Indian Highways Management Company Limited (IHMCL)

Limited Request for Proposal for Selection of Service Provider for Providing HETC System Integration and Transaction Acquiring services at toll plazas under NETC programme

RFP No. IHMCL/Acquirer Bank cum SI/2020/01

Indian Highways Management Company Limited (IHMCL)
Sector-19, Dwarka, New Delhi-110075

Dated: 07.04.2020
Email: tenders@ihmcl.com

DISCLAIMER

The information contained in this Request for Proposal document (the "RFP") or subsequently provided to prospective Applicant(s), whether verbally or in documentary or any other form by or on behalf of IHMCL or any of its employees or advisors, is provided to Applicant(s) on the terms and conditions set out in this RFP and such other terms and conditions subject to which such information is provided.

The issue of this RFP does not imply that IHMCL is bound to select or shortlist pre-qualified Applications for the Bid stage or to appoint the Selected Applicant or Contractor, as the case may be, for the Project and IHMCL reserves the right to reject all or any of the Applicants or Applications without assigning any reason whatsoever.

The assumptions, assessments, statements and information contained in the RFP, may not be complete, accurate, adequate or correct. Each Applicant should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this RFP and obtain independent advice from appropriate sources.

Information provided in this RFP to the Applicant(s) is on a wide range of matters, some of which may depend upon interpretation of law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. IHMCL accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein.

IHMCL, its employees and advisors make no representation or warranty and shall have no liability to any person, including any Applicant under any law whether written or otherwise , statute, rules or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expense which may arise from or be incurred or suffered on account of anything contained in this RFP or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the RFP and any assessment, assumption, statement or information contained therein or deemed to form part of this RFP or arising in any way for participation in this RFP. Each Bidder should, therefore, conduct its own site feasibility, investigations, survey and/or analysis, and should check the accuracy, adequacy, correctness, IT systems' compatibility, reliability and completeness of the assumptions, assessments, statements and information contained in this RFP and obtain independent advice from appropriate sources.

IHMCL also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Applicant upon the statements contained in this RFP. IHMCL may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information, assessment or assumptions contained in this RFP.

Table of Contents

This document comprises of five parts.

PART I: NOTICE INVITING APPLICATIONS

Bids are invited by the Indian Highways Management Company Limited (IHMCL) for the following:

Name of the Work	Document Fee(non-refundable)	Bid Security	Closing date and time
Limited RFP for Selection of Service Provider for Providing HETC System Integration and Transaction Acquiring services at toll plazas under NETC programme	INR 10,000/- (Rupees Ten Thousand Only)	INR 15,00,000/- (Rupees Fifteen Lakhs only)	As provided in section - Schedule of Bidding Process

2. The complete Bidding Documents can be viewed / downloaded from e-tender portal https://etenders.gov.in.The Bids shall be liable for summarily rejected unless accompanied by the requisite EMD and bid document fee as indicated above. IHMCL shall not be responsible for any postal delay. Bids submitted after the closing date/time shall be summarily rejected.

IHMCL reserves the right to accept or reject any or all Applications for the project, before signing of Contract Agreement without thereby incurring any financial or other liability to the affected Applicants.

Address for communication and for Application submission:

The General Manager

Indian Highways Management Co. Ltd. (IHMCL)
2nd Floor, MTNL Building,
Sector 19, Dwarka
New Delhi 110 075

Phone: +91-11- 28042710

Email: tenders@ihmcl.com
Website: www.ihmcl.co.in

PART II: DEFINITIONS and ABBREVIATIONS

1. DEFINITIONS

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

"Applicable Law" means 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.

"Authorized Representative" means any person/agency authorized by IHMCL.

"Applicant/Bidder" means a 'firm' which participates in the subject RFP and submits its application/bid.

"Application/Bid" means the documents submitted by the Applicant in response to this RFP.

"Commencement date" means the date upon which the Successful Bidder receives the notice to commence the work issued by IHMCL.

"Contract" shall mean & include RFP, 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 appendices and any special conditions. All these documents taken together shall be deemed to form one Contract and shall be complementary to each other.

"IHMCL" means Indian Highways Management Company Ltd.

"Law" or "Legislation" - shall mean any Act, notification, bye 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.

"Letter of Award (LOA)" means the issue of a signed letter by IHMCL to Successful Bidder conveying its intention to accept the offer of Successful Bidder and awarding the work.

"Local Currency" means the Indian Rupees

"MoRTH" means Ministry of Road Transport and Highways

"NHAI" means National Highways Authority of India.

"Party" shall mean IHMCL or Applicant individually and **"Parties"** shall mean IHMCL and Applicant collectively.

"Personnel" means persons hired by the Service Provider as employees and assigned to the

performance of the Services or any part thereof.

"RFP" shall mean this Request for Proposal dated 07 April 2020, including the written clarifications & Corrigendum/Addendum issued by IHMCL in respect of the RFP from time to time.

"Services" means requirements defined in this RFP including all additional services associated thereto to be delivered by the Successful Bidder.

"Acquiring Bank" "System Integrator" "Vendor" "Service Provider" shall mean the Successful Bidder post this RFP process.

"Successful Bidder" means the Bidder, who, after the complete evaluation process, has been issued the Letter of Award by IHMCL

"Public Funded" shall refer to toll plazas that are under jurisdiction of NHAI, and are allotted to respective agencies ("Toll Agencies") for purpose of Toll Collection.

"Service Charge" shall refer to quoted % by the Vendor multiplied by the total electronic toll fee collected through FASTag.

Active Tag: An RFID tag that uses a transmitter to return information as opposed to reflecting a signal back from the reader as many passive tags do. Most active tags are battery powered, though they may gather energy from other sources.

Acquirer Bank: The Bank that processes NETC transactions on behalf of Toll Plaza Operator.

Agreement means this Agreement between IHMCL and Service Provider including all Attachments, Annexes thereto.

Business Day: Business day shall mean a calendar day when NPCI is open for conduct of business w.r.t. NETC Transactions.

Certification: Certification refers to the configuration that needs to be made in the NETC system while accepting the Member Bank" connectivity to receive, understand and route all transactions from the Member Banks

Confidential Information: It shall mean any confidential or proprietary information received by any party directly from the other or otherwise, whether during the course of the negotiations prior to entering into this Agreement or after execution of this Agreement or in pursuance hereof. Confidential Information shall include but not be restricted to the customers and customer related information, markets or the business of any party or that of their respective customers and the provisions and terms of this Agreement. Information shall be deemed to be confidential whether the same is contained in tangible or intangible form and whether contained in an electronic format or on paper. Unless otherwise specified by the Bank, all information received shall be deemed to be Confidential Information.

Current Account: It means current account(s) opened and maintained by Member Bank with the

Deposit Accounts Department of RBI, Mumbai for its fund settlement obligations.

Customers: Customer means a person having a valid NETC tag issued in his/her name by any of the participating member Bank.

Cutover Time: The time at which the end of day operations are performed at the NETC Network.

Default: Default means the failure by a member to honor its obligations in terms of this agreement.

Default Obligation: Default Obligation means the amount of funds liable to be paid /delivered by a Member who has committed an act of default in relation to the discharge of its liability and shall include all costs, charges, penalties, levies etc.

Documents as proof in dispute: NETC electronic logs (generated by the Toll Plaza Server, Acquirer Host, Issuer Host, Mapper etc.) for the disputed transaction uploaded in the form of scanned file or image.

Effective Date: Effective Date means the date on which NPCI has started providing the services. Effective date for each participating member bank shall be the date on which it starts availing NETC services from NPCI.

Electronic Product Code: A serial number created by the Auto-ID Centre that will complement barcodes. The EPC identifies the manufacturer, product category and individual item.

Encryption: Altering data so that it cannot be read by those for whom it is not intended. In RFID systems encryption is used to protect stored information or to prevent the interception of communications between RFID tag and reader.

Financial Year shall mean the year commencing on the 1st day of April of one year and ending on the 31st day of March of the next year.

FTP means File Transfer Protocol.

Impact refers to the potential to which the business stands vulnerable.

Intellectual Property means any ideas, know-how, techniques, processes, research, developments, documents, work products or idea expressions, having either patent, copyright, trade secret, trade mark, mask work, software enhancements, new reports or any statutory or other right associated therewith in relation to the said business.

Issuer Bank: The Bank which issues RFID Tags to the customer.

Member Banks: All the Banks participating in NETC network either as Issuer or Acquirer.

NPCI: It is an umbrella organization for all retail payments system in India. It was set up with the guidance and support of the Reserve Bank of India (RBI) and Indian Banks' Association (IBA).

NETC means National Electronic Toll Collection.

NETC Network means group of Bank who are availing the NETC services provided by NPCI.

NETC User Group or the Steering Committee - Refers to a committee of representatives drawn from selected participating member Bank (defined hereunder) and NPCI personnel formed for the purpose of the resolution of disputes arising out of the rules and regulations of the NETC. Functions of Committee shall be reviewed periodically from time to time and could be re-constituted as and when considered necessary by the parties.

National Electronic Toll Collection Switch (NETC) Services: It means switching and routing of following transactions to the participating member Bank joining the NETC Network.

RFID Tag: A microchip attached to an antenna and packaged so that it can be attached to an object. Programmed with a unique serial number, an RFID tag receives signals from a tag reader and sends signals back to the reader. RFID tags can be active, passive or semi-passive.

Service Level Agreement: SLA refers to this service level agreement signed between Member Bank and NPCI, for providing and availing the NETC Services.

Settlement refers to the process of clearing and settlement of NETC transactions.

Settlement Consideration means the total amount of funds to be paid/received by a Member arising out of settlement.

Settlement Date: It means the date on which an NETC Transaction is due for settlement.

Tag: A microchip attached to an antenna and packaged so that it can be attached to an object. The RFID tag receives signals from a tag reader and sends signals back to the reader. RFID tags can be active, passive or semi-passive. Passive RFID Tag would be used in NETC implementation in India.

Tag Owner/Tag Holder: Customers who purchases the tag from the Issuing Bank to affix it on their vehicles.

Toll Plaza Operator: A person or an entity who collects or registers tolls.

Transceiver (Reader): A device that both transmits and receives radio waves.

Descoped Toll Plaza: Toll Plaza removed from the scope of services of successful bidder after completion of SAT (Site Acceptance Test)

Week shall mean 7 days, starting Sunday to Saturday.

Calendar day mean any day in a calendar month.

Working day shall mean any working day as declared by the RBI.

Any other terms not defined herein but defined elsewhere in this RFP shall have the meaning ascribed to such terms therein and shall be deemed to have been included in this section.

2. Abbreviations

- AVC - Automatic Vehicle Classification
- AVI - Automatic Vehicle Identification
- EDI - Electronic Data Interchange
- EGCS - ETC Global Clearing and Settlement System
- EPC - Electronic Product Code
- GUI - Graphical User Interface
- IHMCL - Indian Highway Management Company Limited
- ISO - International Organization for Standards
- KBPS (kilobits per second) – a unit of speed of data communication
- MHz (Megahertz) – a unit of frequency of a signal
- MIS - Management Information System
- NETC - National Electronic Toll Collection
- NHAI - National Highway Authority of India
- NPCI - National Payments Corporation of India
- RBI - Reserve Bank of India.
- RFID - Radio Frequency Identification
- RFU - Reserved for Future Use
- RTGS - Real Time Gross Settlement System.
- RVR - Reader Verification Result
- SFTP - Secured File Transfer Protocol.
- SGF - Settlement Guarantee Fund
- TID - Tag Identification
- UHF - Ultra High Frequency
- WIM - Weight in Motion

PART-III: INSTRUCTIONS TO APPLICANTS

3.1 Introduction:

Electronic Toll Collection (ETC) System

In order to remove the bottlenecks and ensure seamless movement of traffic and collection of tolls as per the notified rates Electronic Toll Collection (ETC) system has been implemented on national highways with passive Radio Frequency Identification (RFID) based on EPC, Gen-2, ISO 18000-6C Standards tags.

For implementing ETC across the country, a new company under Company's Act, 1956, **"Indian Highways Management Company Limited" (IHMCL),** was constituted in 2012 with equity partnership from highway developers, financial institutions and National Highways Authority of India (NHAI).

The objective of IHMCL is to implement an electronic, interoperable toll collection system through RFID technology and to manage the project strategically, administratively, legally, technically, commercially and to Implement a Central Clearing House (CCH) system, including help desk support and setting up of Point-of-Sale (PoS) for ETC System.

3.2 Brief Scope of Work

IHMCL is now looking to select a Service Provider responsible for undertaking HETC system integration as well as transaction acquiring at toll plazas indicated at **Annexure-D.**

The Successful bidder also has to undertake the supply, installation, integration, testing, commissioning, configuration and maintenance of all required hardware & software systems & sub-systems as specified in Annexure-B for Hybrid ETC and Toll Management Systems at the toll plazas in a time bound manner. Successful bidder is also expected to provide round the clock maintenance for the same during the entire period of contract such that the required services are available at the toll plazas as per service level requirements, as per responsibilities laid down in **Annexure A.**

The successful bidder shall also undertake activities of acquirer bank to perform acquisition of all ETC transactions across indicative list of toll plazas provided at **Annexure D.** The successful bidder shall carry out all roles/responsibilities of Acquirer Bank as defined in the Procedural Guidelines – National Electronic Toll Collection Network 2016 version 1.6 issued by NPCI and amended suitably from time to time, as well as the responsibilities laid down in **Annexure C.**

Hence, the successful bidder shall be responsible for implementation of ETC Infra at the provided fee plaza as well as shall be responsible to perform the roles and responsibilities of acquirer bank defined under NETC programme.

3.3 Description of Bidding Process:

3.3.1 IHMCL has adopted the following process (referred to as the "Bidding Process") for selection of the Service Provider.

3.3.2 **Opening of Physical Documents**

    a) Physical Documents submitted will be opened as per details mentioned in "Key Schedules/Schedule of Bidding Process" of RFP.

    b) List of Documents required to be submitted Physically consists of following: -

- Document Fee
- EMD
- Power of Attorney
  (It is clarified that Bidders may submit equivalent documents (for example, delegation of power, board resolution copy), in lieu of this document, as applicable)

    b) Bidder's authorized representative may attend the opening, and those who are present shall sign the Attendance Sheet evidencing their attendance.

    c) The Bidder's names, bid modifications or withdrawals and such other details as IHMCL at its discretion, may consider appropriate, will be announced at the time of opening.

    d) Physical Documents shall be opened first and based upon the evaluation of these documents, IHMCL shall announce the names of the Bidders who have qualified for opening of Financial Bids. It is hereby clarified that Financial Bids of only such Bidders who are declared qualified as stated herein shall be opened.

3.3.3 **Examination and Evaluation of Bids**

    a) Any time during the process of evaluation, IHMCL may seek for clarifications from any or all Bidders. Failure of any Bidder to provide the required clarifications within the stipulated timeline may result in rejection of its Bid, at the sole discretion of IHMCL.

    b) **Phase-1: Technical Documents, Power of Attorney, Document Fee & EMD/Bid Security:**

Document fee: - The document fee (non-refundable) of Rs. 10,000/- (Rupees Ten Thousand only) in the form of a demand draft / pay order drawn in favour of "Indian Highways Management Company Limited" drawn on any Scheduled bank payable at New Delhi shall be submitted by the Applicant.

EMD/Bid Security: - The envelope containing EMD/Bid Security and other relevant documents as required by this RFP will be opened. At any stage during the entire Bid evaluation process, if the EMD is found to be invalid, the respective Bidder's Bid shall be summarily rejected. If Physical Documents submitted by the Bidder has the Financial Bid details, the Bid shall be summarily rejected.

The Bidder shall furnish, as part of the Bid, Earnest Money Deposit (EMD) /Bid Security for an amount INR 15,00,000/-(Rupees Fifteen Lakh only). The Successful Bidder's EMD will be returned, without any interest, upon the Successful Bidder signing the Contract and furnishing the Performance Security in accordance with the provisions thereof. IHMCL may,

at the Successful Bidder's option, adjust the amount of EMD in the amount of Performance Security to be provided by him in accordance with the provisions of the Contract.

The Earnest Money shall be in the form of a demand draft / pay order drawn in favour of "Indian Highways Management Company Ltd." on any Scheduled bank payable at New Delhi.

Upon furnishing of the Performance Security by the Successful Bidder, IHMCL will promptly notify the other Bidders that their Bids have been unsuccessful. EMDs of unsuccessful Bidders will be returned back to them after signing of Contract with the Successful Bidder or after the expiry of the validity period of the Bids, whichever is earlier.

Power of Attorney: - The Bidder shall furnish Power of Attorney as per format mentioned in the RFP

The Technical Bids will be evaluated by an Evaluation Committee. The Bidder shall have to fulfil all the Eligibility Criteria as specified in the RFP, in totality and submit all the required documents. These documents will be scrutinized in this phase of evaluation. Those Bidders who do not fulfil the terms and conditions of Eligibility Criteria as specified in this tender will not be eligible for further evaluation.

Evaluation of Technical Bids by the Evaluation Committee shall not be questioned by any of the Bidders. IHMCL may ask Bidder(s) for additional information, visit to Bidder's site and/ or arrange discussions with their professional, technical faculties to verify claims made in Technical Bid documentation from the Bidder on the already submitted Technical Proposal at any point of time before opening of the Financial Proposal.

Financial bid should not be submitted in physical document submission. If found so, bid shall be considered as non-responsive.

c)   **Phase-2: Financial Bid Evaluation:**

The Financial Bids of ONLY the Bidders who are declared as qualified in Phase 1 will be evaluated. The Financial Bid Evaluation will be based on the "**% of acquired transaction value -Percentage Charges"**, quoted by the Bidder which would be the basis for total pay-outs, but will exclude the GST (if applicable).

If there is a discrepancy between words & figures, the amount in words shall prevail. If the bidder does not accept the correction of errors, its Bid shall be rejected and the EMD will be forfeited.

The Evaluation Committee shall determine if the financial bid is complete and without computational errors. The Bid with the lowest value of "% of acquired transaction value" will be selected.

The "% of acquired transaction value" shall comprise of all cost involved in implementation of ETC Infra as well as performing roles and responsibilities of acquirer bank at provided fee plazas.

3.4 Schedule of Bidding Process

IHMCL shall endeavour to adhere to the following schedule:

Sl. No.	Event Description	Date
1.	Invitation of RFP (NIT)	07th April, 2020
2.	Last date for receiving queries	23rd April, 2020
3.	Pre-Bid meeting at IHMCL at 11:00 AM	24th April, 2020
4.	Corrigendum if any to be released by	30th April, 2020
5.	Bid Due Date for Submission on e-tender portal	12th May, 2020 (Up to 15:00 Hrs IST)
6.	Physical submission of: • Bid Security • EMD • Power of Attorney	12th May, 2020 (Up to 15:30 Hrs IST)
7.	Opening of Technical Bids	13th May, 2020 at 15:30 Hrs IST
8.	Declaration eligible / qualified Bidders	within 30 days from Bid Due Date
9.	Opening of Financial Bid	within 60 days from Bid Due Date
10.	Letter of Award (LOA)	Within 90 days of Bid Due Date
11.	Validity of Bid	180 days from Bid Due Date
12.	Signing of Agreement	Within 45 days of award of LOA

3.5 Any queries or requests for additional information concerning the RFP shall be submitted in writing or by e-mail to the officer designated below in the attached format. The envelope / e-mail communication shall clearly bear the following identification title:

"Limited RFP for Selection of Service Provider for Providing HETC System Integration and Transaction Acquiring services at toll plazas under NETC programme"

"Queries/Request for Additional Information"

Address for correspondence:

> General Manager,
> Indian Highways Management Company Ltd. (IHMCL),
> 2nd Floor, MTNL Building,
> Sector 19, Dwarka
> New Delhi-110 075

3.6 Amendment of RFP:

(i)   At any time, IHMCL may for any reason, whether on its own initiative or in response to clarifications requested by any Applicant, modify the RFP by issuing an Addendum. It is binding on the Applicants including already empanelled Applicants to provide requisite information as per the Addendum and within the time prescribed. Failure to do so will result in the application being rejected and/ or the bidder removed from the list of qualified/ empanelled agencies.

(ii)   Any Addendum issued hereunder will be in writing and shall be hosted on IHMCL website and e-tender portal only.

