Request for Empanelment of System Integrators for Implementation of Electronic Toll Collection System at Toll Plazas

RFE Reference –IHMCL/ETC/Empanelment/2021/01

Indian Highways Management Company Limited (IHMCL)

G – 5 & 6, NHAI HQ, Sector 10, Dwarka

Date: 28 October 2021

Contents

1. NOTICE INVITING APPLICATIONS

1.1. Applications/Bids are invited by the Indian Highways Management Company Limited (IHMCL) for the empanelment of System Integrator(s) for the implementation of Electronic Toll Collection (ETC) System at Toll Plazas.

1.2. All eligible applicants are invited to participate in the empanelment process through this RFE. **This empanelment process shall supersede all previous empanelment of System Integrator(s) by IHMCL. The existing empanelment of System Integrators shall remain valid up to maximum 02 months from the date release of this RFE document. Therefore, all interested existing empanelled system integrators are also required to participate in this empanelment process.**

1.3. The RFE document may be downloaded from **https://rfesi-ihmcl.co.in** ("**RFE portal**") as available on IHMCL website. The Applications shall be summarily rejected if not accompanied by the requisite documents as indicated in this RFE document and RFE Portal. IHMCL shall not be responsible for any technical glitches in submission of application on the portal. A brief description on submission of Application and process is provided at **Section 8** of this RFE, which shall be updated from tine to time on the RFE Portal.

1.4. The process of Application for empanelment of the System Integrator shall be as per process defined below:

a) Eligibility and qualification of the Applicant will be examined based on the details submitted under Eligibility Criteria prescribed in this RFE document.
b) Applicants shall apply for empanelment by submitting the requisite documents in form of bids as per Eligibility Criteria prescribed in this RFE document.
c) The Evaluation Committee shall open and evaluate the requisite documents.
d) Post evaluation of requisite document, IHMCL shall publish/update the list of empanelled System Integrators (SI).
e) ONLY empanelled SIs shall be eligible for participating in subsequent limited tenders/request for Quotations issued by IHMCL for selection of System Integrator for the Implementation of ETC system and providing ETC O&M services at toll plazas.

1.5. IHMCL reserves the right to accept or reject any or all Applications for the project before issuance of letter for shortlisted/Empanelled System Integrator without thereby incurring any financial or other liability to the affected Applicants.

1.6. All official communication regarding this Application to be addressed to:

Chief Operating Officer
Indian Highways Management Company Limited
G 5 & 6, First Floor, National Highways Authority of India Building, Sector 10, Dwarka
New Delhi 110 075
Email - tenders@ihmcl.com
Link for submission of Applications - **https://rfesi-ihmcl.co.in**

2. DEFINITIONS AND ABBREVIATION

In this document, the following terms shall have respective meanings as mentioned below:

a) “Applicable Law” shall mean the laws, rules or regulations and any other instruments, having the force of law in Republic of India, as in force from time to time.

b) “Authorized Representative” means any person/agency authorized by IHMCL.

c) “Applicant/Bidding Entity” means, an entity/company which participates in the Bid process and submits its proposal/bid pursuant to this RFE document, including the Sole Applicant and each member of the Consortium.

d) “Application/Bid” means the documents submitted by the Applicant in response to this RFE.

e) “Commencement date” means the date upon which the Service Provider receives the notice to commence the work issued by IHMCL.

f) “Contract” shall mean & include RFE, Notice for Inviting Tender (NIT), the tender documents and letter of acceptance thereof and the formal agreement, to be executed between IHMCL and the Service Provider together with the complete documents referred to therein including the conditions with appendices and any special conditions, the specifications, designs, drawings, bill of quantities with rates and amounts. All these documents taken together shall be deemed to form one Contract and shall be complementary to each other

g) “IHMCL” means Indian Highways Management Company Ltd.

h) “Law" or "Legislation" - shall mean any Act, notification, by law, rules and regulations, directive, ordinance, order or instruction having the force of law enacted or issued by the Government of India or State Government or regulatory authority.

i) “Letter of Award (LOA)” means the issue of a signed letter by IHMCL to Service Provider conveying its intention to accept the offer of Service Provider and awarding the work mentioning the total Contract Value.

j) "Local Currency" means the Indian Rupees

k) “MoRTH” means Ministry of Road Transport and Highways

l) “NHAI” means National Highways Authority of India.

m) “Party” shall mean IHMCL or Applicant individually and “Parties” shall mean IHMCL and Applicant collectively.

n) "Personnel" means persons hired by the Service Provider as employees and assigned to the performance of the Services or any part thereof.

o) “RFE” shall mean this Request for Empanelment dated 28-10-2021, including the written clarifications & Corrigendum/Addendum issued by IHMCL in respect of the RFE from time to time.

p) “Services” means requirements defined in this RFE including all additional services associated thereto to be delivered by the Successful Applicant selected through subsequent limited tenders issued by IHMCL.

q) “Service Provider” shall mean the empanelled System Integrator who have engaged to implement ETC system and provide O&M services at toll plazas

r) “Empanelled Applicants” means the Applicant(s), who, after the complete evaluation process, has been empanelled by IHMCL.

“Any other term(s), not defined herein above but defined elsewhere in this RFE document shall have the meaning(s) ascribed to such term(s) therein and shall be deemed to have been included in this Section.

2.1. Abbreviations

ALB	:	Automatic Lane Exit Barrier
AVC	:	Automatic Vehicle Classifier
CCTV	:	Closed Circuit Television
NVR	:	Network Video Recorder
ETC	:	Electronic Toll Collection
ICD	:	Interface Control Document (specifications by IHMCL)
IHMCL	:	Indian Highways Management Company Limited
ISCU	:	Intercom Slave Communication Unit
LC	:	Lane Computer-Industrial PC
LGD	:	Load Gauge Detector
LoA	:	Letter of Award
LSDU	:	Lane Status Display Unit
MCBF	:	Mean Cycle Between Failures
MCU	:	Master Communication Unit
MLB	:	Manual Lane Entry Barrier
MTBF	:	Mean Time Between Failures
MTTR	:	Mean Time to Repair
NETC	:	National Electronic Toll Collection programme
NHAI	:	National Highways Authority of India
OHLS	:	Over Head Lane Sign
POS	:	Point of Sales
RAID	:	Redundant Array of Inexpensive Disks
RFID	:	Radio Frequency Identification
RFE	:	Request for Empanelment
RPR	:	Receipt Printer
SFTP	:	Secure File Transfer Protocol
SI	:	System Integrators
Staff Id	:	Staff Identification
TCD	:	Toll Collector Display
TCT	:	Toll Collector's Terminal
TL	:	Traffic Light
TLC	:	Toll Lane Controller
UPS	:	Uninterrupted Power Supply

3. INSTRUCTIONS TO APPLICANTS

3.1. Scope of Bid

3.1.1. IHMCL invites applications/bids from eligible entities having the requisite technical and financial capabilities.

3.1.2. The Bids would be evaluated on the basis of the evaluation criteria set out in this Request for Empanelment (RFE) document in order to identify the qualified System Integrators for providing the services envisaged under this RFE.

3.1.3. Terms used in this RFE document which have not been defined herein shall have the meaning recognized thereto in the draft Contract Conditions.

3.1.4. Pursuant to the release of this RFE document, IHMCL shall receive bids, prepared and submitted in accordance with the terms set forth in this RFE document and other documents provided by IHMCL pursuant to this RFE document including annexure/ Appendix hereto (collectively referred to as the "Bid Documents"), as modified, altered, amended and clarified from time to time by IHMCL.

3.1.5. This RFE document and all attached documents are and shall remain the property of IHMCL and are transmitted to the Applicants solely for the purpose of preparation and the submission of their respective bids in accordance herewith. Applicants shall not use it for any purpose other than for preparation and submission of their bids.

3.1.6. The statements and explanations contained in this RFE document are intended to provide an understanding to the Applicants about the subject matter of this RFE document and shall not be construed or interpreted as limiting, in any way or manner whatsoever, the scope of services, work and obligations of the Service Provider to be set forth in the RFE or IHMCL right to amend, alter, change, supplement or clarify the scope of service and work, the Contract conditions to be awarded pursuant to the RFE document including the terms thereof, and this RFE document including terms herein contained. Consequently, any omissions, conflicts or contradictions in the Bid document are to be noted, interpreted and applied appropriately to give effect to this intent and no claim on that account shall be entertained by IHMCL.

3.1.7. Applicants may note that IHMCL will not entertain any material deviations from the RFE document at the time of submission of the Proposal or thereafter. The Proposal to be submitted by the Applicants will be unconditional and the Applicants would be deemed to have accepted the terms and conditions of the RFE document with all its contents. Any conditional Proposal is liable for outright rejection.

3.1.8. Conditional or incomplete proposals are liable to be treated as non-responsive and, therefore may be rejected at the sole discretion of IHMCL

3.2. Eligibility Criteria/Eligibility to Apply

3.2.1. The eligibility/pre-qualification criteria for the Applicant shall be as listed in the table below.

Sl #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
PQ-1	Legal entity	The Applicant can be either a) A business entity ("Sole Applicant") incorporated under the Companies Act 1956/2013 or Limited Liability Partnerships Act 2008. OR, b) A Consortium of business entities ("Consortium"), where each Member of the Consortium shall be incorporated under the Companies Act 1956/2013 or Limited Liability Partnerships Act 2008, subject to following points: i. members of the Consortium shall nominate one member as the lead member (the "Lead Member"), who shall be responsible for all interactions with IHMCL. ii. maximum number of members in the Consortium shall be two (2), including the Lead Member; iii. the members in the Consortium shall be jointly and severally liable; iv. The Partners/ members of the Consortium shall nominate one Partner/ member to (a) lead the JV or consortium as a lead Applicant and also represent the partners/ members jointly. The lead partner/ member shall nominate an authorized signatory from within the firm. The nomination(s) shall be supported by a Power of Attorney signed by all the members of the Consortium. v. Such authorized signatory shall be a Director/ Partner/ Office bearer of the entity, and his/ her power to sign documents for and on behalf of the entity shall be illustrated by a copy of	**For Sole Applicant or the Lead Applicant and each Member of Consortium:** a) Copy of Certificate of Incorporation / Registration under Companies Act, 1956/2013 or LLP Act 2008, as applicable b) Power of Attorney as per format enclosed at Annexure-3 and Annexure-4 c) In case of a Consortium, Memorandum of Understanding (MoU), as per the format enclosed at Annexure-5 d) GST Registration Certificate

Sl #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
		the Board resolution/ general Body meeting that authorizes him or her to do so, attested by the Company Secretary or such other signatory recognized in law. If such signatory is not such an Office bearer, an office bearer shall extend a Power of Attorney to such signatory, along with the copy of the Board resolution that authorizes the office bearer to issue such a Power of Attorney. vi. any entity who has submitted Proposal for this RFE in its individual capacity or as part of a Consortium cannot participate as a member of any other Consortium; vii. The members of the Consortium shall enter into a Memorandum of Understanding (MoU) for the purpose of submission of the Proposal. The Sole Applicant / all members in case of a Consortium should be registered with GST in India.	
PQ-2	Annual Turnover	a) The Sole Applicant or any member of the Consortium, individually or combined (in case of Consortium) should have an average annual turnover of minimum **Rs. 40 crores** during the three (03) financial years, i.e. FY 2017-18, FY 2018-19 and FY 2019-20 b) **Relaxation for Startup** – In case, the Applicant (Sole Applicant or any member of the Consortium, as applicable) is a Startup registered with Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, GoI, the above criteria (a) shall be relaxed such that the Applicant shall be required to have average turnover of minimum **Rs. 10 crores** during the three (03) financial years, i.e. FY 2017-18, FY 2018-19 and FY 2019-20.	**For Sole Applicant or the Lead Applicant and each Member of Consortium (including Startup entity, if any):** a) Relevant extracts of audited financial statements for the three financial years FY 2017-18, FY 2018-19 and FY 2019-20 **AND** b) Certificate from the Statutory Auditor/CA on turnover details over the three (3) financial years FY 2017-18, FY 2018-19 and FY 2019-20 as per format enclosed at Annexure-2 **In case of Startup entity registered under DPIIT:**

Sl #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
		Important - For the purpose of this criterion, annual turnover of only the bidding entity will be considered. Annual turnover of any parent, subsidiary, associated or other related entity will not be considered.	c) Valid certificate along with registration ID issued by DPIIT as documentary evidence shall have to be submitted.
PQ-3	Net Worth	The Sole Applicant or each member, in case of a Consortium must have **positive** Net worth in Indian Rupees as on **31 March 2020.** **Important -** For the purpose of this criterion, net-worth of only the bidding entity will be considered. Net-Worth of any parent, subsidiary, associated or other related entity will not be considered.	**For Sole Applicant or the Lead Applicant and all other Members of Consortium:** Certificate from the Statutory Auditor /CA clearly specifying the positive net worth of the firm as on **31 March 2020** as per format enclosed at Annexure-2
PQ-4	Toll Management System software	The **Sole Applicant or Lead Member** in case of a Consortium should have developed its proprietary own TMS software having **"real-time transaction processing" functionality** as on date of submission of Application. All IPR, source code etc. of the TMS should be owned by the Sole Applicant or Lead Member in case of a Consortium, as applicable. For the purpose of evaluation, "real-time transaction processing" shall mean as below – • **For projects under NETC (FASTag) programme in India** – Compliance to Interface Control Document (ICD) 2.5 or latest specifications as set out by IHMCL/NHAI with at least one NH toll plaza Live with ICD 2.5 specification as on date of submission of Application. ***OR,*** • **For any other ETC projects (other than FASTag programme)** – The capability of the TMS system to complete end-to-end process of reading/identification of an On-board Unit (OBU) or RFID tag at a toll plaza or a tolled stretch to sharing of acknowledgement/deduction of the applicable toll amount/fee from the bank	**For Sole Applicant or the Lead Applicant of Consortium:** a) A Certificate from Authorized Signatory of the Applicant as per the format enclosed at Annexure-6 AND b) Brief write up on the TMS with Screenshots of all modules such as Lane Application module, Plaza Module, etc. **AND** c) Proof of "**real-time transaction processing**" functionality as below - - **For FASTag programme** – Proof of confirmation from respective Acquirer Bank for Go-Live at any toll plaza on ICD 2.5 or latest specs, Or

Sl #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
		account/wallet linked to the OBU or RFID tag, on a real-time basis.	- **For any ETC project (other than FASTag programme)** – A certificate from client stating the real time transaction processing functionality.
PQ-5	ETC Experience	a) The Sole Applicant or any Member(s) of the Consortium individually or combined (in case of Consortium) should have been awarded and implemented ETC projects in India for commercial operations during last 05 years as on the date of submission of Application. For the purpose of criterion, ETC project experience shall mean project experience for at least **100 ETC Lanes or 10 toll plazas** including supply, installation, and commissioning and Operations & Maintenance of following minimum equipment/system - • Toll Management Software • RFID reader • Toll Lane Controller • Automatic Vehicle Classifier • License Plate Image Capture Camera • Incident Capture camera • Automatic Boom Barrier The project(s) should have been either completed or ongoing. For an ongoing project the completion certificate by client/ self-certificate. b) **Relaxation for Startup** – In case, the Applicant (Sole Applicant or any member of the Consortium, as applicable) is a Startup registered with Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, GoI, the above criteria (a) shall be, **relaxed** such that **ETC project experience** shall mean project experience for at least 5**0 ETC Lanes or 5 toll plazas.** Rest criteria in (a) shall remain same.	**For Sole Applicant or the Lead Applicant and all other Members of Consortium (including Startup entity, if any):** a) Work order/ Contract clearly highlighting the relevant scope of work, and contract value, year of execution. AND b) Completion Certificate issued & signed by the competent authority of the client on the entity's letterhead OR, b) Self-certificate from the Applicant signed by authorized signatory for this bid holding written special power of attorney on stamp paper along with the official contact details of the competent authority of the client. The format of the self-certificate is enclosed at Annexure-7 IHMCL reserves the right to contact the afore-mentioned Competent Authority

Sl #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
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PQ-6	Certification	The Sole Applicant or the Lead Member, in case of a Consortium, should have a valid certificate of any ONE of the following: • CMMi Level 3 or above • ISO 20000 for IT Service Management • ISO 27001:2013 for Information Security Management System	For Sole Applicant or the Lead Applicant, in case of Consortium: Valid copy of relevant certificate
PQ-7	Undertaking of Blacklisting	The Sole Applicant or all members of the Consortium, in case of a Consortium, should not have been blacklisted by any State / Central Government Department or Central /State PSUs in India or Abroad as on date of submission of Application.	To be provided as per format enclosed at Annexure-1
PQ-8	Undertaking for system audit of TMS software	The **Sole Applicant or Lead Member** in case of a Consortium should undertake that it shall carry out a system audit of its TMS software through STQC/CERT-in empanelled vendors at least once in a year as per directions of IHMCL from time to time.	**For Sole Applicant or the Lead Applicant and all other Members of Consortium:** An undertaking in the Cover Letter.

3.3. Power of Attorney

The Applicant should submit a notarized Power of Attorney in the format provided at Annexure-3 (for sole Applicant and all members of Applicant) and Annexure-4 (Lead Applicant) or Letter of Authorization authorizing the signatory of the Bid to sign the Bid and all related documents. It is clarified that Applicants may submit equivalent documents (for example, delegation of power, board resolution copy), in lieu of this document, as applicable.

3.4. Content of the Request for Empanelment

3.4.1. The RFE document should be read in conjunction with any addenda or clarifications issued subsequent to publication of RFE.

3.4.2. Applicants are advised to study the RFE document carefully. Submission of the Application will be deemed to have been done after careful study and examination of all instructions, eligibility norms, terms and requirement specifications in the RFE document with full understanding of its implications. Applications not complying with all the stipulations and requirements as set forth in this RFE document are liable to be rejected at the sole discretion of IHMCL. Failure to furnish all information required in the RFE document or

submission of an application not substantially responsive to the RFE document in all respects will be at the Applicant's risk and may result in the rejection of the Application.

3.4.3. **Cost for Bidding**

The Applicant shall bear all costs associated with the preparation and submission of the Application and IHMCL will in no case, be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

3.4.4. **Non-Refundable Document Fee**

a) A non-refundable document fee of **Rs. 10,000 (incl. GST)** should be deposited in IHMCL bank account and proof of payment (receipt, UTR details etc.) shall be submitted on the Portal. Proposals/Application received without Document fees shall be rejected.

b) IHMCL bank account details for deposit of Document Fee are as mentioned below:

- A/c Holder Name = Indian Highways Management Company Limited
- Bank Name = Canara Bank
- A/c No. = 8598201006217
- IFSC = CNRB0008598
- Branch = Delhi NHAI Dwarka Branch New Delhi-110075

3.4.5. **Earnest Money Deposit (EMD)**

a) The Applicant shall submit, along with their Proposals/Applications, an EMD of **INR 1,00,000/- (Rupees One Lakh only)** in the form of a Demand Draft OR Bankers Cheque or NEFT/RTGS mode to IHMCL Bank Account (Bank details as provided in Clause 3.4.4 (b))

b) Demand Draft/Banker cheque drawn on any schedule bank: Payable at Indian Highways Management Company Limited, New Delhi

c) The Original Demand Draft/Banker's Cheque shall be submitted to IHMCL Office within 07 days from the date of application submission on the Portal. Any delay in submission of Original Demand Draft/Banker's Cheque within specified time may lead to rejection to the Application.

d) Upon completion of processing of Applications, the EMD will be returned/refunded without any interest to respective Applicants within 30 days.

e) Any bid not accompanied by an acceptable Earnest Money Deposit shall be rejected by IHMCL as non-responsive

3.4.6. Clarifications

a) Applicants may submit their queries with respect to the RFE document at tenders@ihmcl.com in the following format (in excel ONLY) as below:

Name of Applicant: _____

Sl #	Ref to RFP (Clause, Page no.)	Original Clause of RFE	Clarification Sought

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

c) To facilitate evaluation of Applications, IHMCL may, at its sole discretion, seek clarifications from any Applicant regarding its Application. Such clarification(s) shall be provided within the time specified by IHMCL for this purpose. Any request for clarification(s) and all clarification(s) in response thereto shall be in writing.

3.4.7. Save and except as provided in this RFE document, IHMCL shall not entertain any correspondence with any Applicant in relation to acceptance or rejection of any Application.

3.4.8. Applications shall be deemed to be under consideration immediately after the Applications are opened and until such time IHMCL makes official intimation of qualification or disqualification to the Applicants. While the Applications are under consideration, Applicants and/ or their representatives or other interested parties are advised to refrain, save and except as required under this RFE, from approaching or contacting through any means, IHMCL and/ or their employees/ representatives on matters related to the Applications under consideration.

3.5. Language of Application

The Application prepared by the Applicant, as well as all correspondence and documents relating to the Bid exchanged by the Applicant and IHMCL shall be written in English language only.

3.6. Preparation and submission of application

3.6.1. Application/Bid must be submitted online only through RFE portal as mentioned in Section 1. **Applicants are advised to go through the guidelines, instructions, manuals, etc. as provided in the portal.**

3.6.2. Applicants are required to upload all requisite document at RFE portal as mentioned in Section 1.

3.6.3. Physical submission of the documents such as Power of Attorney or equivalent as specified in the RFE document are required to be submitted at IHMCL office within 15 days from date of application submitted at RFE portal as mentioned in Section 1. Failure to submit the original document(s) as required in the RFE in physical form within 15 days shall lead to rejection of the application.

3.6.4. If for any reason, any interested Applicant fails to complete any online stages during the complete Application process/cycle, IHMCL shall not be responsible for that and any grievance regarding that shall not be entertained.

3.7. Examination and evaluation of applications

3.7.1. During the process of evaluation, IHMCL may seek for clarifications from any Applicants in respect to the application id at RFE portal. Applicants are required to respond to the clarifications sought by IHMCL within 15 days from date of clarification sought by IHMCL. Failure of any Applicant to provide the required clarifications within 15 days may result in rejection of its application, at the sole discretion of IHMCL.

3.7.2. **Phase-1: Test of Responsiveness:**

a) As part of the evaluation process, IHMCL shall first determine whether each Application is responsive to the requirements of this RFE document.

b) An Application shall be considered responsive only if:

i. All requisite documents are received through RFE portal as per the format required under this RFE document;

ii. Submission of physical document such as Power of Attorney or equivalent as per the format required under this RFE document;

iii. Application contains all the information as required (complete in all respects).

iv. Application does not contain any condition or qualification.

v. Application is accompanied by Power of Attorney for Lead Member of Consortium and the Joint Bidding Agreement as specified in RFE document

vi. it is not non-responsive in terms hereof

c) IHMCL reserves the right to reject any Application which is non-responsive and no request for alteration, modification, substitution or withdrawal shall be entertained by IHMCL in respect thereof.

3.7.3. **Phase-2: Application/Bid Evaluation Process:**

a) The requisite documents as specified in the RFE document submitted at RFE portal will be evaluated by Evaluation Committee. The documents submitted RFE portal will be scrutinized by the Evaluation Committee. The Applications that meet the Eligibility Criteria shall be considered for empanelment.

b) Evaluation process by IHMCL shall not be questioned by any of the Applicants. IHMCL may ask Applicant(s) for additional information.

