class pipe or as instructed, in all the beams, at the time of casting of the slab and beams of the toilet areas. Also
6. all the sleeves required for the underground and Over Head Tanks shall be provided by the Contractor at no extra cost.
7. The Contractor shall provide all inlets, outlets, washouts, vents, overflow and all such other piping connections for Water Storage Tanks.
8. All Sanitary, Plumbing, Drainage & Sewage works required for successful completion of the sub- project shall be in the scope of the Contractor.
9. The Contractor will have to obtain necessary sewerage / drainage approvals, layout scheme approval, water connection, etc. & all other approvals and compliances from various statutory departments as required and no extra amount would be paid for the same except reimbursement against G.R. of actual Govt. Fee for the said approvals.
10. The Contractor shall construct a platform for the Electrical sub-station (Transformer) including its enclosure by way of chain-link fencing on the top of roof of MLCP.

## Section VII – Employer's Requirement

### Annexure – B : Scope of Works for Mechanical Components, Car Parking System and Fire Fighting System

#### **Scope of Mechanical Works:**

- a) The Contractor has to provide two boosting pumps (one stand by and one working) of required capacity with suitable piping and fitting for overhead water tank at the top of the parking systems on a civil structure in the corner and provide two separate pumps of required capacity (one stand by and one working) for Fire Fighting Operations with a separate plumbing system in the sump tank of required capacity at ground floor along with pumps of required capacity. Any additional pumps, if required, for efficient functioning of the system as a whole shall also be provided by the Contractor at no extra cost.
- b) All necessary valves and fittings for efficient pumping system are to be provided by the Contractor.
- c) The Contractor shall test the respective system as described to establish whether the installation has been carried out to facilitate efficient Operation.

#### **Scope of Car Parking System:**

- a) Based on surveys and investigations conducted by the Contractor, the Contractor will Plan a comprehensive proposal for providing the Car Parking Facility for car spaces of Minimum 415 ECS for Kairon market through 9 level structure of Automated Car parking systems.
- b) Provision for disabled persons' car parking spaces has to be provided at ground floor.

#### **Scope of Fire Fighting System:**

Firefighting system is provided to minimize danger to life from fire, smoke, fumes or panic before the building can be evacuated. The safety of life is more than a matter of means of exits. Fire protection techniques are based on fire behaviour characteristics of different material and structural elements of building. There are three different methods to get rid of danger of fire.

- Fire Prevention - Design and construction of building on passive fire protection measures, also describing the various types of building material and their fire rating.
- Life safety – Covering life safety provisions in the event of fire and similar emergencies, also addressing construction and occupancy features that are necessary to minimize danger to life from fire, smoke, fumes and panic.
- Fire protection – Covering the significant appurtenances and their related components and guidelines for selecting the correct type of equipment and installation meant for fire protection of the building depending upon the classification and type of building.
- The minimum capacity of smoke exhaust is now 12 air changes per hour.
- Automatic sprinkler system: A system of water pipes fitted with sprinkler heads at suitable intervals and heights and designed to actuate automatically, control and extinguish a fire by the discharge of water.
- Emergency lighting system: A complete but discrete emergency lighting installation from standby power source to the emergency lighting lamps. This ensures escape routes is illuminated all the time.
- Fire Door: A fire resistive door approved for opening in fire separation. Fire exits and Fire lifts also to be provided.
- Wet riser: An arrangement of fire fighting within building by means of vertical rising mains not less than 100mm nominal diameter with landing valves on each floor/landing for fire fighting purposes and permanently charged with water from a pressurized supply.

## Section VII – Employer's Requirement

This building lies in Group E Sr. No. (2) Business building above 10m but not exceeding 15m. In this class, underground tank capacity required is 50000 litre and an overhead tank of capacity 10000 litre. A pump room with main pump of capacity 2280 lpm 70m head and Diesel pump of same capacity and a jockey pump of 180 lpm 70m head capacity are proposed as per NBC 2005 requirement. One wet riser with hydrants at each level total 8 nos. have been provided. A ring of 150mm dia MS pipe with 6 nos. hydrants with a gap of 20m are proposed. Sprinklers to operate at 68deg C at each level will be installed.

1. The scope of work covers Fire Fighting (Combination of Wet Riser & Sprinkler System) for Proposed Car Parking Facility. It shall be the Contractor's responsibility to plan, design and provide complete Fire Fighting System as per the applicable codes.
2. The Contractor should provide all fire related pumps like fire sprinkler pump, Smoke detector, fire extinguishers, fire hydrant, fire address system, fire prevention, fire alarm system etc.
3. Fire Detection & Fire Fighting systems are to be provided by the Contractor at each level of the car parking facility or at the top level only of the Car parking system as prescribed by the CFO.
4. The Addressable Fire Alarm system planned for this project must in general cover the Design, Quality Control of all The Detectors / Call Points / Annunciation system hooked up to main panel.
5. The Fire Protection System must consist of external & internal Hydrant system as required for different areas within all the levels of car parking system as prescribed by the CFO.
6. Foam Cylinders must be provided at the ground level of Car parking systems to extinguish fire caused due to any kind of fuel.
7. The Contractor shall set out the drainage, soil, waste and water pipe lines and other fittings and fixtures in accordance with the approved plans and designs.
8. The Contractor should note that this work should be executed and completed before the completion of the general work and the Contractor shall take care to see that no damage or breakage is done to work once it is constructed and finished. The sanitary and water supply work shall be programmed in such a way that it does not hold up the general construction or works of other trades.
9. Contractor shall prepare Site drawings indicating the layout, Specification of pipes fittings and all other information required for execution of work. The Shop drawings shall be got approved before carrying out any section of work. The Shop drawings shall be submitted 7 days in advance for approval from the Engineer / Employer.
10. On completion of work, Contractor shall submit to the Engineer 6 copies of as built drawings indicating all works with complete information as regards to sizes, Operational valves, chambers etc. including levels and other such information as may be required for reference.
11. Contractor shall ensure that all the sleeves required at the time of casting of water tank, over head tank and any other sleeves required for Plumbing purpose shall be provided as per the drawings.
12. Contractor has to submit his activity schedule in accordance with the civil activity bar chart (especially water proofing, tiling etc.) and ensure proper coordination with the various agencies to whom these specialized works have been assigned.

## Section VII – Employer's Requirement

13. Contractor will have to obtain necessary approvals for the Fire Fighting works including all approvals and compliances from various statutory departments as required and no extra would be paid for the same except reimbursement against G.R. of actual Govt. Fee for the said approval.
14. If so directed, materials shall be tested in an approved testing laboratory and the Contractor shall produce the test certificate in original to the Engineer / Employer and the entire charges for original as well as repeated tests shall be borne by the Contractor.
15. For the purpose of testing of the Sprinkler system after its completion, the Contractor shall provide free of cost Sprinkler heads to be checked by the Engineer/ Employer. The test shall be carried out on the sprinklers separately for each zone.
16. The Contractor shall provide all materials, tools, testing, materials, scaffolding, labor and electric power, necessary for the perfect completion of the whole work at his own cost.
17. The Contractor shall obtain from time to time various permissions and the completion certificates as per rules of all local and statutory authorities.
18. The Contractor shall be required at his own expense to test the installation with water.
19. The Contractor shall be responsible for any repairs or replacement of any defective Part and shall rectify the installation free of cost to the owner.

## Section VII – Employer's Requirement

### Annexure – C :Scope of Works for Electrical Components, Ventilation and Solar System

#### 1. SCOPE OF ELECTRICAL WORKS:

##### 1.1 GENERAL

###### ► **Electrical Systems Kairon Market:**

Electricity is the life line of any project. Electrical system is designed considering all safety factors, byelaws, controlling equipment and requirements of various loads. Above load has been calculated as per PSPCL norms. Total load of the premises is 237kVA. Taking 80% loading factor to minimize transmission and distribution losses as required by PSPCL, transformer capacity has been taken as 1 nos. of 300 kVA. Low Voltage is general problem in Punjab. This transformer is with on load tap changer provision. It will provide stabilized voltage to the system. Electronic system requires stabilized and harmonics free power to work break free and efficiently. We are taking 100% back up so we are taking 1 no. 250 kva DG set considering 95% loading. Whole load will come at a time hence one DG set taken. Capital cost of the system will be less for single DG set. There are 100 no. E-vehicle charging points considered in the parking ECS stands. These will be charged during night time. PSPCL has asserted that breakdown in supply will be minimum now onwards.

11kV HT meter will be installed by PSPCL. Supply will be given to this Meter probably near gate or easy approachable place. VCB panel, DG set and transformer will be installed at existing substation area. 11 kV VCB will be fed through 3C X 95 sqm Aluminium armoured HT cable. This transformer will feed Main LT panel at same location. All electrical equipment's are outdoor type. DG set are with AMF panel. During power off, DG set will start automatically. There are double neutral and double body chemical type earthing for DG and transformer. For other panels double body earthings are provided. Light and Power sockets will be provided as per requirement. Two no. 6A sockets will be provided for one PC point. The load on 6A socket should not be more than 200W. All power loads should have 6/16A multi socket. Size for point wiring will be 1.5sqmm and power point will be 4 sqm. Secondary 6/16A socket (unused) will be wired with 1.5sqmm. Size of earth wire for 1.5sqmm will be 1sqmm and for 2.5sqmm will be 1.5sqmm and for 4sqmm will be 2.5sqmm. Single earthing will be provided for single phase circuit and double earthing will be provided for three phase circuit. TPN DB's will be used for internal distribution to ensure load balancing on each phase. It is ensured at LT Panel level also. Sub main and circuit wiring will be of copper only. Modular sockets of reputed makes will be used. Cables and Panels switchgears will be of reputed make.

###### ► **Illumination:** We shall use LED lights with efficacy more than 100 lumens per watt of reputed make. Thus we can reduce running cost of the premises. The respective illumination or Lux level of different areas are as follows:

- External areas (Pathways etc.) - 20 Lux
- Pallet space – 250 Lux
- Remaining areas like offices etc. – 500 Lux
- Illumination can be calculated as
- $I = L * C * LF / A$  where
- I = illumination (Lux, lumen/m<sup>2</sup>)
- L = luminance per lamp (lumen) (as provided by manufacturer)

▪ C = coefficient of utilization (generally 0.6)

## Section VII – Employer's Requirement

- LF = light loss factor (generally 0.8)
- A = area per lamp (m<sup>2</sup>)
- Efficacy chosen for LED lamps (minimum) = 100 lumens per watt
- 1 Lux = 1 lumen per sqm

Listed below are the Electrification works to be carried out by the Contractor for Internal and External areas of the Car Parking Area along with all necessary described systems and equipment as per technical specifications, drawings, scope of work and to complete the installation in all respects and make it ready to use and ultimately commission it to the satisfaction of the Engineer / Employer.

### 1.2 Transformer Work: Relocation of Existing Electrical Substation

A substation with 6 no. 500 kVA Oil type without OLTC, associated HT panels, 6 nos. LT Panels, HT/LT cables surrounded by fencing are located at one corner of the site. To clear the site from all encumbrance, the entire substation need be relocated. Following works (all in Bidder's scope) are required to be done:

**1. Six nos.** temporary foundations in any form but suitable for 500 kVA transformers about 2 feet high to be prepared near the site or some mobile arrangement (preferably at parking space of Amrit Talkies or along the wall). Rent, insurance, security, safety (earthing etc.) will be in Bidder's scope. Unauthorized access to this substation shall be avoided. One 500 kVA transformer shall be taken on rent and be put on first foundation. All new HT and LT cables be laid at new safer route other than site. No joint is allowed in HT/LT cables. HT /LT cables should be so cut that there is minimum wastages. Unused cables will be Bidder's property. First transformer then be dismantled by taking shut down for minimum possible time and HT cable will be connected to HT panel. The dismantled transformer be installed at second foundation. The process will be repeated to dismantle second to fifth transformer and same will be placed on third to sixth foundation. Hence sixth /last transformer will be installed at first foundation and rented transformer will be returned. LT Panels one by one be shifted to new location near by away from site. After shifting of all LT panels, HT Panels will be shifted to new location near site. Safety of the system be doubly ensured.

**2.** After the building reaches to terrace, new 06 nos. dry type transformers without OLTC and one transformer for the building with OLTC, one HT panel and one DG set be procured and installed on terrace duly covered by fencing complete as per technical specifications of CSR 2010.

**3.** HT and LT Panels will be at ground floor. Dismantled material will be deposited at PSPCL store at Amritsar as instructed by PSPCL. Credit of old material will be in Bidder's scope though supervision charges @ 15% as per rules of PSPCL with liaisoning for hand over after CEI inspection etc. to PSPCL will be borne by Bidder.

**4.** All material including transformers etc. shall be as approved by PSPCL.

**5.** Access to terrace substation shall be ensured. There should be provision for replacement of faulty transformer/DG set by additional arrangement in alley.

**6.** DT meters of all transformers shall be in bidder's scope.

**7.** Required Earthings and all safety measures shall be given by Bidder.

**8.** Testing of all installed equipment will be done by protection team of PSPCL for which cost will be borne by Bidder.

### 1.3 Employers Requirements of Electrical Work

## **Section VII Employer's Requirement**

The contractor for electrical works must be completed as per the scope mentioned in this document after thoroughly adhering to the specifications of the related electrical works mentioned separately in the Specifications' section.

- 2) The Transformer/DG set of adequate capacity with HT Panel would be provided by the Bidder complete a per specifications of PSPCL at terrace . LT Panel will be at ground floor and from that location the power distribution should be allocated to the entire building.
- 3) The contractor must do a detail study and find out the exact electrical load requirements for this entire project and accordingly recommend to the Engineer / Employer, the details of the capacity of the Transformer/DG set required so that the same can be installed.
- 4) The contractor's scope of work with regard to electrical works will comprise of:-
  - a) Supply, Installation, Testing & Commissioning of substation equipment such as 1 Nos. DG set for 100 % backup with AMF Panels, HT / LT Panels, Feeder Pillar, RMU etc.
  - b) Cabling,
  - c) Internal electrification,
  - d) Lighting fixtures,
  - e ) Street lighting,
  - f) CCTV system wiring etc., Access control wiring etc. with all its allied Electrical equipment
  - h) The contractor should provide all applicable standards, codes, etc.
  - g) Earthing system,
  - h) Lightning arrestor, etc. with all allied equipment.
- 5) The Contractor shall carry out and complete the said work under this contract in every respect in conformity with the bid documents and with the directions of and to the satisfaction of the Engineer / Employer.
- 6) Unless stated elsewhere in these documents, all equipment like pipes, cables, transformers, generators, panels, poles, lighting fixtures etc. are to be factory tested either in this country or abroad by third parties & same shall be intimated to the Engineer / Employer in advance. All incidental expenses for the said third party inspection incurred for factory tests shall be borne by the contractor and later will be reimbursed by the client from the Provisional Sum.
- 7) The contractor shall furnish all labor, materials and equipment including transportation and other incidental activities necessary for supply, installation, testing and commissioning of the complete electrical system as described in the Specifications. This also includes any material, equipment, appliances and incidental work not specifically mentioned herein or in the Specifications section but which are necessary and customary to be performed for the successful completion of the project. The brief scope of electrical system to be provided by the contractor shall be as below but not limited to:
  - a) Contractor shall carry out all necessary tests required to establish the guarantee performance as per IS codes.
  - b) Contractor shall carry out testing and commissioning of the D.G. set as per required capacity with AMF panel supplied by him.
  - c) Contractor shall also carry out all necessary tests at site required to be sure of the performance of the items used in these Electrical Works, before installing the same.

**Section VII Employer's Requirements**  
Contractor shall provide all necessary literature for erection and commissioning works to the Engineer / Employer.

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## Section VII – Employer's Requirement

- e) The detailed design arrangement of the equipment shall be the responsibility of the Contractor subject to the approval of the Engineer / Employer.
- f) All conduits should be concealed wherever applicable
- g) The Contractor shall provide the following:
  - i) All the necessary junction boxes, outlet boxes Switches, plug sockets, cover plates wiring for lighting and power circuits and all other wiring accessories
  - ii) LT Cables, Mains and Sub-Mains, Rising Mains / Bus Ducts, GI raceways and junction boxes, HT/LT panel, Main Distribution / Sub Distribution panels, Final Distribution panels & Capacitor Panels as per their required sizes & thickness (IS Standards) Cables on cable trays and / or within suspended ceiling spaces including installation, cable trays, hangers, supports, cable terminations and all fixing accessories.
  - iii) Earthing (Grounding) System.
  - iv) Lightning Protection System.
  - v) Supply and installation of Lighting Fixtures for Street Lighting areas.
  - vi) Installation of Internal Lighting fixtures.
  - vii) HT switchgear as per required sizes. viii) Substation Earthing.
  - x) Supply and installation of conducting & cabling for CCTV.
  - xi) Supply & Installation of separate cable system for fire detection, fire prevention / fighting and Ventilation equipment.
- 8) DG set provided as a back-up for this car parking system must be connected with the entire parking systems and must be equipped with automatic switch over mechanism.
- 9) The contractor shall carry out the work in accordance with the Specifications, and other documents specified in the bid documents. The contractor shall be fully responsible for the performance of all the equipment at the specified parameters in electrical works and for the efficiency of the installation to deliver the required end result.
- 10) The contractor shall guarantee that the Electrical system as installed shall perform to complete satisfaction of the Engineer / Employer. The contractor shall also guarantee that the performance of various equipment individually, shall not be less than the quoted capacity; also actual power consumption shall not exceed the quoted rating, during testing and commissioning, handing over and guarantee period.
- 11) After completion and successful commissioning of the Electrical works, it shall be responsibility of the Contractor to obtain the necessary NOC from concerned Line Department
- 12) At the close of the work and before issue of final certificate of virtual completion, the contractor shall furnish written performance guarantee against the replaced materials. The Contractor shall hold himself fully responsible for reinstallation or replacement, free of cost for the following:
  - a) Any defective work or material supplied by the Contractor.
  - b) Any material or equipment damaged or destroyed as a result of defective workmanship by the Contractor.

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- 13) The work shall be carried out to the satisfaction of the Engineer / Employer and in accordance with the Specifications, Regulations of the Electrical Supply Authority, Indian Electricity Rules and Regulations and latest Indian Standards.
- 14) The Contractor shall ensure the sufficiency of the size of electrical shaft openings, clearances in wall and suspended ceilings for proper installation of his conduits, cables, cable trays, panels etc.
- 15) The Contractor shall locate all equipment which must be serviced, Operated or maintained in fully accessible positions. The exact location and size of all access panels, required for each concealed control damper, valve or other devices requiring attendance, shall be finalized with the Engineer within sufficient time. Failing this, the Contractor shall make all the necessary repairs and changes at his own expense.
- 16) All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design.
- 17) Makes shall be strictly in conformity with list of approved manufacturers as per IEC/IS Codes as mentioned in the makes list or as suggested by Engineer in charge.
- 18) Where manufacturer has furnished specific instructions, relating to the material and equipment used in this project, and where nothing has been specifically mentioned in these documents, the manufacturer's instructions shall be followed in that case.
- 19) The contractor shall provide all necessary instruments and labor for testing, shall make adequate records of test procedures and readings, shall repeat any tests requested by the Engineer / Employer
- 20) Upon completion of the work and before issuance of certificate of virtual completion the contractor shall submit to the Engineer of the Client four sets of layout drawings in progressive manner for individual systems drawn at approved scale, indicating the complete wiring system as installed.
- 21) Drawings shall be prepared on AUTO-CAD (latest version). Along with the hard copies, the contractor shall submit copies of all drawings on a CD. These drawings must provide:
  - a) Substation equipment layout & all power distribution panel layout.
  - b) Single line power distribution diagram including control wiring for transformer & DG sets.
  - c) Cable Trays with number and size of cables installed
  - d) Run and size of conduits, junction and pull boxes.
  - e) Raceways and Junction Boxes.
  - f) Number and size of conductors in each conduit with phase identification
  - g) Location and rating of sockets and switches controlling the lighting and power outlets.
  - h) Location and details of distribution boards/panels, mains, switches along with phase balancing details
  - i) A complete wiring diagram as installed and single line diagrams showing all connections in the complete electrical system

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- j) Location of all earthing stations, route and size of all earthing conductors manhole
  - k) Layout and particulars of all HT & LT cables.
  - l) Instruction, maintenance and Operation manuals including maintenance schedule for all equipment.  
Testing & commissioning reports of all electrical equipment
- 22) The Contractor shall provide and install all necessary hoists, ladders, scaffolding, tools, tackles, all transport for labor and materials and plants necessary for the proper execution and completion of the work to the satisfaction of the Engineer / Employer.
- 23) The cost of constructing pillars, platforms for temporary works is also to be borne by the Contractor.

## 2. Scope of Solar Power Plant :

It is proposed to install a Solar Power Plant of 40 KV on the roof of Kairon market and connect it with the national grid through Solar PV cells and Inverters of reputed make including necessary cabling up to net meter in LT panel at Ground Floor complete in all respect, as per drawings and Engineer's instruction and including liaising with PSPCL .

A Grid Tied Solar Rooftop Photovoltaic (SPV) power plant consists of SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter, and Controls & Protections, interconnect cables, Junction boxes, Distribution boxes and switches. PV Array is mounted on a suitable structure. Grid tied SPV system should be designed with necessary features to supplement the grid power during day time. Components and parts used in the SPV power plants including the PV modules, metallic structures, cables, junction box, switches, PCUs etc., should conform to the BIS or IEC or international specifications, wherever such specifications are available and applicable. Solar PV system shall consist of following equipment/components:-

Solar PV modules consisting of required number of Crystalline PV cells.

Grid interactive Power Conditioning Unit with Remote Monitoring System Mounting structures Junction Boxes.

- Earthing and lightening protections.
- IR/UV protected PVC Cables, pipes and accessories.

## 3. Scope of work for ventilation:

► **Ventilation System:** Ventilation of car parks is important to prevent the build-up of toxic fumes and flammable gases from motor exhaust and also to clear smoke in the event of a fire. The Building Regulations specify what is required to maintain safe conditions as per BS 7346-7:2006. The rules for mechanical extract state that for control of fumes a system which is capable of limiting the concentration of CO within the car park to below 30 parts per million averaged over an eight hour period should be provided. For smoke clearance 10 air changes per hour should be extracted. Hence exhaust fans all around have been proposed. Mechanical auto ventilating fan at terrace have also been provided.

- Floor Area x Height = Volume
- Air change per hour = the number of times the volume within the car park is extracted within 1 hour.
- The regulations for smoke clearance state that the system should have an extract facility which is split into two parts, each part capable of providing 50% of the required duty and extracting from both high and low level.

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- Exhaust fan systems from reputed company are active systems which, in an emergency, react according to a pre-saved switching matrix, thus offering people and buildings the greatest possible protection. To start with, protection targets are agreed for each project. If there is an emergency, the project-specific switching matrix ensures that the legal basic requirements and the predetermined protection targets are adhered to. These are for example maximum CO and smoke gas concentrations, required visibilities for self-rescue.
- Sensors are installed to comprehensively monitor the carbon and nitrogen concentrations. There are also transparent signs which light up and warn the users if the concentration is too high. All fans, sensors and transparent warning signs are connected with the central or the decentralized control system.

The Contractor should design and built adequate Ventilation system (Natural-cum-Electrical) in the constructed parking building which will be tested for performance before acceptance.

- 1) The contractor for the system shall include all necessary equipment for providing a smoke free environment. The system shall also meet the requirements of NBC.
- 2) The Ventilation System shall consist of Jet Fans / Exhaust Fans of required capacities located at various places for proper Ventilation.
- 3) The Contractor should supply, install, test & commission the complete system.
- 4) The Contractor should carry out the Smoke Test/CFD Analysis to the satisfaction of the Engineer / Employer.
- 5) The Contractor should provide entire Air-cooled condensing unit with outdoor support structure as required.

However for All Collection / Dispensing / Security Booths, Ceiling fans shall be provided by the Contractor.

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### Annexure – D : Scope of Works for Car Parking Management System and Instrumentation

(Scope of Work for ICT Solutions for Indoor MLCP Parking Lots with Mechanized Parking)

#### 1. ICT Intervention in MLCP

The objective of Smart Parking is to provide a seamless, efficient, citizen-friendly, cost-effective parking operation for Amritsar City. The proposed Smart Parking Management system will involve:

- Installation of Parking sensors as required for the MLCP parking system
- Installation of CCTV cameras ad 24X7 monitoring for entire parking area.
- Mobile App based parking transactions and real time status monitoring
- Display of parking availability on entry
- Real time update of entry & exit of vehicle in the local & centralized system
- Real time update of parking violations
- Data for analyzing and understanding the demand of parking at different hours of the day.
- Indicative KPIs for Smart Parking.
- Payment collection reconciliation and analysis
- Trend analysis which shall facilitate better urban planning
- Integration with ASCL Integrated Command and Control Center and Real time monitoring

#### 2. Components for Mechanized Smart Parking Management Systems

Various components of the project, including the expected usage and description are discussed in this section like Automatic Boom Barriers, parking columns, security cameras, handheld ticketing devices, advance booking feature of parking facility, map based guidance system and LED signage. As per site surveys conducted the proposed parking lots selected in Phase 1 at Kairon market shall be mechanized i.e. Puzzle parking or Pick and Place Parking or any other type of parking.





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Below are detailed descriptions of the components involved in Smart Parking Management System selected for mechanized parking lots.

**2.1 Entry / Exit boom Barrier Gate** - Entry/Exit Boom barrier gate with loop detection shall be used for entry and exit to the Parking Lot. These allow entry / exit based upon the information logged in the scanner installed in the Parking Column nearby.

Automated Boom Barriers	
<ul style="list-style-type: none"><li>▶ Boom barriers have 10 million open/close cycles</li><li>▶ These come along with loop detectors for safety and security</li><li>▶ No. of open/close events, loop trigger time etc. are available for analysis and auditing</li><li>▶ The open/close times are configurable for the barriers (0.9 sec, 1.5 sec or 3 sec etc.)</li><li>▶ Completely maintenance free, No AMC required</li></ul>	

**2.2 Loop Detectors:** These magnetic loops are used to detect presence of vehicles and safely operate boom barriers.

Loop Detector
Connected to a ground induction coil with two relay outputs, a loop detector is used to detect the presence of vehicles to safely operate boom barriers

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**2.3 Data Collector:** This device shall integrate with the Parking Availability LED Displays and Programmable Logic Controllers (PLC's) of the mechanized parking solution and collect the availability information and push it to the LED Displays which will be installed at each and every entrance and intersection of the parking lot. The data collector system is also connected to internet and synchronizes data with a web based Parking management application server.

**2.4 Parking Column based Ticket dispenser and QR/Barcode reader & writer** – This system is used for scanning mobile booked tickets, generating on-spot parking tickets and special passes for frequent/staff persons. It is also integrated with the parking boom barriers for automated operation after verification of tickets.

<b>ENTRY / EXIT Parking Column</b>	
The parking columns can dispense parking tickets to gain access to the parking lots. These also have option for contactless card readers, or option to enter/leave without stopping if the window shield tag is read by the external long range reader. Typically the Entry/Exit Station is coupled with a Barrier Gate, Loop Detector, and optional devices, depending on the site requirements.	

**2.5 Handheld Ticket Dispenser**-The Handheld devices are used for issuance of spot tickets, validation and also for monitoring the online pre-booked transaction with printer and scanner. The Machine shall also be able to access Debit/Credit/Smart Card transactions.

**2.6 Parking Availability Displays** – These displays are used for displaying the parking occupancy level and navigational aids at entry points to a mechanized parking lot.

<b>Parking Inventory- LED Display System</b>	
That Real Time Vehicle Inventory system calculates the parking bays automatically at the time of Vehicle Entry and Exit and show the number of parking slots that are free at the entry for allowing vehicles inside.	 

**2.7 CCTV Cameras** – CCTV cameras along with ANPR functionality shall be there at the entry / exit points

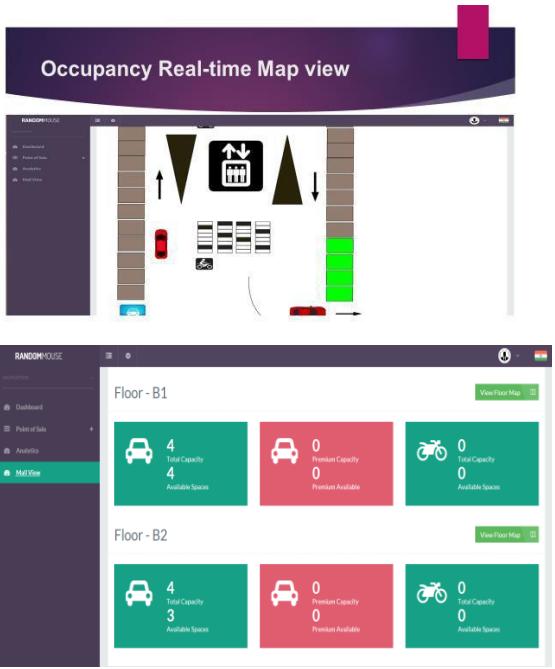
## Section VII – Employer's Requirement

**2.8 Mobile App** - Mobile App based parking management system; facilities like real time parking occupancy level info, parking space pre-booking facilities, online payment mechanism, other alerts & notifications.

<b>Mobile App for Smart Parking</b>	
<ul style="list-style-type: none"><li>▶ Gives real time parking availability data</li><li>▶ Integrated with digital payment options</li><li>▶ Helps commuters remembers where he has parked</li><li>▶ Provision to implement reserved parking space</li></ul>	

## **2.9 Centralized web based Parking Management Software:**

Helps to provide real-time information to operators along with historical and analytical reports on parking lot and provides web based administration and management of functions like pricing, policies etc. related to the parking lot.

<b>Cloud-based / On Premise Software Platform</b>	
<ul style="list-style-type: none"><li>▶ Gives real-time vehicle count, number of transactions and revenue generated</li><li>▶ Allows the operator to change the parking tariff at any time (Dynamic pricing)</li><li>▶ Provides a Map View, which shows the entire parking lot's floor plan mapped with real time parking status</li><li>▶ The software also lets the operator control the LEDs. The LEDs can be shut selective during non-peak hours thereby reducing power consumption.</li><li>▶ Key analytics with regards to revenue (wherever applicable) and traffic could be generated based on data stored on the cloud server</li></ul>	

## **2.10 General Obligation and Requirements of ICT**

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1. The vendor shall supply, install, configure, test, commission , provide training for all required ICT hardware such as boom barriers, handheld ticketing device devices, parking columns, IP surveillance cameras, parking availability displays, computer, printer network equipment, Data collection units etc. as per Bill of Material at the parking lots.
2. The vendor shall supply, install, configure, test, commission, and provide training for Smart Parking Mobile application. The mobile application shall be available through online App stores for Android and Apple to citizens for accessing parking services that shall show the real time status of parking slots, have facility to book the parking space, make online payment through various modes and enter/exit parking lots without physical tickets.
3. The vendor shall supply, install, configure, test, commission, and provide training for web based parking management software. The web based parking management software shall provide real time operations management including pricing management and availability information, payment gateway integration, provide mobile application API and analytics of different trends based on specific time, specific area, vehicle, usage and parking demand etc. for the purpose of better management of parking lots.
4. The vendor shall ensure complete integration of the ICT solution components with the mechanized parking solutions like Car parking, parking system etc. to display parking availability information, revenue management and optimization functions of the parking lot.
5. The vendor shall enable unique identification of each vehicle entering any of the parking lots through bar coded tickets/ QR Coded entry etc. as applicable and ensure collection of parking revenue meets all policies and guidelines of Amritsar Smart City Limited and Amritsar Municipal Corporation.
6. The vendor shall provide training and capacity building along with complete training documentation, copies of the original licences/make product licences /hardware licences/ software licences to parking operator/ASCL and AMC staff as required.
7. The vendor shall provide AMC and Support for period of 10 years from date of Go Live of the complete system including hardware, software, network and other related subsystems.
8. Deliverables to be completed as part of ICT Solution

S.No.	Milestone	Deliverables
1	Team Mobilization	Team shall be mobilized as per the contract
2	Project Initiation	Detailed Survey Report including infrastructure assessment, hardware deployment plans etc. Detailed Project Plan including Operations management, Contract management, Risk management, Information Security and Business Continuity
3	Supply, installation, Configuration, testing and commissioning, of Smart Parking	Delivery Report, inspection reports Site Completion/readiness Report Software Licenses Acceptance /Go Live Certificate from purchaser/authorized entity
4	Training and Capacity Building	Transfer of Training Documentation and Imparting training for operation of equipment and software installed at the Parking Lots to Parking Operators, ASCL and MCA

## Section VII – Employer's Requirement

<b>5</b>	Annual Maintenance Contracts and Support	AMC and Support shall be provided annually for period of 5 years for all equipment's supplied out of which two years shall be defect liability period where cost of replacement of hardware and software shall be completely borne by vendor.
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## Section VII – Employer's Requirement

### **Annexure – E :Scope of Works for Operation & Maintenance**

#### **E.1 General:**

1. Operation & Maintenance of whole Facility for Ten (10) years after the date of issue of completion certificate including the defect liability period of two year. However during defect liability period the cost of Operation (Operational manpower namely operators, watch and ward, traffic regulators, health and safety, fuel and lubricants for DG sets, or any other requirement to Operate the system 24x7 shall be borne by the contractor.
2. The necessary fixtures and furniture required for Contractor's office during O&M period shall be provided by the Contractor at no extra cost and shall remain property of the Contractor.
3. Operation and Maintenance of the Car Parking Systems and maintenance for all the assets and mechanism installed for Electrical Systems, Plumbing, Ventilation, Fire Prevention Systems, Fire Fighting Systems, Rain Water Harvesting Systems and the Civil Building (Office block) will be in the scope of work of the contractor.
4. The Cost of Operation & Maintenance for Ten (10) years shall be borne by the contractor from the revenue generated through the parking.
5. All the defective parts will have to be replaced, to an extent, whereby they cannot be repaired during the whole O&M Period.
6. The maintenance for all the equipment's 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 O&M Period.
7. Operation and Maintenance instruction manuals must be provided by the contractor in 6 sets of hard copy and a soft copy to the Engineer / Employer along with the list of all spare parts to be stored at site for effective maintenance of the entire systems during the defect liability period and during the maintenance contract.
8. The contractor must ensure that he also submits a separate list of the spare parts to be imported and these spare parts must be stored at site immediately after the commissioning of the parking systems.
9. The contractor must maintain at least 5 sets of spare parts for those equipment's which are utilized for safety in fully automatic car parking systems.
10. The contractor shall use only the original and genuine spares of the original equipment as per recommendations given in the maintenance booklet of the manufacturer. Adequate stock of such spares is to be maintained by the contractor. Test certificate of the manufacturer for all major equipment including bearings will be submitted by the Contractor to ASCL/MCA.
11. If any material brought upon the site of works or to the places where Operations have been or are being carried out in connection with or for the purpose of the works, be in the judgment of the ASCL/MCA, of an inferior or improper description or improper be used in the works, the said materials or workmanship shall where required by the said officer be removed or amended by the contractor forthwith or within such period for every breach by the contractor in this clause, the ASCL/MCA is authorized to remove or cause to be removed the materials and workmanship so objected to or any part thereof and replace the same with such other materials and workmanship as shall be satisfactory to ASCL/MCA.

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12. The Contractor should make sure that all the equipment to be replaced at site during the defect liability period and during the comprehensive maintenance period reach the site in proper packaging, without any mishandling and the details of which must be given to the ASCL/MCA every month in his report.
13. The Electricity & Water charges during O&M period shall be borne by contractor. In case of power failure, the DG sets shall be Operated and cost on account of POL for these DG sets shall be borne by contractor.
14. The contractor must provide adequate labor, materials, tools and equipment during Operation and maintenance period.
15. The car parking systems and equipment covered under the above contract shall be promptly attended by the contractor including any 'Trouble Shooting' to ensure smooth and trouble free Operation.
16. Regular drills (at least once in a month) will be carried out by the contractor to check the quality of all the equipment during Operation and maintenance period. The report of the same shall be given to the ASCL/MCA after every quarter.
17. The contractor has to make sure that proper fire extinguishers are used to cover any kind of fire during any mishap within the total boundary area including machineries. The expiry period of refills of various fire extinguishers should be watched and maintained during the period of contract.
18. The Contractor must be responsible for the regular maintenance of the created facility as described in the supplied manual.
19. The Contractor must take minimum 5 years guarantee for all the equipment he purchases from respective vendors however he has to maintain or extend guarantee of all for 10 years.
20. During O&M period, the Contractor will also regularly maintain all constructed structures. During this period, the daily cleaning and maintenance of site premises shall be arranged by the Contractor at no additional cost.
21. The contractor has to maintain all the toilets for proper use of his own office and that of ASCL/MCA.
22. In case of battery Operated auto system panels and also system alarm etc., batteries are required to be maintained and replaced as and when needed by the contractor at no extra cost.
23. POL (Petrol/Diesel Oil & Lubricants) has to be arranged by the contractor as and when needed as per manufactures recommendations for periodical maintenance of entire system.
24. The Contractor shall program inspection/monitoring of the project facility for its good upkeep and smooth Operations. The inspection/monitoring shall be covering all the elements of Project facility including building structure, electrical and mechanical systems, sign boards, service standards etc.
25. In case of major repair due to normal wear and tear/break down, the contractor should bring the same to the notice of the ASCL/MCA immediately and necessary measures for its repair should be taken simultaneously. Breakdown, all repairs of any kind are to be attended by the contractor.
26. The Contractor shall also take care for the on-site personal training of its employees for the emergency Operations.
27. The Contractor shall maintain logbook of planned and reactive maintenance.
28. Any loss or theft to the equipment in the store room will be totally the responsibility of the contractor.
29. The contractor shall not remove/shift any equipment/machinery even temporarily without written permission of the ASCL/MCA or authorized representative.

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30. The Contractor shall attend immediately to all the complaints with reference to O&M of the entire system.
31. ASCL/MCA will be at liberty to post its staff for surveillance/ inspection at the Facility along with access to all units, control room and records, log books, MIS (Management Information system), data etc. round the clock as required. The logbooks and other records shall be properly maintained and any cutting should be attested by the staff from authorized employer officials and this record shall be open for further inspection / checking by ASCL/MCA for further action/improvements/rectifications. All the equipment, building land etc. shall remain the property of ASCL/MCA.

### **E.2 Staffing**

1. The contractor in each shift of Operation must provide minimum number of qualified employees as mentioned in the indicative list of Personnel Requirements for Operation and Maintenance. However a tentative list of actual number of employees required for O&M services shall be provided by the Contractor during the preparatory period. The list of actual number of employees required for O&M services shall be finalized after submission of O&M Manuals.
2. In addition, the contractor will provide unskilled personnel during O&M of the facilities as per requirements.
3. The O&M shall be carried out on a 24x7 basis, without intermission and the staff deployed by the contractor shall be in accordance with this contract.
4. The staff in each shift shall record their attendance electronically operated biometric system. e) The contractor shall provide to his staff all necessary superintendence during the O&M.
5. Such superintendence shall be given by a competent person having adequate knowledge of the Operation and Maintenance to be carried out (including the methods and techniques required), the hazards likely to be encountered and methods of preventing accident as may be required for the satisfactory working of the entire Facility.
6. The contractor shall ensure that the staff employed takes all necessary precautions while carrying out the work either in shift duties or any general shift.
7. The staff engaged shall wear common uniform with name plate indicating name and designation during duty hours.
8. Any dispute among the contractor's staff shall be resolved by the Contractor and in no way shall ASCL/MCA be responsible for the disputes between them.
10. The contractor shall follow the rules and regulations as per Labor Act / Factory Act, as applicable.
11. The contractor shall give his telephone no., contact addresses, etc. to the ASCL/MCA as well as shift duty staff to contact him during emergency/odd hours etc.

### **E.3 Safety/Security**

1. The contractor shall take all safety precautions under various Acts/Rules, under central/State Govt.
2. The contractor shall from time to time ensure compliance with all safety precautions underlined under various Acts/Rules and he shall be responsible for safety of its staff and the consequences thereof.
3. The contractor shall deploy round the clock Watch and ward staff - security personnel at entrance of the premises and in the compound for the safety of the Facility during the O&M period.
4. The contractor shall be completely responsible for the safety of the entire car parking area, all its equipment and all other electrical, Ventilation and mechanical components and all his personnel during this period.

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5. The care of the whole of the car parking area shall remain with the contractor who shall be responsible for all accidents or damages due to causes attributable to him.
6. Adequate safety precautions against fire, flooding, lightening, electrical shocks, accident due to moving/non-moving heavy/light equipment shall be strictly observed by the contractor at his own cost.
7. Suitable safety measures like gumboots, gloves, safety belts, ladders, safety lamps, gas masks, insulated tools, alarms etc. shall be provided by the contractor.
8. Necessary medical first aid kit shall be made available at all times.
9. In absence of observance of above safety precautions, the contractor shall be responsible for any unforeseen loss of the equipment or persons dealing with it.
10. In case of any injury / loss to the workmen / plant and equipment, the contractor shall inform employer immediately within 12 hrs of the occurrence of the event. The facilities will be open to local/state/central agencies for verification of safety/emission/acts compliance.
11. During night hours, the main entrance should be closed. However, shift duty staff should be alert and open the road during surprise checking of ASCL/MCA staff or any other Government Authorities or its nominees
12. Only bona-fide persons will be allowed in the premises, being a prohibited area. Smoking and drinking are strictly prohibited in the premises.

### **E.4 Reporting**

1. The Contractor will prepare monthly reports and quarterly reports and submit the same to the ASCL/MCA. The reports shall contain, inter-alia, the following:
  - A description of the maintenance work carried out in the reporting period.
  - A report on major failures, if any, their causes and remedial actions taken.
  - List of spare parts consumed in the reporting period from the store room.
  - Any change in inventory of the material in the store room with additions and subtractions shown at the end of the reporting period.
  - O&M staff deployed by the contractor during the reporting period.
  - Any major repair works, if any.
2. ASCL/MCA will be at liberty to post its staff for surveillance/ inspection at the Facility along with access to all units, control room and records, log books, MIS (Management Information system), data etc. round the clock as required. The logbooks and other records shall be properly maintained and any cutting should be attested by the staff from authorized employer Officials and this record shall be open for further inspection/checking by ASCL/MCA for further action/improvements/rectifications.
3. The ASCL/MCA reserves the right to carry out any work including capital works in the created Facility for improvement of the performance of the system. The contractor shall not obstruct/ create hindrance to any such work/works by ASCL/MCA or its authorized agencies.
4. All the equipment, building land etc. shall remain the property of ASCL/MCA.

### **E.5 Technical Audit**

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The ASCL/MCA has the right to conduct a technical audit of the Facility and to perform any analysis or inspection if deemed necessary. Before any such inspection, ASCL/MCA shall give a prior written notice of three days to the Contractor. The contractor shall at the Contractor's sole cost and expenses provide all assistance to ASCL/MCA required for such inspections. Such audits may cover all or any of the obligations of the Contractors, including, without limitation, the following:

- (a) Verification of the entire car parking system during the O&M period.
- (b) Verification of the performance standards and life of the individual assets of the facility, for normal wear and tear during O&M period.
- (c) Verification of the capacity of the facility to meet functional guarantees.

### **E.6 Facility Visits**

1. At any time or at the end of each twelve month period, or at the initiative of the ASCL/MCA, a Visit shall be organized so that both parties can check the condition of the installations at the facility.
2. A report shall be drawn up to record the opinions of the both parties. The ASCL/MCA reserves the right to call the equipment manufacturers or specialized technicians for these visits. All expenses are to be borne by the contractor for these purposes.

### **E.7 Training**

The Contractor shall plan and develop the course content, and implement on-the-job and classroom based training, for ASCL/MCA deputed staff of at least 15 personnel in 3 batches of 5 personnel each, during first 6 months of the Operation & Maintenance period. The Contractor shall organize training for identified managers from amongst the ASCL/MCA deputed staff in technical aspects of fully automatic car parking systems to enable ASCL/MCA to build sufficient capacity and skills to manage the said car parking systems at a later date if required.

This training would include training in overhauling and replacement of various components of Semi Automatic Car Parking Systems, Electrical Systems, Plumbing, Ventilation, Fire Prevention Systems, Fire Fighting Systems, Rain Water Harvesting Systems and expertise in Maintenance of the entire Office block.

## **7.2 SPECIFICATIONS**

### **7.2.1 Civil and Steel Components including Sanitary & Plumbing works, Drainage & Sewage Works, Rain Water Harvesting Systems, Landscaping and Revamping of existing Kairon market Parking area.**

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- i. All Civil Works, including Sanitary & Plumbing, Drainage & Sewage, Rain Water Harvesting etc. shall be executed as per CPWD Specifications and relevant latest IS codes.
- ii. The building block shall be designed as combination of RCC framed structure & structural steel structure to be constructed in Seismic Zone – IV.
- iii. The RCC Work shall be executed as per approved Drawings and Designs. The loading will conform to the standards as follows:
  - iv. Dead load for all permanent structures: IS 875 (Part 1) Live load: IS 875 (All 5 Parts)
  - v. Seismic load: IS 1893
  - vi. Floor load other than car parking levels (unless required higher otherwise): 200 kg/m<sup>2</sup>
  - vii. Staircase load: 400 kg/m<sup>2</sup>
  - viii. Floor load for car parking areas: 400 kg/m<sup>2</sup> (or at actual with safety factor, whichever is higher)
  - ix. Due to nature of application, the structure will be subjected to dynamic loading. The structures shall be designed for adequate rigidity and stability in all directions apart from dead and superimposed loads.
  - x. All walls shall be in brickwork of 225 mm thickness constructed in Cement Mortar 1:4.
  - xi. Road Work shall be executed as per MORTH Specifications.

### 7.2.1.1.1 Finishing Items of buildings:

#### A. INTERIOR FINISHES:

##### a) Ceiling and Walls:

The walls of the Ground floor and all the walls of other floors shall be plastered in Cement Mortar Mix 1:4 and the ceiling of G.F. shall be finished in Cement Mortar 1:3 finished with neat cement punning both on walls as well as on ceiling.

The interior (walls & ceiling) of all Car Parking levels except Ground Floor Level of Car Parking Building shall be provided with a coat of grey cement wash.

The interior of Ground Floor Level including Control Room, Server Room, D.G. Set / Battery Room (Area excluding Tiled Portion) and Machine Rooms of Car Parking Building shall be finished with Oil Bound Washable Distemper of approved Shade & Make with Cement Primer over two coats of Cement based putty.

##### b) Flooring:

The flooring of Ground Level and Approach Roads shall be of Cement Concrete Pavement which shall be designed to carry out the impact load of the vehicles.

The flooring for Control Room, Server Room, etc. shall be finished with 600 x 600 mm Vitrified Tiles of approved Shade & Make over 20 mm thick Cement Mortar of Mix 1:4 as per IS : 15622.

The flooring of D.G. Set / Battery Room shall be finished with 10 mm thick Acid Resistant Tiles of approved Shade and Make as per IS : 4457. The Side walls shall also be finished with Acid Resistant Tiles of approved Shade & Make up to 1.50 m height as per IS : 13753.

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The Footpaths / Pathways shall be finished with Cement Concrete Inter-locking tiles, minimum 65 mm thick, of approved Shade & Make over a bed of 150 mm thick sand.

### B. EXTERIOR FINISHES:

The exposed columns in the entire area – if any, shall be provided with cladding of 2 mm thick ACP sheets of approved shade fixed over the steel frame capable of tacking the impact of vehicle.

The Exterior of Control Room, Server Room, D.G. Set / Battery Room, etc. shall plastered with Cement Mortar Mix 1:4. The exterior walls of this office block shall be finished with exterior Weather Coat Paint of approved Shade & Make over exterior cement primer as per relevant specifications.

#### a) Doors & Windows:

The required No. of Doors & Windows of Control Room, Server Room, etc. shall be of Powder Coated Aluminum Sections of 3 mm thickness as per relevant specifications and as approved by the Engineer / Employer. The door shutters shall be partly paneled and partly glazed with toughened glass of minimum 6 mm thickness. The paneling shall be provided with both sides pre-laminated board of 12 mm thickness. All hardware fixtures shall be of approved make.

Fully paneled PVC doors with frames shall be fixed in Bathrooms. The windows / ventilators shall be of Powder Coated Aluminum Sections of 3 mm thickness as per relevant specifications and as approved by the Engineer / Employer.

The glass panes of windows / ventilators shall be provided with toughened glass of minimum 6 mm thickness.

M.S. Rolling Shutter shall be provided in D.G. Set / Battery Room. The windows / ventilators in these rooms shall be of shall be Powder Coated Aluminum Sections of 3 mm thickness as per relevant specifications and as approved by the Engineer / Employer.

#### b) Water Proofing:

Top Floor Roof Slabs of all the Buildings shall be finished with proper treatment of Water Proofing of approved specifications with either of the brands namely FOSROC / CICO / TEXAS through their authorized applicators only.

#### c) Pipes and Specials:

Water pipe lines with clamps and specials etc. shall be described by their diameter and length measured in running m inclusive of joints.

If the joints, special and fittings etc. are required to be separated, it shall be so stated and enumerated. Transporting of useful material such as pipes, valves, steel items to the Stores of respective departments or as directed by the Engineer / Employer.

### 7.2.1.1.2 CARRIAGE OF MATERIALS:

#### a) Scope

This Specification covers the general requirements for carriage of materials.

#### b) General

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The carriage and stacking of materials shall be done as directed by the Engineer. Any tools and plants required for the work shall be arranged by the Contractor. The pipes and specials shall be carried from manufacturer works / agency / supplier to the site of work.

### c) Responsibility for Loss or Damage

Loading, carriage, unloading and stacking shall be done carefully to avoid loss or damage to the materials.

### d) Mode of Carriage

Depending upon the feasibility and economy, the Engineer shall determine the mode of carriage viz. whether by mechanical or manual labor.

### e) Stacking, Covering and Protection

Material shall be stacked in such a manner as to ensure the preservation of their quality and fineness for the work.

Different types of materials shall be stacked separately and in such a way that counting and measurements can be done without disturbing the stacks. Any material that is liable to be affected by rain or other adverse weather conditions shall be covered and protected properly against the same.

Earth, dismantled materials, malba and other similar materials shall be stacked as directed by the Engineer.

Cement bags, steel bars, structural steel sections, bricks and timber and other similar materials shall be stacked in proper manner.

Pipes of, D.I., / D.I. Fittings, HDPE pipes, valves etc. Shall be stacked as per manufacturers/suppliers instructions or as directed by the Engineer.

Stone metal, sand and such similar materials shall be stacked as directed by the Engineer.

#### 7.2.1.1.3 SHORING:

Earthwork in cutting shall be retained by designed Steel Shoring as per relevant code.

If slips, slides, over-breaks or subsidence occur in cuttings during the process of construction, they shall be removed at the cost of the Contractor as ordered by the Engineer. Should slips occur, the slipped material shall be removed and the slope dressed to a modified stable slope. Removal of the slipped earth will not be paid for if the slips are due to the negligence of Contractor. Adequate precautions shall be taken to ensure that during construction, the slopes are not rendered unstable or give rise to recurrent slides after construction. If finished slopes slide into the excavated area subsequently, such slides shall be removed.

#### 7.2.1.1.4 PRESERVATION OF PROPERTY:

The Contractor shall undertake all reasonable precautions for the protection and preservation of any or all existing roadside trees, drains, sewers or other sub-surface drains, pipes, conduits and any other structures under or above ground, which may be affected by construction Operations and which, in the opinion of the Engineer, shall be continued in use without any changes. Safety measures taken by the Contractor in this respect, shall be got approved from the Engineer. However, if any of these objects is damaged by reason of the Contractor's negligence, it shall be replaced or restored to the original condition at his expense. If the Contractor fails to do so, within the required time as directed by the Engineer or if, in the opinion of the Engineer, the actions initiated by the Contractor to replace / restore the damaged objects are not satisfactory, the Engineer shall arrange the replacement / restoration directly through any other agency at the risk and cost of the Contractor after issuing a prior notice to the effect.

#### 7.2.1.1.5 WORKS TO BE KEPT FREE OF WATER:

The Contractor shall arrange for the rapid dispersal of water collected / accumulated on the earthwork or completed formation during construction or on the existing roadway or which enters the earthwork or any other item of work from any source, and where practicable, the water shall be discharged into the permanent outfall of the drainage system. The arrangement shall be made in respect of all earth work including excavation for pipe trenches, foundations or cuttings.

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The Contractor shall provide, where necessary, temporary water courses, ditches, drains, pumping or other means for maintaining the earthwork free from water. Such provisions shall include carrying out the work of forming the cut sections and embankments in such manner that their surfaces have at all times a sufficient minimum cross-fall and, where practicable, a sufficient longitudinal gradient to enable them to shed water and prevent ponding.

The works involved in keeping the earthwork or any other item of works free of water shall be deemed as incidental to the respective item of work.

### 7.2.1.1.6 MATERIALS:

#### a) Scope

Materials to be used in the work shall conform to the specifications mentioned on the drawings, the requirements laid down in this section and specifications for relevant items of work covered under these specifications.

If any material, not covered in these specifications, is required to be used in the work, it shall conform to relevant Indian Standards or international standards (in the absence of Indian standards) or to the requirements specified by the Engineer.

#### b) Sources of Material

The contractor shall notify the Engineer of his proposed sources of materials prior to delivery. If it is found after trial that sources of supply previously approved do not produce uniform and satisfactory products, or if the product from any other source proves unacceptable at any time, the contractor shall furnish acceptable material from other sources at his own expense.

#### c) Bricks

Burnt clay bricks shall conform to the requirement of IS: 1077, except that the minimum compressive strength when tested flat shall not be less than 7.5 MPa for individual brick. They shall be free from cracks and flaws and nodules of free lime. The brick shall have smooth rectangular faces with sharp corners and emit a clear ringing sound when struck. The size may be according to local practice with a tolerance of  $\pm 5$  per cent.

#### d) Cement

Cement to be used in the works shall be any of the following types with the prior approval of the Engineer. These have to be procured from reputed ISO: 9000 organizations: Ordinary Portland Cement, 43 Grade, conforming to IS: 12269 Rapid Hardening Portland Cement, conforming to IS: 8041.

Portland slag cement, 53 Grade conforming to IS: 455.

Pozzolana Portland Cement (PCC) conforming to IS: 1489.

Cement conforming to IS: 8041 shall be used only for precast concrete products after specific approval of the Engineer.

#### e) Coarse Aggregates

For plain and reinforced cement concrete (PCC and RCC) or works, coarse aggregate shall consist of clean, hard, strong, dense, non-porous and durable pieces of crushed stone or granite or other approved inert material. They shall not consist pieces of disintegrated stones, soft, flaky, elongated particles, salt, alkali, vegetable matter or other deleterious materials in such quantities as to reduce the strength and durability of the concrete, or to attack the steel reinforcement. Coarse aggregate having positive alkali silica reaction shall not be used. All coarse aggregates shall conform to IS:383 and tests for conformity shall be carried out as per IS: 2386 Parts I to VIII.

The contractor shall submit for the approval of the Engineer, the entire information indicated in appendix-A of IS: 383.

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Nominal size of coarse aggregate for various components in PCC & RCC is mentioned in BOQ. In case of discrepancy the decision of the Engineer is final.