3.7 Non-refundable fee for participating in the bidding process:

3.7.1. Document fee: The document fee (non-refundable) of Rs. 10,000/- (Rupees Ten Thousand only) in the form of a demand draft / pay order drawn in favour of "Indian Highways Management Company Limited." Drawn on any Scheduled bank payable at New Delhi shall be submitted by the Applicant.

4 PART-IV: DETAILS OF SELECTION PROCESS

4.1 Eligibility to Bid: -

The bidder qualifying the following criteria shall be considered eligible to bid for this RFP:

(i) The Sole bidder or lead bidder of the consortium should be certified by NPCI (National Payments Corporation of India) as an Acquiring Bank under NETC program. The bidder shall have the experience of ETC integration and providing service as an Acquiring Bank for at least 05 Toll Plazas under the NETC program as on bid due date.
(Undertaking as per Format T-4)

(ii) The Sole bidder or any member of the Consortium should not have been blacklisted or debarred by any government department/agency/PSU for material non-performance or contractual non-compliance in the last 3 years from the bid due date.
(Undertaking to be provided by the Authorized Signatory of the Bidder on its letterhead)

(iii) Consortiums, or Joint Ventures are allowed to bid subject to following conditions: -
   a. All Partners of the JV/Consortium shall be entities incorporated and registered in India under the Companies Act, 2013/1956 or equivalent documents like Gazette, Registration with Statutory bodies/Statutory Acts etc. as applicable;

   b. Maximum number of partners in the JV or Consortium shall be two, including the Lead Partner;

   c. The Partners in a JV or Consortium shall be jointly and severally liable;

   d. The Lead Partner in the JV or Consortium shall be single largest partner in terms of Capital contribution to the Capital of JV/Consortium, or as the case may be.

   e. The eligibility/ experience of JV or Consortium shall be considered cumulatively.

   f. The parties in JV or Consortium cannot be part of any other JV / Consortium or bid individually for the same project. Effectively one party shall be bidding only once, either as a standalone company or as a part of Consortium / JV for this project.

The documentary proof in support of the experience(in the form of copy of work order and completion certificate from its clients indicating the names of projects undertaken, scope of work of each project, name of client, start date, date of completion, value of the project etc.) shall be submitted as part of the eligibility documents. The details of the said proofs of experience should be submitted in the prescribed format.

4.2 Preparation and submission of application:

4.2.1 Language of application

4.2.1.1 All correspondence and documentation related to the application exchanged between the Applicant and IHMCL shall be in English language. The Applicant shall be solely responsible for the accuracy of English Translation of various documents submitted by him to IHMCL.

4.2.1.2   The application shall be submitted online on e-tender portal as specified in Clause 4.2.3

4.2.2 Procedure for preparation of applications

The application should be submitted duly filled in prescribed formats and supporting documents as under:

Qualification

   i. Application Form T-1 (Covering letter);
  ii. Brief information about the Applicant duly filled in Form T-2;
 iii. Duly notarized Original Power of Attorney in favor of Authorized Signatory as per Form T-3
  iv. Undertaking to be provided as per Form T-4
   v. Power of Attorney as per T-3 and T-5 (in case of Consortium)
  vi. Cost of RFP bidding documents in the form of Demand Draft or A/c payee pay order
 vii. EMD as per format mentioned in the RFP
viii. Certified copies of other documents:
   a. Certificate of Incorporation of the Bank, or equivalent documents like Gazette, Registration with Statutory bodies/Statutory Acts etc. as applicable;
   b. Statutory Auditor certificate certifying the Net Worth of the Bank;

Financial Bids

   a. Financial bid shall be submitted via online portal in the prescribed format.
   b. Financial bid should not be submitted in Physical document submission.
   c. The bid should include all the charges payable in full compliance to the Scope of Work and other terms specified in the RFP document. No additional payments whatsoever are envisaged.
   d. The bid should include all statutory taxes/ levies / surcharge on tax etc.
   e. In case of any difference in figures and words, the amount mentioned in words will prevail.

4.2.3 Procedure for submission of applications

4.2.3.1 Bid must be submitted online only at https://etenders.gov.in during the validity of registration with the e-Tender Portal being managed by National Informatics Centre (NIC), i.e. https://etenders.gov.in . To participate in e-tender, the intending participants shall register themselves in the website of URL.

4.2.3.2 Bidders/Applicants are advised to go through the FAQs, guidelines, instructions, manuals, policies, system setting procedures etc. as provided in the e-Tender portal.

4.2.3.3 Tender form and relevant documents will not be sold /issued manually from offices.

4.2.3.4 Bidders are required to upload scanned copies of Document Fee, EMD/Bid Security, proof of online payment of cost Bidding Documents, Power of Attorney and other relevant document

on the e-tender portal. Physical Documents are to be submitted to IHMCL as per dates mentioned in the section "Key Dates/Schedule of Tender".

4.2.3.5 The date and time for online submission as mentioned in the section RFP document shall be strictly followed in all cases. The bidder/Applicants should ensure that their tender is submitted online before the expiry of the scheduled date and time. No delay on account of any cause will be entertained. Tender(s) not submitted online will not be entertained.

4.2.3.6 If for any reason, any interested bidder fails to complete any online stages during the complete tender cycle, IHMCL shall not be responsible for that and any grievance regarding that shall not be entertained.

4.2.3.7 All documents including document fee, EMD, Power of Attorney, all annexures, documents confirming eligibility etc. needs to be uploaded on e-tender portal.

4.3 Modification /Substitution/ Withdrawal of Bids

(i)   The Bidder may modify, substitute or withdraw its bid after submission prior to the Bid Due Date. No Bid shall be modified, substituted or withdrawn by the Bidder on or after the Bid Due Date.

(ii)   Any alternative/modification in the Bid or additional information supplied subsequent to the Bid Due Date, unless the same has been expressly sought for by IHMCL, shall be disregarded.

4.4 Opening, and evaluation of bids

4.4.1 The applications received by IHMCL will be examined and evaluated in accordance with the provisions set out herein.

4.4.2 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 of such applications.

4.4.3 In the first stage the Evaluation Committee shall examine the statement of qualification furnished by the Applicant in support of their fulfilment of eligibility against the prescribed criteria. An application shall be considered Responsive only if:

(a)   The prescribed documents above are received by IHMCL in the manner prescribed above with proper seal and signature.

(b)   Cost of RFP/ Bid Documents & EMD is submitted in the prescribed amount and manner.

(c)   The application contains all the required documents and information in the prescribed manner.

(d)   The Applicant qualifies the prescribed eligibility criteria.

and

(e)   The application does not contain any pre-condition, assumption or qualification;

4.4.4 Post completion of the first stage, Evaluation Committee will open the Financial bids on the date and time prescribed. Prior to evaluation of the Financial bids, Evaluation Committee shall determine as to whether each bid is responsive to the requirements of this RFP document. A bid will be declared non-responsive in case:

a)   If the Authorized Signatory holding Power of Attorney and Signatory are not the same

b) If a bidder submits a conditional bid or makes changes in the terms and conditions given in this RFP document

c) Failure to comply with all the requirements of RFP document by a bidder

d) If the financial bid is not submitted in the formats prescribed in the RFP document

e) Financial bid is submitted with physical documents.

f) If any requisite document/ certificate is not in the prescribed format the same shall not be considered while evaluating the Bids and the same may lead to Bid being declared as non-responsive.

and

g) The bid does not contain any pre-condition, assumption or qualification;

4.4.5 IHMCL will announce the Bidder who quotes minimum Financial Bid as the Successful Bidder.

4.4.6 No Applicant shall submit more than one application. If more than one application is received from the same Applicant, all such applications shall be summarily rejected.

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

(i) Suspend and/or cancel the bidding process and/or amend and/or supplement the process or modify the dates or other terms and conditions relating thereto;

(ii) Consult any Applicant in order to receive clarification or further information or documents;

(iii) Retain any information and/ or evidence submitted to IHMCL by, on behalf of, and/ or in relation to any Applicant; and/or;

(iv) Independently verify, disqualify, reject and/ or accept any and all submissions or other information and/or evidence submitted by or on behalf of any Applicant.

4.4.8 IHMCL is not bound to reply/ respond to any representation/ letter or request for change in scope of work, eligibility criteria or any relaxation in conditions. No correspondence will be entertained on this matter.

4.4.9 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 Law, any and all rights and/ or claims it may have in this respect, whether actual or contingent, whether present or in future.

4.4.10 Verification and Dis-qualification: IHMCL reserve the right to verify all statements, information and documents submitted by the Applicant and the Applicants shall, when so required by IHMCL, make available all such information, evidence and documents as may be necessary for such verification. Any such verification or lack of such verification, by IHMCL shall not relieve the Applicant of its obligations or liabilities hereunder nor will it affect any rights of IHMCL thereunder.

4.5 Award of Toll Plazas

4.5.1 IHMCL will announce the name of the Selected/Successful Bidder, which shall be awarded the task for implementation of ETC Infra and acquisition of transactions at indicative list of toll plazas as provided in **Annexure D**.

4.5.2 IHMCL retains the right to amend the list of Toll Plazas provided in **Annexure D** up to 40% (increase/decrease) without assigning any reason at any time during the Contract Period. IHMCL makes no commitments, expressed or implied, that the full scope of work as described in this RFP will be commissioned.

In case of any descoping of toll plazas after SAT has happened, the compensation to the service provider shall be the depreciated value of the equipment. Original cost of equipment shall be taken as the basis of Lowest Capex cost discovered by IHMCL through System Integrator RFP/RFQ up to the date of SAT conducted. The depreciated rate shall be calculated as explained in the example below:

> **Depreciated Capex cost to be paid = (Capex Cost of the equipment as per lowest discovered rate up to date of SAT/ Total Contract Duration) X (Remaining Contract duration)**

For instance, if

- Cost of the equipment as per Lowest Capex Cost discovered by IHMCL up to date of SAT = Rs. 100;
- Total Contract period = 5 years;
  Then,

  the depreciated Capex cost at the end of 2 years shall be = Rs.100/5 X 3 = Rs. 60

4.5.3 IHMCL will issue a Letter of Award (LoA) to the Selected/Successful Bidder for the toll plaza, and upon receipt of the LoA, the Selected/ Successful Bidder shall be required to furnish an unconditional and irrevocable Performance Security in the form of a Performance Bank Guarantee (PBG) within a period of 15 days as per Form-T-6. The PBG shall be for an amount of **Rs. 1.5 Crores** and should be in favour of "Indian Highways Management Company Limited", New Delhi. The Performance Security shall be valid throughout the period of contract, which may be extended appropriately such that it remains valid until one year beyond completion of the contract.

4.5.4 **Time period for the service**
Time period envisaged for the engagement is **5 Years**. Upon completion of the engagement, IHMCL may consider extending the term on yearly basis up to maximum of **another 2 years** with same "% of acquired transaction value" as quoted by the Bidder for the RFP.

PART V – TERMS OF REFERENCE (TOR)

Annexure A

Roles and Responsibilities as System Integrator

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.

5.1 Supply, Installation and Integration:

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

ii. 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 during Site Acceptance Test. Prior to site acceptance test, the responsibility of providing storage and security for supplied material shall be in the scope of service provider.

iii. Service Provider shall be fully responsible for the safety of equipment which shall be delivered or installed at site before commencing SAT by 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.

iv. Service provider shall complete the Installation, Integration, Commissioning of Hybrid ETC system and sub systems at toll plazas as specified in **Annexure-D** within 45 days of the receipt of Letter of Award (LoA). The service provider shall be responsible for system integration so that the Hybrid 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.

v. Damages
Failure of the service provider to complete the Installation, Integration, Commissioning of Hybrid ETC system and including start of Acquiring services at toll plazas within 45 days shall attract a penalty of Rs 2,000.00 for each day of delay in implementation. The total levied penalty, however, shall not exceed Rs 1,00,000.00.

vi. Service provider shall ensure to complete all pre-requisite minor civil works i.e. pole foundation/ sensor foundation/ cabling chamber/lane ducting, plaza to Lane connectivity, etc. pertaining to hybrid ETC system and Toll Management System. Major civil works i.e. PQC work, toll plaza canopy, permanent toll booth structure, Plaza building, Median Extension etc. are not in the scope of service provider.

vii. Service provider shall provide and install valid antivirus and operating System licenses at lanes as well as plaza level in the system highlighted in BOQ items of this document throughout the period of contract Agreement.

viii. Service Provider shall implement online equipment performance monitoring tool for calculating uptime of equipment and provide necessary access to IHMCL/NHAI for each toll plaza.

ix. 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.

x. Service Provider shall be fully responsible in case of any rejection of ETC transactions due to any issue in HETC system and internet service and all such losses of ETC Transactions to Toll Agency shall be borne by Service Provider.

xi. Service Provider shall ensure to install Servo Stabilizer at each toll plaza to protect equipment from unstable voltage and post installation of Servo Stabilizer, the safety of equipment from unstable voltage shall be under the liability of Service Provider.

5.2 Defect Liability Period (DLP)

a) Maintenance, repair and replacement of all hardware, software, peripherals and sub components of all BOQ items shall be the responsibility of Service Provider without any cost to IHMCL/NHAI.

b) Service provider shall be fully responsible for the warranty of all items which shall be supplied by them. 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 monitoring tool or intimated by IHMCL/NHAI/Toll Operating Agency, adequate spare quantity to be maintained at site level for critical items specially Hybrid ETC equipment. If the time for rectification exceeds 24 hours, 1% liquidity damage of monthly recovery made by the service provider on daily basis shall be imposed during the period of deficiency in service. However, this amount of

liquidity damage shall be limited to maximum of 100% of the monthly recovery made by the service provider. Even if the deficiency of services is not removed within 15 days it shall be compulsorily be descoped and no compensation as per Clause 4.5.2 shall be paid.

c) 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.

d) The Service provider shall provide 24X7 on-site support with dedicated Technical manpower in each shift of 08 hrs during the DLP period.

5.3 Operation and Maintenance

a) 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 Hybrid ETC & Toll System.

b) Service Provider shall ensure for maintenance, repair and replacement of all hardware, software, peripherals and sub components of all BOQ items throughout the contract period shall be the responsibility of Service Provider in adherence to the SLA without any further cost to IHMCL.

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

d) The Service provider shall provide 24X7 on-site support with dedicated Technical manpower in each shift of 08 hrs during the operation & maintenance period.

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

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

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

5.4 Other activities

a) 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.

b) The BOQ (As defined under **Annexure-B**) by IHMCL/NHAI shall be fixed for entire contract duration. However, in case successful bidder is unable to achieve the requirements of IHMCL as mentioned in RFP, they shall be required to be increased/replaced the equipment as the case may be so as to match the requirements of IHMCL.

c) 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.

d) 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 Hybrid ETC and Toll Management System and associated peripherals on the plaza.

5.5 Routine Maintenance

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. 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:

a) Checking the condition of components, e.g. check connections for signs of deterioration.
b) 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.
c) Voltage level changes are caused by the deterioration of capacitors, transformers and semiconductor components.
d) Certain measurements can also be performed to check the status of elements of the system, i.e. impedance and isolation tests.
e) Mechanical components need routine cleaning and lubrication to ensure their effective operations.

5.6 Data Retention, Back-up and Restore Operations:

Data Retention:

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.

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

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.

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

Data Back-up & Restore:

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.

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

5.7 Statutory and Others:

IHMCL shall reserve the right to get the security / compliance audit of the Hybrid 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.

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.

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.

5.8 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.

5.9 Acceptance Test and Approvals

After installation of Hybrid 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.

Commissioning: Once Site Acceptance Testing has been concluded and the Service Provider has attended to and remedied all reported defects, the system shall be ready to be commissioned and taken into operation.

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.

Failure by the Service Provider to complete the Works and to have remedied all reported defects by the Prescribed Date for commissioning shall result in the application of the penalties for delays prescribed under liquidated damages in the Contract Agreement.

5.10   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.

5.11   Other Works

a) 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 Hybrid 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.

b) 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.

c) 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.

d) 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.

e) 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.

Annexure - B

BOQ and Specifications

1. HETC 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[1]:

Lane Level			
S.No	**Equipment Description**	**Unit**	**Qty per lane**
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, loop and detector	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

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[1] Please refer specification details of the equipment as captured in this Annexure.

19	Intercom Slave unit in booth	No	1
20	Lane Level UPS	No	1
Plaza Level (Qty per Plaza)			
21	Plaza Servers in hot-standby configuration	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	Outdoor WiFi Access Point	No	1
25	Software – Plaza level	Job	1
26	Broadband Internet connection with minimum 2 Mbps link for CCH connectivity	Facility	1
27	Lease line Internet connection with 1 Public IP of minimum 2 Mbps link for CCH connectivity	Facility	1
28	UPS system as required for complete Hybrid ETC Toll Plaza system (10 KVA or above)	No	2
29	Network Video Recorder (NVR) for CCTV recording with 30 days of storage	No	1
30	CCTV cameras for Plaza building surveillance (server room, control room, cash room, admin)	No	4
31	RFID Handheld Readers	No	4
32	Master Intercom System	No	1
33	Servo Stabilizer (60 KVA -03 phase)	No	1

*All the HETC equipment shall be owned by the Service Provider throughout the duration of contract. The Service Provider will be paid on monthly basis for the complete end-to-end services made available to IHMCL, subject to deductions as per RFP.

2. **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 (JPEG)

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, Hand-held 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

  - Traffic reports (Lane wise all mode of traffic report)
  - Penalty Collection report lane wise

  - Daily / Weekly / monthly reconciliation reports

  - Violation reports
  - AVC Accuracy Report
  - Separate ETC report for Handheld reader

  - Equipment uptime reports (RFID Reader, AVC, TLC, LPIC, ICS and Server)
- Security
  - Login feature for accessing the System

  - Access the system based on roles definition

  - 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.

- 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 5 million tag users and 30,000 (Thirty thousand) transactions per day and at the end of 5 years shall be capable enough to support 20 million tag users and 45,000 (Forty-five thousand) 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.

3. Toll Plaza Equipment 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 supplier may choose to include products with specifications that exceed the standards, post approval from IHMCL.

a) **RFID ETC Transceiver near pay axis (mounted on canopy)**

i. **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.

ii. **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

iii. **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	1. Should have read reliability exceeding 99.**5**% in the distance range specified. 2. 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.

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b)   Electronics Enclosure

i. The Interface Electronics and all related peripheral/controllers should be enclosed in an IP65compliant cabinet.
ii. Locking System: Enclosure shall have a unique key allowing access to the electronic.
iii. 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.
iv. 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.
v. Ventilation and internal temperature: All equipment endorsed by the cabinet shall be kept at a temperature consistent with manufacturers recommendations.
vi. 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).
vii. Cable dressing: All cables (power & signal) shall be properly routed and dressed with suitable railings inside the enclosure and ties.
viii. 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.
ix. 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.

c) Lane Controller with Industrial PC

Functional Requirements

i. 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.

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

iii. The TLC software shall be developed to operate as ETC toll lanes as is defined under earlier section of this document.

iv. All lane operating data shall be stored in the local hard disk drive in the lane. Adequate RAM shall be provided to prevent "Thrashing" of the hard disk drive. The hard disk shall have enough memory to load and maintain all necessary program tables (like ETC black list, white list, 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 local hard disk 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 local hard disk 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 hard disk on the basis of FIFO logic.

v. 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.

vi. The TLC must be capable of storing the following minimum information:
   - 1 month of Transaction data including image associated with incidents
   - Tag Whitelist as mentioned
   - Tag Blacklist as mentioned
   - 5 Tariff Table (active and pending)

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

vii. The minimum required fields are as follows: -
   - ✓ Transaction Sequence Number

- ✓ Date
- ✓ Time
- ✓ Plaza
- ✓ Lane
- ✓ Shift
- ✓ Tag Vehicle Class (TVC)
- ✓ Automatic Vehicle Class (AVC)
- ✓ Image ID (in case of a violation transaction)
- ✓ Tag Id
- ✓ VRN no.
- ✓ Transaction Amount

The transaction time shall be the time when a Tag is detected at **transaction** area.

viii. The TLC shall be capable of interfacing with at least the following peripheral equipment:
- ▪ 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

ix. 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.

x. 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.

xi. 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.

xii. 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.

xiii. 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.

xiv. 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.

xv. 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.