3.8. Process confidentiality

Information relating to the examination, clarification, evaluation, and comparison of Applications and recommendations for the award of a Contract shall not be disclosed to Applicants or any other persons not officially concerned with such process until the award to the Successful Applicant has been announced. Any attempt by an Applicant to influence IHMCL's processing of Applications or award decisions may result in the rejection of his application.

3.9. IHMCL's right to reject any or all applications

Notwithstanding anything contained herein, IHMCL reserves the right to reject any Application, and to annul the empanelment process and reject all Applications at any time before declaring the list of empanelled System Integrators, without thereby incurring any liability to the affected Applicant(s) or any obligation to inform the affected Applicant(s) of the grounds for such decision.

3.10. Confidentiality

3.10.1. The Applicant shall keep confidential any information related to this RFE with the same degree of care as it would treat its own confidential information. The Applicants shall note that the confidential information will be used only for the purposes of this tender and shall not be disclosed to any third party for any reason whatsoever.

3.10.2. Information relating to the examination, clarification, evaluation and recommendation for the Applicants shall not be disclosed to any person who is not officially concerned with the process or is not a retained professional advisor advising IHMCL in relation to, or matters arising out of, or concerning the bidding process. IHMCL will treat all information, submitted as part of the Bid, in confidence and will require all those who have access to such material

to treat the same in confidence. IHMCL may not divulge any such information unless it is directed to do so by any statutory entity that has the power under law to require its disclosure or as may be required by law or in connection with any legal process or such information which would be available in public domain.

3.10.3. At all times during the performance of the Services, the Applicant shall abide by all applicable IHMCL, NHAI/MoRTH's security rules, policies, standards, guidelines and procedures. The Applicant should note that before any of its employees or assignees is given access to the Confidential Information, each such employee and assignees shall agree to be bound by the term of this tender.

3.10.4. The Successful Applicant should not disclose to any other party and keep confidential the terms and conditions of this Contract, any amendment hereof, and any Attachment or Annexure hereof.

3.10.5. The obligations of confidentiality under this section shall survive termination of the Contract.

3.10.6. Applicants shall not be under a declaration of ineligibility or blacklisting for corrupt and fraudulent practices by the Central Government, the State Government or any public undertaking, autonomous body, authority by whatever name called under the Central or the State Government.

3.11. Validity of the empanelment

The empanelment shall remain valid for a period 02 years with effect from date of empanelment and may further be extended up to 1 year as per sole discretion of IHMCL.

3.12. Corrupt or Fraudulent practices

3.12.1. IHMCL will reject the application of the applicants, if it determines that the Applicant recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question.

3.12.2. IHMCL will declare the Applicant ineligible, either indefinitely or for a stated period of time, to be awarded a contract by IHMCL if it at any time determines that the Applicant has engaged in corrupt or fraudulent practices in competing for the contract, or during execution.

3.12.3. "Corrupt practice" means the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official or employee of IHMCL in the procurement process or in Contract execution.

3.12.4. "Fraudulent Practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of IHMCL and includes collusive practice among Applicants (prior to or after Application submission) designed to

establish bid process at artificial non-competitive levels and to deprive IHMCL of the benefits of free and open competition.

3.13. Suspension from Empanelment

3.13.1. IHMCL reserves the right to suspend the empanelment of any empanelled System Integrators till further notice under following conditions:

a) In case of non-performance or failure of carry out any obligation under Contract(s) awarded by IHMCL or NHAI.
b) Repeated occurrence of breach of any SLA parameter
c) If the empanelled System Integrator has been found to be involved in corrupt or fraudulent practices such as posting manual transactions to CCH at toll plazas
d) If upon award of award to any empanelled SI, the SI fails to deliver the project deliverables / milestones within set timelines of the Contract on repeated occasions, IHMCL reserves the right to suspend the empanelment of such SI for a period of 6 months or more. During suspension period, the SI shall be listed in the Abeyance List of SI and published on IHMCL website and shall not be permitted for bidding in any tendering process by IHMCL.
e) Failure in carrying out the system audit through CERT-in/ SQTC empanelled vendors once in a year and submit with IHMCL.

Suspended SI shall not be eligible to participate in any limited tenders of IHMCL.

3.14. Miscellaneous

3.14.1. The Application Process shall be governed by, and construed in accordance with, the laws of India and the Courts at New Delhi shall have exclusive jurisdiction over all disputes arising under, pursuant to and/ or in connection with the Bidding Process.

3.14.2. IHMCL, in its sole discretion and without incurring any obligation or liability, reserves the right, at any time, to;

a) Suspend and/ or cancel the Application Process and/ or amend and/ or supplement the Bidding Process or modify the dates or other terms and conditions relating thereto;
b) Consult with any Applicant in order to receive clarification or further information;
c) Retain any information and/ or evidence submitted to IHMCL by, on behalf of, and/ or in relation to any Applicant; and/ or
d) Independently verify, disqualify, reject and/ or accept any or all submissions or other information and/ or evidence submitted by or on behalf of any Applicant.

3.14.3. It shall be deemed that by submitting the Application, the Applicant agrees and releases IHMCL, its employees, agents and advisers, irrevocably, unconditionally, fully and finally from any and all liability for claims, losses, damages, costs, expenses or liabilities in any way related to or arising from the exercise of any rights and/ or performance of any obligations hereunder, pursuant hereto and/ or in connection with the Bidding Process and waives, to the fullest extent permitted by applicable laws, any and all rights and/ or claims it may have in this respect, whether actual or contingent, whether present or in future.

3.14.4. If the Applicant has committed a transgression under this RFE such as to put its reliability or credibility into question, IHMCL shall be entitled to blacklist and debar such Applicant for any future tenders/contract award process in its sole and absolute discretion.

3.14.5. Inclusion of MSMEs in Project Delivery - Applicants are encouraged to include Micro, Small and Medium Enterprises (MSMEs) in the delivery of the project. Applicants should earmark a minimum of 20 % of the total contract for procuring goods and services from MSMEs. The MSME partner should be registered under the Micro Small Medium Enterprise Act, 2006. The procurement through MSMEs should be in line with Order dated 23rd March 2012 or any latest Order/Directions regarding procurement policy for Micro and Small Enterprises (MSMEs).
(https://eprocure.gov.in/cppp/rulesandprocs/kbadqkdlcswfjdelrquehwuxcfmijmuixngudufgbuubgubfugbububjxcgfvsbdihbgfGhdfgFHytyhRtNDk4Nzg=)

3.14.6. Compliance shall be ensured w.r.t. Office Memorandum of Department of Expenditure, dated 23 July 2020, and any related clarifications, subsequent guidelines issued by Department of Expenditure, as applicable, regarding insertion of Rile 144 (xi) in the General Financial Rules (GFRs), 2017. Applicant may visit website of Department of Expenditure (https://doe.gov.in/) for more details on the said Office Memorandum. (https://doe.gov.in/sites/default/files/OM%20dated%2023.07.2020.pdf)

3.14.7. Compliance shall be ensured w.r.t. Public Procurement (Preference to Make in India) Order 2017 – Notification of Telecom Products, Services or Works" (in short DoT PPP MII notification, 2018) dated 29th August issued by Department of Telecommunications. Applicant may visit website of Department of Telecom (https://dot.gov.in > Investment Promotion > Telecom Equipment Manufacturing) for more details on the said notification. (https://dot.gov.in/sites/default/files/policy_for_preference_to_domestically_managed_telecom_products_in_government_procurement.PDF) and (https://dipp.gov.in/sites/default/files/PPP%20MII%20Order%20dated%2016%2009%202020.pdf)

4. CONDITIONS OF CONTRACT

(Deleted)

5. SCOPE OF WORK

5.1. Background

In order to remove the bottlenecks associated with manual toll collection which includes non-transparency in toll transaction data and ensure seamless movement of traffic and collection of toll as per the notified rates, the Government of India had decided to introduce Electronic Toll Collection (ETC) across National Highways in India.

IHMCL has decided to empanel System Integrator who are eligible for providing services of Electronic Toll Collection system at existing operational toll plazas and for the implementation of Electronic Toll Collection system at the toll plazas which are yet to be made operational with ETC system, in future.

5.2. Objective:

To cater to the above requirement, IHMCL intends to empanel Service Provider(s) to undertake the supply, installation, integration, testing, commissioning and configuration of all required hardware & software systems & sub-systems for ETC System and Toll Management System at the toll plazas in a time bound manner. Service provider is also expected to provide round the clock maintenance with dedicated technical manpower for the same during the entire period of contract such that the required services are available at the new toll plazas as per service level requirements.

5.3. Detailed Scope of Work:

The subsequent sections capture details regarding potential work that may be awarded to shortlisted Applicants by IHMCL. IHMCL reserves the right to reduce/add details to the scope to better satisfy the requirements.

5.3.1. Supply, Installation and Integration:

a) The service provider shall supply, install, integrate, test, commission and configure all required hardware & software systems & sub-systems for ETC and Toll Management System at the designated Toll Plazas upon instructions from IHMCL.

b) Service provider shall ensure to supply items as per BOQ items at toll plazas as per direction from IHMCL and get them verified by IHMCL/PIU. Prior to Site Acceptance Test, the responsibility of providing storage and security for supplied material shall be in the scope of service provider.

c) Service Provider shall be fully responsible for the safety of equipment which shall be delivered or installed at site before commencing SAT by IHMCL/respective PIU. Prior to SAT, if any equipment/sub-equipment/consumable gets non-

functional/damaged due to any reason whatsoever, excluding scenarios covered under force majeure, then service provider will be liable for replacing of damaged item without imposing any extra charges to IHMCL.

d) IHMCL shall invite bids from the empanelled Service Provider(s) to commence work on the specified Toll Plazas as per instructions/timelines received from NHAI for installation of ETC System and Toll Management System.

e) Service Provider shall complete the Installation, Integration, Commissioning of ETC system and sub systems as specified in Annexure-A at the toll plazas within 60 days of the receipt of notification from IHMCL/respective PIU. The service provider shall be responsible for system integration so that the ETC System and Toll Management System including the sub-system(s) work coherently and are able to exchange data/information electronically, among themselves (if applicable), as well as with the acquirer bank and central clearing house for ETC program without any financial implication to Toll Operating Agency and IHMCL/NHAI.

f) Service Provider shall ensure to complete all pre-requisite minor civil works i.e., pole foundation/ sensor foundation/ cabling chamber/lane to Lane Conduiting work, plaza to Lane Conduiting work, etc. pertaining to ETC system and Toll Management System. Major civil works i.e., PQC work, toll plaza canopy, permanent toll booth structure, Plaza building, Median Extension, arrangement of Raw Power from electricity board, Arrangement of DG set etc. are not in the scope of service provider.

g) Service Provider shall provide and install valid antivirus and operating System licenses, Firewall licenses, Database licenses at lanes as well as plaza level in the system highlighted in BOQ items of this document throughout the Contract period. The cost of the same shall be included in the cost of equipment, no additional cost shall be paid by IHMCL/NHAI.

h) Service Provider shall provide requisite support for equipment integration in case ETC/TMS system software is changed by IHMCL. The integration of equipment with new TMS software shall be provided by Service Provider without any cost to IHMCL/NHAI, whatsoever.

i) Service Provider shall be fully responsible in case of any rejection of ETC transactions/non-uploading of ETC transactions to CCH at the toll plaza due to issue in ETC system and internet services. All such losses to Toll Agency shall be borne by Service Provider, IHMCL shall deduct the amount from payment of Service Provider throughout the Contract Period for such loss to toll operating agency.

j) Service Provider shall be responsible for repair/ replacement of the equipment which gets faulty due to reasons like Short Circuit, Thundering/Lightening, Voltage Fluctuation and equipment damaged by Pest for ensuring SLA parameters. Service Provider shall take all preventive measures to upkeep the equipment from these kinds of incidents.

k) Service Provider shall ensure to install Servo Stabilizer at each toll plaza to protect equipment from power fluctuation, and post installation of Servo Stabilizer, the safety of equipment from unstable voltage shall be under the liability of Service Provider throughout the Contract Period.

l) Service Provider shall ensure to make all allocated toll plazas live with ICD 2.5 specification which includes provision of all certificates like SSL, firewall, domain etc

m) Service Provider shall ensure to provide two (02) broadband / lease line internet connection with static IP of different Internet Service Provider. In addition to it, Service Provider shall also ensure to provide internet connectivity through dongle device as a backup solution and cost of the same shall be the part of quarterly O&M charges

n) The Service Provider shall provide 03 Site Engineers (03 shifts) at each fee plazas to ensure 24*7 onsite support. The site engineer shall be at least Graduate or Diploma in Engineering, preferably in Electrical/Electronic/IT/Computer Science or equivalent. The relevant documents shall be required to be shared with respective PIU and IHMCL.

o) Service Provider shall provide full support in plaza handover to new Service Provider engaged by IHMCL at the allocated toll plazas during the O&M period. The Service Provider shall be involved in transition process till toll plaza take over by new Service Provider.

p) The Service Provider shall arrange for all insurances pertaining to the scope of work and it shall be deemed that any related costs are included in the price Application.

q) The scope of the service provider will also include providing earthing to all HETC system, minimum civil & electrical work, networking works required to complete installation/commissioning of ETC and Toll Management System and associated peripherals on the plaza

r) The Service Provider shall adhere to the maintenance of ETC & TMS Equipment, Periodic Preventive Maintenance of equipment, Timely Corrective Maintenance, Software Maintenance, Remote Software support for the ETC & Toll System.

s) The Service Provider shall take prior approval from respective PIU/IHMCL before updating any version of Lane / Plaza application, for which, a software modification request shall be submitted to PIU/ IHMCL for seeking approval.

t) The Service Provider shall take adequate measures to protect ETC system from any Malware/Ransomware attack at fee plazas.

u) The Service Provider shall ensure to provide hardware firewall device to protect against Malware entering the network

v) Service Provider shall be responsible for providing Pest Control services at the toll plaza to prevent equipment for getting faulty. Service Provider shall be responsible for repair/ replacement of equipment within the defined SLA which have got faulty due to cable/equipment damaged by Rodent. The cost of the same is the part of Total O&M Price.

w) In case of descoping of plaza/termination of Contract/Expiry of Contract Agreement, Service Provide shall handover all equipment and data (entire contract duration) with concerned PIU. Full and final shall not do unless handing over and taking over process is not completed.

x) Any equipment which gets accidentally faulty/damaged during the Contract Period shall be repaired/replaced by Service Provider in order to comply with the SLA. Any accidental damage not attributable to Service Provider as per RFE shall be repaired/replaced upon verification and duly recommendation by respective PIU. After recommendation by respective PIU, Service Provider shall ensure to repair/replace such equipment in order to comply with the SLA. The payment for recommendation from respective PIU shall be made as follows: -

   i. Replacement cost shall be as per unit rates discovered by IHMCL
   ii. Repairing cost shall be made as per actual on case-to-case basis

y) Service Provider shall ensure for the integration of Weigh in Motion system and Static Weigh Bridge system (of any make & model) with its ETC system software as per requirement of IHMCL/NHAI.

z) IHMCL may verify the attendance of site engineers on daily basis through mobile app or any other software.

aa) Service Provider/empanelled System Integrator shall ensure to provide requisite support in sharing real time status of equipment for all critical equipment like RFID reader, AVCC, TLCC, LPIC, ICS, ETC Server and internet connectivity of all NH fee plazas with any authorised agency engaged by IHMCL/NHAI.

bb) Service Provider/empanelled System Integrator shall provide data feed for all fee plazas to the central Toll Monitoring & Control Centre (TMCC) at IHMCL HQ/IHMCL for monitoring and remote viewing of all fee plazas.

cc) Service Provider shall ensure to maintain register for Equipment inward and outward throughout the Contract period as per below format: -

Functional Equipment Details						
S. No	Equipment Name	Make & Model	Installation Date	Equipment Sr. No	Equipment Location	Remarks

Damaged Equipment Details								
S. No	Equipment Name	Make & Model	Equipment Damaged Date	Equipment Sr. No	Damaged Equipment Location	Replaced Equipment Make and Model	Replaced Equipment Sr. No	Remarks

5.4. Defect Liability Period (DLP)

5.4.1. DLP will commence from the date of Site Acceptance Test (SAT) request received from the Service Provider and will run for a period of two years (24 month). If any material deviation/specification deviation is found with any equipment during SAT process, then DLP for such equipment will commence from actual delivery, installation, commissioning and verification by IHMCL or concerned PIU for a period of two years (24 month).

5.4.2. Maintenance, repair and replacement of all hardware, software, peripherals and subcomponents of all BOQ items (excluding scenario covers under Force Majeure) shall be the responsibility of Service Provider without any cost to IHMCL/NHAI. Service Provider shall ensure to resolve all faults of equipment/Sub-equipment/consumables which are

linked to spare dependency within 24 hours from the time when the fault actual occurs and for this as indicated through equipment downtime system generated report or intimated by IHMCL/NHAI/Toll Operating Agency, adequate spare quantity to be maintained at site level for critical items specially ETC equipment. If the time for rectification exceeds 24 hours, 1% penalty on daily basis shall be imposed on service provider from the amount which shall be reserved for completion of DLP/O&M service.

5.4.3. Corrective of all defective materials and workmanship in the installation will be carried out as required within this period. All de-snagging will be expediently completed within this period.

5.4.4. Service provider shall adhere to the maintenance of ETC & TMS Equipment, Periodic Preventive Maintenance of equipment, Timely Corrective Maintenance, Software Maintenance, Remote Software support for the ETC & Toll System.

5.4.5. IHMCL/NHAI holds the right to ask Service Provider to replace any staff if found to be unsuitable/ indulged in unwanted activities.

5.5. Operation and Maintenance

5.5.1. Service provider shall adhere to the maintenance of ETC & TMS Equipment, Periodic Preventive Maintenance of equipment, Timely Corrective Maintenance, Software Maintenance, Remote Software support for the ETC & Toll System.

5.5.2. In order to adhere the SLA parameters, Service Provider shall ensure for repair and replacement of hardware, software, peripherals and subcomponents during the O&M period part of Contract Agreement.

5.5.3. Service provider shall intimate PIU/Toll operating agency for any corrective action to be taken on ground to resolve any major issue which takes more than 2 hours of lane closure.

5.5.4. Service Provider shall take prior approval from respective IHMCL/PIU before updating any version of Lane / Plaza application, for which, a software modification request shall be submitted to PIU for seeking approval.

5.5.5. IHMCL/NHAI holds the right to ask Service Provider to replace any staff if found and proved unsuitable/ indulged in unwanted activities.

5.5.6. Any damage cause due to mishandling of equipment by the service provider employees shall be borne by service provider.

5.6. Other activities

5.6.1. Toll Management System should be able to support all kind of Fare structures & Payment methods including, but not limited to, Daily Pass, Return Pass, Monthly Pass, Discounted

tariffs, Exemptions, Open / Closed fare schemes etc. and shall meet the Tolling System requirements of the respective Concession Agreement, including subsequent regulation/ notification thereon by IHMCL/NHAI/MoRTH.

5.6.2. The BOQ (As defined under Annexure-A) by IHMCL/NHAI may increase/decrease according to the further requirement at sites.

5.7. Service Level Requirements (SLA)

5.7.1. Plaza Building Equipment

a) The uptime availability of all Critical equipment of Plaza Building shall be 99% per lane per month. The permissible downtime for all critical Equipment shall be 7 hours per critical plaza equipment per month.

b) The downtime shall be calculated at a cumulative level when any of the critical plaza equipment as mentioned below is non-operational for that specific lane:

i. ETC Server including software
ii. Network Video Recorder
iii. Master Intercom
iv. 24 Port Network Switch
v. Plaza UPS
vi. All Lanes communication down with ETC server

c) Scheduled downtime is defined as a period of time when system will remain unavailable for conducting necessary preventive maintenance, urgent repairs etc. The maximum scheduled downtime for any Site shall be 4 hours per lane per month.

d) For all other equipment of plaza building, the uptime availability shall be 98% per lane per month.

e) The formula for calculation of plaza building system availability shall be as follows:

System Uptime = [1 – {A/(B – C)}*100], where

A = Time for which system is down per month basis scenarios in Hrs

B = Total time in a month

C = Scheduled downtime and Permissible downtime basis section 5.7.1(a) & (c)

f) The Service Provider shall maintain adequate inventory/spares to ensure the service levels prescribed in clause 5.7.1(a) & (d) are adhered.

g) In case of non-adherence to service levels as defined in clause 5.7.1(a) & (d), the penalty for deficiency of services beyond permissible downtime and scheduled downtime shall be imposed as follows: -

- Upto 1 hrs -1% of the monthly O&M charges per plaza
- Upto 1 to 2 hrs -2% of the monthly O&M charges per plaza
- Upto 2 hrs to 3 hrs- 3% of the monthly O&M charges per plaza
- Upto 3 hrs to 5 hrs- 5% of the monthly O&M charges per plaza
- Upto 5 hrs to 10 hrs- 10% of the monthly O&M charges per plaza
- Greater than 10 hrs- 25% of the monthly O&M charges per plaza

5.7.2. Lane Equipment

a) The uptime availability of all Critical equipment of ETC system shall be 99% per lane per month. The permissible downtime for all critical Equipment shall be 7 hours per lane per month.

b) The downtime for a toll lane shall be calculated at a cumulative level when any of the critical equipment as mentioned below is non-operational for that specific lane:
   - RFID Reader
   - Toll Lane Controller System
   - Automatic Vehicles Classification Controller and Sensor
   - Automatic Barrier Gate
   - License Plate Image Capture Camera
   - Incident Capture Camera
   - Lane Application

c) For all other lane equipment, the uptime availability shall be 98% per lane per month.

d) Scheduled downtime is defined as a period of time when system will remain unavailable for conducting necessary preventive maintenance, urgent repairs etc. The maximum scheduled downtime for any Site shall be 4 hours per lane per month.

e) The formula for calculation of ETC System availability shall be as follows:

   System Uptime = [1 – {A/(B – C)}*100], where

   A = Time for which system is down per month basis scenarios

   B = Total time in a month

   C = Scheduled downtime and Permissible downtime basis section 5.7.2(a) & (d)

f) The Service Provider shall maintain adequate inventory/spares to ensure the service levels prescribed in clause 5.7.2(a) & (c) are adhered.

g) In case of non-adherence to service levels as defined in clause 5.7.2(a) & (c), the penalty for deficiency of services beyond permissible downtime and scheduled downtime shall be imposed as follows: -

- Upto 1 hrs -1% of the monthly O&M charges per plaza
- Upto 1 to 2 hrs -2% of the monthly O&M charges per plaza
- Upto 2 hrs to 3 hrs- 3% of the monthly O&M charges per plaza
- Upto 3 hrs to 5 hrs- 5% of the monthly O&M charges per plaza
- Upto 5 hrs to 10 hrs- 10% of the monthly O&M charges per plaza
- Greater than 10 hrs- 25% of the monthly O&M charges per plaza

5.7.3. In case the Service level Requirements are violated repeatedly, IHMCL reserves the right to terminate the whole Contract or descope a particular toll plaza by giving a written notice of 30 days to the Service Provider.