The maximum value for flakiness index for coarse aggregate shall not exceed 35 percent. The coarse aggregate shall satisfy the following requirements of grading:

IS Sieve Size	Percent by Weight Passing the Sieve		
	40 mm	20 mm	12.5 mm
63 mm	100	-	-
40 mm	95-100	100	-
20 mm	30-70	95-100	100
12.5 mm	-	-	90-100
10 mm	10-35	25-55	40-85
4.75 mm	0-5	0-10	0-10

### **f) Sand/Fine Aggregates**

For masonry work, sand shall conform to the requirements of IS: 2116.

For plain and reinforced cement concrete (PCC and RCC) works, fine aggregate shall consist of a suitable combination of natural sand. They shall not contain dust, lumps, soft or flaky, materials, mica or other deleterious materials in such quantities as to reduce the strength and durability of the concrete, or to attack the embedded steel. Sand washing machines should be used to remove impurities from sand. Fine aggregate having positive alkali-silica reaction shall not be used. All fine aggregate shall conform to IS: 383 and test for conformity shall be carried out as per IS: 2386 (Part I to VIII). The contractor shall submit to the Engineer the entire information indicated in Appendix A of IS: 383. The fineness modulus of fine aggregate shall neither be less than 2.0 nor than 3.5.

Sand/fine aggregate for structural concrete shall conform to the following grading requirement

IS Sieve Size	Percent by Weight Passing the Sieve		
	Zone I	Zone II	Zone III
10 mm	100	100	100

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IS Sieve Size	Percent by Weight Passing the Sieve		
	Zone I	Zone II	Zone III
4.75 mm	90-100	90-100	90-100
2.36 mm	60-95	75-100	85-100
1.18 mm	30-70	55-90	75-100
600 micron	15-34	35-59	60-79
300 micron	5-20	8-10	12-40
150 micron	0-10	0-10	0-10

**g) Steel Reinforcement:**

For reinforced cement concrete (RCC) works, the reinforcement / un tensioned steel as the case may be shall consist of the following grades of reinforcing bars:

Grade Designation	Bar type conforming to governing IS specification	Characteristic strength MPa	Elastic Modulus
Fe 500 D	IS : 1786 High Yield Strength Deformed Bars	500	200

All steel shall be procured from original producers, or their authorized re-rollers.

Only new steel shall be delivered to the site. Every bar shall be inspected before assembling on the work and defective, brittle or burnt bar shall be discarded. Cracked ends of bars shall be discarded.

Utmost care should be taken so that bars are not damaged during handling and transportation.

**Structural Steel:**

Unless otherwise permitted herein, all structural steel shall before fabrication comply with the requirement of the following Indian Standards:

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IS: 226	Structural Steel (Standard Quality)
IS: 2062	Wieldable Structural Steel
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: 1731 Dimension for Steel flats for structural and general engineering purposes

The use of structural steel not covered by the above standards may be permitted with the specific approval of the Engineer.

### h) Bitumen

The bitumen shall be paving bitumen of Viscosity Grade VG-30 (60/70) as per Indian Standard Specifications for "Paving Bitumen" IS: 73. Guidance to selection of the grade of bitumen may be taken from Appendix 4 of MORTH Specifications for Roads and Bridge Works (IV Revision).

### i) Water

Water used for mixing and curing shall be clean and free from injurious amounts of oils, acids, alkalis, salts, sugar, organic materials or other substances that may be deleterious to concrete or steel. Potable water is generally considered satisfactory for mixing concrete.

### j) Concrete Admixtures

General:

Admixtures are materials added to the concrete before or during mixing with a view to modify one or more of the properties of concrete in the plastic or hardened state.

Concrete admixtures are proprietary items of manufacture and shall be obtained only from established manufacturers with proven track record, quality assurance and full-fledged laboratory facilities for the manufacture and testing of concrete.

The Contractor shall provide the following information concerning each admixture after obtaining the same from the manufacturer:

- i. Normal dosage and detrimental effects, if any, of under dosage and over dosage.
- ii. The chemical names of the main ingredients in the admixtures.
- iii. The chloride content, if any, expressed as a percentage by weight of the admixture.
- iv. Values of dry material content, ash content and relative density of the admixture which can be used for Uniformity Tests.
- v. Whether or not the admixture leads to the entrainment of air when used as per the manufacturer's recommended dosage and its extent.

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- vi. Where two or more admixtures are proposed to be used in any one mix, confirmation as to their compatibility.
- vii. There would be no increase in risk of corrosion of the reinforcement or other embedment's as a result of using the admixture.

### **Physical and Chemical Requirements:**

Admixtures shall conform to the requirements of IS: 9103. In addition, the following conditions shall be satisfied:

- i. Synthetic fiber (Polyester 12mm Recron 3S) triangular; admixtures shall be added in all concrete works.
- ii. "Plasticizers", "Super - Plasticizers" shall meet the requirements indicated for "Water reducing Admixture".
- iii. Except where resistance to freezing and thawing and to disruptive action of deicing salts is necessary, the air content of freshly mixed concrete in accordance with the pressure method given in IS: 1199 shall not be more than 2 per cent higher than that of the corresponding control mix and in any case not more than 3 per cent of the test mix.
- iv. The chloride content of the admixture shall not exceed 0.2 per cent when tested in accordance with IS: 6925. In addition, the maximum permissible limit of chloride content of all the constituents (not to exceed 1.5% of the weight of cement in each batch of concrete) shall also be observed.
- v. Uniformity tests on the admixtures are essential to compare qualitatively the composition of different samples taken from batch to batch or from the same batch at different times.

The tests that shall be performed along with permissible variations in the same are indicated below:

Dry Material Content: to be within 3 per cent and 5 per cent of liquid and solid admixtures respectively of the value stated by the manufacturer.

Ash content: to be within 1 per cent of the value stated by the manufacturer.

Relative density (for liquid admixtures): to be within 2 percent of the value stated by the manufacturer.

All tests relating to the concretes admixtures shall be conducted periodically at an independent laboratory and compared with the date given by the manufacturer.

### **7.2.1.1.7        Storage of Materials:**

#### **a) General**

All materials may be stored at proper places so as to prevent their deterioration or intrusion by foreign matter and to ensure their satisfactory quality and fitness for the work. The storage space must also permit easy inspection, removal and re-storage of the materials. All such materials even though stored in approved good-owns /places, must be subjected to acceptance test prior to their immediate use.

#### **b) Bricks**

Bricks shall not be dumped at site. They shall be stacked in regular tiers as they are unloaded, to minimize breakage and defacement. The supply of bricks shall be available at site at any time. Bricks selected for use in different situations shall be stacked separately.

#### **c) Aggregates**

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Aggregate stockpiles may be made on ground that is denuded of vegetation, is hard and well drained If necessary, the ground shall be covered with 50 mm plank or brick flat soling. Coarse aggregates shall be delivered to the site in separate sizes agreed by the Engineer in writing.

In the case of fine aggregates, these shall be deposited at the mixing site not less than 8 hours before use and shall have been tested and approved by the Engineer.

### **d) Cement**

Cement shall be transported, handled and stored on the site in such a manner as to avoid deterioration or contamination. Cement shall be stored above ground level in perfectly dry and water-tight sheds and shall be stacked not more than eight bags high. Wherever bulk storage containers are used their capacity should be sufficient to cater to the requirement at site and should be cleaned at least once every 3 to 4 months.

Each consignment shall be stored separately so that, it may be readily identified and inspected and cement shall be used in the sequence in which it is delivered at site. Any consignment or part of a consignment of cement which had deteriorated in any way, during storage, shall not be used in the works and shall be removed from the site by the Contractor without charge to the Employer.

The Contractor shall prepare and maintain proper records on site in respect of delivery, handling, storage and use of cement and these records shall be available for inspection by the Engineer at all times.

The Contractor shall make a monthly return to the Engineer on the date corresponding to the interim certificate date, showing the quantities of cement received and issued during the month and in stock at the end of the month.

### **e) Reinforcement Steel**

The reinforcement bars, when delivered on the job, shall be stored above the surface of the ground upon platforms, skids, or other supports, and shall be protected from mechanical injury and from deterioration by exposure.

### **f) Pipes**

The pipes shall be transported and handled as per IS: 12288. All precaution set out shall be taken out to prevent damage to the protective coating, damage of the jointing surfaces or the ends of the pipes.

The pipes shall be stacked in layers on dry surface preferably on the projected bench/ surface.

All the pipe specials, rubber rings / joints, nut, bolts including valves etc. shall be stored in closed room or shed.

### **g) Mechanical Items**

All the items of mechanical required shall be stored in closed room or shed with original packing.

### **h) Mild steel (M.S) appurtenances**

Special fittings such as bends of odd size angle, flanged and socket tees, gap pieces, tail pieces, tapered flanged pipe nipple and other fittings required as per the site requirement shall be fabricated from MS pipe and steel. The special so fabricated shall be having protection coat and paint against corrosion.

### **i) Fittings And Fixtures**

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All the fittings and fixtures shall be supplied and fixed as per relevant standards or as directed by the Engineer.

### **j) Water**

Water shall be stored in containers / tanks covered at top and cleaned at regular intervals in order to prevent intrusion by foreign matter or growth of organic matter. Water from shallow, muddy or marshy surface shall not be permitted. The intake pipe shall be enclosed to exclude silt, mud, grass and other solid materials and there shall be a minimum depth of 0.60 m of water below the intake at all times.

#### **7.2.1.1.8 TESTS AND STANDARDS OF ACCEPTANCE:**

All materials, even though stored in an approved manner shall be subjected to an acceptance test prior to their immediate use. Independent testing of cement for every consignment shall be done by the Contractor at site or in a laboratory approved by the Engineer before use. Any cement with lower quality than those shown in manufacturer's certificate shall be debarred from use. In case of imported cement, the same series of tests shall be carried out before acceptance.

##### **a) Testing and Approval of Material**

The Contractor shall furnish test certificates from the manufacturer/supplier of materials along with each batch of material(s) delivered to site. Tests shall be as specified in QA/QC Manual.

The Contractor shall set up a field laboratory as per MORTH Standard with necessary equipment for testing materials, finished products used in the construction as per requirements of conditions of contract and the relevant specifications. The testing of all the materials shall be carried out in the presence of the Engineer or his representative for whom the contractor shall make all the necessary arrangements bear the entire cost.

Tests which cannot be carried out in this field laboratory have to be got done at the contractor's cost at any recognized reputed laboratory/testing establishments approved by the Engineer.

##### **b) Sampling of Materials**

Samples provided to the Engineer or his representatives for their retention are to be in labeled boxes suitable for storage. Samples required for approval and testing must be supplied well in advance by at least 48 hours or minimum period required for carrying out relevant tests to allow for testing and approval. Delay to works arising from the late submission of samples will not be acceptable as a reason for delay in the completion of the works.

If materials are brought from abroad, the cost of sampling/testing whether in India or abroad shall be borne by the Contractor.

##### **c) Rejection of Materials not conforming to the Specifications**

Any stock or batch of material(s) of which sample(s) does not conform to the prescribed tests and quality shall be rejected by the Engineer and such materials shall be removed from site by the Contractor at his own cost. Such rejected materials shall not be made acceptable by any modifications

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### d) Testing and Approval of Plant and Equipment

All Plants and equipment used for preparing, testing and production of materials for incorporation into the permanent works shall be in accordance with manufacturer's Specifications and shall be got approved by the Engineer before use.

#### 7.2.1.1.9 OTHER SPECIFICATIONS:

- a) To ensure quality of work, the contractor shall set up and maintain at his own expense a "TESTING LABORATORY" of minimum 15 Sqm. area at site. He should provide all Laboratory apparatus and equipment as per MORT Standard.
- b) The laboratory should be staffed by full time qualified technicians and have a helper who can be a worker on the site.
- c) Minimum one week before the actual commencement of construction, the contractor shall supply to the Architects/Structural Consultant drawings showing the general detailed arrangement for concreting (e.g. - formwork, staging, centering, bar-bending schedules, actual placing arrangement at site, sequence of concreting etc.) for approval.
- d) All materials which have been damaged, contaminated or have deteriorated or do not comply in any way with the requirements of this specification shall be removed from the site at the Contractor's own expense.
- e) The concrete mix shall be designed by recognized methods. The proportions chosen shall be such that the concrete is cohesive and of adequate workability and durability for the conditions prevailing on the work in question and can be properly compacted without segregation.

#### 7.2.1.1.10 SAFETY CODE:

- a) First aid appliance shall be maintained in a readily accessible place including adequate supply of sterilized dressings and cotton wool.
- b) An injured person shall be taken to a public hospital without loss of time, in cases where the injury necessitates hospitalization.
- c) Suitable and strong scaffolds should be provided for work men for all works that cannot safely be done from ground.
- d) No portable single ladder shall be over 8 meters in length. The width between the side rails shall not be less than 30 cm. (Clear) and the distance between two adjacent rung shall not be more than 30 cms. When a ladder is used an extra mazdoor shall be engaged for holding the ladder.

#### 7.2.2 The excavated materials shall not be placed within 1.5 meters of the edge of the trench or half of the depth of trench whichever is more. All trenches and excavations shall be provided with necessary fencing and lighting.

- e) Every opening in the floor of a building or in working platform be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be one meter.
- f) No floor, roof or other part of the structure shall be so overloaded with debris or materials as to render it unsafe.
- g) Workers employed on mixing and handling material such as asphalt, cement mortar or concrete and lime mortar shall be provided with protective footwear and rubber hand gloves.

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- h) Those engaged in welding works shall be provided with welder's protective eye-shields and gloves.
- i) No paint containing lead or lead products shall be used except in the form of paste or readymade paints.
- j) Suitable face marks should be supplied for use by the workers when the paint is applied in the form of spray or surface having lead paint dry rubbed and scraped.
- k) Overenrolls shall be supplied by the Contractor to the painter and adequate facilities shall be provided to enable the working painters to wash during the periods of cessation of work.
- l) Hoisting machines and tackle used in the works, including their attachments, anchorage and supports shall be in perfect condition.
- m) The ropes used in hoisting or lowering material or as a means of suspension shall be of durable quality and adequate strength and free from defects.

### **7.2.2.1.1      SPECIFICATIONS TO BE FOLLOWED BY THE CONTRACTOR FOR CAR PARKING SYSTEMS OF STEEL STRUCTURE FOR LEVELS ABOVE THE GROUND.**

#### **a)      ANCHORAGE TO HARDENED CONCRETE**

- 1. Anchorage to hardened concrete shall include mechanical and adhesive anchors of size, number, and spacing as shown on the drawings.
- 2. Holes shall be drilled and cleaned and anchors shall be installed in strict accordance with the manufacturer's published instructions. Inspection and testing shall be provided in accordance with the general notes.
- 3. Where a specific type of anchorage is specified on the drawings, substitution for a different type of anchorage (including substituting for cast-in-place anchorage) shall not be permitted without prior written approval.

#### **b)      MECHANICAL ANCHORS**

- 1. Acceptable mechanical anchors shall be as follows: hilti "kwik bolt tz" carbon and stainless steel expansion anchor or approved alternative.
- 2. Unless noted otherwise on the drawings, minimum effective anchor embedment depth shall be 6.5 anchor diameters, minimum distance to the nearest concrete edge shall be 12 anchor diameters and minimum anchor spacing shall be 8 anchor diameters.
- 3. Stainless steel anchors shall be used at all exterior locations and where specifically indicated on the drawings.
- 4. No steel Reinforcement shall be cut to install anchors. Defective or abandoned holes shall be filled with non-shrink grout or an injectable adhesive matching the adjacent concrete compressive strength.
- 5. Notify the structural engineer of defective or abandoned holes in walls and columns. These elements may require non-shrink grout with a compressive modulus of elasticity matching that of the adjacent concrete.

#### **c)      ADHESIVE ANCHORS**

- 1. Acceptable adhesive (epoxy) anchors shall be as follows: Hilti "Hilte RE 500" Adhesive anchor or approved alternative. Unless noted otherwise, anchors shall be fe500d reinforcing dowels.

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2. Unless noted otherwise on the drawings, minimum effective anchor embedment depth shall be 7.5 anchor diameters, minimum distance to the nearest concrete edge shall be 6 anchor diameters, and minimum anchor spacing shall be 6 anchor diameters.
3. Holes shall be drilled with rotary impact hammer or equivalent method to produce a hole with a rough inside surface. Core drilling holes is not permitted. No reinforcing shall be cut to install adhesive anchors. The adhesive shall be mixed, applied, and cured in strict accordance with the manufacturer's published installation instructions.
4. All placement and curing shall be conducted with concrete.
5. Adhesive shall be applied only to clean, dry concrete. Positive protection shall be provided so that anchors are not disturbed during the curing period.
6. Defective or abandoned holes shall be filled with non-shrink grout or an injectable adhesive matching the adjacent concrete compressive strength. Notify the structure engineer of defective or abandoned holes in walls and columns. These elements may require non-shrink grout with a compressive modulus of elasticity matching that of the adjacent concrete.

### d) NONSHRINK GROUT FOR BASE PLATES, SLEEVES, EMBEDDED STEEL, AND ANCHOR PLATES

1. Grout shall be an approved non-shrink expandable cementitious grout delivered to the job site in factory pre-packaged containers requiring only the addition of water.
2. The minimum 28day compressive strength shall be at least 2 grades higher (m10 higher) than the supporting concrete strength, unless noted otherwise.
3. Grout shall be mixed, applied, and cured strictly in accordance with the Manufacturer's printed instructions.
4. For grouting under base plates and behind anchor plates, grout shall be proportioned as a flow able mix.
5. When a flow able mix does not provide the required strength or when a minimum strength of M70 is required, an epoxy grout shall be used.

### e) TOLERANCES

1. Standard tolerances shall be based on IS 7215 and IS 486.

### f) SEQUENCING CONSTRUCTION AND LATERAL STABILITY

1. The structural components by themselves are a non-self-supporting structure.
2. Lateral forces due to wind, earthquake, or soil are carried by the roof and floor diaphragms to the lateral system. Certain elements shown on the structural drawings (such as bracing, roof and floor slabs) are required for overall or local stability of other elements (such as beams, columns, and walls).
3. If, due to sequencing of construction, these stability elements are not in place, the contractor shall investigate where temporary shoring/bracing is required and shall design this temporary shoring/bracing.
4. The contractor shall provide this shoring/bracing until the required structural elements and their connections have been installed and reach their final design strengths.

### g) STRUCTURAL STEEL

1. All steel shall conform to the following:
2. I-sections, UBS, UCS, etc IS: 2062, E350 (Fe490)
3. All angles and channels unless noted otherwise IS: 2062, E350 (Fe490)
4. All other steel unless noted otherwise IS: 2062, E350 (Fe490)
5. Base plate/gusset plate IS: 2062, E250 (Fe410w)

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6. The ratio of  $f_y/f_u \leq 0.8$  preferably, but in any case  $f_y/f_u \leq 0.85$ .
7. General notes for steel connections shall apply to all steel connections unless noted otherwise.
8. All work shall be in accordance with the Indian standards. Shop drawings shall be submitted and reviewed by the architect/engineer before commencing fabrication.
9. All steel anchors and ties and other members embedded in concrete or masonry shall be left unpainted.
10. Dimensional tolerance for built up members shall be as per IS 7215.
11. Gas cutting of steel is not allowed.
12. Steel beams are equally spaced between dimension points at the maximum deck span location unless noted otherwise. Minimum camber should be provided in steel beams as shown in structural drawings.
13. Shoring shall be provided to beams, where indicated in structural drawings, to support the weight of wet concrete coming from the slabs. This shoring shall be removed only after the concrete has attained about 80% of the compressive strength. The props shall be spaced at a maximum spacing of 1.2m c/c.
14. The contractor shall be responsible for the design, detailing, and fabrication of all steel framing connections unless specifically detailed on the structural drawings. The contractor shall retain a structural engineer to perform the work, who shall design the connections and submit stamped calculations to the architect / structural engineer for review and approval prior to starting fabrication.
15. Connection design shall meet the requirements of the Indian standards and BS 5950.
16. Connections shall be capable of resisting vertical and horizontal loads listed. The connections should be designed to resist 60% of shear capacity and 90% of moment capacity for beam members, and 100% of member capacity of axially loaded members. Columns should always be spliced using complete joint penetration (CJP) welds.
17. Connection design shall provide an adequate load path to transfer the loads from each member, through the connection, into the supporting member, and shall consider the effects of the forces on each member. Provide stiffener plates, web doublet plates, flange continuity plates, etc, as required. Members shown on the drawings have not been sized for local effects at connections.
18. Steel connection details submitted by the structural engineer show general criteria for design and detailing, and are not intended to show complete connection configurations or other specific information that are the responsibility of the connection design engineer/ contractor/ fabricator. If any connection distances, edge distances, pitch, weld lengths etc. On connection sketches do not match with the minimum or maximum specifications of IS 800:2007, structural engineer should be notified and revised connection sketch should be taken in writing by contractor.
19. Alternative connection configurations may be submitted to the structural engineer for review and approval.
20. Connections specifically detailed on the structural drawings are to be fabricated as shown.
21. The contractor shall be responsible for all erection aids that include, but are not limited to, erection angles, lift holes, and other aids.

### **h) BOLTED CONNECTIONS**

1. All bolts, nuts and washers shall confirm to section 2.4 of IS 800: 2007.
2. All bolts shall be of grade 8.8 unless noted otherwise
  3. All bolt holes shall be of standard clearance bolt holes. Unless noted otherwise, oversize and slotted holes should not be provided.
4. Connections shall be a minimum of two-bolt connection using M20 bolts in single shear.
5. All high-strength bolts shall be installed, tightened, and inspected in accordance with IS 3757, IS 4000, IS 6623, and IS 6649. The criteria for slip-critical connections shall apply to all connections unless noted otherwise as snug-tight.
6. Bolts in connections of beam-to-beam/girder/column may be snug tight, unless specifically called out as slip critical (SC).

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7. Where connections are noted as snug-tight, the contractor may install per the criteria for snug-tight bolts.
8. All shear type connections in columns, and connections in bracing shall be slip- critical. Slip-critical connections shall use load indicator washers or tension control bolts.
9. All bolts shall be provided with lock washers under nuts or self-locking nuts.

### i) **STRUCTURAL STEEL WELDING**

1. All welding electrodes shall be of type E70XX unless noted otherwise.
2. Structural steel shop drawings shall show all welding with IS 813/AWS A2.4 symbols.
3. All welding shall be done by certified welders and in accordance with AWS D1.1 or IS 822.
4. Welds shown on the drawings are the minimum sizes. Increase weld size to IS: 800 minimum sizes, based on plate thickness. The minimum weld size shall be 6 mm.
5. Field welding symbols have been indicated on the drawings. Where shown, proper field welding per IS: 814 and IS: 822 shall be used.
6. Where no field welding symbols are shown, it is the contractor's responsibility to use shop welds or clarify with the structural engineer.
7. Unless noted otherwise, all groove welds should be CJP welds.
8. All fillet weld sizes shown on drawings refer to weld size and not effective throat thickness.
9. All partial joint penetration groove weld sizes shown on the drawings refer to effective throat thickness.
10. All welds shall be made using low hydrogen electrodes with minimum tensile strength per IS: 814 (minimum 480 MPa).
11. Low hydrogen swam electrodes shall be used within 4 hours of opening their sealed containers. Electrodes shall be re-dried no more than one time, and electrodes that have been wet shall not be used.
12. All welding shall be performed in strict adherence to a written welding procedure specification (WPS) submitted by the contractor. All welding parameters shall be within the electrode manufacturer's recommendations.
13. Welding procedures shall be submitted to the owner's testing agency for review before starting fabrication or erection. Copies of the WPS shall be on site and available to all welders and the special inspector.
14. Unless noted otherwise, all welding procedures (WPS) shall be pre-qualified as per AWS D1.1. Annex q of the code gives a sample of a pre-qualified WPS.
15. If non pre-qualified procedures are to be adopted, testing shall be carried out as per AWS D1.1 and the same shall be reported in the WPS.
16. All complete joint penetration welds shall be ultrasonically tested upon completion of the connection, except plate less than or equal to 6 mm thick shall be magnetic particle tested. Testing of welds shall be carried out as per AWS D1.1.
17. Reduction in testing may be made in accordance with the building code with approval of the engineer.
18. The contractor shall be responsible for the joint preparations and welding procedures that include, but are not limited to: required root openings, root face dimensions, groove angles, backing bars, copes, surface roughness values, and tapers and transitions of unequal parts.

### j) **FIREPROOFING STRUCTURAL STEEL**

1. All members of the structural frame shall have fire resistance of 2 hours fireproofing. The thickness of the fire-proofing spray shall be applied accordingly.
2. The structural frame consists of columns and girders, beams, trusses, and spandrels having direct connections to the columns or beams and bracing members designed to carry gravity loads.

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k) **ANCHOR RODS**

1. Anchor rods not specified as adhesive anchors shall be of Grade 8.8, unless noted otherwise.
2. Furnish anchor rods prefabricated with matching double heavy hex nuts jammed at the end embedded in concrete.
3. Furnish hardened plate washers, lock washers, and matching heavy hex nuts for securing the base plate to the anchor rods. Hooked anchor rods shall not be used except where noted.
4. A rigid steel template shall be used to locate anchor rods while placing concrete.
5. Anchor rods shall have sufficient length to provide the minimum embedment shown on the drawings, measured from the face of the concrete to the near face of the double nut, with adequate extension as required to receive the base plate with full thread projection for nut installation.
6. Anchor rod installation shall be coordinated with reinforcing and formwork.
7. Levelling nuts shall not be used except after evaluation by the contractor's erection engineer.
8. After base installation, anchor rod nuts shall be installed to a snug tight condition. No heating or bending of the anchor rods is permitted.
9. Holes in the base material shall not be enlarged by burning.
10. Anchor rod shall follow the following dimensional criteria as far as base plates are concerned:

ANCHOR ROD	HOL E DIA.	MIN. EDGE / END DIST.	MIN. SPACING / PITCH	EMBEDMENT LENGTH (UNO.)
M20	28	50	75	500
M24	32	60	85	600
M30	40	75	100	750
M36	48	85	125	900
M40	52	100	150	1000

l) **COMPOSITE FLOOR SYSTEM**

1. Floor slabs shall be constructed to the elevations shown on the structural drawings.
2. The contractor shall include the quantities of the added concrete due to the steel deck deflection.
3. Design camber shown for the steel beams has been calculated based on the deflection of the beam due to the weight of the steel and concrete slab.
4. Minimum slab reinforcing is type T8 - 150 c/c or A252 mesh, unless noted otherwise.
5. Decking sheets shall be continuous over supports

m) **SHEAR CONNECTOR STUDS**

1. All shear connector studs shall be 19 mm in diameter unless noted otherwise.
2. Shear connector studs shall be automatically end welded in shop or field with equipment recommended by manufacturer of studs. The shear studs shall be able to develop the shear strength as per AISC manual of steel construction.
3. Steel stud material, welding, and inspection shall be in accordance with IS 814 and IS 822.
4. Shear studs shall be placed at a maximum spacing of 300 mm on center for all beams supporting a steel deck with concrete fill or a cast-in-place concrete slab.
5. This spacing shall also apply when the number of studs is not indicated on the plans.

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6. Shear connector layouts are provided in the general detail drawings.
7. Steel deck shop drawings detailing the shear stud placement shall be submitted to the engineer for review before installation.

### n) **STEEL COMPOSITE DECK / METAL DECKING**

1. The steel deck shall be of depth shown on the structural drawings.
2. Unless noted otherwise, gage of deck shall be determined by the contractor based on the span conditions, shoring requirements, construction loads, deflection requirements, and the superimposed loads shown on the drawings, load diagrams, and notes.
3. Minimum sheet thickness is 1 mm.
4. Maximum dead load deflection is 20 mm or L/180.
5. Written verification of conformance for all conditions in the structure shall be submitted for acceptance prior to fabrication.
6. The capacities of the deck shall be certified by the manufacturer.
7. Shop drawings shall be submitted showing deck gage, layout, fastening, stud layout, and closures.
8. If any shoring is to be used, it shall be approved by the general contractor and shall be shown on the shop drawings.
9. Units shall span over four supports, continuous over three or more spans, except where framing does not permit.
10. BS 5950 shall govern the design of all deck units. Steel deck and all of its flashings shall conform to IS 811.
11. The steel shall have received, before being formed, a metal protective coating of zinc conforming to Z185.
12. All welding shall be in accordance with AWS D1.3.
13. Concrete bonding-type units shall be formed with deformations to provide an interlock between the concrete and steel.
14. Unless shown otherwise, units shall be fastened to the steel supports at the ends of the units and at intermediate supports at 300 mm (maximum) on centre with 20-mm-diameter puddle welds; where two units abut, each unit shall be so fastened to the steel supports.
15. The side laps of adjacent units shall be fastened between supports by 40-mm top seam welds at 600 mm on centre or button punched at 600 mm on centre.
16. Deck units shall be fastened to the steel supports at the side boundaries by 20-mm-diameter puddle welds at 300 mm (maximum) on centre. 20-mm-diameter shear studs welded through deck may be used in place of 20-mm-diameter puddle welds.
17. Design and provide flashing and closure plates at wall ends of all units, around columns, and at all perimeter locations requiring closure.
18. Coordinate all closures with elevator, stair, escalator and other architectural details. The deck installation, when complete, shall be ready to receive concrete.
19. Steel deck types shall be Corus Comflor 60 and Comflor 80 or approved equal.
20. Steel decks shall be continuous over supporting beams.

### o) **STEEL ROOF DECK**

1. The steel deck shall be of depth shown on the structural drawings.

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2. The gage of deck and its connections to the structure shall be determined by the contractor based on the span conditions, deflection requirements, construction loads, diaphragm shears, and the superimposed gravity loads and wind loads shown on the drawings, load diagrams, and notes.
3. Minimum sheet thickness is 1 mm. Maximum deflection under superimposed loads is 12 mm or L/240.
4. The deck and its connections shall provide a minimum allowable diaphragm shear capacity of 7 KN/m unless noted otherwise on the drawings.
5. Written verification of conformance for all conditions in the structure shall be submitted for acceptance prior to fabrication.
6. The capacities of the deck shall be certified by the manufacturer. Shop drawings shall be submitted showing deck gage, layout, connections, and closures. Roof deck and all of its flashings shall conform to IS 811.
7. The steel shall have received, before being formed, a metal protective coating of zinc conforming to Z185.
8. All welding shall be in accordance with AWS D1.3.
9. Units shall span over four supports, continuous over three or more spans, except where the framing does not permit.
10. Non composite units shall be fastened to the steel supports at the ends of the units and at intermediate supports by a minimum of four connections per 1 meter of width.
11. Where two units abut, each unit shall be so fastened to the steel framing. The side laps of adjacent units shall be fastened between supports by connections at a maximum spacing of 600 mm on centre unless noted otherwise.
12. Deck units shall be connected to the steel supports at the side boundaries at a maximum spacing of 600 mm on center. Connections shall be made with welds, powder actuated fasteners, or pneumatic pins, screws, or mechanical crimping, provided that the contractor presents calculations with current manufacturer test reports demonstrating equivalent values of shear capacity, deck capacity, and deck flexibility.
13. Where steel members are parallel to the deck flutes and at the same elevation of the bottom of the deck, adjust deck layout and weld deck to steel with same welding as required for side boundaries.
14. Steel deck that is to be covered with insulating concrete shall be slotted or perforated to provide a minimum of 1.5 percent uniformly distributed venting.
15. Provide flashing and closure plates at all perimeter locations requiring closure. The deck installation, when complete, shall be ready to receive insulating concrete.

### **p) STEEL STAIRS, ELEVATORS, AND MISCELLANEOUS METALS**

1. The contractor shall design and supply all additional miscellaneous metals that are indicated in the architectural drawings or those metals which are found to be necessary to support the architectural finishes or other building systems.
2. All framing and connections designed by the contractor shall not result in eccentric loads being applied to the primary structure nor lateral loads being applied to the bottom flange of steel beams.
3. The contractor's design shall verify that the connections do not result in adverse local connection stresses occurring within the primary structure.

### **q) PERMANENT PRESTRESSED ROCK ANCHORS**

1. Drilling for anchors will be completed by rotary or pneumatic methods, as per installation pattern, sizes and lengths provided in drawings.
2. Borehole sides shall be adequately protected against side collapse by use of PVC or MS casing.
3. The anchor hole should be perpendicular to the anchor bearing plate. The deviation of the anchor hole entry angle from its inclination as specified the contract documents shall be no than  $\pm 3$  degrees.

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4. Water tightness test shall be conducted in anchor holes as per IS 12070. If rock permeability is observed to be more than 5 Lugeons, the anchor hole shall be consolidation grouted, redrilled and retested. This procedure shall be repeated until the permeability is less than 5 Lugeons.
5. Ht strands of 12.7mm dia. Or equivalent Tata SSL conforming to LRPC class ii as per IS: 14268 will be cut to length of anchor including that required for stressing purpose.
6. Working loads on strands shall not exceed 50% of the characteristic strength of the strands.
7. The strands shall be pre-treated to remove rust/oil, scaling, grease, etc.. Two coats of epoxy formulation shall be applied on the strands. The 2nd coat shall be applied only after allowing the 1st coat to dry for 2-3 hours. Quartz sand shall be sprinkled to roughen the surface. Following epoxy formulation will be used: Araldite: Gy257 (2 parts), Aradur -140 (1 part).
8. For the strands in free length, a coat of primer (Berger Epilux 610) shall be brush applied. Also a flexible PVC sheath of HDPE, 2mm thick shall be provided over each individual strand. The top and bottom of the HDPE sheathing shall be taped at top and bottom.
9. Prepared strands will be grouped together. Spacers shall be used to separate the strands or bars individually or into small groups at regular intervals of 1.5m in fixed length. The strands will be tied with the help of binding wires at the centre of two spacers. A ms guide shoe shall be welded to the bottom of the strands by brazing for lowering the anchor in the bore.
10. Centralizer shall be utilized to support the tendon in the drill hole and position. The tendons so a minimum grout cover of 12mm is achieved. All centralizers shall be designed to permit grout to flow freely around the tendon and up the drill hole. The contractor shall determine the number of centralizers required; however, a minimum of one unit shall be placed within 1m of the bottom of the hole and another at the bond length and free stressing length interface.
11. A PVC grout tube of 25mm diameter will be inserted through all the cable spacers to facilitate grouting. Care shall be taken to ensure that the sheathing, corrosion protection and grout tubes are not damaged during installation.
12. The fixed length of the anchor should be placed in a HDPE corrugated PVC pipe with minimum wall thickness of 0.8mm.
13. The grout shall entirely fill the annular space between the strands and the bore hole wall in the bond length.
14. Grouting will be done with minimum 53 grade OPC cement neat cement grout with non-shrink compound Cebex 100 or equivalent, or with GP2 compound in fixed length, by providing a packer at the top of fixed length or by ensuring with physical measurements that grout does not intrude the free length portion.
15. Three (3) grout cubes (7.5cm x 7.5cm x 7.5cm) will be cast for each day of grouting. One cube will be tested at 7 days while the remaining cubes will be tested at 28 days.
16. Stressing shall not commence until the grout has reached its 28-day strength.
17. The anchors shall be proof tested to 1.1 times the design load in 5 increments. A Multi-stand jack system should be utilized for stressing of anchors. The initial increment of 10% of design load will be applied.
18. Elongation should be measured at each of the 5 load increments. The load will be held at the final test load for at least 15 minutes.
19. The anchor can be deemed acceptable upon proof testing if both the below conditions are satisfied:
20. Total elongation exceeds 80% of theoretical elongation of free length.
21. Total elongation is less than the theoretical elongation of free length + 50% theoretical elongation of the fixed length.
22. The load shall then be released and the anchor locked off at desired lock off load with wedges. Wedge holes and wedges shall be free of rust, grout, and dirt. The free length will then be grouted.
23. After cutting off the extra portion of the strand, the anchor head shall be protected with epoxy formulation mentioned above applied uniformly over the thrust plate, bearing plate, and anchor wedges by a concrete block with minimum reinforcement of T8-150 (developed 300mm into walled beam or raft) in either direction.

r) **CORROSION PROTECTION OF STRUCTURAL STEEL**

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1. The environmental exposure condition of all structural steel (unclad or clad) exposed to atmosphere (except steel encased in concrete) shall be taken as very severe as per IS 800:2007.
2. The environmental exposure condition of all structural steel within interior of building not exposed to atmosphere shall be taken as moderate as per IS 800:2007.
3. Coating system shall be provided by the contractor based on the above atmospheric conditions and should have a minimum life of 15 years.

### s) **CAUTION**

1. Structural drawings shall be executed on site subject to necessary permission from competent authority.
2. It shall be ensured on site that the construction activity is according to the latest revision of the structural drawings. In case of any confusion or discrepancy, the structural consultant shall be promptly contacted.
3. The responsibility of the structural consultant is limited only to the accuracy of design calculations and structural drawings, and periodic general checking construction activity and test results. The design is based on the data provided by the Client. The Client shall engage an independent supervision agency to ensure quality control on site.
4. Continuous supervision is not part of the scope of the structural engineer and his inspection cannot guarantee that the work is carried out strictly as per his drawings and general detail drawings.
5. We shall not guarantee the work of the contractor; we shall not be responsible for the damage to life and property whatsoever resulting from any act by Client, contractor, suppliers or any other agencies during the execution of work.
6. The Client shall also ensure that: no addition and alteration shall be carried out without consulting the structural engineer.
7. Structural members shall not be damaged / tampered with for any reason whatsoever during and after construction.
8. Overloading the structure, changes in the structural system, lack of maintenance, or any act that is detrimental to the safety and stability of the structure as a whole shall be avoided during the lifetime of the structure.

### t) **DESIGN LOADS**

1. Dead loads shall be calculated as per IS 875 latest - part 1.
2. Live loads shall be calculated as per IS 875 latest - part 2.
3. Wind loads shall be calculated as per IS 875 latest - part 3.
4. Earthquake loads shall be calculated as per IS 1893 latest.
5. Load combinations shall be as per IS 875 latest - part 5 and IS 456:2000 latest.

## **20. Definitions/Terminology for using Steel Structure Bead:**

A single run of weld metal deposited on surface.

### **Butt Weld:**

A weld in which the weld metal lies substantially within the extension of the planes of the surfaces on the parts joined.

### **Crater:**

A depression left in weld metal where the arc was broken or the flame was removed.

### **End Crater:**

A crater at the end of a weld or at the end of a joint.

### **Fillet Wel:**

A weld of approximately triangular cross-section joining two surfaces approximately at the right angles to each other in a lap joint, tee joint or corner joint. It is of two types:

(1) Continuous

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(2) Intermittent.

### **Fusion Welding:**

Any welding process in which the weld is made between metals in a state of fusion without Hammering or pressure.

### **Non-fusion welding:**

A term applied to the deposition, by the Oxy-Acetylene process of filler metal on parent metal without fusion of the latter.

### **Oxy-Acetylene Pressure Welding:**

Pressure welding in which any Oxy-Acetylene flame is used to make the surface to be united plastic. No filler metal is used.

### **Run:**

The metal deposited during one passage of the electrode or blow pipe in the making of a joint.

### **Weld:**

A union between two pieces of metal at faces rendered plastic or liquid by heat or pressure, or both, Filler metal may be used to affect the union.

### **7.2.1.1.12 STEEL WORK IN SINGLE SECTION FIXED INDEPENDENTLY WITH CONNECTING PLATE**

The steel work in single section of R.S. joists, flats, Tees Angles fixed independently with or without connecting plate, is described in these clauses.

#### **Fabrication:**

The steel sections as specified shall be straightened and cut square to correct lengths and measured with a steel tape. The cut ends exposed to view shall be finished smooth. No two pieces shall be welded or otherwise jointed to make up the required length of member. All straightening and shaping to form, shall be done by pressure. Bending or cutting shall be carried out in such a manner as not to impair the strength of the metal.

#### **Erection:**

Steel work shall be hoisted and placed in position carefully without any damage to itself and other building work and injury to workmen. Where necessary mechanical appliances such as lifting tackle winch etc. shall be used. The suitability and capacity of all plant and equipment used for erection shall be up to the satisfaction of the Engineer -in-charge.

### **7.2.1.1.13 STEEL WORK IN BUILT UP SECTIONS (RIVETED AND BOLTED)**

The steel work in built up section (Riveted and bolted) such as trusses, framed work etc. is specified in this clause.

#### **Laying Out:**

A figure of the steel structure to be fabricated shall be drawn on a level platform to full scale. This may be done in full or in parts, as shown on drawings or as directed by the Engineer-in-Charge. Steel tape shall be used for measurements.

#### **Fabrication:**

Fabrication shall generally be done as specified in IS 800. In major works or where so specified, shop drawings giving complete information for the fabrication of the component parts of the structure including the location, type, size, length and details of rivets, bolts or welds, shall be prepared in advance of the actual fabrication and approved by the Engineer -in-charge. The drawings shall indicate the shop and field rivets, bolts and welds. The steel members shall be distinctly marked or stenciled with paint with the identification marks as given in the shop drawings.

Great accuracy shall be observed in the fabrication of various members, so that these can be assembled without being unduly packed, strained or forced into position and when built up, shall be true and free from twist, kinks, buckles or open joints. Wooden or metal sheet templates shall be made to correspond to each member, and position of rivet holes shall

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be marked accurately on them and holes drilled. The templates shall then be laid on the steel members, and holes for riveting and bolting marked on them. The ends of the steel members shall also be marked for cutting as per required dimensions. The base of steel columns and the positions of anchor bolts shall be carefully set out at the required location.

The steel section shall be straight or to be straightened or flattened by pressure unless required to be of curvilinear form and shall free from twists. These shall be cut square either by shearing or sawing to correct length and measured by steel tape. No tow pieces shall be welded or joined to make up for the required length of member.

### **Making Holes:**

Holes through more than one thickness of materials for members, such as compound stanchion and girder flanges shall, where possible, be drilled after the members are

### **Steel Work:**

Assembled and tightly clamped or bolted together. Punching may be permitted before assembly, provided the holes are punched 3mm less in diameter than the required size and reamed after assembly to the full diameter. The thickness of material punched shall be not than 16 mm.

### **Rivet Holes:**

The diameter for rivets and black bolts holes shall be taken as the nominal diameter of a rivet/black bolts plus 1.5 mm for rivets/ bolts of nominal diameter less than or equal to 25 mm and 2.0 mm for rivets of nominal diameter exceeding 25 mm, unless specified otherwise. Holes for turned and fitted bolts shall be drilled or reamed large by 0.2 to 8 mm depending upon the dia. of bolts. Holes shall have their axis perpendicular to the surface bored through. The drilling or reaming shall be free from burrs, and the holes shall be clean and accurate. Holes for rivets and bolts shall not be formed by gas cutting process. Holes for counter sunk bolts shall be made in such a manner that their heads sit flush with the surface after fixing.

### **Assembly :**

Before making holes in individual members, for fabrication and steel work intended to be riveted or bolted together shall be assembled and clamped properly and tightly so as to ensure close abutting, or lapping of the surfaces of the different members. All stiffeners shall be fixed (or placed) tightly both at top and bottom without being drawn or caulked. The abutting joints shall be cut or dressed true and straight, and fitted close together.

Web plates of girders, which have no cover flange plates, shall have their ends flush with the tops of angles unless otherwise required. The web plate when spliced, shall have clearance of not more than 5mm. The erection clearance of cleated ends of members connecting steel to steel shall preferably be not than 1.5 mm. The erection clearance at the ends of beams without web cleats shall not be more than 3 mm at each end but where for practical reasons, clearance is necessary, seating designed suitably shall be provided. Column splices and butt joints of struts and compression members requiring contact for stress transmission shall be accurately, machined and close butted over the whole section. In column caps and bases, the ends of shafts together with the attached gussets, angles, channels etc. after riveting together shall be accurately machined so that the parts connected, butt against each other over the entire surfaces of contact. Connecting angles or channels shall be fabricated and placed in position with great accuracy so that they are not unduly reduced in thickness by machining. The ends of all bearing stiffeners shall be machined or grounded to fit tightly both at top and bottom.

### **Riveting :** Rivets shall be used, where slip under load has to be avoided.

Preliminaries before Riveting:- Members to be riveted shall have all parts firmly placed and held together before and during riveting, and special care shall be taken in this respect for all single riveted connections. For multiple riveted connections, a service bolt shall be provided in every third or fourth hole.

### **Process of Riveting:**

The riveting shall be carried out by using machines of the steady pressure type. However, where such facilities are not available hand riveting may be permitted by the Engineer-in-charge. The rivets shall be heated red hot, care being taken to control the temperature of heating so as not to burn the steel. Rivets of diameter less than 10mm

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may be driven cold. Rivets shall be finished neat with heads full and of equal size. The heads shall be central on shanks and shall grip the assembled members firmly.

All loose, burnt, or badly formed rivets with eccentric or deficient heads shall be cut out and replaced. In cutting out rivets, care shall be taken so as not to injure the assembled members. Caulking and recapping shall not be permitted. For testing rivets, a hammer weighing approx. 0.25 kg shall be used and both heads of the rivet (Specially the machine head) shall be tapped. When so tested, the rivets shall not give a hollow sound and a jar where so specified, other tests shall be carried out to ensure the soundness of rivets. All rivets heads shall be painted with approved steel primer paint within a week of their fixing.

### **Bolting:**

The nominal length of the bolt shall be the distance from the underside of the head to the further end of the shank. The nominal diameter of the bolt shall be the diameter at the shank above the screwed threads. Bolts, nuts and washers shall be thoroughly cleaned and dipped in double boiled linseed oil, before use. All bolts heads and nuts shall be hexagonal unless specified otherwise. The screwed threads shall conform to IS 1363 and the threaded surface shall not be tapered. The bolts shall be of such length as to project at least two clear threads beyond the nuts when fixed in position, and these shall fit in the holes without any shake. The nuts shall fit in the threaded ends of bolts properly. Where necessary, washers shall be tapered or otherwise suitably shaped to give the heads and nuts of bolts a satisfactory bearing. The threaded portion of each bolt shall project through the nut at least two thread. In all cases where the full bearing area of the bolt is to be developed, the bolt shall be provided with a washer of sufficient thickness under the nuts to avoid any threaded portion of the bolt being within the thickness of the parts bolted together. Where there is a risk of the nuts being removed or becoming loose due to vibrations or reversal of stresses, these shall be secured from slackening by the use of lock nut, spring washers as directed by the Engineer-in-charge.

### **Erection:**

Steel members shall be hoisted and erected in position carefully, without any damage to itself, other structures and equipment and injury to workmen. The method of hoisting and erection proposed to be adopted by the contractor shall be got approved from the Engineer-in-charge in advance. The contractor however shall be fully responsible for the work being carried out in a safe and proper manner without unduly stressing the various members and proper equipment such as derricks, lifting tackles, winches, ropes etc. shall be used.

The work of erection may be done in suitable units as may be directed by the Engineer -in charge. Fabricated members shall be lifted at such points so as to avoid deformation or excessive stress in members. The structure or part of it placed in position shall be secured against over-turning or collapse by suitable means. During execution, the steel members shall be securely bolted or otherwise fastened when necessary temporarily braced to provide for all loads including those due to erection equipment and its Operation to be carried safely by structure during erection. The steel members shall be placed in proper position as per approved drawing, final riveting or permanent bolting shall be done only after proper alignment has been checked and confirmed.

Trusses shall be lifted only at nodes. The trusses above 10 m in span shall not be lifted by slinging at two mid points of rafters, which shall be temporary braced by a wooden member of a suitable section. After the trusses are placed in position, purlins and wind bracings shall be fixed as soon as possible.

The end of the truss which faces the prevailing winds shall be fixed with holding down bolts, and the other end kept free to move. In case of trusses of spans up to 10m the free end of the truss shall be laid on lead sheet or steel plate as per design, and the holes for holding down bolts shall be made in the form of oblong slots so as to permit the free movements of the truss end. For larger spans the truss shall be provided with proper bearing as per design.

Columns and stanchions shall be erected truly vertical with the necessary cross bracing etc. and the base shall be properly fixed with the foundation concrete by means of anchor bolts etc. as per drawing.

Anchor bolts to be placed in the concrete foundation should be held in position with a wooden template. At the time of concreting anchor bolt locations shall be provided with suitable timber mould or pipe sleeve to allow for adjustment which shall be removed after initial setting of concrete. The spaces left around anchor bolts shall be linked to a stopping channel in the concrete leading to the side of the pedestal and on the underside of the base plate to allow the spaces

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being grouted up after the base plate is fixed in the position along with the column footing. Grouting shall be of cement mortar 1:3 (1 cement: 3 coarse sand) or as specified.

### **Bedding of Column, Stanchions etc.:**

Bedding shall not be carried out until the steel work has been finally leveled, plumbed and connected together. The stanchion shall be supported on steel wedges and adjusted to make the column plumb. For multistoried buildings, the bedding shall not be done until sufficient number of bottom lengths of stanchions have been properly lined, leveled and plumbed and sufficient floor beams are fixed in position. The base plates shall be wedged clear of the bases by M.S. wedges and adjusted where necessary to plumb the columns. The gaps under the base plate may be made up to 25 mm which shall be pressure grouted with cement grouts. With small columns, if permitted by the Engineer-in-charge, the column base shall be floated on a thick cement grout on the concrete pedestal. The anchor bolt holes in the base plate may be made about 10 to 15 mm larger than the bolts. In such cases suitable washers shall be provided.

### **7.2.1.1.14 SPECIFICATIONS FOR STRUCTURAL FABRICATION AND ERECTION: GENERAL**

All dimensions are in mm and levels in meters. Written dimensions shall be followed. No dimension shall be scaled from the drawing. If in doubt, please ask the concerned project in charge for clarifications. Structures are fabricated in accordance with relevant Indian/ International standard codes of practice.

#### **Material:**

- i. Structural steel and other related materials for construction shall conform to Annexure-A.
- ii. All test certificates confirming to IS Codes which is going to be used for the construction of building structure has to be submitted to CLIENT for every consignment.
- iii. Due to non-availability of specified materials, suitable substitutions may be provided with consent of the CLIENT .Such substitution shall be incorporated in the “As-built” drawings.
- iv. Rolling and cutting tolerances shall be as per IS: 1852-1985.
- v. Cover electrodes for arc welding shall conform to IS: 814 - 2004/ Equivalent International standard.
- vi. Raw materials shall be straightened before marking and cutting if required.
- vii. All hexagonal bolts & nuts should be Chromium Coated and it should be rotate freely and shall conform to IS: 1363-2002 and IS 1364-2004 (for precision and Fully precision hexagonal bolts). Washer shall conform to IS 2016-1967.
- viii. Crane Rails shall conform to IS: 3443-1980.

#### **Connections:**

- i. In general, all welding shall conform to IS:9595-1991/Equivalent standard and welding design to IS:816-1969/Equivalent International standard.
- ii. All fillet welds shall be 6 mm continuous unless otherwise specified.
- iii. Minimum size of fillet welds based on thickness of connected members shall be as given

below if details are not given in the drawing :

S.	Description				
1	Thickness of Plate in mm	6-20	21-  30	31-50	51 & above
2	Minimum size of Fillet weld	6-8	8-  10	10-12	12-16

- a) Bolts shall be provided with washer plates of thickness equal to half the thickness of base plate or 10 mm whichever is more. Washer plates on the column base plate shall be site welded after alignment of column. Holes for bolted connection should match well to permit easy entry of bolts. Gross mismatch of holes shall be avoided.
- b) Fillet weld terminating at the sides or ends of parts shall be returned around the corners for a distance of not less than 25 mm.

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- c) All shop splices shall be made by means of full strength full penetration butt welds unless otherwise specified. Not more than one splice shall be permitted per member.
- d) Shop butt joints in flanges and webs shall be staggered type in assembly.
- e) on account of inaccessibility. Ends of butt welds are to be continued beyond the limits on run-on and run-off plates.
- f) Butt joints are to be welded from both sides irrespective of edge preparation except when back strips are used. Back-gouging shall be done pneumatically or by proper grinding method.
- g) Machining of contact surfaces of column base, end of column shaft, cap plates and bearing stiffeners shall be done wherever specified in the drawing. At other places maximum surface unevenness on contact surface of base plate, cap plate shall not exceed 0.5 mm. Maximum gap between bearing end of column shaft and base plate at any place shall not exceed 1 mm. If this is achieved by cold sawing and grinding, machining of column end need not be done.
- h) Chequered plate platforms exposed to weather shall have 25 mm diameter holes drilled at 450mm C/C to drain rain water.
- i) Drain holes shall be provided in the stiffeners of base plates of columns to drain off rain.
- j) Water, wherever the stiffeners form an enclosed space in the columnbase. Members fabricated in pieces due to limitations of transport shall be control assembled at shop in order to ensure true length, fitment and alignment. Where control assembly is not possible matching details and holes shall be marked with template. Control assembly part assemblies shall be given matching identity marks. In column wherever such type of joints are reqd. it should be provided 1000 mm above the floor level.
- k) Shop splices shall not be spaced less than 6 mtrs.
- l) Prior approval shall be taken for any splice not indicated in the drawing.
- m) Full scale layout is recommended, before cutting of material. Size and length specified in drawing BOM are tentative and are basically released for raw material indenting purpose.
- n) All inclined dimensions and gusset sizes shall be checked during actual shop layout as per drawing.
- o) Fabricated structures shall conform to tolerance as specified in IS: 7215 - 1974/  
Equivalent International standard.

### Inspection of connections:

All butt welds in structural members like columns, floor and framing beams, crane girders and bases shall be tested as follows:

- a) 10 % Dye Penetration test on root run and wherever in doubt during the process.
- b) 100 % Visual examination.
- c) 100% Ultrasonic test (For important Butt Welds Only).

#### **7.2.1.1.15 FABRICATION OF STEEL STRUCTURES: General:**

This specification shall apply to fabrication and supply of all building structures pertaining to structural steel works complete in all respect as per specification.

#### **Fabrication and Painting:**

The Contractor shall carry out, under fabrication and shop painting Connection design, Preparation of drawings, Getting Approval, Procurement of Steel (Grade E250/E350), Primer, Paint, Permanent fasteners, Anchor Bolts and hardware along with all accessories. Fabrication of Structural Steel including Surface preparation with Shot blasting & painting, Packing, loading, transportation and supply at site.

- i) Preparation of Connection drawing mentioning the bolted joints, arrangement of

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bolts and specification of bolts, nuts etc. (Specifying Clearly shop and site bolts).

- ii) Procurement and supply of all erectable consumables like bolts, nuts, washers, shims and packs etc., including allowance for spares and wastages.
- iii) Cold straightening of sections and plates, whenever they are bent and kinks.
- iv) Carry out the controlled assembly of steel structural components at site, wherever required or as directed by the Client.
- v) Re-fabrication of parts, damaged beyond repair during transport & handling or incorrectly fabricated, and fabrication of parts omitted during fabrication by oversight or subsequently found necessary.
- vi) Making arrangements for and providing all facilities wherever applicable for conducting ultrasonic testing on butt welds, getting the test conducted by reputed testing laboratories, making available test films/ graphs, reports and interpretation at site or erection site.
- vii) Preparation of steel structural surfaces with shot blasting for painting at fabrication yard as specified in the design drawings/specification.