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

xvii. Time throughout the entire toll collection system shall be synchronized with reference to the LOCAL ETC SERVER.

d) TLC PC Specification:

i. The following minimum configuration requirements shall be met:

a) Grade   :   Cabinet Industrial PC
b) Motherboard   :   Industrial Grade
c) HDD   :   based on estimated storage requirement for 6 months TLC data (at least 160 GB in case estimated capacity is lesser)
d) RAM   :   4 GB or upgraded
e) Processor   :   Intel i3 or equivalent/higher

f) Processor speed   :   2 Ghz or latest as per market

g) NIC   :   1 Gbps X 2 Numbers On-board

h) PCI Slot   :   2 Nos. Spare

i) USB Port (for authorized):   4 nos.

j) Frame grabber card (if used for Capturing images): 1 no with 2 channels capable to capture frames at the same time on both channels

ii. The TLC shall receive UPS power from the UPS distribution panel. Any special electrical protection / interface unit shall be provided by the Contractor, 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.

e) **AVC including sensors, loop and detector**

i. Accuracy Level:

The AVC system shall be 100% auditable and accuracy of vehicle counting should be 99.5% and classification accuracy shall not be less than 98%.

ii. Auditability:

The AVC System shall comply with the following auditability criteria:

- Each transaction recorded by the system shall be uniquely and sequentially numbered.
- 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. The audit function shall be done in the following manner:
- The auditor shall
  - ➢ connect to the AVC computer through network or RS-232 port of the AVC computer.
  - ➢ Start audit application/data extraction application
  - ➢ Supply Plaza name, AVC number, User id and Password
  - ➢ Enter the date and duration for the audit.
  - ➢ Press enter to start data extraction (any time the auditor shall be able to cancel current command to start with other specific duration).
- 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

iii. The Contractor 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.

iv. 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.

v. Description and Functions
   - The automatic vehicle classification equipment shall be installed in the lane after pay-axis.
   - 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.
   - The AVC shall be able to generate profile image which shall be used for auditing purpose.
   - The AVC shall be able to distinguish between classes as per the applicable notifications of MORTH
   - 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.
   - The Equipment Contractor shall submit details of the performance of existing AVC systems duly validated by the existing operators of the systems.
   - The AVC shall be capable of detecting and reporting the following vehicle movements and incidents in the lane to the TLC:
     - The AVC system must be able to count and distinguish two wheelers, autos and four-wheelers separately.
     - Vehicle Standing – the vehicle presence sensing equipment stays active for longer than a preset time. The preset time shall be parameter settable.
   - 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.
   - 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.

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

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

f) AVC System Design and Approval

i. Functional requirements:
- 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 is 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.

- 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

- All operating data shall be stored on the local hard disk drive of the AVC computer. "Thrashing" of the hard disk 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.
- 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.)

- 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.

- 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.

- 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.

- 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.

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

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

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

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

- 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.

- 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.

- 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.

- 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.

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

- 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.

- 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
  - Cross-talk Verification Process
- Loop Chatter (Bobbing) Verification Process
- Basis of classification logic of AVC

g) AVC Controller Configuration
The following minimum configuration requirements shall be met:
- Grade : Industrial PC
- HDD : based on estimated storage requirement
- RAM : 2 GB or latest
- Processor : latest Intel Processor
- Processor speed : latest available in the market at the time of delivery
- CD / DVD R/W : latest available in the market at the time of delivery
- NIC : 1 Gbps X 2 Numbers On-board
- PCI Slot : 2 Nos. Spare
- USB Port : 4 nos.

h) AVC Enclosure
The AVC and all related peripheral controllers should be enclosed in an IP65 compliant cabinet.
  i. Locking System: Each cabinet shall have a **unique** key allowing access to the AVC.
  ii. 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.
  iii. 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.

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

v. 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).

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

vii. 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.

viii. 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.

i) User Fare Display with mounting pole

i. Description and Function

- 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.

- The UFD shall be of variable message type and shall have high intensity LED or similar Operator approved display of 10 characters per line in two lines with the option of scrolling for displaying seasonal messages.

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

ii. Specifications

The following minimum specifications shall be met:
a) Size   : 750 X 400 mm
b) Display   : Red LED
c) Visibility Range   : 10 m
d) Enclosure   : MS
e) MTBF   : 50,000 hours
f) MTTR   : less than 30 minutes

iii. 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.

iv. Protection
The UFD shall be IP 65 rated or better.

j) Automatic Barrier Gate

i. Description and Functions – Automatic Barriers
- 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.
- 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.
- 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.
- 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.
- Barrier arms shall have retro-reflective red stripes in accordance with the local traffic sign standards.

ii. Specifications
The following minimum specifications shall be met:
a) Boom Length: 3 m or 3.5 m
b) Boom Material: Aluminium

iii. 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.

iv. **Protection**

The Automatic Barrier Gate shall be IP 55 rated.

k) Overhead Lane Status Sign (OHLS)

i. **Description and Functions**

- The Over Head Lane Sign (OHLS) is located above the center 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.
- 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.
- At any situation, both RED and GREEN part shall not glow simultaneously. Under failure conditions, only Red Cross shall be displayed until rectification.

ii. **Specifications**

The following minimum specifications shall be met:

a) Size : 300 mm X 300 mm
b) Display (Cross) : Red LED
c) Display (Arrow) : Green LED
d) LED : 5mm in diameter, 8000 mCd
e) Visibility Range : 150 m (under extreme weather conditions)
f) Enclosure : IP 65 or better grade

iii. **Power Source**

The OHLS shall receive UPS power from the TLC.

iv. **Protection**

The OHLS shall be IP 65 rated or better.

l) Traffic lights with mounting pole

i. **Description and Functions**

- 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. An amber signal with arrow is used to indicate that the user should take suggested path, whilst the green signal is used to indicate that the user should proceed.

- At any situation, both AMBER and GREEN part shall not glow simultaneously. Under failure conditions, only Amber arrow shall be displayed until rectification.

ii. **Specifications**

The following minimum specifications shall be met:

    a)   Size   : 200 mm Φ
    b)   Display (Stop)   : Amber LED
    c)   Display (Start)   : Green LED
    d)   Visibility Range   : 20 m (under normal visibility conditions)
    e)   Enclosure   : SS (stainless steel) or Polycarbonate

iii. 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.

iv. Protection

The TL shall be IP 65 rated or better.

m) Loops with detector

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

n) Incident Capture Camera with mounting Poles

i. The cameras shall be charge coupled device (CCD) color cameras equipped with fixed focal manual iris lenses and night vision capabilities. The cameras shall require a minimum of 1.8 lux for usable image/video. The CCTV systems shall have adequate surge and lightning protection.

ii. The model selected shall have image compensation capability to ignore stray lighting / vehicle lighting so that ICS and LPIC shall render meaningful output for verification.

iii. The camera should be able to capture snapshots also.

iv. Camera Location

The Equipment Contractor 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-65 rated Enclosure to withstand adverse weather conditions.

o) License Plate Image Capture Cameras

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-65 rated Enclosure to withstand adverse weather conditions

p) TFT Display

The TFT display/Fee Collector Display (FCD) shall be located on the fee collectors desktop and shall be screwed or bolted through the counter top, the position of the FCT shall be finalized with the employers 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 FCT to the booth counter top 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 Cable (15- pin HD D – Sub)
Cable routes	Power cable: 15 meters VGA Cable: 15 meters (terminated to the SVGA Port at the LC via booth ducting)
Color	Manufacturer's Original Color
Voltage Requirement	AC 230 V (50 / 60 Hz)
Power Consumption	80 W
Operating Temperature	0 degree C to 50 degree C
Relative Humidity	20 % to 80 %
Design Criteria	- Min. Resolution: 1024 X 768 / 60 Hz - Aspect Ratio : 4:3 - Number of Colors: 16.2 M, (6bit+FRC) - Video bandwidth: 70 MHz - Viewable size: 18.5" Minimum - MTBF: 30,000 hrs - MTTR: 0.25 hrs

q) Customized Keyboard

The keyboard on the Fee Collector terminal for Registration of toll operations shall be a programmable Industrial Grade keyboard. 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:

(1) Staff Id number
(2) Vehicle Classification
(3) Type of Transaction
(4) Accept/Cancel Transaction
(5) Method of payments Selection
(6) Operate OHLS
(7) Numeric Keypad with backspace button for numeric corrections
(8) Class Cancel

(9) Bleed-off button

(10) Violation Cancel/Accept Button

(11) Simulation Button (Only for use during Maintenance Mode)

(12) 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 page, 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

r) Thermal Receipt Printer

i. 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.

ii. 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.

iii. 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 HLC Termination Block via booth ducting. Data cable is connected to the HLC
Color	Cool White/Dark Grey
Power Supply Requirement	24 VDC $\pm$ 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 $\pm$ 0.5 (W) x 83 (diameter)
	Paper thickness: 0.06-0.07 mm
	Auto cutter life: 1.5 million cuts
	Real-time printer status: Auto status back (ASB) messages
	MCBF: 52 million lines
	MTBF: 360,000 hours, Overall MTTR: 0.25 hrs

s) Intercom Slave Unit inside Booth

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.

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

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)

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 10^oC to 50^oC
Reliability	30,000 hrs

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

t) Master Communication Unit (MCU)

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

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.

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

u) Closed Circuit TV (CCTV)

i. **General**

This part of the RFP 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.

The CCTV for lanes shall be:

(1) Booth CCTV cameras

The CCTV for Plaza surveillance are:

(2) Network Video Recorder (NVR)
(3) Video Management Software (VMS)
(4) Plaza Building Security CCTV cameras

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.

The functionality of the CCTV cameras provided by the Bidder shall be described as follows:

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.

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 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

v) Booth Level CCTV

The booth CCTV camera shall be an IP based fixed dome type color 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.

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

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

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.

Technical Specifications of the Booth Cameras shall be as follows:
The technical specifications mentioned hereunder are minimum guidelines. The Applicant shall not deviate materially from the specifications specified herein.

Parameters	Minimum Specifications
Image Sensor	1/2.8" Progressive CMOS
Maximum Resolution	1920x1080 (2MP)
Lens Type	Fixed Focal
Focal Length	f = 2.8
Aperture	F1.8
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.265 & MJPEG
Maximum Frame Rate	30 fps @ 1920x1080 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
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

Parameters	Minimum Specifications
Connectors	RJ-45 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	Temperature: -10°C to 50°C

w) **Network Video Recorder (NVR)**

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.

The NVR shall have minimum following technical features:

a) H.265 Compression Technology
b) Plug & Play One Button Auto Setup
c) Intuitive, Intelligent and Interactive UI
d) Live viewing, recording and Playback features
e) Embedded Linux OS or OEM Specific
f) Support RAID 0/1/5 Storage
g) Up to 12MP Camera Liveview & Playback
h) Dual Lan Network Ports with Failover Function
i) ONVIF Open Platform

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

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.

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.

These cameras shall be

a) **Fixed lens Bullet CCTV night vision colour cameras**.

The bullet cameras installed outdoor shall be installed in the weather proof enclosure.

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

Fixed lens Bullet CCTV night vision color cameras

Parameters	Minimum Specifications
Image Sensor	1/2.8" Progressive CMOS

Parameters	Minimum Specifications
Maximum Resolution	1920x1080 (2MP)
Lens Type	Fixed-focal
Focal Length	f = 3.6 mm
Aperture	F2.1
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
	Seamless Recording
Compression	H.265 & MJPEG
Maximum Frame Rate	30 fps @ 1920x1080
	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
VCA	Line crossing detection, field detection, loitering detection
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

Parameters	Minimum Specifications
	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
	Digital input: 1, Digital output:1
LED Indicator	System power and status indicator
Power Input	DC 12V
	IEEE 802.3af/at PoE Class 0
Power Consumption	Max. 9 W
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 50°C

y) **24 port Network Switches (Layer 3)**

    i. **General**

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.

8-Port PoE industrial grade rugged managed switch with 2 fibre port shall be provided in each lane to connect all lane peripherals. No unmanaged switch shall be provided in the HES lane. This 8-Port switch shall be installed inside the Electronic Enclosure of the Hybrid Lane Controller. Managed switch will ensure that the data transmission between the lanes and PMS 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.

z) **24 Port Layer 3 Switch with 4 Fiber Port**

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 48 Gbps of dedicated stacking bandwidth.

aa) ETC Server (Plaza Server)

i. 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.

ii. 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.

iii. 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 Purchaser.

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

   - The Contractor of the server and workstations shall:
     ➢ Be a well-known and established IT hardware supply company in project location.
     ➢ Be a registered representative of the original equipment manufacturer in project location.
     ➢ Be capable of supplying adequate after-sales service and support on 24X7 basis.

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

vi. 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: 8 GB (Upgrade up to 16GB)
- 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
- 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
- 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
- 17" TFT monitor

vii. The server including all accessories listed above shall be installed in rack.

viii. **Software Compatibility**
The server shall be capable of supporting the following software platforms:
Operating System:
Windows
UNIX
LINUX (64bit platform) or compatible

Database:
Industry standard

ix. **Backup Device**
Backup device shall be connected with the server through a SCSI controller card and shall be DLT drive 80/160 GB.

x. **Archive Storage Device**
- This device shall be connected with the server through a USB port and shall be of any reputed make with service and support availability in India and of RAID configuration.
- This device shall contain all the archived data on a monthly basis after the 5 year retention period. It shall be possible to restore a COPY of the archived data for selected months 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 contract period.

- However, the LPIC, ICS images grabs, AVC profile against each transaction can be archived separately on DVD / Tape after the 5 year retention period and will not be stored in the Server Hard disk and USB based Archive storage device.

xi. **System Image Storage Device**
- A separate secure external HDD shall be supplied for storing the ghost images of all fresh installation of lane / AVC controller and other modules, local ETC Server, etc. After restoring this ghost image, it shall be possible to import / configure the lane / equipment specific characteristics before normal operation of the equipment. Any data required shall be restored from the back-up device. In case of local ETC Server restoration, the current day data after backup to external storage device can be retrieved from the lanes.

xii. **System Software**
- The system shall be in Domain environment and all workstations must connect to that domain.
- An additional secondary server shall be provided, which shall take over immediate charge of Primary server in case of its failure. In other words, this shall be a hot stand by to the primary server in all aspects.
- The specification, make, model of all the accessories of the secondary domain controller shall be same as that of the primary domain controller.

xiii. **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 Authority.

xiv. **Database Management System**
- Database shall be a relational database management system.
- 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.

xv. **Data Network**
- 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.
- 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.

xvi. **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.

xvii. **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.
- **Help Menu**
  An intuitive and interactive help system that can be activated from anywhere in the TMS system.

xviii. **Security System**
- A facility to allow the Authority to manage 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.
- All FDD and 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.

xix. **Workstations Management**
At any time, if the purchaser wants to add additional workstations and its peripheral hardware from the system, shall be able to do so without any additional cost to the purchaser.

xx. **Interfaces**
The system shall be designed using Open interface architecture at all levels of hardware used. In future, it shall be possible for the Authority to change any make / model of any hardware without dependency on the Contractor.

xxi. **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.

xxii. Data Sequence

Each message / transaction shall have its own sequential number.

xxiii. Missing Data Detection and Resolution

- The conditions to be sure all data is in the database in a given moment are:
  a) All message sequences received were correct (no checksum errors)
  b) There were no jumps in message sequential number
  c) There were no jumps in message type sequential number
  d) The Communication sequence is being received with no gaps and small permissible delays.
  e) 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 signaled 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:

  a) 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.
  b) 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.

xxiv. Data Import / Export System

- **Reports Information**

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

xxv. Data Backup & Restore System

Data shall be backed up onto a removable medium on a regular basis for removal from the premises. Contractor shall submit a backup process and plan with the proposal, Authority's agreement and approval is required before its implementation.

xxvi. **Data archiving / restore**
- Data archived on removable media on a regular basis shall be as specified under relevant clause.
- All data shall be transferred / appended to removable electronic media / USB based Archive Storage device at monthly intervals and stored after the expiration of the prescribed period for retention of the data on various system levels, the data may be removed from the system. The plaza ETC system shall provide the facility to perform these functions.

xxvii. **Data Redundancy**
- 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.
- Data retention times within the various levels shall be at least:
    a) Vehicle Processing at Lane Level: 1month
    b) **Plaza level:**
        - Detailed Data: 36 months
        - Archived Data on USB Archive Storage: 10 years

xxviii. **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.

bb) Incident Management Workstation
  i. This module facilitates the supervisor to acknowledge incidents and to correct class discrepancies generated at lane level. Incident capture camera and License plate capture camera image/s and sensor outputs shall help supervisor in deciding the correct class of the vehicle and other validation actions.
 ii. Incident Management
    - 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)
        – User Name (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:
  1. Capture of ICS image none, for selected type of incident, for all types of incident, for all transaction.
  2. Capture of LPIC image none, for selected type of incident, for all types of incident, for all transaction.
  3. Record and report incident transaction at incident management system, none, for selected type of transaction, for all transaction.

iii. Other functions
  - In addition to the above primary function of the Supervisor, the following functions shall be performed by the Supervisor:
    a) Data Completeness
    b) Shift Consolidation
    c) Day Consolidation
    d) Month Closure
    e) Lists Transfer Status

  The above functionalities are explained in detail below.

iv. Data Completeness
  - 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.

- 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.
- 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.

v. Day Closure

- 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.
- When, the supervisor closes the day, the following conditions shall be verified by the system before generation of Day Closure Report:
    - a) Data completeness
    - b) Data transfer to CCH completeness
- 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.
- This procedure shall ensure that no data generated is left unattended for review / reconciliation.

vi. Month Closure

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

vii. Lists Transfer Status

- 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.
- The status of all such lists shall be displayed on selection of this option. The status shall include the following:

a) Name of the list
b) Version of current transfer
c) Version of previous transfer
d) Date & time
e) Frequency of transfer (in HH:MM format)
f) Transfer Status

- It shall be possible for the supervisor to re-request / re-transfer any failed list transfers.
- Also, all lists shall be retained in the system along with date of activation and date of expiry in addition to the version details.
- 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.

viii. Fare table management
- The following functions shall be performed by the Toll Manager:
  a) Fare table management (updation / revision subject to Project Manager authorization in the system through his login)
  b) 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.

ix. Other Toll Manager Functions
- Incident Management
  The Plaza manager can view and access all features / options of this function. However, he / she cannot perform any modifications / corrections.

- 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.

x. Users Management
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		

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

a) Name
b) Address
c) Date Of Birth
d) Contact Person
e) Contact Number
f) Email ID (optional)
g) User ID
h) Activation date
i) Valid upto

3.1.1.2.   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.

xi. **Administrator Functions**
In addition to the normal functions listed above, administrator can perform the following operation.

3.1.1.3.   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.

3.1.1.4.   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.

3.1.1.5.   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.

3.1.1.6.   System Configuration for Incident management
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:

a) Make   :   Reputed Branded
b) Grade   :   Workstation
c) HDD   :   based on estimated storage requirement for 6 months data
    (at least 160 GB in case estimated capacity is lesser) of latest RPM

d) RAM   :   4 GB or latest

e) Processor   :   latest Intel Processor

f) Processor speed : latest available in the market at the time of delivery to the site

g) CD ROM   :   latest available

h) PCI Slot   :   2 Nos. Spare

i) USB Port   :   4 nos.(high speed)

j) NIC   :   1 Gbps On-board

k) RS232 port   :   2

l) LPT port   :   1

m) PS2 port (mouse) : 1

n) PS2 port (keybrd): 1

o) Monitor   :   Colour 17" TFT

p) Mouse   :   Optical

q) Keyboard   :   Standard

cc) Plaza UPS

i. Online UPS(10 KVA) with 4 hours of backup and sizing based on power requirement calculation, shall be provided by the Applicant. The UPS design shall take the following into account:

a) The system 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.