5.7.4. **AVC Accuracy**

The Service Provider shall ensure to provide minimum 98% AVC accuracy for each lane and if any non-conformity beyond the specified accuracy level is observed, following penalties will be imposed on the Service Provider:

- 98% and above each lane – Nil
- Below 98% upto 96 % -1% of the monthly O&M charges for that Lane
- Below 96% upto 94 % -2% of the monthly O&M charges for that Lane
- Below 94% upto 92 % -5% of the monthly O&M charges for that Lane
- Below 92% upto 90 % -10% of the monthly O&M charges for that Lane
- Below 90% - No monthly O&M charge will be paid for that lane

5.7.5. **Manpower**

The Service Provider shall ensure availability of manpower at the toll plazas 24*7. In case of unavailability of manpower or shortfall in attendance (in shift) at site is brought to the notice of IHMCL, penalty shall be imposed as under:

Absence of shortfall in attendance - Rs 1000/- per shift per fee plaza

(Day shall have 3 shifts of 8 hours each)

Day wise attendance sheet shall be submitted with IHMCL with a copy to respective PIU and Toll Operating agency.

5.7.6. **Double deduction/Overcharging in FASTag**

The Service Provider shall ensure for efficient functionality of RFID readers in lanes, a single FASTag should not have two successful transactions within time difference (as latest specified by IHMCL/NHAI). There should not be any case of double/multiple deduction of FASTag account owing to multiple processing of transaction through RFID reader/ ETC application to Acquirer Bank.

In case of any deviance, penalty shall be imposed as below –

- Up to 100 cases of double deduction/over-charging reported in a calendar month – Rs 500 per case
- More than 100 cases of double deduction/over-charging reported in a calendar month – Rs 1000 per case

In addition to above, Service Provider shall also be liable to pay for all the losses incurred by the concessionaire/toll plaza operators.

5.7.7. **Non-reading FASTag – Free Passage**

Gazette GSR 427(E), dated 7 May 2018 provisions –

"Provided also that if a vehicle user with a valid, functional FASTag or any such device with sufficient balance in the linked account crossing a fee plaza installed with Electronic Toll Collection infrastructure, is not able to pay user fee through FASTag or any such device owing to malfunctioning of Electronic Toll Collection infrastructure, the vehicle user shall be permitted to pass the fee plaza without payment of any user fee. An appropriate zero transaction receipt shall be issued mandatorily for all such transactions".

The Service Provider shall ensure for proper functionality and alignment of Fixed RFID readers in lanes, no case shall be found where a valid FASTag is not read by fixed RFID reader.

In case of any deviance, penalty shall be imposed as below –

In cases where vehicle user has been permitted to pass the fee plazas without payment of any user fee, the Service Provider shall be liable to pay for all the losses incurred by the concessionaire/toll plaza operators on account of free passage of vehicle without payment of any user fee.

5.7.8. The Service Provide shall ensure that all ETC transactions shall be uploaded and downloaded as per ICD document (2.4, 2.5 or latest) and PG Guidelines. In case of any deficiency in adherence of ICD document and PG Guidelines, the Service Provider shall be fully responsible to provide settlement to the toll agencies for any rejection or non-uploading

of ETC transaction. In case, settlement is not provided to toll agencies, IHMCL shall recover the same amount from Quarterly O&M Charges.

5.7.9. The Service Provider along with the Toll Operating Agency shall ensure that all transaction files of the ETC systems are uploaded as per the service levels defined in the NETC program.

5.8. ASSIGNMENT MILESTONE & TIMELINES

The following table captures the key events related to implementation of ETC system at the toll plaza and their associated timelines

Sl. No.	Milestone Description	Timelines
1.	Submission of detailed report based on site assessment survey	Within 10 days from the date of Issuance of Letter of Award (LoA), or date of issuance of instruction for commencement notice issued by IHMCL, whichever earlier.
2.	Submit schedule for work execution plan for each toll plaza	Within 5 days of submission of Site Survey Report
3.	Supply, install and commission all the items including Go-Live with CCH	In case Site is FIT for Implementation: - Within 60 days* (inclusive of Sl. no. 1 & 2) from the of date of Issuance of Letter of Award (LoA) or date of issuance of instruction for commencement notice issued by IHMCL, whichever is earlier. SI shall have to carry out site survey and report site-readiness status to IHMCL. In case Site is not FIT for Implementation: - Within 60 days* (inclusive of Sl. no. 1 & 2) from date of intimation for site readiness by IHMCL/concerned PIU

*Non-fulfilment of this requirement or delay in Assignment Timelines would attract penalties.

5.9. DAMAGES

5.9.1. Failure of the service provider to adhere the timelines specified in this document shall attract liquidated damages @ 0.1 % of the Total Price of the toll plaza (as per financial proposal submitted by the Applicant) for each day of delay in implementation. The total levied penalty, however, shall not exceed 10% of the assignment cost.

5.9.2. In case IHMCL is of the view that the delay is due to reasons beyond the control of the Service Provider, suitable extension of time may be granted to the Service Provider with or without imposing any Damages on such Service Provider in the absolute discretion of IHMCL.

5.9.3. Damages shall be payable by the Service Provider within 5 days of imposition thereof by IHMCL, failing which the same shall be deducted from the payments to be made to the Service Provider or from the Performance Security as deemed appropriate by IHMCL.

5.9.4. The Damages payable, as set forth in this Contract, are mutually agreed genuine pre-estimated loss and damage likely to be suffered and incurred by the Party entitled to receive the same and are not by way of penalty (the "Damages").

5.10. Type of maintenance work

The various classifications of maintenance and repair work and related services to be performed by the equipment Service Provider shall include the following:

5.10.1. **Preventive Maintenance**

a) The work to be done consists of monthly inspection/cleaning and quarterly or bi-annual checking, cleaning, and servicing of various system components and related equipment. Minor deficiencies uncovered during the performance of preventive maintenance shall be corrected immediately. Any problems which require further attention or use of spare part(s) shall be recorded on the Fault Report Form.

b) The objective of electronic equipment maintenance shall be to ensure reliability, to purpling/enhancing its economic life and to improve its efficiency.

c) Scheduled downtime / Routine maintenance is defined as a period of time when system will remain unavailable for conducting necessary preventive maintenance, urgent repairs etc. The maximum scheduled downtime for any site shall be 4 hours per lane per month. The objective of electronic equipment maintenance shall be to ensure reliability, to enhance its economic life and to improve its efficiency.

d) Routine maintenance consists of a fixed set of checks, measurements, cleaning and calibration. These activities shall be based on Equipment Service Provider's specifications and general maintenance practices that include but not limited to:

e) Checking the condition of components, e.g., check connections for signs of deterioration.

f) Check voltage levels: Power supply levels are crucial to the effective operation of electronic equipment. Borderline levels could lead to intermittent faults and damage

to components. Voltage level changes are caused by the deterioration of capacitors, transformers and semiconductor components.

g) Certain measurements can also be performed to check the status of elements of the system, i.e., impedance and isolation tests.

h) Mechanical components need routine cleaning and lubrication to ensure their effective operations.

i) The equipment supplier shall ensure that software maintenance and upgrades are possible during the maintenance period. Software test report of all service packs to be applied on the live plaza system shall be submitted to the Concessionaire well in advance. The service pack must be tested over the test rig in presence of the Concessionaire before its application to the live plaza system.

j) The equipment supplier shall perform preventive maintenance of the software to be provided under the Contract as part of the maintenance work. The Contract shall exert the utmost care not to inadvertently damage the software and database and cause erroneous or abnormal operation of the toll management system.

k) The items for software maintenance shall include but not be limited to the following:

- Monitoring of CPU, Memory and disk utilization
- Monitoring of system availability over TCP/IP
- Monitoring of antivirus and system security software operation
- Backup of system and restoration of the system when necessary
- Monitoring and review of system and event logs.
- Applying upgrade and patch of the software provided by third party including operating system and database management.

5.10.2. **Corrective Maintenance**

a) The work to be done consists of correcting malfunctions resulting from any cause including but not limited to defective design, defective manufacturing process, equipment deterioration and failure under normal operating conditions, improper handling and inadequate operation by the Employer's staff, the equipment supplier's staff, or third party.

b) The work to be done consists of repairing damages to the equipment due to accidents, vandalism, act of God, and pavement failures and includes clean-up of debris, erecting necessary warning and safety devices, and hook-up of temporary equipment if required to ensure the safety of the public.

c) The equipment supplier shall maintain a comprehensive record of all maintenance and repair activities and spare parts consumptions. The records shall include as a

minimum maintenance check list, fault reports, spare parts receiving and consumption records, and work orders. The Service Provider share ensure to keep all requisite equipment maintenance tool at the toll plaza to carry out the maintenance activity.

5.10.3. **Data Retention, Back-up and Restore Operations:**

a) Data Retention:

i. Data for each plaza shall be retained for entire Agreement period in the Toll Plaza Server. The backup devices and media as per current industry practice shall also be provided.

ii. The Service provider shall ensure adequate security measure for safeguarding of Toll Transaction data, by providing, off site Disaster recovery or Data Storage mechanism.

iii. The service provider shall also be responsible to extract and provide data /information based on requirement of law Enforcement Agencies of Govt. of India/ State based on specific approvals on case-to-case basis.

iv. However, it will be limited to the data captured in ETC and Toll Management Systems as per standard operations and the data being retained as per retention schedule.

b) Data Back-up & Restore:

i. Service provider shall also demonstrate the backup & restore procedure successfully. The Service Provider shall prepare and implement a proper Data Backup & Restore policy with IHMCL's approval, to ensure data safety and avoid data loss, in case of any untoward incidents.

ii. Such policy shall ensure Back-up & Restore of Toll Transaction data at least once in a week.

iii. Service Provider shall ensure to maintain the Data backup till Contract Expiry and ensure to submit the data backup with IHMCL and concerned PIU after expiry of Contract Agreement.

iv. Data shall be backed up onto a removable medium on a regular basis start from plaza live date to end of Contract period.

v. IHMCL/NHAI as per requirement shall intimate Service Provider to restore the data for a specific period.

vi. The data generated in the system shall be handed over to IHMCL in readable format after the expiry of Contract Agreement. Following reports shall be submitted with NHAI/IHMCL after expiry of Contract Agreement: -

- Raw data for transactions

- Month wise transaction History report
- Month wise Traffic and Revenue report
- Class wise monthly traffic and Revenue report
- AVCC data for all lanes

c) Data Redundancy

i. All transaction and incident data shall be retained duplicated and stored within the various levels of the toll collection system such that should any level or component of that level suffer a partial or total failure, the data is not irretrievably lost to the system. In addition, it shall be possible to reconstruct and restore the data for the failed level form the stored data into its original format.

ii. Data retention times within the various levels shall be at least:

- Vehicle Processing at Lane Level in TLC: 6 months
- Plaza Level
  - Detailed Data: For entire Contract period
  - Summarised Data: For entire Contract period
  - Archived Data on USB external HDD Storage: Entire Contract period to be handed over to the IHMCL/NHAI after expiry of Contract period

5.11. Statutory and Others

5.11.1. IHMCL shall reserve the right to get the security / compliance audit of the ETC and Toll Management Systems done at any time through any agency appointed for the purpose and the service provide shall extend all support & cooperation for smooth conduct of said Audit.

5.11.2. The Service Provider shall abide by all statutory guidelines and comply with rules/ regulations/guidelines framed by NHAI/IHMCL and/or Ministry of Road Transport & Highways from time to time; It shall be responsibility of the service provider to incorporate such changes within the stipulated time frame into the Toll Management System.

5.11.3. The Service Provider shall comply with the guidelines and/ or Specifications and Standards including the revisions thereof issued from time to time by Ministry of Road Transport & Highways Govt. of India / IRC. In absence of which, the system and equipment provided by the service provider shall meet relevant American or European/ British standards & specifications.

5.12. Technical Specifications & Standards

The minimum technical specifications & the standards to be adhered have been prescribed under this document. The Service Provider shall ensure to provide the equipment meeting the prescribed requirements.

5.13. Acceptance Test and Approvals

5.13.1. After installation of ETC and Toll Management System at the toll plazas in the current scope of work, a Site Acceptance Test (SAT) shall be carried out at these plazas to test the system functionality and performance as per the format finalized by IHMCL.

5.13.2. Third Party Check: For Acceptance Testing, IHMCL reserves the right to appoint a third party to carry out Acceptance Testing on behalf of IHMCL. The service provider shall have no objection on the same & will cooperate with such appointed third party/ consultant.

5.13.3. Failure by the Service Provider to complete the Works and to have remedied all reported defects in Site Acceptance Test (SAT), IHMCL shall not release the O&M services amount to the Service Provider till all issues reported issues are resolved.

5.14. System Development Progress Reporting

The Service Provider shall note that they are obliged to provide hardware and software progress reports, if any, as the works proceeds. These reports shall be in the English language for project management purposes.

5.15. Other Works

5.15.1. **Design and Drawing Responsibility**

The Service Provider shall be required to produce engineering design drawings of all Toll Management Systems components / system, electrical installation and computer & data transmission network systems. It shall be the Service Provider's responsibility to adhere to the designs submitted during the implementation of ETC systems and Toll management systems at the plazas. In case of any changes in the systems the service provider shall modify and resubmit the designs. The design should be submitted by the service provider within 7 days of receipt of notification of commencement of work.

5.15.2. **Electricity Requirements**

The Service Provider shall be required to submit the design of the electricity load requirement for the Toll Management Systems / ETC Equipment, which shall include the cabling, distribution boards, and clean earthing system, in regard to its suitability for the Toll Management Systems and ETC components. Toll Management Systems equipment earthing shall be separated from the toll plaza utility power earthing. Earthing for all equipment shall be the responsibility of the Service Provider.

5.15.3. **Cabling to UPS Loads**

The Service Provider shall supply, install, terminate and connect all cabling from the power DB to the entire field and control room equipment. The cable shall be suitably sized and earth PVC insulated and steel wire armoured copper cables. Wire armouring may be omitted, if the cables are drawn through a conduit.

5.15.4. **Cable tray**

The Service Provider shall provide adequate perforated cable trays and/or cable support wherever required, for all cabling required in Toll Lanes / Booths & Plaza Building.

5.15.5. **Cable Numbering**

All cables installed shall be numbered with ferules, in accordance with the universal cable numbering system, in such a way that any person shall be able to understand & identify cabling for specific equipment.

All cables shall be ISI marked, fire retardant type and shall be terminated with proper lugs & joints as per best industry practices.

6. FORMS AND ANNEXURES

6.1. APPLICATION FORM

To

Chief Operating Officer
Indian Highways Management Co. Ltd. (IHMCL)
NHAI HQ Building,
G-5&6, Sector 10, Dwarka,
New Delhi 110 075

Subject: Empanelment of System Integrator(s) for Implementation of Electronic Toll Collection System at Toll Plazas on National Highways

Ref. No. RFE. No. _____ dated _____-

Dear Sir/Madam,

I/We, the undersigned, have carefully examined the contents of the document including amendments/ addendums (if any) thereof and undertake to fully comply and abide by the terms and conditions specified therein and hereby submit our application. Our application is unconditional and unqualified.

I/We understand that:

i. this Bid/Proposal, if found incomplete in any respect and/ or if found with conditional compliance or not accompanied with the supporting document shall be summarily rejected.
ii. if at any time, any averments made or information furnished as part of this application is found incorrect, then the application will be rejected
iii. IHMCL is not bound to accept any/ all Bid (s) it will receive.
iv. Until a final Contract is prepared and executed between us, the Application together with your written acceptance thereof in your notification of award shall constitute a binding Contract between us.

I/We have not been *declared ineligible* by IHMCL, NHAI or Ministry of Road Transport & Highways, Government of India or any other agency for indulging in corrupt or fraudulent practices. I/We also confirm that I/We have not been *declared as non-performing or debarred* by NHAI or Ministry of Road Transport & Highways, Government of India.

I/We *haven't been blacklisted* by a Central/ State Government institution/ Public Sector Undertaking/ Autonomous body and there has been *no litigation* with any Government Department/ PSU/ Autonomous body on account of similar services.

We undertake that, in competing for (and, if the award is made to us, in executing) the above Contract, we will strictly observe the laws against fraud and corruption in force in India namely "Prevention of Corruption Act 1988" and other applicable law. We understand you are not bound to accept any Proposal you receive.

Yours sincerely,

(Signature of the Authorized signatory):

Name and Designation of the Authorized signatory: Name and Address of Applicant:

Phone, Fax & E-Mail

6.2. Annexure-1- UNDERTAKING

(To be submitted by all members of the Consortium, in case of a consortium)

Subject: Selection of Applicant for _____

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

The undersigned also hereby certifies that neither our Company/firm M/s_____ have abandoned any work of National Highways Authority of India/IHMCL nor any contract awarded to us for such works have been rescinded, during last five years prior to the date of this bid.

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

The undersigned understands and agrees that IHMCL may ask for further qualifying information and agrees to furnish any such information at the request of IHMCL.

I/We declare that Toll Management software proposed by us does not infringe any intellectual property rights or any patent as per applicable laws and we shall duly carry out system audit of proposed TMS software **periodically once in every year through STQC/CERT-in empanelled vendors.** Further, we do understand and acknowledge that on event of any non-completion of system audit within 3 months from the date of intimation by IHMCL, IHMCL reserves the right to suspend our empanelment till further notice.

We confirm that we have not been blacklisted /debarred by any central/state Government department/organization or Quasi Government agencies of PSU.

We confirm that no criminal proceeding is pending against our company/firm or any of its Directors/ Partners in any court of law.

We also confirm that we have not been convicted by any court of law for any of the offences under any Indian laws

_____

(Signed by an Authorized Officer of the Applicant)

_____

Title of Officer

_____

Name of Applicant

_____

DATE

6.3. Annexure-2 - APPLICANT'S FINANCIAL CAPACITY

(To be submitted by all members of the Consortium, in case of a consortium)

RFE Ref_____ (Date)

From,

(Name & Address of the Applicant)

_____

_____

To,

Chief Operating Officer,

Indian Highways Management Co. Ltd.

G-5&6, Sector 10, Dwarka

New Delhi 110 075

Subject: ----------

Dear Sir/Madam,

We hereby certify that the average annual turnover of M/s. _____ (name of the Applicant) for the last three financial years (ending 31st March 2020) is as given below:

Annual Net worth for the last 3 Financial Years (FYs) in Indian Rupees (INR)			
FY 2019-20	FY 2018-19	FY 2017-18	Positive /Negative as on 31st March 2020

Annual Turnover for the last 3 Financial Years (FYs) in Indian Rupees (INR)			
FY 2019-20	FY 2018-19	FY 2017-18	Average

Yours Sincerely,

(Signature of Authorised Signatory)

Name of the Statutory Auditor/CA: Seal:

6.4. Annexure-3 - Power of Attorney

(To be submitted by all members of the Consortium, in case of a consortium)

Know all men by these presents, we, M/s ..... (Name of Firm/ Company and address of the registered office) do hereby constitute, nominate, appoint and authorize Mr./ Ms..... son/daughter/wife of…….. and presently residing at ....., who is presently employed with us and holding the position of ..... as our true and lawful attorney (hereinafter referred to as the "Authorized Signatory or Attorney") to do in our name and on our behalf, all such acts, deeds and things as are necessary or required in connection with or incidental to submission of our bids for empanelment as the agency for ----------, proposed by Indian Highways Management Co. Ltd., including but not limited to signing and submission of all applications, proposals and other documents and writings, and providing information/ responses to IHMCL, representing us in all matters before IHMCL, signing and execution of all contracts and undertakings consequent to acceptance of our proposal and generally dealing with IHMCL in all matters in connection with or relating to or arising out of our proposal for the said assignment and/or upon award thereof to us.

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

IN WITNESS WHEREOF WE, ...THE ABOVE-NAMED PRINCIPAL HAVE PURSUANT TO THE RESOLUTION DATED OF THE BOARD OF DIRECTORS IN THAT BEHALF CAUSED ITS COMMON SEAL, EXECUTED THIS

POWER OF ATTORNEY ON THIS ..... DAY OF ....., 2021

For .....

(Signature, name, designation and address)

Witnesses:

1.

2.

Notarized

Accepted

.....

(Signature, name, designation and address of the Attorney)

Notes: -

The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executants(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure. The Power of Attorney should be executed on a non-judicial stamp paper of appropriate denomination and should be registered or duly notarized by a notary public.

Wherever required, the Applicant should submit for verification the extract of the charter documents and other documents such as a resolution/power of attorney in favour of the person executing this Power of Attorney for the delegation of power hereunder on behalf of the Applicant.

For a Power of Attorney executed and issued overseas, the document will also have to be legalized by the Indian Embassy and notarized in the jurisdiction where the Power of Attorney is being issued. However, Applicants from countries that have signed The Hague Legislation Convention 1961 need not get their Power of Attorney legalized by the Indian Embassy if it carries a conforming Apostles

6.5. Annexure -4 - Power of Attorney for Lead member

(On Non – judicial stamp paper of appropriate value or such equivalent document duly attested by notary public)

Whereas Indian Highways Management Company Ltd. (IHMCL), has invited Proposals for Empanelment of System Integrator(s) for the implementation of ETC system on National Highways.

Whereas the members of the Consortium are interested in bidding for the Project and implementing the Project in accordance with the terms and conditions of the Request for Empanelment (RFE) Document and other connected documents in respect of the Project, and

Whereas, it is necessary under the RFE Document for the members of the Consortium to designate the Lead Member with all necessary power and authority to do for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium's bid for the Project who, acting jointly, would have all necessary power and authority to do all acts, deeds and things on behalf of the Consortium, as may be necessary in connection the Consortium's bid for the Project.

NOW THIS POWER OF ATTORNEY WITNESSETH THAT.

We, M/s. …… (Lead Member) and M/s …… (the respective names and addresses of the registered office) do hereby designate M/s. …… being one of the members of the Consortium, as the Lead Member of the Consortium, to do on behalf of the Consortium, all or any of the acts, deeds or things necessary or incidental to the Consortium's bid for the Project, including submission of Proposal, participating in conferences/meetings, responding to queries, submission of information/ documents and generally to represent the Consortium in all its dealings with IHMCL, any other Government Agency or any person, in connection with the Project until culmination of the process of bidding and thereafter till the Agreement is entered into with IHMCL.

We hereby agree to ratify all acts, deeds and things lawfully done by Lead Member, our said attorney pursuant to this Power of Attorney and that all acts deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us/ Consortium.

Dated this the ……Day of …….2021

……

(Executants)

(To be executed by all the members of the Consortium)

Notes:

The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.

6.6. Annexure-5- Memorandum of Understanding

DRAFT MEMORANDUM OF UNDERSTANDING EXECUTED BY MEMBERS OF THE CONSORTIUM

[On Non-judicial stamp paper of INR 100 duly attested by notary public]

This Memorandum of Understanding (MoU) entered into this day of [Date] [Month] 2021 at [Place] among _____ _____ (hereinafter referred to as "_____") and having office at [Address], India, as Party of the First Part and _____ _____ (hereinafter referred as "_____") and having office at [Address], as Party of the Second Part and _____ _____ (hereinafter referred as "____") and having office at [Address], as Party of the Third Part.