### FABRICATION:

- i) Fabrication will be done only as per fabrication drawings/sketches etc. supplied by The Client.
- ii) All edge preparation for welding shall conform to IS: 9595-1980.
- iii) All the items are to be cut as per requirements of the drawing. If joints are to be provided in any item, in order to meet requirements of size and shape, cutting plan showing locations of joints shall be prepared for consideration of The Client. Joints provided shall be incorporated in "As - built" drawings.
- iv) Fabrication of all structural steelwork shall be in accordance with IS: 800-1984 and in conformity with various clauses of specification.
- v) Fabrication of structures shall be preferably be taken as per the sequence of erection.
- vi) Surface, wherever machining is specified, shall be either planed or milled or ground to ensure maximum contact. Standard of acceptance for machined surfaces, wherever specified by designer, (eg. In column cap plates, base plates, and columns shafts etc.) Shall be given as per relevant IS codes. Maximum surface unevenness on bearing surface of cap/base plates shall not be exceeding 0.5 mm.
- vii) Wherever perfect matching of parts is required at site, member shall be shop assembled before dispatch. Parts not completely assembled in the fabrication yard shall be secured, to the extent possible, to prevent damage during dispatch.
- viii) No hole shall be made by gas cutting process.
- ix) The fabricator shall carry out the controlled assembly of the following structures and units at site before dispatch to erection site.
- x) The welding and welded work shall conform to IS: 816-1969. The extent of quality control in respect of welds in important structural elements such as crane girders, girders, floor and framing beams, column shafts including traverses and bases etc., shall be as follows:-
  - a. 100 % Dye Penetration test on root run and wherever in doubt during the process.
  - b. 100% visual examination.
  - c. 100% ultrasonic test (for important butt welds only).
    - xi) The Client/ Client's engineer reserves the right to demand X-ray or other tests of welds wherever he considers necessary and the Contractor shall be prepared to carry out tests as directed by the Client/ Client's engineer. The Cost of NDT of welds as per the specification shall be included in quoted price.
    - xii) For other structures in addition to 100% visual check and measurement of external dimension by appropriate gauges, selective examination of welds by drilling, ultrasonic / radiographic / magnetic particles tests shall be done if necessary.
    - xiii) Standard of acceptance for weld defects is indicated below:
    - xiv) For metal thickness up to 10mm under cuts shall not be more than 0.5mm. For metal thickness more than 10mm, under cuts shall not be more than 1mm.

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- xv) Incomplete weld, molten metal flow, pits and cracks shall not be allowed.
- xvi) Following weld defects detected by ultrasonic method of tests are permissible:
- xvii) For joints welded from both sides, incomplete penetration shall neither be more than 50mm in length in one stretch nor the aggregate length be more than 200mm per meter length of joint. Thickness of incomplete penetration shall not be more than 5% of the thickness of the parent metal or 2mm, whichever is .
- xviii) Where joint welding from one side without backing strip is permitted, thickness of incomplete penetration shall neither exceed 15% of the thickness of parent metal nor 3mm at the root.
- xix) Slag inclusion located along the length of the weld and measured in a chain or separately shall not exceed 200mm per meter length of the weld, subjected to the following:-
- xx) At any cross-section, aggregate thickness of incomplete penetration, slag inclusion and pores located separately as a chain shall not exceed:
  - a. 10% of the metal thickness or 2mm whichever is when welding is done from both sides.
  - b. 15% of the metal thickness or 3mm whichever is when welding is permitted from one side and without backing strip. In case any weld is found defective by radiographic examination further equivalent adjacent lengths or welds shall be tested by radiographic examination.
- xxi) In case of detection of defects in welds, the rectification of the same shall be done as follows:-
- xxii) All craters in the weld and breaks in the weld and breaks in the weld run shall be thoroughly filled with the weld.
- xxiii) Undercuts, beyond acceptable limits, shall be repaired with dressing so as to provide smooth penetration. Porosity, slag inclusion etc. exceeding permissible limits shall be rectified by removing the lengths of weld at the location of such defects plus 10mm from both ends of defective welds, and shall be re-welded.
- xxiv) The Contractor shall make all necessary arrangements for stage inspection by Client's engineer/inspector during the fabrication at site and incorporate all on-the-spot instructions/changes conveyed in writing to the Contractor. Members wrongly fabricated shall be reported to inspector and shall be made good as directed. Minor misfits which can be remedied by a moderate use of drift pins, and moderate amount of reaming and slight chipping may be corrected in that manner, if in the opinion of the client's engineer/inspector the strength or the appearance of the structure will not be affected adversely. In the event, the Client's engineer/inspector directs otherwise, the items will be rejected and completely new piece shall be fabricated. The cost of correcting errors shall be to the account of the Contractor. No field torch repairs shall be carried out unless approved by the engineer/inspector.

### 7.2.1.1.16 Tolerance of Workmanship:

The permissible tolerance in workmanship shall be as per IS: 7215-1974.

#### Programme:

- a) All program on fabrication and dispatch shall match with the sequence of erection of different structural components and different buildings/units, of the projects as per planning or mutual agreement between the client and the Contractor.
- b) The Client may change or alter the detailed working program for the sequence of work and for the fabrication of components of structures, within the framework of the agreed schedule, which will be binding on the Contractor.
- c) If due to design or other stipulations in the bid or requirements at site, a particular sequence of overall construction has to be followed due to which certain interruptions to any one or more items of work are inherent, no claims for such interruption will be admissible.

#### Drawings:

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- a) Three (3) sets of drawings and soft copy in Auto Cad will be supplied to Contractor by the Client.
- b) Correctness of all details like cutting length of individual items, gusset/cleat size, matching holes, dimension of individual items, matching of marking, bill of materials, bolt lists etc, shall be the responsibility of the Contractor .

### **Contractor's Responsibility:**

The Contractor shall take the prior approval from the client regarding subletting the work fully or partly.

### **Shifting of Fabricated Materials:**

The Contractor is solely responsible for any loss or damage during transit of any of the fabricated members, and as such proper precautions shall be taken to guard against such mishaps. For all such important structures, match marking shall be given at the control assembly stage in the shop floor and such match marking shall be made clearly visible while assembling the structures at site. Centre lines of column flanges and both sides of web shall be punched, preferably at top and bottom to facilitate alignment after erection. As built drawing shall be prepared after fabrication is complete to indicate additions/alterations made during the process of fabrication. Each despatchable structure shall bear mark no. along with reference drawing number at two locations.(eg. On flange and bottom of base plate of column).

### **Setting Out:**

- i) The Contractor shall be responsible for checking the alignment and levels of foundations, correctness of foundations, centers of anchor bolts etc., well in advance of starting erection work and shall be responsible for any consequence for non-compliance thereof. Discrepancies, if any shall immediately be brought to the notice of the client. Any mistake subsequently found in alignment and levels of the structural steel work due to non-verification of foundation shall be rectified at Contractor's expense.
- ii) One set of reference axes and one bench mark level will be furnished to the Contractor. These shall be used for setting out of structures. Maintenance of such bench mark level shall be the responsibility of the Contractor.
- iii) The Contractor at his own expenses shall provide measuring instruments (Total Station, Dumpy Level) for setting out, leveling and alignment steel work.

### **Staging:**

Any staging necessary for the preassembly work of structures shall be provided by the Contractor at his own expense.

### **Rules & Regulations of Safety, Electricity Boards, Factory etc.:**

The Contractor shall at all times comply with all relevant factory acts, electricity rules, safety regulations etc. as per statutory requirement of Central/State Government.

### **Deviations:**

Should the Contractor wish to deviate from any specification or details showed on The Client's approved drawings and/or Technical Specifications, he shall obtain The Client's written permission before proceeding with the deviations in proper format.

### **Measurement:**

- i) Measurement for structural steel work shall be made on the calculated weights of steel work as determined from the dimensions given on the approved drawings or any approved amendments there to. In the case of mild steel plates the calculated weight shall be based on 78.5 kg per sq-m of metal 1 cm thick and in the case of mild steel standard sections and rods, the weights shall be calculated on the basis of weight per meter run specified in the relevant Indian standards.
- ii) The weights of all plates and sheets shall be calculated using the actual dimensions shown in the drawings with deductions for skew units and openings irrespective of their size. However, no deductions shall be made for skew cuts for gussets, rolled sections and holes for bolts. The weight for gusset shall be calculated from its overall dimensions.

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- iii) No additional weight for weld metal deposited, bolts (permanent or erection bolt), nuts, washers, etc. shall be allowed in measurements. Cost of bolts, washers, nuts electrodes, gases, etc. as required for the work shall be deemed to be included in the quoted rates.
- iv) Oiling, painting, temporary cleats, marking, packing and delivering to site shall be included in the scope of work.
- v) The weights to which the rates shall be applicable shall be as shown on the approved drawings /material lists and no allowance for wastage shall be permitted. Suitable cutting diagrams of components shall be prepared in order to minimize consumption of steel.

### 7.2.1.1.17 Surface Preparation and Painting of Steel: General

- i) This specification is intended to cover the general requirements for surface preparation and painting of steel structural work. Reference may also be made to IS: 8629-1977 (parts I to III).
- ii) Code of Practice for Protection of Iron and Steel Structures from atmospheric corrosion.
- iii) While this gives a general indication of the surface preparation and painting requirements, special cases may arise which have to be dealt with individually on the merits of each case.

The Contractor shall carry out the painting of structures fabricated by them with suitable paints. The schedule of painting shall be 1 coats of red oxide and 2 coats of enamel paint. Blast cleaning shall be done by shot blasting as per Swedish standard. Grade Sa-2 ½-- this involves very thorough blast cleaning. Mill scale, rust and foreign matter shall be removed to the extent that the only traces remaining are slight stains in the form of spots or strips. Finally the surface is cleaned with a vacuum cleaner, clean dry compressed air or a clean brush. It shall then correspond in appearance to the prints designated as Sa-2 ½.

#### **PAINTS AND PAINTING: General:**

- i. Areas which become inaccessible after assembly shall be painted before assembly after cleaning the surfaces as specified.
- ii. Portion of structures to be encased or embedded in concrete shall not be painted, but shall be coated with cement slurry, on completion of fabrication.
- iii. Wherever shop primer is damaged, the surface shall be thoroughly cleaned and the damaged portion shall be painted with the same primer.
- iv. Application of paint shall be by spraying as per IS: 486-1983 and IS: 487-1985. painting shall not be done when the temperature is less than 5°C or more than 45°C and relative humidity is more than 85% unless manufacturer's recommendations permit. Also painting shall not be done in frosty or foggy weather. During application, paint agitation must be provided where such agitation is recommended by the manufacturer.

#### **Painting of steel structures**

- a) If more than 50% of the painted surface of an item requires repair, the entire item shall be mechanically cleaned and new primer coats shall be applied followed by finishing coats as per painting specification.
- b) Primer paint shall be applied not later than 2-3 hours after preparation of surface, unless specified otherwise.
- c) The finishing paint as specified shall be of approved colour and quality.
- d) Edges, corners, crevices, depressions, joints and welds shall receive special attention to ensure that they receive painting coats of the required thickness.
- e) Surfaces which cannot be painted but require protection shall be given a coat of rust-inhibitive grease according to IS: 958-1975.

### 7.2.1.1.18 Erection of Steel: General

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In addition to provision of erection, transport and handling of equipment, the specification of work in this scenario shall include supply of tools and tackles, consumables, materials, labour and supervision, and shall cover the following:-

- a) Storing and stacking at site all fabricated structural components/ units/ assemblies till the time of erection.
- b) Transporting structures from storage yard to site including multiple handling if required.
- c) All minor rectification/ modifications such as:
  - i. Removal of bends, kinks and twists etc. for parts damaged during transport and handling.
- ii. Other rectification works such as:
- iii. Plugs welding and re-drilling of holes which do not register and which cannot be reamed or used for next higher size bolt.
- iv. Drilling of holes, which are either not, drilled at all or are drilled in incorrect position during fabrication.
- v. Fabrication of minor items/ missing items or such important items as directed by the engineer.
- vi. Verification in the field of the position of the embedded anchor bolts and inserts with respect to line and level, installed by others based on bench mark/ reference co-ordinates to be furnished by the engineer.
- vii. Assembly at site of steel structural components wherever required including temporary supports and staging.
- viii. Rectification at site damaged portions of shop paint by cleaning and touch up paints.
- ix. Erection of structures including connections by bolts/welding (Rail works).
- x. Alignment of all structures true to line, level, plumb and dimensions within specified limits of tolerances as per drawing and specifications.
- xi. Supply of labour in sufficient numbers, where necessary, as directed by The Client.
- xii. Conducting preliminary acceptance & final acceptance tests and rectification of structures wherever required as per preliminary & final acceptance report.
- xiii. Preparation of sketches/ drawings to suit availability of material, convenience of fabrication, transportation and erection and changes during fabrication and erection. All such works are subject to approval of The Client.
- xiv. The members of the structures which are received under knock-down condition shall be assembled and welded on ground at site prior to erection.

### **Erection Drawings:**

The approved erection drawings and any approved arrangement drawings, specifications or instructions accompanying them shall be followed in erecting the structures.

### **Storing and Handling:**

- i. Before starting erection, the program and sequence of work shall be followed as approved or mutually agreed by The Client.
- ii. The fabricated materials on receipt at site shall be carefully unloaded, examined for defects, checked, sorted out for each building and stacked securely on skids above level ground which shall be kept clean and properly drained. Girders and beams shall be placed upright and stored. Long members such as columns and chord members shall be supported on skids placed close enough to prevent damage from deflections.
- iii. The fabricated material shall be verified with respect to markings on the marking plan or shipping list which shall be supplied by the Contractor.
- iv. Any material found damaged or defective shall be stacked separately and the damaged or defective portions shall be painted in distinct color for identification. Such materials shall be dealt with as instructed by The Client.

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v. The handling and storing of component parts of a structure shall involve the use of methods and appliances not likely to produce injury by twisting, bending or otherwise deforming the structures. No member slightly bent or twisted shall be put in place until the defects are corrected. Members severely damaged in handling shall be rejected.

### **Defects in Materials and Rectification:**

All members shall be straight unless required to be curvilinear for and shall be free from twists.

Only cold straightening shall be permitted.

During assembly and before erecting the units to position, the Contractor shall compare the structures with the drawings to ensure that there are no fabrication errors or omissions. Should any defects or omissions be found, the same shall be brought to the notice of CLIENT, who will issue necessary instructions for its rectification.

### **Assembly and Erection:**

- i. Before starting erection, the Contractor shall submit to follow and number and types of equipment and temporary work proposed to use for erection.
- ii. The approval of The Client shall not be considered as relieving the Contractor for the loads for which the erection equipment and temporary work will be called upon to carry and support. Adequate allowances and provision shall be made for lateral forces and wind forces.
- iii. If in the opinion of The Client, the tools, tackles, plant and equipment, instruments, apparatus, etc. arranged by the Contractor are not sufficient or are inadequate for the fulfillment of contractual obligations of the Contractor within the stipulated period, The Client shall have the right to order the Contractor and the Contractor shall comply with order to bring/ arrange such additional tools, tackles, plant and equipment, instruments, apparatus etc. to the site and arrange the same to complete the work in time. All charges in connection thereof shall be borne by the Contractor.

### **Proper consideration shall be given to the following items during erection:**

- a) Frames of the building to be true to plumb.
- b) Temporary guying and bracing shall be used to align the frames during erection, if required. All temporary guying and bracing shall be in Contractor Scope.
- c) Temporary bracing may be required to sustain forces due to erection load and equipment. Erected parts of the structures shall be stable during all stages of erection. The stability of the structure subjected to action of wind, dead weight and erection forces shall be achieved by installing permanent and temporary bracing.
- d) Erection member shall be held securely in place by bolts to take care of dead loads, erection loads, wind loads.
- e) Provision of free expansion and contraction wherever provided.
- f) No final bolting of joints shall be done until the structures are fully aligned.
- g) Erection tools and machinery shall be of suitable capacity for handling the materials furnished and must be in safe Operating conditions at all times to avoid dangers to materials and personnel.
- h) In positioning beams, columns and other steel members, the use of steel sledge shall not be permitted.
- i) The Contractor shall report all failures of the fabricated steel to fit together properly to CLIENT and shall obtain approval prior to taking corrective measures.
- j) Steel members shall not be allowed to fall or be subjected to shock or impact due to other members being swung into position or for any other causes.

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k) Contractor should provide Cherry Packer /Man Lifter for Fixing and Tightening the Bolts & Nuts. I) Torque Value for tightening of Bolts & Nuts should be incorporated.

### **Other vital points to be taken care off during erection**

- i. The erection shall be carried out according to the best modern practices and as laid down in IS: 800-1984 and other relevant standards referred to therein and this erection specification together with erection drawings.
- ii. The Contractor shall be carry out Connection design, manufacture, erection and provide false work, staging, temporary supports etc. wherever required for safe and accurate erection of structural steelwork and shall be fully responsible for the adequacy of the same.
- iii. The Contractor shall provide adequate supervision by competent personal at all stages of the work and examine each portion of the work for accuracy before commencing the erection of the next structural members.
- iv. The Contractor shall also provide facilities such as adequate temporary access ladders, gangways, tools and tackles, instruments etc., for inspection at any stage during erection.
  - v. Instrumental checking for correctness of initial setting out of structures, and adjustment of alignment shall be carried out in sequence and at different stages as determined by design. The final leveling and alignment shall be carried out immediately after completion of each section of a building or when called for by The Client.
- vi. All structural members shall be erected with erection mark in the same relative position as shown in the appropriate erection and shop drawings.

### **Field Connection:**

- a) The number of washer on permanent bolts shall not be more than two (and not less than one) for the nuts and one for bolt head.
- b) Wooden rams or mallets shall be used in forcing members into position, in order to protect the metal from injury and shock.
- c) The permanent bolts shall be tightened to the maximum limit. The threaded portion of each bolt shall project through the nut by at least 4-5 thread.
- d) Spring washers or locknuts shall be provided as specified in the design/ shop drawings.
- e) All field assembly and bolting shall be executed in accordance with the requirement of shop fabrication.

## **BEDDING AND GROUTING**

- i. Base plates shall be set to elevations shown on the drawings, supported and aligned using steel wedges and shims or other approved methods. The supply of wedges and shims and materials for alignment shall be the responsibility of the Contractor as part of this work at no extra cost. Plates shall be leveled, properly positioned and anchor bolts tightened. The Contractor shall provide the packing plate at least four corner of the base plate.
- ii. The bedding/ grouting shall not be carried out until a sufficient number of columns have been aligned, leveled, plumbed and sufficient girders, beams, trusses and bracings are in position to the satisfaction of The Client.
- iii. The Contractor shall inform The Client when the base plates are ready for grouting and shall co-ordinate with others regarding grouting schedule. The Contractor is responsible for the final vertical and horizontal alignment of all base plates.

### **Erection of Miscellaneous Structures:**

- a) Unless otherwise specified, the crane rail joints shall be butt-jointed (either by Thermite or fusion welding) or by fish plate as per specification/ drawings.
- b) The joint shall be free from kinks, twists etc. and shall be ground properly after bolting.

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- c) Method of securing the crane rail to the crane gantry, alignment and expansion joints, if any, shall be as indicated in the approved drawings.

### **7.2.1.1.19 Preliminary Acceptance:**

After completing the erection of a unit or portion thereof, the Contractor shall give a notice in writing stating that the job is complete in all respects and ready for preliminary acceptance. The job shall be jointly inspected visually by representatives of Contractor and The Client. All observed defects and omissions as per drawings and specifications shall be noted down. If the defects are not major in the opinion of The Client / The Client's representatives, the Contractor will be issued a preliminary acceptance certificate mentioning the defects, deficiencies and omissions which shall be made good by the Contractor within a period of 2 weeks.

### **7.2.1.1.20 Final Acceptance:**

- a) Before commencement of inspection for final acceptance of the unit, the Contractor shall make available two complete sets of all modification drawings, sketches (if any) prepared by him during execution of work.
- b) The Contractor shall make good all defects, deficiencies and omissions noted down during preliminary acceptance and shall inform in advance the Client / The Client's representatives for conducting inspection for final acceptance. Final acceptance certificates will be issued by the Client / The Client's representative only after all defects / deficiencies / omissions noted under preliminary acceptance have been certified.

#### **Acceptance of Work:**

1. Acceptance of erected steel structures shall be either after completion of erection of the whole building or in blocks.
2. Intermediate acceptance certificates will be given in the following areas:- i) Any steel work or part thereof embedded in concrete.  
ii) Steel structures, which are to be covered in the process of carrying further work.
3. The following documents shall be prepared and produced by the Contractor at the time of acceptance of erected steel structures:-  
i) Documents showing approved deviations made during execution of erection work. ii) Documents showing acceptance of embedded structural steel work.  
iii) Certificates / documents on control checking and testing of materials (if any) and welds. iv) Data and results of geodetic measurements while checking the erection of structures.

### **7.2.1.1.21 FUSION-BONDED EPOXY COATING**

#### i. MATERIAL:

To protect reinforcing steel against corrosion, the coating shall be provide a continuous film that will resist penetration by salt ions, resist the action of osmosis, adhere to and expand / contract with the steel substrate, resist breakdown from weathering and exposure and be flexible and durable enough for handling. Once the coating is cured, the coating shall not tend to soften with higher temperatures.

The FBE coating shall be done confirming to IS code 13620:1993. Patch up materials shall be procured in sealed containers. PVC coated 18G binding wire shall be used for tying reinforcement steel.

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The epoxy coating shall achieve its beneficial properties as a result of a heat catalyzed chemical reaction. The dry powder shall be produced by combining organic epoxy resins with appropriate curing agents, fillers, pigments flow control agents. When heated, the powder shall melt and its constituent shall react to form complex cross-linked polymers.

The fusion-bonded epoxy coatings used for steel reinforcement shall not contain appreciable solvents or other environmentally hazardous substances. Also systems used to apply the coating shall be very efficient resulting in very little material loss to the atmosphere or waste disposal.

**ii. MANUFACTURING PROCESS:** The application of fusion-bonded epoxy coating to steel reinforcement involves four major process steps:

- a) Surface preparation
- b) Heating
- c) Powder application
- d) Cure

In coating plants, rebar shall be first coated in straight lengths and then fabricated (i.e., cut to length and bent to shape).

**a) SURFACE PREPARATION:** The objective of surface preparation shall be to assure that maximum adhesion will develop at the interface between the steel and the coating. Rebars shall be blast-cleaned using abrasive grit to a near white metal finish. The process shall clean the steel of contaminants, mill scale and rust. It shall also roughen the surface to give it a textured anchor profile. The surface roughness shall key the coating to the steel and shall provide mechanical anchorage. Texturing the surface shall also facilitate adhesion by increasing the exposed surface area of the steel and shall provide more opportunity for chemical bonding of the coating. Chemical pre-treatments shall be used to supplement last cleaning and facilitate surface preparation.

**b) HEATING:** After the bars have been blast-cleaned, they shall be heated to approximately 450 degrees F. This shall be usually accomplished using electrical induction heaters. The gas-fired heating shall be used in some cases.

**c) POWDER APPLICATION:** The heated steel shall be passed through a powder spray booth where the dry epoxy powder shall be emitted from a number of spray nozzles. As the powder leaves the spray gun, an electrical charge shall be imparted to the particles. These electrically charged particles should be attracted to the grounded steel surface providing even coating coverage. The dry powder shall hit the hot steel & shall melt and flow into the anchor profile (i.e., the microscopic peaks and the valleys on the surface) and shall conform to the ribs and deformations of the bar. The heat shall initiate a chemical reaction that causes the powder molecules to form complex cross-linked polymers that shall give the material its beneficial properties.

**d) CURE:** Following powder application, the coating shall be allowed to cure a short period (approximately 30 seconds) during which time it shall harden to a solid. The curing period shall be followed by an air or water quench to reduce the bar temperature to facilitate handling.

Fusion-bonded epoxy coating shall protect against corrosion by isolating the steel from oxygen and chloride. Epoxy coating shall have high electrical resistance, which shall block the flow of electrons that make up the electrochemical process of corrosion. In addition to serving as an electrical circuit breaker, the coating shall protect in another way that is less obvious. Coating a steel surface shall reduce the size and number of potential cathode sites, which limits the rate of any corrosion reaction. In order for macro cell corrosion to take place, a large area of steel surface shall be needed to act as a cathode where oxygen reduction can occur. Thickness for FBE coating shall not be less than 200 to 250 microns.

**iii. STACKING & HANDLING:** The epoxy-coated bars shall be stacked & handled carefully in steel yard during laying. The coated bars shall be carefully handled in order not to drop them, not to rub them on hard surface or against another

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coated bar while conveying, stacking, placing or stacking of fabricated bars & that for this purpose, wooden packing batons shall be used at spacing of not more than 60 cm. The coated bars shall be tied to make bundles with PVC binding material to avoid damages to coating. The cut ends of bars shall be touched up with special touch up materials of specifications as provided by coating agency. There shall be minimum time gap to repair the cut ends and damaged portions with touch up materials and that failure to do so may cause complete rejection of the coated bars the cut ends and damaged portions shall be touched up with repair patch- up material within four hours time gap. All damages to coating in handling etc. shall be repaired irrespective of their size. This stipulation supersedes provision of I.S. Code.

- iv. **MEASUREMENT:** The coating shall be done as per manufacture's specification & as directed by consultant. The measurement of reinforcement bars shall be taken in accordance with IS code & as specified in description.

### **7.2.1.1.22 CEMENT POLYMER COMPOSITE COATING**

The application of the cement polymer composite coating system comprises the following sequence :

i. **SURFACE PREPARATION:** The surface of the steel reinforcing bars to be coated shall be cleaned by abrasive (dry sand) blast cleaning to the near-white metal in accordance with SSPC - SP10/NACE No. 2-1994. It includes the following procedures:

- a) Prior to blast cleaning visible deposits of oil or grease shall be removed by suitable cleaning method.
- b) Clean dry compressed air shall be used for nozzle blasting.
- c) Dry uniformly graded silica sand shall be used for blast cleaning.
- d) Suitable arrangement shall be made in the sandblasting unit to suit automation. e) The pressure at the nozzle shall be regulated as per the supplier's specifications.
- f) Dust and residues shall be removed from prepared surface by brushing, blowing off with dry air.
- g) The surface shall meet the visual standards of comparisons as in SSPC- VIS1 or SSPC- VIS2.

ii. **APPLICATION OF THE COATING:**

- a) The coating shall be applied as soon after cleaning and before oxidation of the surface. However, the application of the coating shall not be delayed more than 4 hrs after cleaning.
- b) A rapid setting primer shall be applied over the prepared surface either by brushing or dipping.
- c) After 30 minutes of application of the primer a cement polymer-sealing coat shall be applied either by brushing or dipping.
- d) The coated rods shall be handled after 6 hrs.

iii. **REQUIREMENT OF THE COATED BARS:**

- (a) Thickness of The Coating: After curing, the minimum average the dry film thickness of the coated bars shall not be less than 150 + or - 25 microns.
- (b) Continuities of The Coating: The coated rod when visually examined should be fairly uniform in thickness and should be devoid of any defects as cracks, peeling, bulging etc. No surface area should be left uncoated. No rust spot should be visible with the unaided eye.

iv.

**SPECIFICATION FOR PATCH REPAIRING OF COATING DAMAGES:**

Coating repair is required when peeling off and other damages exist. Prior to repairs, loose or deleterious material from the damaged area shall be cleaned. In case where rust is present it shall also be mechanically removed prior to repair.

After this, primer coat shall be brush applied. After curing (15-30 minutes) sealing

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shall be applied and it is desirable to ensure a thickness of 150 microns.

### SPECIFICATIONS FOR CUTTING, BENDING AND WELDING OF COATED REBARS AT FIELD :

- (i) It is desirable that the coated rods shall be bend gradually.
- (ii) In the field, the cut and weld portion of the coated rebars shall be repaired by the same formulation.
- (iii) It is advisable that the binding wires shall also be coated by the same formulation.

### THE COATING SYSTEM OF A PRIMER AND A SEALING COAT :

(A) The primer shall have rapid Setting property as per Indian Pat. No. 481/DEL/93. Dated 13.05.93. The specification of primer shall be as under:

- I) Percentage of Solids : 30%
- II) Coverage : 160 cc/m<sup>2</sup>
- III) Colour : Strawberry

(B) The Sealing product shall be formulated with Resin mixed with a pigment. Indian Pat. No. 259/DEL/92. Dated 25.03.92. The specification of Sealing product shall be as under:

- I) Percentage of Solids : 30%
- II) Coverage : 300 cc/m<sup>2</sup>
- III) Colour : Olive Green

(C) A Passivating-cum-barrier type of coating and the product shall be formulated in such a way that due to elasticity and flexibility of the coating, the treated bars can be cut and bend afterwards.

#### **7.2.1.1.23    Applicable Codes and Specifications:**

The following specifications, standards and codes of practice (Latest edition) apart of these specifications and which are referred to herein shall be applicable all official amendments and revisions.

I	38 3	Specification for coarse and fine aggregates from natural sources for concrete
I	43 2	(All 2 Parts)– Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement. Part 1 - Mild steel and medium tensile steel bars, Part 2 - Hard drawn steel wires
I	45	Plain and reinforced concrete - Code of Practice
I	87 5	(All 5 Parts)– Code of Practice for design loads (other than earthquake) for buildings and structures
I	10	Specification for steel doors, windows and ventilators
	10	Common burnt clay building bricks - Specification

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		12 00	(Relevant Parts) – Method of measurement of building and civil engineering works
		12 39	(All 2 Parts)– Mild steel tubes, tubular and other wrought steel fittings, Part 1 - Mild steel tubes, Part 2 - Mild steel tubular and other wrought steel pipe fittings
		13	Code of Practice for prestressed concrete.
		14 43	Code of Practice for laying and finishing of cement concrete floor tiles.
		15 42	– Specification for sand for plaster
		15 66	– Specification for hard-drawn steel wire fabric for concrete reinforcement
		17	– Code of Practice for building drainage
		17 86	– Specification for high strength deformed steel bars and wires for concrete reinforcement
		18	– Criteria for Earthquake resistant design of structures
		19 04	– Code of Practice for design and construction of foundations in soils; general requirements
		22	– Code of Practice for brickwork
		25	– Code of Practice for bending and fixing of bars for concrete reinforcement
		27 51	– Code of Practice for welding of mild steel plain and deformed bars for reinforced concrete construction.
		29	(All 4 Parts)– Code of Practice for design and construction of pile foundations
		29	(All 5 Parts)– Code of Practice for design and construction of machine foundations
		33	(All 4 Parts)– Code of Practice for concrete structures for storage of liquids
		37	– Code of safety for excavation work.
		40 14	– (All 2 Parts) Code of Practice for steel tubular scaffolding
		40 81	– Safety code for blasting and related drilling Operations
		41 38	– Safety code for working in compressed air
		62 48	– Specification for metal rolling shutters and rolling grills
		91 03	– Concrete Admixtures - Specification
		10 26	– Recommended guidelines for concrete mix design
		14 68	– False work for concrete structures – Guidelines

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### **SPECIFICATIONS OF PLUMBING, DRAINAGE & WATER SUPPLY**

#### **Materials:**

G.I. (B-Class) / CPVC pipes shall be used for all External Water Supply Pipe works.

uPVC pipes shall be used for all Soil Waste, Rain Water and Drainage works.

CPVC pipes shall be used for all internal Water Supply Pipe works.

uPVC Pipes for Soil, Waste and Rain Water, Planter and AC drains shall conform to I.S.13592-

1992 (type - B, SWR quality) for concealed pipe within the toilet sunk portion. The jointing of the pipes shall be in solvent cement joints. All the shaft piping shall conform to I.S.13592- 1992 (type - B, SWR quality). Vent Piping shall conform to I.S.13592- 1992 (type - A, SWR quality). All jointing in the shaft shall be by rubber ring joints. Rubber rings shall conform to IS 5382 and fittings to BS 4515 DIN 19531 & 19534. All the fittings like tees, bends, couplers cross etc. shall conform to IS 7834-1975. The joints of uPVC Pipes recommended shall be solvent cement, flanged, or threaded, joints. Pipes and fittings shall be free of any defects like cracks, etc.

#### **Testing:**

Inspection & Testing Pipes and Fittings before Commencing Work:

All Pipes & Fittings shall be inspected before delivery at the site whether they bear where appropriate, the certification mark of the I.S.I.

#### **Testing of Service Pipes and Fittings:**

When the service is complete, it shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock or water hammer. The Service shall be inspected under working conditions of pressure and flow. When all draw-off taps are closed, the service pipe shall be absolutely water-tight.

#### **Painting:**

a. All exposed G.I. pipes and fittings shall be painted with 2 coats of approved shade enamel paint over a coat of Zinc Chromatic primer while M.S pipes shall be painted

with 2 coats of Zinc Chromatic primer with 2 coats of enamel pint to the satisfaction of Engineer / Employer.

b. All pipes concealed through wall of floor shall be protected with anticorrosive paint and hessian cloth.

#### **Sanitary Fixtures:**

All glazed Vitreous china sanitary ware shall conform to Indian Standard IS: 2556. The Vitreous China Sanitary ware shall be of first quality only. They shall be non-porous and fully vitreous, with all the visible portions perfectly glazed and should absolutely be free from hairline cracks, pin-holes and local depressions. They shall be perfectly symmetrical, uniform and smooth. The chromium plated fittings shall match the vitreous china fixtures.

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### **Valves and Controls:**

All Valves (gate, globe, check, safety) shall be either all brass or gun metal valves suitable for the particular services. All valves shall be of the particular duty and design called for. Valves shall either be of the screw type or flange type, with suitable flanges and non-corrosive bolts and gaskets. Tail pieces as required shall be supplied along with valves. Gate, globe and check valves shall conform to Indian Standard IS:778-1971 (Gunmetal gate, globe and check valves for general purposes) and non-return valves to swing check type reflex (non return valves IS:5312 (Part I) 1969.

### **Codes & Standards:**

. All the applicable codes and standards updated and in force published by the Bureau of Indian Standards (BIS) and its subsequent revision and all other standards which may be published by them before construction work starts, shall govern in respect of design, workmanship, quality and properties of materials and method of testing for Plumbing, Drainage and Water Supply etc.

All materials shall conform and bear stamps of the required Indian Standard specifications. The following is the list of applicable codes:

IS : 651 - 1980 Specification for salt glazed stoneware pipes and fittings.

IS : 778 - 1984 Specification for gunmetal gate, globe and check valves for water.

IS : 780E - 1984 Specification for sluice valve for various purpose.

IS : 781 - 1978 Specification for sand cast brass screw down bib taps and stop for water services.

IS : 782 - 1983 Specification for caulking lead

IS : 1172 - 1971 Basic requirement of water supply drainage and sanitation

IS : 1239 - 1982 Specification for M.S. or G.I. Pipes.

IS : 1536 - 1989 Specification for LA class Centrifugal cast (spun) iron pressure pipes for water and sewage.

IS : 1538 - 1976 Specification for cast iron fittings for pressure pipes for water and sewage.

IS : 1703 - 1977 Specification for ball valves (horizontal plunger type)  
including floats for water supply purpose.

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IS : 1879 - 1975	G.I. Fittings	
IS : 3989 1984		Specification for Centrifugal cast (spun) iron pipes for Sewage.
AS		Specification for C.I. Sand cast pipes.
T	1	19
M	5	19
-	4	75
D		Specification for threads of G.I. fittings (parallel female and taper male threads).
-		
17	BS - 5155	Specification for Valves for various purposes.
85		
Sp	1726 - 1974	Specification for cast iron manhole covers and frames intended for use in drainage work.
eci		
fic	1729 -	
ati	1979	Specification for cast iron spigot and socket, soil, waste pipes, fittings and accessories.
on		
for	1742 - 1983	Code of practice for building drainage.
Hi		
gh		maintenance of sanitary appliances.
Pr		
es		
sur		
e	2	19
UP		Code of practice for water supply in buildings.
VC	2	19
Pi		Specification for water meters. (Bulk type).
pe	4	19
s	5	Specification for reinforced cement concrete hume pipe.
		71

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### 7.2.2 Specifications of Works for Mechanical Components including Fire Fighting & Car Parking Systems

#### 7.2.2.1 Applicable Standards:

Unless specifically mentioned otherwise all the applicable codes and standards updated and in force published by the Bureau of Indian Standards (BIS) and its subsequent revision and all other standards which may be published by them before construction work starts, shall govern in respect of design, workmanship, quality and properties of materials and method of testing. Some of these available standards are listed below:

(All materials shall conform and bear stamps of the required Indian Standard specifications). I.S.1239

##### Specifications for G.I. Pipes

- I.S. 778      Specifications for Gun Metal gate, globe, and check valves for water
- I.S. 800      Specifications for Structural steel.
- I.S. 3589      Specifications for ERW black pipes for water, gas and sewage Class I.
- I.S. 814      Specifications for covered electrodes for metal arc welding purpose of structural steel
- B.S 5155      Specifications for C.I. butterfly valve
- I.S. 4927      Specifications for Canvas Hose pipes
- B.S.1641      Specifications for C.I. Screwed fittings.
- I.S. 903      Specifications for Branch pipes
- I.S. 3844      Code of practice for installation of internal fire hydrant in Multi storied building.  
                  .Specifications for landing valves (Courtyard Hydrant)
- I.S. 903      Specifications for coupling double male double female Instantaneous pattern for fire fighting
- I.S. 2217      Recommendation for providing first aid firefighting arrangement in public buildings.
- I.S. 1879      Malleable Iron fittings Parts I to X.
- I.S. 1200      Method of measuring of building & civil engineering works (Water Supply, Plumbing Drain and sanitary fittings)
- I.S. 1538      Specifications for cast iron fittings for pressure pipes for water, gas and sewage.
- I.S. 4853      Recommended practice for radiographic inspection of Fusion welded butt joints in steel pipes
- I.S. 636      Synthetic, jacketed hose pipes
- I.S. 1520      Electrically Operated multistage/ multi-outlet pump
- I.S. 2198      Control Panels

#### Works to comply with Local Regulations:

All Fire Fighting works shall confirm to the prevailing local Bye-laws and/or rules and regulations of Local Bodies and the works shall be got inspected and approved by the various authorities having jurisdiction.

The work shall be carried out through a licensed Fire Fighting Agency.

In the interior of the building, all pipes whether of cast iron or G.I. shall be embedded in an approved manner in chase made in walls or floors if required by the Engineer-in-charge. The Contractor shall make all necessary holes in the walls of masonry and concrete etc. and restore them to the original condition.

All cuttings, chasing and fixing work concealing work, shall be completed before commencement of any plastering tiling or finishing work.

The contractor shall be responsible for the adequacy and efficiency of the entire system.

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The materials & equipment to be incorporated for use in construction of the work shall the responsibility of the contractor in totality.

The equipment of the fire-fighting system / fire prevention system shall be tested independently at various intervals and at completion. Where the situation calls for sectional testing (e.g. before embedding any piping within the building structure or before covering up pipes laid in trenches), the contractor shall promptly arrange such testing. All testing shall be done in the presence of Engineer-in-charge's representative and at intervals as desired by him. The contractor shall record all testing done by him in a 'Log Book' of approved form. The test results shall be countersigned by the representatives of both the Contractor and Engineer-in-charge. The contractor shall arrange for all facilities, labour, materials, kit and instruments required for testing. All expenses thereof shall be borne by the contractor.

### **7.2.2.2 Fire Hydrant & Sprinkler System**

#### **7.2.2.2.1 Materials:**

All materials shall conform and bear stamps of the required standard specifications.

Samples of all materials shall be approved before placing order and the approved samples shall be deposited with Engineer-in-charge.

If so directed, materials shall be tested in an approved testing laboratory and the Contractor shall produce the test certificate in original to the Engineer-in-charge and the entire charges for original as well as repeated tests shall be borne by the Contractor. If required by the Engineer-in-charge, the Contractor shall arrange to test portion of the work at his own cost in order to prove their soundness and efficiency. If after any such test, the work or portions of work is found in the opinion of the Engineer-in-charge, to be defective or unsound, the contractor shall pull down and the same at his own cost. Defective Material shall be removed from site.

It shall be obligatory for the Contractor if so required by the Engineer-in-charge to furnish certificates from manufacturers or materials suppliers, that the work has been carried out using their materials and installed/fixed as per their recommendations/factory manuals.

#### **7.2.2.2.2 Steel Pipes:**

The M.S. pipes of 200 mm dia and above shall conform to IS:3589-1981 Class I Grade 330 with 6 mm wall thickness and 150 mm dia and less G.I shall conform to IS: 1239 (Mild Steel Pipes, Tubular and Wrought Steel) heavy class only.

#### **7.2.2.2.3 Galvanizing:**

Galvanizing shall conform to I.S. 2529 (Hot Dip galvanizing of iron and steel). On delivery to site, the pipes and fittings shall be inspected for the galvanized coating and shall have identification for the class of pipes. Pipes with damaged coatings shall be segregated & removed from the site and not be used in the installation.

#### **7.2.2.2.4 Welding of Pipes:**

The welding of M.S or galvanized pipes and fittings shall be in accordance with "Recommendation for metal Arc welding of carbon and carbon manganese steel". IS: 9595 -1980. The electrodes used for welding shall comply with I.S 814 (part -1) 1974 and IS: 814 (part-2) 1974.

Preparing pipe faces for welding: Before aligning, assembling and welding the pipe faces shall be cleared by scraping by wire brushes or any other method specified by the construction Manager.

The welding shall show evenness in ripples or waves and well formed beds with good fusion along the edge of weld. There shall be no unfilled cavities, small pockets of slags or burned metal air or gas pockets.

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### **7.2.2.2.5 Testing of Welded Joints:**

The welded joints shall be tested in accordance with the procedure laid down in I.S.3600,(Part I) 1973 suitable means as desired by Engineer-in-charge.

### **7.2.2.6 Welding of Closure Gaps:**

Final welding of closure gaps shall be carried out with in a temperature range of average air temperature +8 Degree C.

### **7.2.2.7 Jointing of Pipes:**

All pipes M.S./G.I. shall be joined by means of arc welding after laying in correct position and shall have flanged joints at every 20 M straight length and at change in direction/change in size/branch connections. M.S. Flanges shall conform to I.S 1538 part IV to part VI table E which shall be cut and drilled out of M.S. Plates. M.S. cut flanges shall be galvanized before welding to G.I. Pipes. All gaskets for flanged joints wherever required shall be of Neoprene

6mm thick with G.I. nuts and bolts. Welded joints shall be covered with a coat of epoxy paint, applied after preparation of surface and appropriate primer. Inspection Before Installation:

M.S and G.I. pipes, fittings and specials shall be inspected before delivering at the site for the brand, quality, etc. The pipe and fittings shall be inspected at the site again before laying and defects noticed, if any, such as protrusion, grooves, dents, etc. shall be rectified. Care shall be taken that the resulting wall thickness does not become less than the minimum. Any damaged portion shall be cut-out as a cylinder and replaced by an undamaged piece of pipe.

### **7.2.2.8 Handling Of Pipes And Specials:**

It is very essential to avoid damage to the pipes, fittings specials etc., at all stages during handling. The pipes & specials shall not be distorted of their circular shape and galvanizing shall not be damaged. Pipes shall not be thrown down while unloading.

### **7.2.2.9 Laying of Pipes:**

The pipes cut to required lengths shall be laid to required gradients and joined by welding or by flanged joints as called for. The laying of welded pipes shall comply to IS:5822-1986, "Code of practice for laying of welded pipes for water supply".

### **7.2.2.10 Testing of Pipe Line:**

#### **a. Field Test :**

The field test of pipes shall be carried out as per I.S. 1538.

#### **b. Procedure of Test:**

All air shall be expelled from the pipe line through hydrants and air valves. Each valve section of pipes shall then be slowly and carefully filled with water and allowed to stand full of water for a few hours if time permits. The specified test pressure based on the elevation of lowest point of the line or section under test and corrected to the elevation of the test gauge shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer-in-charge. Due precaution shall be taken to ensure that the required test pressure is not exceeded. Pressure gauges shall be accurate and shall preferably have been re-calibrated before the test. The test pump having been stopped, the test pressure shall maintain itself without measurable loss for at least Two hours or as directed by Engineer-in-charge. The pipes shall be tested in sections as the work of laying Proceeds, and joints

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inspected during testing. The open end of the pipe line may be temporarily closed for testing under moderate pressure by fitting a water tight expanding plug. The end of the pipe and the plug shall be secured by struts or other wise to resist the end thrust of the water pressure in the pipes.

### **7.2.2.2.11 M.S. C.I. Brackets/hangers:**

All M.S. Brackets/Hangers for supports of M.S, G.I. pipes and fittings shall be fabricated out of mild steel section such as channels, Angles, Tees, Flats etc., or shall be cast iron as per site conditions as per drawing or as suitable, as per I.S. Code. The brackets, hangers etc. shall be fabricated to required sizes and shapes and installed in position as shown on drawings or as required as per site conditions. The welding and other Operations involved in fabrication shall be carried out as per relevant specifications and best trade practices.

M.S. Brackets/Hangers shall be thoroughly cleaned by wire brush to make the surface clear from any rust before application of paint. The brackets/Hangers shall be fixed to the ceiling by Anchor fasteners, as directed by the Engineer-in-charge. In case the brackets cannot be fixed by above method due to site condition, they shall be grouted in to the slab with the permission and as directed by the Engineer-in-charge.

Sturdy Hanger, Brackets and saddles of approved design shall be installed to support all pipe lengths, which are not embedded over their entire run. The hangers and brackets shall be of adjustable heights and primer coated with zinc chromate primer. Clamps, collars and saddles to hold pipes shall be provided with nuts, bolts and suitable gaskets. The brackets and hangers shall be designed to carry the weight of pipes safely and without any deflections. All pipes and fittings shall be supported at a maximum of 3 M run of pipe and at change of direction or wherever required as per site conditions. Where called for, pipe hangers shall also be supplied with proper sound and vibration dampening devices, to minimize noise and vibration transmission.

Details of piping support both for Horizontal and vertical pipes are shown in the relevant drawings and shall be strictly followed by the Contractor.

Fire water main pipes or headers shall be supported on M.S. Cradles, fabricated out of M.S. angles of suitable size and verticals made out of M.S. flat of suitable size hooked to reinforcement in slab above and pocket grouted properly.

### **7.2.2.12 Painting:**

This painting clause is applicable to all the structural & mechanical items, cabinet housing electrical controls etc. Items manufactured indigenously will follow relevant standards by Bureau of Indian Standards. For items manufactured outside India EN standards may be followed.

Painting shall be applied to all iron and carbon steel surfaces exposed to the atmospheric action after surface preparation. Items made of asbestos, Aluminum, brass, bronze, galvanized steel, stainless steel and other corrosion resistant alloys, rubber, synthetic polymers, fiber reinforced plastics, and buried pipe work (for which separate protection is required) are not required to be painted except for aesthetic purposes and / or for identification.

The painting process will consist of surface preparation, Application of prime coat, application of intermediate coat where required and finally application of the finish coat and touch up.

The paint material shall conform to the relevant standards by Bureau of Indian Standards. The Make & Shade of the paint shall be approved by the Engineer / Employer.

Primer paint shall be applied on dry and clean surfaces. Intermediate paints formulated with micaceous iron oxide (MIO) to be applied over prime coats where required as an intermediate layer to provide weather proof sealing of prime coat. Finish paint of approved colour to IS 5 shall applied over prime and intermediate coats. Proper cleaning and touch up should be done at all level.

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The colour scheme for the moving items shall follow the relevant standards by Bureau of Indian Standards.

### **7.2.2.2.13 Standards for Painting**

	IS	5	Colours for ready mixed paints and enamels
	IS	384	Brushes, Paints and Varnishes, Flat Specification
	IS	958	Temporary corrosion preventive grease.
	IS	1153	Temporary corrosion preventive fluid
	IS	2074	Ready Mixed Paint, Air Drying, Red Oxide Zinc Chrome, Priming - Specification.
	IS	9954	Pictorial Surface Preparation Standards for painting of Steel Surfaces
	IS	1094	Code of Practice for Painting procedure for Machine Tools.
	IS	8501	Preparation of steel substrate before application of paint.
O	-1		
	SI	0559	Pictorial surface preparation standard for painting of steel.

### **7.2.2.2.14 C.I. Non Return Valves:**

The non-return valve shall be double flanged cast iron of approved make. Re coil check valve with cast iron body with all internals made of Gun Metal or Wafer Type Check Valve.

### **7.2.2.2.15 Orifice Plates:**

These shall be specially designed orifice plates wherever required on hydrant outlets of suitable size for adjustment of delivery pressure, where running pressure exceeds 7 kg/cm<sup>2</sup>.

### **7.2.2.2.16 Hydrant Valves:**

Hydrant valves shall be as per I.S. 5290. The hydrant valves shall be Gun Metal Morris pattern approved by Fire Brigade with necessary nuts, bolts, & gaskets etc. The valve shall be right angled, turn down and other types having instantaneous female plunger type outlets with chained blank cap. Flanged inlets gunmetal or light alloy with C.I. Or brass hand wheels tested to 21 kg/cm<sup>2</sup> pressure. The valves shall be either single outlet or Double outlet as required.

### **7.2.2.2.17 Fire Brigade Connection:**

Fire Brigade inlet connection with 4 (four) connecting points fabricated out of G.I. Pipes and incorporating a C.I. non return valve for fire and sprinkler system. The fire brigade connection shall be connected to the 1) Fire storage tank 2) Fire wet riser system 3) Sprinkler system at appropriate locations.

### **7.2.2.2.18 Sprinklers:**

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Sprinklers shall be 'GRINNEL/AUTOMATIC' Type F UNDER WRITERS LABORATORY/Factory mutual listed or approved equivalent. The bulb shall be quartzoid bulb with a temperature rating of 68 deg.C. The sprinklers shall be pendant type / Side Wall / Recessed type as called for.

The Orifice size shall be 15 mm with Gun Metal Body, Bronze finish and quartzoid bulb as heat sensitive element and universal deflector. The discharge pattern for pendant sprinklers shall be spheroidal covering an area of 9 sq. meters. Sprinklers shall be mounted up right/ suspended in pendant position.

### **7.2.2.2.19 Installation Control Valve:**

Installation Control valves shall be wet type, flanged of suitable size with cast iron body, Bronze seating Alarm valve clack, Drain and test valve, pressure gauge on upstream and downstream and water motor going to be automatically Operated on loss of pressure in the system. The water motor gong shall be pelton wheel type or electric alarm.

### **7.2.2.2.20 Court Yard Hydrant:**

The Court Yard Hydrant landing valve shall be as per I.S. 5290. The valve shall be a single outlet oblique type hydrant valve with instantaneous coupling Gun Metal Body and hand wheel to be fixed on a stand pipe of minimum 80mm dia.

### **7.2.2.2.21 Hose Pipe For Court Yard Hydrant:**

Fire hose shall be synthetic, jacketed type with unified lining and cover of special polymer compound designed to resist impact, abrasion, damage, weathering by ozone, burning oils and chemicals. It shall conform to IS : 636 type B with instantaneous couplings (Male & Female) screwed, with 16 gauge G.I. wire on either ends.

### **7.2.2.2.22 Connection Pipes:**

Connection pipe shall be as per IS-903 long type with copper body with Male inlet and screwed bronze type 20 mm nozzles.

### **7.2.2.2.23 Pressure Gauge:**

The pressure gauges shall be of 'BOURDEN TYPE' with +/- 1% accuracy. The size or diameter of the dial shall be 150mm with a pressure range from 0 to 16 kg./sq.cm. The measuring element type shall be 'BOURDEN' and material shall be SS-316.

### **7.2.2.2.24 Automatic Sprinkler and Fire Alarm Installation (Wet System):**

Installation Control Valves and shall be wet type, flanged of required size with C.I. body, bronze seating alarm valve clack, drain and test valve, pressure gauge on upstream and downstream and water motor going to be automatically Operated on loss of pressure in piping. The water motor gong shall be Pelton wheel type or electric alarm. **Stop Valve:**

The valve shall be of wedge type and be provided with an indicator showing the valve in open or closed position. It shall be secured in the open position by a padlock and strap. This valve controls the water supply to installation and must always remain open.

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### 7.2.2.25 Alarm equipment:

The Alarm equipment to be provided shall give a loud alarm in case of fire. This equipment shall come into Operation when water flows through the installation valves to sprinkler when opened due to fire. The equipment shall consist of simple and positive action main parts namely i) Alarm valve, ii) Alarm Stop Valve, iii) Alarm Motor & Gong

#### Alarm Valve:

Alarm valve shall have a cast iron body & be fitted with a Bronze seating and valve guide clack resting on the bronze seating. The flat circular Bronze plate of the clack shall be faced with a special composition disc, and shall rest on the seating and prevent access of water to the groove. When water flows into the installation, clack shall lift and water shall flow through groove and open alarm stop valve to the alarm motor.

#### Alarm Stop Valve:

Alarm stop valve shall have an indicator to show whether it is open or closed. Alarm stop valve shall control the flow of water from Alarm valve through annular groove to the alarm motor. It should have a strap to keep the valve in open position to give alarm when the fire takes place.

#### Alarm Motor and Gong:

The Alarm Motor shall be of Pelton wheel type. The whole unit shall be simple and robust construction and shall give a reliable service. Suitable Drain pipe shall be provided to discharge water through drip plug with an orifice to restrict the rate of discharge. This shall not impair the Operation of Alarm motor and gong.

### 7.2.2.26 Drain and Test Valve:

The drain pipe size shall be 50mm dia. The test valve shall have to be in closed position secured by a strap. 15mm dia size test valve shall be provided to test the Alarm when the test valve is opened, water shall flow through Alarm valve, lift alarm valve clack from its seat and allow water to flow to the Alarm Motor. Valve shall be in closed position when not in Operation and shall be secured with the strap.

### 7.2.2.27 Examination Under Pressure

Under the test pressure no leak or sweating shall be visible at all section of pipes, fittings, valves, Hydrants & welded joints. Any defective workmanship and defective pipes, fittings, valves or Hydrants discovered in consequence of this pressure test shall be removed and replaced with acceptable material & the test shall be repeated until found satisfactory by the Engineer.

### 7.2.2.3 Testing:

The contractor shall be required at his own expense to test the installation with water. The minimum test pressure shall be 50% higher than the system pressure. Pressure shall be 50% higher than the system pressure. When the installation is completely carried out, proper stoppers, screws, plugs, hose, etc. must be provided for this purpose. If required, these shall be taken out and re-laid at the contractor's expense. The required quantity of water for testing will be provided by the owner. The installation shall be guaranteed against faulty material, workmanship and design. The defect liability period is for 12 months and design and the period commences from the date of commissioning of the whole installation along with the approved certificate from the authorities. During this period the contractor shall be responsible for any repairs or replacement of any defective part and shall rectify the installation free of cost to the owner.

The contractor shall train the ASCL/MCA personnel for the proper maintenance of the Installation.