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

c) The UPS shall be capable of operating at input voltages of 210/380Volts ±10% and 50 Hz ±2.5 Hz.

dd) Lane Level UPS(1 KVA):

Parameter	Minimum Specification
UPS with Battery	Online
Rating	As per power requirement (125% of connected load)
Backup	2 Hours
Input Voltage	155-305 VAC
Input Frequency	50H z
Output Voltage	230 VAC
Output Waveform	Sine Wave

ee) Software – Lane level

As described under various sections of this document.

ff) Software – Plaza level

As described under various section of this document.

gg) Wi-Fi Enabled RFID Handheld Reader

Minimum Specifications	
Dimensions:	192mm x 87mm x 151mm/ 7.56 x 3.43 x 5.94in
Weight:	743g/ 26.21oz, or equivalent/latest
Display:	3.5'' QVGA (240*320), 6.5M colors or equivalent/latest
Touch Panel	Rugged resistive touch panel, or equivalent/latest
Power	Main battery: Li-ion, 3200mAh
	Pistol battery: Li-ion, 5200mAh
Expansion Slot	1 MicroSD (TF) slot
Interfaces	Micro USB(OTG)
Audio	0.5W speaker
Keypad	Numeric / Qwerty
User Environment	
Operating Temp.	-4oF to 122oF / -20oC to 50oC
Storage Temp.	-40oF to 158oF / -40oC to 70oC
Humidity	5%RH - 95%RH non-condensing
Drop Specification	Multiple 1.5m drops to concrete across the operating temperature range
Tumble Specification	1000 x 0.5m/1.64ft falls at room temperature
Sealing	Host IP65 per IEC sealing specifications
Communication	
WLAN	IEEE802.11 a/b/g/n
Bluetooth	Bluetooth 2.0+EDR
RFID	
UHF	
Engine	CM2000-1 module, based on Impinj Indy R2000, or equivalent/latest
Frequency	865MHz-868MHz / 920-925MHz / 902-928MHz
Protocol	EPC C1 GEN2 / ISO18000-6C
Antenna	Linear polarization (1.8dBi); circular polarization (4dBi)(Internal Antenna)
Power	1W (30dBm, +5dBm to +30dBm adjustable)
R/W range	>22m (circular polarization, indoors); >8m (circular polarization, open outdoors); >4.5m (linear polarization, open outdoors);
Reading rate	>200 tags/s (circular polarization)
* Range and rate depend on tags and environment	

hh) Industrial Grade outdoor rugged Wi-Fi Access Point

The Wi-Fi Access point shall be provided as backup for the wired LAN network. If the plaza server is operational and only lane system or network is down, the data transmission from lane

(in case LAN network connectivity between lane area and plaza area is down) and the Handheld (in case ET or Lane system is not functional and lane is operated using HTT) shall communicate to the plaza server / HHT workstation in real time through Wi-Fi access point installed in the lane area, provided the power supply is available in lane for Wi-Fi access point. One Wi-Fi access point shall also be installed in the plaza area for communication and two Wi-Fi access point in lane area (one in each direction) shall be installed at the location in canopy to ensure that all lane area is covered and HHT of each is able to communicate with plaza system. The Wi-fi Access points shall be connected to the LAN network in the lane area. The minimum specifications of Industrial grade outdoor rugged Wi-Fi Access Point are as follows:

i. Wall/Ceiling/Poll mounted Wi-fi access-point suitable for outdoor use with at least 1 10/100/1000Mbps Ethernet ports supporting standard 802.3af/at POE+. Should have additional SFP port for direct fiber termination if required

ii. 802.11ac AP should operate in 2.4 GHz (450 Mbps or more) and 5 GHz simultaneously and capable of minimum 860 Mbps on 5 Ghz for 802.11ac clients supporting minimum 2x2 MIMO with 2 spatial streams. It must support minimum 2 concurrent MU-MIMO users.

iii. The access point should be capable of performing security scanning and serving clients on the same radio.

iv. Must support minimum 27dbm of transmit power in both 2.4Ghz and 5Ghz radios with the support of both Omni and directional (min 120degree) external antenna options.

v. Security mechanisms should be in place to protect the communication between the Access Point controller and the Access Points.

vi. The access point should support WPA2 enterprise authentication and AES/CCMP encryption.

vii. AP should support 802.11k for Radios Resource management and 802.11r for fast roaming.

viii. Implement Wi-Fi alliance standards WMM, 802.11d, 802.11h and 802.11e and should support VoWLAN

ix. AP must support L7 Application Identification and spectrum analysis functions

x. AP should support Minimum -90dB Receiving sensitivity. AP should support Receiver sensitivity Threshold to reduce noise reception in the AP to increase SNR and performance

xi. 802.11 a/b/g/n/ac wave 2 functionality certified by the Wi-Fi alliance, should be IP67 rated and RF transmission power should be approved by WPC.

xii. AP should support up to 100-mph sustained winds and up to 165-mph wind gust.

3.2. Toll Management Software Specifications

The key features of the TMS are as below:

a. Highly secured and reliable system – Integrated Dashboard to monitor real time cash collection along with ETC transaction with many checks and balances, and data archiving options.

b. Convenience of Plug and Play feature – Support easy integration with various existing all HETC infra equipment/software at toll plaza, Interface with complementary systems (e.g. Plaza Queue monitoring) for TMS performance management

c. Centralized remote real-time System monitoring – of toll collection, Lane & Plaza level equipment availability status, software sub-modules, etc.

d. System shall automatically deduct double toll fare for cash vehicle passing through the FASTag express lane.

e. Focus on Security - Adequate levels of encryption in database, transactions and communications.

f. Focused on enhanced ETC performance – Support for both the existing SFTP-based communication (as per ICD 2.4 document) and the proposed API-based communication (as per ICD 2.5 document)

g. Scalable to other electronic media - Use of other ETC media e.g. Contactless Smart card (e.g. NCMC), QR based payment, mobile ticketing etc. for rapid toll payment

3.2.1. General System Requirements

A.	General Requirements
1.	The information flow should be designed to ensure that the system can operate with minimum bandwidth (128 Kbps) for access and operation.
2.	The System should be deployed as easy-to-use plug and play application at Plaza servers. These applications should automatically transmit report related data (as captured in reporting layers) to a Central system at each minute for reporting and dashboard purpose.

3.	System should be interoperable with various systems deployed across toll plazas.
	    a. AVC interface
	    b. WIM interface
	    c. RFID transponder
	    d. Acquirer systems related to various electronic transactions
	    e. Payment gateway
	    f. Smart cards

4.	The User interface of the web-enabled parts of the system should be designed to open in at least the following standard/popular browsers
	    a. Microsoft Internet Explorer
	    b. Mozilla Firefox
	    c. Google Chrome
	    d. Apple Safari

A.	General Requirements
5.	The System should have accuracy in the capture, processing, communication and reporting of Toll Transactions and associated information as per defined standards.
6.	The System should have features to ensure integrity and reliability as per defined standards in conditions like high humidity, dust, rains, temperature variations, and other adverse conditions, that may happen in the Toll Plaza.
7.	The System should be browser independent to the extent possible, the look and feel and the accessibility of the application should be similar across browsers.
8.	The System should automatically detect access by mobile browsers and adjust contents accordingly.
9.	The System must allow archival, retention and deletion of records as per IHMCL/NHAI's records retention policy of retaining records for a period of 10 years.
10	The System should require captcha-based sign-on for any sign-on to the system, unless otherwise specified in this document for a particular module (e.g. Biometric login for TLC)
11	The System should be designed in a modular approach to ensure that it can easily interface with new IT applications and systems that IHMCL/NHAI intends to implement during the project lifecycle, for example, GPS based tolling system.
12	The System should be scalable to other electronic media - Use of other ETC media e.g. Contactless Smart card (e.g. NCMC)), QR based payment, mobile ticketing etc. for rapid toll payment
13	The System should have convenience of Plug and Play feature – Support easy integration with various existing all HETC infra equipment/software at toll plaza, Interface with complementary systems (e.g. Plaza Queue monitoring) for TMS performance management
14	The System should be intuitive, easy to learn system based on level of use with users becoming effective with minimal training time.
15	The System should be designed in a modular approach to ensure that it can easily interface with new IT applications and systems that IHMCL/NHAI intends to implement during the project lifecycle, for example, GPS based tolling system.
16	All webpages should have pop-in as well as separate help menus to help users navigate easily across the system.
17	The System should be integrated with mobile wallet / PPI business as prescribed by the Grantor.
18	The System should cater to various solutions as required by Acquirer Bank as per ICD 2.4 (included in Appendix 4), or the current version as amended from time to time.
19	The System should have features to integrate with various hardware specifications as specified by IHMCL within this RFP and the following RFP: Tender No. IHMCL/HETC/2020/01; However, IHMCL/NHAI reserves the right to delete from /modify/ add to these specifications, from time to time, in the interest of system improvement.
20	The System shall have provision of Data archiving as described below:

A.	General Requirements
	• Summarised data shall be archived on removable media on a regular basis so as to free system resources. All plaza level data shall be transferred to removable electronic media at monthly intervals and stored. The archived data should be secured as per Data Encryption Policy 2017 (https://www.meity.gov.in/writereaddata/files/Guidelines-Contractual_Terms.pdf) • After the expiration of the prescribed period for retention of the data on the various system levels, the data may be removed from the systems. The TMS backend shall provide the facility to perform these functions. The archived data written to the electronic media shall be fully accessible by the TMS and the various reporting facilities of TMS without the necessity of having to restore the data.
21	Data should be retained with the following frequency, at a minimum: • TMS Lane Level :3 months • TMS backend Detailed Data: 12 months • Summarised Data :24 months
22	The System should have adequate backup and redundancy provisions. All transaction and incident data shall be retained, duplicated and stored within the various levels of the TMS 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 from the stored data into its original format.
23	The Graphic User interface on the TCT shall be clutter-free and shall use colours with adequate contrast so as to cause minimum fatigue to the toll collector over the duration of her / his shift. The high contrast shall also make the TCT screen display adequately visible during a high incidence of ambient light like when sunlight directly falls on it. All the displayed text and graphics shall be large enough to be recognized with minimum effort.
24	The System shall incorporate features that will enhance the toll collector's productivity while performing repeated transactions over the shift period. These shall include, at a minimum: • Minimum key presses to complete a cash transaction • Large on-screen text and graphics size • Optimum arrangement of keys on the TCT keyboard
25	The System should adhere to best in class performance requirements. The minimum standards are specified as follows: • Time for the Toll Receipt to be printed: Less than 1.5 seconds after payment confirmation on the TCT by the Toll Collector • Maximum time for validation of a Return ticket / Daily pass: 0.5 seconds • Maximum read time of FASTag (from vehicle arriving over the presence loop and the barrier opening): 1 Second

A.	General Requirements
	• Maximum time for Open loop Contactless Smart Card transaction (Offline) (from the time the card is presented to the validator to the barrier opening): 5 seconds • Any response on GUI to Toll collector key press on the TCT: Less than 1 second • Maximum transaction completion time from vehicle leaving the AVC area until the system getting ready for the next transaction: 1 Second

3.2.2. Vehicle Processing

B.	Vehicle Processing and Plaza Operations

1.	The System should perform the following operations, in the following sequence, for processing a vehicle at the Toll Plaza
	    a. The Boom Barrier should be closed
	    b. The System should check if the vehicle can be processed via electronic transactions. If the vehicle can be processed electronically, then **Error! Reference source not found.** related rules should be followed.
	    c. For vehicle that do not have active electronic payment modes, **Error! Reference source not found.** related rules should be followed.
	    d. The Vehicle's fare should be displayed to the Lane Operator and vehicle user
	    e. Receipt should be printed for cash operations. The receipts should have a QR/bar code that should be able to display following information upon input
	        i. Date and Time of operation
	        ii. Plaza details
	        iii. Vehicle details
	        iv. Cash collected
	        v. Lane number
	        vi. Receipt number
	    f. Triggers should be initiated to capture vehicle's image via various cameras. The number plate details should be specifically captured for ANPR recognition
	    g. The Boom Barrier should be opened
	    h. The loop sensors should detect once the vehicle has passed, and close the boom barrier accordingly
	    i. Steps eland f listed above should not be executed for exempted vehicles. However, step should be executed without fail.

2.	The System should automatically capture the following minimum details associated with each transaction
	        i. Date and time
	        ii. Plaza and lane ID
	        iii. A sequential number assigned based on the data above
	        iv. Vehicle classification (by toll Collector or as read from the FASTag **and** that received from the AVC in both cases)

B.	Vehicle Processing and Plaza Operations

	v. Discrepancy in vehicle classification, if any vi. Vehicle number, if captured by ANPR or manual entry vii. Toll Collector ID in case of manual user fee collection viii. Toll amount collected ix. Fine/Penalty and another amount charged x. Method of Payment: FASTag/CASH/ETC-Card/etc. xi. Exceptional transaction (exemption, convoy and other cases)

3.	The System should automatically transmit the following details regarding the lane to a monitoring system at a Central location
	    i. Lane Mode: Open/Closed/Maintenance
	    ii. Status of following equipment:
	        a. Lane Controller
	        b. Boom Barrier
	        c. RFID transceiver
	        d. Weight in Motion (WIM) equipment
	        e. Automatic Vehicle Classifiers (AVC)
	        f. Internet connectivity (via lease line/dongle/etc.)
	    iii. Total collections via cash/electronic mode since last transmission/for the day
	    iv. Number of vehicles processed since last transmission
	The System should also have features to identify lanes that are not transmitting the above information as per frequency and issue alerts as per defined strategy.

4.	The system should support following components/devices for the operations
	    i. An Overhead Lane sign (OHLS) / Canopy Lane Status Display (CLSD) that indicates to an approaching road user whether the toll lane is open for toll collection or it is closed and if open (in case of the CLSD), the lane mode.
	    ii. An automatic Lane exit barrier (ALB)that allows the road user to leave the lane after toll payment.
	    iii. A traffic light (with Red and Green aspects) (TL) that indicates to the road user whether the vehicle should remain at the toll lane or can exit.
	    iv. The system should also have features for traffic control and guidance of toll paying vehicle through the toll lane

5.	The OHLS sign should display the following details | S.No	OHLS	Automatic lane exit barrier	Traffic Light	Traffic control / guidance
---	---	---	---	---
1	Red	-	-	Don't enter lane
2	Green	Closed	Red	Stop /wait at toll booth (pay axis)
3	Green	Open	Green	Cleared for Exiting the Toll lane	

B.	Vehicle Processing and Plaza Operations			

6.	In case a CLSD is used instead of an OHLS, the following will be the status details of the CLSD			

Lane Mode	Lane Status	CLSD Message Displayed	CLSD Message Color
FASTag – Hybrid mode (also supports other electronic media, validation and cash)	Lane is Open	LANE OPEN	Green
All modes	Lane is Closed	LANE CLOSED	Red
FASTag only mode – Dedicated	Lane is Open	(FASTag Logo) ETC TAG ONLY	Orange
Cashless only mode – FASTag / Other Electronic media	Lane is Open	CASHLESS – No Cash Payment	Purple
FASTag – Hybrid mode for Specific vehicle class	Lane is Open	(Vehicle class Logo) CAR (Vehicle Class) ONLY	Based on lane (MOP) mode

3.2.3. Electronic Tags processing

C.	Electronic Tag processing	
1.		The System should interface with the RFID transceiver installed at the toll plaza to receive the following details regarding an RFID tag - TID - EPC Code - User Code
2.		The System should automatically determine if the Tag is in the Exception list based on Exception list file inputs from the NPCI. Alternatively, the system should also have provision to push the TID/EPC code to designated servers and get the response.
3.	a.	The System should have flexibility to be interoperable with new electronic processing systems based on technologies like EMV/ Credit / Debit card (supporting online transactions), that IHMCL/NHAI may choose in the future.

C.		Electronic Tag processing
		For such technologies, the System should have features to push the relevant code read at the Plaza to the electronic processing system (e.g. Acquirer) via API push, and accept the response via API pull.
	b.	The system shall also have the feature of integration with local Smart card validators (located on the same Toll lane) capable of generating off-line smart card (e.g. contactless, Open-loop, EMV/Rupay bank card) transactions. In this case the system shall send the vehicle class read from the FASTag or through other means, to the validator via a local data link (RS 232/ TCPIP)
4.		The System should automatically open the toll gates for non-blacklisted vehicles, or if the Central Server send the signals to open the gate.
5.		System should deploy the following logic for handling the Exception List files. The TMS shall periodically download the Exception files from their respective Acquirers. On obtaining the FASTag details from the RFID transponder the system shall verify the Tag's Id (based on the EPC code/ TID code) in the current Exception list present in the system. If not found the system shall store the read-in FASTag details for transmission to the Acquirer.
6.		If the Tag's Id is fund in the Exception list ,the System should offer other modes of Electronic transaction (e.g. off-line/on-line Smart card pre-paid / Credit card / Debit card -based transaction). If the user does not avail of any of these or if they fail during an attempt, the system shall offer cash-based transaction for the user.
7.		System should have the capability to capture the information regarding vehicle overweight by fetching the data from the WIM system (if installed), and add the applicable penalty to the payable amount. The System should also display the word "Overload Vehicle" prominently at the lane display.
8.		The vehicle owner/driver should have features to protest the fine and get the vehicle weighed at a static Weighbridge. In case, the vehicle is not overweight at the Static Weighbridge, the System should send message to Acquirer Bank via automatic integration/manual input, to reverse the transaction and initiate a new transaction without the penalty amount.
9.		The System should have the capability to automatically calculate the fare details based on the toll plaza and time of operation.
10.		System should be able to calculate penalties if a non FASTag vehicle has entered the FASTag lane as per IHMCL/NHAI rules.
11.		The System should have feature to alert the customer, Issuer Banks, and NPCI in case of following potential frauds - The tag has been used across different toll plazas within 15-minute window - The tag is used across toll plazas that are not frequently used by the customer - The tag has been used after a considerable period of non-usage
12.		The System should have features to automatically push the captured images to the TMS backend and tag them with FASTag number, time of operations, lane number and the unique transaction number.

C.	Electronic Tag processing
13.	The System should automatically alert the Lane Operator in case of following issues - Vehicle is overweight - The vehicle class as derived from the Mapper and the class from profiler does not match - Vehicle has been Speeding - Vehicle has been highlighted by NHAI/IHMCL/other agencies
14.	In case the System has issued alerts, the Lane Operator should have option to close the lane and prevent the vehicle from passing. If the above is not possible, then the System should automatically alert designated IHMCL/NHAI officials for necessary actions.