The parties are individually referred to as Party and collectively as Parties.

WHEREAS, Indian Highways Management Company Limited (IHMCL) has issued a Request for Empanelment dated [Date] (RFE) for Empanelment of System Integrator(s) for implementation of ETC system at Toll Plazas on National Highways:

AND WHEREAS the Parties have had discussions for formation of a Consortium for bidding for the said Project and have reached an understanding on the following points with respect to the Parties' rights and obligations towards each other and their working relationship.

AS MUTUAL UNDERSTANDING OF THE PARTIES, IT IS HEREBY AGREED AND DECLARED AS FOLLOWS:

The purpose of this Agreement is to define the principles of collaboration among the Parties to:

Submit a response jointly to Bid for the “Request for Empanelment of System Integrator(s) for implementation of ETC system at Toll Plazas on National Highways” as a Consortium.

Sign Contract in case of award.

Provide and perform the supplies and services which would be ordered by the Client pursuant to the Contract.

This Agreement shall not be construed as establishing or giving effect to any legal entity such as, but not limited to, a company, a partnership, etc. It shall relate solely towards the Applicant for Qualification for Empanelment of System Integrator(s) for implementation of ETC system at Toll Plazas on National Highways for and related execution works to be performed pursuant to the Contract and shall not extend to any other activities.

The Parties shall be jointly and severally responsible and bound towards the Purchaser for the performance of the works in accordance with the terms and conditions of the BID document, and Contract.

---------- (Name of Party) shall act as Lead Partner of the Consortium. As such, it shall act as the coordinator of the Party's combined activities and shall carry out the following functions:

To ensure the technical, commercial and administrative co-ordination of the work package

To lead the contract negotiations of the work package with IHMCL.

The Lead partner is authorized to receive instructions and incur liabilities for and on behalf of all Parties.

In case of an award, act as channel of communication between the Purchaser and the Parties to execute the Contract

That the Parties shall carry out all responsibilities as Developer in terms of the Project Agreement.

That the broad roles and the responsibilities of each Party at each stage of the Bidding shall be as below:

Party A: _____

Party B: _____

That the Parties affirm that they shall implement the Project in good faith and shall take all necessary steps to see the Project through expeditiously.

That this MoU shall be governed in accordance with the laws of India and courts in New Delhi shall have exclusive jurisdiction to adjudicate disputes arising from the terms herein.

In witness whereof the Parties affirm that the information provided is accurate and true and have caused this MoU duly executed on the date and year above mentioned.

(Party of the first part) (Party of the second part)

Witness:

_____ ____

_____ ____

6.7. Annexure-6- Undertaking for Toll Management System Software

(In Bidding entity's Letter head)

(To be submitted by Sole Applicant or Lead Member of the Consortium)

(Screenshots of the TMS module to be attached along with)

I/We, hereby certify and confirm that M/s.
……, (the name and address of the registered office of the Applicant have developed and implemented/integrated ETC system with our own proprietary TMS software at the fee plazas.

We undertake that, at any point of time if we are found not using our proprietary TMS software at our allocated fee plazas, IHMCL may suspend our empanelment with immediate effect.

Dated this ……..Day of ……., 2021.

Name of the Applicant

…….

Signature of the Authorised Signatory

…….

Name of the Authorised Signatory

6.8. Annexure 7: Self Certificate - Format for Project Citation by the Applicant

The details of projects executed by the Applicant (to be submitted for all Projects):

Name of the Project & Location	
Client's Name, Contract Details Complete Address	
Brief narrative description of Project – highlighting relevant scope of work such as • Number of toll plaza • Number of ETC Lanes, etc.	
Contract Value for the Project as per work order (in INR)	
In case of an ongoing project, the value of work completed as per payment released by Client (in INR)	
Date of Start of Project	
Date of Completion of Project/Status of Completion	
Confirm for the implementation of following minimum equipment/system - • Toll Management Software • RFID reader • Toll Lane Controller • Automatic Vehicle Classifier • License Plate Image Capture Camera • Incident Capture camera • Automatic Boom Barrier	
Activities undertaken by Lead Member or Consortium member	

6.9. Annexure-A

6.9.1. ETC equipment

The following table captures the list of equipment required at plaza and lanes. The minimum standard expected of this equipment is captured in subsequent sections of this document, while the number of equipment expected to be provided as part of project is as follows: -

Lane Level			
S. No	Equipment Description	Unit	Qty
1	RFID ETC transceiver near Pay-axis - mounted on canopy	No	1
2	Electronics Enclosure	No	1
3	Lane Controller with Industrial PC	No	1
4	AVC including sensors and controller	Set	1
5	User Fare Display with mounting pole	Set	1
6	Automatic Barrier Gate	No	1
7	Overhead Lane Status light (OHLS)	No	1
8	Traffic light with mounting pole	Set	1
9	Loops with detector	Set	2
10	Incident Capture Camera with mounting pole	Set	1
11	License Plate Image Capture Camera with mounting poles	Set	1
12	TFT Monitor	No	1
13	Customized industrial grade keyboard	No	1
14	Thermal Receipt Printer	No	1
15	Violation light & Alarm (on existing pole) and Foot switch in booth	No	1
16	Booth CCTV camera with voice recording	No	1
17	Cabling/Networking/Installation/Commissioning (Lump sum)	LS	1
18	Software – Lane Level	No	1
19	Intercom Slave unit in booth	No	1
20	Lane Level UPS	No	1
Plaza Level			
21	ETC Server (Plaza)	No	1
22	Workstations for MIS, Cashup, Audit & LSDU System (in control room)	No	4
23	24 Port Network switch (Layer 3)	No	2
24	Software – Plaza level	Job	1

25	Broadband/Dedicated Internet Lease Line (01 Static IP) with minimum 04 Mbps link for CCH connectivity	Facility	2
26	UPS system as required for complete ETC Toll Plaza system (10 KVA or above)	No	2
27	Network Video Recorder (NVR) for CCTV recording along with 21.5" LED Display	No	1
28	CCTV cameras for Plaza building surveillance (server room, control room, cash room, admin)	No	4
29	Master Intercom System	No	1
30	Servo Stabilizer (60 KVA -03 phase)	No	1
31	Firewall Hardware	No	1
Operation and Maintenance per Toll Plaza			
32	Quarterly O&M Charges	Quarter	1

7. TOLL PLAZA EQUIPMENT AND SOFTWARE SPECIFICATIONS

The subsequent sections capture the specifications of various equipment that may be required as a part of this project. Please note that this is in exhaustive list of all ETC equipment, and the entire set may not be required in the current phase. Applicants are requested to refer to the detailed BOQ captured in the preceding sections of this Annexure. Also, the specifications are a minimum standard, and the Service Provider may choose to include products with specifications that exceed the standards, post approval from IHMCL.

7.1. RFID ETC Transceiver near pay axis (mounted on canopy)

7.1.1. General:

S. No	Parameter	Minimum Specifications
1	Frequency	UHF 865 MHZ to 867 MHZ *
2	Communication	Ethernet/ Serial communication (EIA standard RS 232 C / RS 485)
3	RF Power Maximum	1 W – transmitted & 4 W – EIRP (Equivalent Isotopically Radiated Power) *
4	Reading distance	With the Transceiver mounted typically at a height of 6 m above the road surface, the coverage of the antenna shall not exceed a diameter of 3.6m.
5	Antenna	Circularly Polarized
6	Protocol	EPC Gen 2, ISO 18000-6C and shall comply with the general conformance requirements of the standard
7	Visual Diagnostics	The Transceiver shall have LED indicators for sense, transmit Fault and Power which shall be visible clearly to the operator on ground while the system is operational.

is in the wireless license free band for RFID use in India. Typical existing product(s) for 'RFID- based-ETC' operates in the 865 MHz – 868 MHz band.

7.1.2. Environmental:

S. No	Parameter	Particular
1	Enclosure	Light weight enclosure for the RFID Transceiver and circularly polarized antenna
2	Environmental	IP 65 or better for outdoor units
3	Relative Humidity	95% Condensing
4	Operating Temperature	-20°C to 55°C
5	Storage Temperature	-40°C to 85°C

7.1.3. Operating Characteristics

Sr.	Parameter	Particulars
1	Air Interface & Adaptive Noise Features	The Transceiver technology employed should have the capability to optimize read rates for the vehicle identification application and adapt to instantaneous noise and interference level
2	Application capability	Should have read reliability exceeding 99.5% in the distance range specified. Diagnostic and Reporting Tools
3.	Upgradeability	The firmware should be upgradable to support future protocols.
4	Transaction Capability	Reading of Tag & EPC memory for at least 2 Tags per second for a moving vehicle with a speed limit of 40 kilometres/ hour.
5.	Driver Software	The transceiver driver software shall be provided along with the transceiver that will interface to the ETC client through socket interface and handle the communication with ETC client. The packet structures shall be as notified in the ETC client-transceiver interface. The driver software shall implement filtering using a range of EPC-codes provided by set of bit pattern masks.

7.2. Electronics Enclosure

7.2.1. The Interface Electronics and all related peripheral/controllers should be enclosed in an IP65 compliant cabinet.

7.2.2. Locking System: Enclosure shall have a unique key allowing access to the electronic.

7.2.3. Door monitoring: The cabinet door shall be monitored utilizing proximity switch. Door open / close events shall be recorded as incidents identified by time and Lane. The incidents are to be displayed on the plaza software subsystem.

7.2.4. Cabling Layout: All external cables shall be protected against the effects of lightning and shall comply with all requirements for the control of interference from EMI. All data cables shall be screened and shall be properly separated and shielded from all power cables.

7.2.5. Ventilation and internal temperature: All equipment endorsed by the cabinet shall be kept at a temperature consistent with manufacturers recommendations.

7.2.6. Finishing: The cabinet surfaces shall be protected from the environment in which it shall be used, and the Equipment Contractor shall specify the surface treatments to be applied. Each cabinet shall be painted and numbered in a manner consistent with the toll lanes and consistent with all equipment related functions (e.g., reporting to the plaza software subsystem).

7.2.7. Cable dressing: All cables (power & signal) shall be properly routed and dressed with suitable railings inside the enclosure and ties.

7.2.8. Cable numbering: The signal & power cable terminations shall be identified by proper numbering. In addition to the termination at the controller end, this numbering shall also be maintained at locations where the cables are exposed (like manholes, junctions) and at the peripheral end. Further, all the individual component boards shall be properly identified by labelling.

7.2.9. Cable terminations: The signal & power cable (from the peripherals) terminations shall be kept separated inside the cabinet. The cable routing inside the enclosures shall be done in a proper manner, so that, aesthetics apart, the cable faults can be traced, and faulty cables replaced, easily and less time consuming.

7.3. Lane Controller with Industrial PC

7.3.1. Functional Requirements

a) The Toll Lane Controller (TLC) is situated in the tunnel underneath the toll lane or in the booth and has the principal task of controlling the toll collection function and all the peripheral equipment, transmitting information and data on all lane activities to a local ETC Server and receiving other control information and data from the ETC server. It also has the function of controlling all the peripherals connected to it.

b) All hardware, software, TLC interface to peripherals and local ETC Server shall be supplied by the equipment supplier.

c) The TLC software shall be developed to operate any type of toll lanes such as dedicated ETC toll lanes, Normal Hybrid ETC toll lanes, Extra wide Hybrid ETC toll lanes, Bike Lane etc. as is defined under earlier section of this document.

d) All lane operating data shall be stored in the local Solid-State drive in the lane. Adequate RAM shall be provided to prevent “Thrashing” of the Solid-State drive. The Solid-State Drive shall have enough memory to load and maintain all necessary program tables (like ETC blacklist, whitelist, discount list etc.) and data in memory, to optimize the toll collection functionality. Each transaction data collected from the lane peripherals shall be stored in the Solid-State Drive of the TLC in a separate encrypted file placed in a folder automatically created with the month’s name at the

start of each month, before being transmitted to the master database in the local ETC server. This data shall remain in the Solid-State Drive irrespective of transmission to the local ETC server until a period of 1 month. At the start of the 7th month, the 1stweek's data shall be deleted from the Solid-State Drive on the basis of FIFO logic.

e) Further, there should be a mechanism for auditing the real time data transmission (including incidents) over a predetermined time period (say 30 minutes) and automatic data retrieval from the lane in case of data mismatch.

f) The TLC must be capable of storing the following minimum information:

   i. 6 months of transaction data and at least 1 month of images associated with transaction

   ii. 500000 Blacklist and discount files of FASTag

   iii. 5 Tariff Table (active and pending)

g) A transaction record shall contain all the necessary information to enable complete control and auditing of the system.

h) The minimum required fields are as follows: -

- Transaction Sequence Number
- Date
- Time
- Plaza
- Lane
- Shift
- Collector Id
- Manual Vehicle Class
- Tag Vehicle Class (TVC)
- Automatic Vehicle Class (AVC)
- Supervisor Class
- Mapper Vehicle Class
- Method of Payment
- Image ID (in case of a violation transaction)
- Tag Id
- VRN no. (XXXXXXX in case of FASTag)
- Transaction Amount

i) The transaction time shall be the time when a Tag is detected at transaction area or when the toll collector validates the MOP for manual transaction.

j) The TLC shall be capable of interfacing with at least the following peripheral equipment:
   - RFID Reader
   - Toll Collector Display
   - User Fare Display
   - Vehicle guidance signals (Traffic Lights)
   - Overhead Lane Sign
   - Automatic Exit Barrier
   - Exit Barrier Loop
   - AVC system including AVC loop
   - Electronic Toll Collection Equipment
   - Incident Recording (CCTV) System
   - License Plate Image Capture Camera
   - Thermal Receipt Printer
   - Barcode Reader

k) The TLC shall further allow for interfacing via three additional (spare) high-speed serial devices. All components of toll lane controller (TLC) should be available in open market including Digital I/O board of industrial grade, there should not be any customise panel/card inside TLC.

l) The TLC shall be capable of communicating with the local ETC server. Communication shall consist of data necessary to build a complete database in the local ETC server, from which the required financial and operating reports and statistics can be generated. The local ETC server shall also receive and log any reportable incidents occurring in the lane, which shall be transmitted real-time to the Incidents Computer (IC) for action by the toll supervision staff. In terms of incidents, real-time shall mean the time from the occurrence of the incident to the storage of the incident and the subsequent display of the incident on the IC; shall not be greater than 2 seconds.

m) As described above, all data entries shall be sequentially numbered and referenced to other related entities. The incidents that occur during a transaction shall refer to that transaction. Transactions and incidents shall refer to the applicable financial entity in which they occur.

n) An automatic / manual data validation process is required to check for data continuity and missing/duplicate data. An audit trail of manual corrections is required. The data validation process shall be linked to a “data not complete”

message that will be indicated on reports if data is missing / pending validation / consolidation.

o) Further, the TLC (via the AVC) shall monitor the lane at all times for any traffic violation or incident; and for failure of any of the toll equipment. The level of incident reported to plaza via the peripherals in the toll lane or reported to the LOCAL ETC SERVER shall be a parameter setting in the software available at a definable level.

p) The TLC shall also be capable of receiving messages from the local ETC Server. These messages will contain data on the Tariff tables, classification table, whitelist, tag blacklists, ETC account balance, etc. Should the link between the TLC and the LOCAL ETC SERVER fail, a system to download such information locally into either end (TLC & LOCAL ETC SERVER) is to be made available.

q) The CCH maintains a vehicle class description that is generic to all toll plazas. However, as the vehicle class description at each toll plaza for the same vehicle may be different, the TLC shall maintain a mapping of the CCH Vehicle class to the Plaza Vehicle class. The TLC generated transaction shall always refer to the Plaza vehicle class.

r) Extended operation of the TLC in the Local Mode must be possible. The system shall manage its data storage capacity to ensure adequate free space for the operating system, application and data. The system shall provide warnings regarding free space when the storage capacity reduces to predefined critical limits. If the data storage on the TLC reaches this critical limit, it shall immediately instruct the plaza to stop processing of transactions any further and inform the supervisory staff to initiate a data extraction procedure. The data extraction shall be carried out via a thumb drive or portable computer and restored in the LOCAL ETC SERVER.

s) The Equipment Supplier shall provide the details on the TLC data management strategy.

t) The TLC shall be capable of producing a printed report in the lane (mini shift) for each period worked (each login to logout period). The system shall allow generation of such reports only for certain predefined privilege levels. Time throughout the entire toll collection system shall be synchronized with reference to the LOCAL ETC SERVER.

7.3.2. TLC PC Specification:

The following minimum configuration requirements shall be met:

Descriptions	**Remarks**
TYPE	Industrial Grade Computer (IPC)

Processor Board	ATX / Micro ATX / Mini -ITX Industrial Mother Board
Power Supply	ATX 450 or as per need of Industrial grade computer
Mains Input	AC input from 200~240V, 50 Hz
Installation Method	Mounting at Door inside the TLC Enclosure
Cables	Power Cable, UTP cable
Colour	Manufacturer's Original Colour
Access for maintenance, modularity of construction	Minimal maintenance, Commercially off-the-shelf product
Environmental Considerations	-30°C to 70°C Operating Temperature, 95% @ 40°C (non-condensing)
IPC Design Criteria	Processor: Intel Core i7- 6500 Processor (Quad Core, 6 MB Cache, upto 3.20 Ghz w/Turbo Boost) or better RAM: 16 GB (2 X 8 GB) DDR4 Synchronous Dynamic RAM Supports Dual channel (non-ECC) DDR4 1866/2133 up to 32GB Storage Drive: Based on estimated storage requirement for 6 months TLC data (at least 500 GB Solid-State Drive-in case estimated capacity is lesser) Supports SATA3.02 x PCIe expansion Slot Supports VGA and DVI display, Minimum 01 PCIe expansion slots, 4 x USB 3.0, 2 x USB 2.0, 4 x COMs ports Serial port support, RS-485 auto flow control 2 X Ethernet RJ-45 network port, 10/100/1000 Mbps Ethernet controller, support Wake on LAN 8 Operating System: Linux or Windows latest or Embedded Application Software: Lane Software, Antivirus Overall MTBF: 30,000 hrs Overall MTTR: 0.5 hrs – 1 hrs

7.3.3. Enclosure Cabinet

The TLC and all related peripheral controllers should be enclosed in an IP55 compliant cabinet.

a) **Locking System**: Cabinet shall have a unique key allowing access
b) **Door monitoring**: The cabinet door shall be monitored utilising proximity switch. Door Open/ close events shall be recorded as incidents identified by time and Lane. The incidents are to be displayed on the LSDU.
c) **Cabling Layout**: All external cables shall be protected against the effects of lightning and shall comply with all requirements for the control of interference from EMI. All data cables shall be screened and shall be properly separated and shielded from all power cables.
d) **Ventilation and internal temperature**: All equipment endorsed by the cabinet shall be kept at a temperature consistent with manufacturers recommendations.
e) **Cable dressing**: All cables (power & signal) shall be properly routed and dressed with suitable railings inside the enclosure and ties.
f) **Cable numbering**: The signal & power cable terminations shall be identified by proper numbering. In addition to the termination at the controller end, this numbering shall also be maintained at locations where the cables are exposed (like manholes, junctions) and at the peripheral end. Further, all the individual component boards shall be properly identified by labelling.
g) **Cable terminations**: The signal & power cable (from the peripherals) terminations shall be kept separated inside the cabinet. The cable routing inside the enclosures shall be done in a proper manner, so that, aesthetics apart, the cable faults can be traced, and faulty cables replaced, easily and less
h) **Power Supply:** The TLC shall receive UPS power from the UPS distribution panel. Any special electrical protection / interface unit shall be provided by the Service Provider, if required, based on the needs of the device. The power distribution to the lane peripherals from the TLC shall be adequately protected with the help of surge arresters, lightning protection, etc.
i) **Protection:** The TLC panel should have short circuit, overload, line filter & surge protection devices for power & data. Each equipment which to be connected with TLC should have separate circuit breaker & fuse. Beside this, TLC enclosure should be IP 55 rated.

7.4. AVC including Controller, sensors, loop and detector

7.4.1. **Accuracy Level**: The system shall be profiler based and 100% auditable, accuracy of vehicle counting should be 100% and classification shall not be less than 98%. AVC sensors range between Rx and Tx or transceiver must work at least 7.5 m.

7.4.2. **Auditability:** The AVC System shall comply with the following auditability criteria:

a) Each transaction recorded by the system shall be uniquely and sequentially numbered.

b) The AVC shall be able to provide information to a laptop or to a computer connected to the same network as on AVC computer that shall be used for auditing the classification of the AVC as well as the classification of the lane operator.

c) The audit function shall be done in the following manner. The auditor shall

d) connect to the AVC computer through network or RS-232 port of the AVC computer.

i. Start audit application/data extraction application

ii. Enter Plaza name, AVC number, User id and Password

iii. Enter the date and duration for the audit.

iv. Press enter to start data extraction (any time the auditor shall be able to cancel current command to start with other specific duration).

e) Obtain output of the audit report in XLS format and it shall contain at least the following:

- Transaction sequence number
- Date & time of the transaction
- Lane ID
- Shift ID
- TLC class
- AVC class
- MOP
- Incident type and details associated with the transaction, if any

7.4.3. The Service Provider shall provide a data extraction tool to the Authority, it shall be possible to extract the AVC/TLC data for a user defined period in XLS format using that tool.

7.4.4. For audit purposes, it shall be possible to enable all transactions as incidents in order to grab LPIC images and ICS image for Supervisor / Auditor review per lane / direction / all lanes.

7.4.5. Description and Functions

a) The automatic vehicle classification equipment shall be installed in the lane after pay-axis.
b) The purpose of the AVC is to sense the presence of a vehicle (differentiate it from non-vehicular crossing), to measure and interpret certain physical characteristics of the vehicle as it passes through the AVC.
c) The AVC shall be able to generate profile image which shall be used for auditing purpose.
d) The AVC shall be able to distinguish between classes as per the applicable notifications of MORTH
e) This class information shall be stored locally at AVC level and communicated to the TLC. Simultaneously a still image of the vehicle shall be captured / grabbed by the Incident Capture System (ICS) Camera as the vehicle triggers the AVC sensors. The TLC shall then check whether this AVC class matches the vehicle class (the CCH Class mapped to the Toll Plaza class) as read from the tag. If there is a discrepancy between the two classifications, the license plate image (captured when the vehicle passed through the ETC exit) and the ICS camera image shall be saved and stored with all transaction and incident information watermarked on them. The images and discrepancy information shall be communicated to the Local ETC server for further action and processing by the toll supervision staff.
f) The Equipment Service Provider shall submit details of the performance of existing AVC systems duly validated by the existing operators of the systems.
g) The AVC shall be capable of detecting and reporting the following vehicle movements and incidents in the lane to the TLC:
    i. The AVC system must be able to count and distinguish two wheelers, autos and four-wheelers separately.
    ii. Vehicle Standing – the vehicle presence sensing equipment stays active for longer than a preset time. The preset time shall be parameter settable.
    iii. All AVC elements (loops, Profiler based sensor, cameras, etc.) shall be fully weatherproof and installed in a location where vehicle damage by accident is not possible.
    iv. When the TLC is inoperative, or communication between the TLC and the AVC is severed, the AVC shall record the last transaction number transmitted and shall be able to independently count and record (store) vehicle classes passing through or over it. A sequential vehicle counter at AVC level shall be implemented to reconcile. The AVC shall have its own battery backup and data extraction facility on to a CD or to a laptop computer.

v. The AVC shall have its own battery backup at least 8 hours and data extraction facility on to a CD or to a laptop computer

vi. The AVC shall be able to generate violation if the ETC lane is not logged- in and a vehicle passes through it.

vii. In following cases, the AVC shall generate an alarm on the plaza level and send record to incident control system for supervisory action apart from the incidents defined:

- Degraded classification (in case of any single Transmit / Receive failure)
- Unable to classify

h) The accuracy of the AVC shall not be affected by temperature or any weather /environmental conditions and shall be independent of vehicle speed / weight.