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### **7.2.3 SPECIFICATION FOR INTELLIGENT ANALOG ADDRESSABLE TYPE FIRE DETECTION AND ALARM SYSTEMS**

1. The main / local fire alarm control panel and loop devices including sensors , Manual call points, interface & relay units should be sourced from the same ISO 9002 certified manufacturer to ensure compatibility between hardware and software.
2. All basic equipment proposed and planned for use shall be formally approved by at least one internationally recognised testing labs and/or approval from all the concerned authority for the system offered, few or which are listed below :
  - a) UL - Underwriters Laboratories, USA.
  - b) FM - Factory Mutual, USA.
  - c) B.S. - British Standards, Great Britain
  - d) U.L.C. - Underwriters Laboratories, Canada
3. Vendor shall obtain clearance and approval of drawings from the following Authorities
  - a) Local Fire Authorities
  - b) Tariff Advisory Committee
4. All control equipment's and loop devices including sensors, interface modules, relay units etc. are to be manufactured by a single company to ensure total compatibility and faultless communication of the FAS.
5. The system shall be capable of connecting signal devices (hooters, horns, flash light etc) & Monitor Devices (sensors, MCP's etc) in the same loop irrespective of difference in the principle of operation and should not require separate loop. This would reduce the no. of cards installed in the system and thus maintenance would be easy.
6. Sensors should be provided in the ducting used for the air-conditioners in addition to those used below the ceiling.
7. The system shall be one of the latest generations of INTELLIGENT ANALOG SYSTMS whereby it shall be the FIRE ALARM PANEL that determines that a fire situation really exists and not the device in alarm. This should be possible so as to eliminate the false alarms.
8. The system should have the optional facility to be connected into a Network in future, by adding the required cards, and thus Operate as a Node of that Network while maintaining its Local Mode Operation.
9. Monitoring and Control Equipment:
  - 9.1 Standard Features
    - i. The Fire Alarm Control Panel should be manufactured by a ISO 9002 company and be UL listed for NFPA 71, 72, UL 1076 Security Operation or similar and approved by FM or a similar laboratory in addition to approvals from local authorities.
    - ii. This should be capable of optional 100% Hot redundant Operation with identical other panel or 100% Redundant Operation with standby processor.
    - iii. To provide maximum efficiency in performing primary fire alarm functions, the main operator panel should give access only to the indication and interaction keys required in Emergency situation. For increased functionality operator should need to open "Access Door" to access the additional operator keys.

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- iv. The depth of the Operators interaction with the control panel should be protected by at least 4 software programmable Access levels so that specific functions may be allowed only to designated persons. It should be capable of assigning min 20 discrete passwords to identify individual operator. The user specific code shall be stored in the on line history log to identify the individual responsible for activating the function.
- v. The main panel shall have a 2 X 40 character Back-lit Super Twist Alpha Numeric LCD Display screen, which may be visible under any lighting condition. Vacuum fluorescent displays, which may consume high levels of current and are not readily visible in high ambient light conditions, shall not be used. At least 40 character of the LCD display shall be available for customer text to describe the location of a zone or device.
- vi. Each loop must be able to support minimum 127 addressable input and/or output devices in any combination.
- vii. The memory of the panel shall be non-volatile. Systems requiring a power source to maintain site programmed data are not recommended.
- viii. The system shall have self contained (internal) standby battery as a part of the Intelligent power supply with automatic charger. The charger must be capable of Automatically adjusting the Boost or trickle charger according to the requirement of the Battery. The charger must be able to charge the battery back up required for 24 hrs. of normal Operation and 10 minutes of alarm Operations in case of mains failure. There should be complete supervision of the power supply from main panel.
- ix. The LCD Display on the main panel shall be capable of displaying all the information about the current status of the power supply, Battery and charger ( low/no battery, Battery voltage, peak current, Battery current etc.)
- x. The main panel should be able to supervise and monitor supervisor services (water flow switches, tamper switches etc.) in addition to the fire alarm system. There should be a dedicated supervisory service indicator LED & acknowledge on the main panel.
- xi. Alarm, Trouble & Supervisory conditions should have separate LED's & acknowledge keys. Operation of the appropriate Acknowledge Button, silences the Tone Alert but the LED remains illuminated until all conditions in that category are restored to normal.

### 9.2 Software Features

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- i. The control panel shall be fully site programmable by Laptop computer i.e. field programmable, configurable and expandable in the field without the need for any material to enable such programming to be undertaken. A down loading facility with suitable hardware and software via a PC shall be provided.
- ii. In addition to the above it should have the facility to connect an optional external CRT – keyboard and/or printer through RS – 232 port card. There should be no need to provide any extra software or compatibility of the printer / CRT keyboard with the main panel.
- iii. The CRT should be able to display all the Historical logs and other information that the Main Panel displays. In addition it should be possible for the CRT/Keyboard to perform all the basic functions that the main panel performs.
- iv. The system should have a One Person walk test capability to allow for one person to physically test system devices to reduce further maintenance costs. It should be possible to make a minimum of 8 walk test groups so that even if one group is in walk test the others remain in Normal Working condition.
- v. The control panel must be fully field configurable, programmable and editable and should perform programmable functions like changing circuit labels, selective signaling, coding, selective relay control, priorities, cross zoning, 2-stage alarm etc.
- vi. The control panel shall allow for cross zoning or looping of sensors i.e. a detector on any loop may be assigned to any zone. This will prevent the need for excessive wiring.
- vii. The control panel shall have the facility of field selectable alarm verification by zone, by group of zones, or by system.
- viii. The control panel should contain a non-volatile Historical Event Log with a minimum of 600 events ready for display or printing. Only printing is not acceptable substitute for Display. Trouble events (300) and alarm events (300) should be stored in a separate Log for easy diagnostics.
- ix. The control panel shall have total control over the sensor in all respects. It should allow for sensitivity / alarm level programming for sensor so that the system is tailored to relevant site conditions.
- x. The main control panel should be capable of displaying the detailed information about the sensor (current analog value, average analog value, set sensitivity, alarm level, address of sensor, condition of sensor, location of sensor, troubles if any etc.) on the LCD display.
- xi. In case of the heat sensor the ambient temperature of the environment in which the sensor is mounted should be displayed on the LCD panel directly in C or F.

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xii. A facility shall be provided to give a pre-warning of devices that were almost dirty. If actions not taken at this warning a second should be displayed telling that the sensor is “excessively dirty” and needs immediate maintenance.

xiii. It shall be possible to program a day/night facility with programmable alarm delay to reduce the unnecessary evacuation of the building during working hours.

xiv. Main panel shall have features like :

- a) Field selectable signal silence inhibit
- b) Software based field programmable (per circuit) selective zoned PNIS coded, temporal coded, march time coded or master coded Operation
- c) Sprinkler flow/gate valve supervisory monitoring
- d) Alarm / trouble resound
- e) Supervised serial annunciation connection
- f) Built-in alarm verification tally for alarm verification zones
- g) Optional remote serial (two-wire) alarm and trouble annunciation with optional acknowledge and reset switch, trouble signal, trouble light and trouble signal silence switch

xv. There should be an optional facility in the main panel to integrate voice communications (one way communication). For details refer to Annexure -

xvi. The control panel should allow for addition of card for interfacing optional supervised serial annunciations, graphic annunciation modules etc.

### 9.3 Sensors:

a) **Intelligent Analog Addressable Photoelectric Smoke Sensor** compatible with a common base and approved by UL, ULC, FM or a similar laboratory. The sensitivity of this sensor should be adjustable from the Main Panel in 7 steps ranging from a minimum of 0.2% (UL Certified) to a maximum of 3.7% per foot of smoke obscuration.

b) **Intelligent Analog Addressable Heat Sensor** compatible with a common base and with combined Fixed Temperature Element and Rate of rise Element and approved by UL, ULC, FM or a similar laboratory. The Rate of rise Operation should be selectable in either a 15F ( 8.3C) per Minute or a 20F (11.1C) per Minute Rate of Temperature rise. Fixed Temperature setting should be entirely independent of the Rate of rise Operation and should Operate at 135F (57.2C)

### c) Other Requirement of Sensors:

i. All intelligent Addressable Analog Sensors should be manufactured by the same manufacturer as that of the control panel so as to assure complete compatibility and communication with the system.

ii. All sensors (both f& heat) shall be similar in appearance so that, when different detectors are required within the same area, a balanced and aesthetically pleasing effect is provided.

iii. A full range of detectors shall be available and identical in appearance as follows :

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- iv. Each detector's "hard" Address must be Dip Switch selectable and the switch must be within the detector's base only. The Dip-switch shall be below the sensor Head (In Base) to prevent the ingress of dust and other foreign matter.
  - v. Each detector shall incorporate a LED to for staff identifying the device in alarm. In the alarm condition, the LED shall illuminate continuously until the system is reset. In the normal working condition the device LED's will flash to a pre-defined time period indicating normal Operation of the unit. If any unit is incorrectly addressed, then the duplicate addressing shall be identified by the panel.
  - vi. All sensors shall be low profile & have an earth bonding point on each sensor base.
  - vii. All sensors shall have 30 mesh insect screens & have completely closed backs to restrict entry of insects, dust & air turbulence which may drastically affect the Operation of the detector.
  - viii. Electronics of the unit shall be completely shielded to protect against False Alarms from EMI & RFI.
  - ix. The sensors shall contain Locking screw to discourage unauthorized Tampering.
  - x. The detector should contain a functional test switch (magnetically Operated) that when Operated, will test the electronics of the unit and put it into the alarm.
  - xi. The sensors should have arrangement to connect to optional bases with sounder, Relay driver for Remote Relay & Remote Alarm LED indicator Operation.
  - xii. All sensors must have Automatic self test feature meeting NFPA 72 sensitivity Test requirements which tests the sensor every minute thus reducing maintenance cost.
  - xiii. All smoke sensors shall have the facility for selection of two sensitivities for a dual stage Operation. A system unable to satisfy this requirement is unacceptable.
  - xiv. All sensors should have a facility of Automatic Environmental compensation i.e. once set the sensitivity should remain fixed irrespective of the various environmental factors like Temperature, Humidity, Dust, Dirt etc. No Drift in the sensitivity shall be allowed.
  - xv. Wrong device connection must immediately give trouble condition at the panel. However the device must still Operate at its default setting to protect the premises.
- 9.4 LCD Repeater Panel:
- i. An LCD Repeater Panel identical to the Main Control Panel Display and connected by suitable twisted pair shall be compatible with the Main Panel.
  - ii. The Repeater Panel shall its power from the main Panel and should not need a separate power supply.

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- iii. The Panel should have a 2 x 40 Character Back-lit, wide viewing Angle, Super-Twist Alpha Numeric LCD Display.
- iv. It should have a switch for Lamp/LCD Test.
- v. A maximum of 31 LCD Repeater Panels (Only Repeater Panels) should be able to be connected on the same communication line.
- vi. Operation of Alarm Silence, Manual Evacuation, and system Reset keys shall initiate the appropriate action on the control Panel.
- vii. The Repeater & Main Panel shall monitor each other for fault conditions and any anomalies in either Panel shall cause the relevant fault LED to illuminate and buzzer to sound in both Panels.

### 7.2.3.1 SPECIFICATIONS FOR CAR PARKING SYSTEMS

#### 1. Design & Specifications

The bidder has to provide the complete design, drawings and specification of each component to be used in Car Parking System with reference to following or any other relevant code / specifications:

- (i) Euro norm Standards EN:14010:2003 for parking structure safety
- (ii) American National Standard Institute (ANSI)
- (iii) Building Officials and Code Administrators of America (BOCA) (iv) International Standards Organization (ISO)
- (v) Fire Protection for these semi automatic car parking systems should fulfill - National Fire Protection Association of America (NFPA) as well as NBC (National Building Code ) of India.
- (vi) National Electric Code of America (NEC)
- (vii) Safety Code for Mechanized Parking Garage Equipment of America (ASA.A113.1)
- (viii) American Society of testing Materials (ASTM)
- (ix) International Society for Measurement and Control (ISA) (x) ISO 9000 – as per latest data available
- (xi) American Society of Mechanical Engineers code on Storage Retrieval (S/R) Machines and Associated Equipment (ASME B30.13)
- (xii) National Mechanical Code of America (NMC)

In line to the above standards the contractor must take care of the following aspects:

- a) The contractor must use structural steel of following grades for semi automatic parking systems :

Rolled steel sections: IS 2062 Fe 410W A  
Plates up to 20 mm thickness: IS 2062 Fe 410W A  
Plates above 20 mm thickness: IS 2062 Fe 410W B  
Sections & plates -medium or high tensile steel: IS 8500  
Circular steel tubes: IS 1161 Yst 240  
Rectangular or sq hollow steel sections: IS 4923 Yst 240  
Rails or crane rails: IS 3443

- b) This steel must be galvanized.
- c) No compromise must be made in safety. All the components of the car parking systems must match international safety standards as per the codes mentioned above.

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- d) Adequate sensors must be provided by the contractor for these semi automatic car parking systems as per the above standards so that the functioning is very smooth.

### **2. Technology**

The bidder will also provide the following details / documents:

- i. Certificates from concerned authority of the projects where the proposed parking technology/product has been installed in either India or abroad stating its functionality.
- ii. Certificate from the vendor regarding suitability in context of the site.
- iii. Technology management & know-how transfer arrangements.

### **3. Concept**

- a) Based on surveys and investigations conducted by the Contractor, the Contractor will Plan a comprehensive proposal for providing the Car Parking Facility for a total of Minimum 415 ECS spaces through 9 level structure (5 levels above ground floor and 3 levels below ground) in the Kairon market area and to allocate space for 50 Two-Wheelers on the ground floor of the Facility.
- b) 6 levels shall be proposed to be allocated for Sedans and 3 levels shall be allocated for SUVs / cars with carriers. A Sedan slot must allow a car of at least 1700mm height, and a SUV / cars with carriers slot should allow a car of 2250 mm height.
- c) Provision for disabled persons' car parking spaces has to be provided at ground floor.
- d) The sophisticated mechanism at the entry exit gate of the bomb detection unit must be equipped with scanning system so that the car to be parked is scanned in terms of length, width, weight and height. This must be done so that a car of dimensions which is not suitable to be parked in the car parking tower is denied entry in the premises and is asked to be removed from the bomb detection unit through a display board.
- e) The parking capacity must be worked out in terms of no. of Equivalent Car Space (ECS) proposed.
- f) While designing, the Contractor shall take care of Integration Arrangement with surrounding traffic flow and street network

### **4. Evacuation Time**

**Evacuation time for all the Minimum 415 ECSs in Kairon market must not be more than 4.0 hours.**

### **5. General Specifications for the Car Parking Facility**

- i. Once the car enters the premises, it is to be cleared through a bomb detection test.
- ii. Before parking the Car, the user has to authorize himself / herself through a swipe card / bar coded ticket / permanent access card as prescribed in the car parking management system.
- iii. The average time taken for the fully automatic car parking system to park and retrieve cars must not exceed 3 minutes on an average.

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- iv. The minimum length, width and weight allowed for each car in the fully automatic car parking system must be 5.0 meters, 1.8 meters and 2.25 tons respectively.
- v. The noise level of the car parking systems must not exceed 90 db during any given time.
- vi. Both the DG Sets should be connected to the car parking systems to park and retrieve cars in case of power failure.

### 6. Standards

The following Standards are applicable to structural work. However this list is not exhaustive:

		5	Colours for ready mixed paints and enamels
		2	Galvanized steel sheets (plain and corrugated)
		7	
		8	Code of Practice for general construction in steel
		0	
		8	Covered electrodes for manual metal arc welding of carbon and carbon manganese steel
		1	
		8	Code of Practice for use of metal arc welding for general construction in mild steel
		1	
		8	Code of Procedure for inspection of welds
		7	
		8	(All 5 Parts)– Code of Practice for design loads (other than earthquake) for buildings and structures
		1	
		0	Code of Practice for use of welding in bridges and structures subject to dynamic loading
		1	Carbon steel castings for general engineering purposes
		1	Steel tubes for structural purposes - Specification
		1	
		1	Recommended Practice for radiographic examination of butt joints in steel plates.
		1	
		1	Corrugated Aluminum sheet
		1	
		1	(All 3 Parts)– Hexagon head bolts, screws and nuts of product grade C
		3	
		1	(All 5 Parts)– Hexagon head bolts, screws and nuts of product grade A and B
		3	
		1	(All 20 Parts)– Technical supply conditions for threaded steel fasteners
		1	
		4	(All 2 Parts)– Code of Practice for painting of ferrous metals in buildings
		1	
		8	Rolling and cutting tolerances for hot rolled steel products.
		1	
		8	Criteria for Earthquake resistant design of structures
		1	
		2	Specification for plain washers

	2	Steel for general structural purposes - Specification
	0	Ready mixed paint, air drying, red oxide-zinc chrome, priming - Specification
	2	Code of Practice for radiographic testing

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		2	Recommended Practice for hot-dip galvanizing of iron and steel
		6	
		3	Crane rail sections
		4	
		3	(All 9 Parts)– Method of testing fusion welded joints and weld metal in steel
		6	
		3	Radiographic image quality indicators
		3	Code of Practice for liquid penetrant flaw detection
		6	
		3	Code of Practice for ultrasonic pulse echo testings of contact and immersion methods
		6	
		3	Specification for high strength structural bolts
		4	Code of Practice for high strength bolts in steel structures
		0	
		4	Recommended Practice for ultrasonic testing of butt welds in ferritic steel
		2	
		4	Hot Dip Zinc coating on structural steel and other allied products
		7	
		4	Hollow steel sections for structural use
		9	
		4	Assessment of butt and fillet fusion welds in steel sheet, plate and pipe
		9	
		5	Code of Practice for magnetic particle flaw detection of welds
		3	
		5	Taper washers for channels (ISMС)
		3	
		5	Taper washers for I-beams (ISMB)
		3	
		5	Foundation bolts - Specification
		3	
		6	Specification for high strength structural nuts
		6	
		6	Specification for hardened and tempered washers for high strength structural bolts and nuts
		6	
		6	Double coil helical spring washers
		7	Tolerances for fabrication of steel structures
		2	
		7	Bare wire electrodes for submerged arc welding of structural steel
		2	
		7	Safety code for working with construction machinery.
		2	
		8	Structural steel – Micro alloyed (medium and high strength qualities) -
		5	Specification
		8	(All 3 Parts) Code of Practice for protection of iron and steel structures
		6	from atmospheric corrosion
		95	Metal arc welding of carbon and carbon manganese steels -
		95	Recommendation
		12	Tolerances for erection of steel structures

### 7.2.3.2 Car Parking Mechanical Machinery

#### 7.2.3.2.1 General

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- a) Each machine is a complete unit serving a specific purpose. The selection, design and construction of the machine or any of its elements shall be to suit the specific purpose and satisfy the demands of good engineering practice. These guidelines are provided to maximize the interchangeability and to minimize the maintenance.
- b) In the interest of availability of maintenance spares certain brands may be preferred over others. Regarding choice of machine or machine elements for foreign brands, the brand with presence in India will be preferred, provided the same is technically suitable for the purpose.
- c) Components shall be designed to meet the specified requirements – hardness, strength, rigidity, resistance to wear and fatigue etc. Due care in their detailing is to be taken to avoid stress concentration.
- d) Sub-assemblies and machine elements shall be easily dismantled without disturbing the neighboring units as far as possible.
- e) All large and or critical rotating parts shall be statically and dynamically balanced.
- f) After selection of the motor, the elements down the line should be designed for the maximum starting torque or break down torque whichever is higher

### 7.2.3.2.2 Manufacturing Methods

- a) Carbon steel forgings will be as per IS 2004. Other forgings will be as per relevant IS.
- b) Carbon steel black bars for production of mechanical parts will be as per IS 2073. Bright steel bars as per IS 9550 may also be used as raw material for production of mechanical parts, if the strength and other requirements permit.
- c) Iron Castings will be as per IS 210 and IS 14329.

Steel castings will be as per IS 1030, IS 2644, IS 2707, IS 2708, IS 3444

Non-ferrous castings will follow the relevant IS.

- d) Selection of electrodes, procedure, testing and any other aspect of welding in steel will be as IS 814, IS 822, IS 1182, IS 3600, IS 4260, IS 5334 and IS 9595. Welding and brazing of other metals will follow national and international practice.
- e) Machining and tolerance of various items like couplings, gears, key and keyways, shafts, splines, sprockets, V-belt pulleys etc will be to relevant IS.

### 7.2.3.2.3 Mechanical Systems

- a) Couplings, electric brakes, electric motors, fasteners, gear boxes, roller chains, V-belts, various kinds of ball and roller bearings etc will be bought out items of reputed and approved brands. Appropriate factor of safety shall be used for all these items depending on torque transmitted / resisted.
- b) For ball and roller bearings the expected ISO basic Operating hours L10h will be around 40 000 (forty thousand). The static rating of the bearings must have an appropriate, depending on the type of application, factor of safety over the rated loads.

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- c) For structural welded machine frames steps are to be taken to avoid time dependent distortion due to locked up stress. The seating of motor, gearbox etc is to be machined after fabrication. During assembly shim packs are to be used as required following good engineering practice.
- d) Centralized lubrication is preferred.

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### 7.2.3.2.4 Standard

The following Standards are applicable to Car Parking Mechanical Machinery. However this list is not exhaustive:

		28	Phosphor bronze ingots and castings
		21	Grey iron castings - Specification
	0	30	Specification for aluminum bronze ingots and castings
	5	30	Tin bronze ingots and castings
	6	31	Specification for leaded tin bronze ingots and castings
	8	61	Aluminum and Aluminum alloy ingots and castings for general engineering purposes
	7	81	Covered electrodes for manual metal arc welding of carbon and carbon manganese steel
	4	81	Code of Practice for use of metal arc welding for general construction in mild steel
		82	Code of Procedure for inspection of welds
		91	(All 2 Parts) ISO system of limits and fits Part 1 Bases of tolerance, deviations and fits, Part 2 Tables of standard tolerance grades and limit of deviations for holes and shafts
		9	
	10		Carbon steel castings for general engineering purposes
	11		Recommended Practice for radiographic examination of butt joints in steel plates.
	82		
	13		(All 3 Parts)– Hexagon head bolts, screws and nuts of product grade C
	13	64	(All 6 Parts)– Hexagon head bolts, screws and nuts of product grade A and B
		13	Specification for slotted countersunk head screws
		13	Slotted cheese head screws - Product grade A

		13	(All 20 Parts)– Technical supply conditions for threaded steel fasteners
		13	Dimension of end parts with external ISO metric threads
	68		
	14		Railway bronze ingots and castings
	58		
	20		Carbon steel forgings for general engineering purposes
	04		
	20		Specification for plain washers
	16		
	20		Driving and driven machines - Shaft heights
	31		
	20		Specification for parallel keys and keyways
	48		
	20		carbon steel black bars for production of machine parts for general engineering purposes
	73		

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		21 02	(All 2 Parts) General tolerance Part 1 Tolerance for linear and angular dimensions without individual tolerance indications Part 2 Geometrical tolerance for features without individual t tolerance indications
		22	Specification for slotted castle nuts
		22 69	Hexagon socket head cap screws
		22 91	Specification Tangential keys and keyways
		22 92	Specification for taper keys and keyways
		22 93	Specification for gib-head keys and keyways
		22 94	Specification for woodruff keys and keyways
		23 27	Straight sided splines for cylindrical shafts with internal centering - Dimensions, tolerances and verification
		23	Slotted grub screws
		24 03	Short pitch transmission precision roller chains and chain wheels
		24 94	(All 2 Parts)- V-Belts - Endless V-belts for industrial purpose - Specification
		25 01	Solid drawn copper tubes for general engineering purposes - Specification
		25 35	Basic rack and modules of cylindrical gears for general engineering and heavy engineering
		26	Steel roller chains type S and C, attachments and chain wheels
		26 44	High tensile steel castings
		27 07	Carbon steel castings for surface hardening - Specification
		27 08	1.5 Percent manganese steel castings for general engineering purposes
		31 42	Pulleys, V-grooved pulleys for endless V-belts section Z, A, B. C. D and E and endless wedge belts section SPZ, SPA, SPB and SPC -

			Specification
		344 4	Corrosion resistant high alloy steel and nickel base castings for general applications - Specification
		354 2	Specification for extended pitch transmission precision roller chains and chain wheels
		356 0	Specification for short pitch transmission precision bush chains and chain wheels
		356 0	Specification for Short pitch transmission precision bush chains and chain wheels
		360 0	(All 9 Parts)- Method of testing fusion welded joints and weld metal in steel
		366	Dimensions for involute sided splines

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		368 1	Gears - Cylindrical Gears - Accuracies
		420 6	Dimensions for nominal lengths and thread lengths for bolts, screws and studs
		421	(All 6 Parts)– ISO metric screw threads
		426 0	Recommended Practice for ultrasonic testing of butt welds in ferrous steel
		503 7	Specification for basic rack and modules of straight bevel gears for general engineering and heavy engineering
		533	Code of Practice for magnetic particle flaw detection of welds
		955 0	Bright steel bars - Specifications
		959 5	Metal arc welding of carbon and carbon manganese steels - Recommendation
		143	Malleable iron castings
		151 51	Belt drives - Pulleys and V-ribbed belts for industrial applications - PH, PJ, PK, PM and PM profiles : Dimensions

### 7.2.3.2.5 Make List

The following make list should be followed:-

Mechanical Items		
Sr.	Items	Make (by )
1	Bearing, Plummer blocks	KHK(Japan) / FYH(Japan)/ZNL
2	Transmission Chain	Ti – Diamond, Dong Bo (Korea), Renold (Rollon)
3	Coupler	Lovejoy / KTR / NMT/
4	Geared Motors for Modules	Kavitsu/ IC Bauer/MGM Varvel/ Bonfiglioli/ MCN/ Nord/SEW
5	Gearbox	Kavitsu/ IC Bauer/MGM Varvel/ Bonfiglioli/ MCN/ Nord/SEW
6	Wire Ropes	Usha Martin/ TATA/SAIL

### 7.2.3.3 Power Hydraulics

#### 7.2.3.3.1 General

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- a) Some car parking equipment could be hydraulically Operated. The hydraulic equipment will consist of 3 systems: the hydraulic actuator, the hydraulic power pack and electrical controls.
- b) The hydraulic actuator is either a cylinder or a motor. The actuator will consume the pressurized fluid and transform the same to a linear or rotary motion.
- c) The hydraulic power pack will generate the pressurized fluid. It will consist of all or some of the following:  
Pipe lines, Flexible hose, Pumps and Electric Motors, Direction Control Valves, Gate Valve, Check Valve, Restrictor Valve, Flow Control Valve, Reducing Valve, Relief Valve Reservoir, Accumulator, Air Breather, Filter, Strainer, Cooler, Pressure Gauge, Level Gauge, Thermometer, Pressure Switch, Hydraulic Fluid etc.
- d) For remote actuation generally the valves are electrically controlled. The electrical controls again are actuated by programmable logic controllers (PLC) with computer monitoring.

### 7.2.3.3.2 Hydraulic Power System

The hydraulic Power System shall satisfy the following:

- i. All hydraulic circuit elements should be generously sized.
- ii. Minimize surge pressure using appropriately sized accumulators
- iii. The size of all components shall be selected to withstand the highest surge pressure.
- iv. With a view to reduced heat generation, the system should be Operating for the required period only with a small margin of time during cut-off and also for recharging the accumulators. The temperature of the hydraulic fluid shall not be permitted to rise beyond 500 C. Considering the ambience, if required, coolers may be used.
- v. Incorporate necessary connections, valves and appurtenances to facilitate air purging, testing, pickling, flushing, draining, sampling and re-commissioning the system.
- vi. Provisions to reduce the risk of ignition of the hydraulic fluid.
- vii. The selection of the type of pump will depend on the service condition. viii. The working volume of the reservoir must be adequate.
- ix. The return and suction pipes in the reservoir shall be located as far away as possible with a baffle wall in between.
- x. The bottom of the reservoir shall be sloped for easy draining.
- xi. The reservoir shall have a suitably protected thermometer. There shall be provisions for high & low temperature alarms.
- xii. There shall be a flush mounted fluid level indicator for the reservoir.
- xiii. The total flow rate of the pumps should have adequate margin over the design flow rate.
- xiv. Provision of stand by pump should be made.
- xv. Pumps shall be provided with isolation valves on both suction and delivery side to facilitate maintenance.

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- xvi. All directional valves shall be sub plate mounted on suitable valve stand or ease of Operation and maintenance.
- xvii. Proportional and servo valves shall be provided with electronic card and cardholder. Necessary test kit shall be provided for proportional and servo valves.
- xviii. Solenoid Operated valves shall incorporate the following features:
  - Suitably sealed to avoid splashing liquid and airborne contaminant
  - Manual override, which can be Operated without removing the cover but cannot be Operated accidentally.
  - Solenoids shall be continuous duty type, Operating on 24 V DC.
- xix. All accumulators shall preferably be bladder type and charged with nitrogen / inert gas. The size of the accumulator should satisfy the functional needs. The design pressure shall at least be 1.5 times the nominal design pressure.
- xx. Before removing the accumulator from the system, the gas and fluid shall be released from the same. Arrangement shall be provided in the accumulator for this purpose. Manual bleeding and shut off valve shall be provided. Suitable charging device shall be provided. The accumulator shall be provided with safety relief valve and pressure gauge.
- xxi. The cylinder body, heads and flanges shall be of steel. The cushion adjusting screws shall be stainless steel. Bleed valves are to be provided at both ends of the cylinder. Arrangement should be made to make the cylinder and cylinder head joint leak proof.
- xxii. The piston shall be bronze or bronze coated steel. In the later case the minimum bronze coating thickness after machining will be 2.5 mm. Piston rods shall be high yield strength steel with hard chrome plating to 40~50 micron thickness, with 0.25 rms surface finish. The piston rod shall have wrench flats for the ease of tightening with the piston.
- xxiii. The hydraulic motor selection shall incorporate the following features:
  - The hydraulic motor shall be designed to meet 1.25 times the maximum system pressure at full flow rate.
  - Possibility of over-running and complete stalling of the motor is present, suitable relief arrangement shall be provided to allow the oil to circuit without overheating.
  - Where the hydraulic motor is required to rotate in both directions, arrangement shall be made for smooth change of direction.
- xxiv. Hydraulic system shall b provided with pressure filter, circulation filter and return line filter of 3 micron, 5 micron and 10 micron respectively. The size shall be chosen to handle at least 100% of the rated capacity of the pumps. The filters shall have differential pressure switch to provide audiovisual signal indicating clogging.
- xxv. The pipelines shall have minimum bursting pressure of 5 times the maximum working pressure. Fluid velocity in the pipeline shall be near about 4 m/s. xxvi. Interlocks shall be provided to keep the system Operating.
- xxvii. Positive position stop shall be provided so that the dwell time will not be affected when the position stops are reset.
- xxviii. The hydraulic power system shall have built in safety in all areas.

### 7.2.3.3.3 Standards

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The following Standards are applicable to power hydraulic system. However this list is not exhaustive:

	I	635	Specification for oil and solvent resistant hose of rubber
I	765		Wire reinforced rubber covered hydraulic hose- Specification
I	820		Sizes for cylinder bores and piston rod diameter for fluid power systems
I	926		Evaluation of pressure drops versus flow characteristics of hydraulic filter elements and filters - Method of test
I	I	105	Code of Practice for selection and use of fire resistant hydraulic fluids
I	105		(All of 4 Parts) Specification for fire resistant hydraulic fluids Hydraulic
I	106		Specification for rubber hydraulic hose with textile reinforcement
I	110		(All of 2 Parts) Recommendations for mounting dimensions for hydraulic fluid power - single rod cylinders, 160 bar medium series - bore -50 to 500 mm
S	03		

		111	Hydraulic fluid power - Cylinders - Bore and rod area ratios
111	47		Recommendations for parameter definitions and letter symbols for hydraulic fluid power pumps, motors and integral transmissions
112	77		Recommendations for characteristic quantities and designation of hydraulic fluid power gas loaded accumulators with separators
		113	Purchase specification for hydraulic cylinders
115	59		Hydraulic fluid power - Cylinders - Rod end spherical eyes - mounting dimensions
		115	Hydraulic fluid power - Cylinders - Rod end plain eyes - mounting dimensions
120	92		Method of hose assembly used in hydraulic fluid power system
130	53		Hydraulic fluid power system - Commissioning and maintenance of complete hydraulic systems
131	02		Hydraulic fluid power - Single rod cylinders 250 bar (25 MPa) series - Port dimensions
131	03		Hydraulic fluid power - Single rod cylinders 160 bar (16 MPa) compact series - Port dimensions
136		136	(All of 2 Parts) Hydraulic fluid power - Quick action couplings
14			Hydraulic couplings quick action
141			Hydraulic Lifting table - Specification
30			Hydraulic fluid power - Pressure control valves (excluding pressure relief valves), sequence valves, unloading valves, throttle valves and check valves - Mounting surfaces
141			Fluid power systems and components - Cylinders - Nominal pressures
48			Code of Practice for installation and maintenance of hydraulic lifts
146	71		

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		148	Hydraulic fluid power - Pumps and motors - Geometric displacements
		48	
		148	(All of 2 Parts) Hydraulic fluid power - Determination of characteristics of motors
		49	
		151	Fluid power systems and components - Cylinders - Identification code for mounting dimension and mounting types
		68	
		151	Hydraulic fluid power - Methods for cleaning and assessing the cleanliness level of components
		70	
		151	Hydraulic fluid power - Fire resistant fluids - Guide lines for use
		79	
		151	Hydraulic fluid power - Compatibility between elastomeric material and fluids
		151	(All of 2 Parts) Hydraulic fluid power - Measurement techniques

### 7.2.4 SPECIFICATION OF WORKS FOR ELECTRICAL COMPONENTS AND VENTILATION (HEATING, VENTILATION AND AIR CONDITIONING SYSTEM)

The Technical Specifications in accordance with which the entire work described hereinafter shall be constructed and completed by the Contractor within the quoted rates are given in this section. Specifications given are in accordance with the specifications / requirements indicated in Indian Electricity Act 2003 and Local Power Authority rules and regulations.

#### 7.2.4.1 11 KV H.T. PANEL

##### 7.2.4.1.1 Principle Technical Requirement

Unless otherwise specified elsewhere in this specification, the rating, performance and testing of the indoor 11kV switchgear and accessories shall conform to latest revision, of following Indian standard/IEC:

IEC / IS	Description
IEC 62271-100	AC high voltage alternating current circuit breaker
IEC 62271-001	Common specification for High Voltage Switchgear and Control gear standards.
IEC 60694	Common clause for high voltage switchgear & control-gear standards
IS 12729	General requirements for Switchgear and Control gear for voltages exceeding 1000V.
IS 13118	General requirements for Circuit Breakers for voltages above 1000V.
IS 9920	High voltage switches
IEC 60044-1	Current transformer
IEC 60044-6	Current transformer
IS 2705	Current transformer
IS 4201	Application guide for current transformer
IEC 60044-2	Voltage transformer
IS 3156	Voltage transformer
IS 4146	Application guide for voltage transformer

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IEC 60270	Partial discharge measurement.
IS 6209	Methods for partial discharge measurement.
IEC 60137	Bushing for alternating voltage above 1000 V
IS 2099	Specification for bushing for alternating voltage above 1.1 kV.
IEC 60427	Synthetic testing of high voltage AC circuit breaker
IEC 60071	Insulation co-ordination
IEC 60270	Partial discharge measurement
IS 4146	Application guide for voltage transformer

IEC 60255	Electrical Relay
IS 3231	Specification for electric relays for power system protection
IS 3842	Application guidance for electric relays for AC system
IS 1248	Electrical Indicating instruments
IS 0722	Energy meter
IS 6875	Control switches & push buttons

The components & devices which are not covered by the above standards shall conform to, and comply with the latest applicable standards, rules, codes & regulations of the Indian or international recognized standardizing body. The contractor / agency should provide all applicable standards, codes, etc. to the Engineer / Employer for their reference.

### 7.2.4.1.2 Service conditions

- a. The switchgear shall be capable of Operating normally within the following temperature range:
  - Maximum air temperature: + 55 ° C
  - Minimum air temperature: + 1 ° C
- b. The switchgear shall be capable of being Operated in electrically exposed locations.
- c. The switchgear shall be capable of Operating normally within the following relative Humidity
  - Max. average relative humidity measured over 24 Hrs :- 95 %
  - Max. average relative humidity measured over 1 Month :- 90 %
- d. The switchgear shall be suitable for indoor installations with the following levels of ingress protection:
  - Insulating medium envelope no less than IP55.
  - Panel's exterior housing not less than IP54 (main door shut).
  - Panel's exterior housing not less than IP41 (main door open).

### 7.2.4.1.3 Switchgear for 11 KV HT panel

S r	Description	Qty
1	Draw out type 11kV, 2000A, 50KA motorized ACB	As per

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	<p>2 Current transformer of ratio for each <u>Breaker</u>  Core 1 protection class, ratio 630/5A Burden 20VA accuracy 5P 20  Core 2 protection class, ratio 630/5A  Burden 40VA accuracy PS  Core 3 protection class, ratio 630/5A Burden 20VA accuracy 5P 20  Core 4 metering class, ratio 630/5A</p>	<p>design approved by the Engineer / Employer</p>
--	--	---

S r	<b>Description</b>	Qty
	Burden 20VA accuracy 0.5	
3	Potential transformer for <u>breaker</u> 11kV/3 /110V/3, 30VA, C.L.1.0	
4	Instruments suitable for <u>Breaker</u> Voltmeter 0-12kV digital type with selector switch Digital Multifunction Meter	
5	Breaker control switch (Last motion type) / each breaker	
6	Circuit breaker position indication lamps/ each breaker	
7	Voltage indication lamps/ each PT	
8	Indication lamp for on and off on each breaker	
9	Indication lamp for spring charge on each breaker	
1	Indication lamp for protection trip on each breaker	
1	Indication lamp for trip circuit healthy on each breaker	
1	Indication for test and service position on each breaker	
1	Push button for Emergency Trip on each breaker	
1	Ammeter selector switch stay put type each breaker	
1	Microprocessor based over current and earth fault relay with instantaneous and time unit on breaker	
5		
1	Microprocessor based Directional over current relay with instantaneous and time unit on breaker	
6		
1	Microprocessor based transformer differential relay, trip circuit supervision relay on breaker	
7		
1	Master Trip relay per breaker	
1	Space heater with thermostat per breaker	
2	C.F. lamp for panel illumination	
2	Receptacle for each panel	
2	'48 Volts DC failure' alarm	
2	220 V AC hooters for non trip	
2	Relay for DC failure	
2	Annunciator on each breaker	

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### 7.2.4.2 D.G SET

**7.2.4.2.1** This specification covers the requirements of design, manufacture, assembly, testing, packing and forwarding, transportation, erection and commissioning of following DG Set:

- 1Nos. of adequate capacity ,
- 440 / 415V D.G. Set (Outdoor) with base frame,
- Battery & battery charger & fuel tank.

- a) D.G control panels with required switchgear & protection. Generator control unit (GCU) shall be included in panel to provide control for AMF & Synchronous Operation.
- b) Acoustics enclosure should be provided to restrict the vibration level to 70db at 1mtr distance from the DG set. HSD day tank of sufficient capacity should be provided with level glass tube. c) Flue gas ducting with silencer in IS 2002, 6mm thick. (Or A106 Gr. B., Sch 40) SS 304 below, lightly resin branded mineral wool, 100mm thick with 22g Aluminum cladding and exhaust chimney. Length of chimney shall be as per local regulations.
- d) All statutory approvals such as local supply co. and pollution control board NOC and approval of electrical inspector for installation drawings and installation work from Electricity Department, Pollution Control Board etc.
- e) Earthing grid for DG and panel, earth pits in scope of contract. f) All civil work, power cabling etc. shall be in scope of contract. g) All piping / hose between Day tank and DG set.
- h) AVM pads (gel filled) for engine and alternator frame mounting.

### 7.2.4.2.2 Format of Data Sheet for DG Set

	Description	To be filled in by contractor
	<b>Diesel Engine</b>	
	Make	**
	Model no.	**
	Bore / Stroke / Mean piston speed /No. of cylinders	**
	Fuel Consumption in Gm/BHP/hr. & liters/hr	
	At 100% load in gm/BHP/hr.	**
	At 75% load in gm/BHP/hr.	**
	At 50% load in gm/BHP/hr.	**
	At 100% load in ltrs./ hr.	**
	At 75% load in ltrs./ hr.	**
	At 50% load in ltrs./ hr.	**
	Lube Oil Consumption (liters/hr.)	**
	Frequency of lube oil replacement	**
	Coolant conditioner consumption	**
	Frequency of corrosion resistor replacement	**
	Power availability at Generator terminals (units/liter of HSD)	**
	Specific gravity & calorific value of HSD considered for Fuel	**
	Type of AMF controller and Technical details.	**
	Cooling Water requirement:	
	Inlet temperature	**
	Outlet temperature o C	**

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	Water flow required in Ltr/min	**
	Heat load Ton	**

	<b>Description</b>	<b>To be filled in by contractor</b>
	Ventilation requirement (water)	**
	<b>Alternator</b>	
	Make	**
	Model	**
	Enclosure Air cooled IP protection class	**
	Insulation class F/F	**
	Temperature sensor for bearings	**
	Temperature sensor for windings	**
	Anti-condensation standstill heaters – Voltage: 220V AC	**
	Tropical/Humidity Protection	**
	Voltage regulator	**
	<b>Protection Relays</b>	**
	<b>Acoustic Enclosure</b>	
	Weatherproof, metallic, sound attenuated	**
	Noise level to be maintained at a level of less than 72 dB.	**
	Self supporting structure	**
	Normal regular conversation possible at a distance of 1.0 mtr. from the enclosure	**
	Residential silencer with suitable lagging	**
	Warranty offered for weather proof enclosure	**
	Overall Dimension layout with clearances with respect to DG set shall be provided	**
	<b>Battery &amp; Battery Chargers</b>	
	Battery	
	Make	**
	Type	**
	Voltage	**
	Battery Charger	
	- AH capacity	**
	<b>Maintenance</b>	
	Spares/consumables list for one year trouble free Operation after warranty period.	**
	Maintenance schedule incorporating normal/major maintenance & shut down requirements.	**

**Note:** \*\* Data to be filled by contractor.

**7.2.4.3 Earth Mat Design**

Provision of adequate earthing system in a Substation is extremely important for the safety of the Operating personnel as well as for proper system Operation and performance of the protective devices. The primary requirements of a good earthing system in a Sub Station are:

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- a) The impedance to ground should be as low as possible but it should not exceed 1.0 (ONE) Ohm.
- b) The step Potential, which is the maximum value of the potential difference possible of being shunted by a human body between two accessible points on the ground separated by the distance of one pace (which may be assumed to be one meter), should be within safe limits
- c) Touch Potential, which is the maximum value of potential difference between a point on the ground and a point on an object likely to carry fault current such that the points can be touched by a person, should also be within safe limits.

To meet these requirements, an earthed system comprising of an earthing mat buried at a suitable depth below ground and supplemented with ground rods at suitable points is provided in the Sub Stations.

All the structures & equipment in the Sub Station are connected to the earthing mat so as to ensure that under fault conditions, none of these parts is at a potential higher than that of the earthing mat.

The neutral points of different voltage levels of transformers & reactors are separately earthed at two different points. Each of these earthed points should be interconnected with the station earthing mat.

### 7.2.4.4 DC Substation Battery

This covers the supplying, erecting and commissioning of 48V partial recombination type Nickel- Cadmium alkaline batteries sub-stations.

The batteries covered in this specification are for indoor use.  
DC system shall consist of 2 battery charger & 2 battery sets.

### 7.2.4.5 Applicable Standards

All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those (IS codes, standards etc.) referred to herein, the former shall prevail. Unless otherwise modified in this specification, the Ni-Cd batteries shall comply with latest version of IEC 62259.

All the work shall be carried out as per the following standards and codes.

Sr. N	International Standards	Indian Standards	Description
1.	IEC: 62259	-	Secondary cells and batteries containing alkaline or other non-acid electrolytes-Nickel-cadmium prismatic secondary single cells with partial gas recombination
2.	IEC: 60623	IS: 10918	Secondary cells and batteries containing alkaline or other non-acid electrolytes-vented Nickel Cadmium prismatic rechargeable single cells
3.		IS: 1146	Rubber & Plastic container for lead acid storage batteries

Sr. N	International Standards	Indian Standards	Description

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4.	IEEE: 1106		Recommended practice for maintenance, testing & replacement of Ni-Cd storage
5.	IEEE: 1115		Recommended practice for sizing of Ni-Cd batteries for stationary applications
6.		IS: 13140	Glass reinforced Polyester sheet moulding compounds
7.		IS: 1248	Voltmeter
8		IS: 5	Colours for ready mix paints.
8.		IS: 1248	Specification for Direct acting indicating analogue electrical measuring instruments.
9.	IEC : 947-1	IS: 13947 Prt-1	Degree of protection provided by enclosures for low voltage switch gear and control gear.
10	IEC : 947-2	IS: 13947 Prt.-2	Low voltage circuit breaker
11	IEC : 947-3	IS : 13947 Prt-3	Specification for low voltage switch gear and control gear
.			
12	IEC : 947-4	IS : 13947 Prt-4	Contractors
13	IEC:439	IS:8623	Low voltage switch-gear and control-gear assembly
.			
14		IS: 8686	Static protective relays
15	IEC: 337	IS:6875	Control switches
16	IEC:225	IS: 3231	Electrical relays for power system protection.
1.		IS : 3842	Application guide for Electrical relays for AC System
2.	IEC 146	IS : 3895	Mono-crystalline semi conductor Rectifier Cells and Stacks.
3.	IEC 146	IS: 4540	Mono crystalline semi conductor Rectifier assemblies and equipment.
4.		IS:6619	Safety Code for semi conductor Rectifier Equipment.
5.		IS: 6875	Control switches (switching devices for control and auxiliary circuits including contactor relays) for voltage up to 1000 V AC or 1200 VDC.
6.		IS: 9000	Basic environmental testing procedures for electronic and electrical items.
7.	IEC:60269	IS:13703 Prt-4	Low voltage fuses for protection of semiconductor devices.
8.		IS:1901	Visual indicating lamps
9.		IS:6005	Code of practice for phosphating Iron and Steel
10	IEC :227	IS:694 IS: 1554	PVC Insulated Cable for working voltages up to and including 1100 V.

Equipment complying with other internationally accepted standards such as IEC, BS etc. will also be considered if they ensure performance and constructional features equivalent or superior to standards listed above. In such a case, the contractor shall clearly indicate the standard(s) adopted, furnish a copy in English of the latest revision of the standards

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along with copies of all official amendments and revisions in force and shall clearly bring out the salient features for comparison

### 7.2.4.6 DC Distribution Panel

#### 7.2.4.6.1 Specification

This section sets out the scope of the work covered by this specification as well as required supplies and services and includes other necessary components and services not specifically mentioned.

- a) 20% of each size of electrical components, used in DC distribution panel, as spares required for Ten (10) years of trouble free Operation. Spares list to be provided by bidder.
- b) All necessary base frames, channels and all erection hardware

#### 7.2.4.6.2 Technical requirements

The equipment shall be indoor type, suitable for inter-connection with battery & DC Distribution Panel.

#### 7.2.4.6.3 Standard

The design, engineering, quality surveillance, manufacturing and testing of various equipment covered in this specification shall comply with latest edition of following standards.

Sr .	Description	IS
1.	Switchgear bus bars and bus bar connections	IS-375/ BS-159
2.	Degree of Protection Provided by enclosures for LV switchgear	IS-2147
3.	PVC Insulated Cables	IS-1554
4.	General requirement for switch-gear and control gear	IS-4237
5.	For voltage not exceeding 1000 V	IS-3202
6.	Code of practice for climate proofing of electrical equipment	IS-6005
7.	Code of Practice for phosphating Iron and Steel	IS-1108
8.	HRC Cartridge fuses links up to 650 V.	IS-8623

### 7.2.4.7 Low Voltage Panels / APFC Panel

#### 7.2.4.7.1 Specification

These specifications cover the design, material selection, manufacture, testing at manufacturer's works, insurance, packing, transportation, loading/unloading, supply at site, installation, testing and commissioning of the low voltage panels / APFC panels covered in the BOQ, for indoor / outdoor installation.

#### 7.2.4.7.2 Codes and Standards

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Some of the important applicable codes/ standards issued by the Bureau of Indian Standards are listed below for the guidance of the Tenderers. Latest issues of the standards/codes shall be applicable:

IS: 13947	L.V. switchgear and control gear Part-I – 1993 General rules
IS: 5578	Guide for marking of insulated conductors
IS: 11353	Guide for uniform system of marking and identification of conductors and apparatus terminals
IS: 2147	Degree of protection provided by enclosures for low voltage switchgear and control gears
IS: 2675	Enclosed distribution fuse boards and cutouts for Voltages not exceeding 1000 V
IS: 255	Danger notice plates
IEC60947	Circuit Breakers (Part- II)
IEC60947	Circuit breakers (Part-II)
IS: 13947	Switches, Disconnectors, switch disconnector (Part - III) and fuse combination units.
IS: 1818	Alternating current isolators (disconnectors) and earthing switches.
IS: 8623	Factory built assemblies of switchgear and control gear for voltages up to and including 1000 V AC & 1200 V DC.
IS: 8828	Miniature air break circuit breakers for voltages not exceeding 1000 V
IS: 9926	Fuse wires used in rewirable type Electric fuses up to 1100 Volts
IS: 2208	HRC fuse links
IS: 2705	Current Transformers (Part- I, II & III)
IS: 3156	Voltage Transformers (Part- I, II & III)
IS: 1248	Indicating Instruments
IS: 722	Integrating Instruments
IEC 60947 / IS: 13947	Control devices and switching elements (Part - 5) Section-1
IEC60947/ IS: 13947	Contactors and motor starter section 1 (Part - 4) Electromechanical. Section - 1
IS: 3231	Relays
IS: 375	Marking and arrangement of busbars Indian Electricity Act and Rules

### 7.2.4.7.3 System Rating

All the Main Panels / Motor control centres / APFC panels shall be suitable for Operation on three phase/ single phase, 415/230 volts, 50 Hz neutral solidly grounded at transformer and short circuit level not less than 415 Volts at 35 KA / 25 KA.

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All the Main Panels / Motor control centres / APFC panels shall be designed to withstand heaviest condition at site, with maximum expected ambient temperature of 45°C, 90-95 percent humidity and dusty weather.

### 7.2.4.8 Distribution Boards

This specification shall cover the supply, installation, testing and commissioning of lighting and power distribution boards.

#### 7.2.4.8.1 System

The MCB distribution boards shall be suitable for Operation on 415/440 volt, 3 phase, 4 wire, 50 Hz A.C. supply system or 220/250 volt, 1 phase, 2 / 3 wire, 50 Hz A.C. supply system.

#### 7.2.4.8.2 Codes and Standards

Some of the important applicable codes/ standards issued by the Bureau of Indian Standards are listed below for the guidance of the Tenderers. Latest issues of the standards/codes shall be applicable:

1)	IS:2675-1983	Enclosed distribution fuse boards and cutouts for Voltages not exceeding 1000V.
2)	IS:375-1963	Marking and arrangement of Switchgear busbars main connections and auxiliary wiring.
3)	IS:8828-1978	Miniature circuit Breakers
4)	IS:2607-1976	Air break Isolators for voltages not exceeding 1000V.
5)	IS:9926-1981	Fuse wire used in Rewirable type Electric fuses up to 650 volts.
6)	Electricity Act 1910 and rules issued there under.	

### 7.2.4.9 HT AVR (Stabilizer)

- i) As this is a design built contract, the contractor must provide the required size of HT AVR as per the load requirement of the entire building through the transformer
- ii) As this project involves semi automatic car parking systems, a three terminal voltage regulator is a must for voltage regulation.
- iii) HT AVR must be suitable for indoor / outdoor installations.
- iv) The Automatic Voltage Regulator must possess an automatic voltage regulation mechanism which stabilizes the voltage i.e. it must keep output voltage in steady state automatically when the power voltage fluctuates or the load current varies and must protect all the electrical equipment in the building from overloading.
- v) These voltage regulators must also control the output of the entire building.
- vi) These voltage regulators must be installed along distribution lines so that all the points receive steady voltage independent of how much power is drawn from the line.
- vii) This automatic integrated circuit voltage regulator must be connected to the output of a filtered rectifier and must maintain a constant output voltage or current despite changes in the input, the load current, or the temperature.
- viii) HT output must be within +/- 1% accuracy.

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- ix) HT AVR must possess large capacity, high efficiency, no wave distortion, stable voltage adjustment, suitability for kinds of loads, bearing instantaneous overload, working continually for long time, as well as free transferring between manual control and automatic control, etc,
- x) This Automatic Voltage Regulator must be provided with protection against over- voltage, over current, phase failure and protection for phase sequence.
- xi) Full wave bridge rectifier must be used to rectify the ac output of secondary of 230/12V step down transformer.
- xii) HT AVR must have the following merits: small volume, light weight, convenient installation and reliable running.
- xiii) The HT AVR system must be copper wound.
- xiv) The fluctuating voltage must be initially controlled by the HT AVR and then fed to the transformer resulting in the constant H.T. Output within +/- 1% accuracy.
- xv) The design of the HT AVR must be robust; thus resulting in lesser losses & more efficiency and making the distribution transformer to utilize up to 100% capacity.
- xvi) HT AVR must work continuously for a long time without human attendance.
- xvii) The design, engineering, quality surveillance, manufacturing and testing of these HT AVR shall comply with latest edition of ISO 9001:2008 / BIS standards / IS 9815-94 / IEC
- xviii) HT AVR must be designed keeping in view the following parameters:

Working input voltage range	170-270 V,	140-270 V,	110-270 V,	90-270 V,
Output Voltage Range	As required and as per application generally in the range of +/- 10%, +/- 8%, +/- 5%, etc			
High / Low Cut - Off System	Must protect the Connected Equipment against dangerous high voltage and low voltage, cuts-off supply at dangerous zone			
Technology	IC based electronic circuits for High reliability and Self Protection			
Time Delay	Time delay circuit is to be provided to reduce surge currents and overloads during the switch on off at frequent intervals, thus the load is protected.			
Temperature bearing capacity	Minus 5°C to Plus 48°C			

### 7.2.4.10 LT Cable

#### 7.2.4.10.1 General

The scope of this specification covers manufacture, supply, inspection, testing at works, packing and forwarding of 1100V grade LT XLPE Power cables & installation including commissioning at site.

Cables shall be Aluminum, XLPE insulated, PVC sheathed and round armored of 3 / 3-½ core and 4 core of sizes specified and suitable for 230 / 415 volts, 1 / 3 phase 50 Hz power supply. The cables shall be suitable for the rated voltage 1100 volts conforming to IS 7098 with latest amendments.

Cables shall be of approved make only. Each drum or coil of cable shall be accompanied by a certificate stating the manufacturer's name, rating of cable, result, and date of tests.

## Section VII – Employer's Requirement

All cables shall be delivered with cable ends effectively sealed. When a cable is cut from a drum both ends shall be immediately sealed to prevent ingress of moisture. Cables shall not be transported to site in loose coils but a number of short lengths of cable may be transported on the same drum. The Contractor shall be wholly responsible for the purchase and/or hire costs of all cable drums and for the removal of these drums from site after use.

Cables shall be adequately rated for current carrying capacity under normal and short time fault conditions at the specified voltage.

The voltage drop for any circuit from origin of the installation (i.e. supply authority's terminals) and the load under steady state conditions shall not exceed  $\pm 6\%$  of the nominal voltage.

The Contractor shall submit cable schedules for approval detailing ratings, sizes, lengths, method of installation and function of all individual cables. Cables shall be laid in uncut / single lengths from one termination to the other.

All cables will be identified close to their termination point by cable numbers as per cable schedule. Cable numbers will be punched on aluminum straps (2 mm thick) securely fastened to the cable and wrapped around it. Alternatively cable tags shall be circular in construction to which cable numbers can be conveniently punched. Each underground cable shall be provided with identity tags of lead securely fastened every 30 M of its underground length with at least one tag at each end before the cable enters the ground. Unpaved area, cable trenches shall be identified by means of markers as per standards.