3.2.4. Fare Calculations and Cash Operations

D.	Fare Calculations and Toll Operations
1.	As the vehicle approaches the Pay-axis on the Toll Lane, the Lane operator in the Toll booth classifies the vehicle on the TCT keyboard. The System shall also capture the videos/images of such vehicles and tag them with transaction time, and vehicle number (as captured via ANPR/manual entry).
2.	The system should have features to automatically detect the vehicle number via ANPR based system and show the same on the screen. In case of issues, there should be provision for the operator to enter the vehicle number. The operator should have provision to skip the number entry, if required. However, the system should mandatorily require the input/capture of vehicle number in case the Class has been over ridden.
3.	The system shall have the facility to automatically calculate the fare based on the following details - Toll plaza - Class of vehicle - Time of operation - Vehicle weight - Return journey - Cash vehicle entering the ETC Lane (double the Toll amount) It is possible that all the above parameters or a subset among them may be used for fare calculation. It shall be possible to configure the system accordingly during system commissioning.
4.	System should be configurable to configure customized Toll fares at each individual toll plaza for different category of vehicle as per toll guidelines issued from time to time, and automatically push the same to individual Toll Plazas from a central system.
5.	System should have feature to receive the images from various toll plazas and store them at a Central location. The images should be tagged with transaction based on the time stamp and the toll plaza/lane location. The retention period for these

D.	Fare Calculations and Toll Operations
	images shall be 90 days, or till the dispute (associated with the transaction) is resolved, whichever is higher
6.	System should have the capability to accept the information regarding vehicle overweight (with the Vehicle weight received from the WIM) and add the applicable penalty to the payable amount.
7.	The system should have features to perform the following activities upon receipt of cash by the operator - Enter the cash received - Display the change payable - Open the cash register - Print the Toll receipt - Open the Boom Barrier
8.	The System should automatically alert the Lane Operator in case of following issues - Vehicle is overweight - Vehicle has been Speeding - Vehicle has been highlighted - The vehicle class is different at different plazas
9.	In case the System has issued alerts, the Lane Operator should have option to close the lane and prevent the vehicle from passing. If the above is not possible, then the System should automatically alert designated IHMCL/NHAI officials for necessary actions.
10.	The System should have features to handle following categories of exceptions and calculate fare as per policy specified by IHMCL/NHAI - Single Journey/Return Ticket / Daily pass - Monthly Pass - Local vehicle Pass (concessional Toll) - Exempt Vehicle The system should be able to perform the above calculations for both electronic and cash-based payments.
11.	The System should have features to handle Convoy vehicles via the following approach - Lane Operator should be required to press the Convoy button to start the transactions - The display boards should display fare as Zero - There should be no receipts for these vehicles - Alert the supervisor regarding Convoy operations - Capture images and videos and mark them accordingly - Continue the operations until the Toll Operator presses Convoy key followed by the `accept' key, post which the system should resume normal operations
12.	The System should have features to capture details of "run-through vehicles" that pass the Toll Plaza without paying toll. The System should automatically capture images of such vehicles and send to IHMCL/NHAI/relevant authorities at the end of

D.	Fare Calculations and Toll Operations
	day. The above features should also be available for vehicles that have been classified inaccurately.
13.	System should have the capability to capture the information regarding vehicle overweight by fetching the data from the WIM system (if installed), and add the applicable penalty to the payable amount. The System should also display the word "Over Weight Vehicle" prominently at the lane display.
14.	The vehicle owner/driver should have features to protest the fine and get the vehicle weighed at a static Weighbridge. In case, the vehicle is not overweight at the Static Weighbridge via automatic integration/manual input, the System should display the new amount (after deducting the penalty), and have features to accept the fees. For this purpose, the system shall support a suitably featured user interface on a Desktop computer / Mobile device located at the Static Weighbridge
15.	The System should have features to accept "Towed vehicles", such vehicles should be processed only via cash. Even if the Vehicle has a FASTag, or electronic payment instrument, the System should not send the transaction for processing. The following steps should be adopted for processing these vehicles - The Toll Collector Presses Towed Vehicle key - The Toll Collector enters number of vehicles being towed and their class - The System displays the total amount payable - Toll Collector confirms receipt of due amount - Boom barrier is opened - The loop sensors allow Boom Barrier to be opened till the entered number of vehicles have passed

3.2.5. Plaza/Lane Management Module

E.	Plaza/Lane Management Module

1.	The Lane management module should have the following features
	• Login/Logout
	   o Toll Collector/Fee Collector
	   o Supervisor
	   o Maintenance
	• Lane Mode /Configuration
	   o Hybrid Lane (supporting Cash, and ETC)
	   o ETC Lane (Dedicated)
	   o Cash (Semi-Automatic)
	• Mode of Operation
	   o Idle/Closed Mode
	   o Open Mode
	   o Local Mode
	        ▪ Local Mode Without TMS (Server)
	   o Maintenance Mode
	• Mode of Payment
	   o Cash

E.	Plaza/Lane Management Module

	o Local/Monthly Pass
	   o Smart card
	   o Barcode/QR code - Multiple/Return journeys
	   o Credit card/ Debit Card
	   o Wallet
	   o FASTag / Electronic mode/Other electronic mode
	   o National Common Mobility Card
	   o Exempt
	  • Journey Type
	   o Single
	   o Return
	   o Exempt
	     ▪ Emergency/Authorised Exemption
	     ▪ Non- Emergency/Local Exemption
	   o Violation
	   o Multiple

2.	The following steps should be performed to complete the login of the Toll Collector - The Toll Collector scans his/her card and/or scans the biometric sensor - The Toll Collector enters details of the cash-in-hand before starting operations - The supervisor verifies the above details via biometric verification - System maintains a log of above events and their respective time The lane is tagged as "Under Maintenance", and no operations are allowed on the same till the above are completed. Post completion of the above steps, the lane operations can resume and the lane mode changes from "Under Maintenance" to "Operations"
3.	The following steps are performed once the Toll Collector finishes the duty, or takes a temporary break - Toll Collector selects the "Log Off" option and verifies the same via biometric, and/or card input - System puts the lane under "Maintenance Mode" and no operations are allowed - A report is generated of the total cash collected. The report also displays the total cash expected from the Toll Collector - The supervisor accepts the log off activity - The lane remains in "Maintenance Mode" till a new login is performed on the same The System prompts the supervisor to tally the cash collected and automatically adds the above to the total amount to be submitted in the Bank,

3.2.6. Plaza Activity Module

F.	Plaza Activity Module
1.	The System should have features to perform the following plaza related activities - Admin Activity - Authorize Staff - to add new staff/add authorization levels - User Rights – to add/remove/update rights of various users - User Rights Report – To generate report of various system users and their rights - Unlock Shift – manually treat shift as complete if the operator has to leave due to emergency - Release Login – release the plaza from systems' preview as per instructions - Vehicle Tracking – capture details of vehicles being tagged in the system - The System should have features to ensure that the activities above capture the details of various instructions issued by IHMCL related to the activity.

3.2.7. Finance and Accounting Module

G.	F&A Module – General Requirements
1.	The System should have the provision for not to allow the vehicle to pass in case the funds are not sufficient for operations for dues, or if the tag has been debarred by user/ IHMCL/NHAI.
2.	The System should also create a provision where the above control can be overridden to varying degrees (like part payment accepted, no payment accepted) based on approval received from the appropriate IHMCL/NHAI authority
3.	The System should have a provision for requesting such relaxations for predefined reasons which will then be approved by appropriate authority
4.	The System should have provision to create, edit, delete predefined reasons

H.	Accounting Requirements
1.	The System should facilitate definition and configuration of the Chart of Accounts (CoA) to capture all financial transactions pertaining to the Operators/User. The CoA should have multiple level and the levels should hierarchical relation i.e. parent-child relationship
2.	Facility for creation, modification and deactivation of CoA should be available
3.	Newly created CoA should be automatically available for payment deposit, payment posting etc.
4.	The System should facilitate the system to automatically transfer the due amount to an escrow account, and transfer the amount to Vendor as per specifications of IHMCL/NHAI.
5.	The System should maintain electronic payment register, cash book, ledger accounts and sub ledger accounts as the case may be for each Operator as applicable

6.	The System should update the payment register as soon as it becomes due and must automatically update the cash book and ledger account for each Operator based on the payment made or reconciliation
7.	The System should capture/post the accounting transaction as per the defined chart of accounts
8.	The System should capture the timing of each transaction
9.	The System should ensure prohibition of CoA use based on the user profile
10.	Facility should provide to adjust the advance with multiple payment head (fully or partially)
11.	During partial payment The System should appropriately handle penalty, interest and fees
12.	The System shall implement mechanisms to split and allocate the total amount received from the User to the respective transactions, if User has paid a lump sum /consolidated amounts for multiple transactions together
13.	The System should have capability to handle payment and accounting of each offices separately
14.	The System should automatically post different components (Fee, penalty, tax etc.) of a transaction in respective heads of account
15.	The System should have facility for segregating revenue earned component and tax payable component to enable IHMCL/NHAI to calculate their tax deposit liability
16.	The System should automatically compile the accounts statement and reports at the level of IHMCL/NHAI HQ, Regional Offices, User, Operator, Service Types, etc. for each financial year

I.	Payment Reconciliation
1.	The System should reconcile the operations at a toll plaza with ETC amount debited from the customer. The system should automatically issue alerts to the operator and IHMCL/NHAI in case of any issues.
2.	In case of mismatch between debited and demanded amount, the lesser of the two should be highlighted to the Operator for raising disputes, if applicable.
3.	The System should have the facility to capture/upload bank statement/transaction detail from bank's software/web services/External drive etc.
4.	The System should have facility to link its own financial record with the bank transaction record and reconcile the same
5.	Failed reconciliation is to be reported
6.	Facility should be provided for auto reconciliation of batch data or reconciliation by manual selection of payment detail.
7.	Transaction should be posted in cash register once the reconciliation is complete

3.2.8. Integration Module

J.	Financial Partners
1.	The System should have features to calculate the following details for any Lane/Plaza at any point in time - Cash issued to the Lane Operator - Cash expected from the Lane Operator (basis vehicles passing through the plaza)
2.	The System should enable designated officials to view the above report and verify if the cash expected was received. The System should also have features to enter number of currency notes/coins' designation received from the Lane Operator and tally the results.
3.	The System should have designated module to enable cash submission at the bank. This module should automatically display number of various currency/note denominations and the total amount to be submitted at the bank.
4.	The System should have features to integrate with the bank statement (excel/xml/csv) and confirm the details of submitted amount versus bank details. The System should automatically flag transactions that do not match, or do have corresponding statement.

K.	Technology Partners
1.	The System should have features to integrate the system with following IHMCL/NHAI Systems - Tag registration mobile application In addition, the System should also have capability to integrate (by exposing APIs) with Five (5) additional applications defined by IHMCL/NHAI, subject to the overall transaction volume not exceeding ten (10) times of current load, as a result of the changes.
2.	The interface to the FASTag transaction Acquirer system is implemented on TCP/IP over a public internet. The transaction processing and interfacing with the Acquirer system shall meet all relevant requirements included in the following documents: • Procedural Guidelines, National Electronic Toll Collection Network (NETC Network), version 1.7, Jan 2018 • Central Clearing House (CCH) Interface Control Document, version 2.4 (or the current version)
3.	While the present system relies on the Secure File Transfer Protocol (SFTP) for transferring both Vehicle Identification records (Toll Transaction related) to the FASTag Acquirer as well as to receive the Exception (Black) list , Toll & violation Reconciliation records and Discounts related data from the FASTag Acquirer, IHMCL may adopt and specify an approach in the future involving online data transfer (e.g. using an API) or any other approach to enhance performance. The Contractor shall implement this approach in the TMS as an addition to the existing approach (i.e. SFTP) with an option of either approach to be used by the TMS operator / Vendor.

K.	Technology Partners
4.	The TMS shall provide secure interfaces via a TCP/IP link (dedicated link / VPN / Public internet) for MoRTH/NHAI/IHMCL authorized remote monitoring systems to acquire data from it in real time. The data required will include all those captured in the TMS including TMS lane system performance data, Toll collector performance data, traffic data including Toll Plaza throughput, Transaction data, financial data and all relevant data to determine all aspects of Toll plaza performance including its operational efficiency and effectiveness.
5.	The TMS shall provide performance monitoring via the Lane Status Display Unit. This will involve the comprehensiveness and the level of detail the TMS provides for on-line system performance monitoring.
6.	The TMS shall provide flexibility to define toll fee tariffs over and above the NHAI toll fee tariff table which will enable extending of tariff table to include more vehicles (e.g. two wheelers, three wheelers) and toll schemes (e.g. Toll Tariff depending on day of week, time of day can be predefined and stored in system for activation on a specified date)
7.	The TMS shall provide on-line transmission of FASTag Vehicle Identification records from the lane controller to the TMS server. On-line transmission to TMS server results in quick transfer of vehicle identification records to the Acquirer system thus resulting in faster updates of exception which in turn enhances road user experience as well as reduces the potential of chargebacks.
8.	The TMS shall provide Live Performance Monitoring of the TMS. This feature helps monitoring the lane-wise Toll Plaza traffic on-line.
9.	The TMS shall provide option to select lane operation mode which will help in configuration of the different modes of lane operation (e.g. Hybrid, Dedicated etc) proposed. For example, in case of failure of a Dedicated FASTag lane, an adjacent Hybrid lane can be quickly configured to be a Dedicated lane, until the original Dedicated lane is set right.
10.	The TMS toll products shall be configurable which will allow new toll products / schemes like e.g. time -based (e.g. Weekly pass, Monthly pass) or Trip-based (Limited trips) or a combination of both (e.g. Monthly pass with limited number of trips) can be introduced.
11.	The TMS shall enable user configurable toll vehicle classes i.e. new vehicle classes can be introduced into the system and can be effectively implemented provided the AVC system can uniquely classify them with a high level of accuracy.
12.	The TMS Toll collector user interface shall use high contrast between graphics/text and the background for easily readability even in the presence of high ambient light. Toll collector interface should facilitate easy readability and high contrast enhance toll collector efficiency and reduce toll collector fatigue.

K.	Technology Partners
13.	The TMS should capture presence of a Media (RFID) for audit. For example, whether a single daily pass is fraudulently shared by several vehicles and mis-used or daily pass that is paid by cash (with a printed barcode on a receipt) or even with a FASTag affixed to a portable glass plate and shared between vehicles. The system should have functionality to highlight and mark such records for enabling authorities take necessary steps.
14.	The TMS should have functionality for transaction audit and availability of evidence. The Auditor in the TMS has the responsibility of resolving incident / violation transactions like: a) Where AVC class does not match with the Toll Collector class (in case of cash transaction) or when AVC class does not match with the vehicle class written on FASTag. b) When a vehicle has been exempted from paying toll by the toll collector. c) When a vehicle has 'run through' a toll lane without paying toll. The TMS should provide a rich list of evidence to the Auditor including Vehicle Image/ Video, License Plate, AVC profile, WIM Measurement, SWB measurement to help her/him make an informed decision.
15.	The TMS should facilitate user customizable report. Such a feature aids the user to generate specific analytical reports that provide a better insight into the TMS performance for its improvement. Such reports may not be a part of the standard list of reports present in the TMS but can be customized as per requirement.
16.	The TMS shall provide web-based performance monitoring and transaction audit feature for remote performance monitoring and transaction auditing.
17.	The TMS shall have functionality to detect and highlight error in Lane Status Display Unit (used for performance monitoring) through which an issue alert shall automatically be sent to the authority.

L.	System Integration
1.	The System should have features to integrate with the following peripherals | S. No	Device	Typical connection type from the System (as per specification, or similar solution)
---	---	---
1	Incident Camera & License plate recognition camera	TCP/IP
2	User Fare Display	RS 232
3	Automatic Lane Exit Barrier	Digital I/O	

L.			System Integration		
		4	Traffic Light	Digital I/O	
		5	Over Head Lane Signal (OHLS) / Canopy Lane Status Display (CLSD)	Digital I/O or data link using RS 232/RS 485 or TCP/IP	
		6	Credit/ Debit/ CSC/NFC reader / validator	RS 232 or TCP/IP	
		7	AVC system data	Via RS 232 to Lane controller and TCP/IP to the TMS backend OR Via TCP/IP to both the Lane controller and the TMS backend	
		8	TLC / AVC door status	Digital input	

2.	The above interactions should be via secure/encrypted communication protocols.
3.	The above requirements are indicative, and the System designers can recommend new backward compatible connectivity protocols for the above equipment basis the latest industry protocols/Indian requirements.
4.	Although the main information transfer in many peripheral devices is only one way (i.e. output) from the TMS lane system (e.g. OHLS/CLSD, TL, UFD), the TMS lane system shall support two-way communication and obtain the device status, in as much detail as possible, based on the hardware connectivity / Device driver / communication protocol provided by the device manufacturer/ vendor.
5.	In general, the TMS shall communicate adequately to activate all possible controls/displays supported by the peripheral device/system and to obtain all possible information provided by the Peripheral device / System.
6.	A non-response of the Device / system over the communication channel shall be tagged as an event and communicated on-line to the TMS backend. Further the restoration of communication shall also be tagged as an event and communicated on-line to the TMS backend.
7.	The communication shall be secure to the maximum extent possible supported by the device connectivity.
8.	Loop Failures (related to loop for Presence detection or AVC or barrier) shall be automatically detected.
9.	All such obtained device/ system status information, as detected and captured above, shall be transferred on-line to the TMS backend.

3.2.9. Employee Module

M.	Configuration Dashboard
1.	The System must support Role-based access for administrators and users.
2.	The System should have facility for creating/editing/deleting Vehicle category, toll rates, plaza contracts, employee assigned, etc. so that the same may be used for toll calculations
3.	The System configuration module should be accessible only to a selected group of users across each department and office
4.	Every update in the System configuration should require approvals from a user at least one level above the updating user. All the changes should also be available for audit purposes.
5.	By default, the System should populate the related fields of a form if one parameter is selected, therefore list of meta data should be created for all possible fields
6.	The System should have facility for creating/editing/deleting fee rates for various services rendered by IHMCL/NHAI
7.	The System should keep history of year wise fee rate and facilitate automatic calculation of fee for a given year for a given service
8.	The System should have facility for creating/editing/deleting various rate of penalties or interests relating to specific service, time period etc.
9.	Facility for multiyear fee, penalty and interest calculation should be provided considering variable rate for multiple year
10.	The System should have facility for creating/editing/deleting Account Head or Chart of Account (CoA)
11.	The CoA should have hierarchical relation between its various levels
12.	Facility for creating relation between CoA and services/fees should be provided
13.	The System should have facility for creating/editing/deleting document list required for various application type/service type and the minimum information that needs to be captured in the Form for each of the applications
14.	The System should facilitate creation and modification of workflows related to activities like changes in new plaza, updates in fare rules, modification in issuer banks list, etc.
15.	The System should have facility for creating/editing/deleting various roles, users etc. for System use
16.	The System should have facility for creating/editing/deleting linkages between roles, users, workflow etc.
17.	The System should have facility for creating/editing/deleting tasks and linking/assigning the same with roles/users
18.	Facility should be there for assigning, reassigning, activating, deactivating etc. for various task, users and roles
19.	The System should have facility for creating/editing/deleting list of standard comments/reasons and facility to link it with various task/workflow etc.

M.	Configuration Dashboard
20.	The System should facilitate definition, configuration and criteria setting for the key events and related alert or messages
21.	The System shall facilitate making necessary changes to the existing structure for fee, fines and other charges based on the revisions in the policy
22.	The System should have facility to define and configure exemptions, rebates, special cases etc. for various transactions and also for financial matters
23.	During various processes/operation in the System, these exemptions, rebates should be automatically considered
24.	The System should provide provision for creating, editing, deleting various type of commissions for different transactions
25.	The System should have facility for creating vendor/contract users and their commission for different type of transactions
26.	The System must maintain an audit trail of all updates in the meta data
27.	The System shall require following additional security mechanisms for following categories - One-time password for critical approvals (for example updating the toll rates) - Digital signatures for senior management

N.	Workflow Approvals
1.	The System should facilitate creation and modification of workflows
2.	Facility should be there for assigning, reassigning, activating, deactivating etc. for various task, users and roles
3.	The System should have facility for creating/editing/deleting various roles, users etc. for The System use
4.	The System should have facility for creating/editing/deleting linkages between roles, users, workflow etc.
5.	The System should have facility for creating/editing/deleting tasks and linking/assigning the same with roles/users
6.	Definition of transactions should include issuing unique identification code to the transaction, name of the transaction, brief description of the transaction, etc.
7.	The System shall facilitate definition of master list of transactions under the respective service types
8.	The System shall facilitate definition and configuration of mandatory transactions from the master list of transactions including its periodicity
9.	The System should enable many-many relationship between various activities, roles and users.
10.	The System should have facility for re-assigning any task to other relevant user from the front-end GUI to handle absence of any user on a particular day
11.	The System should have facility for creating/editing/deleting list of standard comments/reasons and facility to link it with various task/workflow etc.

N.	Workflow Approvals
12.	The System should facilitate definition, configuration and criteria setting for the key events and related alert or messages
13.	The System should enable linear as well as parallel approvals.

O.	IHMCL Dashboard
1.	The System shall have an online work space for each of the designated employee within IHMCL/NHAI.
2.	The entry to the dashboard should be via employee id and password.
3.	For certain employee categories, The System must only allow entries to machines that have a security certificate installed on the machines.
4.	The System should automatically require password reset after 90 days.

5.	The dashboard shall present the following information to employees by pushing relevant information from Plazas to a central system
	• Different disputes/issues regarding payment reconciliation
	• Role base hierarchical dashboard.
	• Status of ETC toll plazas across various tolls plazas under the jurisdiction of the employee. The status should display the following information, at a minimum
	   o Plaza Name
	   o Number of lanes
	   o Lanes where ETC equipment is not functional
	   o Lane-wise name of the non-functional equipment
	   o Contact details of following – Vendor and IHMCL/NHAI employee
	• Integrated Dashboard to monitor real time cash collection across different toll plazas along with ETC transaction and health status of HETC equipment installed at each toll plaza.
	• Reporting dashboard with (at least) following reports
	   o Revenue target vs. actual revenue generated
	   o Plazas with maximum issues with ETC lanes
	   o Resolution time for the ETC issues.
	The reporting dashboard should have a hierarchical integration. For example, supervisor should be able to see reports for all reporting employees at an individual and aggregate level
	Following additional reports should be available for senior management across with option to split the same across department/plaza operator/region
	Revenue targets vs. actual collection across ROs/PIUs
	Override reports across offices
	The management dashboard should also be hierarchical and allow senior management at Central office to view reports across all offices, while regional offices should be able to see only their data. Similarly, the views of department heads should be restricted to their departments.