7.4.6. **AVC System Design**

a) Functional requirements:

i. The AVC shall be able to automatically classify the classes of vehicles as indicated in the vehicle class table to an accuracy of 99.60% without manual intervention and class correction or validation. Unless the above criteria are achieved, the AVC shall never classify a vehicle to any defined category in the Classification table; it shall be categorized as unable to classify so that it triggers an incident and there is no chance for revenue loss. This can be used to fine tune the AVC to improve the accuracy later.

ii. The functional specification for the AVC shall include the hardware, software and operational requirements. The design requirements of the AVC are to be seen as a system in which all failures, events and other events are logged, stored and managed. The following design criteria shall be used in the AVC:

- ✓ AVC Classification Table
- ✓ AVC Configuration
- ✓ Vehicle Detection and Classification
- ✓ AVC Interfaces
- ✓ AVC Technical Requirements
- ✓ Data Storage

iii. All operating data shall be stored on the local Solid-State Drive of the AVC computer. “Thrashing” of the Solid-State Drive shall be prevented. The AVC shall have enough memory to load and maintain all necessary program tables and data in memory. All other transaction data shall be stored on the local hard drive of the AVC and a copy to be transmitted to the LOCAL ETC SERVER.

iv. The following minimum information is to be stored at AVC level:

- Classification table
- AVC configuration
- Data of at least one year (transaction, event, AVC centric incident etc.)

v. Two separate streams of data, carrying vehicle classification information from TLC and AVC shall be copied at LOCAL ETC SERVER level for comparison, evaluation and audit purposes. There shall be provisions for drawing separate reports for TLC and AVC classifications at LOCAL ETC SERVER level. An AVC accuracy and reconciliation report shall be present in the toll system.

vi. The performance of the AVC shall form the basis for the accuracy checks, functional tests, installation, commissioning and handover to achieve the required accuracy and performance. All design and installation approvals shall be obtained from IHMCL before installation and commissioning. The Contractor shall submit a detailed list of vehicles with photographs and Indian RTO authorized classification category of all models of vehicles found in India as part of technical specifications delivery. The configuration of AVC classification table into the system shall be done in the presence of the authorized representative of IHMCL.

vii. The plaza lane area detailed AVC layout including the following items shall be provided at the time of technical specifications delivery by the Contractor so that the design process can be implemented at site. The Contractor shall ensure that the equipment layout is in conformance with the Lane Design Drawings as provided by the Authority.

viii. The system architecture shall provide the details of the equipment layouts and the physical location of each component of the system in the ETC toll lane.

ix. The loop detector units/cards shall conform to the following minimum requirements.

x. The unit shall be easily removable and shall be fitted with at least two (2) loops per card.

xi. The unit shall have a minimum of 4 separate adjustable sensitivity and frequency levels.

xii. The unit shall have indicators for vehicle presence, loop on/off and failure.

xiii. The AVC Profiler shall comply with the following specification and are mounted in a manner as to ensure that the following minimum specifications are adhered to at all times.

- Ensure that no vehicle can pass through the AVC and miss axle counting.
- Number of Axles per vehicle is accurately counted for every vehicle passage

- Ensure to generate profile image of each vehicle.
- Sensor replacement time shall not exceed 30 minutes.

xiv. It shall be noted that the equipment enclosures shall be mounted in the tunnel/booth at the toll plaza, sufficient ventilation shall be provided by the equipment Service Provider for this enclosure and the enclosure shall have IP65 protection.

xv. The AVC enclosure shall be mounted in the tunnel/booth. The AVC enclosure shall be secured using suitable corrosion resistant fixtures, and all fixtures shall be approved before the mounting of the AVC can take place.

xvi. The AVC enclosure shall be provided with a switch to detect that the AVC door is open or closed, and the status shall be updated at plaza level in real time.

xvii. All mounting shall be done in a neat and professional manner and shall be approved by the Authority.

xviii. All AVC cables that enter the enclosure shall be protected between the enclosure and the sensors, using a suitable flexible steel re-enforced trunking / cable tray / ducting as approved by the Authority to reduce the risk of tampering. All the cable entries to the AVC enclosure shall be sealed properly with glands / sealant, as approved.

xix. The quality control procedure manual shall be provided with the proposal by the equipment Contractor, which shall include a minimum of:

- AVC Installation Log Sheet
- Loop Resistance Testing and Loop Earth Testing Procedure
- Crosstalk Verification Process
- Loop Chatter (Bobbing) Verification Process
- Basis of classification logic of AVC

7.4.7. **AVC Controller Configuration**

The following minimum configuration requirements shall be met:

Descriptions	**Remarks**
TYPE	Industrial Grade Computer (IPC)
Processor Board	ATX / Micro ATX / Mini -ITX Industrial Mother Board
Power Supply	ATX 450 or as per need of Industrial grade computer
Mains Input	AC input from 200~240V, 50 Hz
Cables	Power Cable, UTP cable
Colour	Manufacturer's Original Colour
Access for maintenance,	Minimal maintenance, Commercially

modularity of construction	off-the-shelf product
Environmental Considerations	-20°C to 60°C Operating Temperature, 95% @ 40°C (non-condensing)
IPC Design Criteria	Processor: Intel Core i7- 6500 Processor (Quad Core, 6 MB Cache, upto 3.20 Ghz w/Turbo Boost) or better RAM: 16 GB (2 X 8 GB) DDR4 Synchronous Dynamic RAM Supports Dual channel (non-ECC) DDR4 1866/2133 up to 32GB Storage Drive: Based on estimated storage requirement for 6 months TLC data (at least 500 GB Solid-State Drive-in case estimated capacity is lesser) Supports SATA3.02 x PCIe expansion Slot Supports VGA and DVI display, 6 x USB 2.0, 4 x COMs ports Serial port support, RS-485 auto flow control 2 X Ethernet RJ-45 network port, 10/100/1000 Mbps Ethernet controller, support Wake on LAN 8 Operating System: Linux or Windows latest or Embedded Application Software: Lane Software, Antivirus Overall MTBF: 30,000 hrs Overall MTTR: 0.5 hrs – 1 hr

7.4.8. **AVC Enclosure**

The AVC and all related peripheral controllers should be enclosed in an IP65 compliant cabinet.

a) Locking System: Each cabinet shall have a unique key allowing access to the AVC.
b) Door monitoring: The cabinet door shall be monitored utilizing proximity / limit switch. Door open / close events shall be recorded as incidents identified by time and Lane identification. The incidents are to be displayed on the plaza level.

c) Cabling Layout: All external cables shall be protected against the effects of lightning and shall comply with all requirements for the control of interference from EMI. All data cables shall be screened and shall be properly separated and shielded from all power cables.

d) Ventilation and internal temperature: All equipment endorsed by the cabinet shall be kept at a temperature consistent with manufacturers recommendations.

e) Finishing: The cabinet surfaces shall be protected from the environment in which it shall be used, and the Equipment Contractor shall specify the surface treatments to be applied. Each cabinet shall be painted and numbered in a manner consistent with the toll lanes and consistent with all equipment related functions (e.g., reporting to the plaza software subsystem).

f) Cable dressing: All cables (power & signal) shall be properly routed and dressed with suitable railings inside the enclosure and ties.

g) Cable numbering: The signal & power cable terminations shall be identified by proper numbering. In addition to the termination at the controller end, this numbering shall also be maintained at locations where the cables are exposed (like manholes, junctions) and at the peripheral end. Further, all the individual component boards shall be properly identified by labelling.

h) Cable terminations: The signal & power cable (from the peripherals) terminations shall be kept separated inside the cabinet. The cable routing inside the enclosures shall be done in a proper manner, so that, aesthetics apart, the cable faults can be traced, and faulty cables replaced, easily and less time consuming.

7.5. User Fare Display with mounting pole

7.5.1. Description and Function

a) The User Fare Display (UFD) shall be located in the toll lane in a position where it is readily visible to and readable by Users from the pay point. The display has the primary purpose of informing the User of the vehicle. It shall convey ETC balance information & low balance warnings, public relations and seasonal messages.

b) The UFD shall be of variable message type and shall have high intensity LED or similar Operator approved display of 16 characters per line in three lines with the option of scrolling for displaying seasonal messages.

c) The UFD shall send status information to the TLC for interface with plaza subsystem.

7.5.2. Specifications

The following minimum specifications shall be met:

- Size : 750 X 450 mm
- Character per Line: At least 16 per line
- Luminous Intensity: >2000 mcd
- Display : Red LED
- Visibility Range : 10 m
- Enclosure : MS
- MTBF : 50,000 hours
- MTTR : less than 30 minutes

7.5.3. **Power Source**

The UFD shall receive UPS power from the TLC. Any special electrical protection / interface unit shall be provided by the Contractor, if required based on the needs of the device.

7.5.4. **Protection**

The UFD shall be IP 65 rated or better.

7.6. Automatic Barrier Gate

7.6.1. **Description and Functions – Automatic Barriers**

a) The lane exit barrier shall be suitable for high- speed ETC transactions. One full open-close cycle shall not take more than 1.2 seconds. The barriers are being used in the ETC express lane; the barriers shall be capable of full lane open from a close state in less than 0.6 seconds.

b) The housing and any mounting frame shall be fabricated from corrosion-resistant materials. They shall be IP 55 rated. The barrier shall be driven electrically. The motor shall not be damaged when the barrier is blocked in any position. Exit barriers shall have presence detectors independent to the AVC system to prevent barrier arms coming down on vehicles while passing. This shall be in the form of infrared units and dedicated embedded loops. Apart from the barrier arm, the mechanism may not have any moving protrusions that pose a risk to persons standing in close proximity to the barrier.

c) The barrier arm shall be fabricated from a light, corrosion resistant material readily and inexpensively available in India. The barrier arm shall further have a protective mechanism whereby controlled fracture of the barrier arm occurs without damage to the housing or motor in the event of frontal collision. Preference will be given to non-destructive break-away mechanisms. Further, there shall be a protection

mechanism to detect the presence of vehicles to avoid accidental hitting on the vehicles, whenever the boom is triggered for closing.

d) Suitable power supply scheme shall be implemented by the Contractor to feed the Exit barrier to protect the source from being damaged due to electrical surges / spikes injected by the dynamic (inductive) load. Further, the drive shall be so designed as to the damping factor is just sufficient for the drive to operate the booms without any jerks during open / close to avoid freak hitting by the exiting vehicles.

e) Barrier arms shall have retro-reflective red stripes in accordance with the local traffic sign standards.

7.6.2. **Specifications**

The following minimum specifications shall be met:

- Boom Length: 3 m or 3.5 m
- Boom Material: Aluminium

7.6.3. **Power Source**

The Automatic Barrier Gate shall receive power directly from dedicated online UPS. Suitable protection shall be provided by the Contractor at the load end to protect the Boom Barrier. The Contractor shall fulfil any specific earthing requirement.

7.6.4. **Protection**

The Automatic Barrier Gate shall be IP 55 rated.

7.7. Overhead Lane Status Sign (OHLS)

7.7.1. Description and Functions

a) The Overhead Lane Sign (OHLS) is located above the centre of the lane at the lane entrance. The purpose of the OHLS is to indicate to the User whether the toll lane is open for the processing of vehicle or closed. A red cross is used to signal that the lane is closed, whilst a green arrow is used to indicate that the lane is open to traffic.

b) Signs must be sufficiently bright and directed to indicate to a motorist, approaching the toll plaza, at a distance of 300 m on a bright cloud free day that the lane is available for use. The OHLS status shall also be visible up to a peripheral view of 45 degrees from the travel axis.

c) At any situation, both RED and GREEN part shall not glow simultaneously. Under failure conditions, only Red Cross shall be displayed until rectification.

7.7.2. **Specifications**

The following minimum specifications shall be met:

- Size : 480 mm X 480 mm
- Display (Cross) : Red LED
- Display (Arrow) : Green LED
- LED : 5mm in diameter, 8000 mCd
- Visibility Range : 150 m (under extreme weather conditions) and 300 m under normal ambient conditions
- Enclosure : MS with powder coating
- Environmental Protection : IP 65 or better grade

7.7.3. **Power Source**

The OHLS shall receive UPS power from the TLC.

7.7.4. **Protection**

The OHLS shall be IP 65 rated or better.

7.8. Traffic lights with mounting pole

7.8.1. **Description and Functions**

a) The Traffic Light (TL) shall be located in the toll lanes in a position where it is readily visible to users of the toll road, usually on the side of the lane beyond the toll booth. The traffic light shall consist of two traffic light heads mounted on a suitable pole. A red signal is used to indicate that the user should stop whilst the green signal is used to indicate that the user should proceed.

b) At any situation, both RED and GREEN part shall not glow simultaneously. Under failure conditions, only RED arrow shall be displayed until rectification.

7.8.2. **Specifications**

The following minimum specifications shall be met:

- Size : 200 mm with sun visor
- Display (Stop) : Red LED
- Display (Start) : Green LED
- Visibility Range : 20 m (under normal visibility conditions)
- Enclosure : MS Housing
- Mounting : On Pole

7.8.3. **Power Source**

The TL shall receive UPS power from the TLC. Any special electrical protection / interface unit shall be provided by the Contractor, if required based on the needs of the device.

7.8.4. **Protection**

The TL shall be IP 65 rated or better.

7.9. Violation Light & Alarm

The siren operates in conjunction with a "violation" and acts as a warning device, The purpose of the siren is to alert the plaza staff of a 'run-through' through the lane. Visual indication is via a strobe light. It shall meet the following requirements:

Violation light:	Minimum Specification
Technology	Motor driven
Operating Voltage	230 VACS
Colour	Amber
Dimension	142mm x 118mm
Violation Alarm	
Volume	112 db at 1 meter
Hearing distance	500 meters
Protection	IP 65

7.10. Loops with detector

Dimension as suggested by the Service Provider/System Integrator and detector specification as per AVC specification chapter.

7.11. Incident Capture Camera with mounting Poles

7.11.1. The cameras shall be charge coupled device (CCD) colour cameras equipped with fixed focal manual iris lenses and night vision capabilities. The CCTV systems shall have adequate surge and lightning protection.

7.11.2. The model selected shall have image compensation capability to ignore stray lighting / vehicle lighting so that ICS shall render meaningful output for verification. The camera should be able to capture snapshots also.

7.11.3. Camera Location: The Equipment Service Provider shall determine the best mounting positions for the cameras so that effects, such as, direct sunlight and stray lighting is negated. The cameras shall also be protected from or be resistant to high winds and moisture. Vibration shall be minimised such that the image quality is never compromised. Each camera shall view and detect vehicle images for its lane. The cameras shall be

located so that sidelong profile of the vehicle is obtained as it crosses the AVC, so that the number of axles of the vehicle crossing the AVC shall be clearly visible when the vehicle is exiting the lane. The camera shall have an automatic adjustment of brightness. The housing shall be an IP-67 rated enclosure to withstand adverse weather conditions. The housing shall be equipped with a hood to protect the camera under direct sunlight / canopy light. The Incident Capture Camera is installed at a convenient location on the island to capture images and video clips of the vehicles for the following incidents:

a) Class discrepancy between the classes detected by the AVC and that entered by the fee collector
b) Exempt users
c) All transaction of vehicle with special events
d) Offending vehicles

7.11.4. The camera shall be installed inside the housing at the suitable height above the surface of the lane on a pole to record the vehicle images and video clip for every transaction in the lane. The vehicle images captured shall be of the front and right-side portion of the vehicle.

a) General Requirements: The housing will be equipped with a hood to protect the camera under direct sunlight.
b) Protection: IP67
c) ONVIF supported

7.11.5. The stand of the lane camera shall be made of steel that shall not swing or twist under gutter speed of strong wind. The stand will be protected from corrosive environmental conditions.

7.11.6. **Specification:** -

Description	Specifications
Image Sensor	1/3", progressive scan CMOS
Minimum Resolution	4MP (2592×1520)
Lens Type	Varifocal
Field of View	Horizontal field of view: 105° to 35°
	Vertical field of view: 56° to 20° Diagonal field of view: 126° to 40.5°
Shutter Time	1/3 s to 1/100,000 sec. or better
Day/Night	Removable IR-cut filter for day & night function
Minimum Illumination	Colour: 0.005 Lux @ (F1.2, AGC ON), 0 Lux with IR
	Colour: 0.0068 Lux @ (F1.4, AGC ON), 0 Lux with IR
IR Illuminators	Built-in IR illuminators, effective up to 50 meters

Description	Specifications
On-board Storage	Slot type: SD/SDHC/SDXC card slot
	Seamless Recording
Video Compression	H.265+/H.265/H.264+/H.264/MJPEG
Maximum Frame Rate	30 fps
	In both compression modes
Maximum Streams	4 simultaneous streams
S/N Ratio	50 dB or better
Dynamic Range	95 dB or better
Video Streaming	Adjustable resolution, quality and bitrate, Stream
Image Settings	Adjustable image size, quality and bit rate, Time stamp, text overlay, flip & mirror, Configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks, Scheduled profile settings, 3D Noise Reduction, Video
	Rotation, Defog, WDR, HLC
Image Enhancement	BLC/3D DNR/HLC
Audio Capability	Two-way audio (full duplex)
Audio Compression	G.711/G.722.1/G.726/MP2L2/PCM
Interface	External microphone input
	Audio output
Users	Live viewing for up to 10 clients
Protocols	IPv4, IPv6, TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP, IGMP,
	SMTP, FTP, DHCP, NTP, DNS, DDNS, PPPoE, CoS, QoS, SNMP, 802.1X, UDP, ICMP, ARP, SSL, TLS
Interface	10 Base-T/100 Base TX Ethernet (RJ-45)
ONVIF	Supported
Alarm Triggers	Video motion detection, manual trigger, digital input, periodical trigger, system boot, recording notification, camera tampering detection,
	audio detection
Alarm Events	Event notification using digital output, HTTP, SMTP, FTP and NAS
	server, SD Card
	File upload via HTTP, SMTP, FTP, NAS server and SD card
Smart Focus System	Fixed Focus
Connectors	RJ-45 cable connector for Network/PoE connection
	Audio input

Description	Specifications
	Audio output
	DC 12V power input
	Digital input: 1, Digital output:1
LED Indicator	System power and status indicator
Casing	Weather-proof IP66-rated housing
	Vandal-proof IK10-rated metal housing (Casing Only)
Safety Certifications	CE, LVD, FCC Class A, VCCI, C-Tick
Operating Temperature	10°C to 60°C

7.12. License Plate Image Capture Cameras

7.12.1. The cameras shall be charge coupled device (CCD) colour cameras equipped with fixed focal manual iris lenses and night vision capabilities. The CCTV systems shall have adequate surge and lightning protection.

7.12.2. The model selected shall have image compensation capability to ignore stray lighting / vehicle lighting so that LPIC shall render meaningful output for verification. The camera should be able to capture snapshots also.

7.12.3. Each camera shall view and capture vehicle images for its lane. The cameras shall be so located so that the front license plate of the vehicle is clearly within the view of the camera, so that the real time feed of this camera shall be displayed as a section in the TCD. The camera shall have an automatic adjustment of brightness. The housing shall be an IP-67 rated enclosure to withstand adverse weather conditions. The housing shall be equipped with a hood to protect the camera under direct sunlight / canopy light.

7.12.4. Specification: -

Description	Specifications
Image Sensor	1/3", progressive scan CMOS
Minimum Resolution	4MP (2592×1520)
Lens Type	Varifocal
Field of View	Horizontal field of view: 105° to 35°
	Vertical field of view: 56° to 20° Diagonal field of view: 126° to 40.5°
Shutter Time	1/3 s to 1/100,000 sec. or better
Day/Night	Removable IR-cut filter for day & night function
Minimum Illumination	Color: 0.005 Lux @ (F1.2, AGC ON), 0 Lux with IR
	Color: 0.0068 Lux @ (F1.4, AGC ON), 0 Lux with IR
IR Illuminators	Built-in IR illuminators, effective up to 50 meters

Description	Specifications
On-board Storage	Slot type: SD/SDHC/SDXC card slot
	Seamless Recording
Video Compression	H.265+/H.265/H.264+/H.264/MJPEG
Maximum Frame Rate	30 fps
	In both compression modes
Maximum Streams	4 simultaneous streams
S/N Ratio	50 dB or better
Dynamic Range	95 dB or better
Video Streaming	Adjustable resolution, quality and bitrate, Stream
Image Settings	Adjustable image size, quality and bit rate, Time stamp, text overlay, flip & mirror, Configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks, Scheduled profile settings, 3D Noise Reduction, Video
	Rotation, Defog, WDR, HLC
Image Enhancement	BLC/3D DNR/HLC
Audio Capability	Two-way audio (full duplex)
Audio Compression	G.711/G.722.1/G.726/MP2L2/PCM
Interface	External microphone input
	Audio output
Users	Live viewing for up to 10 clients
Protocols	IPv4, IPv6, TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP, IGMP,
	SMTP, FTP, DHCP, NTP, DNS, DDNS, PPPoE, CoS, QoS, SNMP, 802.1X, UDP, ICMP, ARP, SSL, TLS
Interface	10 Base-T/100 Base TX Ethernet (RJ-45)
ONVIF	Supported
Alarm Triggers	Video motion detection, manual trigger, digital input, periodical trigger, system boot, recording notification, camera tampering detection,
	audio detection
Alarm Events	Event notification using digital output, HTTP, SMTP, FTP and NAS
	server, SD Card
	File upload via HTTP, SMTP, FTP, NAS server and SD card
Smart Focus System	Fixed Focus
Connectors	RJ-45 cable connector for Network/PoE connection
	Audio input
	Audio output
	DC 12V power input

Description	Specifications
	Digital input: 1, Digital output:1
LED Indicator	System power and status indicator
Casing	Weather-proof IP66-rated housing
	Vandal-proof IK10-rated metal housing (Casing Only)
Safety Certifications	CE, LVD, FCC Class A, VCCI, C-Tick
Operating Temperature	10°C to 60°C

7.13. TFT Display

The TFT display/Fee Collector Display (FCD) shall be located on the fee collector's desktop and shall be screwed or bolted through the countertop, the position of the TFT shall be finalized with the employer's engineer at time of installation, suitable mounting brackets manufactured from stainless steel shall be provided to fix the screen to the desktop. All nuts and bolts are used to secure the TFT to the booth countertop shall be stainless steel. It shall be the system's interface to the fee collector, to display the status of transactions and status of the lane peripherals.