### 7.2.4.10.2 Standards

The cables offered shall conform to the latest revision of relevant Indian Standard Specifications. Some of these standard are listed below

Sr No	Indian Standard	Title
1	7098	XLPE insulated electrical cables for working voltages up to 1100V
2	8130	Conductors for insulated electric cables and flexible cords.
3	5831	PVC insulation & Sheath of electric cables.
4	3975	Mild steel wires, strips and tapes for armouring of cables.
5	2633	Methods of testing weight, uniformity of coating, thickness on hot dip galvanized articles.
6	3961	Recommended current ratings for cables- PVC insulated and PVC sheathed.
7	1753	Aluminum conductors for insulators cables.

### 7.2.4.10.3 Termination

All XLPE cables up to 1.1KV grade shall be terminated at the equipment by means of cable glands. They shall have a screwed nipple with conduit electrical threads and check nut.

Cable leads shall be terminated at the equipment terminals, by means of crimped type lugs. When crimping the lug to the cable, proper crimping tool to suit the size of lug / cable is to be used.

### 7.2.4.11 Cable Trays / Raceway & Accessories

## Section VII – Employer's Requirement

These specifications cover the design, material selection, fabrication, testing at manufacturer's works, insurance, packing, transportation, loading / unloading, supply at site and installation of cable trays, trunking (Raceway) and accessories covered herein.

### 7.2.4.11.1 Material and construction

Cable trays and accessories shall be manufactured to comply with the specifications of National Electrical Code (NEC) and National Electrical Manufacturers' Association (NEMA).

Cable trays and accessories shall be fabricated using mild steel sheets and hot dip galvanized in accordance with B.S.729 after fabrication. All bolts, nuts and washers shall also be galvanized. The zinc coating shall be uniform, smooth and free from imperfections such as flux & ash, black spots, blisters etc. Cable trays and accessories shall undergo a process of degreasing, pickling in acid & cold rinsing prior to galvanisation.

Cable trays shall be of the following type:

- i. Ladder type with rungs
- ii. Perforated type.

Perforated cable trays shall be generally of channel type and the perforations shall be 10x30 mm oval holes.

Perforated cable trays shall also be galvanized. Galvanizing shall be in accordance with that specified above for ladder type cable tray.

Ladder type cable trays shall be made from 2mm thick sheet formed in 'C' section of 75mm height and inward flanges of 15mm as side runners and 30mm wide x 10mm high rungs ('C' shaped) from a 1.5mm thick sheet. Perforations as mentioned above shall be provided in the width of the rungs. Pitch of the rungs shall not exceed 250 mm center to centre. Rungs shall be tack welded to the side members.

The thickness of sheet steel for perforated trays shall be 1.6 mm and they shall be of the formed channel shape.

Cable trays shall be of following dimensions as specified in BOQ.

### 7.2.4.11.2 Accessories

Following accessories and hardware, as required, shall be supplied with cable trays :

Coupler plates  
bends  
Tees  
Reducers  
4-way cross  
Fasteners (Hardware)

### 7.2.4.11.3 Testing at manufacturers' work

The material for cable trays and accessories shall be offered for stage inspection of the Engineer / Employer as follows:

Prior to fabrication and galvanizing.

After fabrication but before galvanizing.

After galvanizing but prior to dispatch.

During inspection, thickness of sheets, dimensions and weight of zinc coating will be measured. Items not conforming to specifications shall be rejected.

Prior to fabrication, sheets to be used for fabrication of trunking/accessories shall be offered for inspection.

Subsequent to fabrication, but prior to galvanizing, trunking/accessories shall be offered for inspection. Items not conforming to specifications shall be rejected.

## Section VII – Employer's Requirement

### cWiring System

This section covers providing & commissioning of wiring system for lights, fans, exhaust fans, power sockets etc. The wiring shall generally be carried out using 1.1 KV grade PVC insulated stranded copper conductors FRLS wires in rigid PVC conduit laid on surface or concealed complete with insulated earth wire, flushed modular switches, sockets etc.

#### 7.2.4.11.4 Standards

The installation shall conform in all respects to Indian Standard Code of Practice for Electrical wiring installation IS:732-1963 and IS:2274-1963. It shall also be in conformity with Indian Electricity Rules and the Regulations, National Electric Code and National Building Code, CPWD specifications and requirements of the Local Electric Supply Authority. In general, all materials, equipment and workmanship shall conform to the Indian Standards, specifications and code. Some of the applicable codes/standards are as under:

IS 375	Marking and arrangements for switchgear : Bus bars, main connection and auxiliary wiring
IS 2675	Specifications for enclosed distribution
IS 1554	Specifications for PVC insulated (heavy duty) electric cable Part-I for voltage Up to 1100 volts.
IS 694	Specifications for PVC insulated: Cables for voltage up to 1100V with Aluminum conductors.
IS 5133	Boxes for the enclosure of electrical accessories
IS 1293	3 pin plugs and socket outlets
IS 1913	General and safety requirements for electric lighting fittings.
IS 374	Electric ceiling fans and regulators.
IS 3043	Code of practice for earthing IS 3043
IS 1646	Electrical installation.
IS 8623	Factory built assemblies of switch gear & control gear.

#### 7.2.4.11.5 Distribution Wiring Systems

##### 1. General

The wiring systems should be suitable for the following systems depending on the requirement.

- i. 3 phase, 4 wire, 440V, 50 Hz, AC.
- ii. Single phase, 2/3 wire, 240V, 50 Hz, AC

##### 2. Wiring systems

Depending on the requirement, the following systems are covered by this specification.

Concealed / Exposed systems using conduits laid / surface mounted in / on slabs, beams, walls, flooring etc. The conduits should be of heavy duty rigid PVC.

##### 3. Installation

## Section VII – Employer's Requirement

The size of conduit shall be selected in accordance with the number of wires permitted under table given below. The minimum size of the conduit shall be 20 mm Dia unless otherwise indicated or approved. Size of wires shall be as specified in the schedule of work / SLD.

Nominal dia of wires	Nominal Cross sec. area	mm B	mm S	mm B	mm S	m B	m S	m B
1/2.40	1.50	3	8	6	1	9	-	-
1/1.80	2.50	2	6	4	1	8	-	-
1/2.24	4.00	2	4	3	8	6	-	-
1/2.80	6.00	-	4	3	6	6	-	-
1/3.55	10.00	-	3	2	5	4	6	5

- a) 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) B- runs of conduits, which have, deflect from the straight by more than 15 degree.
- c) Conduits shall be kept at a minimum of 100 mm from the pipes of other non-electrical services.

Separate conduits shall be used for each of the following:

- Normal lights and 6A 3 pin sockets on lighting circuit
- Power outlets - 16A 6 pin socket
- Emergency lighting
- Telephones
- Data outlets
- Fire alarm system
- Public address system
- Call bell wiring
- CCTV system
- Access Control

Conduit layout shall be as approved of the Engineer. Wiring for short extensions to outlets in hung ceiling or to vibrating equipment, motors etc., shall be installed in flexible conduits. Otherwise rigid conduits shall be used. No flexible extension shall exceed 1.25m.

### 7.2.4.11.6 Point Wiring

#### 1. Definition

A point shall include all work necessary in complete wiring to the following outlets from the controlling switch or MCB.

- a. Ceiling rose or connector (in the case of points for ceiling / exhaust fan points, prewired light fittings, and call bells).
- b. Ceiling rose (in case of pendants except stiff pendants).
- c. Back plate (in the case of stiff pendants).
- d. Lamp holder (in the case of goose neck type wall brackets, batten holders and fittings which are not prewired).

#### 2. Point wiring (Other than socket outlet points)

## Section VII – Employer's Requirement

a. Unless and otherwise specified, there shall be no linear measurement for point wiring for light points, fan points, exhaust fan points, call bell points and power point. These shall be measured on unit basis by counting.

### **7.2.4.11.7 Group Control point wiring:**

a. In the case of points with more than one point controlled by the same switch, such points shall be measured in parts i.e. (a) from the DB to switch board & the switch to the first point outlet as one point (Primary point) and for the subsequent points, the distance from that outlet to the next one and so on, shall be treated as separate point (Secondary point)

b. No recovery shall be made for non-provision of more than one switch in such cases.

### **7.2.4.11.8 Socket Outlets:**

i. Socket outlets shall be 6A 3 pin, 16 Amp 3 pin or 16/6 Amp 6 pin. 5 pin socket outlets will not be permitted. The third pin shall be connected to earth through protective (loop earthing) conductor, 2 pin or 5 pin sockets shall not be permitted to be used.

ii. Conductors connecting electrical appliances with socket outlets shall be of flexible type with an earthing conductor for connection to the earth terminal of plug and the metallic body of the electrical appliance.

iii. Sockets for the power outlets of rating above 1 KW shall be of industrial type with associated plug top and controlling MCB.

iv. Where specified, shutter type (interlocking type) of sockets shall be used.

v. Every socket outlet shall be controlled by a switch or MCB, as specified. The control switch/MCB shall be connected on the 'live' side of the line.

vi. 5A/6A and 15A/ 16A socket outlets shall be installed at the following positions, unless otherwise specified.

a. Non-residential buildings - 23cm above floor level.

b. Kitchen - 23 cm above working platform and away from the likely positions of stove and sink. Bathroom - No socket outlet is permitted for connecting a portable appliance thereto. MCB/IC switch may be provided above 2 m for fixed appliances, and at least 1 m away from shower.

c. Rooms in residences - 23 cm above floor level, or any other level in special cases as desired by the Engineer-in-charge.

d. Unless and otherwise specified, the control switches for the 6A and 16A socket outlets shall be kept along with the socket outlets.

### **7.2.4.11.9 Advanced Lightning Protection System**

#### **1. General**

## **Section VII – Employer's Requirement**

The lightning protection system shall be of the enhanced type which is designed to attract lightning to a preferred point and safely convey the lightning energy to ground with minimal risk of side flashing via a pre-determined route. The complete lightning protection system will comprise of the following key components: (a) Lightning Air Terminal (b) Mounting support (c) Dedicated down conductor (d) Lightning Strike Recorder (e) Dedicated earthing system

### **2. The Lightning Air Terminal**

- a) The lightning air terminal shall be an Early Streamer Emission terminal which will respond dynamically upon leader activity in the near area.
- b) The lightning air terminal shall be configured as a spheroid which is comprised of separate electrically isolated panels surrounding an earthed central finial.
- c) The insulation material used to electrically isolate the panels shall be comprised of a base polymer which provides high ozone and UV resistance with a dielectric strength of 24 – 38 KV/mm.
- d) The central finial shall be elevated above the spheroid to a length of 90mm. e) The upper section of the central finial shall be rated to withstand 200KA.
- f) An air gap shall be provided between the individual electrically isolated panels (4 panels) and the finial tip of the central rod.
- g) Arcing shall occur between the panel sections of the spheroid and the finial tip only upon the progression of a lightning leader.
- h) The lightning air terminal shall have no moving parts and will have no dependence on external power supply or batteries.
- i) The lightning air terminal shall be tested and certified in accordance with the French National Standard – NF C 17-102. & IEC 60-1:1989

### **3. Mounting Support of Lightning Air Terminal**

The mounting pole used to support the lightning air terminal shall either be a circular insulating fibre glass tube or Aluminum or S.S mast or powder coated mast at a minimum height of 2 metres above the area to be protected. The pole will have an outside diameter of 68mm.

The mounting pole and supports shall be securely fixed with brackets and guy wires where required. The down conductor shall pass through the centre of the pole for the entire length of the pole.

### **4. Down Conductor**

- a. Each lightning air terminal should be fixed with one down conductor. The down conductor should have a minimum size of 70mm<sup>2</sup> and can be a insulated round copper conductor. The down conductor should be fixed securely every half metre. The down conductor shall be routed as directly as possible to the ground avoiding electrical shafts and sharp bends (minimum bending radius of 0,5m). The down conductor shall be of single length, devoid of any joints for the entire vertical run of the conductor.

## **Section VII – Employer's Requirement**

- b. As an alternative the use of a high voltage shielded cable is acceptable. The high voltage shielded cable shall consist of a core filler, stranded copper conductor, insulation material, outer copper conductor with external conductive sheath.
- c. The main copper conductor within the high voltage shielded cable shall have a minimum cross sectional area of 75mm<sup>2</sup>.
- d. The outer diameter of the high voltage shielded cable shall be less than 38mm.
- e. The high voltage shielded cable shall have a maximum inductance of 25 nH/m.
- f. The main copper conductor shall allow for direct connection to the lightning rod through the use of a compression lug.
- g. The high voltage shielded cable shall be fixed to the structure through the use of conductive saddles every two metres for the length of the cable route.
- h. The high voltage shielded cable shall be installed as per manufacturer's instructions and shall not be subject to bends of less than 0.6 metres radius.

### **5. Event Recording Device**

- i. All systems shall be installed complete with the lightning strike recorder.
- ii. The lightning strike recorder shall contain a mechanical 6 digit display which will register all lightning discharges with a sensitivity of 1500A 8/20 µs peak current impulse.
- iii. The lightning strike recorder shall be housed in a IP 65 rated enclosure and will Operate without reliance on batteries or an external power source.
- iv. The lightning strike recorder shall be installed as per the manufacturer's instructions.

### **6. Grounding**

- a) The grounding system shall incorporate the following individual components or a combination of the following – flat copper tape buried to a depth of not more than 800mm or by deep driven copper bonded steel core ground rods 10' x 5/8".
- b) All components of the grounding system shall be electrically connected to the central injection rod which is securely connected to the lower end of the high voltage shielded cable.
- c) The grounding system shall be installed so that the final impedance reading does not exceed 10 Ohms unless otherwise stipulated by the lightning protection manufacturer or consulting engineer.
- d) It is recommended that the grounding system is bonded to all structural reinforcing steel of the building, along with all connecting services.
- e) The use of ground resistance improvement material shall be applied in order to reduce the resistivity levels of the grounding system and maintain a constant low resistivity. The grounding system shall be maintenance free.

#### **7.2.4.11.10 Earthing**

##### **1. Specifications**

## **Section VII – Employer's Requirement**

The earthing shall be done in accordance with requirements given here. Measurement of soil resistivity and earth mat design calculations for switchyard area shall be submitted by contractor for review by client. The main earth mat shall be laid in the switchyard area in accordance with the approved design requirements.

Neutral points of systems of different voltages, metallic enclosures and frame works associated with all current carrying equipment and extraneous metal works associated with electric system shall be connected to a single earthing system unless stipulated otherwise.

Earthing and lightning protection system installation shall be in strict accordance with the latest editions of Indian Electricity Rules, relevant Indian Standards and Codes of practice and Regulations existing in the locality where the system is installed.

a) Code of practice for Earthing IS: 3043

b) Code of practice for the protection of Building and an allied structure against lightning IS: 2309.

c) Indian Electricity Rules 1956 with latest amendments. d) National Electricity Safety code IEEE publication.

### **2. Earthing Conductor Layout**

Earthing conductors in outdoor areas shall be buried at least 900 mm below finished ground level unless stated otherwise.

Tap-connections from the earthing grid to the equipment/structure to be earthed shall be terminated on the earthing terminals of the equipment/structure as per "Earthing Details".

Earthing conductors or leads along their run on cable trench, ladder, walls etc. shall be supported by suitable welding/cleaving at intervals of 750 mm. Wherever it passes through walls, floors etc., galvanized iron sleeves shall be provided for the passage of the conductor and both ends of the sleeve shall be sealed to prevent the passage of water through the sleeves.

Earthing conductor around the building shall be buried in earth at a minimum distance of 1000 mm from the outer boundary of the building. In case high temperature is encountered at some location, the earthing conductor shall be laid minimum 1500 mm away from such location. Earthing conductors crossing the road shall be laid 300 mm below road or at depth to suit the site conditions.

Earthing conductors embedded in the concrete shall have approximately 50 mm concrete cover.

### **3. Equipment and Structure Earthing**

Earthing pads shall be provided for the apparatus/equipment at accessible position. The connection between earthing pads and the earthing grid shall be made by two short earthing leads (one direct and another through the support structure) free from kinks and splices. In case earthing pads are not provided on the item to be earthed, same shall be provided in consultation with Owner.

Whether specifically shown in drawings or not, steel/RCC columns, metallic stairs etc. shall be connected to the nearby earthing grid conductor by two earthing leads. Electrical continuity shall be ensured by bonding different sections of hand-rails and metallic stairs.

Metallic pipes, conduits and cable tray sections for cable installation shall be bonded to ensure electrical continuity and connected to earthing conductors at regular interval. Apart from intermediate connections, beginning points shall also be connected to earthing system.

Metallic conduits shall not be used as earth continuity conductor.

Wherever earthing conductor crosses or runs along metallic structures such as gas, water, steam conduits, etc. and steel reinforcement in concrete it shall be bonded to the same.

### **4. Jointing**

## **Section VII – Employer's Requirement**

Earthing connections with equipment earthing pads shall be bolted type. Contact surfaces shall be free from scale, paint, enamel, grease, rust or dirt. Two bolts shall be provided for making each connection. Equipment bolted connections, after being checked and tested, shall be painted with anti corrosive paint/compound.

Connection between equipment earthing lead and main earthing conductors and between main earthing conductors shall be welded type. For rust protections, the welds should be treated with red lead and afterwards coated with two layers bitumen compound to prevent Corrosion.

Steel to copper connections shall be brazed type and shall be treated to prevent moisture ingress.

Resistance of the joint shall not be more than the resistance of the equivalent length of the conductor.

All ground connections shall be made by electric arc welding. All welded joints shall be allowed to cool down gradually to atmospheric temperature before putting any load on it. Artificial cooling shall not be allowed.

Bending of earthing rod shall be done preferably by gas heating.

All arc welding with large dia. conductors shall be done with low hydrogen content electrodes. The 50x6mm GS flat shall be clamped with the equipment support structures at 1000mm interval.

### **5. Power Cable Earthing**

Metallic sheaths and armour of all multi core power cables shall be earthed at both equipment and switchgear end. Sheath and armour of single core power cables shall be earthed at switchgear end only.

### **6. Earthing Conductors**

#### **General:**

All conductors buried in earth and concrete shall be of galvanized steel. All conductors above ground level and earthing leads shall be of galvanized steel, except for cable trench earthing.

#### **Constructional Features of Galvanized Steel**

- a) Steel conductors above ground level shall be galvanized according to IS: 2629.
- b) The minimum weight of the zinc coating shall be 610 gm/sq. m. and minimum thickness shall be 85 microns.
- c) The galvanized surfaces shall consist of a continuous and uniformly thick coating of zinc, firmly adhering to the surfaces of steel. The finished surface shall be clean and smooth and shall be free from defects like discoloured patches, bare spots, unevenness of coating, spelter which is loosely attached to the steel globules, spiky deposits, blistered surfaces, flaking or peeling off etc. The presence of any of these defects noticed on visual or microscopic inspection shall render the material liable to rejection.

#### **Tests:**

In accordance with stipulations of the specifications galvanized steel shall be subjected to four one minute dips in copper sulphate solution as per IS: 2633.

#### **Procedure for Soil Resistivity Measurement**

Soil resistivity measurement should be carried out with the earth tester. Please check the calibration report before performing the measurement. Also check

The measurement should be strictly followed as per procedure given in IS 3043 (Wenner method of measurement)

#### **7.2.4.11.11 LT panels, Distribution Boards, Control Panels**

##### **1. Erection**

- a) Electrical panels and bus duct shall be delivered in convenient shipping section. The contractor shall make his own arrangement for safe transportation of all the items to the erection site and also carry out complete loading/unloading during transportation. The contractor shall be responsible for final assembly and inter connection of bus bar / wiring. Foundation channel shall be grouted in the flooring by the contractor. Switchgear shall be aligned and leveled on their base channels and bolted or tack welded to them as per the instructions of the Engineer-in-charge. The earth bus shall be made continuous throughout the length. Loosely supplied relays and instruments shall be mounted and connected on the Switchgear. The contacts of the draw-out circuit breakers shall be checked for proper alignment and interchangeability.
- b) After erection the switch board shall be inspected for dust and vermin proof. Any hole which might allow dust or vermin etc. to enter the panel shall be plugged suitably at no extra cost.
- c) If the instrument transformers are supplied separately they shall be erected as per the direction of the Engineer of the client-. The contractor shall fix the cable glands after drilling the bottom/ top plates of all switch boards with suitable holes at no extra cost.
- d) Range of overload relays/timers etc. shall be checked with requirement of motor actually to be connected at site and shall be provided accordingly.
- e) The bus duct shall be suitably supported between switchgear and transformer. The opening in the wall where the duct enters the switchgear room shall be sealed to avoid rain water entry. The foundation of the switchgear shall be raised suitably for minor adjustment to ensure proper alignment and connection of the bus duct at no extra cost. Expansion joints, flexible connection, etc. supplied by the manufacturer / contractor of the bus duct shall be properly connected.

##### **2. 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.

- i. Contact alignment and wipe shall be checked and adjusted where necessary in accordance with the breaker manufacturer's instructions.
- ii. 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.
- iii. All adjustable direct acting trip devices shall be set using values given by the Engineer of the client- / manufacturer.
- iv. Close and trip the circuit breaker from its local control switch push button or Operating handle. Switch gear control bus may be energized to permit test Operation of circuit breaker with AC closing with prior permission of the Engineer -in-charge.
- v. Test tripping of the electrically Operated circuit breaker by Operating mechanical trip device.
- vi. Test proper Operation of circuit breakers latch, check carriage limit switch if provided.
- vii. Test proper Operation of lock-out device in the closing circuit. Wherever provided by simulating conditions which would cause a lock-out to occur.

- viii. Trip beaker either manually or by applying current or voltage to each of its associated protective relays.
- ix. Before switchgear is energised, the tests covered above shall be repeated with each breaker in its normal operating position.
- x. Capacitor banks shall be tested as per IS: 13340 / IPP3 & IS: 13585 (Part – I) / IPP4. In addition, test for output and /or capacitance, Insulation resistance test and test for efficiency of discharge device shall be carried out.
- xi. All electrical equipment alarms shall be tested for proper Operation by causing alarms to sound under simulated abnormal conditions.

### **3. Installation of Lighting Fixtures**

Scope of work under this item shall start from light point, with a connector/ ceiling Rose , 3core 1.5 mm.<sup>2</sup> PVC insulated wires from the point to the connector inside the lighting fixture, connections, fixing of lighting fixture complete with all accessories including supports, down rods , lamps on wall / roof / steel truss etc. testing the lighting fixture and commissioning.

#### **a) Installation of Exhaust Fans**

Scope of work under this system shall start from exhaust fan point, with a ceiling rose, 3core 2.5 mm.<sup>2</sup> PVC insulated wire from ceiling rose to connector of exhaust fan, connections, including fixing of fan with all accessories and supports complete with testing and commissioning.

#### **b) Bracket for Street Light Fittings:**

The brackets shall be made GI pipe with MS galvanized “sleeve” of required length and design, to accommodate type of street light fitting to be fixed.

#### **c) Installation of Poles:**

Installation of poles shall be done as approved by the Engineer /Employer.

#### **d) Installation of Street Light Fixtures:**

This specification includes fixing of street light fittings complete with accessories and lamps at the end of the pole / bracket, connecting it with 3 x 2.5 mm.<sup>2</sup> Aluminum conductor, PVC insulated cable from terminal box, testing, commissioning. Third core shall be connected with earthing point of light fitting at one end and earthing point of terminal box at the other end.

#### **7.2.4.11.12 Completion Tests**

After supply and installation of complete project or a particular building / area, tests shall be carried out by the contractor before switching on the power to installation and the results shall be recorded and submitted to the Site-Engineer.

If results are not satisfactory / as per standards set herewith, the contractor shall identify the defects / shortcomings and shall rectify the same. Nothing extra shall be paid for carrying out these tests and contractor has to arrange all necessary instruments.

#### **7.2.4.12 SPECIFICATIONS FOR VENTILATION SYSTEM**

##### **7.2.4.12.1 JETVENT Centrifugal Induction / Impulse Fan**

These Fans are to be used for providing Ventilation System. The JETVENT Centrifugal shall be as per European Standard EN12101-3:2002 and IS 3588:1987.

a. **Quality Management:** The unit is supplied with a fitted pad lockable external isolator switch protected to IP:65

Units shall be designed and manufactured with procedures as defined in BS EN ISO 9001:2000 and tested at elevated temperatures in accordance with the requirements of the European standard EN12101-3:2002.

b. A specially designed venturi inlet is provided to maximise the air input into the fan and motor assembly, whilst a fully adjustable air diffuser is provided to ensure maximum flexibility for air distribution and control.

c. A beveled section at the air supply side of the unit shall be provided to ensure that the air is directed away from transverse beam sections that may be present in the car park.

### **1. MIMIC Panel For JETVENT Fans**

MIMIC Panel for JETVENT Fans with all required accessories shall be provided in the Control Room as per IS 3588:1987.

### **2. LT AC Supply**

Voltage, Phase & frequency : 380V-500V AC, 3 Phase, 50 Hz. Voltage Variation : + 10 %, - 10 %

Frequency Variation : 48-62 Hz 1 % The system should be solidly earthed with transformer neutral

### **3. Scope of Engineering Services & Documentation**

The scope shall cover Design, Engineering, Manufacturing, Supply, and Commissioning of the AC Drive System for Basement Ventilation Fan Application for which the following documentation shall be provided.

1. Detail Electrical Circuit diagram
2. Instruction Manual giving details of Operation and Maintenance shall be provided.

### **4. Testing and Commissioning of System. (T and C)**

The Car Park Ventilation system will follow the general guidelines indicated below as far as testing and commissioning are concerned:

1. Provide a mega test on all wiring loops and record data.
2. Check incoming supply to all panel positions.
3. Check for continuity on all respective control loops.

#### **a) Induction Fans.**

1. Individually manually inspect each fan for rotation and clearance.
2. Run each fan individually on low and high speed.
3. Test each fan group for low and high speed Operation from the local control panel in each floor / zone.
4. Determine and record all relevant test data

#### **b) Main Supply Fans.**

1. Individually manually inspect each fan for rotation and clearance.
2. Run each fan individually on low and high speed.
3. Test each fan group for low and high speed Operation from the local control panel in each floor / zone.
4. Determine and record all relevant test data.

**c) Main Exhaust Fans.**

1. Individually manually inspect each fan for rotation and clearance.
2. Run each fan individually on low and high speed.
3. Test each fan group for low and high speed Operation from the local control panel in each floor / zone.
4. Determine and record all relevant test data.

**d) Full Scale Tests.**

1. Run full coordinated test for Operation and activation of all low speed systems.
2. Run full coordinated test for Operation and activation of all high speed systems.
3. Check Operation of system transfer to high speed requirement from general Ventilation condition.
4. Run full coordinated smoke test for Operation and activation of all low speed systems and high speed system
5. Provide CFD analysis to consultant for approval.

**5. System handover.**

Training of ASCL/MCA staff in the Operation and maintenance requirements for the entire system shall be done by the contractor.

**7.2.4.12.2 Technical specifications for solar power plant**

***Technical Description- 50 kW On Grid for Kairon Market MLCP***

<b>S.No.</b>	<b>Description</b>	<b>Quantity</b>
<b>1</b>	<b>Solar Photo Voltaic Module IEC Certified 320W/24 each</b>	<b>157</b>
<b>2</b>	<b>Technical Specifications</b>	
	Module Matrix ----- 12*6 (72 pcs)	
	Dimensions(mm)----- 1961*983*40	
	Weight (in Kgs)----- 21.20	
	Front Glass----- 3.2mm (Tempered Glass)	
	Frame----- Anodized Aluminium Alloy	
	Relative Humidity----- 0 to 100%	
	Cell Encapsulated Type - Ethylene Vinyl Acetate	
	Mechanical Load----- 5400 Pa	
	Glass Type----- High Transmittance Low Iron Tempered Glass	
	Backsheet----- Composite Film	
<b>3</b>	<b>Structure</b>	<b>1 Set For 50 kW (As Per Requirement)</b>
	Galvanized Iron Structure	
	Thickness----- 2 mm	
	Galvanization----- 70 microns	
	Nutbolts----- Galvanized	

	Mounting Angle--- 22 Degree	
4	<b>Inverter (IEC Cetrified)</b>	
	Capacity- 50 kW	
	<b>Input(DC)</b>	
	Max Input Power- 55000W	
	Max DC Power for Single MPPT- 22000W (500V-800V)	
	No. of DC Inputs- 4/3/3	
	Max. MPPT Current(A) - 40/30/30	
	<b>Output(A.C.)</b>	
	Rated Power(@230V.50Hz) 50000 W	
	Max. A.C. Power 50000 VA	
	Max. Output Current 80 A	
	Nominal Grid Voltage 3/N/PE,230/400Vac	
	Grid Voltage Range 180 Vac- 270 Vac	
	Power Factor 1 (Adiustable +/-0.8)	
	<b>Performance</b>	
	Max. Efficiency 98.5%	
	<b>Protection</b>	
	DC Reverse Polarity Protection YES	
	DC Switch YES	
	Operation Data Storage 25 Years	
5	<b>Surge Protection Device (S.P.D.)</b>	
	SPD BOX (IP65)	
	DC S.P.D.	
	AC S.P.D.	
	MC4 Connectors	1 Set
6	<b>Cables (Between Modules and Inverter)</b>	
	Cable Tray UV Stablized	1 Set
	Thickness 1. 50 mm-Aluminium 2. 35 mm-Copper	
7	<b>Junction Box (IP65)</b>	1 Set
	MCB's (As Per Site Reauirement)	
8	<b>Lightening Arrestor (Coventional Type) with Complete Aluminium Strip</b>	1 Set

<b>9</b>	<b>D.C. Earthing</b>	<b>1 Set</b>
<b>1</b>		
<b>0</b>	<b>A.C Earthing</b>	<b>1 Set</b>
	Isolator with panel box (A.C. Side)	1
	Panel Box	1

#### **SOLAR PHOTOVOLTAIC MODULES :-**

The PV modules used should be made in India.

The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards Crystalline Silicon Solar Cell Modules IEC 61215/IS14286. In addition, the modules must conform to IEC 61730 Part-1 - requirements for construction & Part 2 – requirements for testing, for safety qualification or equivalent IS.

- a. For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701.
- b. The total solar PV array capacity should not be less than allocated capacity (kWp) and should comprise of solar crystalline modules of minimum 250 Wp and above wattage. Module capacity less than minimum 250 watts shall not be accepted.
- c. Adequate protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided.
- d. PV modules must be tested and approved by one of the IEC authorized test centres.
- e. The module frame shall be made of corrosion resistant materials, preferably having anodized aluminum.
- f. The EoL holder shall carefully design & accommodate requisite numbers of the modules to achieve the rated power in his EoL. PEDa/owners shall allow only minor changes at the time of execution.
- g. Other general requirement for the PV modules and subsystems shall be the Following:

The rated output power of any supplied module shall have tolerance within +/-3%.

The peak-power point voltage and the peak-power point current of any supplied module and/or any module string (series connected modules) shall not vary by more than 2 (two) per cent from the respective arithmetic means for all modules and/or for all module strings, as the case may be.

The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weather proof lid with captive screws and cable gland entry points or may be of sealed type and IP-65 rated.

I-V curves at STC should be provided by EoL holder.

#### **SOLAR PV MODULES :-**

Modules deployed must use a RF identification tag. The following information must be mentioned in the RFID used on each modules. This should be inside the laminate only.

- a. Name of the manufacture of the PV module
- b. Name of the manufacture of Solar Cells.
- c. Month & year of the manufacture (separate for solar cells and modules)
- d. Country of origin (separately for solar cells and module)
- e. I-V curve for the module Wattage, Im, Vm and FF for the module
- f. Unique Serial No and Model No of the module
- g. Date and year of obtaining IEC PV module qualification certificate.
- h. Name of the test lab issuing IEC certificate.
- i. Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001

#### **WARRANTIES:-**

Material Warranty:

- a. Material Warranty is defined as: The project developer should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (05) years from the date of sale to the original customer ("Customer")
- b. Defects and/or failures due to manufacturing

- c. Defects and/or failures due to quality of materials
- d. Non conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the project developer will repair or replace the solar module(s), at the Owners sole option.

**Performance Warranty:**

- a. The predicted electrical degradation of power generated not exceeding 20% of the minimum rated power over the 25 year period and not more than 10% after ten years period of the full rated original output.

**ARRAY STRUCTURE :-**

Hot dip galvanized MS mounting structures may be used for mounting the modules / panels / arrays. Minimum thickness of galvanization should be at least 120 microns.

Each structure should have angle of inclination as per the site conditions to take maximum insulation. However to accommodate more capacity the angle inclination may be reduced until the plant meets the specified performance ratio requirements.

The Mounting structure shall be so designed to withstand the speed for the wind zone of the location where a PV system is proposed to be installed (wind speed of 150 km/hour). It may be ensured that the design has been certified by a recognized Lab/ Institution in this regard and submit wind loading calculation sheet to PEDA. Suitable fastening arrangement such as grouting and calking should be provided to secure the installation against the specific wind speed.

The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.

Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts.

**Aluminium structures also can be used which can withstand the wind speed of respective wind zone.** Necessary protection towards rusting need to be provided either by coating or anodization.

Aluminium frames should be avoided for installations in coastal areas.

The fasteners used should be made up of stainless steel. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels.

Regarding civil structures the EoI holder need to take care of the load bearing capacity of the roof and need arrange suitable structures based on the quality of roof.

The total load of the structure (when installed with PV modules) on the terrace should be less than 60 kg/m<sup>2</sup>.

The minimum clearance of the structure from the roof level should be 300 mm.

**JUNCTION BOXES (JBs) :-**

The junction boxes are to be provided in the PV array for termination of connecting cables. The J. Boxes (JBs) shall be made of GRP / FRP / Powder Coated Aluminum /cast aluminum alloy with full dust, water & vermin proof arrangement. All wires / cables must be terminated through cable lugs. The JBs shall be such that input & output termination can be made through suitable cable glands.

Copper bus bars / terminal blocks housed in the junction box with suitable termination threads Conforming to IP65 standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry. Single / double compression cable glands. Provision of earthings. It should be placed at 5 feet height or above for ease of accessibility.

Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups.

Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification.

All fuses shall have DIN rail mountable fuse holders and shall be housed in thermoplastic IP 65 enclosures with transparent covers.

**DC DISTRIBUTION BOARD :-**

DC Distribution panel to receive the DC output from the array field.

DC DPBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars are made of copper of desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors.

**AC DISTRIBUTION PANEL BOARD :-**

AC Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter, and should have necessary surge arrestors. Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.

All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS 60947 part I, II and III.

The changeover switches, cabling work should be undertaken by the EoI holder as part of the project.

All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz

The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.

All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better.

Should conform to Indian Electricity Act and rules (till last amendment).

All the 415 AC or 230 volts devices / equipment like bus support insulators, circuit breakers, SPDs, VTs etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions:-

Variation in supply voltage +/- 10 %

Variation in supply frequency +/- 3 Hz

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**PCU / ARRAY SIZE RATIO :-**

The combined wattage of all inverters should not be less than rated capacity of power plant under STC.

Maximum power point tracker shall be integrated in the PCU/inverter to maximize energy drawn from the array.

**PCU / INVERTER :-**

As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust the voltage levels to match the grid voltage. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit (PCU)". In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to the power conditioning unit/inverter should also be DG set interactive. If necessary. Inverter output should be compatible with the grid frequency. Typical technical features of the inverter shall be as follows:-

Switching devices IGBT/MOSFET Control Microprocessor /DSP Nominal AC output voltage and

Frequency 415V, 3 Phase, 50 Hz (In case single phase inverters are offered, suitable arrangement for balancing the phases must be made.)

Output frequency 50 Hz

Grid Frequency Synchronization range + 3 Hz or more

Ambient temperature considered -20o C to 50o C

Humidity 95 % Non-condensing

IP-20(Minimum) Protection of Enclosure for indoor.

IP-65(Minimum) for outdoor.

Grid Frequency Tolerance range + 3 or more

Grid Voltage tolerance -0.20.15

No-load losses Less than 1% of rated power

Inverter efficiency(minimum) >93% (In case of 10 kW or above with inbuilt galvanic isolation)

>97% (In case of 10 KW or above without in-built galvanic isolation)

Inverter efficiency (minimum) > 90% (In case of less than 10 kW)

THD < 3%

PF > 0.9

a. Three phase PCU/ inverter shall be used with each power plant system (10kW and/or above) but in case of less than 10kW single phase inverter can be used.

b. PCU / inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown.

c. The output of power factor of PCU inverter is suitable for all voltage ranges or sink of reactive power, inverter should have internal protection arrangement against any sustainable fault in feeder line and against the lightning on feeder.

- d. Built-in meter and data logger to monitor plant performance through external computer shall be provided.
- e. **Anti-islanding** (Protection against Islanding of grid): The PCU shall have anti islanding protection in conformity to IEEE 1547/UL 1741/ IEC 62116 or equivalent BIS standard.
- f. Channel Partner shall be responsible for galvanic isolation of solar roof top power plant (>100kW) with electrical grid or LT panel.
- g. In PCU/Inverter, there shall be a direct current isolation provided at the output by means of a suitable isolating transformer. If Isolation Transformer is not incorporated with PCU/Inverter, there shall be a separate Isolation Transformer of suitable rating provided at the output side of PCU/PCU units for capacity more than 100 kW.
- h. The PCU/ inverter generated harmonics, flicker, DC injection limits, Voltage Range, Frequency Range and Anti-Islanding measures at the point of connection to the utility services should follow the latest CEA (Technical Standards for Connectivity Distribution Generation Resources) Guidelines.
- i. The power conditioning units / inverters should comply with applicable IEC/ equivalent BIS standard for efficiency measurements and environmental tests as per standard codes IEC 61683/IS 61683 and IEC 60068-2 (1,2,14,30)/ Equivalent BIS Std.
- j. The MPPT units environmental testing should qualify IEC 60068-2 (1, 2, 14, 30)/ Equivalent BIS std. The junction boxes/ enclosures should be IP 65 (for outdoor)/ IP 54 (indoor) and as per IEC 529 specifications.
- k. The PCU / inverters should be tested from the MNRE approved test centres / NABL / BIS / IEC accredited testing-calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses.

#### **INTEGRATION OF PV POWER WITH GRID :-**

The output power from SPV would be fed to the inverters which converts DC produced by SPV array to AC and feeds it into the main electricity grid after synchronization. In case of grid failure, or low or high voltage, solar PV system shall be out of synchronization and shall be disconnected from the grid. Once the DG set comes into service, PV system shall again be synchronized with DG supply and load requirement would be met to the extent of availability of power. 4 pole isolation of inverter output with respect to the grid/ DG power connection need to be provided.

#### **DATA ACQUISITION SYSTEM / PLANT MONITORING :-**

Data Acquisition System shall be provided for each of the solar PV plant above 10 kWp capacity.

Data Logging Provision for plant control and monitoring, time and date stamped system data logs for analysis with the high quality, suitable PC. Metering and Instrumentation for display of systems parameters and status indication to be provided.

Temperature: Temperature probes for recording the Solar panel temperature and/or ambient temperature to be provided complete with readouts integrated with the data logging system.

The following parameters are accessible via the operating interface display in real time separately for solar power plant:

- a. AC Voltage.
- b. AC Output current.
- c. Output Power
- d. Power factor.
- e. DC Input Voltage.
- f. DC Input Current.
- g. Time Active.
- h. Time disabled.
- i. Time Idle.
- j. Power produced

k. Protective function limits (Viz-AC Over voltage, AC Under voltage, Over frequency, Under frequency ground fault, PV starting voltage, PV stopping voltage).

All major parameters available on the digital bus and logging facility for energy auditing through the internal microprocessor and read on the digital front panel at any time) and logging facility (the current values, previous

values for up to a month and the average values) should be made available for energy auditing through the internal microprocessor and should be read on the digital front panel.

PV array energy production: Digital Energy Meters to log the actual value of AC/ DC voltage, Current & Energy generated by the PV system provided. Energy meter along with CT/PT should be of 0.5 accuracy class.

Computerized DC String/Array monitoring and AC output monitoring shall be provided as part of the inverter and/or string/array combiner box or separately.

String and array DC Voltage, Current and Power, Inverter AC output voltage and current (All 3 phases and lines), AC power (Active, Reactive and Apparent), Power Factor and AC energy (All 3 phases and cumulative) and frequency shall be monitored.

Computerized AC energy monitoring shall be in addition to the digital AC energy meter.

The data shall be recorded in a common work sheet chronologically date wise. The data file shall be MS Excel compatible. The data shall be represented in both tabular and graphical form.

All instantaneous data shall be shown on the computer screen.

Software shall be provided for USB download and analysis of DC and AC parametric data for individual plant.

Provision for instantaneous Internet monitoring and download of historical data shall be also incorporated.

Remote Server and Software for centralized Internet monitoring system shall be also provided for download and

analysis of cumulative data of all the plants and the data of the solar radiation and temperature monitoring system.

Ambient / Solar PV module back surface temperature shall be also monitored on continuous basis.

Simultaneous monitoring of DC and AC electrical voltage, current, power, energy and other data of the plant for correlation with solar and environment data shall be provided.

Remote Monitoring and data acquisition through Remote Monitoring System software at the owner / PEDA location with latest software/hardware configuration and service connectivity for online / real time data monitoring / control complete to be supplied and operation and maintenance / control to be ensured by the EoI holder.

The EoI holders shall be obligated to push real-time plant monitoring data on a specified intervals (say 15 minute) through open protocol at receiver location (cloud server) in XML/JSON format, preferably. Suitable provision in this regard will be intimated to the EoI holders.

#### **TRANSFORMER "IF REQUIRED" & METERING :-**

Dry/oil type relevant kVA, 11kV/415V, 50 Hz Step up along with all protections, switchgears, Vacuum circuit breakers, cables etc. along with required civil work.

The EoI directional electronic energy meter (0.5 S class) shall be installed for the measurement of import/Export of energy.

The EoI holder must take approval/NOC from the Concerned DISCOM for the connectivity, technical feasibility, and synchronization of SPV plant with distribution network before commissioning of SPV plant.

Reverse power relay shall be provided by EoI holder (if necessary), as per the local DISCOM requirement.

#### **POWER CONSUMPTION:**

Regarding the generated power consumption, priority need to give for internal consumption first and thereafter any excess power can be exported to grid. Finalization of tariff is not under the purview of PEDA or MNRE. Decisions of appropriate authority like DISCOM, state regulator may be followed.

#### **PROTECTIONS :-**

The system should be provided with all necessary protections like earthing, Lightning, and grid islanding as follows:

#### **LIGHTNING PROTECTION :-**

The SPV power plants shall be provided with lightning & overvoltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protection should be provided as per IEC 62305 standard. The protection against induced high-voltages shall be provided by the use of metal oxide varistors (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

#### **SURGE PROTECTION :-**

Internal surge protection shall consist of three MOV type surge-arrestors connected from +ve and -ve terminals to earth (via Y arrangement).

### **EARTHING PROTECTION :-**

Each array structure of the PV yard should be grounded/ earthed properly as per IS:3043-1987. In addition the lighting arrester/masts should also be earthed inside the array field. Earth Resistance shall be tested in presence of the representative of Department/PEDA as and when required after earthing by calibrated earth tester. PCU, ACDB and DCDB should also be earthed properly.

Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earthing points are bonded together to make them at the same potential.

### **GRID ISLANDING :-**

In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a short period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as "Islands." Powered Islands present a risk to workers who may expect the area to be unpowered, and they may also damage grid-tied equipment. The Rooftop PV system shall be equipped with islanding protection. In addition to disconnection from the grid (due to islanding protection) disconnection due to under and over voltage conditions shall also be provided.

A manual disconnect 4-pole isolation switch beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personnel to carry out any maintenance. This switch shall be locked by the utility personnel.

### **CABLES :-**

Cables of appropriate size to be used in the system shall have the following characteristics:

- a) Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards
- b) Temp. Range: -10oC to +80oC.
- c) Voltage rating 660/1000V
- d) Excellent resistance to heat, cold, water, oil, abrasion, UV radiation.
- e) Flexible
- f) Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum (2%)
- g) For the DC cabling, XLPE or, XLPO insulated and sheathed, UVstabilized single core multi-stranded flexible copper cables shall be used; Multi-core cables shall not be used.
- h) For the AC cabling, PVC or, XLPE insulated and PVC sheathed single or, multi-core multi-stranded flexible copper cables shall be used; Outdoor AC cables shall have a UV-stabilized outer sheath.
- i) The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use. Outer sheath of cables shall be electron beam cross-linked XLPO type and black in colour.
- j) The DC cables from the SPV module array shall run through a UVstabilized PVC conduit pipe of adequate diameter with a minimum wall thickness of 1.5mm.
- k) Cables and wires used for the interconnection of solar PV modules shall be provided with solar PV connectors (MC4) and couplers.
- l) All cables and conduit pipes shall be clamped to the rooftop, walls and ceilings with thermo-plastic clamps at intervals not exceeding 50 cm; the minimum DC cable size shall be 4.0 mm<sup>2</sup> copper; the minimum AC cable size shall be 4.0 mm<sup>2</sup> copper. In three phase systems, the size of the neutral wire size shall be equal to the size of the phase wires.
- m) Cable Routing / Marking: All cable/wires are to be routed in a GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified. In addition, cable drum no. / Batch no. to be embossed/ printed at every one meter.
- n) Cable Jacket should also be electron beam cross-linked XLPO, flame retardant, UV resistant and black in colour.
- o) All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions including High temperatures, UV radiation, rain, humidity, dirt, salt, burial and attack by moss and microbes for 25 years and voltages as per latest IEC standards. DC cables used from solar modules to array junction box shall be solar grade copper (Cu) with XLPO insulation and rated for 1.1kV as per relevant standards only.

- p) The ratings given are approximate. EoI holder to indicate size and length as per system design requirement. All the cables required for the plant shall be provided by the EoI holder. Any change in cabling sizes if desired by the EoI holder shall be approved after citing appropriate reasons. All cable schedules/ layout drawings shall be approved prior to installation.
- q) Multi Strand, Annealed high conductivity copper conductor PVC type 'A' pressure extruded insulation or XLPE insulation. Overall PVC/XLPE insulation for UV protection Armoured cable for underground laying. All cable trays including covers to be provided. All cables conform to latest edition of IEC/ equivalent BIS Standards as specified below: BoS item / component Standard Description Standard Number Cables General Test and Measuring Methods, PVC/XLPE insulated cables for working Voltage up to and including 1100 V, UV resistant for outdoor installation IS /IEC 69947.
- r) The total voltage drop on the cable segments from the solar PV modules to the solar grid inverter shall not exceed 2.0%.
- s) The total voltage drop on the cable segments from the solar grid inverter to the building distribution board shall not exceed 2.0%.

**CONNECTIVITY :-**

The maximum capacity for interconnection with the grid at a specific voltage level shall be as specified in the Distribution Code/Supply Code of the State and amended from time to time. Following criteria have been suggested for selection of voltage level in the distribution system for ready reference of the solar suppliers.

**Plant Capacity Connecting voltage**

Up to 10 kW 240V-single phase or 415V-three phase at the option of the consumer

Above 10kW and up to 100 kW 415V – three phase

Above 100kW At HT/EHT level (11kV/33kV/66kV) as per DISCOM rules

a. The maximum permissible capacity for rooftop shall be 1 MW for a single net metering point.

b. Utilities may have voltage levels other than above, DISCOMS may be consulted before finalization of the voltage level and specification be made accordingly.

**TOOLS & TACKLES AND SPARES :-**

After completion of installation & commissioning of the power plant, necessary tools & tackles are to be provided free of cost by the EoI holder for maintenance purpose. List of tools and tackles to be supplied by the EoI holder for approval of specifications and make from PEDA/ owner.

A list of requisite spares in case of PCU/inverter comprising of a set of control logic cards, IGBT driver cards etc. Junction Boxes. Fuses, MOVs / arrestors, MCCBs etc along with spare set of PV modules be indicated, which shall be supplied along with the equipment. A minimum set of spares shall be maintained in the plant itself for the entire period of warranty and Operation & Maintenance which upon its use shall be replenished.

**DANGER BOARDS AND SIGNAGES :-**

Danger boards should be provided as and where necessary as per IE Act. /IE rules as amended up to date. Three signage shall be provided one each at battery –cum- control room, solar array area and main entry from administrative block. Text of the signage may be finalized in consultation with PEDA/ owner.

**FIRE EXTINGUISHERS :-**

The firefighting system for the proposed power plant for fire protection shall be consisting of:-

a. Portable fire extinguishers in the control room for fire caused by electrical short circuits.

b. Sand buckets in the control room.

c. The installation of Fire Extinguishers should confirm to TAC regulations and BIS standards. The fire extinguishers shall be provided in the control room housing PCUs as well as on the Roof or site where the PV arrays have been installed.

## D: SPECIFICATION OF WORKS FOR CAR PARKING MANAGEMENT SYSTEM

### Functional & Technical Requirement Specifications

#### 1.1 Smart Parking System – Functional Requirement Specifications

##### 1.1.1 Entry Requirement

Sr. No	Indicative Requirement Description
ENTR.FR.001	Entry to any parking space shall have outdoor displays/screens showing overall availability of parking slots in that particular parking space.
ENTR.FR.002	Each entry lane shall be equipped with one Entry Device with the following capabilities:
ENTR.FR.003	The Entry Device shall act as an Automatic Ticket Dispenser
ENTR.FR.004	It shall have touch screen for motorist to enter Unique Booking Number
ENTR.FR.005	The ticket with Barcode/QR Code used by SI shall be capable of capturing data that is easily retrievable at the exit.
ENTR.FR.006	Every vehicle entering the parking space shall be stopped by barrier. The barrier is raised when the motorist is issued a ticket or has been identified as a legitimate user.
ENTR.FR.007	In case the parking lot is already occupied to its capacity, the ticket issuing shall automatically be blocked and therefore, the barrier shall not open. A message shall also be displayed on the outdoor screen stating the same.
ENTR.FR.008	The Entry Device shall be able to detect and report :
ENTR.FR.009	Anti-pass back
ENTR.FR.0010	Back-out ticket
ENTR.FR.0011	Low ticket stock
ENTR.FR.0012	The display on Entry Device shall have capability to display messages in English, Punjabi and Hindi languages. The solution shall also include provision to capture the video of vehicle using dedicated cameras.

### 1.1.2 Exit Requirement

Sr. No	Indicative Requirement Description
EXIR.FR.001	Any vehicle, before leaving the parking area, shall be stopped by a barrier system at the point of exit from the parking.
EXIR.FR.002	The solution shall have parking column display with clear instructions easy to use interface
EXIR.FR.003	The solution shall also include provision to capture the video of the vehicle exiting any of the parking spaces and the all the information related to the same shall be stored at a central server.
EXIR.FR.004	The solution should provide option of manual cash payment through handheld payment terminal operated by an attendant
EXIR.FR.005	Exit of every parking shall be equipped with a manned parking pay station (booth).
EXIR.FR.006	The exit booth shall have appropriate space for keeping devices such as a computer with internet connectivity, handheld with QR code reader, credit card reader, printer etc.
EXIR.FR.007	For motorists who enter the parking lot using Smart Parking Card or Monthly pass the exit booth shall also have facility for motorist to tap his/her Smart Parking Card for express exit. The payment can also be linked to the e-Wallet of the motorist with auto-debit option and corresponding limits and alerts to the same.
EXIR.FR.008	The payment for parking shall be collected based on entry time stamp by any personnel stationed at the Pay Station.
EXIR.FR.009	The system will calculate the fee automatically and indicate this on the screen clearly visible to the motorist. No manual intervention shall be necessary to compute the fee.
EXIR.FR.010	Once the vehicle exits a parking slot, the total parking slots available in that parking space shall automatically get updated.
EXIR.FR.011	Only after completing the full cycle correctly the transaction will be considered as valid within the car park. However, audit trail of each complete, incomplete and cancelled transaction shall be available in the system.
EXIR.FR.012	The solution shall be equipped with Anti-pass back technology and be able to detect and report any instance pass back.
EXIR.FR.013	The solution shall allow full integration of third party devices with the Parking Management and Guidance System, and capture all transactions to generate customized reports.
EXIR.FR.014	The solution shall track each and every revenue source and shall ensure no leakages due to manual intervention.
EXIR.FR.015	The Pay Station shall be capable of charging handheld devices.

### 1.1.3 Entry and Exit Boom Barrier

Sr. No	Indicative Requirement Description
EEBB.FR.001	The entrance and exit of each parking lot shall have a barrier gate system using technologies such as boom barriers, bollards etc.
EEBB.FR.002	The barrier shall remain in open position for optimal period of time for the vehicle to pass at entrance and exit.
EEBB.FR.003	The solution shall also include provision to capture video of vehicle of every vehicle entering and leaving any of the parking spaces and the all the information related to the same shall be stored at a central server.
EEBB.FR.004	Barrier shall have capability of in built glowing direction signage

Sr. No	Indicative Requirement Description
EEBB.FR.006	Upon horizontal impact by a vehicle, the barrier arm shall get detached from the barrier unit with minimal damage to the vehicle and the barrier motor mechanism. An alarm shall also be raised and sent to the server and monitoring console, when the barrier is detached.
EEBB.FR.007	An alert shall be sent to the console and server to ensure that the administrator is informed that the barrier is not attached or barrier breakage.
EEBB.FR.008	All vehicular passages during the time that the barrier is not attached shall be recorded and displayed in the reports separately in order to audit the necessary revenue transactions during that time.
EEBB.FR.009	Upon impact during closure, the arm will stop and stay in the same position. Under no circumstances shall the arm re-open upon impact. This is to prevent keeping the arm open for illegal entries or exits.
EEBB.FR.010	The barrier arm shall be easy to refit with barrier unit in a short duration (within one minute).
EEBB.FR.011	If for any reason and external override (fire system) needs to be connected, then this shall only be possible over the Entry/exit Device and the switch shall be permanently monitored by the Parking Management System.

#### 1.1.4 Wireless Handheld Device

Sr. No	Indicative Requirement Description
HHD.FR.001	Handheld device shall be able to receive available parking information from control centre
HHD.FR.002	It shall be able to allocate parking space to local users and generate tickets
HHD.FR.003	It shall be able to authenticate ticket of mobile users via QR code reading from mobile devices
HHD.FR.004	It shall update central web-server with parking bay allocation information
HHD.FR.005	It shall be integrated with local display unit for parking status information and boom barrier operations for which logs are to be created in Parking Management System
HHD.FR.006	Similar device at the exit location should work as payment collection device or same device if enter and exit are next to each other
HHD.FR.007	The calculated amount will be received from parking users through integration with payment gateways
HHD.FR.008	In case of failure of network, the amount should be calculated manually and same should be updated to Smart Parking System later

#### 1.1.5 Payment Options

Sr. No	Indicative Requirement Description
PAY.FR.001	The primary mode of payment for parking will be by cash at the Pay Station
PAY.FR.002	For bookings through Citizen App or Smart Web portal application, payment will be made using e-Wallet, net banking, credit card, debit card etc. with appropriate integration with payment gateways
PAY.FR.003	Additionally, the SI can implement innovative and cost effective payment methods (such as e-vouchers).

#### 1.1.6 Parking Guidance subsystem for motorists -Informative Display Panels

Sr. No	Indicative Requirement Description
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Sr. No	Indicative Requirement Description
IDP.FR.001	The display panels units shall indicate available spaces for each parking aisle, bay/zone/level, total parking and shall be able to be customized by software.
IDP.FR.002	The display panel shall be easy to understand and must have graphical directional and zone status indication (as red crosses for zone full or green directional arrows to guide drivers to zones with available spaces).