O.	IHMCL Dashboard
	The management dashboard should have option to select any/all of the following items and generate the report(s)
	time,
	office,
	revenue,
	transaction type,
	vehicle type,
	User Type,
	Plaza Operator,
	HETC Equipment,
	Account Heads
	The dashboards should have easy to use Graphical User Interface to customize reports and make comparisons.
	• The dashboard should also display KPI adherence for all the KPIs defined under the provision of Operation and Maintenance, for identified IHMCL/NHAI users.
6.	The dashboard must have facility to generate on-demand reports based on criteria defined above.
7.	The dashboard must have facility to enable identified users to download data for archival purpose in an easy to use format (for example excel).
8.	The dashboard should also have the facility to define the frequency of report generation and the intended recipients. The System should then automatically email the reports to defined users.
9.	The System should have facility to allow only certain IP addresses to access some sections of the solution
10.	The System should highlight tasks that have allocated to IHMCL/NHAI officials via a pop-up window. They should have option to act on task, or postpone for later. For tasks that have not been acknowledged within a time-frame, The System should highlight details to supervisor for reallocation.

P.	System Dashboard
1.	The System shall have a System Dashboard for defined class of IHMCL/IHMCL/NHAI users. The System Dashboard should allow users to change the system configuration as per requirements/legislative changes.
2.	The entry to the dashboard should be via employee id and password.
3.	For System Dashboard access, The System must only allow entries to machines that have a security certificate installed on the machines.
4.	The system dashboard should allow for editing of following Toll plaza details – - Add a new toll plaza - Change the number of lanes - Change the ETC lanes

P.	System Dashboard
	- Change the Toll Operator - Delete the toll plaza - Edit the mapping between plaza and rates
5.	The system dashboard should allow for editing of following Vehicle Class details - Add a new Vehicle Class - Drop a vehicle class - Change the rates associated with the vehicle class
6.	The system dashboard should allow for editing of following Toll Operator details – Add a new Toll Operator - Assign a Plaza to Operator - Drop the Plaza from Operator
7.	The system dashboard should allow for editing of following Employee details – - Add a new Employee - Assign a Plaza to Employee - Drop the Plaza from Operator

3.2.10. Reporting Module

Q.	Revenue Dashboard
1.	The System should have module to generate the following reports, but not limited to: - • Shift Collection Report • Manual/Cancel Report • Till Time Collection report • Periodic system collection Report • Transaction Report • Periodic Transaction Report • Day Collection Report • Discrepancy Transaction Report • ETC Collection System should also have features to automatically integrate the above reports, or to dissect the same at a plaza/project/PD level.

R.	Other Dashboard
1.	The System should have module to generate the AVC reports • AVC comparison/Accuracy Report • AVC Traffic count Report • Back up AVC Transaction Report
2.	There should be features to generate the following Traffic reports • Lane Wise Report • Class Wise Report • Traffic Count Report • Traffic count summary Report • Monthly Traffic Report

R.	Other Dashboard
3.	There should be features for following Event reports • Day Violation Report • User Activity Report • Exempt Vehicle Report • Cash collection in FASTag exclusive lanes • Total ETC Collection • Total Cash Collection • Simulation History Report • Exemption Report
4.	There should be features for following Audit Reports • Audit Transaction Report • Post Audit Collection Report
5.	There should be following WIM reports in the system • Overweight Revenue Report • Overweight Amount Summary Report • WIM Transaction Report • SWB overloaded Transaction Report • WIM Transaction Vs SWB Report • WIM data received Report
6.	The system should have features for following ETC reports • Acquirer File Upload Download Details Report • Acquirer File Transaction Report • ETC Transaction Report • TMS CCH Transaction Reconciliation Report • Transaction Vs missing Reconciliation Report • Vehicle number wise ETC Transaction Report
7.	The system should have features to automatically track the status of various equipment at the plazas/lanes on an hourly basis
8.	The system should have features to automatically report all the above reports to authorized representatives/IT systems in IHMCL/NHAI.

9.	The system should be customizable to include any of the following incidents in the reports:
	    1. Date / hour change
	    2. Hybrid lane open
	    3. Dedicated/FASTag Exclusive lane open
	    4. Lane closed
	    5. Invalid toll collector
	    6. Tariff change
	    7. Lane into maintenance mode
	    8. Lane out of maintenance mode
	    9. Vehicle detected without collector classification (run through)

R.	Other Dashboard
	10. Vehicle discrepancy 11. Time exceeded for vehicle exit from lane 12. Classification cancelled [for toll collector, lane] 13. Vehicle reclassified 14. Extra receipt printed 15. TLC enclosure opened [sound buzzer] 16. TLC enclosure closed 17. Low disk space warning on TLC 18. Low disk space warning on TMS related server 19. Low disk space warning on local drive 20. Insufficient memory warning on TMS related server 21. Loss of communication with TMS lane system (specific TLC/AVC) 22. Communication with TMS lane system re-established specific 23. TLC/AVC) 24. Loss Communication with specific TMS backend server 25. Communication with TMS lane system re-established 26. Change of TLC mode without permission 27. Equipment failure: Sensor 1 28. Equipment failure: Sensor 2 29. Equipment failure: exit barrier 30. Equipment failure: AVC 31. Equipment failure: etc. for all equipment 32. Database corrupt [all database] 33. Toll collector confirmed bleed-off 34. Vehicle without valid FASTag detected in the toll lane 35. Panic alarm initiated 36. Shift opened 37. Shift closed 38. Change in toll collector database 39. Change in user access level 40. FASTag unreadable 41. FASTag in Exception List 42. Failure reading tariff table 43. Toll collector login 44. Toll collector logout 45. Run through violation 46. Class discrepancy – Over-classification 47. Class discrepancy – Under-classification 48. Pass back of any vehicle (any vehicle passing through the Toll plaza in the same direction within in a pre-defined time period) In addition to the above, IHMCL/NHAI can design/make any activity to be an incident in the TMS and get its status/reports.

3.2.11. Other Features
- i. Performance monitoring
- ii. TMS Administration
- (a) User Management
- (b) Shift Consolidation
- (c) Day Consolidation
- (d) Data Reconciliation User Interface
- iii. Axle weight Measurement
- iv. Independent Vehicle class and Image Acquisition
- v. Maintenance Tool
- vi. Data security and Data integrity (Lane level & TMS Level)
- vii. Remote Monitoring - Head Quarter Management System
- viii. Architecture related - Modular organization

Annexure C

Roles and Responsibilities as Acquirer Bank

The successful bidder shall carry out all roles/responsibilities of Acquirer Bank as defined in the documents by NHAI/IHMCL/NPCI.

A. Business Functionalities:

A.1. The selected vendor is required to integrate their systems with toll plaza operators for the purpose of acquiring transactions happening on the ETC lanes. They would also integrate their system with NPCI's ETC system [ETC Switch and ETC Mapper] to facilitate the toll fare calculation as well as transaction processing.

A.2. This solution should cover the following components of the entire transaction life cycle for ETC transactions initiated at the Toll Plaza Server and should send to the Acquiring Host, which then gets processed through the NETC System.

The selected vendor should undertake the following roles and responsibilities.

- To integrate with Toll Plaza System and NETC System.

- To contract with toll plaza operators and to deploy the acquiring host, that includes installation and management of NPCI and/or issuer bank public keys, adequately protected for integrity.

- The host should support both online and offline means of communication with toll plaza operators (preferably online).

- The vendor should have system having feasibility to support primary and secondary systems to ensure connectivity with multiple endpoints.

- Should be capable of processing payment transactions to make payment the toll plaza operators for the processed transactions.

- Should be capable to transmit the completed transaction records to the issuer in order to obtain the settlement with in TAT.

- Should be capable to send all the transactions which are executed at the lane controller to NETC system i.e. successful, fail, decline NETC

- Should be capable to keep the image files provided by the toll plaza operators [i.e. AVC profile, Vehicle Image NETC for a period of one year.

- Should manage the business rules relating to toll fare calculation and share the of exception list, Local exemption list (discount file list) with toll plazas.
- Should share vehicle class discrepancy (i.e. mismatch between AVC and mapper vehicle class) and exempted vehicle transaction details with toll plaza.

- The vendor needs to assist the disputes raised by Issuers or toll plaza operators. The vendor is responsible for the resolution of disputes as per the applicable TAT.

- Should provide support helpdesk to Toll plaza operator by means of toll-free numbers.

B. Integration with Toll Plaza System

B.1. The toll plaza server will process the transactions in the specified format and send it to the acquiring host system for toll fare calculation and transaction processing. The communication between toll plaza server and the acquirer host shall be online only. The responsibility of providing internet connectivity at the toll plaza lies with Service Provider. The processing mostly covering interoperability needs to be carried out depending on availability of connectivity. The specifications and processes defined by NPCI / NHAI / MoRTH / IHMCL / any other statutory authority should be adhered to.

B.2 The successful bidder may also be required to integrate the proposed system through RFP to any other system/software/equipment as per requirement of IHMCL/NHAI without any additional financial implication to IHMCL.

C. Integration with NETC System

C.1. The Service Provider will integrate their host system with the ETC system (ETC Switch and ETC Mapper) hosted by NPCI. The vendor has to ensure the transaction data is in the specified format as defined by the ETC System interface specifications.

C.2. The Service Provider's host system should contain the business rules for toll fare calculation. On receiving the transaction information from the toll plaza server, the acquirer host will check the tag status from the NETC Mapper, calculate the toll fare based on vehicle class received from NETC mapper and present the transaction messages to NETC switch for further processing.

C.3. The specifications and processes defined by NPCI / NHAI / MoRTH /IHMCL any other statutory authority should be adhered to.

D. Online Transaction Processing

D.1. The System should support both online and offline means of communication with toll plaza operator for Transaction Processing. It should send all transactions which are executed at the lane controller to NETC system i.e. successful, fail, decline etc. Keep the image files provided by the toll plaza operators [i.e. AVC profile, Vehicle Image etc.] for a period of one year.

D.2. The vendor should manage the business rules relating to toll fare calculation - Check tag status from Mapper. Acquirer host fetches vehicle class, vehicle registration number, tag status & issuer bank ID. The acquiring host system has to be configured with the applicable toll fare calculation business rules for the acquired toll plaza. The business rules might consist of: -

 D.2.1. Standard fare rules – This includes the rules for calculating toll fare as per the standard fare defined for the vehicle class.

D.2.2. Exemption rules – This includes different types of concessions   be regulated by one or more exemptions applicable for the toll plaza like- Local resident exemption, applicable discounts or concessions on purchase of monthly pass, Distance based toll fare discount or concessions etc.

D.3. The standard and exemption rules are defined by the toll plaza operator (as per the norms stated by concerned authorities). The acquiring host should support all such business rules defined by the toll plaza operator.

D.4. Transaction Settlement – The vendor should undertake end-to-end transactions and settlements within defined TAT.

D.5. Violation Management - Acquiring System should have provision to process the violations (due to Vehicle Class Mismatch) raised by the Toll Plaza. System should have a mechanism to audit the supporting Images of Violations and raise a Credit or Debit Adjustment based on the auditor's class.

D.6. Exception list - Acquiring host should be able to receive the exception list, exemption list from NETC through both offline and online channels. The acquiring host system has to synchronize the exception list with the toll plaza server. The acquirer can get the exception list using one of the following methods or as defined by NPCI and any statutory authorities.

- The Service Provider's system should periodically fetch the latest exception list from the NETC System and send the same to toll plaza server every 10 minutes. The Toll plaza server will update this exception list to lane controllers within 10 minutes of its receipt.

- The acquiring system should also have an option to download the exception list from the SFTP server.

D.7. Exception list

D.7.1. Blacklist: A blacklist is a list of tag ID which will not be accepted at toll plaza. NHAI/IHMCL can request Service Provider or acquirer to add/remove the tag ID in the blacklist.

D.7.2. Low Balance List/Grey list: If the balance in the customer's account linked to the tag comes below a threshold limit, that Tag ID will be added to this list and the notification is sent to the customer for low balance. This list will be provided by the Service Provider.

D.7.3. Exempted Vehicle Class List: Unless otherwise stipulated, no toll fare will be charged for the vehicles that come under this category as defined by the respective authorities from time to time. Few examples can be, as VVIP convoy, Ambulance, Fire brigade, Police Vehicle.

D.8. Transaction Reconciliation – Acquiring host should perform transaction reconciliation on daily basis with Toll Plaza operator data and send the report. Acquiring host should also perform the reconciliation with NETC system data and identify the discrepancy transactions. Acquiring host should settle all the transactions which are accepted by NETC system.

D.9. Dispute Handling – Service Provider shall have all the liability and responsibility to handle dispute resolution with Toll plaza operator.

D.10. The vendor system should carry out the transactions as detailed in NPCI document. The clearing and settlement process along with the transaction life cycle will be as per NPCI documents released from time to time.

E. **Helpdesk for Toll plaza operator**

E.1. The vendor should provide helpdesk or toll-free services to toll plaza operator for resolving any issues pertaining to NETC Transaction, as per the SLAs provided by IHMCL. It is the responsibility of the vendor to ensure all the transactional conflicts are resolved for the toll plaza operator as per TAT.

F. Technical Requirements

i. The technical requirement for Acquiring system for NETC will be governed by the Technical specifications and processes as defined by NHAI / MoRTH / IHMCL or any other statutory authorities.

ii. As per specifications defined by IHMCL, the vendor should submit detail diagram, data flow information, security maintenance etc. End to End management of the solution should be covered by the vendor.

iii. The vendor should submit declaration that the NETC acquiring system proposed is fully compliant with NHAI / MoRTH / IHMCL specifications.

iv. The vendor is required to go through NHAI / MoRTH / IHMCL documents on NETC acquiring and should comply to all technical and functional requirements.

G. Help Desk Requirements

A 24x7, 365 days per year, robust online customer / Toll operator support facility for all sorts of issuing / acquiring related queries. Service Providers support staff should be well trained to effectively handle queries raised by the customer / employees etc. Bidder should provide MIS reports periodically to IHMCL, for example: Volume of calls / per day, resolution % per day etc. Help desk should support all issuing and Acquirer queries.

Annexure D

Indicative List of Toll Plazas

S.No.	Plaza Name	RO	Number of lanes	ETC Traffic Count FY 18-19	ETC Traffic Amount FY 18-19 (in Rs.)	ETC Traffic Count FY 19-20 till 24.03.2020	ETC Traffic Amount FY 19-20 till 24.03.2020 (in Rs.)
1.	Manoharabad	Hyderabad	6	4,90,025	12,86,79,715	11,18,649	26,11,34,720
2.	Guabari	Kolkata	8	36,657	61,95,570	3,87,088	6,88,34,680
3.	Kelapur	Nagpur	4	3,680	4,22,975	2,86,218	9,34,70,360
4.	Panchvati Colony	Vijayawada	8	5,66,809	8,57,64,552	10,82,835	13,16,65,135
5.	Madapam	Vijayawada	8	5,81,888	11,99,91,995	10,18,329	11,52,37,905
6.	Chilakapalem	Vijayawada	8	8,57,785	13,81,53,590	13,02,278	19,78,09,865
7.	Agnampudi	Vijayawada	8	8,43,250	12,13,60,550	13,81,034	18,52,44,170
8.	Nathalavasa	Vijayawada	8	7,34,822	13,40,14,695	11,86,123	21,43,28,915
9	Km. 39+500 NH-327E	Patna	6	New Plaza			

Annexure E

SERVICE LEVEL AGREEMENT PARAMETERS

1. **General Terms**

   i.   IHMCL shall issue notice to successful bidder on report of deviance in performance parameters as per Service Level Agreement (SLA) document leading to penalty (T – Date of Intimation)

   ii.   Successful bidder to provide responses in their clarification/supporting evidences in the T+ 15 calendar days. In the event of no response from the defaulting entity, the claim will be deemed accepted and the penalty shall be imposed as per SLA.

   iii. IHMCL shall review the responses/clarifications from Successful bidder and take decisions as approved by IHMCL Competent Authority and intimate Successful bidder.

   iv.   The Service Level Agreement (SLA) parameters shall be monitored and default charges will be computed on monthly basis.

   v.   In case, IHMCL/NHAI so desires, the SLAs may be reviewed on yearly basis and may be amended. Till such time, any revision is mutually agreed, the existing SLAs will continue to be in force.

   vi.   SLA will be excluded in case of incidents/instances as specified by IHMCL/NHAI to the Service Provider, depending upon case to case basis.

   vii. IHMCL/NHAI shall take into considerations the escalations/evidences from various project stakeholders such as Concessionaire, Toll Operators, Customers, NPCI, Issuer/Acquirer Banks, etc.   to assess the SLA deviations.

   viii. Any breach of SLA due to Force Majeure events, scheduled downtime, vandalism damage shall not be accountable to Service Provider.

   ix.   Any scheduled and approved preventive maintenance activity by the Successful bidder which affects the NETC system shall be carried out with prior intimation to IHMCL/NHAI and NPCI. Any periodic bank/server level maintenance activities being done by Service Provider shall be intimated to IHMCL and affected party(ies) such as concessionaire/toll plazas operators etc. at least 7 working days in advance.

   x.   All technical terms shall be in line with the definition provided in the Interface Control Document (ICD) version 2.4 or as amended from time to time, as applicable.

   xi.   Rate of Interest incurred on any penalty amount shall be as per prevailing NHAI rates

   xii. Default charges/penalty amount for a month shall be capped at Twenty-Five percent (25%) of the total Service fee (revenue earned by the participant) for the given month or Rs. 5,00,000 (Rupees Five Lakhs) whichever is higher. In addition to the default charges/penalty amount, the Successful bidder shall also bear any losses incurred by affected parties such as Concessionaire/Toll operating agencies etc. due to non-adherence of the SLA parameters by the Successful bidder.

xiii.   In case of repetitive defaults from Successful bidder, IHMCL reserves the right to take appropriate steps as deemed fit, to the extent of debarring the defaulting Successful bidder from the IHMCL and NETC Program.

2. SLA for Service Provider as ACQUIRER BANK

Successful bidder shall complete implementation of ICD 2.5 or latest version of ICD at the allocated toll plaza before Go-Live. The successful bidder shall be responsible for upgradation of ICD requirement at all toll plazas as amended by IHMCL from time to time.

IHMCL reserves the right to impose a penalty of Rs. 2000 per toll plaza per day if the ICD 2.5 implementation is not completed within specified timelines as mentioned in this RFP. The selected bidder shall provide acquiring services as defined in the Procedural Guidelines – National Electronic Toll Collection Network 2016 version 1.7 issued by NPCI and amended suitably from time to time.

Other SLA parameters for acquiring services are as under:

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
a)	Sharing of Blacklist_ Diff file with Toll plaza	The Acquirer bank/Service Provider shall share Blacklist_Diff file to the SFTP folder of the Toll Plaza.	SFTP folder of Toll Plaza to be updated every 10 minutes (10 minutes will be calculated from the time of Blacklist_Diff file uploaded at SFTP).	Any financial losses incurred by the Concessionaires/Toll Operator due to non-compliance of the SLA would be borne by the Acquirer bank/ Service Provider.	• All chargeback for low balance and blacklist shall be borne by the Acquirer bank/entity, except for cases that are due to issues of NPCI switch. In the latter cases, the penalties shall be borne by NPCI. • Concessionaire /Toll Operators shall not be held responsible for any losses incurred due to non-adherence of the SLA by Acquirer bank/ Service Provider.