Minimum Technical specifications for the TFT display shall be as follows:

Description	Remarks
Display Type	TFT with Diagonal Size of 18.5" Minimum
Cables	Power Cable 1 x VGA/HDMI Cable (15- pin HD D – Sub)
Cable routes	Power cable is terminated to the Lane Controller power distribution block via booth ducting. VGA/HDMI Cable is terminated to the SVGA/HDMI Port at the Lane Controller via booth ducting
Color	Manufacturer's Original Color
Voltage Requirement	AC 230 V (50 / 60 Hz)
Power Consumption	28 W
IP Rating	66
Operating Temperature	0 degree C to 50 degree C
Relative Humidity	20 % to 80 %
Design Criteria	- Min. Resolution: 1920 x 1080 @ 60 Hz - Aspect Ratio: 4:3 - Number of Colours: 16.2 M, (6bit+FRC)

	- Video bandwidth: 70 MHz - Viewable size: 18.5” Minimum - MTBF: 50,000 hrs - MTTR: 0.25 hrs

7.14. TOLL COLLECTOR TERMINAL (TCT) /Customized Keyboard

All keys (push buttons) used on the TCT shall be of positive displacement (click) type, of rugged industrial grade construction and capable of lasting for at least 2 million cycles before failure. The keyboard on the Fee Collector terminal for Registration of toll operations shall be a programmable Industrial Grade keyboard. The TCT shall receive power from the TLC. Any special electrical protection / interface unit shall be provided by the Supplier, if required, based on the needs of the device. The TCT shall be IP 54 rated.

The industrial grade keyboard shall be fully programmable; this however must be approved by the engineer before supply. These keys will be used to enter data of:

- Staff Id number
- Vehicle Classification
- Type of Transaction
- Accept/Cancel Transaction
- Method of payments Selection
- Operate OHLS
- Numeric Keypad with backspace button for numeric corrections
- Class Cancel
- Bleed-off button
- Violation Cancel/Accept Button
- Simulation Button (Only for use during Maintenance Mode)
- Alpha Numeric Keys in QWERTY format

Customized Programmable Keyboard Features and minimum Specification shall be as follows:

- Shall have Powerful programming capability
- Programming under DOS and Windows, multiple pages, multiple level, whole range key content, time delay, position sense answer back code, etc.
- True spill-resistant design
- Optional blank key, double key for alternative key group layout
- Optional MSR

- 70 programming keys + 6 position control key
- Key top size: 18 mm x 22 mm for single key
- Interface: PS/2 or USB
- Dimension (maximum): 340 mm (W) x 150 mm (D) x 58 mm (H) or vendor/OEM specific
- Weight: upto 1.2 kg
- Color: OEM Specific

7.15. Thermal Receipt Printer

7.15.1. The thermal receipt printer shall be located in the tollbooth and mounted in a position that will allow the operator to easily reach the receipts printed on the printer. The thermal receipt printer (RPR) shall be used to print receipts in the lanes. The printer shall be provided with the automatic advance function of the paper after printing so that the space for the first line of printing is aligned under the print head thus reducing the time taken to produce a receipt. The print rate should be sufficiently fast to print the details of a receipt or of a transaction in not more than 1 second.

7.15.2. For design purpose, it shall be assumed that receipts will be approximately 70mm in length. The Employer (NHAI) and project/plaza information will occupy space on the top. The area under this shall be used for particular printed data. The System Integrator shall take the approval from the Employer for the format of the receipt. A “low paper / paper out” message is to be sent to the TLC when there is low paper in the printer. Also, this is to be displayed to the Toll Collector in the respective booth. The RP shall receive UPS power from the TLC. Any special electrical protection / interface unit shall be provided by the Supplier, if required, based on the needs of the device. The RP shall be IP 54 rated.

7.15.3. Minimum Technical specifications for the RPR shall be as follows:

Descriptions	Remarks
Dimension	Maximum up to 145mm (W) x 195mm (D) x 148 (H)
Weight	Shall be less than 2 kg
Installation and Fixing Details	Installed and fixed on the Fee Collector desk
Cables	- Power cable - Serial RS232C/ Parallel /USB
Cable routes	Power cable is terminated to the TLC Termination Block via booth ducting. Data cable is connected to the TLC
Color	Cool White/Dark Grey
Power Supply Requirement	24 VDC + 7%

Access for maintenance, modularity of construction	The cover can be opened for maintenance. It also has paper sensors. Off-the-shelf product
Operating Temperature	5 C to 50 C
Relative Humidity	5 % to 90 %
Design Criteria	Print Speed: 47 LPS Print font: 9x17/12x24 Print column capacity: 56/42 columns
	Character size (mm): 0.99(W) x 2.4 (H) / 1.41 (W) x 3.4 (H) Paper dimension (mm): 79.5 + 0.5 (W) x 83 (diameter) Paper thickness: 0.06-0.07 mm Auto cutter life: 2 million cuts Real-time printer status: Auto status back (ASB) messages MCBF: 52 million lines MTBF: 360,000 hours, Overall MTTR: 0.25 hrs
Speed	Min. 60 receipts/ minutes.
Power/Normal Operation	Green LED
Paper Low	Amber LED
Error LED	Red

7.16. Intercom Slave Unit inside Booth

7.16.1. This specification lays down the general, functional and technical requirements of intercom slave communication unit to be used as a sub-system in the Booth at the Plaza.

7.16.2. ISCU shall be used for communication between the Toll Collector at the lane and the auditor/ supervisor at the Plaza building.

7.16.3. ISCU shall have the following functions:

- Voice communication installed in the booths shall provide hands free two-way verbal communication between the supervision staff in the control room and the Collectors. The Collector shall be able to attract the attention of the auditor in the control room by pressing a single button on the intercom slave unit in the booth.
- The equipment shall also have the facility to allow the supervision staff to monitor communication in the booth between the Collector and the user or between any booth without alerting the Collector.
- The voice communication system shall operate independently of the Plaza Toll management system.

- Voice communication shall also be implemented in various rooms of the plaza building and at building access points.
- Two-way communications shall be possible as soon as the auditor responds by selecting the appropriate lane button on the Master Communication unit
- One-way communication shall be possible from the Control Room intercom to all lanes simultaneously (broadcast)

7.16.4. **ISCU shall meet the following minimum technical specifications:**

Descriptions	Minimum Specifications
Installation and Fixing Details	Fixed in the booth. (wall/desktop mount)
Speech Method	Hands-free
Wiring distance	120 meters with 0.202 mm diameter (33 AWG) cable, 300 meters with 1.024 mm diameter (18AWG) cable
Speaker	20 ohms
Power Consumption	6 W (max.)
Power Supply Requirement	Power supply from Master System
Wiring	2 wires, non-twisted
Environmental Considerations	Operating Temperature of 10OC to 50OC
Reliability	30,000 hrs

The System Integrator may also propose/ provide an IP based intercom system.

7.17. Master Communication Unit (MCU)

7.17.1. This specification lays down the general, functional and technical requirements of master communication unit to be used as a sub-system in the Plaza.

7.17.2. The master communication unit MCU is a master communication system to control communication between the Collector at the lane and the auditor at the Plaza building. The unit will be located in the Control room and controlled by auditor/ supervisor.

7.17.3. **Technical Specifications:**

Descriptions	**Remarks**
Power Source	24V DC
Current Consumption	Max. 1A, 80mA in standby
Communication	Push-to-talk at master station hands free at sub

Calling	LED and intermittent ringing tone at master until answered
Frequency Response	770 – 6800Hz
Total Harmonic Distortion	3% @ 1000Hz at 20 ohms
Mounting	Wall or desk mount
Wiring	2 conductor per sub station
MTBF	30,000 hrs

7.18. Closed Circuit TV (CCTV)

7.18.1. General

a) This part of the RFE covers the equipment and services to be supplied under CCTV equipment to be installed at the Plazas. The CCTV equipment shall be categorized as two types, CCTV for lanes and CCTV for Plaza surveillance. Earthing of the Camera equipment must be done with a resistance value of less than 3 Ohms. Earth spikes with suitable cable shall be used for this purpose.

b) The CCTV for lanes shall be:

i. Booth CCTV cameras

c) The CCTV for Plaza surveillance are:

i. Network Video Recorder (NVR)

ii. Video Management Software (VMS)

iii. Plaza Building Security CCTV cameras

iv. Display (LED Monitor)

d) All the cameras shall be IP based and shall be connected to the Plaza Network video recorder (NVR). The video management software (VMS) installed on NVR shall provide the facility to control the cameras at the Supervision Control room at the Plaza Buildings. The video recording of each camera shall be stored at for a period of minimum 30 days.

e) The functionality of the CCTV cameras provided by the Applicant shall be described as follows:

i. Booth CCTV cameras – These cameras shall be installed inside of the booth to capture the activities of the Collector all the time and especially when doing the transactions along with the view of the paying vehicle. The position of the booth camera shall be decided accordingly. These cameras shall have inbuilt voice recording and SD memory card of minimum 32GB for local storage of videos and voice recordings.

ii. Plaza Building Security CCTV cameras – These cameras shall be intended for monitoring of security areas such as the plaza compound, general parking area, Toll Control Room, cash room, plaza building lobby, Collector walkway, server room, UPS room, tunnel, parking, staircase, cash van loading area, etc. The bullet cameras installed outdoor shall be weatherproof enclosure.

iii. The design of the CCTV system for the plaza shall consider the following: -

- Provide effective supervision and control
- Easy to use
- Self-contained system
- Increase span of management
- Reduce unnecessary travel
- View / evaluate situations quickly
- Motion detection
- Savings on time and manpower
- Easy access to video information and quick playback
- Minimize the use of security guards
- Eliminate unnecessary responses to false alarms
- Provision for future scalability

f) Booth Level CCTV

i. The booth CCTV camera shall be an IP based fixed dome type colour cameras installed inside the booth to capture the activities of the Fee Collector while performing his operations. The camera also shall capture the view of the paying vehicle while capturing the transaction video.

ii. These cameras shall have inbuilt voice recording and SD memory card of minimum 32GB for local storage of videos and voice recordings.

iii. These cameras shall be connected to the NVR installed at the control/server room at each Plaza building.

iv. The camera and NVMS shall be capable of triggering alarms in case of Video motion detection, manual trigger, digital input, periodical trigger, system boot, recording notification, camera tampering detection and audio detection. The triggering alerts can be controlled by the control room operator.

v. Technical Specifications of the Booth Cameras shall be as follows:

vi. The technical specifications mentioned hereunder are minimum guidelines. The Applicant shall not deviate materially from the specifications specified herein.

Description	Specifications
Image Sensor	1/2.8” Progressive CMOS
Min Resolution	4MP (2592×1520)
Lens Type	Fixed Focal
Field of View	110° (Horizontal), 64° (Vertical) ,135° (Diagonal)
Shutter Time	1/5 sec. to 1/30,000 sec.
Day/Night	Removable IR-cut filter for day & night function
Minimum Illumination	0.08 Lux @ F1.8 (Color)
	0.001 Lux @ F1.8 (B/W)
IR Illuminators	Built-in IR illuminators, effective up to 25 meters or better
	IR LED*8
On-board Storage	SD/SDHC/SDXC card slot
Compression	H.264 & MJPEG
Maximum Frame Rate	30 fps in both compression modes
Maximum Streams	4 simultaneous streams
S/N Ratio	Above 55dB
Dynamic Range	97dB or better
Video Streaming	Adjustable resolution, quality and bitrate
Image Settings	Adjustable image size, quality and bit rate, time stamp, text overlay, flip & mirror, configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks, scheduled profile settings, seamless recording, smart stream, 3D Noise Reduction,
	Video Rotation
Audio Capability	Audio input /output (full duplex)
Compression	G.711, G.726
Interface	External microphone input Audio output
Protocols	IPv4, IPv6, TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP, IGMP, SMTP, FTP, DHCP, NTP, DNS, DDNS, PPPoE, CoS,
	QoS, SNMP, 802.1X, UDP, ICMP
Interface	10 Base-T/100 BaseTX Ethernet (RJ-45)
ONVIF	Supported

Description	Specifications
Alarm Triggers	Video motion detection, manual trigger, digital input, periodical trigger, system boot, recording notification, camera tampering
	detection, audio detection
Alarm Events	Event notification using digital output, HTTP, SMTP, FTP and
	NAS server, SD Card, File upload via HTTP, SMTP, FTP, NAS server and SD card
Connectors	RJ-45 cable connector for Network/PoE connection Audio output
	DC 12V power input Digital input*1
	Digital output*1
LED Indicator	System power and status indicator
Power Input	Max. 9 W (PoE)
Safety Certifications	CE, LVD, FCC Class B, VCCI, C-Tick
Operating Temperature	Starting Temperature: -10°C to 50°C (14°F~ 122°F)

g) Network Video Recorder (NVR)

i. H.265 Linux-based embedded standalone NVR shall be provided. Shall support 16-Channel /24-Channel / 32-Channel network cameras. The NVR shall be ONVIF compliant and scalable configuration with features to help users to set up and manage advanced IP surveillance systems with ease. The NVR shall also support remote and mobile access, via web-based application, and app for both iOS and Android devices.

ii. The NVR shall have minimum following technical features:

- H.265 Compression Technology
- Plug & Play One Button Auto Setup
- Intuitive, Intelligent and Interactive UI
- Live viewing, recording and Playback features
- Embedded Linux OS or OEM Specific
- Support RAID 0/1/5 Storage
- Up to 12MP Camera Live view & Playback
- Dual Lan Network Ports with Failover Function
- ONVIF Open Platform
- Storage capacity: min. 30 days with HD resolution @ 30fps

Description	Specifications
Video and Audio	
IP Video Input	32-ch
Two-way audio input	1-ch, RCA
Network	
Incoming bandwidth	320Mbps
Outgoing bandwidth	320 Mbps
Remote connection	128
Video/Audio Output	
HDMI/VGA Output	HDMI1/VGA: 1920x1080p /60Hz, 1920x1080p /50Hz, 1600x1200 /60Hz, 1280x1024 /60Hz, 1280x720 /60Hz, 1024x768 /60Hz HDMI2: 4K (3840x2160) /60Hz, 4K (3840x2160) /30Hz, 1920x1080p /60Hz, 1920x1080p /50Hz, 1600x1200 /60Hz, 1280x1024 /60Hz, 1280x720 /60Hz, 1024x768 /60Hz
Audio Output	1-ch, RCA
Recording Resolution	8MP/6MP/5MP/4MP/3MP/1080p/960p/720p/D1/2CIF/CIF
Synchronous Playback	16-ch
Decoding	
Compression	H.265 / H.264
Live view/Playback	8MP/6MP/5MP/4MP/3MP/1080p/960p/720p/D1/2CIF/CIF
Capability	4 x 4K@30, 8 x 4MP@20, 16 x 1080p@25, 32 x 720p@25
Hard Disk	
SATA	Minimum 4 SATA interface
Capacity	Minimum 8TB for each disk
Disk Array	
Array type	RAID1, RAID5
External Interface	
Network Interface	2 RJ-45 10M/100M/1000M self-adaptive Ethernet Interfaces
Network Function	HTTP, TCP/IP, IPV4, UPNP, RTSP, UDP, SMTP, NTP, DHCP, DNS, IP Filter, PPPOE, DDNS, FTP, IP Server, P2P
Serial Interface	1 x RS-485
USB Interface	Front panel: 1 x USB2.0 Rear panel: 1 x USB2.0, 1 x USB3.0
Alarm In	16-ch

Description	Specifications
Alarm Out	4-ch
General	
Power Supply	12V DC
Consumption (without HDD and PoE)	≤ 12 W
Working Temperature	-10°C ~ + 55°C (+14°F ~ +131°F)
Working Humidity	10% ~ 90%

h) CCTV cameras for Plaza Building surveillance (Server room, Control room, Cash room, admin)

i. The system shall be connected to the NVR. The VMS installed on NVR shall provide the facility to control the cameras at the Supervision Control room at the Plaza Buildings.

ii. The cameras shall be for monitoring of security areas such as plaza compound, security garage, Control Room, Change of Shift Room and Cash Counting Room, Lobby, Hallway, Tunnel, Fee Collector Walkway, parking, staircase, DG room, electrical room, server room, UPS room, Loading Bay, etc.

iii. These cameras shall be – Fixed lens Bullet CCTV night vision colour cameras. The bullet cameras installed outdoor shall be weatherproof enclosure.

iv. Technical Specifications of the Plaza Surveillance Cameras shall be as stated hereunder. The technical specifications mentioned hereunder are minimum guidelines. The Applicant shall not deviate materially from the specification specified while preparing the Technical Proposal of the Tender.

Description	Specifications
Image Sensor	1/2.8" Progressive CMOS
Min Resolution	4MP (2592×1520)
Lens Type	Fixed-focal
Field of View	83° (Horizontal), 53° (Vertical), 91° (Diagonal)
Shutter Time	1/5 sec. to 1/30,000 sec. or better
Day/Night	Removable IR-cut filter for day & night function
Minimum Illumination	0.06 Lux @ F2.1 (Color)
	0.001 Lux @ F2.1 (B/W)
IR Illuminators	Built-in IR illuminators, effective up to 30 meters
On-board Storage	Slot type: SD/SDHC/SDXC card slot

Description	Specifications
	Seamless Recording
Compression	H.265 & MJPEG
Maximum Frame Rate	30 fps
	In both compression modes
Maximum Streams	4 simultaneous streams
S/N Ratio	50 dB or better
Dynamic Range	95 dB or better
Video Streaming	Adjustable resolution, quality and bitrate, Stream
Image Settings	Adjustable image size, quality and bit rate, Time stamp, text overlay, flip & mirror, Configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks, Scheduled profile settings, 3D Noise
	Reduction, Video Rotation, Defog
Audio Capability	Two-way audio (full duplex)
Compression	G.711, G.726
Interface	External microphone input
	Audio output
Users	Live viewing for up to 10 clients
Protocols	IPv4, IPv6, TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP,
	IGMP, SMTP, FTP, DHCP, NTP, DNS, DDNS, PPPoE, CoS, QoS, SNMP, 802.1X, UDP, ICMP, ARP, SSL, TLS
Interface	10 Base-T/100 BaseTX Ethernet (RJ-45)
ONVIF	Supported
Alarm Triggers	Video motion detection, manual trigger, digital input, periodical trigger, system boot, recording notification, camera tampering
	detection, audio detection
Alarm Events	Event notification using digital output, HTTP, SMTP, FTP and NAS
	server, SD Card
	File upload via HTTP, SMTP, FTP, NAS server and SD card
Smart Focus System	Fixed Focus
Connectors	RJ-45 cable connector for Network/PoE connection
	Audio input
	Audio output
	DC 12V power input

Description	Specifications
	Digital input: 1, Digital output:1
LED Indicator	System power and status indicator
Casing	Weather-proof IP66-rated housing
	Vandal-proof IK10-rated metal housing (Casing Only)
Safety Certifications	CE, LVD, FCC Class A, VCCI, C-Tick
Operating Temperature	10°C to 60°C

7.19. Network Switches (Layer 3)

7.19.1. General

The main switches which connect lane/booth system to main control building network shall be managed by layer 3 type switch. The System Integrator shall supply and install network equipment at each Plaza and each toll gate to connect Plaza building system with toll lane systems. At the Plaza, the System Integrator shall supply and install all equipment, cables, connectors, terminals and other miscellaneous materials necessary to establish a working local area network connecting these two systems.

The network configuration shall be determined by the System Integrator. The cost of the network devices and materials that is not explicitly listed in the BOQ of this Contract but necessary for the system shall be deemed as included in the cost of appropriate items and the Contract Price, and no separate payment shall be made.

7.19.2. 8-Port PoE industrial grade rugged managed switch with 2 fibre port

It shall be provided in each lane to connect all lane peripherals. No unmanaged switch shall be provided in the lane. This 8-Port switch shall be installed inside the Electronic Enclosure of the Lane Controller and the cost of the same shall be included in the cost of toll lane controller. Manageable switch will ensure that the data transmission among lane equipment is smooth and faster. This will also prevent data broadcasting from lanes which may result in chocking of the entire network and slows the data transfer and efficiency of the lane equipment.

7.19.3. 24 Port Layer 3 Switch with 4 Fiber Port

it shall be provided in each direction of the lanes at the fee plaza to connect all lanes with ETC Server. No unmanaged switch shall be provided in the lane. This 24-Port switch shall be installed inside the network switch rack of minimum size 09 -12 U or as compatible. Manageable switch will ensure that the data transmission between the lanes and ETC server is smooth and faster.

7.19.4. **Specification**

- Switch should support port security, DHCP snooping, Dynamic ARP inspection, IP Source guard, BPDU Guard, spanning tree root guard.
- Switch should be IPv6 Certified/IPv6 logo ready, and Switch / Switch's Operating System should be tested and certified or in process of certification for EAL 2/NDPP or above under Common Criteria Certification.
- Switch should have 1:1 redundant internal power supply. Power supply modules, fan modules and transceivers modules should be hot swappable.
- Should support IEEE Standards of Ethernet: IEEE 802.1D, 802.1s, 802.1w, 802.1x, 802.3ad, 802.3x, 802.1p, 802.1Q, 802.3, 802.3u, 802.3ab, 802.3z, 802.3az.
- Switch shall have minimum 24 nos. 10/100/1000 Base-T ports and additional 4 nos. SFP uplink ports loaded with MMF modules with dedicated stacking ports
- Switch shall have wire rate performance and 128 Gbps of dedicated stacking bandwidth.

7.20. ETC Server (Plaza Server)

7.20.1. The local ETC server is responsible for the control, data storage, processing and administration of the toll operation. It shall be the responsibility of toll management server to synchronize all activities of toll collection process, data and time of all workstations.

7.20.2. There shall be a separate partition for Operating System. All Data files shall be stored in a separate partition. Image files shall have a separate 3rd partition. This scheme is applicable not only for the LOCAL ETC SERVER but in all levels of Toll System.

7.20.3. Storage sizing at each level shall be backed up with corresponding file size per transaction / record as part of technical specifications delivery. If required, the HDD finalized as part of BOQ shall be revised to handle the data storage capacity requirement as per the requirement without any additional cost to the IHMCL/NHAI.

7.20.4. **General Requirements**

a) The manufacturer of the server and workstations shall:
   i. Be a well-known and established company worldwide in the field of Information Technology.
   ii. Have an established and appointed representative or authorized agency in project location.

b) The Service Provider shall ensure that the OEM of the server and workstations shall: -

i. Be a well-known and established IT hardware supply company in project location.
ii. Be a registered representative of the original equipment manufacturer in project location.
iii. Be capable of supplying adequate after-sales service and support on 24X7 basis.

7.20.5. **Platform**

The server shall make use of minimum 64-bit platform.