#### 1.1.7 Real-time Monitoring and Dynamic MIS Reporting

Sr. No	Indicative Requirement Description
MIS.FR.001	The system should include central reporting system establishing the connection between the devices and sensors, and the centralized Command and Control Centre.
MIS.FR.002	The solution should include reporting dashboards with location specific thresholds to be set for generating customized reports
MIS.FR.003	The solution should be capable of monitoring the number of vehicles that entered or exited the parking premises during any given time
MIS.FR.004	The solution should generate reports for each parking spot, in each of the parking lots capturing utilization, cost, and revenue details, and details of assets, people and etc.
MIS.FR.005	These reports should be available in all standard acceptable formats like .csv, .pdf, .txt, etc.

#### 1.1.8 Smart Parking Mobile application

S. No	Indicative Requirement Description
MA.FR.001	The Smart Parking solution shall provide citizens real time parking availability information in parking lots
MA.FR.003	The application should be provided for both Android and Apple mobile phones
MA.FR.004	The system integrator shall provide a citizen centric mobile application that will allow citizens to install the application from Android and Apple mobile phones APP store.
MA.FR.005	Citizen should register themselves to use this mobile app. The registration shall include Name, Mobile no and email ID of the applicant.
MA.FR.006	The system shall acquire the data from program Logic Controller (PLC) of mechanized parking system which include parking availability. The parking availability display will show availability information with colour coding (Green shows the available parking space and red shows the parking's booked by mobile app and currently occupied)
MA.FR.007	The application shall provide the citizen for advance online booking of the available parking space.
MA.FR.008	The application shall display the day wise different parking zone, parking availability of every parking place, rate of parking. The application shall have the features to incorporate the updated fare whenever updated by Municipality / ASCL
MA.FR.009	It shall be possible for commuters to book the parking ticket well advance by mobile application. The mobile application shall generate QR code based online ticketing system and the application will share the ticket by sms and email services to the applicant.
MA.FR.010	It shall be possible to verify the QR code at entry and exit by parking column and handheld device. The entry parking column or handheld shall scan the QR/Barcode code and update the web application with the exact date/time of entry and exit of a vehicle. The application shall increase the parking fare if the car has overstayed i.e. the entry and exit boom barrier shall verify this and update the fare accordingly.
MA.FR.011	The application shall have the provision of payment gateway from different source i.e. mobile

	wallet / Paytm / online payment / credit card / debit card system.
MA.FR.012	Mobile App will beep if the block time for parking is ending 15 minutes in advance.
MA.FR.013	All connected mobiles shall have an information refresh rate of 30 seconds or less.
MA.FR.014	The system should cancel booked parking if the user does not arrive within configurable duration (in minutes) of his parking start time.

### 1.1.9 Parking Management System Web Application

S. No	Indicative Requirement Description
WS.FR.001	Parking web application server shall be host on a public domain
WS.FR.002	The mobile application shall connect to the web application server for availability information, booking and payments via a payment gateway. The payment should be done in the exit boom barrier.
WS.FR.003	The space for hosting the web application server shall be provided by ASCL.
WS.FR.004	The citizens should be able to generate MIS report to view occupancy of parking lots over a defined time period.
WS.FR.005	The administrators should be able to generate MIS report to view occupancy, collection and other usage statistics over a defined time period.
WS.FR.006	The application should support both fixed and dynamic (based on peak time) pricing plans.
WS.FR.007	The web interface shall provide complete information on revenue collected from parking operations in real time along with occupancy status
WS.FR.008	The web interface shall provide complete historical reports on revenue collected from parking operations at parking lots

### 1.1.10 Network Video Recorders and accessories

S. No	Indicative Requirement Description
NVR.FR.001	The system shall provide real-time over the network digital video surveillance
NVR.FR.002	System shall have the functionality including recording capability for period of 15 days
NVR.FR.003	The system shall allow full functionality with IP cameras from major manufacturers
NVR.FR.004	The system shall support various compressions, including MPEG-4, M-JPEG and H.264,H.265 manufacturer dependant
NVR.FR.005	The system shall have Graphical Map feature supports realistic camera location
NVR.FR.006	Multiple channel viewing/recording system allowing networking of Network Video Recorders (NVR)
NVR.FR.007	The system shall allow the Device Site List or logical camera grouping
NVR.FR.008	The system shall allow Individual picture quality settings per camera
NVR.FR.009	The system shall allow the remote configuration of devices across the Network
NVR.FR.010	The system shall have the features LAN and WAN (Internet) connectivity
NVR.FR.011	The system shall have the features of Remote alarm capability
NVR.FR.012	The system shall have the authorization utility for maximum system security
NVR.FR.013	The system shall create macros to view/listen and record video and audio, PTZ cameras at pre-set positions, trigger relays over the network and send email or text message on alarms or on schedule
NVR.FR.014	The system shall have the features of video intelligence module provides alarms with indication on video
NVR.FR.015	The system shall have the provision to record up to 50 no. of camera at a time
NVR.FR.016	The system shall record and view live video at different fps without additional video streams

## 1.2 Smart Parking System – Hardware Technical Specifications

### 1.2.1 Entry / Exit boom Barrier Gate

Sr. No.	Parameter	Indicative Requirement Description	Compliance Y / N
ABB.TR.001	General Features	High Strength , Attractive Look and Fine Finish, Integration with Parking Column shall be possible	
ABB.TR.002	Opening Time(sec):	6 Sec	
ABB.TR.003	Boom Length(mm):	3000	
ABB.TR.004	Height Of Boom Form Ground (mm)	800	
ABB.TR.005	Housing Dimension (mm)	1050x300x260	
ABB.TR.006	Boom Dimension (mm)	100x50	
ABB.TR.007	Controller Protecting Rating	IP 55	
ABB.TR.008	Power	100 Watt or less	
ABB.TR.009	Torque(nm)	400 or more	
ABB.TR.010	Duty Use	Intensive Use	
ABB.TR.011	Operating Temp & Humidity	-20 C To + 60 C, 5-95% RH	
ABB.TR.012	Life Expectancy	10 Years	
ABB.TR.013	Daily Operating Cycles (recommended)	600	
ABB.TR.014	Standard Accessories (included)	Remote, Control Board, Instruction Manual, Manual Key, Wireless Push Button	

### 1.2.2 Desktop

Sr. No.	Parameter	Indicative Requirement Description	Compliance Y / N
DSK.TR.001	Processor	Intel Core i5 , 64bit x86 Processor @ 3.2 GHz or more,4MB L3 cache, Memory support DDR3 or better specifications	
DSK.TR.002	Motherboard & Chipset	OEM Motherboard	
DSK.TR.003	Video	The video management software shall be installed on each desktop to access the video feed from NVR system.	
DSK.TR.004	Network	Integrated 10/100/1000 Gigabit Ethernet controller	
DSK.TR.005	Ports	1 HDMI port (Preferable), 2x USB 2.0 and 2 x USB 3.0 (Preferable) ,	
DSK.TR.006	Ports	Minimum 4 ports USB 3.0	
DSK.TR.007	Ports	Front I/O includes (2 or more ) USB 2.0 ports	
DSK.TR.008	Ports	Rear I/O includes (2 or more ) USB 3.0 ports, (2 or more) USB 2.0 ports, serial port, Parallel port, PS/2 mouse and	

Sr. No.	Parameter	Indicative Requirement Description	Compliance Y / N
DSK.TR.009	Ports	keyboard ports, RJ-45 network interface, DisplayPort 1 VGA and 3.5mm audio in/out jacks; 4 in 1 Media Card Reader (Preferable)	
DSK.TR.010	HDD Controller	Integrated dual port SATA-II controller	
DSK.TR.011	Memory	16GB DDR III 1333MHz or higher	
DSK.TR.012	Storage	1TB @ HDD 7200 RPM	
DSK.TR.013	Optical Drive	22X DVD writer or higher and the corresponding software	
DSK.TR.014	Monitor	21" TFT LCD monitor minimum 1920 x 1080 resolution with 5 ms response time or better specifications, TCO 03 or higher certified	
DSK.TR.015	Keyboard	107 or more Keys Keyboard	
DSK.TR.016	Mouse	2 / 3 button USB Optical Scroll Mouse with anti-static mouse pad resolution of Optical 1000 cpi, Complying to CE and FCC norms	
DSK.TR.017	Power Management and DMI	System with Power management features & Desktop Management Interface implementation	
DSK.TR.018	Operating System	Windows desktop latest version	
DSK.TR.019	Power input	100 -240V AC	
DSK.TR.020	Router	3G/4G to Wi-Fi/Ethernet Router with High Power 3G Antenna shall be provided with desktops where internet is not available	

### 1.2.3 Parking Column with Barcode\QR code Ticket Reader & Writer

Sr. No.	Parameter	Indicative Requirement Description	Compliance Y / N
PCG.TR.001	feature	The Column Gate shall have the following features	
PCG.TR.002		Ticket Dispenser	
PCG.TR.003		Barcode / QR Code Reader	
PCG.TR.004		Ticket Printing facility	
PCG.TR.005		Display	
PCG.TR.006	Design	It shall have unique design based on Aluminum and high grade synthetics	
PCG.TR.007	Functionality	It shall be modular, easy to maintain and connected to the central web application server for operations management	
PCG.TR.008	Display	Bright High Resolution graphic display	
PCG.TR.009	Ticket Dispenser	It shall have ticket dispenser functionality with paper roll printer	
PCG.TR.010	Operating Voltage	100-240 V ±10 % / 50-60 Hz	
PCG.TR.011	Operating temperature	0 to +50 °C	
PCG.TR.012	Humidity	Max 90%	
PCG.TR.013	Protection	IP65	

### 1.2.4 Data Collector Unit

Sr. No.	Parameter	Indicative Requirement Description	Compliance Y / N
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Sr. No.	Parameter	Indicative Requirement Description	Compliance Y / N
DCU.TR.001	Feature	Shall be a microcontroller / microprocessor based system that shall integrate with PLC of the Parking Mechanization system over wired bus protocols like Modbus, Ethernet Ip , Profibus etc. to collect parking availability information.	
DCU.TR.002	Design	It shall have unique design based on Aluminum and high grade synthetics	
DCU.TR.003	Functionality	It shall be modular, easy to maintain and connected to the central web application server for operations management and syncing availability updates from mechanized parking system	
DCU.TR.004	Display	The DCU shall connect with parking availability displays to show the parking availability information on them.	
DCU.TR.005	Operating Voltage	100-240 V ±10 % / 50-60 Hz	
DCU.TR.006	Operating temperature	0 to +50 °C	
DCU.TR.007	Humidity	Max 90%	
DCU.TR.008	Protection	IP65	

### 1.2.5 Point of Sale Device

Sr. No.	Item	Indicative Requirement Description	Compliance Y / N
POS.TR.001	Functions	EMV / PBOC Chip Card Reader	
POS.TR.002	Functions	Triple track magnetic stripe card reader	
POS.TR.003	Functions	NFC	
POS.TR.004	Functions	Over-the-air firmware update	
POS.TR.006	Functions	Secure PIN pad	
POS.TR.007	Functions	Thermal printer	
POS.TR.008	Display	Backlit dot-matrix LCD display	
POS.TR.009	Buttons	Numerical buttons, ENTER, CANCEL & CLEAR buttons, power on/ setting button, Up/Feed Paper buttons, Down/ Reprint button	
POS.TR.010	Communication Interface Thermal Printer	Bluetooth v4.0, USB, WIFI, GPRS	
POS.TR.011	Paper Width	58mm/2.28 inch	
POS.TR.012	Paper Roll Diameter	Max 30 mm/ 1.18 inch ( shall print min 60 receipts with printing length 10mm per receipt)	
POS.TR.013	Resolution	8 dots/mm, 384 dots / line	
POS.TR.014	Power Battery	Lithium rechargeable battery 1400 MAH, 3.7V or above	
POS.TR.015	Charging	via micro USB or cradle	
POS.TR.016	Key Management	DUKPT, MK/SK	
POS.TR.017	Encryption Algorithm	TDES, AES	
POS.TR.018	Support operating Systems	Android 2.1 or above	
		iOS 6.0 or above	
		Windows Phone 8	
		MS Windows	

Sr. No.	Item	Indicative Requirement Description	Compliance Y / N
POS.TR.019	MCU	ARM Secure MCU with M4 core, speed up to 120MHz	
POS.TR.020	Memory	1 MB Flash Memory	
POS.TR.021	Operating Temperature	0 to 60 Degree Celsius	
POS.TR.022	Humidity	5-95 %	
POS.TR.022	Functionality	The system shall provide complete ticketing solution as per functional requirements of the RFP and work in synchronization with centralized parking web application	

### 1.2.6 Surveillance IP Camera (Full HD, Fixed Box)

Sl. No.	Category	Minimum Requirement Specifications	Compliance Y / N
FSC.TR.001	General Requirements	The camera should be manufacturer's official product line designed for commercial / industrial 24x7x365 use. The camera and camera firmware should be designed and developed by same OEM	
FSC.TR.002	Image Sensor with WDR	1/3.2" with True WDR, Progressive CMOS Sensor or better	
FSC.TR.003	Lens Specs	Compatible to image sensor, Focal length 8-50 mm or better, Full HD (1080P), Auto IRIS / P IRIS, Corrected IR, CS Mount with IR cut filter	
FSC.TR.004	Resolution	Active Pixels 1920(w) x 1080(h)	
FSC.TR.005	Minimum illumination	Colour: 0.3 lux or better, B/W: 0.05 lux or better	
FSC.TR.006	Video Encoder	H.265, Motion JPEG	
FSC.TR.007	Frame Rate	min. 25 FPS or higher	
FSC.TR.008	Local Storage	32 GB SD Card or higher	
FSC.TR.009	Ethernet	10/100/ Base-T ports	
FSC.TR.010	Protocols	Minimum of the following protocols to be supported RTSP, RTP/TCP, RTP/UDP, HTTP, HTTPS, DHCP	
FSC.TR.011	Industry Standards	ONVIF Compliant	
FSC.TR.012	Power Supply	POE IEE 802.3af compliant	
FSC.TR.013	Operating Temperature	0° C to 50° C or better	
FSC.TR.014	Operating Humidity	0% to 90% for cameras	
FSC.TR.015	Enclosure / Casing	IP 66	
FSC.TR.016	Certifications	UL, CE, C83FCC, ONVIF 2.x/S	
FSC.TR.017	Support	The system should not be an end of life / end of service product.	
FSC.TR.018	Streaming	The camera shall be able to setup and stream out minimum two (2) stream profiles. Each stream profile can has its own compression, resolution, frame rate and quality independently.	
FSC.TR.019	White Balance	Auto / Manual	
FSC.TR.020	Back Light Compensation	Auto	
FSC.TR.021	Security	Security Password protection	

<b>Sl. No.</b>	<b>Category</b>	<b>Minimum Requirement Specifications</b>	<b>Compliance Y / N</b>
FSC.TR.022	Security	Vandal and impact resistant housing, IK 10, IP66, NEMA 4X	
FSC.TR.023	Security	Detection of camera tampering and Detection of Motion should be possible using either camera or VMS	
FSC.TR.024	Functional	Self-cleaning / anti-dust / hydro-phobic coating features	
FSC.TR.025	Mounting Accessories	For pole and surface mount with L/C Brackets	
FSC.TR.026	IR Illuminator	External / build-in IR Illuminator with minimum 50 mtr. In case of external, "IR Illuminator" section to be referred	

### 1.2.7 Parking Availability LED Display

<b>Sr. No.</b>	<b>Item</b>	<b>Indicative Requirement Description</b>	<b>Compliance Y / N</b>
LED.4Line.TR.001	Size	LED Display - Minimum 600x1000 mm to show complete parking availability information	
LED.4Line.TR.002	Pitch	13 mm (H) * 13 mm (V)	
LED.4Line.TR.003	Colour	Amber colored LED - Day Light Readable	
LED.Line.TR.004	Minimum & maximum viewing distance and angle of viewing	Viewing distance 20-100 meters Angle of viewing - Minimum 60°V – 110°H	
LED.4Line.TR.005	Vibration standard AIS 12/AIS:062 - 10g	2g	
LED.4Line.TR.006	Storage capacity inside the Display	Shall be able to store parking availability information	
LED.4Line.TR.007	Communication protocol	GPRS , RF , RS485 etc. as per site requirement	
LED.4Line.TR.008	Controller and antenna	Inbuilt	
LED.4Line.TR.009	Environmental specifications	(a) Temperature: 0 to +55 deg C (b) Thermal cycling: 5 Deg C/mt (c) Humidity: 5% to 95% RH (d) Sealing: IP 65 (Front), IP 54 (Rear)	
LED.4Line.TR.010	Minimum life	50,000 Hrs	
LED.4Line.TR.011	Data format	Bitmap or Unicode	
LED.4Line.TR.012	Power supply	90 V to 250 V AC; 50 VA	
LED.4Line.TR.013	Update of Information	Real time (configurable refresh rate)	
LED.4Line.TR.014	Display Format	Multimedia content, text in Hindi, English and Punjabi/ with presentation in tables, fixed and scrolling text	

<b>Sr. No.</b>	<b>Item</b>	<b>Indicative Requirement Description</b>	<b>Compliance Y / N</b>
LED.4Line.TR.015	Structure	Light weight structure with toughened glass fixed with UV resistant adhesive in front	
LED.4Line.TR.016	Compliance	IS /IEC 60947-1:2004 in conjunction with IS/IEC 60529:2001	



## **E: SPECIFICATIONS FOR OPERATION AND MAINTENANCE**

### **1. Maintenance**

Three types of Maintenance to be carried out by the Contractor

- i. Preventive maintenance, where equipment is maintained before break down occurs. The contractor should make every effort to maintain the equipment before break down occurs. For this purpose the Contractor should ensure the Operation of all the stand by equipment in rotation.
- ii. Operational maintenance, where equipment is maintained while being used.
- iii. Corrective maintenance, where equipment is maintained after break down. This maintenance will of course be an integral part of the contract and in case of break down, the contractor must see to it that the said component is Operational within maximum 6 hours from the time of its occurrence.

The Contractor must take care of Maintenance, Repair, and Operations / Overhaul - (MRO) as explained below:

- a. MRO involves fixing any sort of mechanical, plumbing or electrical device should it become out of order or broken (known as repair, unscheduled, or casualty maintenance).
- b. It also includes performing routine actions which keep the device in working order (known as scheduled maintenance) or prevents trouble from arising (preventive maintenance).
- c. MRO may be defined as, "All actions which have the objective of retaining or restoring an item in or to a state in which it can perform its required function. The actions include the combination of all technical and corresponding administrative, managerial, and supervision actions."

### **2. Operation**

- a. In case, the motor or any other equipment is burnt or damaged due to negligence of the contractor or due to faulty Operation it shall be sole responsibility of the Contractor to rewind/replace/repair it as per standards of the equipment free of cost within 72 hours.
- b. In case of any fault in Operation and performance of the Facility, contractor or his staff at duty will immediately report to the ASCL/MCA about it.
- c. The Contractor shall run the entire car parking systems after ensuring proper voltage. He shall also record all the power failures and voltage in daily log sheet. He will bring into notice of power supply agency as well as control room and Departmental Engineer about the break down/power failure. He will also get the electricity restored simultaneously and will use DG sets immediately to reduce parking / retrieval time.

### **3. Specifications for Operation and Maintenance Manual**

- a. The contractor shall provide three copies of revised O&M Manual, if any, to the Engineer / Employer / ASCL/MCA in soft as well as hard copies, at the time of the commissioning of the project.
- b. The O&M Manual shall include in elaborate detail, all Operating and maintenance procedures
- c. and policies which are required, advisable and / or necessary for the Facility to achieve full compliance with the Operational guarantees and to achieve maintenance and repair standard for the Facility which will ensure compliance with the maintenance specifications.
- d. Without limiting the generality of the foregoing the O&M Manual shall include descriptions, procedures, and shall comply with the requirements, set forth in the provisions of the Bid Documents.
- e. The draft of the O&M Manual shall be subject to the review and approval of employer, which
- f. shall have the right to make any changes and revisions to the O&M Manual as it may deem appropriate. The Contractor shall revise such draft O&M Manual prior to the commencement of the O&M period.
- g. The contractor shall annually fully review, revise, update and modify the draft O&M Manual as may be necessary

or appropriate.

- h. During the term of this Agreement, the contractor shall promptly notify employer of any revisions, additions or modifications which he, in his professional opinion, believes should be made to the O&M Manual, whether as a result of additional experience in Operating and maintaining the Facility, changes or modifications to any equipment, part, component or structure incorporated in the Facility.
- i. The Maintenance and Operation Manual shall have a write up on the procedure to be followed in case of fire.
- j. There has to be a description of the system used for firefighting and schedule of maintenance and refilling if any.
- k. The location of the detectors and nozzles for distribution / spraying of the fire-fighting media shall be depicted on a proper drawing.
- l. The Operation portion of the Manual will at least contain the following information:
  - o Block diagrams for the safety interlocks
  - o Block diagrams for the software
  - o Clear description for the Macros
- J. The Maintenance portion of the Manual will contain at least the following information:
  - o Schedule of lubrication with type of lubricants to be used
  - o Schedule of topping and oil changes for the gear boxes with type of oil
  - o Schedule of bearings replacements
  - o Schedule of replacement of the electrical contacts.
  - o General Arrangement drawing
  - o Drawing showing point of Lubrication for grease and oil for centralized lubrication
  - o Manufacturing drawing with material for the maintenance items

Block diagram for the electrical circuit  
 Circuit diagram for the electrical circuit with identification of control gears and wire end ferrule numbering  
 Block diagram for the PLC with identification.

#### 4. Training

The Contractor shall plan and develop the course content, and implement on-the-job and classroom based training, for ASCL/MCA deputed staff of at least 15 personnel in 3 batches of 5 personnel each, during first 6 months of the Operation & Maintenance period. The Contractor shall organize training for identified managers from amongst the ASCL/MCA deputed staff in technical aspects of semi-automatic car parking systems to enable ASCL/MCA to build sufficient capacity and skills to manage the said car parking systems at a later date if required.

This training would include training in overhauling and replacement of various components of Semi-Automatic Car Parking Systems, Electrical Systems, Plumbing, Ventilation, Fire Prevention Systems, Fire Fighting Systems, Rain Water Harvesting Systems and expertise in Maintenance of the entire Office block.

The contractor shall provide on job training to the staff of ASCL/MCA so that after completion of O&M period, ASCL/MCA employees can easily maintain and Operate the systems on their own.

ICT infrastructure O&M key Metric requirements

#	Component	Severity Level	Uptime/Availability Requirement
1	Smart Parking Mobile Application - API & Web application Server	High	99.50%
2	Network Switch/Router and other accessories	High	99.00%
3	Central Web Application Server Hardware	High	99.50%
4	Desktop, Printers	Medium	99.00%
5	Video Management System	High	99.50%
6	Surveillance IP Camera / Per camera	Medium	99.00%
7	Network Video Recorders and accessories	High	99.50%
8	Entry / Exit boom Barrier Gate	High	99.00%
9	Data Collector/Processors	High	99.00
10	Display Units	High	99.00%
11	Handheld Barcode Ticketing Device	High	99.00%
12	Column based processor with Barcode & QR code Reader & Writer	High	99.00%
13	Replacement of Faulty devices	Very High	24 hours
14	Network connectivity with ICCC	Very High	99.95%
15	Manpower	Low	Man power / shift
16	Replacement of Manpower	Medium	Manpower as per contract and deployed
17	Sitting enclosures , chairs, tables, fans, AC. Lights, light enclosures or any other equipment/devices	Low	Within 48 hrs

## Definitions

- The scheduled maintenance should be carried out during nonpeak- hours and shall not exceed more than four (4) hours and not more than four (4) times in a year.
- “Uptime” – Time period for which the specified services are available in the period being considered for evaluation of Uptime.
- $\text{Uptime (\%)} = [1 - \{( \text{Total Downtime}) / (\text{Total Time} - \text{Scheduled Maintenance Time})\}] * 100$ .
- “Availability”: When the system is working properly performing all business and functional requirements as defined in this RFP.

$$\text{Availability} = ((\text{Agreed Hours} - (\text{Incident(s)} \times \text{Duration})) / \text{Agreed Hours}) * 100$$

- “Incident” – Any event/abnormalities in the service/system being provided that may lead to disruption in regular/normal operations and services to the end user.
- “Response Time” – Time elapsed from the moment an incident is reported to the Helpdesk either manually or automatically through the system to the time when a resource is assigned for the resolution of the same.
- “Resolution Time” – Time elapsed from the moment incident is reported to the Helpdesk either manually or automatically through system, to the time by which the incident is resolved completely and services as per the Contract are restored.

## Section VIII – General Conditions

### 7.3 Drawings

The drawings provided, hereunder, are indicative only. However, since this is a design-built-Operate contract, the contractor has to develop his own drawings and submit the same for approval before execution.

#### LIST OF DRAWINGS

Sl. No.	Description	Drawing Number	No. of Sheets
1.	Site plan with existing establishment for proposed Mechanized Fully Automatic Car Parking Facility in Kairon market		

Section VIII – General Conditions

**Revenue Model for Operation & Maintenance**

Section VIII – General Conditions

**Commercial Terms for Operation & Maintenance**

S. No.	Parameter	Details													
1.	<b>Project Details</b>	Minimum no. of four wheeler parking bays: 415 Minimum no. of two wheeler parking bays: 50													
2.	<b>Parking Operations</b>	The bidder shall be maintaining minimum of 30% of total bays for monthly pass holders and accordingly the daily user's bays shall be reduced to 70% of total bays as shown below. Also 50% of daily user four wheeler parking bays shall mandatorily have electric charging points as shown below:													
		Parking Type	Monthly Pass Bays	Daily Bays	Users	Charging Stations*									
		Four Wheelers	125	290	145										
		Two Wheelers	15	35	NA										
3.	<b>Revenue streams &amp; Parking Charges</b>	<p><b>(A) Revenue from parking:</b></p> <p>The bidder shall be allowed to charge as per its annual parking business plan but shall not be allowed charge more than below mentioned parking charges in year 1 of operations</p> <table border="1"> <thead> <tr> <th>Parking Type</th><th>Monthly Pass</th><th>Daily Users</th></tr> </thead> <tbody> <tr> <td>Four Wheelers</td><td>Rs 1000 Per month</td><td>Rs 40 for first four hours and Rs 10 per hour thereafter</td></tr> <tr> <td>Two Wheelers</td><td>Rs 250 per month</td><td>Rs 10 for every four hours</td></tr> </tbody> </table> <p>The above mentioned parking charges shall be allowed to increase by maximum of 10% from previous year parking charges after every 3 years</p> <p><b>(B) Revenue from e-vehicle charging</b></p> <p>The bidder shall be allowed to charge maximum of Rs 100 per e-vehicle charging for 8 hours.</p> <p>These charges shall be allowed to increase by maximum of 10% from previous year charges after every 3 years</p> <p><b>(C) Revenue from Visitor Facilitation Centre</b></p> <p>The bidder shall be allowed to lease out Visitor Facilitation centre admeasuring ~ 80 sq.m as per prevailing market rates for activities permitted</p> <p><b>(D) Revenue from Advertisement</b></p> <p>The bidder shall not be allowed for outdoor advertisement at building façade. The rights of advertisement outside the building façade shall be with Municipal Corporation Amritsar</p> <p>The bidder may participate in annual advertisement tender by Municipal Corporation Amritsar and can further earn from revenue from advertisement space as per The Punjab Outdoor Advertisement Policy 2012</p>					Parking Type	Monthly Pass	Daily Users	Four Wheelers	Rs 1000 Per month	Rs 40 for first four hours and Rs 10 per hour thereafter	Two Wheelers	Rs 250 per month	Rs 10 for every four hours
Parking Type	Monthly Pass	Daily Users													
Four Wheelers	Rs 1000 Per month	Rs 40 for first four hours and Rs 10 per hour thereafter													
Two Wheelers	Rs 250 per month	Rs 10 for every four hours													
4.	<b>License Fees</b>	<p><b><u>Annual License Fee</u></b></p> <p>The bidder shall be mandatorily paying the license fee as per the below mentioned criteria:</p>													

Section VIII – General Conditions

S. No.	Parameter	Details		
	Sl. No.	Description		Payment Time period
	1)	Revenue Share	The Bidder shall pay higher of the following: a) Revenue Share as 18% of Annual Gross Revenue from parking operations* OR b) Annual Guaranteed License Fee	The Revenue Share of the achieved Annual Gross Revenue from parking operations shall be due and payable latest by the first working day of 10 <sup>th</sup> day of next financial year. This would be positive difference of 18% Annual Gross Revenue from parking operations and Annual Guaranteed License fee which already paid in advance for the applicable year.
	2)	Annual Guaranteed License fee as defined by the Authority in the bidding documents escalated at the rate of 10% every year.	To be quoted by bidder. Minimum annual guaranteed license fee to be quoted by bidder shall be INR 25 lakhs in 1 <sup>st</sup> year and escalated at the rate of 10% every year	Annual Guaranteed License fee shall be due and payable, in advance, latest by the first working day of each financial year.  It is clarified that the payment of the first instalment of the Annual Guaranteed license fee shall be due on 1 <sup>st</sup> day of 13 month of the contract period. It's understood that completion of the complete facility has to be done in 12 months.

*\*This excludes possible revenue from leasing out visitor facilitation space*

## Section VIII – General Conditions

### **Section VIII: General Conditions**

These Conditions of Contract comprise two Parts: – General Conditions, and Particular Conditions of Contract.

The Conditions of Contract, Volume I: General Conditions, shall be those forming Part I of “FIDIC – Conditions of Contract for Design, Build and Operate Projects, FIDIC Gold Book (2008)”.

Copies of the FIDIC Conditions of Contract can be obtained from:

Federation International des Ingénieurs-Conseils (FIDIC) World  
Trade Centre II  
P O Box 311  
1215 GENEVA 15 (Switzerland)  
Facsimile: 41 22 799 4901  
Telephone: 41 22 799 4900

In cases of any differences, the provisions contained in Particular Conditions of Contract shall take precedence over the provisions of General Conditions.

## Section IX – Particular Conditions of Contract

### Section IX – Particular Conditions of Contract

CONTRACT DATA shall be read as Appendix to Tender

#### CLAUSE 1 GENERAL PROVISIONS Sub

##### Clause 1.1 Definitions

*Amend Subparagraph 1.1.1.10 of Sub-Clause 1.1. to read as follows:*

1.1.10(a) "Contract" means these Conditions of Contract (Parts I and II), the Employer's Requirements, the Tender, the Contractor's Proposal, the Schedules, the Letter of Acceptance, the Contract Agreement (if completed) and such further documents as may be expressly incorporated in the Letter of Acceptance or Contract Agreement (if completed).

For the purposes of defining the different activities and obligations under the Contract, the Contract will be comprised of a "**Works Contract**" and an "**O&M Contract**", as defined in the following Sub-paragraphs 1.1.10(b) and (c), respectively; such definitions are for convenience only and shall not affect the rights or obligations of the Employer or the Contractor under the Contract.

1.1.1.10(b) "**Works Contract**" means that portion of the Contract that relates to the **design, submittals, procurement, construction, fabrication, installation, testing, trial run, and commissioning of the Works or components of the Works, and the remedying of any defects including defect liability period** Operation and Maintenance, in accordance with the provisions of the Contract.

1.1.1.10(c) "**O & M Contract**" means that portion of the Contract that relates to the **Operation and Maintenance of the Works for the Operation and Maintenance Period**, as defined in the Appendix to Tender, but excluding the Works Contract, in accordance with the provisions of the Contract.

*Amend Subparagraph 1.1.11 of Sub-Clause 1.1. to read as follows:*

*Substitute the words 'if any' by words 'if completed' within the brackets.*

*Amend Subparagraph 1.1.75 of Sub-Clause 1.1 by adding the following words at the end:*

"The word '**Tender**' is synonymous with '**Bid**', and their derivatives, bidder/tenderer, bid/tender, bidding/tendering" as well as the words "Tender Documents" and "Bid Documents" are also synonymous."

*Delete Subparagraph -Clause 1.1.78 and replace it with the following:*

1.1.78 (i) "**Time for Completion of Works**" means the time period, starting from the Commencement Date, within which Contractor is required by Contract to complete the Works. The numerical value for Time for Completion of Works is specified in Appendix to Tender.

(ii) "**Operation and Maintenance Period**" means the time period during which the Contractor shall be fully responsible for operation and maintenance of the Works, starting from the date of completion of the Works as certified by the Employer's Representative]. The numerical value for Operation and Maintenance Period is specified in Appendix to Tender.

*Amend Sub paragraph 1.1.13to read as follows:*

1.1.13 "**Final Contract Completion Certificate**" means the certificate issued by the Employer's Representative upon satisfactory completion of the Operation and Maintenance responsibilities under Sub-Clause 8.6[*Contract Completion Certificate*].

## Section IX – Particular Conditions of Contract

*Delete Sub paragraph 1.1.16 and replace it with the following:*

1.1.16(a) “**Contract Price**” means the price as defined in Sub Clause 14.1[*The Contract Price*], and includes the adjustments in accordance with the Contract.

For the purposes of determining payments under the Contract and, where applicable, other obligations, the Contract Price shall be subdivided into a “**Works Contract Price**” and “**O&M Contract Price**”, as defined in the following Sub paragraphs 1.1.16(b) and (c), respectively.

The total “**Contract Price**” will be the sum of the Works Contract Price and the O&M Contract Price.

1.1.16(b) “**Works Contract Price**” means that portion of the Contract Price payable to the Contractor for performance of the Works Contract in accordance with the provisions of the Contract. The **Works Contract Price** will be the total of the amounts for carrying out the Works, as set out in Volume III Schedule of Prices, under for Various Packages

1.1.16(c) “**O&M Contract Price**” means that portion of the Contract Price payable to the Contractor for performance of the O&M Contract in accordance with the provisions of the Contract. The **O&M Contract Price** will be the total amount for operation and maintenance during the O&M period, as set out in Volume III , Schedule of Prices, under Schedule for Operation and Maintenance.

*Amend Sub paragraph 1.1.61 to read as follows:*

1.1.61 “Permanent Works” means all Civil, Mechanical, Electrical, Instrumentation and Control, and any and all allied components necessary for fully functional and operational installations and facilities capable of meeting all performance and other requirements specified in Volume II of Bid Documents,,

Add the Sub paragraph 1.1.84 as follows:

1.1.84 “Facilities” means the Works executed and completed by the Contractor after trial run and commissioning, and remedying defects therein in terms of the Contract.

Add Sub paragraph 1.1.85 as follows:

1.1.85 “Operations and Maintenance” means performance of any and all tasks and provision of any and all things necessary for the safe and efficient functioning of the Works in compliance with all applicable regulations and the O&M Contract. This includes but is not limited to supply of all labour, equipment, materials, fuel and other consumables, and all other necessary things.

## **Sub-Clause 1.5 Priority of Documents**

*Replace the list of documents listed under (a) to (h) with the following:*

1. The Contract Agreement ( including addenda, clarification, when signed by all parties concerned)
2. the Letter of Acceptance
3. Volume I Special Conditions of Contract
4. Volume I : General Conditions of Contract
5. Volume II Works Requirement / Technical Specification
6. Volume III: The Bid (accepted Price Proposal)
7. Volume IV: Bid Drawings
8. Completed Technical Schedules
9. Bidder's Technical Proposal other than Completed Technical Schedules
10. Any Other documents issued by the employer before signing the contract agreement and forming the part of the contract.

Section IX – Particular Conditions of Contract  
Sub-clause 1.6 Contract Agreements

*Replace the entire text of Sub clause 1.6 with the following:*

“A Contract Agreement in the form annexed, with such modifications as may be necessary to record the agreement reached, shall be executed within the time period. The costs of stamp duties and similar charges imposed by the law shall be borne by the Contractor.”

“Not signing the Contract Agreement for any reason whatsoever shall not affect the contract entered into by the Contractor and the Employer by the Letter of Tender and the Letter of Acceptance issued by them respectively”.

The Time period for signing the Contract agreement will be as per clause 49 of Section 1 ( ITB ) Instruction to Bidders –

Volume 1

**Sub-Clause 1.8 Assignments**

*Add the following text at the end of Sub-Clause 1.8:*

“Any assignment in terms of Sub-paragraph (b) above shall be subject to the condition that the bank or financial institution will not have any rights under or in relation to the Contract, except to direct that all or any payments that are offered to be made by the Party liable to make such payments be made to the person or to the account designated by the bank or financial institution.”

**Sub-Clause 1.9 Care and Supply of Documents**

*Replace the text of third paragraph with the following:*

If a Party becomes aware of an error or defect in a document which was prepared for use in performing work under the Contract, the Party shall promptly give notice to the other Party of such error or defect

*.Add the following text at the end of Sub-Clause 1.9:*

“Failure to issue such notice by the Employer or the Employer’s Representative to the Contractor in respect of any error in the Contractor’s Documents shall not in any manner relieve the Contractor of its obligation to ensure the correctness and accuracy of the Contractor’s Documents, and their compliance with the requirements of the Contract.”

**CLAUSE 2 THE EMPLOYER**

**Sub-Clause 2.1 Right of Access to the Site**

*Replace the first, second, and third paragraph of this sub clause with the following:*

The Employer shall give the Contractor right of access to, and licensee possession of, all parts of the Site starting from the “Date of Access to Site” stated in the Appendix to Tender. The right and possession may not be exclusive to the Contractor. If, under the Contract, the Employer is required to give (to the Contractor) licensee possession of any foundation, structure, plant, or means of access, the Employer shall do so at the time and in the manner stated in the Bid Documents. If no such information is provided in the Bid Documents, the Employer shall give the Contractor right of access to, and licensee possession of, the Site at such times as necessary in accordance with the program submitted under Sub-Clause 8.3 [Programme]. However, the Employer may withhold any such right or licensee possession until the Performance Security has been received.

If the Contractor suffers delays as a result of a failure by the Employer to give any such right or licensee possession in accordance with the Contract, the Contractor shall give notice to the Employer’s Representative and, subject to Sub-Clause 20.1[Contractor’s Claims], shall be entitled to

## Section IX – Particular Conditions of Contract

(a) An extension of time for any such delay, if completion is or will be delayed, under sub-clause 9.3 ( extension of Time for completion of Design Build: and

(b) Contractor will not be entitled for any additional payment and other costs due to such delays. There will be no claim for such financial implications to the Contractor

## CLAUSE 3 THE EMPLOYER'S REPRESENTATIVE

### Sub-Clause 3.1 Employer's representative Duties and Authority

*Delete the last sentence of third paragraph of this Sub-Clause 3.1 “The Employer undertakes.....except as agreed with the Contractor.”*

*Replace the entire text of fourth paragraph with the following:*

Whenever the Employer's representative exercises a specified authority for which the Employer's approval is required, then such exercise of authority shall be valid for the purposes of this Contract only if it is accompanied by approval from the Employer.

*Add the following text at the end of Sub-Clause 3.1:*

"The Employer's representative shall obtain specific written approval of the Employer before taking any of the following actions under the respective clauses of the Contract:

- (a) determining value, cost, or extension of time under Sub-clause 3.5 [*Determinations*],
- (b) approving Sub-contracting of any part of the Works under Sub-Clause 4.5.[*Nominated Subcontractors*],
- (c) granting an extension of the time for completion under Sub-Clause 9.3 [*Extension of Time for Completion*],
- (d) suspending progress of part or all of the Works under Sub-Clause9.7 [*Suspension of Works*]
- (g) issuing a **Final Contract Completion Certificate** for Completion of the Operations and Maintenance Services under Sub-Clause 8.6 [*Completion of the Operations and Maintenance Services*],
- (h) issuing a variation under Clause 13 [*Variations and Adjustments*],
- (i) determining the validity of any claims made by the Contractor under Sub-Clause 20.1 [*Contractor's Claims*].

Notwithstanding the obligation to obtain Employer's approval as set out in the preceding paragraph, if, in the sole opinion of the Employer's Representative, an emergency occurs affecting life-safety or the safety of the Works or of adjoining property, the Employer's Representative may, without relieving the Contractor of any of its duties and responsibilities under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the sole opinion of the Employer's Representative, be necessary to address the emergency. The Contractor shall forthwith comply with the instructions of the Employer's Representative despite the absence of approval of the Employer. The Employer's Representative shall determine whether the emergency situation was caused by the Contractor's actions or lack thereof or whether it was beyond the Contractor's control and make a recommendation to the Employer regarding extra costs payable to the Contractor, if any, for addressing the emergency situation. The Employer will make the final determination regarding whether or not any additional payments will be made to the Contractor."

## Section IX – Particular Conditions of Contract

Notwithstanding anything stated in this Contract, the Employer's Representative being treated as an Employee, agent or representative of the Employer for the purposes of this Contract, shall not be construed in any manner whatsoever for the purpose of attributing to the Employer any act, omission, determination, certification, or evaluation of the Employer's Representative under or in relation to this Contract and the Employer shall be entitled to dispute any or all such acts, omissions, determinations, certifications, or evaluations made by the Employer's Representative as provided under this Contract, either before the DAB or by arbitration.

### **Sub-Clause 3.3 Instructions of the Employer's representative**

*Delete the entire text of Sub-Clause 3.3 and replace it with the following:*

The Employer's Representative may at any time issue written instructions to the Contractor to perform tasks that may be necessary for proper execution of the Works and/or the remedying of any defects, all in accordance with the Contract. The Contractor shall promptly comply with such instructions. Failure to so comply may result in delays in the payments associated with the work components in question.

### **Sub-Clause 3.4 Replacement of Employer's representative**

*Add the following text at the end of Sub-Clause 3.4:*

"The Employer's representative shall serve as an agent or a representative of the Employer. Mere change in the incumbent of the position of the Employer's Representative by reason of transfer, retirement or otherwise shall not be construed as replacement of the Employer's Representative for the purpose of this Contract."

*Add Sub-clause 3.6 –Meetings, as below:*

### **Sub-Clause 3.6 Meetings**

"The Employer's Representative or the Contractor may require the other to attend meetings as necessary in order to discuss matters related to the Works or Operation and Maintenance. The party initiating the meeting shall provide a written agenda to the other party no less than three (3) working days prior to the date of the meeting, unless the meeting is required to address an emergency. The party initiating the meeting shall prepare meeting minutes documenting the proceedings of such meetings and supply copies of the minutes to those attending the meetings and to the Employer. The minutes shall assign responsibilities for any actions to be taken in accordance with the Contract."

Add the Following Sentence at the End of Clause 3

The word Engineer in Charge / Engineer / Project Manager / PMC is synonymous with Employer's Representative

## Section IX – Particular Conditions of Contract

### **CLAUSE 4 THE CONTRACTOR**

#### **Sub-Clause 4.1 Contractor's General Obligations**

*Add the following sentence to precede the existing text under Sub-Clause 4.1:*

"The Contractor shall check the design criteria and calculations (if any) included in the Bid Documents and satisfy itself regarding their accuracy and adequacy. Contractor shall meet the minimum design and sizing requirements specified in the Bid Documents – a design that does not meet such minimum requirements shall not be acceptable and will result in rejection. Further, if Contractor believes that the minimum design and sizing requirements specified are not adequate to meet the minimum performance requirements specified, then Contractor shall make whatever upward adjustments to the design and sizing it deems necessary to meet the performance requirements and include these in the Bid Price. Contractor assumes full responsibility for meeting the specified performance requirements and ensuring the adequacy of the Works for this purpose."

*In the second sentence of the fifth paragraph replace the words 'notified to' by the words 'approved by'.*

*Add the following sentence at the end of Sub-Clause 4.1:*

"The Contractor shall attend all meetings as required by the Employer or the Employer's Representative."

#### **Sub-Clause 4.2 Performance Security**

*Replace the entire text of Sub-Clause 4.2 with the following:*

"The Contractor shall provide a Performance Security at his cost for its proper performance of the Contract, to be delivered to the Employer within 14 days after the receipt of the Letter of Acceptance. The Performance Security will be as specified in the Appendix to Tender, and shall be in the form of an unconditional and irrevocable bank guarantee issued either by a Nationalized or Scheduled Bank located in India or a foreign bank through a correspondent bank located in India and acceptable to the Employer.

The Performance Security shall be valid 60 days beyond until the Contractor has fully and satisfactorily completed all of its obligations of the DB Contract. Half of the performance security shall be released after issuing of Commissioning Certificate; the remaining half of Performance Security will be released to contractor after completion of contract i.e. completion of Operation & Maintenance period and shall be valid up to 30 days beyond expiry of the Operation and Maintenance Period."

The Performance Security for the Operation and Maintenance Period will be released to the Contractor within 14 days of the issue of the Final Contract Completion Certificate following completion of Operation and Maintenance of the facilities as per Sub-Clause 10.6.

Prior to making a claim under the Performance Security, the Employer shall, in every case, notify the Contractor stating the nature of the default for which the claim is to be made."

## Section IX – Particular Conditions of Contract

### **Sub-Clause 4.3 Contractor's Representative**

*At the end of Sub-Clause 4.3 add the following:*

"If the Contractor's Representative is not fluent in the English language, the Contractor shall make a competent interpreter available during all working hours for the entire duration of the Contract."

### **Sub-Clause 4.4 Subcontractors**

*Replace the entire text of Sub-Clause 4.4 with the following:*

"The Contractor shall not subcontract more than 25% (twenty-five percent) of the Works Contract Price, and any proposed subcontracts shall be subject to the following conditions:

- (a) for all subcontracts, whether proposed in the tender or at a later date, the Contractor shall, in the format provided in Volume I, Section IV A Bidding Forms (Schedule VII - Sub- Contracting), submit a list of proposed Subcontractors along with their credentials including technical capability, financial capability, and experience in works similar to those which are proposed to be subcontracted;
- (b) the Employer's Representative will scrutinize the proposals submitted by the Contractor and approval of the Subcontractors will be based on their overall capacity to execute the works proposed to be subcontracted;
- (c) the prior approval of the Employer's Representative shall be obtained for all proposed Subcontractors, as well as for the proposed agreement(s) between the Contractor and such proposed Subcontractors;
- (d) the Contractor shall submit a copy of the proposed agreement between the Contractor and the proposed Subcontractor, and such agreement shall require approval of the Employer's Representative.

The Contractor shall be responsible for ensuring that no unauthorized subcontractors are permitted to work on any part of the Site. If, at any stage during execution, a subcontractor is found working at the Site without prior approval of the Employer's Representative, then the work being done by that subcontractor shall be stopped, the subcontractor shall be expelled from the Site, and the Employer's Representative and Employer will jointly determine what components of the subcontractor's work are acceptable, what components shall be reworked or remedied by the Contractor, and what payment, if any, is payable for the subcontractor's work.

The act of subcontracting any part or component of the Works shall not relieve the Contractor of his overall responsibilities under the Contract. The Contractor shall be responsible for compliance by all Subcontractors with all the provisions of the Contract. The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents, or employees, as fully as if they were the acts or defaults of the Contractor, his agents, or employees.

In the event that the Employer's Representative determines that any Subcontractor's performance with respect to progress, quality, or Contract compliance is unsatisfactory, then the Contractor will be required to remove such Subcontractor from the Site and either undertake the Works itself or provide a suitably qualified replacement. If any delays occur as a result, the Contractor will be responsible for taking any necessary actions to make up the lost time, for which no additional payments or extension of time will be granted."

## Section IX – Particular Conditions of Contract

The Contractor shall carry out all Operation and Maintenance of the Works solely by himself and shall not subcontract any part of the O&M Contract.

### **Sub-Clause 4.6 Co-operation**

*In the last paragraph replace the words ‘possession of’ by the words ‘access to’.*

*At the end of Sub-Clause 4.6 add the following:*

"The Contractor shall be responsible for the co-ordination and proper execution of the Works, including co-ordination with other contractors, sub-contractors, and organizations to the extent specified in the Employer's Requirements".

### **Sub-Clause 4.8 Safety Procedures**

*Replace the entire text of Sub-Clause 4.8 with the following:*

Unless otherwise stated in the Employer's Requirements, the Contractor shall, from the date of the Employer providing right of access to or licensee possession of the Site to the Contractor under Sub Clause 2.1 [*Right of Access to the Site*], until completion of its obligations under the Contract (including the O&M Contract), shall:

- (a) comply with all applicable health and safety regulations,
- (b) ensure the health and safety of all persons present on the Site in an authorized capacity,
- (c) use reasonable efforts to keep the Site and the Works clear of debris or unnecessary obstructions,
- (d) provide lighting, and security for the Site and the Works
- (e) provide any Temporary Works (including roadways, walkways, guardrails, and fences) that may be necessary for performance of the Contractor's work, for the use and protection of the public and of the Employers and occupiers of adjacent land.

"The Contractor shall submit, within fourteen (14) days of signing of the Contract Agreement, the required Safety Plan developed in accordance with the requirements set out in Volume II, for approval by the Employer's Representative. The Employer's Representative will either approve the submittal or provide comments thereon to the Contractor within fourteen (14) days of submission by the Contractor. The Employer's Representative's, approval, disapproval, comments, or failure to provide any of these to the Contractor, shall in no way relieve the Contractor of any of its obligations or responsibilities under the Contract."

## Section IX – Particular Conditions of Contract

### **Sub-Clause 4.9 Quality Assurance**

*Replace the entire text of Sub-Clause 4.9 with the following:*

“The Contractor shall institute a Quality Assurance and Quality Control (QA/QC) system in accordance with the requirements set out in Volume II to demonstrate compliance with the requirements of the Contract.

The Contractor shall submit, within fourteen (14) days of signing of the Contract Agreement, the required Quality Assurance and Quality Control (QA/QC) Program for approval by the Employer’s Representative. The Employer’s Representative will either approve the submittal or provide comments thereon to the Contractor within fourteen (14) days of submission by the Contractor. The Employer’s Representative’s, approval, disapproval, comments, or failure to provide any of these to the Contractor, shall in no way relieve the Contractor of any of its obligations or responsibilities under the Contract.”

The Contractor, prior to commencement of work at the Site, shall set up his own laboratory, with prior notification to the Employer’s Representative. The calibration of the laboratory equipment and instruments shall be certified by agencies approved by the Employer’s Representative. Laboratory equipment shall be properly maintained and calibrated throughout the period of the Contract by the Contractor at his own expense.

The Contractor shall give the Employer’s Representative reasonable advance notice prior to conducting any tests required by the Bid Documents, which the Employer’s Representative may choose to witness at his discretion. The Employer’s Representative will also inspect the laboratory if deemed necessary and the Contractor shall provide adequate facilities to the Employer’s Representative that may be necessary for witnessing testing or for independent verification of the accuracy and adequacy of the facilities and equipment. The list of mandatory equipment to be provided at the Site by the Contractor is indicated in Volume II.

Compliance with the QA/QC system shall not relieve the Contractor of any of his duties, obligations, or responsibilities under the Contract.

## Section IX – Particular Conditions of Contract

### **Sub-Clause 4.10 Site Data**

*Insert the following paragraph after first paragraph:*

"The Employer does not warrant either the sufficiency or accuracy of site data provided in the Bid Documents or elsewhere. The Contractor shall be fully responsible for independently verifying or obtaining any and all site data that Contractor deems necessary to prepare the bid. Any Site data in Employer's possession that is not included in the Bid Documents will be available for inspection at the Employer's address provided in the Appendix to Tender.

## Section IX – Particular Conditions of Contract

*In the first sentence of the second paragraph, delete the following words:*

“To the extent which was practicable (taking account of cost and time),”

*In the Fourth sentence of the second paragraph delete the following words:*

“To the same extent,”

*Replace the text of Item (c) with the following:*

“the extent and nature of the work and Goods necessary for execution and completion of the Works Contract and the O&M Contract.”

### **Sub-Clause 4.11 Sufficiency of the Accepted Contract Amount**

*Add the following words at the end of the last sentence of this Sub-clause:*

...., and satisfactory completion of the O&M Contract.”

### **Sub-Clause 4.12 Unforeseeable Physical Conditions**

*Replace Sub paragraph (b) of the Sub Clause with the following:*

b) Except as otherwise stated in the Agreement or mutually agreed upon with ASCL

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

### **Sub-Clause 4.17 Contractor's Equipment**

*Replace the first sentence with the following:*

“Unless otherwise stated in the Employer’s Requirements, the Contractor shall provide all Contractor’s Equipment necessary to fully and satisfactorily complete the Works Contract and the O&M of the facilities”

*Add the following paragraph at the end of this Sub-clause:*

## Section IX – Particular Conditions of Contract

"The Contractor shall submit, within fourteen (14) days of signing the Contract Agreement, the proposed Deployment Program for all necessary Equipment, Plant, and Machinery to be used for construction, for approval by the Employer's Representative. Such Deployment Program shall be developed using normally available commercial project management software and shall show equipment, plant, and machinery at micro level detail, along with Bar charts, essential for systematic and professional management of all construction works. The Employer's Representative will either approve the submittal or provide comments thereon to the Contractor within fourteen (14) days of submission by the Contractor. The Employer's Representative's, approval, disapproval, comments, or failure to provide any of these to the Contractor, shall in no way relieve the Contractor of any of its obligations or responsibilities under the Contract."

### **Sub-Clause 4.19 Electricity, Water and Gas**

*Rename this Sub-Clause as "Electricity and Water"*

*Replace the entire text of Sub-Clause 4.19 with the following:*

For performance of the Works Contract except Tests on Completion:

The Contractor shall be responsible for provision of all power, water, and other services the Contractor may require for performance of the Works Contract. This includes contacting the appropriate utility or service providers and applying for connections as necessary. At its sole discretion, the Employer may provide a water connection to the Contractor on an "as is" basis, with no guarantee of any kind provided regarding the quality, quantity, or availability of the water whatsoever. Should the Contractor choose to avail himself of this facility, he shall, at his own risk and cost, provide all piping, fittings, and other equipment necessary for his use and for metering of the water and any treatment needed. The Contractor shall pay the Employer for water consumed at the commercial rate as indicated in the Appendix to Tender. The Contractor is to ensure that the quality of Water remains suitable for the purpose for which it is intended.

For performance of Tests on Completion and the O&M Contract:

Provision of electricity during Tests on Completion and during the Operation and Maintenance Period shall be the responsibility of the Contractor.

Provision of water for any and all uses in the Works during the Operation and Maintenance period shall be the responsibility of the Contractor.

### **Sub-Clause 4.21 Progress Reports**

*Amend the first sentence to read as follows:*

"Monthly Progress Reports, along with photographs depicting the progress achieved in the month, shall be prepared by the Contractor in a format approved by the Employer's Representative and the Employer and submitted to the Employer's Representative."

Delay in submitting the Monthly Progress Reports in the approved format within the stipulated time, the Contractor shall be levied a penalty of INR 10,000 (Rupees Ten Thousand Only) per month.

*Add the following sentence at the end of the Sub-Clause:*

"The Special reporting requirements during the Operation and Maintenance Period shall be as specified in the Employer's Requirements."

## Section IX – Particular Conditions of Contract

### CLAUSE 5 DESIGN

#### Sub-Clause 5.1 General Design Obligations

*Replace the first sentence with the following sentence:*

“The Contractor shall carry out, and be responsible for, the design of the Works, including any site surveys, subsoil investigations, materials testing, and all other things necessary for proper planning and design.”

*Add the following paragraphs at the end of this Sub-Clause:*

“The Contractor shall establish a design liaison office at Amritsar City within twenty eight (28) days from the Commencement Date to facilitate preparation and submission of designs, drawings, construction documents, etc., for review and approval by the Employer’s Representative. The design liaison office shall preferably be located near the Employer’s office to facilitate communications and frequent interactions with the Employer’s Representative and the Employer. The Contractor shall provide full-time design staff and continuously maintain the design liaison office until such time as all necessary designs and Construction Documents have been completed, reviewed, and approved by the Employer’s Representative.

The Contractor will be fully responsible for ensuring that its designs, drawings, and construction documents satisfy all requirements for constructing Works that are complete and fully functional in all respects.

#### Sub-Clause 5.2 Contractor’s Documents

*In Sub-Clause 5.2 replace sub-paragraph (a) with the following:*

(a) The Contractor shall submit, within 14 days of signing the Contract Agreement, the proposed “Submission and Anticipated Approval Programme” for all necessary Contractor’s Documents (such as resources required, productivity, deployment schedule) for approval by the Employer’s Representative. Such Program shall ensure availability of all construction documents on site in a timely manner, which is essential for systematic and professional management of all construction works. The Employer’s Representative will either approve the submittal or provide comments thereon to the Contractor within fourteen (14) days of submission by the Contractor. The Employer’s Representative’s, approval, disapproval, comments, or failure to provide any of these to the Contractor, shall in no way relieve the Contractor of any of its obligations or responsibilities under the Contract. Construction on any component of the Works shall not commence until the Contractor receives from the Employer’s Representative approval of all Contractor’s Documents relevant to the design and construction of the component. If the Employer’s Representative fails to respond to a Contractor’s Document at the end of 14 days, despite the Contractor’s written reminder at the end of the 21-day “review period”, then the Employer’s Representative shall be deemed to have approved that Document.”

#### Sub-Clause 5.4 Technical Standards & Regulations

*Add the following sentence to the end of Sub-Clause 5.4:*

“With respect to technical standards, National or International Standards other than those specified may be acceptable, subject solely to the Employer’s Representative’s approval.”

### CLAUSE 6 STAFF AND LABOUR

#### Sub-Clause 6.5 Working Hours

*Add the following at the end of this Sub-Clause:*

“The above applies to the Works Contract. For the O&M Contract, working hours shall be twenty four (24) hours per day, every day of every year within the O&M Period.”

## Section IX – Particular Conditions of Contract

### **Sub-Clause 6.7 Health and Safety**

*Add the following paragraph after first paragraph:*

"In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and/or carry out all such regulations, orders, and/or requirements as may be applicable, including those imposed by various governments and the local medical or sanitary authorities."

*Amend the last sentence of second paragraph to read as follows:*

"Throughout the execution of the Works and the Operation and Maintenance Period, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority."

### **Sub-Clause 6.8 Contractor's Superintendence**

*Add the following paragraph at the end of Sub-Clause 6.8:*

"The Contractor shall submit, within fourteen (14) days of signing the Contract Agreement, the proposed Deployment Program for all key personnel as well as workers for superintendence of construction activities for approval by the Employer's Representative. Such Deployment Program shall show details of qualifications and experience of key personnel and the number of skilled/Fully skilled/unskilled workers to be deployed on a timeline, which is essential for proper superintendence and systematic and professional management of all construction works. The Employer's Representative will either approve the submittal or provide comments thereon to the Contractor within 14 days of submission by the Contractor. The Employer's Representative's, approval, disapproval, comments, or failure to provide any of these to the Contractor, shall in no way relieve the Contractor of any of its obligations or responsibilities under the Contract. At least seventy-five percent (75%) of the Contractor's Superintending staff shall have a working knowledge of the English language, or the Contractor shall have a sufficient number of competent interpreters available on site during all working hours."

None of the Contractor's Representative, supervisors, or labour staff shall be withdrawn from the Works without due notice being given to the Employer's Representative. Further, no such withdrawals shall be made if in the sole opinion of Employer's Representative, such withdrawals will jeopardize the progress and timely, successful completion of the Works.

### **Sub-Clause 6.10 Records of Contractor's Personnel and Equipment**

*Replace the last sentence of this Sub-Clause with the following:*

"Details shall be submitted each calendar month, in a form approved by the Employer's Representative, until the Contractor has completed all work under both the Works Contract and the O&M Contract according to the terms of the Contract."

*Add the following paragraph at the end of Sub-Clause 6.10:*

"During the Operation and Maintenance Period, the Employer shall be notified of any changes to the Personnel or Equipment at the end of each calendar month"

*Add the following Sub-Clauses under Clause 6 - Staff and Labour:*

### **Sub-Clause 6.12 Foreign Staff and Labour**

"The Contractor may employ such personnel as are required to execute the Works. The Contractor must ensure that all such personnel are provided with or otherwise obtain the required visas and work permits and comply with all legal requirements. The Contractor shall be responsible for all personnel who are foreign

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nationals for the duration of their engagement with the Contractor in connection with this Contract, and shall also be responsible for ensuring the return of such personnel at the end of the engagement to their previous engagement or domicile in or outside India.”

### **Sub-Clause 6.13 Measures Against Insect & Pest Nuisance**

“The Contractor shall at all times take the necessary precautions to protect all staff and labor employed on the Site from insect and pest nuisance, and to reduce the dangers to public health and the general nuisance occasioned by the same. The Contractor shall provide its staff and labor with suitable prophylactics for the prevention of malaria and dengue fever, and take steps to prevent the formation of stagnant pools of water. The Contractor shall comply with all the regulations of the local health authorities and shall arrange to spray thoroughly with approved insecticide all buildings erected on the Site. Such treatment shall be carried out at least once a year or as instructed by such authorities.”

### **Sub-Clause 6.14 Alcoholic Liquors or Drugs**

“The Contractor shall not, other than in accordance with the Statutes, Ordinances, Government Regulations, or orders that may be in effect from time to time, import, sell, give, barter, or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter, or disposal by his Subcontractors, agents, staff, or labor.”

### **Sub-Clause 6.15 Arms and Ammunition**

“The Contractor shall not give, barter, or otherwise dispose of any arms or ammunition of any kind or permit or suffer any such gift, barter or disposal by his subcontractors, agents, staff, or labor.”

### **Sub-Clause 6.16 Festivals and Religious Customs**

“The Contractor shall in all dealings with his staff and labor show due regard for all recognized festivals, days of rest, and religious or other customs.”

## **CLAUSE 7 PLANT, MATERIALS, AND WORKMANSHIP**

### **Sub-Clause 7.1 Manner of Execution**

*Replace the first sentence with the following:*

**The Contractor shall carry out the manufacture of Plant and or replacement and/or repair of the Plant, the production and manufacture of Materials, and all other execution of the Works and Operation and Maintenance:**

*Add the following paragraph at the end of Sub-clause 7.1:*

“The Contractor shall submit, within 60 days of signing the Contract Agreement, the proposed Procurement Program for all necessary Equipment, Plant, and Materials (including but not limited to Pumps, Motors, Compressor, Surge Vessels, Piping, Electrical Equipment, Structural Steel, Cement, Reinforcement Steel, Fuels, Lubricants, Spare Parts, etc.) to be incorporated into the

### **Section IX – Particular Conditions of Contract**

Works for approval by the Employer's Representative. Such Procurement Program shall be developed using a normally available commercial project management software and shall show detailed planning and scheduling for placing of orders, inspections by the Contractor, Employer's Representative, Employer, and/or Third Party Agencies, as applicable, and transportation plans and delivery schedules for all Equipment, Plant, and Materials to be incorporated into the Works as essential for systematic and professional management of all construction works. The Employer's Representative will either approve the submittal or provide comments thereon to the Contractor within fifteen (15) days of submission by the Contractor. The Employer's Representative's, approval, disapproval, comments, or failure to provide any of these to the Contractor, shall in no way relieve the Contractor of any of its obligations or responsibilities under the Contract."

#### **Sub-Clause 7.3 Inspection**

*Replace Sub-paragraph (b) of the first paragraph of Sub-Clause 7.3 with the following:*

"during production, manufacture, and construction (at the Site and elsewhere), and during the O&M Period, be entitled to examine, inspect, measure, and test the materials and workmanship, and to check the progress of manufacture of Plant, production and manufacture of Materials, and Operation and Maintenance."

Employer may appoint third party for auditing, inspection and testing of the material and workmanship, and accounts or any other work done by contractor during design, construction and O&M period.

#### **Sub-Clause 7.4 Testing**

*Delete the first sentence of the fourth paragraph "The Employer's Representative shall give the Contractor ... intention to attend the tests."*

#### **Sub-Clause 7.7 Employer ship of Plant and Materials**

*Add at the end of sub clause 7.7 :*

Notwithstanding the provisions of the preceding paragraph of this Sub clause 7.7, the Contractor shall not be entitled to payment for Plant and Materials which are not in compliance with the Specifications or any other terms or requirements of this Contract.

#### **Sub-Clause 7.8 Royalties**

*Replace Sub-Clause 7.8 with the following:*

"Unless otherwise stated in the Employer's Requirements, and in accordance with the prevailing rules and rates specified by the Government of Punjab , the Contractor shall pay all applicable royalties, rents, and other payments to the relevant parties for:

- (a) all Equipment, Plant, and Materials used in the Works, and
- (b) the disposal of material from demolitions and excavations and of other surplus materials (whether natural or manmade), except to the extent that disposal areas within the site are specified in the Contract.

*Add the following Sub-Clause under Clause 7 - Plant, Materials, and Workmanship*

#### **Sub-Clause 7.9 Failure to Remedy Defects or to Complete Part of Works**

"If the Contractor fails to remedy any defect in the Plant, Materials, design, or workmanship, or if the Contractor fails to complete any part of the Works deemed necessary by the Employer within a reasonable time

## **Section IX – Particular Conditions of Contract**

after being notified by the Employer's Representative, the Employer or the Employer's Representative may fix a date on or before which to remedy the defect or damage or to execute the part of the Works in question to the satisfaction of the Employer's Representative, and give the Contractor reasonable notice of such date."

If the Contractor fails to remedy the defect or damage or to complete the required part of the Works by the specified date the Employer may (at his sole discretion):

- (a) carry out the work himself or by others, in a reasonable manner, and at the Contractor's risk and expense; the costs properly incurred by the Employer in remedying the defect or damage or in executing part of the Works shall be recoverable from the Contractor by the Employer and will be calculated based on the direct cost of any labor, equipment, materials, superintendence, and other services provided by the Employer for carrying out such work, as certified by the Employer's Representative, plus an administration fee of twenty percent (20%) of the direct costs to cover overheads and other indirect costs; or
- (b) require the Employer's Representative to determine and certify a reasonable reduction in the Contract Price; or
- (c) if, in the sole opinion of the Employer, the defect, damage, or uncompleted work is such that the Employer has been deprived of substantially the entire benefit of the Works or parts of the Works, terminate the Contract with respect to such parts of the Works as cannot be put to the intended use: the Employer shall then be entitled to recover all sums paid for such parts of the Works, together with the cost of dismantling the same, clearing the Site, and returning Plant and Materials to the Contractor, and the provisions of Clause 15 [Termination by Employer] will apply."

The cost due to the items '(a)' to '(c)' will be recovered from the Contractor. This cost is in addition to the maximum delay damages of 10% of works contract price as indicated in Appendix to Tender.

## **CLAUSE 8 COMMENCEMENT DATE, COMPLETION AND PROGRAMME**

### **Add sub clause 8.9 Commencement of work as per below**

"The Contractor shall commence the design of the Works as soon as is reasonably possible after receipt of the Notice of the Commencement Date from the Employer's Representative, but in any event not later than the earlier of  
(i) 14 days after establishing the design liaison office, or  
(ii) 30 days after issue of Notice of commencement date. The Contractor shall commence the execution of the Works as soon as is reasonably possible after receipt of a notice to this effect from the Employer's Representative, but in any event not later than the earlier of  
i) 21 days after commencing establishment of the Site offices and field laboratories, or  
ii) 60 days after issue of Notice to Commence."

"The Contractor shall commence the Operation and Maintenance services immediately after successful commissioning of the Works and issuance of the Taking-Over Certificate by the

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Employer. The Works will be handed over back to the Contractor for the purpose of Operation and Maintenance."

### **Sub-Clause 8.2 Time for Completion**

*Replace the text of Sub-Clause 8.2 in its entirety with the following:*

"The Contractor shall ensure that various components of the Works are executed in conformity with the Volume II Technical Specifications / Works requirement, and that the Works are fully completed within the Time for Completion specified in the Appendix to Tender.

The entirety of the Works shall be completed and shall have passed the Tests on Completion, trial run, and commissioning within the Time for Completion of the Works as specified in the Appendix to Tender. The Taking-Over Certificate will be issued upon successful completion of the Tests on Completion, trial run, and commissioning,

Operation and Maintenance of the Works shall be carried out for the Operation and Maintenance Period as specified in the Appendix to Tender."

The time for completion of the Project is 1 Year (12 months) from the date of commencement of works. 3 months for the completion of the Design and 9 months for the completion of Construction and 120 months of Operation and maintenance including 24 months defect liability period.

### **Sub-Clause 8.3 Programme**

Add the following at the end of Sub-Clause 8.3:

*"Notwithstanding anything to the contrary in the above paragraphs of this Sub-Clause 8.3 or elsewhere in the Bid Documents, the Contractor shall be fully responsible for ensuring that the Works are fully completed within the Time for Completion of Works specified in the Appendix to Tender and in conformity with the Volume II Work requirement and technical specification. The Contractor shall submit, within 14 days of signing the Contract Agreement, the proposed Construction Program for approval by the Employer's Representative. Such Construction Program shall be developed using a normally available commercial project management software (such as Primavera, MS Project, or equivalent) and shall show detailed micro-level activities together with Gantt charts, CPM diagrams, critical paths, daily schedules, resources allocated, etc., as needed for systematic and professional management of all construction works. The Employer's Representative will either approve the submittal or provide comments thereon to the Contractor within 14 days of submission by the Contractor. The Employer's Representative's, approval, disapproval, comments, or failure to provide any of these to the Contractor, shall in no way relieve the Contractor of any of its obligations or responsibilities under the Contract.*

*In the event that the Contractor's actual progress falls behind the planned progress for reasons that are not outside the control of the Contractor, the Contractor shall accelerate his schedule to the extent required to ensure full completion of the Works within the Time for Completion of the Works, for which no additional payment will be made."*

### **Sub-Clause 8.5 Delay Damages**

*Add the following after the first paragraph:*

*Delay damages will be linked to the Project Schedule and Milestone prepared by Contractor and mutually agreed by both parties, Client & Contractor" If the Contractor fails to provide Operation and Maintenance for the entire O&M Period specified in the Contract, and such failure:*

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- (a) is due to a cause for which the Contractor is responsible, and
- (b) results in the Employer losing revenue or income which the Employer normally would have expected to receive during the Operation and Maintenance Period, or
- (c) results in the Employer suffering any other loss which he would not have suffered but for such failure, or
- (d) results in inadequate treatment service and/or inadequate performance

then the Contractor shall pay to the Employer compensation in accordance with Sub-Clause 22.5 [*Delays and Interruptions during the Operation and Maintenance*].”

## CLAUSE 9 DESIGN-BUILD

### Sub-Clause 9.5

#### Rate of Progress

*Add the following at the end of this Sub-Clause:*

The Contractor shall endeavour to advise the Employer in advance of any known or probable future events or circumstances which might adversely affect progress. The Employer may require the Contractor to submit an estimate of the anticipated effect of the future events or circumstances, and/or a proposal under Sub-Clause 13.3 [*Variation Procedure*].”

## CLAUSE 11 TESTS

### Sub-Clause 11.4 Failure to Pass Tests on Completion of Design-Build

*Replace the Second paragraph in its entirety with the following:*

In the event that the Works fail to pass any or all of the Tests on Completion as defined in Volume II, the Employer will levy Damages, based on the extent or magnitude of such failure, in accordance with the formulation provided in the Appendix to Tender.

If the following conditions apply:

- (a) the Works, or a Section, fail to pass any or all of the Tests on Completion,
- (b) the relevant sum payable as damages for such failure is stated (or its method of calculation is defined) in the Appendix to Tender, and
- (c) the Contractor pays such relevant damages to the Employer then the Works or such Section shall be deemed to have passed such Tests on Completion. However, the total amount of Delay Damages for Works and Damages for failure to pass the Tests on Completion as defined in this Sub-Clause shall not exceed the maximum amount of ‘Delay Damages for Works’ stated in the Appendix to Tender.”The damages will be accessed by Independent Engineer/PMC on actuals

### Sub Clause 11.7 Commissioning Certificate

#### Add the Following Sentence at the End of Clause

The Phrase “Taking Over Certificate” is synonymous with “Commissioning Certificate”

## CLAUSE 12 DEFECTS

## Section IX – Particular Conditions of Contract

### **Sub-Clause 12.1 Completion of Outstanding Work and Remedying Defects**

*Add the following in the end of Sub-Clause 12.1:*

During the Operation and Maintenance Period the Contractor shall be responsible for repairing and making good any damage or defect occurring during the Operation and Maintenance Period, whether such defect or damage is identified by the Employer's Representative / Employer or observed by the Contractor himself.

The Final Contract Completion Certificate on Completion of the Operation and Maintenance Contract described under Sub-Clause 8.6 will not be issued until all defects and damage have been remedied and all outstanding work, including all such items identified during the joint inspection made in accordance with Sub-Clause 11.8 [Joint Inspection Prior to Contract Completion] have been completed.

### **Sub-Clause 12.2 Cost of Remedying Defects**

*Add the following Sub-paragraph 12.2(c)*

- (c) Improper Operation and Maintenance attributable to the Contractor.

*Add the following Sub-Clause 12.7*

### **Sub-Clause 12.7 Completion of Operations and Maintenance Services**

"In order that the Works shall be in the condition required by the Contract at the end of the Operation and Maintenance Period and can be handed over to the Employer in good operating condition (fair wear and tear excepted), the Contractor shall:

- (a) ensure that all components of the Works are fully functional and in good operating condition, suitable for the purposes for which they are intended;
- (b) ensure that all defects or damages which may have arisen from the design, workmanship, materials, or Operation and Maintenance, have been identified and remedied;
- (c) provide replacements for all spare parts that were used/consumed during the Operations and Maintenance Period; all such replacements shall be new and manufacturer's original equipment only; and
- (d) execute all required work of amendment, reconstruction, repair, and remedying of defects and damage per instructions of the Employer or Employer's Representative.

All such work shall be executed by the Contractor at his own cost before handing over the Works. In the event that the Contractor fails to carry out the necessary remedial works, the Employer's Representative shall notify the Contractor, and proceed in accordance with the provisions of. Any costs incurred by the Employer in so doing shall be recoverable from the Contractor and will become a debt due and payable by the Contractor to the Employer and the Employer may, at his sole discretion, recover such amount by invoking the Contractor's bank guarantee or by any amount due to contractor.

The Contract shall not be considered to be completed until the Final Contract Completion Certificate has been signed by the Employer's Representative and delivered to the Contractor, stating the date upon which the Contractor has completed his operation and maintenance obligations to the satisfaction of the Employer's Representative.

The Final Contract Completion Certificate shall be given by the Employer's Representative within 28 days after the end of the Operation and Maintenance Period, or as soon after such date as the Contractor has completed his obligations.

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Only the Final Contract Completion Certificate shall be deemed to constitute final certification that the Contractor has satisfactorily fulfilled all of his obligations under the Contract."

### CLAUSE 13 VARIATIONS AND ADJUSTMENTS

#### Sub-Clause 13.8 Adjustment for Changes in Cost

*Delete the text of Sub-Clause 13.8 in its entirety and replace it with the following:*

13.8.1 The amount payable to the Contractor and valued at base prices in accordance with the payment Schedule shall be adjusted for rises or falls in the cost of Labor, Equipment, Plant, Materials and other inputs to the Works, by the addition or deduction of the amounts determined by the formulae prescribed in this Sub-Clause. To the extent that full compensation for any rise or fall in costs to the Contractor is not covered by the provisions of this or any other clause in the Contract, the Contract Price shall be determined to include amounts to cover the contingency of such other rise or fall in costs.

13.8.2 **Adjustment Formula:** The amount to be added to or deducted from the Interim Payment Certificates for changes in cost and legislation shall be determined from formulae for each of the currencies in which the Contract Price is payable and for each of the sections of work priced in the said Schedule. The formulae is given in Schedule 4.

The source of indices shall be those listed in the Appendix to Tender

13.8.3 **Base, Current and Provisional Indices:** The cost indices or reference prices specified in the Appendix to Tender, as approved by the Employer's Representative, shall be used. In cases where the Currency of Index is not the relevant currency of payment, the index shall be converted into the relevant currency of payment at the selling rate established by the Reserve Bank of India. If at any time a current index (for the date forty nine (49) days prior to the last date of the period to which the Special Interim Payment Certificate is related) is unavailable, a provisional index as determined by the Employer's Representative shall be used, subject to subsequent correction of the amounts certified when the current index is available.

13.8.4 **Weighting and Adjustment Factors:** The weightings (coefficients) for each of the factors of cost, unless otherwise provided by the Employer in the Bidding Document, shall be proposed by the Contractor, subject to approval by the Employer's Representative. The weightings shall be adjusted if, in the opinion of the Employer's Representative, the weightings are rendered unreasonable, unbalanced, or inapplicable as the result of changes in the methods of work, or as a result of varied or additional work already executed or ordered or for any other reason. The decision of the Employer's Representative shall be final and binding to the Contractor.

13.8.5 **Adjustable Amount:** The adjustable amount of each Interim Payment Certificate shall be the difference between (i) the amount which, in the opinion of the Employer's Representative, shall be due to the Contractor pursuant to Sub-Clause 13.7 including the amount at base rates and prices of the scheduled work carried out but excluding provisional sums and the value of materials on site, and (ii) the amount as calculated in (i) above and included in the last preceding Interim Payment Certificate issued by the Employer's Representative. The adjustable amount shall exclude payments to nominated Sub-Contractors and any other amounts based upon actual cost or current prices.

13.8.6 **Adjusted Amount:** The adjusted amount of each Interim Payment Certificate shall be determined by applying the Price Adjustment Factor to the adjustable amount, and shall become payable to the Contractor in accordance with the provisions of Clause 13.7, subject to any deductions there from for retention money, delay damages, and any other monies due to the Employer from the Contractor including the recovery of the mobilization advance, if any.

13.8.7 **Adjustment due to Shortfall in Progress:** In the event the Contractor fails to attain the rate of progress, as per the approved program and schedule of progress, in the first or another quarter of the construction period and the shortfall in progress is covered up by him during subsequent quarters within the Intended

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## Section IX – Particular Conditions of Contract

Completion Period then the price adjustment of such work which was scheduled to be done in the previous quarter shall be notionally given based upon the price index of that quarter in which such work was required to be done.

**13.8.8 Failure to Complete Within the Time for Completion:** If the Contractor fails to complete the whole of the Works within the Time for Completion, adjustment of prices thereafter until the date of completion of the Works shall be made using either each index or price applicable on the date forty nine (49) days prior to the expiry of the Time for Completion, or the current index or price, whichever is more favorable to the Employer; provided that, if an extension of time is granted in accordance with Sub-Clause 8.3, the above provision shall apply only to the adjustment made after the expiry of such extension of time.

### 13.8.9 Dates for Application of Changes in Cost:

Work which is carried out during First Year ( 365 days) of the Works Contract Period will be carried out at the base rates and prices in accordance with the payment Schedule, and will not be subject to any adjustment for rises or falls in the cost of labor, equipment, plant, materials or other inputs to the Works. Increases or decreases in the cost of such inputs shall be adjusted on a monthly basis thereafter for the remaining works.

*Add the following as Sub-Clause 13.9:*

### Sub-Clause 13.9 Amendments to the Contract Conditions/Specifications

"If the Employer determines that if, in exceptional circumstances, it would be in best interests of the Project to modify or amend some of the Contract Conditions/ Specifications, then such modifications or amendments may be made if mutually agreed by the Employer and the Contractor.

## CLAUSE 14 CONTRACT PRICE AND PAYMENT Sub-Clause 14.1

### The Contract Price

*Delete the text of Sub-Clause 14.1 in its entirety and replace it with the following:*

"(a) Payment for the Works shall be made on a lump sum under major work categories as follow:

- (i) Design Documentation Works, Piping Works, Civil works, installation, testing, commissioning of mechanical, electrical and instrumentation and control equipment required for the different components in accordance with the payment units as set out in the Schedule of Prices and/or as proposed by the Contractor and approved by the Employer's Representative;
- (ii) Plant and equipment, whether supplied from outside or within the Employer's country, including supply of all electro-mechanical, electrical and instrumentation equipment, mandatory spare parts, etc., for the different components according to the payment units as set out in the Schedule of Prices and/or as proposed by the Contractor and approved by the Employer's Representative; and
- (iii) Operation and maintenance of the constructed facilities after completion and acceptance of the Works.

Selection of any of the recommended spare parts will be solely at the Employer's option, and payment for such spare parts, if any, will be made at the quoted unit rates.

- b) The Contractor shall pay all the duties and taxes in consequence of his obligations under the Contract, and the Contract Price shall not be adjusted for such costs, except as stated in Sub-Clauses 13.7[*Adjustment for Change in Technology*] and 13.8.

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(c) Any quantities which may be set out in the Schedule are only estimated quantities and are not to be taken as the actual and correct quantities of the Works to be executed by the Contractor in fulfillment of his obligations under the Contract. The Contractor is responsible to assess the exact requirements and quantities for all items for the purpose of quoting his rates, and no variation in rates will be allowed on account of any variation in the estimated quantities.

(e) Any quantities, prices or rates of payment per unit quantity which may be set out in the Schedule are only to be used for the purposes stated in such Schedule.

### **Sub-Clause 14.2 Advance Payments**

*Delete the text of Sub-Clause 14.2 in its entirety and replace it with the following:*

“The Employer will, if requested by the Contractor, make mobilization advance payments to the Contractor to assist in defraying the initial expenses that will necessarily be incurred by the Contractor for mobilization and design. The Mobilization Advance will be given to the Contractor as per bank interest rate. Mobilization advance shall be claimed by the contractor within 120 days from the signing of contract.

The Advance payment will be made in three installments. The First installment shall be an amount equal to 2 % (two percent) of the contract price, the Second Installment shall be equal to 3 % (three percent) of the contract price and the third installment shall be equal to 5 % (five percent) of the contract price. Advance payment will be paid only after Contractor submitting unconditional and irrevocable Bank guarantee for an amount equivalent to 110 % (One Hundred Ten percent) of such installment. Interest on mobilization advance by Employer shall be charged @ 12% or bank interest rate whichever is higher.

The Employer’s Representative shall issue an Interim Payment Certificate for the first installment after (i) execution of the Form of Agreement by the parties hereto (ii) provision by the Contractor of the Performance Security in accordance with Sub-Clause 4.2. Such bank guarantee shall be issued either by a Nationalized or Scheduled Bank located in India or a foreign bank through a correspondent bank located in India and acceptable to the Employer.

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After the first installment of the advance payment has been utilized as per the approved program, and to the satisfaction of the Employer's Representative, the Contractor may then apply for the second installment. The Employer will make payment of the Second installment of the mobilization advance only after the Contractor has fulfilled the following conditions:

- (a) Mobilized the Project Manager for the Contract.
- (b) Established and staffed a functional design liaison office at Amritsar city.

After the Second installment of the advance payment has been utilized as per the approved programmer, and to the satisfaction of the Employer's Representative, the Contractor may then apply for the Third installment.

The Employer will make payment of the Third installment after the Contractor has successfully fulfilled the following conditions:

- (a) Mobilized the all survey and subsoil investigation crews to the Site and commenced the surveys and subsoil investigations.
- (b) Submitted a list of proposed subcontractors and their respective agreements for approval by the Employer's Representative.
- (c) Submitted the proposed "Submission and Anticipated Approval Program" for construction documents for approval by the Employer's Representative.
- (d) Submitted the proposed construction programmer for approval by the Employer's Representative.
- (e) Submitted, for approval by the Employer's Representative, mobilization/ deployment schedules for:
  - (i) Contractor's key personnel required for managing, executing and supervising the Works,
  - (ii) Contractor's Plant, Machinery and Equipment required for executing the Works; and
  - (iii) Procurement Schedule for major materials and equipment to be incorporated into the Permanent Works.
- (f) Submitted a Cash Flow Forecast for O&M for approval by the Employer's Representative.
- (g) Actual deployment of: (i) such Personnel, (ii) Machinery and Equipment, and (iii) placing of orders for major materials and equipment to be incorporated into the Permanent Works, as per the approved deployment schedules.
- (h) Established the fully furnished and functional Site office and filed laboratory.

The advance payments shall be used by the Contractor exclusively for mobilization expenses, as per the programmer approved by the Employer's Representative. It is expected that the Contractor will also mobilize sufficient funds, which should normally be not less than the advance provided by the Employer, so that adequate cash flow is maintained at all times during execution. The Contractor is required to maintain liquidity from its own sources, and the advance from the Employer is only intended to facilitate the Contractor's mobilization and enhance activities on Site. In case the advance payment is not utilized by the Contractor as per the approved program and within the stipulated period to the satisfaction of the Employer's Representative, default proceedings as per Clause 15 [*Termination by Employer*] of General Conditions, shall be initiated against

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the Contractor. In case any action is initiated against the Contractor under clause 15 (Termination by Employer), then the bank Guarantee with the Employer shall be encashed, without any prejudice to the provision of Contract

Bank Guarantee shall remain effective until the Advance payment have been repaid.

Each Installment of advance payment shall be recovered from the IPC's at the rate of 15.0 % of the IPC value. The entire advance payment shall be recovered from the contractor within 365 days from the signing of contract. In the event of the Contractor failure to make the repayment on time, the Employer will encash the Bank Guarantee for the advance payment. For the delay in repayment of the Advance payment, the contractor shall pay the interest to the Employer for each day of delay, such interest to be calculated at the rate of 18 % (Eighteen Percent) per annum.

If the Advance Payment has not been fully repaid prior to Termination under Clause 15, as the Case may be, the whole of the balance then outstanding shall immediately become due and payable by the Contractor to the Client. In the event of Termination for Contractor Default, the Advance Payment shall be deemed to carry interest at the rate of 10% (ten per cent) per annum from the date of Advance Payment to the date of recovery by encashment of the Bank Guarantee for the Advance Payment. For the avoidance of doubt, the aforesaid interest shall be payable on each installment of the Advance Payment, regardless of whether the installment or any part thereof has been repaid to the Authority prior to Termination.

### **Sub-Clause 14.3 Application for Interim Payment Certificate**

*Delete the text of this Sub-Clause and replace with the following:*

#### **14.3.1 Interim Payment Certificate for Works**

The Contractor shall submit a statement in six copies to the Employer's Representative after the end of each month in a form approved by the Employer's Representative, showing the amounts to which the Contractor considers himself to be entitled together with supporting documents which shall include the detailed report of progress during the month in accordance with Sub-Clause 4.21 [Progress Reports]. ***In case of supplied plant and equipment, inspection and testing clearance certificates shall also be enclosed as support documents.*** The statement shall include the following items, as applicable, which shall be expressed in the various currencies in which the Contract Price is payable, in the sequence listed:

- (a) the estimated contract value, at base rates and prices, of the Construction Documents produced and the Works (including variations) executed up to the end of the month.
- (b) any amounts to be added and deducted for changes in legislation and Adjustments in cost in accordance with Sub-Clauses 13.6[Adjustments for Changes in Legislation] and 13.8 [Adjustments for Changes in Cost];

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- (c) any amount to be deducted for retention, calculated by applying the percentage of retention stated in the Appendix to Tender to the total of the above amounts, until the amount so retained by the Employer reaches the limit of Retention Money (if any) stated in the Appendix to Tender;
- (d) any amounts to be added and deducted for the advance payments and repayments in accordance with Sub-Clause 14.2 [*Advance Payment*];
- (e) any amounts to be added or deducted for Plant and Materials in accordance with Sub- Clause 14.6 [*Payment for Plants and Materials Intended for the Works*];
- (f) any other additions or deductions which may have become due in accordance with the Contract (including those under Clause 20 –Claims, Disputes and Arbitration), other than under Sub-Clause 8.5 [*Delay Damages*]; and
- (g) the deduction of the amounts certified in all previous Interim Payment Certificates.

### **14.3.2: Interim Payment Certificates for Operation and Maintenance**

The Contractor shall submit a statement in six copies to the Employer's Representative after the end of each month, in a form approved by the Employer's Representative, showing the amounts of Expenditure and revenues with supporting documents. The Statement shall include the following items as applicable:

- (a) the expenditure value of the operation and maintenance services of the facilities up to the end of the month;
- (b) The revenue generated on account of user fee collection and advertising right at the end of the month.
- (c) any other additions or deductions which may have become due in accordance with the Contract (including those under Clause 20–Claims, Disputes and Arbitration), other than under Sub-Clause 8.5 [*Delay Damages*]; and
- (d) the deduction of the amounts certified in all previous Interim Payment Certificates."

*Change the heading of Sub-Clause 14.4, Schedule of Payments, to read as Sub-Clause 14.4, Interim Valuation*

### **Sub-Clause 14.4 Interim Valuation**

*Delete the text of this Sub-Clause and replace it with the following text:*

14.4.1 'Prior to commencing construction of the Permanent Works, the Contractor shall submit a Bill of Principal Quantities of the Permanent Works" including provision for construction, installation, testing, trial run and commissioning (referred to in this Sub-Clause as "the BPQPW") together with such supporting information and calculations as the Employer's Representative may reasonably require. The BPQPW shall include the anticipated final quantities of the principal items of Permanent Works, which shall have been priced using all-in rates such that the total amount equals the Works Contract Price. The BPQPW shall not contain priced items for design (other than as may be specified in the Schedule of Prices) or for Temporary Works; the value of each element of such work, and of any other work elements not described in the BPQPW, shall each be included in the rates for Permanent Works to be constructed after such element is carried out. The BPQPW shall be subject to the approval of the Employer's Representative, which may at any time be withdrawn, and shall be without prejudice to the final amount due under the Contract. The BPQPW shall be revised and reissued if it appears at any time before Taking-Over that it will not fully represent the Permanent Works when complete.

During the Time for Completion, the contract value for the purpose of sub-paragraph (a) of Sub-Clause 14.3.1 shall not exceed the amount calculated from the current BPQPW, based on the quantities of



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Permanent Works which have been constructed in accordance with the Contract. The Contractor's interim statement shall be in the same form as that of the current BPQPW and shall be accompanied by the Contractor's signed statement that the current BPQPW attached thereto (including anticipated final quantity) and the as-constructed quantities are all correct; each such statement shall also be accompanied by a Construction Certificate, signed by the Contractor's Representative, certifying that the part of the Works constructed to date complies with the Contract. However, the Contractor may propose such lesser amount as seems reasonable, supported with appropriate calculations on a similar basis to the procedure described in this Sub-Clause.

**14.4.2 Procedures for Interim Valuations:** The above procedures notwithstanding, interim valuations for the purposes of determining payments to be made to the Contractor by the Employer will be made on a progressive basis,

**14.4.3 Payment against any physical work, procurement of material and equipment, plants etc.**

Payment against commissioning shall be made only after successful commissioning of the entire package. No payment will be made against part commissioning.

**14.4.3 Payment for the works** shall be made in accordance with Payment Schedule approved by Employer. The Contractor shall submit the measurements of Executed works in measurable units as per standard procedure of measurement books. Increase or decrease in physical quantity of lump sum item for which rate has been quoted will not be considered for change in rate and the rate will remain constant for any variation in such quantities.

**14.4.4** The Contractor shall submit the Payment Schedule for the approval of the Employer. Payment Schedule will be linked with project schedule and milestone prepared by Contractor and mutually agreed by both parties, Employer & Contractor

### **Sub-Clause 14.6 Payment for Plant and Materials Intended for Works**

*In the first sentence of Sub-Clause 14.6, delete the phrase "If this Sub-Clause applies,"*

*Sub paragraph (b) does not apply to this contract*

*Sub paragraph (c)(i) is amended to read as follows:*

*"(c)(i) are considered to be in accordance with the Contract, have passed any required pre-delivery inspections and tests, and have successfully passed any required third party inspections and are those listed in the Appendix to Tender for payment when delivered to site; and ."*

*Paragraph (c)(ii) is amended to read as follows:*

*"(c)(ii) have been delivered to the Site in accordance with the approved program and delivery schedule, have passed any required inspections and/or tests on delivery, and are properly stored on the Site and protected against loss, damage or deterioration and appear to be in accordance with the Contract."*

*Fourth Paragraph is amended to read as follows:*

The additional amount to be certified shall be equivalent to Seventy Five (75 % ) of the amount claimed by the contractor for such plants and materials delivered to site, after review of the documents mentioned in this Sub clause, taking account of the contract value of Such Plants and Materials as determined and appropriate by the Employer's Representative. Payment will be done only after contractor submitting the bank guarantee of amount equal to such certified amount.

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Plant & Material delivered to site should be as per Project Requirement & Project Schedule, and will be verified and certified by PMC

### **Sub-Clause 14.7 Issue of Advance and Interim Payment Certificates**

*Delete the last sentence of the second paragraph ‘in this event, the Employer’s Representative shall give notice to the Contractor accordingly.’*

*Insert the following paragraph before the last paragraph in this Sub-Clause:*

“In continuation to the first paragraph of this Sub-Clause 14.7, the Contractor will be permitted to submit monthly claims for payment for work, subject to the claim having a minimum value as indicated in Appendix to Tender. If requested by the Contractor, the Employer’s Representative shall, within 3 (three) days of receiving the statement and supporting documents confirming that the work has been executed, and after having satisfied himself as to the acceptability of the claim, deliver to the Employer with a copy to the Contractor an Advance Interim Payment Certificate in an amount of 80% (eighty percent) of the amount claimed by the Contractor. The Employer’s Representative shall subsequently, within the time set forth in the first paragraph of this Sub- Clause, deliver to the Employer with a copy to the Contractor an Interim Payment Certificate for the balance amount which the Employer’s Representative considers to be due. All relevant deductions or adjustments, as set out in Sub-Clause 14.3.1, shall be applied to such Interim Payments, and any amounts that are to be deducted for advance repayments shall be adjusted on a pro-rata basis.

In the event that the Employer’s Representative determines to its satisfaction that the Contractor is abusing the privilege of availing the Advance Interim Payment Certificate by submitting false claims for any work that has not been done, then the Contractor will be subject to a penalty or penal actions in accordance with the following:

- (a) for the first offence, a penalty of Rs.100,000 (Rupees one hundred thousand) which will be deducted from the amount approved under the Interim Payment Certificate;
- (b) for the second offence, a penalty of Rs.200,000 (Rupees two hundred thousand) which will be deducted from the amount approved under the Interim Payment Certificate;
- (c) for the third offence a penalty of Rs.500,000 (Rupees five hundred thousand) which will be deducted from the amount approved under the Interim Payment Certificate, accompanied by withdrawal of the entitlement for submitting monthly bills and receiving Advance Interim Payment Certificates.”

### **Sub-Clause 14.9 Delayed Payments**

*Delete the paragraph and replace it with the following paragraph:*

“If payment of any sum payable under Sub-Clause 14.8 is delayed, the Contractor shall not be entitled to receive interest on the unpaid amount during the period of delay. Interest will be calculated from the date by which the payment should have been made at the rate of interest per annum stated in the Appendix to Tender. The Contractor shall be entitled to such payment without formal notice and without prejudice to any other right or remedy.”

### **Sub Clause 14.10 Payment of Retention Money**

*Rename this Sub-Clause as “Payment of Retention Money for Works”*

*Append the following paragraph in the end:*

Notwithstanding anything stated in the preceding paragraphs, at the request of the Contractor, the Retention Money shall be released as specified in appendix to tender.

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### **Sub-Clause 14.13 Application for Final Payment Certificate Operation Service**

*Add the following paragraph at the end of this Sub-Clause:*

"Within 56 days of receiving the Final Contract Completion on Completion of the Operation and Maintenance, the Contractor shall submit to the Employer's Representative, six copies of the a draft Final Statement for Operation and Maintenance with supporting documents showing in detail in a form approved by the Employer's Representative:

- (a) the value of all work done in Operation and Maintenance, and
- (b) any further sums which the Contractor considers due to him under the Contract or otherwise in relation to the Operation and Maintenance.

If the Employer's Representative disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Employer's Representative may reasonably require and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Employer's Representative the final statement on Operation and Maintenance as agreed. This agreed statement on Operation and Maintenance is referred to in these Conditions as the "Final Statement on Operation and Maintenance".

However, if following discussions between the Employer's Representative and the Contractor and any changes to the draft final statement on Operation and Maintenance which are agreed, it becomes evident that a dispute exists, the Employer's Representative shall deliver to the Employer (with a copy to the Contractor) an Interim Payment Certificate for the agreed parts of the draft final statement on Operation and Maintenance. Thereafter, if the dispute is finally resolved under Sub- Clause 20.6 [*Obtaining Dispute Adjudication Board's Decision*] or Clause 20.7 [*Amicable Settlement*], the Contractor shall then prepare and submit to the Employer (with a copy to the Employer's Representative) a Final Statement."

### **Sub-Clause 14.17 Currencies of Payment**

*Delete the entire text of first paragraph Sub-Clause 14.17 and replace it with the following:*

The Contract Price shall be paid in the currency or currencies named in the Appendix to Tender or as agreed by both the Parties.

*Delete the entire text of sub paragraph (a) of this Sub-Clause 14.17.*

## **CLAUSE 17 RISK ALLOCATION**

### **Sub-Clause 17.5 Contractor's Care of the Works**

*Add the following in the end of Sub-Clause 17.5*

The Contractor shall also be responsible for the care of the Facilities during the Operation and Maintenance Period in accordance with the requirement of the License Agreement Notwithstanding anything to the contrary stated in the Contract, the Contractor shall also be responsible for any part of the Works for which Taking-Over Certificate is issued.

The Contractor shall also take full responsibility for any outstanding work which he shall have undertaken to complete during the Operation and Maintenance Period until all such outstanding work is completed.

Subject to the provisions of Sub-Clause 17.8 [*Limitation of Liability*], the Contractor's Risks during the Operation and Maintenance Period are:

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- a. all risks resulting or arising from the design or construction of the Works, or the Materials used therein, notwithstanding any testing carried out by or approved or witnessed by the Employer's Representative; and
- b. all risks resulting or arising from the operation and maintenance of the Facilities and the care of the Facilities excluding the Employer's Risks listed under Sub-Clause 17.3 [*Employer's Risks*].

### **Sub-Clause 17.12 Risk of Infringement of Intellectual and Industrial Property Rights**

*Delete the Second paragraph 'Whenever a party .....any right to indemnity under this Sub clause.*

*Add the following Sub-Clause 17.13*

### **Sub-Clause 17.13 Occupation and Care of Employer's Facilities**

"The Contractor occupying the Employer's facilities temporarily for the purpose of the Contract shall take full responsibility, from the dates of use or occupation to the dates of handover or cessation of occupation, of the items which are described, if any, in Volume II Technical Specifications/ Works requirements. If any loss or damage happens to any of the occupied facilities while the Contractor is responsible for their care, arising from any cause whatsoever other than the Employer's Risks listed in Sub-Clause 17.3, the Contractor shall, at its own cost, rectify such loss or damage to the satisfaction of the Employer's Representative. All temporarily occupied facilities shall be handed over upon completion of the Works, or on such other date as is mutually agreed, in the same or better condition than when they were given into the Contractor's care, normal wear and tear is accepted."

The Contractor shall be liable for any loss or damage caused by any actions performed by the contractor after a Taking over certificate has been issued. The Contractor shall also be liable for any loss or damage which occurs after a Taking over certificate has been issued and which arose from a previous event for which the Contractor was liable.

## **CLAUSE 20 CLAIMS, DISPUTES AND ARBITRATION**

*Add the Following*

Modify Clauses 20.3, 20.4, 20.5, 20.6, 20.7, 20.8, 20.9, 20.10, 20.11 as follows

- a. No Dispute can be raised except before the Competent Authority as defined in contract data in writing giving full description and grounds of dispute. It is clarified that merely recording protest while accepting measurement and / or payment shall not be taken as raising a dispute.
- b. No dispute can be raised after 14 days of its first occurrence. Any dispute raised after expiry of 14 days of its first occurrence shall not be entertained and the Employer s hall not be liable for claims arising out of such dispute.
- c. The dispute shall be addressed to the sole arbitrator nominated by CEO, PMIDC and procedure established under the Arbitration and Reconciliation Act 1996 shall be followed.
- d. It is a term of the Contract that the party invoking arbitration shall specify all disputes to be referred to arbitration at the time of invocation of arbitration and not thereafter
- e. It is also a term of the Contract that neither party to the Contract shall be entitled for any interest on the amount of the award

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- g. The Arbitral Tribunal shall give reasonable award and the same shall be final, conclusive and binding on the parties
- h. The fees of the arbitrator shall be borne by the parties nominating them and the fee of the Presiding Arbitrator, costs and other expenses incidental to the arbitration proceedings shall be borne equally by the parties
- i. Subject to as aforesaid the provisions of the Arbitration and Conciliation Act, 1996 and any statutory modifications or re-enactment in lieu thereof shall apply to the arbitration proceedings under this clause
- j. The contractor shall have to continue execution of the work with the due diligence notwithstanding pendency of a dispute before any authority or forum.

Implementation of Clause 20.1 & 20.2 will be as per procedure as mentioned above.

## CLAUSE 21 TAXATION

### Sub-Clause 21.1 Foreign Taxation

"The prices bid by the Contractor shall include all taxes, duties and other charges imposed outside the Employer's country on the production, manufacture, sale and transport of the Contractor's Equipment, Plant, materials and supplies to be used on or furnished under the Contract and on the services performed under the Contract."

### Sub-Clause 21.2 Local Taxation

(i) The rates quoted by the Contractor shall be deemed to be inclusive of all the taxes (including GST), levies, etc. including their variations as notified by the concerned authority from time to time and also of all the new taxes and alevies that may be imposed that the Contractor will have to pay for the performance of this Contract. The Engineer on behalf of the Employer will perform such duties in regard to the deduction of such taxes at source as per applicable law.

Nothing in the Contract shall relieve the Contractor from its responsibility to pay any tax that may be levied in India on profits made or otherwise by it in respect of the Contract.

The Contractor shall comply with the proper bye-laws and legal orders of the local body or public authority under the jurisdiction of which the work is executed and pay all fees and charges for which he may be liable. Nothing extra shall be payable on this account.

### Sub-Clause 21.3 Income Taxes on Staff

"The Contractor's staff and labor will be liable to pay personal income tax in the Employer's country in respect of such of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations."

Any expatriate staff or staff not normally resident in India, employed by the Contractor shall pay personal income Tax on all money earned and paid in India.

### Sub-Clause 21.4 Tax Deduction at Source (TDS)

Tax shall be deducted at the source from the payments made to the Contractor as per the Applicable Law / Statute

### Sub-Clause 21.5 Duties on Contractor's Equipment

"Notwithstanding the provisions of Sub-Clause 4.17 [Contractor's Equipment], including essential spare parts thereof, imported by the Contractor for the sole purpose of executing the Contract, shall be temporarily

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exempt from the payment of import duties and taxes upon initial importation, provided the Contractor shall post with the customs authorities at the point of entry an approved export bond or bank guarantee, valid until the time of completion of the Contract plus six months, in an amount equal to the full import duties and taxes which would be payable on the assessed imported value of such Contractor's Equipment and spare parts, and callable in the event that the Contractor's Equipment is not exported from the Employer's country on completion of the Contract. A copy of the bond or bank guarantee endorsed by the customs authorities shall be provided by the Contractor to the Employer upon the importation of individual items of Contractor's Equipment and spare parts.

Upon export of individual items of Contractor's Equipment or spare parts, or upon completion of the Contract, the Contractor shall prepare, for approval by the customs authorities, an assessment of the residual value of the Contractor's Equipment and spare parts to be exported, based on the depreciation scale(s) and other criteria used by the customs authorities for such purposes under the provisions of the applicable law. Import duties and taxes shall be due and payable to the customs authorities by the Contractor on (a) the difference between the initial imported value and the residual value of the Contractor's Equipment and spare parts to be exported; and (b) on the initial imported value of that Contractor's Equipment and spare parts remaining in the Employer's country after completion of the Contract.

Upon payment of such dues within 28 days of being invoiced, the bond or bank guarantee shall be reduced or released accordingly; otherwise the security shall be called in the full amount remaining."

### **CLAUSE 22 OPERATION AND MAINTENANCE**

#### **Sub-Clause 22.1 General Requirements**

The Contractor shall comply with the Operation Management System as provided for in the Contract and any revisions thereof which are agreed during the Contract Period. The Contractor shall follow the requirements of the Operation and Maintenance Plan and the Operation and Maintenance Manuals. No significant alteration to such arrangements and methods shall be made without the prior approval of the Employer's Representative.

The Plant Contractors and maintenance personnel shall have the appropriate experience and qualifications to perform the Operation and Maintenance service as required under the Contract. The names, with details of their qualifications and experience, of all operation and maintenance personnel shall be submitted to the Employer for approval, and no such personnel shall be engaged prior to receiving such approval.

#### **Sub-Clause 22.2 Commencement of Operation and Maintenance**

The Operation and Maintenance shall not commence until the Works have been completed in accordance with the Contract and Taking-Over Certificate has been issued in terms of the Contract.

Should the Works Contract Completion Certificate or any notice attached or pertaining thereto, contain requirements or restrictions over and above those in the Contract, the Contractor shall comply with such requirements and/or restrictions, and, to the extent that the Contractor suffers additional Cost as a result, he shall be reimbursed by the Employer.

The Contractor shall thereafter provide the Operation and Maintenance service in compliance with the Operation Management System and in accordance with As-Built Documents and the Operation and Maintenance Manuals.

If the Contractor wishes to modify a document which has previously been submitted and approved, the Contractor shall immediately notify the Employer's Representative, and shall subsequently submit revised document(s) to the Employer's Representative for review accompanied by a written explanation of the need for such modification.

The Contractor shall not implement any proposed modification until such modification has been reviewed by the Employer's Representative, and consent to proceed has been given in writing. However, any such approval or Amritsar Smart City Limited

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consent, or any review (under this Sub-Clause or otherwise), shall not relieve the Contractor from any obligation or responsibility.

### **Sub-Clause 22.3 Delivery of Raw Materials**

The Contractor shall be responsible for the supply and delivery to the Site (or other designated place) of the chemicals, fuels, consumables and other such items specified in the Employer's Requirements. The Contractor shall be responsible that all such items are fit for purpose and comply with the requirements of the Contract in respect of quality, purpose and function.

In the event that any such item or product is not delivered in accordance with the agreed delivery program or deviates from the specified quality, and such delay or deviation causes the Contractor to suffer additional cost, the Contractor shall not be entitled for any extra costs which he has incurred.

### **Sub-Clause 22.4 Training**

The Contractor shall carry out the training of Employer's Personnel in the Operation and Maintenance of the Facilities to the extent specified in the Employer's Requirements.

The program and scheduling of the training shall be agreed with the Employer, and the Contractor shall provide experienced training staff, and all training materials as stated in the Employer's Requirements. The Employer shall be responsible for nominating and selecting suitable personnel for training.

### **Sub-Clause 22.5 Delays and Interruptions during Operation and Maintenance**

Delays and interruptions during the Operation Service will be agreed and determined as follows:

- a. delays or interruptions caused by the Contractor

If there are any delays or interruptions during the Operation and Maintenance service which are caused by the Contractor or by a cause for which the Contractor is responsible, the Contractor shall compensate the Employer for any losses including loss of revenue, loss of profit, and overhead losses. The amount of compensation due shall be agreed according to Sub-Clause 3.5 [Determinations], and the Employer shall be entitled to recover the amount due by making a corresponding deduction from the next payment due to the Contractor. However, the total amount of compensation payable by the Contractor to the Employer shall not exceed the amount stated in the Appendix to Tender.

- b. suspension by the Employer

The Employer's Representative may at any time during the Operation and Maintenance instruct the Contractor to suspend progress of the Operation and Maintenance. During such suspension, the Contractor shall protect, store, secure and maintain the Facilities against any deterioration, loss or damage.

If the need to suspend the Operation and Maintenance by the Employer is due to any failure of the Contractor or circumstances for which the Contractor is responsible under the Contract, the provisions of paragraph (a) of this Sub-Clause shall apply.

If the need to suspend the Operation and Maintenance is not as a result of any failure by the Contractor or is due to circumstances for which the Contractor is not responsible under the Contract, the provisions of paragraph (b) of this Sub-Clause shall apply.

If a suspension which is not due to any failure by the Contractor or is due to circumstances for which the Contractor is not responsible under the Contract has continued for more than eighty four (84) days, the

~~Contractor may request the Employer's Representative's permission to proceed. If the Employer's Amritsar Smart City Limited~~

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Representative does not give permission within twenty eight (28) days after being requested to do so, the Contractor may give notice of termination under Sub-Clause 16.2 [*Termination by Contractor*].

After the permission or instruction to proceed is given, the Contractor and the Employer's Representative shall jointly examine the Facilities. The Contractor shall make good any deterioration or defect in the Plant and the Employer's Representative shall make a written record of all making good required to be carried out by the Contractor. If the suspension is not due to any failure by the Contractor or is due to circumstances for which the Contractor is not responsible under the Contract, the Contractor shall be entitled to be paid only after approval from the Employer the amount required for making good the Facilities prior to re-commencing the Operation and Maintenance

### **Sub-Clause 22.6 Failure to Maintain Compliance with Quality requirements**

In the event that the Contractor fails to achieve and maintain compliance with the Specified quality requirements specified in the Contract, the Contractor and Employer shall jointly establish the cause of such failure.

If the Employer suffers any loss as a result of the failure or the measures taken by the Contractor, the Contractor, subject to Sub-Clause 3.5 [*Determinations*], shall pay the Employer performance damages as stipulated in Appendix to Tender.

Unless otherwise stated in the Contract, if the failure continues for a period of more than 15 days, and the Contractor is unable to achieve compliance with the specified quality requirements specified in the Contract, the Employer may:

- a. either continue with the Operation and Maintenance with the deduction in the Contractor's monthly payment as stated in Appendix to Tender or
- b. give the Contractor 30 days' notice in writing and terminate the Contract. In such an event, the Employer shall be free to continue the Operation and Maintenance himself or by others.

### **Sub-Clause 22.7 Completion of Operation and Maintenance**

Unless the Parties have mutually agreed to extend the Operation and Maintenance Period, the obligation of the Contractor to operate and maintain the Facilities under the Contract shall cease at the end of the period stated in the Contract as the Operation and Maintenance Period.

Notwithstanding the foregoing, other services required to be performed by the Contractor must be completed before the Contractor will be entitled to receive the Final Contract Completion Certificate on Completion of the Operation and Maintenance Period in accordance with Sub- Clause 10.6 of this Contract.

Pre-conditions which must be fulfilled by the Contractor before the Final Contract Completion Certificate on Completion of the Operation and Maintenance Period will be issued are:

- a. Inspection in accordance with Sub-Clause 11.8 [Joint Inspection Prior to Contract Completion ],
- b. Testing in accordance with Sub-Clause 11.9 [Procedure for Tests Prior to Completion],
- c. Updating Operation and Maintenance manuals and providing performance records and data in accordance with Sub- Clause 5.6 [Operation and Maintenance Manuals], and
- d. Remediying defects found during inspection in accordance with Sub-Clause 11.8 [Joint Inspection Prior to Contract Completion].

## Section IXA: Appendix to Tender

### **Sub-Clause 22.8 Operating License**

The Employer shall issue to the Contractor the Operating License or equivalent legal authorization to enable the Contractor to operate and maintain the Facilities during the Operation and Maintenance Period.

The Operating License shall automatically come into full force and effect upon issue of the Completion Certificate upon completion of the execution of the Works and successful commissioning of the parking system in accordance with the Contract and issuance of the Taking-Over Certificate.

The Operating License shall only extend to those parts of the Site which it is required to occupy for the purposes of carrying out the Works and Operation and Maintenance as set out in the Contract. The Operating License granted pursuant to this clause shall not operate nor be deemed to operate as a tenement or a demise of the Site or any part thereof. The Contractor shall not have or be entitled to any estate, right, title or interest in the Site / Facilities. The license will immediately terminate upon termination of this Contract for whatever reason.

### **CLAUSE 23 STATUTORY COMPLIANCE**

The law of the place of the work shall govern the work of the Contract. The Contractors shall be responsible for all work & shall comply to the requirements of all applicable Central (Federal), State & Local Laws, Ordinances, guidelines, rules

### **CLAUSE 24 CHANGE OF SCOPE**

Change of Scope shall means:-

- i. change in specifications of any items of works
- ii. any additional works, Plants, Materials or Services which are not included in the scope of the project, including any associated tests on completion of Works

In the event the Employer determining that a change of scope is necessary, it may direct the Engineer to issue "Change of Scope" notice to the Contractor, specifying the details of works & services to be undertaken. On receiving the "Change of Scope" notice, the contractor shall provide to the employer information such as

- a. Break down of quantities, unit rates and cost for different items of works
- b. Proposed modification, if any, to project completion schedule.

No change of scope shall be executed unless the employer has issued change of Scope Order to the contractor.

Total value of all change of Scope orders shall not exceed Ten percent ( 10 %) of Approved Contract Amount

Section IXA: Appendix to Tender

**TERMS AND PROCEDURES OF PAYMENT**

**TERMS OF PAYMENT**

**1.1 General**

In accordance with the provisions of GCC, the Employer shall pay the Contractor in the manner and at the times set out in this Terms and Procedures of Payment Appendix.

**1.2 Payment during the Design-Build Period**

In respect of the amount for Design-Build Services listed in Price Schedule of the Contractor's Bid (the "Design-Build Price") for all current portions, the Employer shall make the payments as per the relevant clause of Contract Price

**1.3 Payment during the Operation Period**

As per the price schedule.

**1.4 Currencies**

Payments will be made by the Employer in the currencies and as quoted by the Contractor in the Price Schedule of the Contractor's Bid, unless otherwise agreed between the Parties.

**PAYMENT PROCEDURES**

The procedures to be followed in applying for certification and making payments shall be as follows:

- (1) During the Design-Build Period, payment shall be dealt with in accordance with progress achieved for Design built services, and
  - (a) During the Operations Period, the Contractor shall deliver an invoice no later than fifteen (15) days after the end of the thirty (30) days period to which the invoice applies. If the End Date falls on a date that makes the Contractor's last period of operation less than thirty (30) days, the Contractor shall submit an invoice that pro-rates the Monthly Operations Payment based on the number of days that the Operations Services were provided in the final period of operations.

Section IXA: Appendix to Tender

**Section IXA: APPENDIX TO TENDER**

[NOTE: *With the exception of the items for which the Employer's requirements have been inserted, the following information must be completed before the Tender is submitted*].

Item	Sub clause no.	Data
Employer's Name and Address	1.1.32	Amritsar Smart City Limited (ASCL) SCO – 21, II Floor, District Shopping Centre, Block – B, Ranjit Avenue, Amritsar - 143001, Punjab, INDIA Telephone: : +91-183-5015048
Contractor's Name and Address	1.1.17	
Engineer's Name and Address	1.1.35	To be determined by Employer
Time for Completion of Works	1.1.78(i)	The work shall be completed within Twelve (12) months including rainy season from the date of issue of work order.
Time for Operation and Maintenance	1.1.78(ii)	Operation & Maintenance Period will commence after issue of completion certificate. Completion of work shall be deemed to occur after contractor has demonstrated successful continuous trial running of entire system for a period of 30 days.
Defects Liability Period		For a Period of Two Year (2 Years) after issuing commissioning certificate for entire works.
Section	1.1.70	Section does not apply for this contract. The whole of the Work shall be completed within the time for completion of work
Electronic transmission systems	1.3	Facsimile transmission will be acceptable form of electronic transmission system. As an alternate E-mail will also be acceptable form of electronic transmission system, provided signed written communication in hard copy is also received within seven (7) days of the transmission of an E-mail.
Governing Law	1.4	Law of Republic of India & Govt. of Punjab.
Ruling Language	1.4	English
Language of Communication	1.4	English

Section IXA: Appendix to Tender

Item	Sub clause no.	Data
Amount of Performance Security	4.2	Five (5) Percent of Accepted Contract Amount
Return of Performance Security	4.2	Half of the performance security shall be released after issue of completion certificate & Balance half of the Performance security shall be paid after completion of contract i.e. completion of Operation and maintenance period.
Electricity and Water	4.19	The contractor shall make his own arrangement for Electricity and water during construction testing & commissioning of the project.
Normal working hours	6.5	As per prevailing norms in State of Punjab
Delay Damages for Works	8.5	Two Percent (2 %) of the cost of incomplete work of each milestone per week / as per project schedule. However if the contractor catches with the progress of work the same will be released in Interim Payment Certificates on contractor achieving subsequent milestone(s)
Maximum amount of Delay damages	8.5	7.5% of the <b>Works Contract Price</b> .
Liquidated Damages for Failure to Pass the Tests After Completion.	11.4	In the event that the Works fail to pass any or all of the Tests After Completion as defined in the Specifications- and as per relevant codes, then the Employer shall levy Liquidated Damages, based on the extent of such failure, subject to the condition that the total amount of Delay Damages for Works and/or Liquidated Damages for failure to pass the Tests After Completion shall not exceed the Limit of Delay Damages as defined in Sub-clause 8.5 above: The damages will be assessed by Third Party/Independent Engineer/PMC on actuals
<b>Power Consumption:</b>	All Payments during operation & maintenance period relating to the power consumption, to operate the system shall be borne by the contractor.	

Section IXA: Appendix to Tender

Item	Sub clause no.	Data		
Adjustment for change in cost: Coefficients	13.8	Coefficient	Description of Coefficient	Weightage
		(a)	Fixed Coefficient	15
		(b)	Labor	20
		(c)	Material	60
		(d)	Fuel	05
			TOTAL	100
Source of Indices	13.8	Type of Index	Source	
		Cost Index of Labor	The average consumer price index for industrial workers as Notified by <b>Reserve Bank of India</b> . The base date shall be the date thirty (30) days prior to bid closing date)	
		Cost Index for Material (All commodities )	The average Whole sale price index for all commodities as Notified by <b>Reserve Bank of India</b> for India. The Base date shall be date thirty (30) days prior to bid closing date	
		Cost Index of Equipment Operations (Fuels & Lubricants)	The average whole sale price index for fuel, power, light & Lubricants as notified by <b>Reserve Bank of India for India</b> . The base date shall be date thirty (30) days prior to bid closing date	
Mobilization Advance	14.2	Interest on Mobilization Advance will be charges from Contractor @ 12% or Bank Interest rate whichever is higher.		
Number and timings of Installments	14.2	Three (3) within one hundred twenty (120) days from the date of signing of contract.		
Currencies and proportion	14.2	Local Currency: Indian Rupee (INR)		

Section IXA: Appendix to Tender

Item	Sub clause no.	Data
Start repayment of advance payment	14.2	Advance payment shall be repaid through Not less than 15% deductions in each interim payment certificate, all amount to be recovered within 8 months of giving advance. • Entire amount to be recovered by the time, 80% of construction work is completed or stipulated period of construction work whichever is early
Percentage of retention	14.3.1 (c)	5% (Five percent) of the amount of all Interim Payment Certificates for the Works Contract portion of the Contract, excluding any Provisional Sums (if any)
Limit of Retention Money	14.3.1 (c)	5% (Five percent) of the Works Contract Price, excluding any Provisional Sums (if any)
Release of Retention Money	14.3.1 (c)	50% of the retention money will be released after the Completion of project a fifty percent (50%) of retention money will be released after the successful completion of defect liability period.
Plant and Materials for Payment when delivered to site	14.5 (c)	Seventy five percent (75%) of fair market value of plant & material a mount claimed by the contractor after certified by the Engineer on receipt of Indemnity bond.
Minimum Amount of Interim Payment Certificate	14.6	2.5 % of the Accepted Contract Amount
Interest on delayed payment	14.9	Not Applicable
Currencies of Payment	14.17	The Contractor shall be paid the currencies as specified in the Bid Document
Period of Submission of evidence :		
(a) Evidence of insurance	19.1	30 days
(b) Relevant policies	19.1	30 days
Minimum Amount of Third Party Insurance		Rs 1,000,000/- per occurrence with number of occurrences unlimited. The Insurance should be valid during period of the contract including extension of contract
Limit of the Compensation for delays or interruptions caused by the Contractor	22.5	10 % of Contract Price

Section IXA: Appendix to Tender

## Delays and Penalty

### 1. Plant of Equipment

Contractor shall need to maintain minimum equipment as specified in Clause No 6 of Eligibility Criterion. Non-compliance shall result in penalties as below:

Sr.No.	Equipment Type and Characteristics	Minimum Number Required	Deductible per month if not mobilized/ not found in working
1	Excavator	1 No.	50000
2	Concrete weigh batchers	1 No.	50000
3	Tower crane of suitable capacity	1 No	50000
4	Needle/ plate vibrator	2 No.	15000
5	Tippers	3 No.	30000
6	Total station survey equipment set	1 No.	10000
7	Water tanker (with sprinkling arrangements)	2 No.	5000
8	Tower Crane of suitable capacity	1 No.	10000
9	Generator of suitable capacity	1 No.	10000
10	Laboratory apparatus & equipment as per MORTH Standard.	1 Set	50000
11	Welding Units	As required	10000
12	Electrical Testing Kit (Megger, Voltmeter etc. of Various ranges)	As required	10000
13	Safety Equipment for personnel	As per legal	25000

### 2. Staff

Non providing the Key-Personnel expert resources as per Section 6: Employers Requirement shall result into penalty as per following Table. The total penalty shall not exceed 10% of contract value.

No.	Position	Deductible per month if not mobilized (in INR)
1	Project Manager – 1 B. E. Civil / Mechanical / Electrical	100000
2	Material / Quality Engineer – 1; B.E	75000
3	Installation Engineer – 1; B.E (Mech./Elect./Electronics) (Having experience in car parking systems)	50000
4	Supervisors – 2; Diploma (Mech./Elect./Electronics/Civil)	30000
5	Technicians (ITI) Trained – 2 Nos.	25000
6	Operators (ITI) Trained – 3 Nos. (For Day shifts)	25000
7	Operators (ITI) Trained – 2 Nos. (For Night shift)	25000

## Schedules to Section 9

### **3. Delay in Progress of Work**

SIP shall be submitted as per the SIP activity schedule. Any delay in submissions will attract penalty specified therein.

Maximum amount of seven point five percent (7.5 %) of Contract Price as Liquidated damage may be recovered from Contractor for not completing the Works and Services or any part thereof within the Time for Completion or any extension thereof. Liquidated damages for delay of overall contract completion is 0.07% per day. The maximum amount of liquidated damages for such delay is 7.5% of the Contract Price.

However, If the Contract is completed in the original time period as agreed upon in the Contract, then the Liquidated Damages so imposed for delays of intermediate milestones will be adjusted/ paid.

### **4. As Built Drawings**

The as-built drawings will be submitted to Employer within twenty (21) days after the completion of the respective works.

Contractor shall be levied a penalty of 0.5% of the value of the works for which the as-built drawing has not been submitted.

Schedules to Section 9

**Schedules to Section 9:  
Particular Conditions of Contract**

Schedule 1: Obligations of the Employer – supplement to GCC Clause 2

Schedule 2: Obligations of the Contractor – supplement to GCC Clause 4

Schedule 3: EMPLOYER Personnel – supplement to GCC Sub-Clause 2.3

Schedule 4: Contractor Payments – supplement to GCC Clause 14

## Schedules to Section 9

### **Schedule 1: Obligations of the Employer**

During the term of this Contract, the Employer shall have the following obligations:

1. Overall Project Management including review, finalization and supervision of the Design-Build activities, disbursement of the capital expenditures in accordance with the procedure specified in the construction contract, disbursement of Contractor Payments set out in Schedule 6, taking decisions regarding the completion of the Mandatory Works and the achievement of the respective obligations by each party, and the issue of the certificate of commencement of Design-Build Period and Operating Period.
2. Manage the project roles and responsibilities, interfaces and resolution of problems arising out of them using appropriate level(s) of interface.
3. Employer will be responsible for getting the utility shifting and provide hindrance free right of way to the Contractor. Contractor will provide full support and assistance in identifying utilities and hindrances.
4. Employer shall provide right of access.
5. Be responsible for the overall project management including decisions regarding achievement/non-achievement of Contractor's obligations during Design-Build period and release of eligible payments to the Contractor during this period.
6. Supervise payments to the Contractor, his consultants, vendors and sub-contractors on request of the main Contractor.
7. Manage the project roles and responsibilities, interfaces and resolution of problems arising out of them using appropriate level(s) of interface.
8. Manage and disburse the investment component of the Project.
9. Timely disbursement of all the eligible Contractor Payments on successful fulfillment of Contractor Obligations during Design-Build Period.

## **Schedule 2: Obligations of Contractor**

### **1. Contractor Obligations**

#### **1.1. General Obligations of the Contractor**

- 1.1.1. The Contractor shall have the right and obligation to provide the Construction and Operation Services in the works site on an exclusive basis during the Contract period. Should the Employer desire to expand the Service Area, the Employer and the Contractor shall meet and negotiate in good faith with a view to agreeing on the provision of Operation Service by the Contractor to such expanded Service Area and the payment to the Contractor there for.
- 1.1.2. The Contractor shall perform the construction and operations in accordance with governing Laws (including all environmental legislations), and procedures, guidelines and agreements with Government of India and Government of Punjab on ASCL, approved SIP, prudent industry practice, the Performance Standards, the urban poor services policies, and the locally applicable regulatory social policies if any.
- 1.1.3. The Contractor shall have care and custody of Works and Site during the term of this Contract.
- 1.1.4. Subject to Section 1.1.2 above, the Contractor shall have discretion in determining the means and methods to be used to perform the Construction and Operation Services.

#### **1.2. Accounting, Audit**

- 1.2.1. The Contractor shall maintain accurate and systematic accounts and records in respect of the Operation Service in such form and detail enabling clear identification of all relevant charges and cost incurred by the Contractor and the basis thereof as well as proper and timely technical and financial audits. Such accounts may be audited by external auditors as appointed by Employer.
- 1.2.2. Financial accounts shall be in accordance with the accepted Indian accounting principles.
- 1.2.3. The Contractor shall permit the Employer or its designated representative to fully annually inspect such accounts and records and shall permit appointed Authority to carry out technical and financial audits on an annual basis.

#### **1.3. Conflict of Interests**

- 1.3.1. Neither the Contractor nor its sub-contractors nor the Contractor personnel shall engage during the term of this Contract, either directly or indirectly in any business or professional activities in the Service Area which would conflict with the activities assigned to them under this Contract.
- 1.3.2. Notwithstanding Sections 1.3.1, the Contractor will be eligible to bid for subsequent contracts related to the Operation Services, but shall not have any right of first refusal.

### **2. Standard of Construction and Operation Services Provided by the Contractor**

#### **2.1. The Contractor shall perform all the Construction and Operation Service from the Commencement**

## Schedules to Section 9

Date until the Contract Completion Date in accordance with Section 7 Employer Requirements, Schedule-4 to the Particular Conditions of Contract - Contractor Payments and Schedule 5 to the Particular Conditions of Contract - Performance Targets and Measurements; as well as:

- a. The standards of a reasonable and prudent Contractor;
- b. All relevant permits set forth in GCC Sub-Clause 2.2 and other permits for services in force from time to time and;
- c. All governing Laws, in force from time to time.

**2.2. The Contractor shall collect the revenue generated from Operation Service and deposit in the Designated Revenue Account (Escrow Account) maintained by the Employer as described under Section 6, Employer's Requirement.**

### **Schedule 3: ASCL Personnel**

1. ASCL personnel will assist and provide full support to the Contractor in making assessment of existing infrastructure during preparation of Service Improvement Plan and during execution of Construction and Operation Service.
2. ASCL shall not depute any personnel for Operation Service of the works.
3. Contractor will arrange all required personnel for Operation Service during the Operation Service period.
4. However if ASCL is able to provide some of the existing staff and Contractor wishes to use their services in Operation Service, he/ they can be provided to the Contractor on deputation basis. In such case, Contractor will make all payment related to his salary and allowances and an additional 20% of salary and allowances to the Employer to take care of his/their pension and retirement benefits.

## Schedule 4: Contractor Payment

1. **The total Contractor Payments comprises of two components:**
  - A. Payment for Design and Construction including operation maintenance during defect liability period; and
  - B. Premium Payments to employer during Operation and Maintenance Services.

2. **Payments for Construction:** The eligibility of payment shall be as follows:

**Contractor shall be eligible to the payment as Percentage Payment on quoted lump sum offer under the head of A - Payment for Design and Construction including operation maintenance during defect liability period (Project Cost).** During the Construction Phase, 75% of the quoted CAPEX amount will be paid. Balance 25% of the quoted CAPEX amount shall be paid along with the Operation and Maintenance Period equally divided in 10 years.

### **Payments**

The payment will be made only for the quantity actually supplied, executed and certified as per following Schedule:

S.no.	Deliverables (Stages)	Timelines (Month)	% of Capex Cost
1	Mobilization of Resources + PoA	X	Mobilization Advance
2	At design Submission & Approval	X+2	5 %
3	Civil Works		
	Completion of Foundation+ Substructure below plinth level	X+ 4	15%
	Completion of all civil works above plinth up to roof level at site including utility, landscaping etc	X+5	10%
5	Upon Supply & Installation of Super Structure	X+6	15%
	Supply and erection of all structural frame work at site of each module on prorate basis		
	Installation of Building envelope		
6	MEP/ICT Work	X+7	5%
	Installation & Procurement of Material		
7	Automation and Testing	X+8	
	Delivery & installation of drive assembly and pallets of each module on prorate basis		25%
	Installation of Robotic System & Other Machinery		5%
8	Solar Plant Installation	X+09	
9	Commissioning & Handover of Automated System	X+10	10%
10	Miscellaneous work like Submission of All NOC, Completion Certificate, As Build drawing etc	X+11	10%
	<b>TOTAL</b>	12 Months	100%*

- Subject to PBS & retention money for Interim Payments as per payments terms in RFP

**Operation & Maintenance Services**

The contractor liable for complete operation and maintenance of developed facility on payment of quoted premium paid to ASCL at the beginning of the year.

**Adjustment for changes in costs for Construction:** As per Punjab GF Rules

## **Service Level Agreement**

### **Service Level Agreement:**

ASCL through their Smart parking initiative, intends to have an IT enablement of Parking Management System to track and monitoring the identified corporation parking spaces.

- ▶ The purpose of Service Levels is to define the levels of service provided by the SI to the Client for the duration of the contract. The benefits of this are:
  - ✓ Helps the Client to control the levels and performance of SI's services;
  - ✓ Create clear requirements for measurement of the performance of the system and help in monitoring the same during the Contract duration.
- ▶ The Service Levels are between the Client and SI.

### **Service Level Agreement & Targets**

- ▶ This section is agreed to by Client and SI as the key performance indicator for the project;
- ▶ The following section reflects the measurements to be used to track and report system's performance on a regular basis. The targets shown in the following tables are for the period of Contract.

General Principles of Service Level Agreement are as follows;

- i. Service Level Agreement (SLA) shall become the part of the Contract between the Client and the SI. SLA defines the terms of SI's responsibility in ensuring the timely delivery of the deliverables and the correctness of the deliverables based on the agreed performance indicators as detailed in this section.
  - ii. The SI shall comply with the SLAs to ensure adherence to project timelines, quality and availability of services throughout the duration of the Contract. For the purpose of the SLA, definitions and terms as specified in the document along with the following terms shall have the meanings set forth below:
    - ▶ "Total Time" – Total number of hours in consideration for evaluation of SLA performance.
    - ▶ "Downtime" – Time period for which the specified services/components/system are not available in the concerned period, being considered for evaluation of SLA, which shall exclude downtime owing to Force Majeure and reasons beyond control of the SI.
    - ▶ "Scheduled Maintenance Time" – Time period for which the specified services/components/system with specified technical and service standards are not available due to scheduled maintenance activity. The SI shall take at least 15 days prior approval from the Client for any such activity. The scheduled maintenance should be carried out during nonpeak- hours and shall not exceed more than four (4) hours and not more than four (4) times in a year.
    - ▶ "Uptime" – Time period for which the specified services are available in the period being considered for evaluation of SLA.
- ▶  $\text{Uptime (\%)} = [1 - \{(Total Downtime) / (Total Time - Scheduled Maintenance Time)\}] * 100$ .
- ▶ "Availability": When the system is working properly performing all business and functional requirements as defined in this RFP.
- Availability =  $((\text{Agreed Hours} - (\text{Incident(s}) \times \text{Duration})) / \text{Agreed Hours}) * 100$
- ▶ Penalties shall be applied for each criteria individually and then added together for the total penalty for a particular quarter.

- ▶ “Incident” – Any event/abnormalities in the service/system being provided that may lead to disruption in regular/normal operations and services to the end user.
- ▶ “Response Time” – Time elapsed from the moment an incident is reported to the Helpdesk either manually or automatically through the system to the time when a resource is assigned for the resolution of the same.
- ▶ “Resolution Time” – Time elapsed from the moment incident is reported to the Helpdesk either manually or automatically through system, to the time by which the incident is resolved completely and services as per the Contract are restored.

### **1.1.1 Measurement & Targets**

- i. Implementation Phase related SLAs
  - During Implementation phase any delay in deliverables and milestones shall attract liquidated damages as per conditions of Contract.
- ii. Operation & Maintenance Phase related SLAs
  - These SLAs shall be used to evaluate the performance of the services post the Implementation Phase and commencement of the O&M Phase. These SLAs and associated performance shall be monitored on quarterly basis. Penalty levied for non-performance as per SLA shall be deducted through subsequent payments due from the Client or through the Performance Bank Guarantee.
  - The Scheduled Maintenance Time should be approved by the client in writing. The schedule maintenance request should be submitted to the client 15 days in advance from the scheduled maintenance rate.
  - The Exhibit below provides the Service Level's (SLA) to be adhered by the bidder during the operational hours of the project/system/sub-system/components. The scheduled maintenance and the scheduled down time shall be carried out by the Bidder during the non-operational hours of the project. In case of not meeting the SLA's, the corresponding penalties as defined in the Exhibit in the subsequent section on next page:

### **1.1.2 Implementation SLA Matrix**

### **1.1.3 Operations SLA Matrix**

#	Component	Severity Level	Requirement	Penalty (INR)	Calculation
1	Smart Parking Mobile Application - API & Web application Server	High	99.50%	7500 per 0.50% decrease	For every decrease of 0.50% in Availability of the mobile API & web application server & its associated services in a month, a penalty of INR 7500 for every 0.50% decrease shall be imposed
2	Network Switch/Router and other	High	99.00%	5000 per 0.50% decrease	For every decrease of 0.50% in Uptime of each Network Switch/Router & its associated

#	Component	Severity Level	Requirement	Penalty (INR)	Calculation
	accessories				component in a month, a penalty of INR 5000 shall be imposed
3	Central Web Application Server Hardware	High	99.50%	7500 per 0.50% decrease	For every decrease of 0.50% in Uptime of Central Web Application Server Hardware & its associated component in a month, a penalty of INR 7500 shall be imposed
4	Desktop, Printers	Medium	99.00%	5000 per 0.50% decrease	For every decrease of 0.50% in Uptime of each Desktop, Printers & its associated component in a month, a penalty of INR 5000 shall be imposed
5	Video Management System	High	99.50%	7500 per 0.50% decrease	For every decrease of 0.50% in Availability of the Video Management System & its associated services in a month, a penalty of INR 7500 for every 0.50% decrease shall be imposed
6	Surveillance IP Camera / Per camera	Medium	99.00%	5000 per 0.50% decrease	For every decrease of 0.50% in uptime of each Surveillance IP Camera & its associated component in a month, a penalty of INR 7500 shall be imposed
7	Network Video Recorders and accessories	High	99.50%	7500 per 0.50% decrease	For every decrease of 0.50% in Uptime of each device & its associated component in a month, a penalty of INR 7500 shall be imposed
8	Entry / Exit boom Barrier Gate	High	99.00%	5000 per 0.50% decrease	For every decrease of 0.50% in Uptime of the exit/entry boom barriers/unit, a penalty of INR 5000 shall be imposed
9	Data Collector/Processors	High	99.00	5000 per 0.50% decrease	For every decrease of 0.50% in Uptime of data collectors/processors/ unit in a month, a penalty of INR 5000 shall be imposed
10	Display Units	High	99.00%	5000 per 0.50% decrease	For every decrease of 0.50% in Uptime of each display unit & its associated component in a month, a penalty of INR 5000 shall be imposed
11	Handheld Barcode Ticketing Device	High	99.00%	5000 per 0.50% decrease	For every decrease of 0.50% in Uptime of each Handheld Barcode Ticketing Device & its associated component in a month, a penalty of INR 100

#	Component	Severity Level	Requirement	Penalty (INR)	Calculation
					shall be imposed
12	Column based processor with Barcode & QR code Reader & Writer	High	99.00%	5000 per 0.50% decrease	For every decrease of 0.50% in Uptime of each device & its associated component in a month, a penalty of INR 1000 shall be imposed
13	Replacement of Faulty devices	Very High	24 hours		If the faulty device/part is not repaired/ replaced within 24 hrs, then the penalty should be computed on hourly basis. For every one hour 0.50% of the total product value.
14	Network connectivity with ICCC	Very High	99.95%	10000	For every decrease of 0.25% in Uptime of each network device & its associated component in a month, a penalty of INR 10000 shall be imposed
15	Manpower	Low	Man power / shift	1000	Non availability of man power. INR 1000/ Man power/shift
16	Replacement of Manpower	Medium	Manpower as per contract and deployed	1000	INR. 1000 for Non Availability of a resource / per day . (Rs. 1000 per resource/day)
17	Sitting enclosures , chairs, tables, fans, AC. Lights, light enclosures or any other equipment/devices	Low	Within 48 hrs	Rs 100/day	Rs 100 for every twelve hours after 48 hours

\*All the numbers shall be rounded off to nearest decimal. For e.g 98.82 shall be rounded off to 98.8 and 98.87 shall be rounded to 98.90.

Note - Hardware, operating systems, IP Monitoring components are expected to be available, functioning and delivering all its expected services to the fullest. The SI integrator is expected to hold contingency plans, redundant devices , spare parts to ensure 100% uptime and 100% availability of their equipment's and applications so uninterrupted service from each equipment is achieved.

#### **1.1.4 SLA Requirements**

- i. Selected SI should ensure availability and uptime of the systems as per SLA matrix.
- ii. The SI shall provide all SLA reports on real-time basis through a web interface using all requisite website monitoring, web service monitoring, security monitoring, server monitoring etc. tools and application used shall be part of acceptance testing by client.
- iii. Uptime and Availability shall be calculated as per the period defined by the client e.g. daily/Monthly/Quarterly/Half yearly/Yearly/ Custom period. Uptime and Availability will be based on the report of system logs, equipment logs, downtime and rectification reporting etc. In case the uptime and availability for each of the system under Warranty/ Annual Maintenance Contract is less than the period mentioned in the contract/ agreement, the non-performance deduction (i.e. penalty) from scheduled payments for the system under Warranty/ Annual Maintenance Contract.
- iv. However, if the delay is caused due to reasons outside the control of the Selected SI, client reserves the right to waive off the penalties.
- v. Faulty / damaged / Non-working device must be replaced / repaired before the start of the next day. If repairing / replacement is not done in 24 hours, then penalty will be calculated on hourly basis.

#### **1.1.5 Breach of SLA**

- i. The maximum total penalty in any quarter (excluding non-availability of deployed manpower/ resources/ personnel) shall not be more than 15% of the total amount due for the quarter. Imposition of penalties amounting to 15% of the quarterly contract value for a continuous period of 3 quarters shall be treated as non-performance and as a case of breach of SLA. The following steps will be taken in such a case:
  - a. ASCL issues a show cause notice to the SI
  - b. SI should reply to the notice within three working days
  - c. If authorities are not satisfied with the reply, authorities will initiate stricter penalty for the remaining period of the contract and may forfeit the security deposit.

## **Environmental Management Plan of Parking Area Amritsar**

Parking is an essential component of any cities transportation system. It is increasingly becoming an important aspect of transportation planning. Public and private parking spaces are important elements of a planned urban transportation system. This plays an important role in increasing the capacity of existing roadways, improving traffic circulation and reducing urban chaos in the city. Suitable site selection for public parking spaces not only increases the parking efficiency, but also decreases unorganized car parking which results in higher roadway capacity and better traffic circulation.

In the absence of adequate parking facilities, there are un-authorized parking vehicles along busy corridors in the City of Amritsar. This on-street parking is causing major congestion and bottleneck for the smooth flow of traffic.

With dense population, high density of vehicles, large number of pavement hawkers, sidewalk encroachments, heterogeneous nature of traffic and commercial area development along all the major roads have compounded the traffic congestion issue along the major and minor roads in the City of Amritsar.

### **1.2    *Objectives of EMP***

The objective of the EMP is to provide sustainable development of the project and to address the potential adverse impacts envisaged due to project development and provide the followings:

- Minimize potential adverse impacts on environment
- Provide mitigation and management measures
- Use latest pollution control equipment with its routine check.

Projects are being taken up to provide basic infrastructure amenities, in this case parking area for vehicle which facilitates improvement in the overall area common parking area for avoiding congestion in city area and to make visitors easy and simple and also by taking care of health and hygiene of the community to minimize the pollution effect using latest technologies of pollution control equipment as well as its routine check and controls.

The proposed project components shall be assessed with respect to environmentally sensitive places, rehabilitation of communities / villages.

The main aim of the EMP is the early determination of the potential magnitude of environmental impacts due to proposed works and development of mitigation measures and assess requirement of clearances if any and make project viable obeying all legal pollution control laws by MoEF & CC.

### **1.3    *Environmental Management Plan***

Summarizes the generic environmental management plan for economic investment that identifies the potential issues of various activities that are anticipated in the design and development, construction, and operation phases of the proposed project work.

The environmental management plan ensures to suggest appropriate mitigation measure against the issues/concerns identified during the environmental and social assessment study.

In general, the ASCL (with assistance from DBO Operator and Independent Engineer/Supervision Consultant) is the responsible entity for ensuring that the mitigation measures as suggested in the ESMP. The roles and responsibilities of the involved institutes are described below.

#### **1.4 Implementation of EMP Specific activities by ASCL**

The role of Amritsar Smart City Ltd in the implementation of EMP involves the following activities:

##### **Specific activities by Design Built Operate (DBO) Operator**

The operator shall implement the mitigation measures as recommended in EMP attached to the bid document during construction and operation time.

##### **Implementation of EMP**

The DBO Operator shall have prime responsibility to implement the EMP. “The DBO engineer” shall monitor the compliance of the EMP. DBO engineer and ASCL will have secondary responsibility for implementation of EMP.

##### **The Operator shall ensure that:**

- Ensure that parking area development process does not create any hazardous movement situation. Also ensure that public is pre-warned about the activities, construction area is barricaded, all debris is well managed causing minimum inconvenience to public and other measures are implemented as indicated under EMP.
- Specific area shall be earmarked for intermittent storage of biodegradable and non-biodegradable waste at site.
- Tree plantation (minimum two rows) shall be made on the periphery of project corridor if free space available to trap the dust, gas as well as noise at construction locations as well as control of vehicle pollution during start and closing of Vehicle at parking area.
- Housekeeping is need to be develop in such a manner so that no any hazardous material should be thrown coming out from Construction or from vehicles in huge amount which required disposal through the **approved registered recycler** of the MoEF & CC to control its adverse effects direct/indirect on community/ surroundings as per **Hazard Waste Management Laws**.

Feedback from the local residents can also be taken from time to time to cross check the contractor's report. Project management consultants should make routine inspection visits at construction site to check the implementation of Environment Management Plan as per the contract. Broad Institutional arrangement for implementation of EMP is shown in Table below:

##### **Environmental Management Plan for Parking Area Development at Amritsar**

Sl. No.	Potential Negative Impacts	Mitigation Measures	Time frame	
1.	Construction of labour camps	<p>Operator shall follow all relevant provisions of the <b>Factories Act, 1948</b> and the <b>Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996</b> for construction and maintenance of labour camp.</p> <p>The location, layout and basic facility provision of each labour camp will be</p>		Pre-construction and construction phase

		<p>submitted to Engineer prior to their construction.</p> <p>The construction will commence only upon the written approval of the Engineer.</p> <p>The Operator shall maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the Engineer.</p> <p>Operator shall provide transportation facilities to the labour from the camp to the working site.</p> <p>All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. Water supply system for the camp must be planned and implemented. Shall provide solid waste collection and disposal arrangements. Adequate health care is to be provided for the work force. The layout of the construction camp and details of the facilities provided should be prepared and shall be approved by the engineer. The construction camp shall not be located within 500m from the nearest water stream, residential areas and / or any sensitive land uses like schools, hospitals, etc.</p>		
2.	Planning of temporary Traffic arrangements	<p>Temporary diversion will be provided with the approval of the engineer. Detailed traffic control plans will be prepared and submitted to the engineers for approval, at least two weeks prior to commencement of works.</p> <p>The traffic control plans shall contain details of temporary diversion, details of arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, SIGNAGES, safety measures for transport of hazardous materials and arrangement of flagmen.</p> <p>Any accidents and/or risk of inconveniences caused to the community shall be borne by the Operator.</p>		Pre-construction & construction phase
3.	Storage of	The Operator shall identify the site for		Pre-

	materials	temporary use of land for construction sites / storage of construction materials including pipes, etc. These sites shall not cause any inconveniences to local population / traffic movement and shall not be located within 500 m from schools/hospitals. These locations shall be approved by the engineer and shall be operated only after the approval.		<b>construction &amp; construction phase</b>
4.	Protection of top soil	In case of opening of any virgin ground, the top soil to be protected in a separate and well designated area in trapezoidal shape not exceeding 3 m in length, 2 m width and 1.5m height. The top soil shall be restored after completion of works on appropriate locations like covering of pipelines, plantation areas, any public and open lands and agricultural lands.		<b>During construction</b>
5.	Storage of excavated earth	The Operator shall secure the excavated material for backfill purposes. The excavated material storage shall be maintained in such a way that the material will not block the drainages, hinder the traffic. The storage arrangements shall be approved by the engineer. After backfilling, the left out soil or debris at the storage location or by the side of trenches shall be cleared.		
6.	Disposal of construction debris and excavated materials.	Operator will identify the sites for excess earth and debris disposal, prior to start of the earthworks; taking into account the following: (a) The dumping shall not impact natural drainage courses (b) no endangered / rare flora is impacted by such dumping (c) Settlement area located at least 500 m away from the site. (d) Avoid disposal on productive land. (e) In case of community lands, should be located with the consensus of the local community, in consultation with the engineer.		<b>Pre-construction and Construction</b>
7.	Laying of cables trench, sewerage	Adequate precautions should be taken while laying water pipeline lines to avoid the		<b>During construction</b>

	or water pipeline system	possibility of cross connection with other water supply lines, cable trench or gas pipelines underground.			
8.	Flooding in the low lying areas like proposed underground parking of vehicle	Low lying areas in the project site can get flooded during monsoon period; to prevent the situation proper drainage arrangements has to be planned. All such areas shall be identified prior to initiation of construction works and the appropriate drainage measures shall be established prior to initiation of construction works			Prior to initiation of construction
9.	Temporary flooding due to excavation.	Proper drainage arrangements to be made, to avoid the overflowing of existing drains due to excavation during the laying of water pipe line mains.			During construction
10.	Temporary water supply interruptions	Establish coordination with the concerned department to avoid or minimize the interruption of regular supply of drinking water to the residents. Proper alternative arrangements to be planned when interruption of drinking water supply to the nearby residents. iii) Prior intimation (at least 5 working days) shall be given in case of planned disruption of water supply. In the event of accidental disruptions, the supply lines shall be restored within 24 hours, and alternative water supply arrangement should be made.			Pre-construction and Construction
11.	Using of modern machineries	Using of modern machineries such as JCBs, backhoes etc, shall be used to minimize the construction period, it will reduce the construction period impacts to the nearby residents.			During construction
12.	Prevention of accidents	<b>Prevention of accidents involving human beings, animals or vehicles falling or accidents due to open trenches/manholes during construction period.</b> This needs to be ensured with proper barricading, signage boards and lighting etc.			During construction
13.	Barricading site	The construction site should be barricaded at all time with adequate marking, flags, reflectors etc. for safety of general traffic movement and pedestrians.			During construction
14.	Dust Pollution	All earth work will be protected in manner			During

	near settlements	<p>acceptable to the engineer to minimize generation of dust. Area under construction shall be water sprinkled. Construction material shall be covered or stored in such a manner so as to avoid being affected by wind direction.</p> <p>Unpaved haul roads near / passing through residential and commercial areas to be watered thrice a day. The costs thereof will be borne by the Operator. Trucks carrying construction material to be adequately covered to avoid the dust pollution and to avoid the material spillage.</p>		<b>construction</b>
<b>15.</b>	Protection of residential / sensitive receptors.	<p>All the properties along the construction site shall be provided with clear access.</p> <p>Noisy construction operations in residential and sensitive areas should be carried out only <b>between 7.30 am and 6.00 pm.</b></p> <p>Preventive maintenance of construction <b>equipment and vehicles to meet emission standards</b> and to keep them with low noise, including <b>PUC certification to check air pollution.</b></p> <p>Low noise generators shall be used specially generated acoustic and less pollution DG.</p> <p>The sensitive areas like Schools, hospitals to be provided with safety measures, and clear access to such places, prior to the start of work in order to minimize the dust and noise impacts due to vehicle movement during construction and their effectiveness to be checked during operation phase .</p>		<b>During construction</b>
<b>16.</b>	Vehicular noise pollution at residential / sensitive receptors.	<p>dling of temporary trucks or other equipment should not be permitted during periods of loading / unloading or when they are not in active use. The practice must be ensured especially near residential / commercial / sensitive areas.</p> <p>Stationary construction equipment will be kept at least 500m away from sensitive receptors.</p> <p>All possible and practical measures to control noise emissions during drilling shall be</p>		<b>During construction</b>

		employed. The Engineer may direct to take adequate controls measures depending on site conditions.		
17.	Noise from vehicles, plants and equipment's	<p>Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced.</p> <p>Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Engineer to keep noise levels at the minimum.</p>		<b>During construction</b>
18.	Pollution from Fuel and Lubricants	<p>The Operator shall ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites shall be located away from rivers and irrigation canal/ponds.</p> <p>Operator shall ensure that all vehicle/machinery and equipment's operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground.</p> <p>Operator shall arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Engineer) and approved by the Engineer. All spills and collected petroleum products will be disposed of in accordance with <b>MoEFCC and state PCB guidelines</b>.</p> <p>Engineer will certify that all arrangements comply with the guidelines of PCB/ MoEF &amp; CC or any other relevant laws and should strictly follow <b>Environmental Law of ISO-14001</b>.</p>		<b>construction and operation</b>
19.	Pollution from Construction Wastes	The Operator shall take all precautionary measures to prevent the wastewater generated during construction (e.g. during the testing of pipeline) from entering into streams, water bodies or the irrigation system. Engineer shall facilitate disposal of such water in to the nearest STP at the cost		<b>During Construction and post-construction</b>

		<p>of the Operator. All waste arising from the project is to be disposed of in the manner that is acceptable by the Engineer.</p> <p>The engineer shall certify that all liquid wastes disposed of from the sites meet the acceptable discharge standard.</p>		
20.	Safety Aspects	<p>Proper barricading shall be provided as mentioned in the technical specifications of the contract and bill of quantities</p> <p>Adequate precautions shall be taken to prevent the accidents from the machineries.</p> <p>All machines used shall confirm to the relevant Indian standards Code and shall be regularly inspected by the Engineer as per <b>OHSAS -18001</b></p> <p>Where loose soil is met with, shoring and strutting shall be provided to avoid collapse of soil as per the technical specifications of the contract.</p> <p>Personal Protective Equipment such as footwear and protective goggles to all workers employed on mixing of materials like cement, concrete etc. shall be provided. Welder's protective eye-shields shall be provided to workers who are engaged in welding works.</p> <p>Earplugs shall be provided to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation.</p> <p>The Operator shall supply all necessary safety appliances such as safety goggles, helmets, safety belts, ear plugs, mask etc. to workers and staffs.</p> <p>The Operator will comply with all the precautions as required for ensuring the safety of the workmen as per the <b>International Labor Organization (ILO)</b> Convention No. 62 as far as those are applicable to this contract.</p> <p>The Operator will make sure that during the construction work all relevant provisions of the <b>Factories Act, 1948</b> and the <b>Building and other Construction Workers (regulation of</b></p>		<b>During construction</b>

		<b>Employment and Conditions of Services) Act, 1996</b> are adhered to. The Operator shall not employ any person below the age of 14 years for any work and no woman will be employed on the work of painting with products containing lead in any form.		
21.	First Aid	The Operator shall arrange for:  i) A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone ii) Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital. All work should be strictly based on site as per OHSAS-18001 for Occupational Health and Safety Laws.		<b>During construction</b>
22.	Chance Found Archaeological Property	All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation.  The Operator will take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He will, immediately upon discovery thereof and before removal acquaint the Engineer of such discovery and carry out the SC's instructions for dealing with the same, waiting which all work shall be stopped.  The Engineer will seek direction from the Archaeological Survey of India (ASI) before instructing the Operator in above such cases to recommence the work in the site.		<b>Construction</b>
23.	Tree Protection	Giving due protection to the trees that fall in the shoulders /corridor of impact shall be the prime focus during Construction/post construction  Any requirement of cutting of trees shall be notified to the engineer in advance of commencement of work		<b>Corridor of Impact</b>

24.	Monitoring of environment parameters	The Operator shall undertake seasonal monitoring of air, water, and noise and soil quality through an approved monitoring agency as per <b>MoEF &amp; CC Notifications and ISO-14001 laws for implementation</b> . The parameter to be monitored, frequency and duration of monitoring plan shall be prepared		Project area
25.	Clearing of construction of camps and restoration	<b>Operator to prepare site restoration plans for approval by the engineer. The plan is to be implemented by the Operator prior to demobilization.</b>  <b>On completion of the works, all temporary structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the Operator's expenses, to the entire satisfaction of the engineer. The substantial completion certification will be issued only after clearing of all construction camp sites.</b>		Corridor of Impact

## **CONTRACT FORMS**

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Letter of Acceptance (LOA)  
Notice to Proceed (NTP)  
Contract agreement Form  
Performance Security for Commissioning  
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## **Letter of Acceptance**

Date: \_\_\_\_\_

To,

**[Name and address of the Contractor]**

**Sub:**            ***Proposal for < Insert the name of Work>.***

Dear Sir(s)

This is to notify you that your Proposal dated \_\_\_\_\_ for execution of the work “< Insert the name of Work>.” on turnkey basis involving design, execution and Operation & maintenance of works \_\_\_\_\_ [Name of the contract and identification number, as given in the Instructions to Bidders] for the Contract Price of Rupees \_ (\_\_\_\_\_) [amount in words and figures], as corrected and modified in accordance with the Instructions to Bidders<sup>1</sup> is hereby accepted by our Agency.

We note that as per the bid, you do not intend to subcontract any component of work

**1.            (Or)**

We note that as per bid, you propose to employ \_\_\_\_\_ as sub-contractor for executing \_\_\_\_\_

**(Delete whichever is not applicable)**

You are hereby requested to furnish Performance Security and Additional Performance Security (if any) in the form detailed in the ITB for an amount of Rs...../- within 21 days of the receipt of this letter of acceptance and sign the contract failing which action as stated in Para ---- of ITB will be taken.

Yours faithfully,

***Authorized Signature***

**Name and Title of Signatory**

**Name of Agency**

**Issue of Notice to proceed with the work**

(On Letter head of the Client)

Date \_\_\_\_\_ 2019

To,

(name and address of the Contractor)

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Dear Sirs:

Pursuant to your furnishing the requisite security and signing of the contract agreement for the work “< Insert the name of Work>.” involving execution and Operation & Maintenance of works at a Bid Price of Rs. , you are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully,

*(Signature, name and*

*Title of signatory authorized*

*to sign on behalf of Client)*

## **Contract Agreement Form**

This agreement, made on the \_\_\_\_\_ day of \_\_\_\_\_ 2019, between \_\_\_\_\_

\_\_\_\_\_ [name and address of Client] (hereinafter called "the Client") of the one part and \_\_\_\_\_ [name and address of contractor] (hereinafter called "the Contractor") of the other part.

Whereas the Client is desirous that the Contractor "[insert name of the work] [name and identification number of Contract] (hereinafter called "the Works") and the Client has accepted the Bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein, at a contract price of Rs.....

***NOW THIS AGREEMENT WITNESS as follows:***

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Client to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Client to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.
3. The Client hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
  - i) Letter of Acceptance
  - ii) Notice to proceed with the works
  - iii) Contractor's Bid (Technical & financial part)
  - iv) Addendum, Corrigendum & Clarifications, if any
  - v) Contract Data
  - vi) Special Conditions of Contract
  - vii) General Conditions of contract
  - viii) Specifications
  - ix) Drawings
  - x) Bill of Quantities
  - xi) Payment Schedule

Any other document listed in the Contract Data / PCC as forming part of the contract.

In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of \_\_\_\_\_

was hereunto affixed in the presence of:

Signed, Sealed and Delivered by the said \_\_\_\_\_ in the presence of: Binding signature of Client

\_\_\_\_\_  
Binding Signature of Contractor \_\_\_\_\_

**Performance Security for Commissioning**

**Performance Security**

.....[Bank's Name, and Address of Issuing Branch or Office] .....

**Beneficiary:** [Name and Address of Procuring Entity (Chief Executive Officer, Amritsar Smart City Limited, Amritsar)]

**Date:** ..... **Performance Guarantee No.:** ..... We have been informed that .... **[name of the Contractor]** .... (hereinafter called "the Contractor") has entered into Contract No. .... **[reference number of the Contract]** .... dated ..... with you, for the execution of .... **[name of contract and brief description of Works]** .... (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance security is required.

At the request of the Contractor, we .... **[name of the Bank]** .... hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of Rupees\* .... **[amount in figures]** .... (Rupees.....)

.... **[amount in words]** .... such sum being payable upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

The Guarantor agrees to extend this guarantee for a specified period in response to the Procuring Entity's written request for such extension for that specified period, provided that such request is presented to the Guarantor before the expiry of the guarantee.

This guarantee shall expire, no later than the ... Day of ...., .... \*\*, and any demand for payment under it must be received by us at this office on or before that date.

.....

*Seal of Bank and Authorised Signature(s)*

\* The Guarantor shall insert an amount representing the percentage of the Contract Price specified in the Contract

\*\*Insert the date sixty days after the expected completion date, including defect liability period and maintenance period, if any.

Notes:

1. All italicized text is for guidance on how to prepare this advance payment guarantee and shall be deleted from the final document.
2. The Procuring Entity should note that in the event of an extension of the time for completion of the Contract, the Procuring Entity would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee.

Schedules to Section 9

**Performance Security Declaration**

**Form of Performance Security Declaration**

Date: \_\_\_\_\_ [insert date (as day, month and year)]

Contract Name and No.: \_\_\_\_\_ [insert name and number of Contract]

To: \_\_\_\_\_ [insert Designation and complete address of Procuring Entity]

We, the undersigned, declare that:

We understand that, according to your conditions, the Contract must be supported by a Performance Security Declaration as a guarantee to ensure fulfilment of our all performance obligations under the Contract for \_\_\_\_\_ [insert name of subject matter of procurement].

We accept that we will automatically be suspended from being eligible for bidding in any contract with you for the period of time of 60 months [Procuring Entity to indicate here the period of time for which the Procuring Entity will declare Bidder ineligible to be awarded a Contract if the performance Security Declaration is to be executed] starting on the date that we receive a notification from you, the CEO,ASCL [Designation of the Procuring Entity] that our Performance Security Declaration is executed, if we are in breach of any of our performance obligation under the conditions of the Contract,

We understand this Performance Security Declaration shall expire after 60 days of completion of our all obligations under the Contract including Defect Liability, warranty/ Guarantee, operation, maintenance, etc. in accordance with the conditions of the Contract.

Signed: \_\_\_\_\_

[insert signature of person whose name and capacity are shown]

In the capacity of: \_\_\_\_\_

[insert legal capacity of person signing the Performance Security Declaration]

Name: \_\_\_\_\_

[insert complete name of person signing the Declaration]

Duly authorized to sign the Contract for and on behalf of: \_\_\_\_\_

[insert complete name and address of the Bidder]

Dated on \_\_\_\_\_ day of \_\_\_\_\_ [insert date of signing]

Corporate Seal \_\_\_\_\_

## Schedules to Section 9

..... [Bank's Name, and Address of Issuing Branch or Office] .....

**Beneficiary:** [Name and Address of Procuring Entity (Chief Executive Officer, Amritsar Smart City Limited)] .....

**Date:** ..... **Performance Guarantee No.:** ..... We have been informed that . . . . [name of the Contractor] . . . . (hereinafter called "the Contractor") has entered into Contract No. . . . . [reference number of the Contract] . . . . dated . . . . . with you, for the execution of . . . . . [name of contract and brief description of Works] . . . . (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance security is required.

At the request of the Contractor, we . . . . [name of the Bank] . . . hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of Rupees\* . . . . [amount in figures] . . . . (. Rupees..... . . . . [amount in words] . . . .) such sum being payable upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

The Guarantor agrees to extend this guarantee for a specified period in response to the Procuring Entity's written request for such extension for that specified period, provided that such request is presented to the Guarantor before the expiry of the guarantee.

This guarantee shall expire, no later than the . . . . Day of . . . . , . . . . \*\*, and any demand for payment under it must be received by us at this office on or before that date.

### ***Seal of Bank and Authorised Signature(s)***

\* The Guarantor shall insert an amount representing the percentage of the Contract Price specified in the Contract

\*\* Insert the date sixty days after the expected completion date, including defect liability period and maintenance period, if any.

#### **Notes:**

4. All italicized text is for guidance on how to prepare this advance payment guarantee and shall be deleted from the final document.
5. The Procuring Entity should note that in the event of an extension of the time for completion of the Contract, the Procuring Entity would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee.

Performance Security for Maintenance.

**Performance Security**

**PRICE SCHEDULES**

1. The Price Schedules are divided into separate Schedules as follows:

Schedule No. 1: Rate per car park

Schedule No. 2: Premium Rate payable to employer by bidder during O&M period

2. The Schedules do not generally give a full description of the plant to be supplied and the services to be performed under each item. Bidders shall be deemed to have read the Employer's Requirements and other sections of the Bidding Document and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices. The entered rates and prices shall be deemed to cover the full scope as aforesaid, including overheads and profit.
3. If bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with ITB 7 prior to submitting their bid.

**PRICING**

4. Prices shall be filled in indelible ink, and any alterations necessary due to errors, etc. shall be initialed by the Bidder.
5. As specified in the Bid Data Sheet and Special Conditions of Contract, prices shall be fixed and firm for the duration of the Contract, or prices shall be subject to adjustment in accordance with the corresponding Appendix (Price Adjustment) to the Contract Agreement.
6. Bid prices shall be quoted in the manner indicated and in the currencies specified in the Instructions to Bidders in the Bidding Document.
7. For each item, bidders shall complete each appropriate column in the respective Schedules, giving the price breakdown as indicated in the Schedules.
8. Prices given in the Schedules against each item shall be for the scope covered by that item as detailed in Section 6 (Employer's Requirements) or elsewhere in the Bidding Document.
9. Payments will be made to the Contractor in the currency or currencies indicated under each respective item.
10. When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.

Schedules to Section 9

**Amritsar Smart City Limited (ASCL)**

**Package Name: Design, Build, Operation and Maintenance for ten years of Mechanized Fully Automatic Multi Level Car Parking Facility in Kairon Market, Amritsar**

Bill of quantity (only for references purposes  
and not for uploading with the bid)

**Price Schedule: 1 MLCP Facility at Kairon Market - BOQ**

S.	Description of Item	Qty	Unit	Rate Per Car Space in Rs.	Amount in Rs.
1	DESIGN, BUILD, OPERATION AND MAINTENANCE FOR TEN YEARS OF MECHANIZED FULLY AUTOMATIC MULTI LEVEL CAR PARKING FACILITY for 10 (ten) years including defect liability period of 2 (two) years as per detailed scope & specification of RFB				
a	Automated Multi stack System for Four Wheeler, having Nine Level (Three basement, Ground level & 5 upper floors) Multi Grid automated Parking System with Electro Mechanical Technology accommodating minimum 415 Cars. The parking system shall be designed for permitting cars with the following characteristics: Max Length 5.20 M, Max Height 2.05 M, Max Width 2.10 M, Weight 2500 Kg (at least 3 floors with SUVs & Luxury cars provision) with average retrieval/parking time not more than 180 seconds. The system must be having safety features as outlined in specifications and maintained for complete duration of O&M period. (a) Brakes : DC magnetic (b) Emergency stop switch (c) Photo sensors (d) Final Limit Switch (e) Pallet Stopper	No of ECS to be mentioned by bidder	Car space (ECS)	Rate to be mentioned only in financial part on per ECS basis	
b	Covered two wheeler surface parking & other Public Amenities area like Visitor facilitation Centre, Public toilets etc. as per scope of work mentioned in RFP				
<b>Total (Rs.)</b>					
<b>Grand Total (Rs.)</b>					

Schedules to Section 9

**Amritsar Smart City Limited (ASCL)**

**Package Name: Design, Build, Operation and Maintenance for ten years of Mechanized Fully Automatic Multi Level Car Parking Facility in Kairon Market, Amritsar**

**Premium Sheet (only for references purposes and not for uploading with the bid)**

**Price Schedule : 2 Operation & Maintenance Services (Kairon Market)**

S.No	Description of Item	Qty	Unit	Premium Rate Per year in Rs.	Amount in Rs.
A	Premium rate (Minimum Rs 25 lacs per year) paid to employer (ASCL & MCA) with annual increment @ 10% as mentioned in bid document				
1	-Do- For First year of O&M	1	Per year	Premium to be quoted by bidder in financial part only	0
2	-Do- For Second year of O&M	1	Per year	0	0
3	-Do- For Third year of O&M	1	Per year	0	0
4	-Do- For Fourth year of O&M	1	Per year	0	0
5	-Do- For Fifth year of O&M	1	Per year	0	0
6	-Do- For Sixth year of O&M	1	Per year	0	0
7	-Do- For Seventh year of O&M	1	Per year	0	0
8	-Do- For Eighth year of O&M	1	Per year	0	0
9	-Do- For Ninth year of O&M	1	Per year	0	0
10	-Do- For Tenth year of O&M	1	Per year	0	0
11	<b>Total (Rs.)</b>				0
	<b>Grand Total (Rs.)</b>				

\*Quoted premium to be paid to ASCL/MCA shall be minimum INR 25, 00,000 with year on increment of 10%.