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
					If there is any frequent change in Diff file within the 10 minutes interval then the Acquirer Bank is required to ensure that the last transmitted Diff file has all the updated details. If any transaction gets rejected due to the liability of acquirer bank then it is the responsibility of acquirer bank to settle all that rejected transactions within 3 working days.
b)	Sharing of INIT file with Toll Plaza	The Acquirer bank/ Service Provider shall share the INIT file to the SFTP folder of the Toll Plaza.	SFTP folder of Toll Plaza to be updated on a daily basis.	Any financial losses incurred by the Concessionaires/Toll Operator due to non-compliance of the SLA would be borne by the Acquirer bank/Service Provider.	• All chargeback for low balance and blacklist shall be borne by the Acquirer bank/entity. • Concessionaire /Toll Operators shall not be held responsible for any losses incurred due to non-adherence of the SLA by Acquirer bank/entity. • Content of INIT file will be same for all acquiring banks (excluding monthly and local pass).

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
					• It is the responsibility of acquirer bank to pull INIT file before 23:59:59 hrs. and send it to SFTP folder.
c)	Processing of a toll transaction, including of sending the transaction to NPCI system by the Acquiring Bank/entity	The Acquirer bank/ Service Provider should process a toll transaction which is uploaded on SFTP folder by the concessionaire/toll operator and send the transaction to the NPCI system.	The entire process of picking up a toll transaction and sending it to NPCI system shall be done within 5 minutes from the time of receipt of toll transaction on SFTP folder.	• Any financial losses incurred by the Concessionaires/Toll Operator due to non-compliance of the SLA would be borne by the Acquirer bank/ Service Provider. • Breach of SLA reported shall be subject to penalty as under: o Less than 5 incidents of breach for a particular toll plaza in a calendar month with valid reasons acceptable to IHMCL/NHAI – **No penalty**	• For the measurement of the SLA, it is pre-requisite that both concessionaire as well as the Acquirer bank/ Service Provider shall maintain server log for the period of three months of their respective systems to trace the transaction upload time on SFTP folder as well as SFTP connectivity status. • It is only applicable if the concessionaire SLA of 10 minutes transaction upload is followed.

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
				o 5 or more number of incidents for a particular toll plaza in a calendar month – **Rs. 50,000/-**	
d)	Sharing of TRC (Transaction Reconciliation) and VRC (Violation Reconciliation) file to the SFTP folder of toll plaza	Acquiring Bank/ Service Provider shall share TRC and VRC files with the concessionaire / toll operator on a daily basis. Status of accepted, rejected transactions (with valid reason code) shall be shared in TRC and VRC file by Acquirer bank/ Service Provider.	TRC and VRC files to be updated by Acquirer bank/entity on a daily basis as prescribed in ICD 2.4. document as amended from time to time.	• Any losses incurred by concessionaire or toll operator due to non-adherence of the SLA shall be borne by the Acquirer bank/entity. • Breach of SLA reported shall be subject to penalty as under: o Up to 2 incidents of breach for a particular toll plaza in a calendar month with valid reasons acceptable to IHMCL/NHAI – **No penalty**	• For the measurement of the SLA, it is pre-requisite that both concessionaire as well as the Acquirer bank/entity shall maintain server log of their respective systems to trace the TRC and VRC file upload time as well as SFTP connectivity status. The TRC and VRC files shall contain all transactions uploaded by concessionaire/toll operator for the day under consideration. All TRC and VRC files should be reached to Concessionaire/Toll operator before 6:00 AM.

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
				o More than 2 incidents for a particular toll plaza in a calendar month – **Rs. 50,000/-**	
e)	Sharing of Chargeback details with concessionaire/toll operator post receipt in EGCS	Acquirer bank/ Service Provider shall share the chargeback transaction details with relevant supporting to be validated by concessionaire or toll operator.	Chargeback details with relevant supporting to be shared within T+1 working day Where T = Chargeback transaction received in EGCS	• All the chargeback amount incurred due to breach of SLA for a particular incident shall be borne by the Acquirer bank/ Service Provider.	• Acquirer bank/ Service Provider shall mandatorily take the approval of concessionaire/toll operator before debiting the chargeback amount to the account of concessionaire/toll operator. • The concessionaire/toll operator shall mandatorily respond (i.e. accept or reject) the chargeback request within 5 calendar days[1] of receipt of the same. If no respond is received from the concessionaire/toll operator within 5 calendar days[1], the acquirer bank/entity may debit the chargeback

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
					amount to the account of concessionaire/toll operator. • Acquirer bank will share the chargeback details of accepted and rejected chargeback request with concessionaire/Toll operator. [1] Note – Post necessary changes in the NETC system by NPCI, 5 calendar days shall be changed to 7 calendar days.
f)	Settlement of clean transactions	Acquirer bank/ Service Provider shall share the reconciliation file with concessionaire /toll operator on daily basis. The acquirer bank/ Service Provider shall settle the final amount for a particular day to the bank account of the	Acquirer bank/entity shall settle the amount for all clean transactions to concessionaire/ toll operator within T+1 working day. Where T =Transaction processing day	• The acquirer bank/entity shall be liable to pay any interest accrued on the outstanding amount to the concessionaire /toll operator. • Rate of Interest shall be equivalent to the late fee interest charged by NHAI on outstanding amount for	All amount for clean transaction for the day till 23:50 Hrs. shall be settled with in T+1 working day.

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
		Concessionaire / toll operator. The chargeback transaction details with relevant supporting to be validated by concessionaire or toll operator		concessionaire/toll operators. • Breach of SLA reported for any incidents of breach for a particular toll plaza in a calendar month– **Rs. 50,000/- penalty will be imposed per incident.**	
g)	Settlement of violation transactions (Only the differential amount)	Acquirer bank / Service Provider shall perform complete audit of transaction marked as "is violation=1" and raise debit adjustment of valid violation transactions.	• T+1 working day (settlement of violation transaction to be done in T+ working day) Where T = Debit Adjustment settled in acquirer bank account by NPCI • The complete cycle of violation processing shall be completed within T + 5 calendar days	• If the transaction is rejected due to delay in audit, the transaction amount shall be borne by the acquirer bank/entity. • During audit, any incorrect image review by acquirer bank/entity, the transaction amount shall be borne by the acquirer bank/entity.	• As the initial amount is settled through mapper class of NPCI, only the differential amount shall be settled to the Concessionaire or toll operators within 6 days of transaction upload date.

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
			Where T = Transaction processing day by Acquirer Bank.		
h)	Account mapping for settlement of funds	In event of new Toll operator replacing existing toll operator, NHAI/IHMCL sends intimation to Acquirer bank/ Service Provider to change the account details for transfer of funds collected through NETC program. Acquirer bank/ Service Provider shall change the account details as per instruction by NHAI/IHMCL.	• As per date and time mentioned on letter/email by NHAI/IHMCL • IHMCL/NHAI/Concessionaire shall give 2 days' advance intimation to Service Provider for change of mapping of settlement account.	• The amount wrongly transferred shall be refunded to the correct recipient immediately, not exceeding two working days from the date of receipt complaint by the acquirer bank/ Service Provider. • In case of any delay beyond 2 working days, the Acquirer bank/ Service Provider shall be liable to pay interest on the amount under consideration.	• NHAI/IHMCL shall intimate Acquiring Bank/ Service Provider as per Plaza Roll Over policy via email which shall be binding on the bank/ Service Provider. • No penalty shall be imposed on Banks for cases not attributable to the Service Provider.
i)	Setting up of FASTag Point-of-Sale (PoS) at Toll plaza acquired	Acquirer Bank/ Service Provider shall setup dedicated Point of Sale (PoS) for issuance	• One (1) dedicated POS shall be setup for issuance of FASTag	Penalty shall be calculated as below: • Rs. 1000 per day for delay in setup of Point-of-sale	

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
		of FASTag from the date of start of providing acquiring services at the toll plaza.	• POS shall be operational between 9 am to 6 pm on all working days.	(PoS) from the date of start of providing acquiring services at the toll plaza. • If Acquirer Bank fails to set up PoS within 30 days, IHMCL reserves the right to initiate process of plaza allocation to other Acquirer bank, as deemed fit.	
j)	Priority of BLT/DIS file.	Any Tag in Monthly pass, Local Monthly pass and Global exemption Acquirer Bank/ Service Provider needs to send the Tag information in DIS file and the same shall not be available in blacklist file for the particular Toll plaza.	Acquirer Bank to manage the BLT file generation as per ICD 2.4 document as amended time to time and ensure Tag present in discount file not to be sent in blacklist file.	• Any losses incurred by concessionaire or toll operator due to non-adherence of the SLA shall be borne by the Acquirer bank/entity. • Breach of SLA reported shall be subject to penalty as under: o Up to 5 incidents of breach for a	• If the Tag has been blacklisted for any reason, Acquirer Bank shall send the Tag into Blacklist file and remove the same from Discount file as per timelines defined in ICD 2.4 as amended from time to time.

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
				particular toll plaza in a calendar month with valid reasons acceptable to IHMCL/NHAI Rs. 5000/- More than 5 incidents for a particular toll plaza in a calendar month – Rs. 10,000/-	
k)	Implementation of ICD 2.4 Improvement by Acquirer Banks	Acquirer bank/ Service Provider to make necessary changes in the system to incorporate the ICD 2.4 improvement document.	Acquirer bank to implement the system as per timelines. Penalty shall be measured based on the number of toll plazas yet to be upgraded to ICD 2.4 improvement document on a daily basis.	• Penalty for delay in implementation of ICD 2.4 improvement document: Rs. 500/- per day per toll plaza not upgraded with ICD 2.4 improvement document.	• -
l)	Dispute/Complaint /Issue resolution based on report of NPCI and IHMCL. Reports may be based on NPCI DMS	Service Provider to close Dispute/Complaint/Iss ue raised within Turn Around Time (TAT) defined. TAT shall be	Penalty to be measured based on the delay from defined TAT on each Dispute/Complaint/Iss ue	• Delay per day in resolution of Dispute/Complaint/Issue: Rs. 100/- per Dispute/Complaint/Issue	•

Sl. No.	Service Description	SLA definition	Service Level Requirement	Default Charges	Remarks, if any
	Portal/EGCS system or IHMCL customer compliant portal or NHAI Helpline No. 1033	defined as under: Acknowledgement of Compliant/Dispute by bank – Within 2 days.			

3. **SLA for Service Provider as System Integrator**

a.   System Downtime Calculations

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

   ii. 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
        - Customize Keyboard
        - Thermal Receipt Printer
        - License Plate Image Capture Camera
        - Incident Capture Camera
        - Any Plaza Level Equipment that result in lane downtime

   iii. For all other Equipment of Hybrid ETC System the uptime availability shall be 98% per lane per month.

   iv. 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 HETC system for any Site shall be 4 hours per lane per month.

   v.   The formula for calculation of Hybrid 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 Annexure E Clause 3.iv

   vi. The Service Provider shall maintain adequate inventory/spares to ensure the service levels as prescribed in Annexure E Clause 3.i and Clause 3.iii of RFP are adhered.

   vii. In case of non-adherence to service levels as defined in Annexure E Clause 3.i and Clause 3.iii of RFP, the penalty for deficiency of services beyond permissible downtime and scheduled downtime shall be imposed as follows: -
        - Upto 1 hrs -1% of the monthly payment per plaza

- Upto 1 to 2 hrs -2% of the monthly payment per plaza
- Upto 2 hrs to 3 hrs- 3% of the monthly payment per plaza
- Upto 3 hrs to 5 hrs- 5% of the monthly payment per plaza
- Upto 5 hrs to 10 hrs- 10% of the monthly payment per plaza
- Greater than 10 hrs- 25% of the monthly payment per plaza

viii.   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.

ix. 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 payment for that Lane
- Below 96% upto 94 % -2% of the monthly payment for that Lane
- Below 94% upto 92 % -5% of the monthly payment for that Lane
- Below 92% upto 90 % -10% of the monthly payment for that Lane
- Below 90% - No monthly payment will be paid for that lane

x. The Service Provide shall ensure that all ETC transactions shall be uploaded and downloaded as per ICD 2.4 document or latest and PG Guidelines. In case of any deficiency in adherence of ICD 2.4 document or latest one 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 monthly payment.

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

xii. For all other conditions mentioned in scope of work in case not adhered to satisfactorily, the penalty shall be imposed upto 5% of monthly payment.

Annexure F: PROFORMA FOR SUBMITTING WRITTEN QUERIES
(To be submitted in doc/editable format only at the given email address[2])

Sub.:   Limited RFP for Selection of Service Provider for Providing HETC System Integration and Transaction Acquiring services at toll plazas under NETC programme (to be submitted via email in excel format only)

Ref: RFP No. IHMCL/Acquirer Bank cum SI/2020/01 dated 07 April 2020 **on above subject.**

Name of Company: _____,

Name of Person_____

Contact No. _____, line

Email Id: _____

S. No.	Page no. of RFP	Clause	RFP Statement	Query	Remarks

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[2] tenders@ihmcl.com

Annexure G: FORMATS FOR BID SUBMISSION

Form T-1: Covering Letter

(To be prepared on letterhead of the Applicant)

To

The Chief Operating Officer/General Manager
Indian Highways Management Co. Ltd. (IHMCL)
2nd Floor, MTNL Building,
Sector 19, Dwarka
New Delhi 110 075

Subject: Limited RFP for Selection of Service Provider for Providing HETC System Integration and Transaction Acquiring services at toll plazas under NETC programme

Ref. No.   RFP. No. **IHMCL/Acquirer Bank cum SI/2020/01** dated <_____>

Dear Sir,

1. 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.

2.   I/We undertake that, in competing for (and, if the award is made to us), for executing the above contract, we will strictly observe the laws against fraud and corruption in force in India.

3.   I/We understand that:

   a. this application, if found incomplete in any respect and/ or if found with conditional compliance or not accompanied with the requisite application fee and/ or prescribed supporting document shall be summarily rejected.

   b. if at any time, any averments made or information furnished as part of this application is found incorrect, then the application will be rejected

   c. IHMCL is not bound to accept any/ all application(s) it will receive.

4.   I/We declare that:

(a)   **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.

(b)   **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.

5.   I/We declare that our bid is valid for 180 days.

Name ………………….

Designation/ Title of the Authorized Signatory…………………………

Form T-2: Brief Information about the Applicant(s)

(To be prepared on letterhead of the Applicant)

Subject: Limited RFP for Selection of Service Provider for Providing HETC System Integration and Transaction Acquiring services at toll plazas under NETC programme

Ref. No. RFP. No. **IHMCL/Acquirer Bank cum SI/2020/01** dated <_____>

1. (a) Name of Applicant:
   (b) Year of establishment:
   (c) Registered Address:
   (d) Constitution of the Applicant entity e.g. Government enterprise, private limited company, limited company, etc.

2. Address for correspondence with Telephone/ Fax numbers/ e-mail address:
   (a) Complete postal address:
   (b) Fixed telephone number
   (c) Mobile number
   (d) E-mail address

   1. Name of the Statutory Auditor certifying the documents along with his/ her Membership number, if applicable:

Name ………………….

Designation/ Title of the Authorized Signatory…………………………

Form T-3: Format for Power of Attorney

Know all men by these presents, we, ... (Name of 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 application for empanelment and financial e-bids for above mentioned RFP, proposed by Indian Highways Management Company Limited, including but not limited to signing and submission of all applications, bid(s) 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 bid and generally dealing with IHMCL in all matters in connection with or relating to or arising out of our application or bid 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 Authorised 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 Authorised Representative/ Attorney in exercise of the powers hereby conferred shall and shall always be deemed to have been done by us.

IN WITNESS WHEREOF WE, ...THE ABOVE NAMED PRINCIPAL HAVE EXECUTED THIS POWER OF ATTORNEY ON THIS .... DAY OF ...., 2020

For ....
(Signature, name, designation and address)

Witnesses:
1.
2.
Notarised
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 notarised by a notary public**. Wherever required, the Applicant should submit for verification the extracts 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 legalised by the Indian Embassy and notarised 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 legalised by the Indian Embassy if it carries a conforming Apostles certificate.

Form T-4: Undertaking on providing services as acquiring bank

To

The Chief Operating Officer/General Manager
Indian Highways Management Co. Ltd. (IHMCL)
2nd Floor, MTNL Building,
Sector 19, Dwarka
New Delhi 110 075

Subject: Limited RFP for Selection of Service Provider for Providing HETC System Integration and Transaction Acquiring services at toll plazas under NETC programme

Ref. No.   RFP. No. **IHMCL/Acquirer Bank cum SI/2020/01** dated <_____>

Dear Sir,

I/We declare that we have been certified by NPCI to provide acquiring services under NETC programme.

As on the bid due date, we have at least 05 toll plazas where we are providing acquiring services.

Signature:
Name ………………….

Designation/ Title of the Authorized Signatory…………………………

Form T-5: Power of Attorney for Lead member

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

Power of Attorney

Whereas Indian Highways Management Company Ltd. (IHMCL), has invited Proposals from eligible entities for Limited RFP for Selection of Service Provider for Providing HETC System Integration and Transaction Acquiring services at toll plazas under NETC programme the "Project",

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 Proposal (RFP) Document and other connected documents in respect of the Project, and

Whereas, it is necessary under the RFP 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 …….2020 …………………………………… (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.

Form T-6: Format for Performance Security (Bank Guarantee)

To,
    General Manager,
    Indian Highways Management Company Ltd
    2nd Floor, MTNL Building,
    Sector-19, Dwarka,
    New Delhi – 110075, India

WHEREAS _____[Name and address of Agency] (hereinafter called "the Service Provider") has decided to apply to IHMCL for providing services, in pursuance of IHMCL letter of work award No._____ dated dd/mm/yyyy for **"Limited RFP for Selection of Service Provider for Providing HETC System Integration and Transaction Acquiring services at toll plazas under NETC programme (RFP No. IHMCL/Acquirer Bank cum SI/2020/01)"** *" (hereinafter called the "Contract").*

1. AND WHEREAS it has been stipulated by IHMCL in the said letter that the Service Provider shall furnish a Bank Guarantee for the sum specified therein as security for compliance with his obligations in accordance with the terms & conditions of the Contract Agreement.

2. AND WHEREAS we have agreed to give the Service Provider such a Bank Guarantee:

3. NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Service Provider up to a total of ` ……../- (Rupees ………………………) only, such sum
being payable in the types and proportions of currencies in which the Contract Price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of ` ……………/- as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

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

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

6. We undertake to pay to the IHMCL any money so demanded notwithstanding any dispute or disputes raised by the Service Provider(s) in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal. The payment so made by us under this

bond shall be a valid discharge of our liability for payment thereunder and the Service Provider(s) shall have no claim against us for making such payment.

7. The liability of the Bank under this Guarantee shall not be affected by any change in the constitution of the Service Provider or of the Bank.

8. This guarantee shall also be operable at our _____branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension/ renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

9. This bank guarantee shall be valid from ……………………

10. Notwithstanding anything contained herein:

    (i) Our liability under this Bank Guarantee shall not exceed ` ……………/-

    (ii) The Bank Guarantee shall be valid up to……………………………………………

    (iii) We are liable to pay the Guarantee amount or any part thereof under this Guarantee only and only if you serve upon us a written claim or demand on or before ……………

Name:

Date :

Designation:
Employee Code Number:

Telephone Number:

Name of issuing bank branch _____

Address _____

Telephone number _____

E-mail: _____

Name of bank branch at New Delhi _____

Address _____

Telephone number _____

E-mail: _____

Name of controlling bank branch _____

Address _____

Telephone number _____

E-mail: _____

* The bank guarantee shall be verified through SFMS package.

Form F-1: FORMAT FOR FINANCIAL BID SUBMISSION

(To be submitted on in the excel format uploaded on the website)

Name of the Project :	
Limited RFP for Selection of Service Provider for Providing HETC System Integration and Transaction Acquiring services at toll plazas under NETC programme (RFP No. IHMCL/Acquirer Bank cum SI/2020/01)	
Name of Bidder:	
RFP Publishing Date	

Parameter	Quoted Value (In Percentage)
% of acquired transaction value for each ETC transaction* - "Percentage Charges"	

* The "% of acquired transaction value" shall comprise of all cost involved in implementation of HETC equipment as well as performing roles and responsibilities of acquirer bank at fee plazas.

Draft Contract Agreement

This Contract Agreement is made on this the _____ day of _____at _____ (hereinafter 'the Agreement') made between

Indian Highways Management Company Limited (herein after referred to as IHMCL) a company registered under Companies Act, 1956 with CIN: U74140DL2012PLC246662 having its registered office and corporate office at, 2nd floor, MTNL Building, Sector -19, Dwarka, New Delhi -110 075, which expression shall, unless it be repugnant to the subject thereof, include its successors and assigns, of the First Part

And

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX Bank Ltd (hereinafter referred to as "Service Provider/Vendor/System Integrator/Acquiring Bank") a company registered under Companies Act, 1956 CIN XXXXXXXXX having its registered office at _____ _____

which expression shall, unless it be repugnant to the subject thereof, include its successors and assigns, of the Second Part

IHMCL and Service Provider are hereinafter collectively referred to as "Parties" and individually as a "Party".

Whereas,

A. IHMCL has been incorporated for implementation of Electronic Toll Collection (ETC) and other Intelligent Transportation System (ITS)/ transportation related solutions on Highways in India.

B. IHMCL has been mandated for implementing ETC at Toll Plazas on National Highways in India and has been assigned the responsibility for implementing the ETC system on Indian National Highways.

C. National Payment Corporation of India (NPCI) has been incorporated for implementation & integration of electronic payment systems in the country and is

owning, operating and managing various payment system such as National Financial Switch (NFS), Immediate Mobile Payment Service (IMPS), RuPay Card Payment Service, Cheque Truncation System (CTS), Aadhaar Enabled Payment System (AEPS) and is in the process of implementing UPI and BBPS etc. IHMCL has entrusted the project for implementation of National Electronic Toll Collection (NETC) to NPCI.

D. The Service Provider (lead member) is a banking institution licensed by the Reserve Bank of India to carry on the business of banking.

E. The Service Provider inter-alia accepts RFID NETC FASTag, which is used to conduct toll payment transactions through various devices installed at NETC Lane at the Toll Plazas.

F. Such devices at NETC Lane are procured, installed and maintain by Concessionaire/Toll Plaza Operator vis-à-vis acquired by the Acquirer Bank.

G. The Concessionaire/Toll Plaza Operator is required to acquire the transactions made on the NETC Lane and send the transaction to NETC switch via Acquirer Bank for processing and the Acquirer Bank require to settle such payments and credit payment to Concessionaire/Toll Plaza Operator account.

H. The Service Provider and Concessionaire/Toll Plaza Operator acknowledges that the implementation of NETC Program is in the interest of all the Parties and the road users and accordingly, it has agreed to join the NETC Program. It has duly perused, reviewed, acclimatized to, and understood, the NETC Services and agrees and consents to the implementation of the NETC Program in respect of the toll plazas mentioned Appendix hereto.

1.1 CONDITIONS OF CONTRACT

These Conditions shall supplement or amend the other parts of the Bidding Documents and whenever there is a conflict; provision herein shall prevail over those in the other parts of the Bidding Documents.

1.2 GOVERNING LANGUAGE

All correspondence and other documents to be exchanged by the parties shall be written in the English language. The version written in English language shall govern its interpretation.

1.3 APPLICABLE LAW

Appropriate laws as in force in Republic of India shall apply.

1.4 Project Scope

The scope of project shall include activities as specified in relevant section of the RFP document and as amended in corrigendum/addendum issued thereof.

1.5 INTERPRETATION

In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined.

The Bidders are expected to examine all terms and instructions included in the RFP Document. During preparation of the proposal, the bidders shall make their own assessment of staff to undertake the assignment.

1.6 RIGHT TO AMEND PROJECT SCOPE

IHMCL retains the right to amend the Project Scope without assigning any reason at any time during the Contract Period. IHMCL makes no commitments, express or implied, that the full scope of work as described in this RFP will be commissioned.

1.7 PAYMENT TERMS

a) Payments will be made in Indian Rupees only.
b) The payment to be made to the Contractor shall be on monthly basis.
c) The payment shall be as the following formula: -
   a. **Monthly Payment = Percentage Charges[3] * Amount of FASTag transactions settled in a month[4] - Deductions[5]**
d) All payments shall be made subject to adjustment of applicable penalties.

1.8 SLA/ PENALTY

The Vendor shall ensure that the system adheres to the SLA mentioned in **Annexure E** of the RFP or as amended in corrigendum.

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[3] Quoted by the Contractor
[4] As confirmed by NPCI system
[5] Defined in subsequent sections

1.9 PRICES

    a) GST as applicable, which will be levied on the goods and services invoiced by the Service Provider to IHMCL, will be reimbursed on actual basis.

    b) IHMCL reserves the right to ask the Service Provider to submit proof of payment against any of the taxes, duties, levies indicated.

    c) All payments shall be made subject to adjustment of applicable damages.

    d) No amount or cost shall be payable for holding discussion, as considered necessary by IHMCL, for any purpose with IHMCL's Officials at IHMCL's Head Office or elsewhere, prior, during or after the conduct of an assignment.

    e) Prices quoted by the bidder shall be excluding GST and fixed for the entire Contract period.

    f) Service Provider shall raise the invoices on monthly basis.

1.10 CONTRACT PERIOD

The time period of the project is 5 years and shall start from the date of signing of Contract Agreement. Upon completion of 5 years, IHMCL may consider extending the engagement on yearly basis upto a maximum of 2 years from the date of signing of Contract Agreement with same "Percentage Charges" as quoted by the Bidder for the RFP.

1.11 Ownership of Equipment & other conditions:

All the HETC equipment shall be owned by the Service Provider throughout the duration of contract. The Service Provider will be paid on monthly basis for the complete end-to-end services made available to IHMCL, subject to deductions, if any, towards deficiencies in services as per service level agreements mentioned in RFP.

It may please be noted that procurement of any Toll Systems/ Equipment/ Hardware/Software/ AVCC System etc. has not been envisaged through this tender. The Service Provider shall be required to provide the services as per the scope of work prescribed in RFP.

The bidders are required to offer and propose the latest technologies/ cost effective/ innovative/ best suitable system and equipment for Traffic Scenario on National Highways and conditions at the toll plazas in India.

The Service Provider may take back his equipment after completion of contract and/or termination of services (as the case may be). However, the data generated in the system shall be handed over to IHMCL in readable format.

1.12 INSURANCE

The Service Provider shall effect and maintain at its own cost, during the Contract period, such insurances for such maximum sums as may be required under the Applicable Laws, and such insurances as may be necessary or prudent in accordance with Good Industry Practice to cover third party claims, theft, accidental damage, vandalism, fire, flood, and Force Majeure events. The Service Provider shall replace/rectify the damaged equipment within 15 days of incident. IHMCL shall not be liable for any payment against

any type of damage to equipment. Necessary liquidity damage as per RFP provision shall be applied in case of any deficiency in services/uptime of equipment.

1.13 FORCE MAJEURE

a) Neither party shall be responsible to the other for any delay or failure in performance of its obligations due to any occurrence of a Force Majeure event which is beyond the control of any of the Parties, including, but without limited to, fire, flood, explosion, acts of God or any governmental body, public disorder, riots, embargoes, or strikes, acts of military authority, epidemics, strikes, lockouts or other labour disputes, insurrections, civil commotion, war, enemy actions.

b) If a Force Majeure arises, the Service Provider shall promptly notify IHMCL in writing of such condition and the cause thereof. Unless otherwise directed by IHMCL, the Service Provider shall continue to perform his obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event. The Parties shall be excused from performance of their respective obligations in whole or part as long as such Force Majeure event continues to prevent or delay such performance by the Parties. However, in case such Force Majeure event lasts for a continuous period of 60 days, either Party may terminate the Contract.

1.14 INDEMNIFICATION

a) The Service Provider shall indemnify, defend, save and hold harmless, IHMCL,NHAI and MoRTH and their officers, servants, agents (hereinafter referred to as the "IHMCL Indemnified Persons") against any direct loss, damage, claims, cost and expense of whatever kind and nature (including without limitation, legal fees, claims and expenses incurred in connection with any suit, action or proceeding or any claim asserted, as such fees and expenses are incurred), joint or several, that arise out of or are based upon any order passed by any statutory authority including Courts, tribunals or other judicial/quasi-judicial authorities, on account of breach of the Service Provider's obligations under this Contract or any other related agreement or otherwise, any fraud or negligence attributable to the Service Provider or its Agents under contract or tort or on any other ground whatsoever, all eventualities of theft, dacoity, robbery, etc., except to the extent that any such suits, proceedings, actions, demands and claims has arisen due to any breach or default of this Contract on the part of IHMCL Indemnified Persons.

b) The Service Provider shall indemnify IHMCL Indemnified Persons from all legal obligations in respect of professionals deployed by the Service Provider. IHMCL Indemnified Persons also stand absolved of any liability on account of death or injury sustained by the Service Provider's staff during the performance of their work and also for any damages or compensation due to any dispute between the Service Provider and its staff.

c) In addition to the aforesaid, the Service Provider shall fully indemnify, hold harmless and defend IHMCL Indemnified Persons from and against any and all direct loss, damage, cost and expense of whatever kind and nature (including, without

limitation, legal fees and other expenses incurred in connection with any suit, action or proceeding or any claim asserted, as such fees and expenses are incurred), joint or several, that arise out of, or are based upon any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other intellectual property, proprietary or confidentiality rights with respect to any materials, information, design or process used by the Service Provider or by the Agents in performing the Service Provider's obligations or in any way incorporated in or related to this Contract. If in any such suit, action, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the Service Provider shall make every reasonable effort, by giving a bond (of the type and value as required) or otherwise, to secure the revocation or suspension of the injunction or restraint order and continue to perform its obligations hereunder. If the Service Provider is unable to secure such revocation within a reasonable time, it shall, at its own expense, and without impairing the Specifications and Standards, shall rectify such defaults and shall also be liable for damages to IHMCL for the corresponding loss during the interim period on this account.

d) The provisions of this Clause shall survive Termination.

e) The remedies provided under the Clause are not exclusive and shall not limit any rights or remedies that may otherwise be available to IHMCL Indemnified Persons at law or in equity.

1.15 TERMINATION

a) ON EXPIRY OF THE CONTRACT: Subject to the condition mentioned under the RFP, the Agreement shall be deemed to have been automatically terminated on the expiry of the Contract Period unless IHMCL has exercised its option to further renew the Contract Period in accordance with the provisions, if any, of the Contract.

b) ON ACCOUNT OF FORCE MAJEURE: Either party shall have the right to terminate the Contract on account of Force Majeure, as set forth in the RFP.

c) ON BREACH OF CONTRACT: IHMCL may terminate the Contract if the Service Provider causes a fundamental breach of the Contract. Fundamental breach of Contract includes, but shall not be limited to, the following:

    i. The Service Provider fails to carry out any obligation under the Contract.

    ii. The Service Provider without reasonable excuse fails to commence the work in accordance with relevant clauses.

    iii. Has failed to furnish the required securities or extension thereof in terms of the Contract.

    iv. the Service Provider stops work and the stoppage has not been authorized by IHMCL;

    v. the Service Provider at any time during the term of the Contract becomes insolvent or makes a voluntary assignment of its assets for the benefit of creditors or is adjudged bankrupt

    vi. If the Service Provider, in the judgment of the Employer, has engaged in the corrupt or fraudulent practice in competing for or in executing the Contract.

d) Any other fundamental breaches as specified in the RFP.

e) Notwithstanding the above, IHMCL may terminate the Contract in its sole discretion by giving 30 days prior notice without assigning any reason.

f) Upon Termination (except on account of expiry of Term of this Agreement, Force Majeure), IHMCL shall be entitled at the sole discretion to:

   i. appropriate the entire Performance Security or part thereof as Damages; and

   ii. Debar/Blacklist the Service Provider from participating in any other project/assignment/work of IHMCL for a period as determined by IHMCL in its sole discretion.

1.16 Appropriation of Performance Security

a) Upon failure of the Service Provider to commence the services, for any reason whatsoever, within the period set forth in this Contract or the extended period thereunder, IHMCL shall, without prejudice to its other rights and remedies hereunder or in law, be entitled to levy Damages as per relevant Clause hereinabove.

b) IHMCL shall, without prejudice to its other rights and remedies hereunder or in law, be entitled to encash and appropriate the relevant amounts from the Performance Security as Damages or any other amounts payable to IHMCL under this Contract as and when such Damages or other amounts become due and payable. Upon such encashment and appropriation from the Performance Security, the Service Provider shall, within 10 days thereof, replenish, in case of partial appropriation, to its original level of the amount guaranteed under the Performance Security, and in case of appropriation of the entire Performance Security, provide a fresh Performance Security, as the case may be failing which IHMCL shall be entitled to terminate this Agreement in accordance with relevant clause hereof.

1.17 MISCELLANEOUS

a) Standard of Performance

The Service Provider shall undertake to perform the services with the highest standards of professional and ethical competence and integrity which are, amongst others, ESSENCE of this assignment. Keeping in view the sensitivity involved in such assignments, the personnel deployed should maintain confidentiality/integrity at all times and should work in a professional manner to protect the interest of IHMCL. The firm shall promptly replace any personnel deployed under this contract that IHMCL considered unsatisfactory.

b) Representations and Warranties of the Parties

The Parties represents and warrants to the each other that:

(a) It is duly organized and validly existing under the applicable laws, and has full power and authority to execute and perform its obligations under this Contract and to carry out the transactions contemplated hereby;

(b) It has taken all necessary corporate and other actions under applicable laws to authorize the execution and delivery of this Contract and to validly exercise its rights and perform its obligations under this Contract;

(c) This Contract constitutes its legal, valid and binding obligation, enforceable

against it in accordance with the terms hereof, and its obligations under this Contract will be legally valid, binding and enforceable obligations against it in accordance with the terms hereof;

(d) The information furnished in the Bid and as updated on or before the date of this Contract is true and accurate in all respects as on the date of this Contract;

(e) The execution, delivery and performance of this Contract will not conflict with, result in the breach of, constitute a default under, or accelerate performance required by any of the terms of its Memorandum and Articles of Association [or those of any member of the Consortium] or any Applicable Laws or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets is bound or affected;

(f) There are no actions, suits, proceedings, or investigations pending or, to its knowledge, threatened against it at law or in equity before any court or before any other judicial, quasi-judicial or other authority, the outcome of which may result in the breach of this Contract or which individually or in the aggregate may result in any material impairment of its ability to perform any of its obligations under this Contract;

c) Waiver of immunity

Each Party unconditionally and irrevocably:

(a) Agrees that the execution, delivery and performance by it of this Contract constitute commercial acts done and performed for commercial purpose;

(b) Agrees that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Contract or any transaction contemplated by this Contract, no immunity (whether by reason of sovereignty or otherwise) from such proceedings shall be claimed by or on behalf of the Party with respect to its assets;)

(c) Waives any right of immunity which it or its assets, property or revenues now has, may acquire in the future or which may be attributed to it in any jurisdiction; and

(d) Consents generally in respect of the enforcement of any judgment or award against it in any such proceedings to the giving of any relief or the issue of any process in any jurisdiction in connection with such proceedings (including the making, enforcement or execution against it or in respect of any assets, property or revenues whatsoever irrespective of their use or intended use of any order or judgment that may be made or given in connection therewith).

d) Waiver

i.   Waiver, including partial or conditional waiver, by either Party of any default by the other Party in the observance and performance of any provision of or obligations under this Contract:

• Shall not operate or be construed as a waiver of any other or subsequent default hereof or of other provisions of or obligations under this Contract;

- Shall not be effective unless it is in writing and executed by a duly authorised representative of the Party; and
- Shall not affect the validity or enforceability of this Contract in any manner.

ii. Neither the failure by either Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Contract or any obligation there under nor time or other indulgence granted by a Party to the other Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right hereunder.

e) **Liability for review of Documents**

Except to the extent expressly provided in this Contract:

i. No review, comment or approval by IHMCL, any document submitted by the Service Provider nor any observation or inspection of the Services performed by the Contractor nor the failure to review, approve, comment, observe or inspect hereunder shall relieve or absolve the Contractor from its obligations, duties and liabilities under this Contract, the Applicable Laws and applicable permits; and

ii. IHMCL shall not be liable to the Service Provider by reason of any review, comment, approval, observation or inspection referred to in Sub-clause (i) above.

f) **Exclusion of implied warranties etc.**

This Contract expressly excludes any warranty, condition or other undertaking implied at law or by custom or otherwise arising out of any other agreement between the Parties or any representation by either Party not contained in a binding legal agreement executed by both Parties.

g) **Survival**

i. Termination shall:
   a. Not relieve the Contractor or IHMCL, as the case may be, of any obligations hereunder which expressly or by implication survive Termination hereof; and
   b. Except as otherwise provided in any provision of this Contract expressly limiting the liability of either Party, not relieve either Party of any obligations or liabilities for loss or damage to the other Party arising out of or caused by acts or omissions of such Party prior to the effectiveness of such Termination or arising out of such Termination.

ii. All obligations surviving Termination shall only survive for a period of 3 (three) years following the date of such Termination

h) **Entire Agreement**

This Contract, the RFP and the Sections hereto together constitute a complete and exclusive statement of the terms of the agreement between the Parties on the

subject hereof and no amendment or modification hereto shall be valid and effective unless such modification or amendment is agreed to in writing by the Parties and duly executed by persons especially empowered in this behalf by the respective Parties. All prior written or oral understandings, offers or other communications of every kind pertaining to this Contract are abrogated and withdrawn. For the avoidance of doubt, the Parties hereto agree that any obligations of the Contractor arising from the Request for Proposals shall be deemed to form part of this Contract and treated as such.

i) **Severability**

If for any reason whatever any provision of this Contract is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties will negotiate in good faith with a view to agreeing to one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable to such invalid, illegal or unenforceable provision. Failure to agree upon any such provisions shall not be subject to the Dispute Resolution Procedure set forth under this Contract or otherwise.

j) **No partnership**

This Contract shall not be interpreted or construed to create an association, joint venture or partnership between the Parties, or to impose any partnership obligation or liability upon either Party and neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

k) **Third parties**

This Contract is intended solely for the benefit of the Parties and their respective successors and permitted assigns and nothing in this Contract shall be construed to create any duty to, standard of care with reference to, or any liability to, any person not a Party to this Contract.

l) **Successors and assigns**

This Contract shall be binding upon and inure to the benefit of the Parties and their respective successors and permitted assigns.

m) **Notices**

Any notice or other communication to be given by any Party to the other Party under or in connection with the matters contemplated by this Contract shall be in writing and shall:

(a) in the case of the Contractor, be given by facsimile or e-mail and by letter delivered by hand to the address given and marked for attention of the person set out below or to such other person as the Contractor may from time to time designate by notice to IHMCL; provided that notices or other communications

to be given to an address outside Delhi may, if they are subsequently confirmed by sending a copy thereof by registered acknowledgement due, air mail or by courier, be sent by facsimile or e-mail to the number as the Contractor may from time to time designate by notice to IHMCL;

(b) in the case of IHMCL, be given by facsimile or e-mail and by letter delivered by hand and be addressed to the [•] of IHMCL with a copy delivered to the Authority Representative or such other person as IHMCL may from time to time designate by notice to the Contractor; provided that if the Contractor does not have an office in Delhi it may send such notice by facsimile or e-mail and by registered acknowledgement due, air mail or by courier; and

(c)any notice or communication by a Party to the other Party given in accordance herewith shall be deemed to have been delivered when in the normal course of post it ought to have been delivered and in all other cases, it shall be deemed to have been delivered on the actual date and time of delivery; provided that in the case of facsimile or e-mail, it shall be deemed to have been delivered on the working day following the date of its delivery

n) Sub-Contracting

The Service Provider may sub-contract part of the work to a third party. However, However, allowing sub-contracting shall not dilute the responsibility & liability of the Service Provider. The Service Provider shall remain solely responsible and liable to ensure the quality and performance of work under this Agreement.

o) Confidentiality of the Assignment/Findings

The agency shall not, during the term of assignment and within two years after its expiration, disclose any propriety or confidential information relating to the services, this assignment or IHMCL's business or operations without prior written consent of IHMCL.

p) Modification

Modification of the terms and conditions of this Contract, including any modification of the scope of the Services, may only be made by written agreement between the Parties as the case may be, has been obtained.

q) Language

All notices required to be given by one Party to the other Party and all other communications, Documentation and proceedings which are in any way relevant to this Contract shall be in writing and in English language.

For & behalf of IHMCL

By   Signature

Authorised Representative   Name

Address

For & behalf of

(Contractor)

By

Authorised Representative

Witness

1.   Signature

Name

Address

2.   Signature

Name

Address