7.20.6. **Configuration**

- Processor board: shall have the capacity to accept up to 4, 64-bit central processor units.
- Central Processor Unit/s: shall be 64-bit, Xenon 3 GHz or superior latest available speed at the time of delivery to the site.
- Number of Processors: 2
- RAM: 64 GB DDR4 8SFF (2.5inch) Hot Plug SAS/SATA SAS/SATA H240 Smart HBA RAID 0/1/5
- RAID (Redundant Array of Inexpensive Disks): shall use RAID5 with hardware RAID controller.
- SCSI Controller: shall have a minimum of two channels
- HDD: hot swap disks of latest available speed; capacity shall be based on data retention of all data for a period of 5 years but not less than 10 x 1.8TB 12G SAS 15K 2.5 in SC ENT HDD or latest available RMP
- DVD R/W: latest available speed
- Network Devices: 3X10G (Gigabit) LAN NIC (Network Interface Card)
- Power Supply: shall have a dual hot swap power supply to provide redundancy
- Connectivity: Two (2) standard communications ports (D sub 9 pin), Four USB (Universal Serial Bus) ports (High Speed USB 2.0), SVGA Screen port, PS2 Mouse port, PS2 keyboard port
- Light path diagnostic with external visible panel
- LCD display for server operational log (events)
- Integrated system management processor on board
- Redundant hot swap fans
- Optical scroll Mouse
- 21.5” TFT monitor

7.20.7. The server including all accessories listed above shall be installed in a 42U rack.

7.20.8. **Software Compatibility**

The server shall be capable of supporting the following software platforms:

7.20.9. **Operating System:**

Windows

UNIX

LINUX (64bit platform) or compatible

7.20.10. **Database:**

Oracle

SQL

Any other database as suggested by Service Provider to IHMCL/NHAI

The Service Provider shall be capable of providing an undertaking for a pre-determined time period for ETC server. The Service Provider shall provide undertaking for extensive support & maintenance actions on a 24-hour, 7-days-a-week basis and also shall ensure that a four (4) hour response time and a two (2) hour repair time can be achieved.

7.20.11. **Archive Storage Device (USB HDD Device minimum 2 TB)**

This device shall be connected with the server through a USB port. This device shall contain all the archived data for the entire Contract Agreement. It shall be possible to restore a COPY of the archived data for selected period to the live database as and when required and can be removed immediately after it serves its purpose. Since, this data is to be utilized only for reporting purposes, all the transaction and related data shall be retained in the Archive until the end of Concession period. The cost of the device shall be included in the cost of ETC server. No extra cost shall be paid for this device.

7.20.12. **Licensing**

License for each server, workstation operating system, Database management system software, database maintenance software (like TOAD, etc.) or any other software (MS-OFFICE package, Adobe, GHOST etc.) used in toll system, which requires a license, shall be provided by the Contractor in the name of the Authority without any additional cost to the IHMCL/NHAI.

7.20.13. **Database Management System**

a) Database shall be a relational database management system.
b) Lane system shall not have any direct database access. Data from the lane going to the database shall be through dedicated software that runs on database server.

7.20.14. **Data Network**

a) The data network shall be Ethernet format. The network shall use TCP/IP protocol and the cabling shall be STP / MM OFC and it shall be compatible with all network system and equipment.
b) Care shall be taken to ensure that the cable and the network switches used between two equipment shall be able to cater to the speed of the higher NIC.

7.20.15. **Remote Access**

Remote access shall be through a safety system as a remote connection server or firewall system. The Toll system network shall be compliant with the majority remote access equipment and remote access system, and it shall be configured with any remote system available at site.

7.20.16. **Hardware and Software Control System**

Hardware and Software fault logging system. This shall include all information regarding faults, downtime and repair time, imported from the ETC Server.

7.20.17. **Help Menu**

An intuitive and interactive help system that can be activated from anywhere in the ETC server.

7.20.18. **Security System**

- A facility to allow for managing the users and their access levels.
- The plaza ETC system shall at its highest level determine access to the separate modules by any employee. It shall have the facility to define the employee according to an associated level or duty, and provide a mechanism, whereby access is restricted.
- CD R/RW of workstation shall be disabled and except Administrator no one shall have any right assigned to add, remove or modify any program on any of the workstations.
- Nothing other than toll collection and operations function shall be accessible to any level of toll operation function. If need arises, then the user shall logout, exit the application using administrator rights.

- After this Logoff from the system the user shall login into Windows with Administrator rights and perform any required action. This is applicable for all levels of the Toll System.

7.20.19. **Workstations Management**

At any time, if the IHMCL/NHAI wants to add additional workstations and its peripheral hardware from the system, shall be able to do so without any additional cost to the IHMCL/NHAI.

7.20.20. **Interfaces**

The system shall be designed using Open interface architecture at all levels of hardware used. In future, it shall be possible for the IHMCL/NHAI to change any make / model of any hardware without dependency on the Service Provider.

7.20.21. **Data Management and Integrity**

- The basic need for data integrity is the account closing at the administrative level. The closing process assumes that all data from the lanes has been introduced into the database.
- This can be resumed to:
  - Guarantee the data in database is complete
  - Guarantee the data in database is correct
- This is accomplished with:
  - Checksum: let detect errors in data
  - Data type sequencing: let detect missing sequence
  - Communication sequence: this is a periodic messaging to allow detection of communication failure
- Since, the whole Toll Collection system is designed to detect and subsequently prevent misuse in any manner and collect all collectible revenues, any transaction / operation performed in any level of the Plaza ETC system shall be recorded in the system on detecting a definitive positive / negative confirmation only. Usage of any other irrelevant keys under such conditions shall display a warning message to use the correct keys.

7.20.22. **Data Sequence**

Each message / transaction shall have its own sequential number.

7.20.23. **Missing Data Detection and Resolution**

- The conditions to be sure all data is in the database in a given moment are:

- All message sequences received were correct (no checksum errors)
- There were no jumps in message sequential number
- There were no jumps in message type sequential number
- The Communication sequence is being received with no gaps and small permissible delays.
- The message sequence type counters into Communication sequence are in accordance with the counters received in actual messages.

- The program used to insert lane messages into the database keeps making the above checks. If any problem is detected, it is signalized to plaza level.
- If any of the conditions above fail, the system signals a problem with the data on a connected workstation in graphical form i.e., for each lane by hour. The resolution of the problem is:
  - If there is a data error (message received with bad checksum or bad data fields) the system automatically tries to read the TLC / AVC message again.
  - If data is missing, the normal way to solve this will be to make an export from TLC and import in Administrative System using lane data import function. If the problem persists,
- The specific situation will have to be analysed by going in details like which kind of data sequence is missing - revenue or non-revenue, the missing sequence details shall be made available just by clicking on the failure block of the lane data as represented by the lane data failure graphics.

7.20.24. **Data Import / Export System**

- Reports Information

To a Microsoft Excel, comma separated and MS Access compatible database file.

7.20.25. **Data Transfer**

No workstation / controller can be used as a router to send data to the server database; all data shall be reported directly to the server.

7.21. Incident Management Workstation

7.21.1. This module provides facilities for the supervisor to acknowledge incidents and to correct class discrepancies generated at lane level. Incident capture camera, vehicle profile and License plate capture camera images shall help supervisor deciding the correct class of the vehicle and other validation actions.

7.21.2. Incident Management

a) The GUI shall be so designed that it shall be possible for the Supervisor to view at least the following information corresponding to each incident:
   - Plaza ID
   - Lane ID
   - User ID (of the user who was logged in lane at the time of incident generation)
   - Username (corresponding to above User ID)
   - Transaction Number
   - Transaction Date & time
   - TLC/TAG Class
   - TLC / TAG VRN
   - TLC MOP
   - AVC Class
   - Axle Count
   - Processed by (User ID of the Supervisor who processed the incident)
   - Supervisor Name (corresponding to Processed by User ID)
   - Corrected Class
   - Corrected VRN
   - Supervisor Action
   - TAG Media ID
   - ICS image (with watermarked Date / Time stamp, transaction number, incident type, etc.)
   - LPIC image (with watermarked Date / Time stamp, transaction number, lane VRN, etc.)
   - AVC Output Graph
   - Event details (events / anomalies associated with this transaction – each transaction starts when Valid TAG Media is detected – for media-based transactions / AVC Loop is triggered – for violations and ends when the vehicle liberates the AVC loop)

b) For processing of incidents / review of processed incidents, the Supervisor can filter the list of incidents based on the following:
   - Plaza ID (Default – All) Drop down menu form
   - Lane ID (Default – All) Drop down menu form
   - User ID (Default – All) Drop down menu form
   - Transaction Date & time duration – From & To (Default – Current Date) User configurable

- TLC Class (Default – All) Drop down menu form
- TLC MOP (Default – All) Drop down menu form
- AVC Class (Default – All) Drop down menu form
- Axle Count (Default – All) Drop down menu form
- Processed by (Default – All) Drop down menu form including blank which shall be the case until incident is processed.
- Corrected Class (Default – All) Drop down menu form including blank which shall be the case until incident is processed.
- Supervisor Action (Default – All) Drop down menu form including blank which shall be the case until incident is processed.
- Event details (Default – All) Drop down menu form
- Processed Incidents / Not Processed Incidents

c) In addition to the above, it shall be possible for the Supervisor to search for a particular record based on any / combination of the following search criteria:
   - User ID
   - Transaction Number
   - TLC Class
   - TLC / Media VRN
   - TLC MOP
   - Processed by
   - Corrected Class
   - Corrected VRN
   - Supervisor Action
   - TAG Media ID

d) Based on the MOPs defined in the system and the Incident configuration, it shall be possible for the Supervisor to correct the class of the vehicle, Vehicle Registration Number (VRN) and Confirm / Reject the Lane MOP selected by TC.

e) The incidents can normally be processed by Supervisor by performing selections / feeding information on one and / or all of the below fields:
   - Corrected Class
   - Corrected VRN
   - Comments (optional)

f) It shall be possible for the Supervisor to perform these actions only by double clicking on a particular incident to view all information in detailed view before processing the incident.

g) It shall be possible at Plaza ETC system level to configure following on selection menu basis in order to activate and deactivate by administrator level function:
   - Capture of ICS image none, for selected type of incident, for all types of incidents, for all transaction.
   - Capture of LPIC image none, for selected type of incident, for all types of incidents, for all transaction.
   - Record and report incident transaction at incident management system, none, for selected type of transaction, for all transaction.

h) Other functions

   i. In addition to the above primary function of the Supervisor, the following functions shall be performed by the Supervisor:
   - Data Completeness
   - Shift Consolidation
   - Day Consolidation
   - Month Closure
   - Lists Transfer Status

The above functionalities are explained in detail below.

i) Data Completeness

   i. The Supervisor can verify the status of data transfer between the lanes and workstations on an hourly basis. Wherever, the data transfer status is not OK, a separate process shall be available through which the Supervisor can re-request data transfer to correct the status.

   ii. The Data completeness procedure shall check at least the following minimum items:
   - Transaction sequence jump
   - Transaction sequence reset
   - Gap in time (if regular data packets are not updated), etc.

j) The Data completeness procedure needs to be defined and a separate document shall be provided by the TCE Supplier on how this feature is to be accomplished in the system.

k) Day Closure

   i. The Day Closure option is used by the Supervisor to close each Operational day. When the Supervisor selects this option, the system shall display the current status of Operation in terms of data exchange.

ii. When, the supervisor closes the day, the following conditions shall be verified by the system before generation of Day Closure Report:
   - Data completeness
   - Data transfer to CCH completeness

iii. If any of the above checks fail, the system shall display an alert (POP-UP) to the Supervisor to perform these pending operations before day closure.

iv. This procedure shall ensure that no data generated is left unattended for review / reconciliation.

l) Month Closure

i. Month closure is performed on a monthly basis on a complete calendar month. Once, this option is selected any day pending closure shall be brought to the notice of the Supervisor. For ensuring that all data and all corrections are complete and no deconsolidation whatsoever shall be required

ii. any further, the month closure for a particular month shall be performed on the 2nd day of the subsequent month (configurable).

iii. Once, this operation is performed, no changes whatsoever can be made through the application to the transaction data of the corresponding month whatsoever. Deconsolidation option shall not be available and all manual overrides with respect to these transactions shall not be possible.

iv. Whenever, this operation is confirmed, system shall ensure that this operation is performed after debt recovery. A warning message to this effect shall still appear for the Supervisor to ensure and confirm that the debt recovery process for the month for which month closure is being performed is already complete.

m) Lists Transfer Status

i. In addition to the transaction data, there can be various lists related to users, media, classification, fare, configuration, parameters etc. which shall be transferred between server and workstations / lanes.

ii. The status of all such lists shall be displayed on selection of this option. The status shall include the following:
   - Name of the list
   - Version of current transfer
   - Version of previous transfer
   - Date & time
   - Frequency of transfer (in HH:MM format)
   - Transfer Status

iii. It shall be possible for the supervisor to re-request / re-transfer any failed list transfers.

iv. Also, all lists shall be retained in the system along with date of activation and date of expiry in addition to the version details.

v. All the above listed functionalities are the core responsibilities of the Supervisor and only he / she can perform the above functions. Any user of a higher user-group though can view the actions performed by the Supervisor / current status but cannot modify anything unless explicitly so mentioned.

n) Fare table management

The following functions shall be performed by the Toll Manager:

- Fare table management (updation / revision subject to Project Manager authorization in the system through his login)
- Whenever a new version of fare table is generated, the old fares and contracts shall be picked up by default. It shall be possible for the user to further modify these fares and set the date / time of activation.

o) Other Toll Manager Functions

i. Incident Management

The Plaza manager can view and access all features / options of this function. However, he / she cannot perform any modifications / corrections.

ii. Data Completeness

On certain conditions when the Data completeness status cannot be corrected due to false triggers, non-revenue data missing, revenue data missing, etc., an option shall be available for the Plaza manager to manually override such statuses in order to restore the operational flow.

p) Users Management

i. The following are the various user groups that shall be available in the system:

Operations	Finance	System
Project Manager	Finance Manager	Administrator
Toll Manager	Cashier	Maintenance
Supervisor		

ii. When the user is created for the first time, all the information below is mandatory.

- Name
- Address

- Date Of Birth
- Contact Person
- Contact Number
- Email ID (optional)
- User ID
- Activation date
- Valid upto

iii. The status of account and Date of creation shall be displayed against all the existing users in the system. User account can never be deleted from the system once created, as there can be operations / transactions performed by the user that exists in the database and is required for reporting purposes.

q) Administrator Functions

i. In addition to the normal functions listed above, administrator can perform the following operation.

- Lists Transfer Management

The administrator can manually copy the latest version of lists from the local ETC Server and restore the same in all the lanes.

- Incident reporting levels
  - The system will allow the assignment of a level of importance to each incident and also define if the incident should be acknowledged by the supervisor.
  - The system has different levels of importance that can be assigned to different types of incidents. They shall be colour coded to facilitate easy visualization by the supervisor.

r) Incident Recording

ICS image capturing start from loop occupation to loop liberation and an additional configurable time limit after loop liberation of that transaction. Image capturing shall timeout after 30 seconds (configurable) after loop occupation irrespective of the above condition.

s) System Configuration for Incident Management Workstation

One number of Incident management workstation with following configuration and peripherals shall be supplied by the Contractor.

The following minimum configuration requirements shall be met:

Description	Specifications
Make	Reputed Brand
Grade	Business Desktop
HDD	1TB of latest RPM
RAM	32 GB
RAM Slot	4 DDR4 memory slots
Processor	Intel Core i7 (8th Gen) or Higher
Processor speed	Intel Core i7(6600 3.3 2133 4C CPU) or latest available in the market
Optical drive	DVD-writer
PCI Slot	4 Nos. Spare
USB Port	6 nos. (high speed)
NIC	10/100/1000 Mbps and Intel 8260 802.11 a/b/g/n/ac PCIe WLAN NIC
RS232 port	2
LPT port	1
PS2 port (mouse)	1
PS2 port (Keyboard)	1
ENERGY STAR	Yes
Monitor	Colour 22"
Mouse	Optical
Keyboard	Standard

7.22. FIREWALL HARDWARE

7.22.1. Physical Interfaces

- LAN ports: Four (4) 10/100/1000 Mbps auto-sensing, Auto Uplink RJ-45 ports Page 41 of 62
- WAN ports: Two (2) 10/100/1000 Mbps auto-sensing, Auto Uplink RJ-45 ports to connect to any broadband modem, such as DSL or cable

7.22.2. Network Requirements

- Firewall should operate in Route mode and transparent mode.
- Traffic shaping/bandwidth management on a per policy basis for specific network/IP/Interface/Zone (individual or shared) and should be able to define guaranteed, burstable/maximum bandwidth per policy. Also, able to set different level of priority.

- Support DHCP server, DHCP client, DHCP relay, DNS client and NTP client. xix. Support NAT (SNAT and DNAT) with following modes Static, Dynamic, PAT and IPv6 to IPv4 (vice a versa).
- Support both IPv4 and IPv6
- The appliance should support Link aggregation (IEEE 802.3ad) technology to group multiple physical links into a single logical link of higher bandwidth and link fail over capability
- Remote access VPN (client-to-site), site-to-site VPN
- IPsec NAT traversal (VPN pass-through)

7.22.3. Data Leak Prevention requirements: -

- Should have the ability to prevent data loss through SMTP, FTP, HTTP, HTTPS & IM
- Should have built in pattern database

7.22.4. Support SSL VPN with following requirements: -

- Should support at least 20 SSL VPN users with at least 10 users from day 1.
- Should support two factor authentications with LDAP, Radius and using tokens/email/SMS.
- Support for clientless or client-based VPN in Full Tunnel and Split Tunnel mode.
- Should support HTTP/HTTPS proxy, FTP, RDP, SSH, VNC, SMB service access provision through portal.
- Support on 32 bit and 64-bit OS.
- Certified by ICSA preferred.
- Support for all major browsers like Firefox/IE/Chrome etc. Java Script, Basic and Advanced Network Extensions.
- Management over GUI using HTTPS or equivalent secure mechanism, SSH and console access.
- Generate GUI based reports categorized on IP, user etc.
- The Firewall should support for TWO modes of SSL VPN
- Web-only mode: for thin remote clients equipped with a web browser only and support web application such as: HTTP/HTTPS PROXY, FTP, SMB/CIFS, SSH, VNC, RDP
- Tunnel mode, for remote computers that run a variety of client and server applications

- The system shall provide SSL VPN tunnel mode that supports 32 and 64-bit Windows operating systems
- The proposed solution shall allow administrators to create multiple bookmarks to add to a group and make these bookmarks available for SSL-VPN users.

7.22.5. Support IPS with following requirements

- ICSA and NSS certified preferred.
- Anomaly detection and prevention up to layer 7 traffic including application type, SSL/TLS and must be applicable on any firewall policy
- Should be able to respond to any unauthorized activity, Dos/Distributed Dos, network missuses, pre-attack probes like various types of TCP/UDP scanners etc. that originate from both inside and outside network.
- Management over GUI using HTTPS or equivalent secure mechanism, SSH and console access.
- Generate GUI based reports categorized by alerts, attackers, severity wise, protocol etc.

7.22.6. Web content filtering

- Support web content filtering up to layer 7 traffic like HTTP, HTTPS, FTP, DNS, SMTP, IMAP, POP3 etc., with Application identification like IM, torrent etc., Allow/Deny traffic based on Src / Dst IP / Networks, Web URLs, Regular expressions, Web plug-ins such as ActiveX , Java Applet & Cookies, Regular file extensions, Spy wares, Ad wares, Time/Day.
- Should have URL database of 20 million or more for web content filtering based on categories.
- Data leak prevention for up to layer 7 traffic.
- Should provide an option to send customized Access denied message to the end user.
- The proposed solution must block HTTP or HTTPS based anonymous proxy request available on the Internet.
- Support for geographical based filtering like country level TLD etc.

7.22.7. Gateway Antivirus

- Should provide protection against viruses, worms or any other malicious content in traffic like SMTP, POP3, IMAP, HTTP/S, FTP etc. and must be configurable/applicable on specific firewall Policy.
- Should be able to scan the file either on the basis of flow or buffering.

- Should have option to respond to virus detection in several ways like delete/quarantine the file and send notification via e-mail/SMS.
- Antivirus signature updates must be done automatically/schedule and should not require reboot of the appliance.
- Management over GUI using HTTPS or equivalent secures mechanism, SSH and console access.
- Support at least 1 million or more signatures
- The antivirus signature database of proposed solution should comprise of up-to-date list of signatures of virus, malwares, spyware etc.
- Support on quarantined facility on the appliance or on a remote system. • Allow/Block/quarantine file type extensions
- Generate GUI based reports categorized by virus signatures, host/user infected etc.

7.22.8. Logging and Reporting

- Have standard report templates
- Support scheduling of reports
- Support sending of reports by email at scheduled intervals
- Should provide standard dashboards
- Should be possible to offload logs from the logging and reporting appliance to other external storage for long term retention.
- Logging up to layer 7 traffic details (firewall policy level, denied traffic details etc.)
- Should provide log report in Web/GUI /dashboard-based format with detailed information categorized by IP/Application/Port/Protocol etc., able to forward logs to syslog server and sending schedule reports and send via email.
- Log storing facility on a local disk or on to a remote system. Logs stored on the local disk must be transferable over network(scheduled) to a remote system and must be in a generic format like CSV, HTML, PDF, Excel(formats) or if proprietary, must provide appropriate software/hardware to generate the report.
- Support configurable option for E-mail or SMS alerts (Via SMS gateway) in case of any event trigger.
- Should provide information of real time data transfer/bandwidth utilization of individual IP/Application/protocol/port/Interface/Zone.

7.23. Lane Status Display Unit (LSDU)

7.23.1. The LSDU system shall provide a graphic display to the toll lane status and allow individual and global control of toll lane peripherals and toll collector functions. LSDU shall function independently even when the TMS server is unavailable.

7.23.2. LSDU has no menu. LSDU functions are accessed through clicking on desired area for ease of operation.

7.23.3. In the event of TMS server failure, the LSDU shall keep a copy of all records received from lanes, locally and as soon as the server goes online, it shall transfer these records to TMS.

7.23.4. In Addition to above, LSDU shall also have the status of FASTag related required file synchronization status with Acquirer bank.

7.23.5. One LSDU machine with following configuration and peripherals shall be supplied by the Supplier.

7.23.6. System Configuration

Description	Specifications
Make	Reputed Brand
Grade	Business Desktop
HDD	1TB of latest RPM
RAM	32 GB
RAM Slot	4 DDR4 memory slots
Processor	Intel Core i7 (8th Gen) or Higher
Processor speed	Intel Core i7(6600 3.3 2133 4C CPU) or latest available in the market
Optical drive	DVD-writer
PCI Slot	4 Nos. Spare
USB Port	6 nos. (high speed)
NIC	10/100/1000 Mbps and Intel 8260 802.11 a/b/g/n/ac PCIe WLAN NIC
RS232 port	2
LPT port	1
PS2 port (mouse)	1
PS2 port (Keyboard)	1
ENERGY STAR	Yes
Monitor	Colour 22"
Mouse	Optical
Keyboard	Standard

7.23.7. Functionality

a) Graphical status indications:

i. Schematic of all lanes.
ii. Overhead lane sign: indicating the status of the lane.
iii. Direction that the lane is opened.
iv. Lane mode selection and status: Idle; Open; Fault; or Maintenance.
v. Indication of whether lane is operating as FASTag lane
vi. Approximate traffic processed per hour shown for each lane and also for the entire plaza
vii. Traffic count averages over user defined time spans per direction.
viii. Exit barrier mode: barriers in automatic or open mode.
ix. TLC & AVC network status: local mode or connected to the TMS.
x. TLC & AVC power supply: UPS or mains power.
xi. Downloaded table status for most recently implemented tariff table.
xii. Server Database status
xiii. All Other Lane peripheral status
xiv. Total traffic processed per hour shown for each lane and also for the entire plaza (Lane traffic per calendar day Vs Direction traffic per calendar day Vs Plaza Traffic per calendar day for current as well as previous calendar day)

b) On selecting particular traffic information, it shall be possible to see the class wise / MOP wise traffic processed.

i. Toll collector control functions:
- Toll collector login and logout requests.
- Permission to open and close lanes.
- Open / Close lanes.
- Perform Special transactions (manual capture key, SIM key, Convoy key, exempt, LTO, etc.)
- Reset lanes.

ii. LSDU operator functions:
- Operator login.
- Operator logout.

iii. Configuration:
- Incidents level configuration.
- Incident Capture System parameters configuration per lane.
- License plate image capture parameters configuration per lane.
- Boom Gate operation per lane.
- UFD messages per lane.

- Transaction timeouts (timeout with AVC communication).

iv. Single Lane Status Display:

Shows the chosen lane onscreen with the following information:

- Schematic of the lane
- Overhead Lane Sign: Indicating Lane open / closed
- Direction open
- Lane mode selection and status: Idle; Open; Fault or Maintenance
- Indication of whether lane is operating as FASTag lane, Hybrid Lane
- Approximate traffic processed per hour shown for the lane, updated continuously
- Traffic count averages over user defined time spans per direction
- Panic Alarm Status (also audio indication).
- Exit barrier mode: Barriers in automatic or open mode
- TLC & AVC network status: Local mode or connected to the CCS
- TLC & AVC Power supply: UPS or mains power
- Downloaded table status for most recently implemented tariff table
- Access door detection to TLC
- Access door detection to AVC
- AVC UPS status
- RFID reader health status

v. Incident Display and Acknowledgement:

This is a text window showing the last reported incidents. For each incident, the information shown is:

- Lane number
- Date
- Time
- Message code
- Text description
- Associated data (in case of a transaction, vehicle information and Tag information).
- Level of the incident
- Acknowledgement status

Incidents that must be acknowledged by the Supervisor must be acknowledged individually. Bulk acknowledgement of incidents shall not be allowed.

vi. Equipment Fault Display and Reporting:

When a fault occurs in a lane, it shall be reflected on the LSDU screen by:

- A message in the Incident Display
- A change in the lane graphical status display
- All the lane and booth equipment are subject to fault detection.

vii. Traffic Count Displays:

- The Traffic Count Display presents a window with traffic count. The operator can choose
- The base-time for traffic count, from 1 minute to 60 minutes.
- The type of count: one lane, one direction of operation or the entire plaza.

viii. UFD Message Handling:

This function allows the modification of the welcome message and the proceed message showed on UFD by TLC. It is possible to set a message:

- for all lanes
- for lanes operating in one specific direction
- for one specific lane
- Each command affects only the lanes specified, so it is possible to set one message for each lane and override it with the same message for all lanes.

ix. Access Security and Logon Control:

- LSDU operates in two states: logged and not logged. Not logged mode is the default mode after initialisation. In this state, only view functions (basically the displays) are enabled. In logged mode, the command functions (lane control functions and LSDU configuration functions) are also enabled.
- The logon in operating system shall be automatic and gives the user only enough access to run LSDU application. Only one LSDU shall be allowed by the system to login at a time for one plaza.

x. Information Timeliness and Screen Refresh Cycle:

- The information presented onscreen shall be updated as soon as LSDU receives new information from the lanes. The screen refresh cycle will change for each lane, depending directly on the rate of events generated by them.
- LSDU Incidents

Date / hour change
Manual lane open
FASTag lane open
Hybrid ETC lane open
Lane closed
Request to open lane
Request to close lane
Request to pause lane
Confirmation to open lane
Confirmation to close lane
Confirmation to pause lane
Time expiration for lane open after confirmation
Time expiration for lane close after confirmation
Time expiration for lane pause after confirmation
Invalid toll collector
Lane into maintenance mode
Lane out of maintenance mode
Vehicle detected without collector classification
Vehicle discrepancy
Time exceeded for vehicle exit from lane
Classification cancelled [for toll collector, lane]
Vehicle reclassified
TLC enclosure opened [sound buzzer]
TLC enclosure closed
Low disk space warning on TLC
Low disk space warning on TMS
Low disk space warning on local drive
Insufficient memory warning on TMS
Communication with TMS server re-established
TLC data removed by disk
Change of TLC mode without permission
Equipment failure: RFID Reader
Equipment failure: TLC

Equipment failure: Exit barrier
Equipment failure: AVC
Equipment failure: for all lane and booth equipment
Database corrupt [all database]
Foot Switch initiated
Shift opened
Shift closed
BLT file not updated in 20 min
Toll collector login
Toll collector logout
Run through violation
Class discrepancy – Over-classification
Class discrepancy – Under- classification
Loop failure/disconnected [sound buzzer]
AVC about to shutdown [sound buzzer]
AVC Main Power failure [sound buzzer]
Application restart – Manual
Application restart – Automatic
OS restart – Manual
OS restart – Automatic
DB restart – Manual
DB restart – Automatic

7.24. The specification of other 02 workstations shall remain same as of LSDU

7.25. Uninterruptible Power Supply Unit

7.25.1. Online UPS shall be capable of maintaining an uninterrupted power supply to the UPS loads for a sustained period of at least 4 hours under full load conditions from a fully charged battery.

7.25.2. It shall also be capable of continuously supplying power to the system under an intermittent interruption cycle.

7.25.3. The UPS shall be capable of operating at input voltages of 210/380Volts±10% and 50 Hz ±2.5 Hz. The Service Provider shall issue a certificate to the IHMCL/NHAI that the equipment has been tested for load capacity and insulation at the applicable rated voltages and loads. The IHMCL/NHAI shall reserve the right to witness such tests or nominate a representative to witness such tests.

7.25.4. Lane Status Display Unit (LSDU) workstation shall display the status of each such UPSs in real time. The LSDU shall record every change in status (mains off, low battery, mains on,

any change in input or output power of more than 3 volts, link failure, or any other failure) of the UPSs as incident and shall require acknowledgement.

7.25.5. UPS along with its battery shall be compact and shall be housed in a wall mountable enclosure with suitable ventilation arrangements. The design for the same shall be submitted by TCE Supplier and approved by the Concessionaire.

7.25.6. **Specification for Plaza Level UPS (Min 10 KVA or above as per site conditions)**

Parameter	Minimum Specification
UPS with Battery	Online
Rating	As per power requirement (125% of connected load)
Backup	8 Hours
Input Voltage	155-305 VAC
Input Frequency	50H z
Output Voltage	230 VAC
Output Waveform	Sine Wave

7.25.7. **Specification for Lane Level UPS (1 KVA):**

Parameter	Minimum Specification
UPS with Battery	Online
Rating	As per power requirement (125% of connected load)
Backup	4 Hours
Input Voltage	155-305 VAC
Input Frequency	50H z
Output Voltage	230 VAC
Output Waveform	Sine Wave

7.26. Software – Lane level

As described under various sections of this document.

7.27. Software – Plaza level

As described under various section of this document.

7.28. ETC system Software Specifications

a) Functional Requirements

i. General Requirements

This functionality shall meet the lane operation described in the subsequent sections.

ii. Transaction Data Format:

The following shall be the minimum data that make up an ETC transaction

- Transaction ID
- Tag ID (TID, EPC, and User Memory)
- Plaza and Lane ID
- Date and Time Stamp
- AVC Class
- Image of vehicle (AVC, License Plate and Incident Capture Camera)

The above may be modified during project execution in order to optimize the performance.

iii. Transaction Processing

The System shall:

- Have functionality to feed in transaction data through RFID ETC transceiver, Handheld RFID Reader devices and manually entry of Registration no. of vehicles.
- Validate each transaction for completeness (e.g., possessing all the related information like Tag ID, Vehicle class etc.)
- Check for duplicate transactions (e.g., the same tag cannot be used in the same direction within a specified duration at the same plaza)
- Support generation of a wide variety of reports as given below but not limited to:
  - Revenue reports (Lane Wise)
  - Traffic reports (Lane wise all mode of traffic report)
  - Penalty Collection report lane wise
  - Daily / Weekly / monthly reconciliation reports
  - Violation reports
  - AVC Accuracy Report (Lane Wise/ Overall)
  - Separate ETC report for Handheld reader
  - Equipment uptime reports (RFID Reader, AVC, TLC, LPIC, ICS and Server)

iv. Security

- Login feature for accessing the System

- Access the system based on roles definition, toll collector cannot minimize the lane application and limited accessibility to work on workstation by toll staff.
- Storage of Sensitive data like password in an encrypted format
- Use of Complicated passwords: password should be more than 6 characters and should have at least one numeric character.
- Automatic logging of every sensitive action in the system.

v. Scalability

The System / Servers shall be scalable to support increase in Tag Users / ETC transactions in future. During the time of system commissioning each lane of the system shall be capable to support 10 million tag users and 100,000 (One Lakh) transactions per day and at the end of 5 years shall be capable enough to support 50 million tag users and 5,00,000 (Five Lakh) transactions per day.

Automatic Lane closure

The ETC lane shall close automatically in case of detection of failure of critical equipment like RFID Transceiver, Boom barrier, LPIC camera, AVC system. In such cases the OHLS shall display that ETC lane is closed and the ETC exit barrier shall remain closed.

vi. Reports

The GUI shall be so designed that it shall be possible for the Supervisor to view at least the following information corresponding to each incident:

- Plaza ID
- Lane ID
- User ID (of the user who was logged in lane at the time of incident generation)
- Username (corresponding to above User ID)
- Transaction Number
- Transaction Date & time
- TLC Class
- TLC / TAG VRN
- TLC MOP
- AVC Class
- Axle Count
- Processed by (User ID of the Supervisor who processed the incident)
- Supervisor Name (corresponding to Processed by User ID)
- Corrected Class
- Corrected VRN

- Supervisor Action
- TAG Media ID
- ICS image (with watermarked Date / Time stamp, transaction number, incident type, etc.)
- LPIC image (with watermarked Date / Time stamp, transaction number, lane VRN, etc.)
- Event details (events / anomalies associated with this transaction – each transaction starts when Valid TAG Media is detected – for media-based transactions / AVC Loop is triggered – for violations and ends when the vehicle liberates the AVC loop)

For processing of incidents / review of processed incidents, the Supervisor can filter the list of incidents based on the following:

- Plaza ID (Default – All) Drop down menu form
- Lane ID (Default – All) Drop down menu form
- User ID (Default – All) Drop down menu form
- Transaction Date & time duration – From & To (Default – Current Date) User configurable
- TLC Class (Default – All) Drop down menu form
- TLC MOP (Default – All) Drop down menu form
- AVC Class (Default – All) Drop down menu form
- Axle Count (Default – All) Drop down menu form
- Processed by (Default – All) Drop down menu form including blank which shall be the case until incident is processed.
- Corrected Class (Default – All) Drop down menu form including blank which shall be the case until incident is processed.
- Supervisor Action (Default – All) Drop down menu form including blank which shall be the case until incident is processed.
- Event details (Default – All) Drop down menu form
- Processed Incidents / Not Processed Incidents

In addition to the above, it shall be possible for the Supervisor to search for a particular record based on any / combination of the following search criteria:

- User ID
- Transaction Number
- TLC Class
- TLC / Media VRN

- TLC MOP
- Processed by
- Corrected Class
- Corrected VRN
- Supervisor Action
- TAG Media ID

- Based on the MOPs defined in the system and the Incident configuration, it shall be possible for the Supervisor to correct the class of the vehicle, Vehicle Registration Number (VRN) and confirm / Reject the Lane MOP.

- The incidents can normally be processed by Supervisor by performing selections / feeding information on one and / or all of the below fields:
  - Corrected Class
  - Corrected VRN
  - Comments (optional)
- It shall be possible for the Supervisor to perform these actions only by double clicking on a particular incident to view all information in detailed view before processing the incident.
- It shall be possible at Plaza ETC system level to configure following on selection menu basis in order to activate and deactivate by administrator level function:
  - Capture of ICS image none, for selected type of incident, for all types of incidents, for all transaction.
  - Capture of LPIC image none, for selected type of incident, for all types of incidents, for all transaction.
  - Record and report incident transaction at incident management system, none, for selected type of transaction, for all transaction.
- Other functions
  - In addition to the above primary function of the Supervisor, the following functions shall be performed by the Supervisor:
  - Data Completeness
  - Shift Consolidation
  - Day Consolidation
  - Month Closure
  - Lists Transfer Status

8. PROCESS FOR SUBMISSION OF APPLICATION FOR EMPANELMENT ON WEB-PORTAL

Step	Activity
Registration Process	
1.	a) Applicant shall visit IHMCL website and click on Section/Tab "***Empanelment of System Integrator***" which will redirect to web portal for empanelment or can directly visit the website https://rfesi-ihmcl.co.in (RFE Portal) b) Applicant will register themselves providing details as mentioned below: • Name of the Entity • Name of the Authorized Signatory • Mobile Number • Email ID c) After entering above details, applicant shall click on option "LET'S VERIFY" • A **Verification Code** shall be sent to Email Id provided by Applicant • Applicant shall enter the **Verification Code** and click on "Submit" button • Applicant shall create their password and click on "Submit" button d) Unique User ID will be sent to the Email ID provided by the Applicant
Application Process	
2.	Once, the registration process is completed, the Applicant can Login using the User ID (received in email ID after successful registration) and Password (created by applicant during registration) followed by a unique "Captcha"
3.	a) Applicant shall click on option "Apply for Empanelment" to apply for the fresh empanelment b) Applicant shall choose one (01) of option from the following two (02) options: - • Sole Applicant • Consortium, in case the entity is a Consortium as referred in RFE. Document
4.	a) Applicant shall upload all requisite documents as per Eligibility Criteria mentioned on web portal b) After uploading all requisite documents, Applicant shall have following options to proceed with: - • Save and review the application • Final Submission - *Applicant cannot proceed for Final Submission unless all requisite mandatory documents are uploaded in each field of requirement parameter.*
View Submitted Application	
	a) Upon successful submission of Application, the applicant can log in on the portal and view the details of their submitted application by using option "View Application Details". b) The applicant needs to enter the application number to view the application details
Check Application Status	

Step	Activity
	a) Upon successful submission of Application, the applicant can log in on to the portal and track the status of their application through option "Check Application Status" b) Applicant needs to provide the Application number to get the Application status. c) Applicant can get the status as per below: • **Accepted** – Application has been approved by IHMCL • **Under Evaluation** – Application is under evaluation • **Clarification sought** – Clarification/query is sought by IHMCL for their application. • **Rejected** – Application has been rejected by IHMCL due to non-fulfilling the Eligibility Criteria
Clarification Sought	
	a) Upon receipt of Clarification sought status, applicant needs to read the clarification sought by IHMCL and provide the response to the clarification with the option provided in the portal. b) IHMCL shall seek for clarification of a particular application up to maximum 02 times. In case, the clarification provided in 02 attempt are not as per RFE document, the application shall be rejected.
Rejected Application	
	In case of Rejection of its application, the Applicant shall have option to resubmit a fresh application using existing login credential of the portal.

Important Note:

a) In case of any query/clarifications sought by IHMCL during bid evaluation on the RFE Portal, the applicant shall be required to revert with clarification within **7 calendar days** on the web-portal only, beyond which the application shall be liable to be rejected.

b) Upon receipt of an application, IHMCL shall endeavour to complete the evaluation of the application within 3 weeks' time, subject to volume to applications and clarification received from Applicant.

c) Any Applicant rejected shall not be permitted to apply within 3 months from the date of rejection of the previous application.

d) IHMCL shall regularly publish the list of empanelled System Integrators as updated from time to time.

e) If for any reason, any interested Applicant fails to submit application due to any technical glitch, or any reasons, IHMCL shall not be responsible for that and any grievance regarding that shall not be entertained.

f) The above online application process is subject to change from time to time, and Applicants are advised to go through the instructions provided in the online portal under tab "Application Process" and submit their application accordingly.

CORRIGENDUM -1

Dated: 25.11.2021

Request for Empanelment of System Integrators for Implementation of Electronic Toll Collection System at Toll Plazas

RFE Reference –IHMCL/ETC/Empanelment/2021/01, dated 28 October 2021

S. No	Section	Original Clause	Updated Clause
1	Clause 3.2, Page No. 09-10, Eligibility Criteria/Eligibility to Apply, SI #-PQ-2, Annual Turnover	a) The Sole Applicant or any member of the Consortium, individually or combined (in case of Consortium) should have an average annual turnover of minimum **Rs. 40 crores** during the three (03) financial years, i.e. FY 2017-18, FY 2018-19 and FY 2019-20 b) **Relaxation for Startup** – In case, the Applicant (Sole Applicant or any member of the Consortium, as applicable) is a Startup registered with Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, GoI, the above criteria (a) shall be relaxed such that the Applicant shall be required to have average turnover of minimum **Rs. 10 crores** during the three (03) financial years, i.e. FY 2017-18, FY 2018-19 and FY 2019-20.	a) The Sole Applicant or any member of the Consortium, individually or combined (in case of Consortium) should have an average annual turnover of minimum Rs. 40 crores during ~~the three (03) financial years, i.e., FY 2017-18, FY 2018-19, FY 2019-20~~ any three consecutive financial years between 01 April 2017 to 31 March 2021 (the specified period). b) Relaxation for Startup – In case, the Applicant (Sole Applicant or any member of the Consortium, as applicable) is a Startup registered with Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, GoI, the above criteria (a) shall be relaxed such that the Applicant shall be required to have average turnover of minimum Rs. 10 crores during ~~the three (03) financial years, i.e. FY 2017-18, FY 2018-19 and FY 2019-20~~ any three consecutive financial years between 01 April 2017 to 31 March 2021 (the specified period) *P.S- Documentary Evidence on turnover shall be submitted as applicable*
2	Clause No. 3.2, Page No.10, Eligibility Criteria/Eligibility to Apply, SI #-PQ-3, Net Worth	The Sole Applicant or each member, in case of a Consortium must have **positive** Net worth in Indian Rupees as on **31 March 2020.** **Important -** For the purpose of this criterion, net-worth of only the bidding entity will be considered. Net-Worth of any parent, subsidiary, associated or other related entity will not be considered.	The Sole Applicant or each member, in case of a Consortium must have **positive** Net worth in Indian Rupees as on **31 March 2020 or as on 31 March 2021.** **Important -** For the purpose of this criterion, net-worth of only the bidding entity will be considered. Net-Worth of any parent, subsidiary, associated or other related entity will not be considered. P.S- Documentary Evidence on Net Worth shall be submitted as applicable

CORRIGENDUM -2

Dated: 11.09.2023

Request for Empanelment of System Integrators for Implementation of Electronic Toll Collection System at Toll Plazas

RFE Reference –IHMCL/ETC/Empanelment/2021/01, dated 28 October 2021

S. No.	Section	Original Clause	Updated Clause
1	Clause 3.2, Page No. 09- 10, Eligibility Criteria/Eligibility to Apply, Sl #- PQ-2, Annual Turnover	a) The Sole Applicant or any member of the Consortium, individually or combined (in case of Consortium) should have an average annual turnover of minimum Rs. 40 crores during the three (03) financial years, any three consecutive financial years between 01 April 2017 to 31 March 2021 (the specified period). b) Relaxation for Startup – In case, the Applicant (Sole Applicant or any member of the Consortium, as applicable) is a Startup registered with Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, GoI, the above criteria (a) shall be relaxed such that the Applicant shall be required to have average turnover of minimum Rs. 10 crores during any three consecutive financial years between 01 April 2017 to 31 March 2021 (the specified period) P.S- Documentary Evidence on turnover shall be submitted as applicable.	a) The Sole Applicant or any member of the Consortium, individually or combined (in case of Consortium) should have an average annual turnover of minimum Rs. 40 crores ~~during any three consecutive financial years between 01 April 2017 to 31 March 2021 (the specified period~~ as per audited financial statement for the last three (03) financial years. b) Relaxation for Startup – In case, the Applicant (Sole Applicant or any member of the Consortium, as applicable) is a Startup registered with Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry, GoI, the above criteria (a) shall be relaxed such that the Applicant shall be required to have average turnover of minimum Rs. 10 crores ~~during any three consecutive financial years between 01 April 2017 to 31 March 2021 (the specified period)~~ as per audited financial statement for the last three (03) financial years. P.S- Documentary Evidence on turnover shall be submitted as applicable. The revised format for Annexure-2 is attached with this corrigendum.
2	Clause No. 3.2, Page No.10, Eligibility Criteria/Eligibility to Apply, Sl #- PQ-3, Net Worth	The Sole Applicant or each member, in case of a Consortium must have positive Net worth in Indian Rupees as on 31 March 2020 or as on 31 March 2021. Important - For the purpose of this criterion, net-worth of only the bidding entity will be considered. Net-Worth of any parent, subsidiary, associated or other related entity will not be considered. P.S- Documentary Evidence on Net Worth shall be submitted as applicable	The Sole Applicant or each member, in case of a Consortium must have positive Net worth ~~31 March 2020 or as on 31 March 2021~~ for last financial year. Important - For the purpose of this criterion, net-worth of only the bidding entity will be considered. Net-Worth of any parent, subsidiary, associated or other related entity will not be considered. P.S- Documentary Evidence on Net Worth shall be submitted as applicable. The revised format for Annexure-2 is attached with this corrigendum.

Annexure-2 - APPLICANT'S FINANCIAL CAPACITY

(To be submitted by all members of the Consortium, in case of a consortium)

RFE Ref_____ (Date)

From,

(Name & Address of the Applicant)

_____

_____

To,

Chief Operating Officer,

Indian Highways Management Co. Ltd.

G-5&6, Sector 10, Dwarka

New Delhi 110 075

Subject: ----------

Dear Sir/Madam,

We hereby certify that the average annual turnover of M/s. _____ (name of the Applicant) for the last three financial years is as given below:

Annual Net worth for the last 3 Financial Years (FYs) in Indian Rupees (INR)			
FY _____	FY _____	FY _____	Positive /Negative as on FY _____

Annual Turnover for the last 3 Financial Years (FYs) in Indian Rupees (INR)			
FY _____	FY _____	FY _____	Average

Yours Sincerely,

(Signature of Authorised Signatory)

Name of the Statutory Auditor/CA: Seal: