

Request for Empanelment of System Integrators for Implementation of Electronic Toll Collection System Including Weigh-in-Motion & Static Weigh Bridge System at Toll Plazas

RFE Reference –IHMCL/ETC/Empanelment/2024/01

Indian Highways Management Company Limited (IHMCL)

G – 5 & 6, NHAI HQ, Sector 10, Dwarka

Date: 30th May 2024



1. NOTICE INVITING APPLICATIONS

- 1.1. Applications/Bids are invited by the Indian Highways Management Company Limited (IHMCL) for the empanelment of System Integrator(s) for the implementation of Electronic Toll Collection (ETC) System at Toll Plazas.
- 1.2. All eligible applicants are invited to participate in the empanelment process through this RFE. This empanelment process shall supersede all previous empanelment of System Integrator(s) by IHMCL.
- 1.3. The RFE document may be downloaded from <https://empanelment.ihmcl.co.in> (“RFE portal”) as available on IHMCL website. The Applications shall be summarily rejected if not accompanied by the requisite documents as indicated in this RFE document and RFE Portal. IHMCL shall not be responsible for any technical glitches in submission of application on the portal. A brief description on submission of Application and process is provided at **Section 8** of this RFE, which shall be updated from time to time on the RFE Portal.
- 1.4. The process of Application for empanelment of the System Integrator shall be as per process defined below:
 - a) Eligibility and qualification of the Applicant will be examined based on the details submitted under Eligibility Criteria prescribed in this RFE document.
 - b) Applicants shall apply for empanelment by submitting the requisite documents in form of bids as per Eligibility Criteria prescribed in this RFE document.
 - c) The Evaluation Committee shall open and evaluate the requisite documents.
 - d) Post evaluation of requisite document, IHMCL shall issue a Letter of Intent to eligible System Integrators (SI).
 - e) The eligible System Integrators (SIs) shall submit an unconditional and irrevocable bank guarantee in terms of Clause 3.4.6 of this RFE, as part of the empanelment process (the “NETC Performance Bank Guarantee”)
 - f) ONLY empanelled SIs shall be eligible for participating in subsequent limited tenders/request for Quotations issued by IHMCL for the selection of System Integrator for the Implementation of ETC system and providing ETC O&M services at toll plazas,
 - g) Only IHMCL empanelled System Integrators are eligible to be appointed by Contractors/Concessionaires of NHAI in terms of **NHAI Policy Circular No.**

17.5.88/2024, dated 10.05.2024 and subsequent amendments/modifications and any other applicable policy issued by IHMCL/NHAI in this regard from time to time.

IHMCL reserves the right to accept or reject any or all applications for the empanelment of System Integrators at its sole discretion, prior to the issuance of a letter confirming their empanelment. It is hereby clarified that IHMCL shall not incur any financial or other liability of any nature to the affected applicants as a result of such acceptance or rejection.

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

Chief Operating Officer

Indian Highways Management Company Limited

G 5 & 6, First Floor, National Highways Authority of India Building, Sector 10, Dwarka

New Delhi 110 075

Email - tenders@ihmcl.com

Link for submission of Applications - <https://empanelment.ihmcl.co.in>

2. DEFINITIONS AND ABBREVIATION

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

- a) "Applicable Law" shall mean the laws, rules or regulations and any other instruments, having the force of law in Republic of India, as in force from time to time.
- b) "Authorized Representative" means any person/agency authorized by IHMCL.
- c) "Applicant/Bidding Entity" means, an entity/company which participates in the Bid process and submits its proposal/bid pursuant to this RFE document, including the Sole Applicant and each member of the Consortium.
- d) "Application/Bid" means the documents submitted by the Applicant in response to this RFE.
- e) "Commencement date" means the date upon which the Service Provider receives the notice to commence the work issued by IHMCL.
- f) "Contract" shall mean & include RFE, Notice for Inviting Tender (NIT), the tender documents and letter of acceptance thereof and the formal agreement, to be executed between IHMCL and the Service Provider together with the complete documents referred to therein including the conditions with appendices and any special conditions, the specifications, designs, drawings, bill of quantities with rates and amounts. All these documents taken together shall be deemed to form one Contract and shall be complementary to each other
- g) "IHMCL" means Indian Highways Management Company Ltd.
- h) "Law" or "Legislation" - shall mean any Act, notification, by law, rules and regulations, directive, ordinance, order or instruction having the force of law enacted or issued by the Government of India or State Government or regulatory authority.
- i) "Letter of Award (LOA)" means the issue of a signed letter by IHMCL to Service Provider conveying its intention to accept the offer of Service Provider and awarding the work mentioning the total Contract Value.
- j) "Local Currency" means the Indian Rupees
- k) "MoRTH" means Ministry of Road Transport and Highways
- l) "NHAI" means National Highways Authority of India.
- m) "Party" shall mean IHMCL or Applicant individually and "Parties" shall mean IHMCL and Applicant collectively.

- n) "Personnel" means persons hired by the Service Provider as employees and assigned to the performance of the Services or any part thereof.
- o) "RFE" shall mean this Request for Empanelment dated 30.05.2024, including the written clarifications & Corrigendum/Addendum issued by IHMCL in respect of the RFE from time to time.
- p) "**Services**" means requirements defined in this RFE including all additional services associated thereto to be delivered by the Successful Applicant selected through subsequent limited tenders issued by IHMCL.
- q) "**Service Provider**" shall mean the empanelled System Integrator who have engaged to implement ETC system and provide O&M services at toll plazas.
- r) "**Empanelled Applicants**" means the Applicant(s), who, after the complete evaluation process, has been empanelled by IHMCL.
- s) "**Uptime**" refers to the duration during which an ETC equipment or system is actively functioning, operating and ready to execute its intended tasks effectively, meeting the operational characteristics as defined in the RFP document, without encountering significant interruptions or failures.
- t) "**Downtime**" refers to the period during which an ETC equipment or system is either non-functional or not actively operating to execute its intended tasks effectively, thus failing to meet the operational characteristics outlined in the RFP document due to significant interruptions or failures.
- u) "**TMCC**" refers to the Toll Monitoring and Control Centre established at NHAI headquarters in New Delhi for monitoring and maintaining the ETC equipment health status, as well as the traffic and revenue data of all National Highway fee plazas.

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

2.1. Abbreviations

Sr.	Abbreviation	Description
1	AC	Alternating Current
2	AGC	Automatic Gain Control
3	ANPR	Automatic Number Plate Recognition
4	ASB	Auto Status back
5	AVC	Automatic Vehicle Classification
6	CCH	Central Clearing House
7	CMOS	Complementary Metal-Oxide-Semiconductor
8	CPU	Central Processing Unit
9	dB	Decibel
10	DC	Direct Current
11	DDR	Double Data Rate
12	DNR	Digital Noise Reduction
13	EIA	Environmental Impact Assessment
14	EIRP	Equivalent isotropic radiated power
15	EPC	Electronic Product Code
16	ETC	Electronic Toll Collection
17	FGL	Finished Ground Level
18	FPS	Frames Per Second
19	GB	Giga Byte
20	GbE	Gigabit Ethernet
21	GHz	Giga Hertz
22	GIF	Graphics Interchange Format
23	GUI	Graphical User Interface
24	HDD	Hard Disk
25	HHT	Hand Held Terminal
26	Hrs	Hours
27	HSRP	High Security Registration Plate
28	Hz	Hertz
29	I/O	Input / Output
30	ICC	Incident Capture Camera
31	ICS	Incident Capture System
32	ID	Identification
33	IEC	International Electrotechnical Commission
34	IP	Ingress Protection
35	IR	Infra-Red
36	ISO	International Organization for Standardization
37	JPEG	Joint Picture Experts Group
38	Kbps	Kilo Bits Per Second
39	Km/hrs.	Kilo Meter Per Hour
40	KPI	Key Performance Indicator
41	KVA	Kilo – Volt – Amperes
42	LAN	Local Area Network

Request for Empanelment(RFE) of System Integrators for Implementation of Electronic Toll Collection System Including Weigh-in-Motion & Static Weigh Bridge System at Toll Plazas

Sr.	Abbreviation	Description
43	LCV	Light Commercial Vehicle
44	LED	Light Emitting Diode
45	LPIC	License Plate Image Capture
46	LPS	Lines Per Second
47	LSDU	Lane Status Display Unit
48	MAV	Multi Axle Vehicle
49	Mbps	Mega Bits Per Second
50	MCB	Miniature Circuit Breaker
51	MHz	Mega Hertz
52	MIS	Management Information System
53	MOP	Method Of Payment
54	ms	Milli – Second
55	MS	Mild Steel
56	MTBF	Mean Time Between Failure
57	MTTR	Mean Time To Repair
58	NIC	Network Interface Controller
59	OCR	Optical Character Recognition
60	OEM	Original Equipment Manufacturer
61	OHLS	Over Head Lane Status Sign
62	ONVIF	Open Network Video Interface Forum
63	OS	Operating System
64	OSV	Over Sized Vehicle
65	PC	Personal Computer
66	PCIE	Peripheral Component Interconnect Express
67	PDF	Portable Document Format
68	Ph+N	Phase + Neutral
69	PNG	Portable Network Graphics
70	PoE	Power over Ethernet
71	QC	Quality Control
72	QR	Quick Response
73	RAID	Redundant Array of Inexpensive / Independent Disks
74	RAM	Random Access Memory
75	RF	Radio Frequency
76	RFID	Radio Frequency Identification
77	RH	Relative Humidity
78	RJ	Registered Jack
79	RPR	Thermal Receipt Printer
80	SAS	Serially Attached Small Computer Systems Interface
81	SATA	Serial Advanced Technology Attachment
82	SFP	Small Form Factor
83	SSD	Solid State Drive
84	SWB	Static Weigh Bridge
85	TB	Tera Byte
86	TCD	Toll Collector Display

Request for Empanelment(RFE) of System Integrators for Implementation of Electronic Toll Collection System Including Weigh-in-Motion & Static Weigh Bridge System at Toll Plazas

Sr.	Abbreviation	Description
87	TCK	Toll Collector Keyboard
88	TCP / IP	Transmission Control Protocol / Internet Protocol
89	TCT	Toll Collector Terminal
90	TL	Traffic Light
91	TLC	Toll Lane Controller
92	TPM	Trusted Platform Module
93	TR	Transaction review
94	TXN	Transaction
95	UFD	User Fare Display
96	UHF	Ultra-High Frequency
97	UPS	Uninterruptible Power Supply
98	USB	Universal Serial Bus
99	VDC	Volts Direct Current
100	VRN	Vehicle Registration Number
101	W	Watt
102	WDR	Wide Dynamic Range
103	WIM	Weigh In Motion
104	WS	Work Station
105	ALB	Automatic Lane Exit Barrier
106	AVC	Automatic Vehicle Classifier
107	CCTV	Closed Circuit Television
108	NVR	Network Video Recorder
109	ETC	Electronic Toll Collection
110	ICD	Interface Control Document (specifications by IHMCL)
111	IHMCL	Indian Highways Management Company Limited
112	ISCU	Intercom Slave Communication Unit
113	LC	Lane Computer-Industrial PC
114	LGD	Load Gauge Detector
115	LoA	Letter of Award
116	LSDU	Lane Status Display Unit
117	MCBF	Mean Cycle Between Failures
118	MCU	Master Communication Unit
119	MLB	Manual Lane Entry Barrier
120	MTBF	Mean Time Between Failures
121	MTTR	Mean Time to Repair
122	NETC	National Electronic Toll Collection programme
123	NHAI	National Highways Authority of India
124	OHLS	Over Head Lane Sign
125	POS	Point of Sales
126	RAID	Redundant Array of Inexpensive Disks
127	RFID	Radio Frequency Identification
128	RFE	Request for Empanelment
129	RPR	Receipt Printer
130	SFTP	Secure File Transfer Protocol

Request for Empanelment(RFE) of System Integrators for Implementation of Electronic Toll Collection System Including Weigh-in-Motion & Static Weigh Bridge System at Toll Plazas

Sr.	Abbreviation	Description
131	SI	System Integrator
132	Staff Id	Staff Identification
133	TCD	Toll Collector Display
134	TCT	Toll Collector's Terminal
135	TL	Traffic Light
136	TLC	Toll Lane Controller
137	UPS	Uninterrupted Power Supply

3. INSTRUCTIONS TO APPLICANTS

3.1. Scope of RFE

- 3.1.1. IHMCL invites applications/bids from eligible entities that strictly meet the criteria technical and financial capabilities.
- 3.1.2. The RFE would be evaluated on the basis of the criteria set out in this Request for Empanelment (RFE) document in order to identify the qualified System Integrators for providing the services envisaged outlined under this RFE.
- 3.1.3. Terms used in this RFE document which have not been defined herein shall have the meaning recognized thereto in the draft Contract Conditions.
- 3.1.4. Applicants shall submit its application in accordance with the terms set forth in this RFE document and any other document/s provided by IHMCL pursuant to this RFE, including annexure and appendices (collectively referred to as the "**Bid Documents**"), as modified, altered, amended and clarified from time to time by IHMCL.
- 3.1.5. The Bid Documents are and shall remain the property of IHMCL and are transmitted to the Applicants solely for preparation and submission of their respective bids in accordance herewith. Applicants shall not use it for any purpose other than for preparation and submission of their bids.
- 3.1.6. The statements and explanations contained in this RFE document are intended to provide an understanding to the Applicants about the subject matter of this RFE and shall not be construed or interpreted as limiting, in any way, the scope of services, work, and obligations of the Service Provider as outlined in the RFE. IHMCL reserves the right to amend, alter, change, supplement or clarify the scope of service and work, as well as the contract conditions to be awarded in lines with this RFE document (as amended/supplemented from time to time). Consequently, any omissions, conflicts, or contradictions in the Bid document are to be noted, interpreted and applied appropriately to give effect to this intent, and no claims on that account shall be entertained by IHMCL.
- 3.1.7. IHMCL reserves the right to reject any bid submitted in response to this Request for Empanelment (RFE) that contains material deviations. A material deviation is defined as any exception, condition, or reservation related to the terms and conditions of the RFE or any substantive requirement that significantly affects the scope, quality, performance, or eligibly criteria of the bidder. Material deviations include, but are not limited to:
- i. Failure to comply with mandatory technical specifications.
 - ii. Conditional bids or bids with exceptions to the terms and conditions of the RFE.

- iii. Non-compliance with the financial requirements or payment terms.
- iv. Any other deviations that, in the opinion of IHMCL, affect the fundamental aspects of the bid.

Bids determined to have material deviations will not be considered for further evaluation, and the bidder will be notified accordingly. The decision of IHMCL regarding the materiality of deviations and the subsequent rejection of bids shall be final and binding.

3.1.8. The Proposal to be submitted by the Applicants will be unconditional and the Applicants would be deemed to have accepted the terms and conditions of the RFE document with all its contents. Any conditional Proposal is liable for outright rejection.

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

3.2. Eligibility Criteria to Apply for the Empanelment:

3.2.1. The criteria for the Applicant shall be as listed in the table below:

SI #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
EC-1	Legal entity	<p>The Applicant shall be a business entity incorporated under the Companies Act 1956/2013 or Limited Liability Partnerships Act 2008 and under GST as on the date of publishing of the RFE.</p> <p>It is clarified that the Applicant must independently qualify in terms of this RFE, and the experience of its members, directors, key personnel, or partners, as applicable, shall not be considered.</p> <p>Further, such an entity must have been in existence for a minimum of 3 years as of the date of submission of its application for empanelment.</p> <p><i>Note: Applications submitted by joint ventures (JVs) or consortiums will not be accepted in response to this RFE. Each applicant must</i></p>	<p>a) Copy of Certificate of Incorporation / Registration under Companies Act, 1956/2013 or LLP Act 2008, as applicable</p> <p>b) GST Registration Certificate</p> <p>c) Power of Attorney as per format enclosed at Annexure-2</p>

SI #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
		<p><i>submit its application independently and solely in its own name. Any application that includes or is submitted in collaboration with another entity as a joint venture or consortium will be deemed ineligible and will not be considered for evaluation. This ensures that each applicant independently meets the qualifications and criteria set forth in the RFE without relying on the capabilities or qualifications of other entities.</i></p>	
EC-2	Annual Turnover	<p>The applicant should have a minimum annual turnover of Rs 20 crore in any of the previous three (3) financial years.</p>	<p>Relevant extracts of audited financial statements for the last three (3) financial years. These extracts should include essential financial information such as revenue, expenses, profits, and other pertinent financial data that demonstrate the financial health and stability of the applicant;</p> <p>AND</p> <p>Certificate from the Statutory Auditor/CA on turnover detail of the last three (3) financial years. as per format enclosed at Annexure-1.</p>
EC-3	Net Worth	<p>The Applicant must have a positive Net worth for last financial year.</p>	<p>Certificate from the Statutory Auditor /CA clearly specifying the positive net worth of the firm for last financial year as per the format enclosed at Annexure-1</p>

SI #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
EC-4	Toll Management System software	<p>The applicant should have developed its own proprietary TMS software having “real-time transaction processing” functionality as on date of submission of Application. All IPR, source code etc. of the TMS should be owned by the Applicant.</p> <p>For the purpose of evaluation, “real-time transaction processing” shall mean as below – For projects under NETC (FASTag) programme in India – Compliance to Interface Control Document (ICD) 2.5 or latest protocol as set out by IHMCL/NHAI as on date of submission of Application.</p>	<p>a) A Certificate from Authorized Signatory of the Applicant as per the format enclosed at Annexure -4.</p> <p>b) Proof of “real-time transaction processing” functionality as below - - For the FASTag programme the Applicant must provide – Proof of confirmation from the respective Acquirer Bank verifying Go-Live at all toll plazas on ICD 2.5 or the latest protocol. This confirmation should demonstrate that the Applicant’s systems are fully operational and compliant with the required standards for the FASTag programme; and</p> <p>c) Along with Annexure-4, the applicant should submit the signed copy of the technical user manual of TMS showing complete functionality and all the TMS modules defined in the Annexure-9</p> <p><i>If any discrepancies are discovered at the toll plaza</i></p>

SI #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
			<p><i>between the technical user manual submitted by the applicant and the actual implementation at any during the period of empanelment, the application for empanelment is liable to be rejected or system integrator shall be liable to be de-listed from the empanelment. Additionally and their performance security shall be liable to be encashed.</i></p>
EC-5	ETC Experience	<p>The Applicant should have implemented 100 ETC Lanes and a minimum 10 Highway toll plazas as on the date of submission of the Application.</p> <p>The ETC lanes should include supply, installation, and commissioning and Operations & Maintenance of the following minimum equipment/system -</p> <ul style="list-style-type: none"> • Toll Management Software • RFID reader • Toll Lane Controller • Automatic Vehicle Classifier • License Plate Image Capture Camera/Automatic Number Plate Recognition Camera • Incident Capture camera • Automatic Boom Barrier 	<p>a) Work order/ Contract clearly highlighting the relevant scope of work, and contract value, year of execution.</p> <p>b) Completion Certificate issued and signed by a competent authority of the client. This certificate should be on the client's official letterhead and must be enclosed as per the format provided in Annexure-5.</p> <p><i>IHMCL reserves the right to contact the aforementioned Competent Authority for the purpose of the verification.</i></p> <p><i>Note: The experience of the applicant as a sole SI or as a consortium/JV partner SI is acceptable.</i></p>

SI #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
EC-6	Implementation of Interface Control Document (ICD 2.5) on National Highways	The Applicant should have implemented the ICD-2.5 on all Highways Toll Plazas under the NETC Programme allotted to the Applicant as on the date of submission of the Application.	Undertaking as per Annexure -8 IHMCL reserves the right to verify the same from the NETC ecosystem.
EC-7	Certification	The Applicant should have valid certificates of the following: <ul style="list-style-type: none"> • CMMi Level 3 or above • ISO 20000 for IT Service Management • ISO 27001:2013 for Information Security Management System • ISO 9001:2015 for Quality Management System • ISO 27017:2015 for Information Security Controls for Cloud Services 	Valid copies of relevant certificates from the concerned authorities.
EC-8	Undertaking of Blacklisting	The Applicant, should not have been Suspended/De-listed by IHMCL/NHAI or blacklisted by any State / Central Government Department or Central /State PSUs in India or Abroad as of the date of submission of the application.	To be provided as per the format enclosed at Annexure-3
EC-9	Certification	The Applicant should submit a valid certification by CERT-In empanelled agencies for the TMS Application(s).	The Applicant shall submit the latest certification.

SI #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
EC-10	Certification	The Applicant should submit a valid STQC certification for the TMS Application including all Modules (s) as specified in Annexure - 9	The Applicant shall submit the latest certification on modules as specified in Annexure-9 with the user manual.
EC-11	Implementation of Manual Policy	The Applicant should have implemented the Manual FASTag policy at their respective Highway Toll Plazas under the NETC Programme, as per IHMCL circular no E-123819, IHMCL/Manul FASTag Transaction /Policy/123819/269 dated 13.04.2023, and 25.05.2024 as on submission of the application date (enclosed in the RFE).	Undertaking as per Annexure -6 <i>IHMCL reserves the right to cross-check the details from NPCI, TMCC or the Acquirer Bank.</i>
EC-12	People in organization (Full-time Employees – FTE)	The Applicant should have a Full-Time minimum of 50 Employees (FTE) in the organization as on the application submission date.	Submission of HR certificate stating the same along with latest EPFO Chalan.
EC-13	Integration with Weigh – in – Motion (WIM)	The applicant must have integrated the Weigh In Motion (WIM) System and Static-Weigh-Bridge (SWB) with their TMS and <u>TMCC in all the existing allocated NH Plazas</u> as on the bid submission date. <i>Note: In case WIM/SWB is not functional, not installed or no-overload fee is collected at the toll plaza, SI shall record zero (0) in the TMS and share the same in the database view of the TMCC.</i>	Undertaking from authorized signatory in the specified format provided in Annexure-10 of RFE. IHMCL reserves the right to verify the same from TMCC data or from PIU and/or Concessionaire as deemed fit. <i>If any discrepancies are discovered at the toll plaza regarding the reporting of incorrect information with TMCC by the applicant, the application</i>

SI #	Requirement Parameter	Eligibility Criteria	Documentary Evidence
			<i>for empanelment is liable to be rejected or system integrator shall be liable to be de-listed from the empanelment. Additionally, their performance security shall be liable to be encashed.</i>
EC-14	Certification	The System Integrator shall submit the undertaking that the critical equipment mentioned in the RFE shall be procured only from those OEMs who have obtained STQC certificate for the equipment clearly mentioning that the equipment meets the specifications mentioned in RFE documents. The STQC certificate shall be submitted to the Authority/ IHMCL before FAT.	Undertaking as per Annexure-11

3.3. Power of Attorney

The Applicant should submit a notarized Power of Attorney in the format provided at Annexure-2 Letter of Authorization authorizing the signatory of the Bid to sign the Bid and all related documents. It is clarified that Applicants may submit equivalent documents (for example, delegation of power, board resolution copy), in lieu of this document, as applicable.

3.4. Content of the Request for Empanelment

3.4.1. The RFE document should be read in conjunction with any addenda or clarifications issued subsequent to the publication of RFE or any circular issued in this regard by IHMCL/NHAI.

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

an application not substantially responsive to the RFE document in all respects will be at the Applicant's risk and may result in the rejection of the Application. In the event of any discrepancies, misrepresentation or wilful omission/suppression of material information discovered in the declarations or documents in the future, IHMCL reserves the right to revoke the applicant's empanelment and pursue its legal remedy in this regard.

3.4.3. Cost for Bidding

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

3.4.4. Non-Refundable Document Fee

- a) A non-refundable document fee of **Rs. 10,000 (incl. GST)** should be deposited in IHMCL bank account and proof of payment (receipt, UTR details etc.) shall be submitted on the Portal. Proposals/Application received without Document fees shall be rejected.
- b) IHMCL bank account details for deposit of Document Fee are as mentioned below:
 - A/c Holder Name = Indian Highways Management Company Limited
 - Bank Name = Canara Bank
 - A/c No. = 8598201006217
 - IFSC = CNRB0008598
 - Branch = Delhi NHAI Dwarka Branch New Delhi-110075

3.4.5. Earnest Money Deposit (EMD)

- a) The Applicant shall submit, along with their Proposals/Applications, an EMD of **INR 1,00,000/- (Rupees One Lakh only)** in the form of a Demand Draft OR Bankers Cheque or NEFT/RTGS mode to IHMCL Bank Account (Bank details as provided in Clause 3.5.4 (b))
- b) Demand Draft/Banker cheque drawn on any schedule bank: Payable at Indian Highways Management Company Limited, New Delhi
- c) The Original Demand Draft/Banker's Cheque shall be submitted to IHMCL Office within 07 days from the date of application submission on the Portal. Any delay in submission of Original Demand Draft/Banker's Cheque within specified time may lead to rejection to the Application.
- d) Upon completion of processing of Applications, the EMD will be returned/refunded without any interest to respective Applicants within 30 days.

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

3.4.6. Performance Bank Guarantee:

- a) Within 7 (Seven) days of the issue of Letter of Intent by IHMCL, the successful Applicant shall submit an irrevocable and unconditional Bank Guarantee amounting Rs 10 (Ten) Lakhs towards Performance Security of NETC Program in the prescribed format given in the RFE at Annexure-7. In case the BG is not submitted by the applicant within the stipulated time period the application shall be rejected by the IHMCL, and the EMD submitted by the applicant will be forfeited by IHMCL.
- b) The aforesaid Bank Guarantee will be valid for a period of 180 days after the expiry of the empanelment period and shall also have a minimum claim period of 1 year.
- c) The Bank Guarantee in the name of IHMCL issued by the following banks would only be accepted: -
- i. Any Nationalized Bank
 - ii. Any Scheduled Commercial Bank approved by RBI having a net worth of not less than Rs. 500 crores as per the latest Audited Balance Sheet of the Bank. In the case of a Foreign Bank (issued by a branch in India), the net worth in respect of the Indian operations shall only be taken into account
 - iii. A Foreign Bank (issued by a branch outside India) with a counter guarantee from any Indian Nationalized Bank.
 - iv. Export Import Bank of India
- d) The acceptance of the Bank Guarantees shall also be subject to the following conditions: -
- i. The capital adequacy of the Bank shall not be less than the norms prescribed by RBI
 - ii. The bank guarantee issued by a Cooperative Bank shall not be accepted.
- e) For the avoidance of doubt, the Applicant shall be enlisted as Empanelled SI only upon meeting all PQ criteria and submission of Performance Security.

3.4.7. Clarifications

- a) Applicants may submit their queries with respect to the RFE document at tenders@ihmcl.com in the following format (in excel ONLY) as below, within 15 days of release of the RFE:

Name of Applicant: _____

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

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

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

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

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

3.4.10. Language of Application

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

3.4.11. Preparation and submission of application

- i. Application/Bid must be submitted online only through the link provided on the IHMCL website as mentioned in Section 1. Applicants are advised to go through the guidelines, instructions, manuals, etc. as provided in the portal.
- ii. Applicants are required to upload all requisite document at the link provided on the IHMCL website as mentioned in Section 1.
- iii. Physical submission of the documents such as Power of Attorney or equivalent, EMD in case of submission through DD, as specified in the RFE document are required to be submitted at the IHMCL office within 7 days from the date of application submitted at the RFE portal as mentioned in Section 1. Failure to submit the original document(s) as required in the RFE in physical form within 7 days shall lead to rejection of the application.
- iv. If for any reason, any interested Applicant fails to complete any online stages during the complete Application process/cycle, IHMCL shall not be responsible for that and any grievance regarding that shall not be entertained.

3.5. Examination and evaluation of applications

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

3.5.2. The evaluation process, including deliberation, and discussions on applications, shall be considered confidential and privileged information and shall not be disclosed/ discussed with bidders, or any third party.

3.5.3. Phase-1: Test of Responsiveness:

- a) As part of the evaluation process, IHMCL shall first determine whether each Application is responsive to the requirements of this RFE document.
- b) An Application shall be considered responsive only if:
 - i. All requisite documents are received through the RFE portal as per the format required under this RFE document.
 - ii. Submission of physical document such as Power of Attorney or equivalent and EMD in case of submission through DD as per the format required under this RFE document.
 - iii. Application contains all the information as required (complete in all respects).
 - iv. Application does not contain any condition or qualification.

- v. it is not non-responsive in terms hereof
- c) IHMCL reserves the right to reject any Application which is non-responsive and no request for alteration, modification, substitution or withdrawal shall be entertained by IHMCL in respect thereof.

3.5.4. Phase-2: Application Evaluation Process:

- a) The requisite documents as specified in the RFE document submitted at the RFE portal will be evaluated by the Evaluation Committee. The documents submitted RFE portal will be scrutinized by the Evaluation Committee. The Applications that meet the Eligibility Criteria shall be considered for empanelment.
- b) In the event that IHMCL identifies any deviations or incorrect documentation during the evaluation process, IHMCL reserves the right to forfeit the EMD (Earnest Money Deposit) submitted by the applicant.

3.6. Process confidentiality:

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

3.7. IHMCL's right to reject any or all applications:

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

3.8. Confidentiality

- 3.8.1.** The Applicant shall keep confidential any information related to this RFE with the same degree of care as it would treat its own confidential information. The Applicants shall note that the confidential information will be used only for the purposes of this tender and shall not be disclosed to any third party for any reason whatsoever.
- 3.8.2.** Information relating to the examination, clarification, evaluation and recommendation for the Applicants shall not be disclosed to any person who is not officially concerned with the process or is not a retained professional advisor advising IHMCL in relation to, or matters arising out of, or concerning the bidding process. IHMCL will treat all information, submitted

as part of the Bid, in confidence and will require all those who have access to such material to treat the same in confidence. IHMCL may not divulge any such information unless it is directed to do so by any statutory entity that has the power under law to require its disclosure or as may be required by law or in connection with any legal process or such information which would be available in public domain.

- 3.8.3.** At all times during the performance of the Services, the Applicant shall abide by all applicable IHMCL, NHAI/MoRTH's security rules, policies, standards, guidelines and procedures. The Applicant should note that before any of its employees or assignees is given access to the Confidential Information, each such employee and assignees shall agree to be bound by the term of this tender.
- 3.8.4.** The Successful Applicant should not disclose to any other party and keep confidential the terms and conditions of this Contract, any amendment hereof, and any Attachment or Annexure hereof.
- 3.8.5.** The obligations of confidentiality under this section shall survive termination of the Contract.
- 3.8.6.** Applicants shall not be under a declaration of ineligibility or blacklisting for corrupt and fraudulent practices by the Central Government, the State Government or any public undertaking, autonomous body, authority by whatever name called under the Central or the State Government.

3.9. Validity of the empanelment

The empanelment process will continue throughout the year, any applicant can apply for empanelment at any point of time and subject to other terms and conditions of this RFE, empanelment will be valid till 31st March 2026 from the date of empanelment and can be extended up to 1 (one) year at the sole discretion of IHMCL.

3.10. Corrupt or Fraudulent practices

- 3.10.1.** IHMCL will reject the application of the applicants if it determines that the empanelled Applicant, during the bidding process for bids for a project invited by IHMCL/NHAI, had engaged in corrupt or fraudulent practices in competing for the project in question.
- 3.10.2.** IHMCL will declare the Applicant ineligible, either indefinitely or for a stated period of time, if it at any time determines that the Applicant has engaged in corrupt or fraudulent practices in competing for the contract, or during the execution. This determination applies to projects awarded by IHMCL, NHAI, or any Concessionaire/Contractor and affiliated with National Highway / Expressway Toll Plaza.

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

3.10.4. “Fraudulent Practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of IHMCL and includes collusive practice among Applicants (prior to or after Application submission) designed to establish bid process at artificial non-competitive levels and to deprive IHMCL of the benefits of free and open competition.

3.11. Suspension from Empanelment

3.11.1. IHMCL reserves the right to suspend the empanelment of any empanelled System Integrators under the following conditions:

- a) In case of non-performance or failure to meet the terms & conditions under this RFP while appointed as System Integrator at any National Highway / Expressway Toll Plaza.
- b) If the empanelled System Integrator has been found to be involved in compromised, unauthorized, corrupt or fraudulent practices such as posting manual transactions to CCH at toll plazas without Implementation of Manual Transaction Policy and in case of wrong or fraudulent mapping of Internet Protocol (IP) Address with TMCC. This includes any actions taken by the System Integrator that compromise the integrity, accuracy, or transparency of toll plaza operations.
- c) If the average manual transactions of the month is more than **2%** of the Total transactions in any of the Plaza allotted to the SI.
- d) If upon award to any empanelled SI by IHMCL or any entity appointed by NHAI, the SI fails to deliver the project deliverables/milestones within set timelines of the Contract, IHMCL reserves the right to suspend the empanelment of such SI for a period of 6 months or more.
- e) Failure to carry out the system audit through CERT-in and SQTC empanelled vendors once a year.
- f) In case of deficiencies observed during Audit by Third Party Information System Audit by IHMCL/NHAI empanelled Auditors.
- g) In case of non-adherence to the policy guidelines /directions/SLAs released by NHAI/IHMCL from time to time.
- h) In event of Toll Plaza not running with ICD 2.5 or latest for more than 10 days., IHMCL reserves the right to suspend the empanelment of such SI for a period of a minimum of 3 months.
- i) In case of non-performance or failure to carry any obligation under this RFE.

- j) In the event of any fraudulent or fake transactions processed through the TMS.
- k) If the empanelled System Integrator is found to have engaged in corrupt or fraudulent practices with the tolling agency or concessionaire.
- l) In case of non-compliance with the Data Protection and Privacy Act DPDP Act of 2023, GOI.
- m) If the System Integrator fails to provide the necessary software and hardware support during the Plaza Migration upon completion or termination of the contract, the Performance Security of the RFE/RFP will be encash.

3.12. Encashment of Performance Bank Guarantee:

The Performance Bank Gurantee provided by the System Integrator shall serve as a guarantee for the performance of their obligations under the RFE.

3.12.1. Conditions for Encashment:

- a) Failure of the System Integrator to provide the necessary software and hardware support during Plaza Migration upon completion or termination of the contract.
- b) Non-compliance with the project timelines or milestones as specified in the contract.
- c) Breach of any terms and conditions of the RFE by the System Integrator.
- d) Failure to rectify any defects or issues identified d within the stipulated time frame.
- e) Failure to comply with the service level agreements (SLAs) outlined in the RFE.
- f) If the empanelled System Integrator has been found to be involved in corrupt or fraudulent practices such as posting manual transactions to CCH at toll plazas without Implementation of Manual Transaction Policy.
- g) Failure to carry out the system audit through CERT-in and SQTC empanelled vendors once a year.
- h) In the event of any fraudulent or fake transactions processed through the TMS.
- i) In case of non-compliance with the Data Protection and Privacy Act DPDP Act of 2023, GOI.
- j) In case of wrong mapping of Internet Protocol (IP) Address with TMCC.
- k) During the period of empanelment if any discrepancies are discovered at the toll plaza between the technical user manual submitted by the applicant and the actual implementation at the toll plaza.

3.12.2. Replenishment of Performance Security:

In the event of partial encashment of the Performance Security, the System Integrator shall replenish the Performance Security to its original amount within 10 days of encashment. In case non-replenishment of performance security within the stipulated time period, IHMCL reserves the right to de-list the system integrator from the empanelment.

3.13. Miscellaneous:

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

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

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

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

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

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

3.13.6. Compliance shall be ensured w.r.t. Public Procurement (Preference to Make in India) Order 2017 – Notification of Telecom Products, Services or Works” (in short DoT PPP MII notification, 2018) dated 29th August issued by Department of Telecommunications. Applicant may visit website of Department of Telecom (<https://dot.gov.in> > Investment Promotion > Telecom Equipment Manufacturing) for more details on the said notification. (https://dot.gov.in/sites/default/files/policy_for_preference_to_domestically_managed_telecom_products_services_or_works_2017.pdf)

[om products in government procurement.PDF](#) and
<https://dipp.gov.in/sites/default/files/PPP%20MII%20Order%20dated%2016%2009%202020.pdf>

3.13.7. Eligible Goods and Services, and Original Equipment Manufacturer (OEM):

3.13.7.1. For purposes of this Clause, the term “goods” includes commodities, raw material, machinery, equipment, and industrial plants; and “related services” includes services such as insurance, transportation, supply, installation, integration, testing, commissioning, training, and initial maintenance.

3.13.7.2. OEM of each component/ equipment shall be preferably Indian OEM/ Manufacturers or preferably Class-I Local supplier (as defined in DPIIT Order no. P-45021/2/2017-PP (BE-II) dated 04.06.2020 (revised “Public Procurement (Preference to Make in India) Order 2017”) having direct presence in India and own service and support offices to ensure smooth after sales service support on site.

3.13.7.3. Applicant must comply with the Office Memorandum no. F. No. NH-35014/20/2020-H, Government of India, Ministry of Road Transport & Highways dated 04.08.2020, regarding Department of Expenditure (DoE), Ministry of Finance, Govt. of India O.M. No. 6/18/2019-PPD dated 23.07.2020, vide which Rule 144 of the general Financial Rules 2017 entitled “Fundamental principles of public buying’ has been amended by inserting sub-rule 144 (xi) in the General Financial Rules (GFRs), 2017. As per the new rule “**Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) or works (including turnkey projects) only if the bidder is registered with the Competent Authority.**” The Bidder shall furnish the registration status of the supplier with Competent Authority (for the items / goods proposed to be procured from any country which shares a land border with India).

3.13.7.4. That the OEM should not be rebranding & reselling products in India through importing/ trading from a country that shares a Land Border with India.

3.13.7.5. That the source code of the Software and Firmware being supplied for all the relevant equipment being supplied against this bid does not reside in any Country that shared a Land Border with India.

3.13.7.6. STQC Certification of Critical Equipment:

(a) The System Integrator shall ensure that critical equipment as mentioned at 3.13.7.6(b) are procured only from OEMs that have obtained an STQC certificate for the equipment. The certificate must clearly state that the equipment meets the specifications outlined in the RFE documents. The STQC certificate must be submitted to the Authority/IHMCL before the FAT.

(b) The Critical Equipment for STQC Certification shall include:

- RFID Reader along with the Antenna
- Automatic Lane Barrier
- Automatic Vehicle Count & Classifier (AVCC)
- Cameras - ICS, LPIC, ANPR, and PTZ
- Toll Lane Controller
- Toll Plaza Server

4. SCOPE OF WORK

4.1. Background

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

4.2. Objective:

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

4.3. Detailed Scope of Work:

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

4.3.1. Supply Installation, Commission & Operation & Maintenance of ETC system:

- a) The service provider shall supply, install, integrate, test, commission and configure all required hardware & software systems & sub-systems for ETC and Toll Management System at the designated Toll Plazas upon instructions from IHMCL.
- b) Service provider shall ensure to integrate the Automatic Number Plate Capture (ANPR) Camera with Lane software and Plaza software.
- c) Service Provider shall ensure for automatic capturing of vehicle registration number (VRN) of each vehicle through ANPR camera installed in lanes. A functionality shall be developed in lane application to process FASTag transaction based on VRN captured by ANPR camera and the same shall be used as secondary option whenever FASTag is not read through fixed RFID reader.
- d) Service Provider shall ensure to keep a proper inventory of the ETC infrastructure installed at fee plazas throughout the Contract period.

- e) Service Provider shall ensure to install Lane Monitoring Camera/Incident Capture Camera in all lanes at toll plaza which will record the video and also capture the incidents. This camera shall be mounted on the pole at a location (to be decided by Service Provider) whereby proper video recording can be made of the lane and incidents can be captured in TMS software. This camera shall be integrated with TMS software to capture the incidents and also connected with Network Video Recorder. Following Cameras are required to be connected with Network Video Recorder with minimum 30 Days of video Backup: -
- a. Lane Monitoring Camera/Incident Capture Camera
 - b. Booth Monitoring Camera
 - c. Plaza Building Camera
 - d. PTZ Camera
- f) The Service Provider shall diligently implement the Electronic Toll Collection (ETC) system at the fee plazas, adhering to the prescribed business rules. In the event of an entry-exit concept being utilized at the fee plazas, the Service shall responsibly develop a suitable solution and successfully execute the required tasks within the specified timeline outlined in the Request for Proposal (RFP).
- g) The Service Provider is responsible for supplying, installing, and commissioning both the Medium Speed Weigh in Motion (MSWIM) system and Static Weigh Bridge (SWB) System within timeline outlined in the Contract Agreement. Additionally, the Service Provider must execute all necessary civil works required for the implementation of the MSWIM and SWB systems at designated fee plazas. These civil works include PQC cutting, foundation laying, groove cutting, ducting, piping, SWB foundation construction, and SWB ramp construction. The cost of these civil works should be included in the overall cost of the MSWIM and SWB systems, and no separate payment will be issued for civil works as specified.
- h) In case of staggered fee plazas, the Service Provider shall ensure to make arrangement of network connectivity among fee plazas and ensure for smooth functioning of ETC system. The cost of network connectivity management shall be the part of Cabling/Networking/Installation/ Commissioning as mentioned in Annexure-A.
- i) In the case of fee plazas with pre-existing ETC systems, the selected Service System shall dismantle the old ETC system. The handover/takeover activity for old ETC equipment, whether in working or non-working condition, should be diligently carried out by the successful bidder. The Service Provider shall be responsible for the complete dismantling of the existing ETC equipment from the toll plaza.
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- j) Service provider shall ensure to supply items as per BOQ items at toll plazas as per direction from NHAI/IHMCL and get them verified by IHMCL/NHAI. Prior to the Site Acceptance Test, the responsibility of providing storage and security for supplied material shall be in the scope of service provider IHMCL /NHAI will not be responsible for the faulty/vandalism of the equipment.
- k) Service Provider shall be fully responsible for the safety of equipment which shall be delivered or installed at site before commencing SAT by IHMCL/respective PIU. Prior to SAT, if any equipment/sub-equipment/consumable gets non-functional/damaged due to any reason whatsoever, excluding scenarios covered under force majeure, then service provider will be liable for replacing of damaged item without imposing any extra charges to IHMCL/NHAI.
- l) Service Provider shall complete the Installation, Integration, Commissioning of ETC system and sub systems (part of BOQ items) as specified in Annexure-A at the toll plazas within the timeline specified in the Contract Agreement.. The service provider shall be responsible for system integration so that the ETC System and Toll Management System including the sub-system(s) work coherently and are able to exchange data/information electronically, among themselves (if applicable), as well as with the acquirer bank and central clearing house for ETC program without any financial implication to Toll Operating Agency and IHMCL/NHAI.

4.3.2. Providing O&M services of existing ETC System:

- a) Service Provider shall take over all existing **Available**¹ ETC equipment on As-Is basis at the allocated toll plazas and carryout proactive and reactive maintenance, repair and replacement of defective components (IT and Non-IT/ Hardware, UPS with Batteries, Software etc.), or replacement as required to maintain the SLAs in the RFP throughout the Contract Period. In case, some of the equipment are found to be of low configuration, the Service Provider shall carryout requisite refurbishment/replacement of equipment. The cost for repair, replacement, and refurbishment of ETC equipment shall be borne by the Service Provider and shall be deemed to be factored in the quoted value for O&M services by the Service Provider.
- b) Service Provider shall take over all existing MSWIM and SWB system on As-Is basis at the designated toll plazas and perform refurbishment, proactive and reactive maintenance, as well as repairing or replacing any defective components,

¹ Available – Shall mean that equipment/software which are pre-existing at the toll plaza as per status of equipment provided in this RFP-Annexure-C. This equipment/software may be in functional/faulty/damage condition.

subcomponents, or consumables as necessary to ensure the equipment's full functionality. Furthermore, the Service Provider shall uphold the Service Level Agreements (SLAs) outlined in the Request for Proposal (RFP) throughout the entire Contract Period.

- c) The functional requirement of MSWIM system are as follows: -
- i. The MSWIM system shall be integrated with toll lane controller of the lane.
 - ii. The MSWIM system shall be able to capture number of axles, axle spacing, number of wheels, gross weight of vehicle and height of each passing vehicle and provide data of each vehicle to the lane controller for further auditing and analysis.
 - iii. The Gross Vehicle Weight of vehicles approaching the toll booth shall be automatically detected for speed range prescribed in the specifications.
 - iv. This detected weight shall not be displayed on the computer terminal of toll collector until the toll collector classifies the vehicle.
 - v. If the vehicle is found to be overloaded based on Toll Collector Classification, the Weight information shall be displayed as "Overload" on user fare display and appropriate toll receipts with applicable fare/fee including overload penalty amount, shall be generated automatically.
 - vi. The excess fee charged against such overloaded vehicles shall also be separately printed on user fee receipts of such vehicles.
 - vii. MIS reports shall be available for the Authority, on numbers of overloaded vehicles crossing any toll plaza.
 - viii. Integration of MSWIM with ETC already provided by other service provider.
 - ix. The MSWIM controller shall be able to work and also store the data independently and shall also send the MSWIM data for each transaction to the central system (TMCC) designated by IHMCL.
 - x. MIS reports shall be available in the ETC, on numbers of overloaded vehicles crossing any toll plaza along with necessary details in terms of overload weight.
 - xi. MSWIM system must be equipped with vehicle separation and direction detection sensors installed in each lane adjacent to the MSWIM structure. These sensors are specifically designed to segregate each vehicle passing through the MSWIM lane and precisely determine its direction of travel. In the event of any vehicle passing in reverse direction, the sensors promptly alert the Toll Lane Controller. Upon detection of a vehicle moving in reverse from the MSWIM structure, both the MSWIM system and Toll Lane Controller shall delete the

associated data. Only vehicles moving in the forward direction shall be counted and weighed by the MSWIM system.

- d) The equipment that are Not-Available² at the fee plazas shall be supplied, installed, and commissioned by the Service Provider at the latest discovered rates of IHMCL or as per rates mentioned in the Contract Agreement with Service Provider.
- e) Any replacement/new supply of equipment by the Service Provider shall be as per equipment Specification mentioned in RFE Tender No. IHMCL/ETC/Empanelment/2024/01, dated 30-05-2024.
- f) Service Provider shall ensure to start Operation & Maintenance services of ETC system at fee plazas with their own ETC software within the timeline as specified in the Contract Agreement. The O&M services shall be considered as started upon completion of following activities: -
 - i. Smooth roll over of ETC system at Fee Plaza (confirmation from Acquirer Banks/NPCI required)
 - ii. Repair/replacement/Refurbishment of all faulty/damaged equipment as handed over by previous System integrator (To be verified by IHMCL/representative from PIU)
 - iii. Installation & commission work of additional equipment which are not available at the fee plazas (To be verified by IHMCL/representative from PIU)
 - iv. Implementation of ICD 2.5 specification
 - v. Implementation of ANPR system in all lanes using existing camera.

Upon completion of above-mentioned processes, Service Provider shall notify IHMCL to verify the same. Upon Verification, if any of the activity is found to be non-complied, the O&M services shall not be considered as started. The O&M services shall not be treated as started unless above mentioned processes are completed and informed by Service Provider.

- g) Service Provider shall ensure to integrate all existing ETC equipment of the fee plazas. Any requirement to integrate existing ETC equipment like arrangement of protocol, Integration software etc. shall be the responsibility of Service Provider.
- h) Upon detection of overload by the MSWIM system in a lane, a pop-up notification will be generated in the lane system, providing the lane operator with the option to collect the overload penalty amount or not. If the lane operator opts to collect the overload penalty amount, the receipt printer will generate a receipt containing comprehensive information,

² Not-Available – Shall mean that equipment/software which are not currently installed/present at the toll plaza as per status of equipment provided in this RFP-Annexure-C

including the Vehicle Number, transaction date and time, permissible weight, actual weight, applicable overload, and any other relevant details. The user will then be requested to pay the overload amount as indicated on the receipt. The Toll Lane Controller will store the transaction data, along with images captured by the Automatic Number Plate Recognition (ANPR) camera and Lane Monitoring Camera, for all transactions where the MSWIM system detected overload. This data should be available for all overload cases whether the operator collects the overload amount or not. This comprehensive data, including accompanying images, is retained for reconciliation purposes, ensuring accurate record-keeping and facilitating any necessary audits. The images (clearly indicating the vehicle and the VRN) should be retained for minimum of 06 months and should be readily available as and when required. Service provider shall provide a monthly status of overweight transactions along with images and associated details.

- i) Service Provider shall ensure that MSWIM system & SWB system should be stamped and sealed by the Weight & Measure (W&M) Department after calibration by the Service Provider on a yearly basis. The cost of the same shall be included in the O&M value as quoted by the Service Provider. Calibration copy to be pasted on the TLC system.
- j) Service Provider will ensure periodic calibration of the MSWIM and SWB system to maintain its proper functioning. This calibration process will be carried out at regular intervals to ensure accurate and reliable weight measurements.
- k) Service Provider shall ensure to maintain proper earthing, pest control services, Surge protection for MSWIM and SWB system.
- l) The functional requirement of SWB system are as follows:-
 - i. Upon detection of overload by the MSWIM system and upon user objection to the weight measurement by MSWIM, the vehicle shall proceed to the SWB location upon payment of the appropriate fee in the designated lane. At the SWB location, the vehicle will undergo another weighing process to confirm the overload weight. The ANPR camera will capture the Vehicle Registration Number (VRN) to retrieve information from the respective lane system, or manual entry of VRN/Transaction ID can be performed. If the vehicle is found to be overloaded, the user will be asked to pass. However, if the vehicle is underloaded, a refund pop-up will be generated in the SWB system. The SWB operator will confirm for the refund and a receipt through the receipt printer shall be generated mentioning the following details:
 - i. VRN Number

- ii. SWB Transaction number
 - iii. Transaction number from the lane system
 - iv. Permissible weight
 - v. Weight captured in lane
 - vi. Amount collected in lane
 - vii. Amount refunded
- ii. The MSWIM system shall be integrated with toll lane controller of the lane.
 - iii. The SWB system shall be able to capture number of axles, axle spacing, number of wheels, gross weight of vehicle and provide data of each vehicle.
 - iv. The Gross Vehicle Weight of vehicles approaching the SWB system shall be automatically detected.
 - v. If the vehicle is found to be overloaded based, the Weight information shall be displayed as “Overload” on SWB indicator and appropriate toll receipts with applicable fare/fee including overload penalty amount, shall be generated automatically.
 - vi. The excess fee charged against such overloaded vehicles shall also be separately printed on user fee receipts of such vehicles.
 - vii. Integration of SWB system with ETC system.
 - viii. The SWB system shall be able to work and also store the data independently and shall also send the SWB data for each transaction to the central system(TMCC) designated by IHMCL.
 - ix. MIS reports shall be available in the ETC, on numbers of overloaded vehicles.
 - x. The SWB system shall be able to capture Toll Transaction Number with Date and Time, Vehicle Registration Number, Category of Vehicle, Permissible Weight, and Gross Vehicle Weight along with date/time of weighing, and the receipt printed by the SWB system shall contain this information. This system shall also be integrated with the toll system and generate a closure report.
 - xi. The SWB station shall have a CCTV camera for capturing image of vehicle while weighing. Monthly MIS reports shall be available through the ETC system, such as Actual Overloaded vehicles, Total Overweight Vehicles (WIM) vs Actual Overweight vehicles (SWB) etc.
 - xii. The SWB transactions shall be linked with the Toll transactions and saved in the same Toll Plaza server for easy accessibility & audit. Service Provider shall ensure to keep a proper inventory of the WIM infrastructure installed at fee plazas throughout the Contract period.

- xiii. Service Provider shall ensure to install ANPR camera at each SWB location which will record the video and also auto recognize the VRN number. This camera shall be mounted on the pole at a location (to be decided by Service Provider) whereby proper video recording and VRN number recognition can be made of the vehicle. This camera shall be integrated with ETC system to capture the incidents and also connected with Network Video Recorder.
- m) Service Provider is required to maintain a spare quantity of sub-equipment & consumables of MSWIM system and SWB system at the fee plaza, strictly adhering to the SLA parameters outlined in the RFP document. It is important to note that the Service Provider shall factor the cost of spare equipment into the originally quoted amount. IHMCL will not make any additional payments for the provision of the spare equipment.
- n) Service provider shall conduct a detailed site survey to assess the existing conditions, including traffic flow, road condition, available space, and proximity to power and network connectivity.
- o) The Service Provider shall be responsible for maintaining the TMS data, encompassing various fields but limited to the specified fields mentioned below. Various types of reports, including a consolidated report, should be generated from the TMS software using these specified fields.

Fields	Fields	Fields	Fields	Fields
SL No	Shift	Mapper Vehicle Class	CCH Txn Type(Violation/Dispute)	SWB Lane ID
Plaza Name	Toll Collector ID	VRN No	Bank Settled Amount	SWB Weight
Txn Date	Txn Method of Payment(MOP)	Auditor ID	CCH(Up/Down)	SWB Txn ID
Lane No	Txn Journey Type	Auditor Class	MSWIM Weight	SWB Txn Date & Time
Lane Direction	Plaza Txn Amount	Auditor Action	Permissible Weight	SWB Class
TMS Txn ID	TLC Class	Auditor MOP	MSWIM Overload Status	SWB Weight Status
CCH Txn ID	AVC Class	Tag ID	MSWIM Penalty Amount	SWB Axle Count
				SWB Amount
				Refund Amount

4.3.3. Other scope of work:

- a) IHMCL shall invite bids from the empanelled Service Provider(s) to commence work on the specified Toll Plazas as per instructions/timelines received from NHAI for installation of ETC System and Toll Management System.
- b) Service Provider shall be fully responsible for the safety of equipment which shall be delivered or installed at site before commencing SAT by IHMCL/respective PIU. Prior to SAT, if any equipment/sub-equipment/consumable gets non-functional/damaged due to any reason whatsoever, excluding scenarios covered under force majeure, then service provider will be liable for replacing of damaged item without imposing any extra charges to IHMCL/NHAI.
- c) Service Provider shall ensure to complete all pre-requisite minor civil works i.e., pole foundation/ sensor foundation/ cabling chamber/lane to Lane Conduiting work, plaza to Lane Conduiting work, etc. pertaining to ETC system and Toll Management System. Major civil works i.e., PQC work, toll plaza canopy, permanent toll booth structure, Plaza building, Median Extension, arrangement of Raw Power from electricity board, Arrangement of DG set etc. are not in the scope of service provider.
- d) Service Provider shall ensure to provide licensed antivirus, operating systems, and databases for lane and plaza system and plaza system as applicable for the entire duration of the contract period. The cost of the same shall be included in the cost of equipment, no additional cost shall be paid by IHMCL/NHAI. During any third party audit by agency appointed by the IHMCL or site inspection by NHAI/IHMCL, if unlicensed products are found, a penalty of Rs. 1,00,000/- will be imposed on the Service Provider, in case of non-submission of penalty amount within 7 days from the issuance of notice by IHMCL. IHMCL reserves the right to recover the penalty amount from the BG and de-listed the service provider from empanelment for a duration of six months.
- e) The service provider is responsible for deploying the TMS software at the toll plaza in accordance with the TMS Module outlined in the RFE. Any addition/modifications to the TMS must receive approval from IHMCL. If any discrepancies are identified in the TMS module, IHMCL retains the right to remove the service provider from the empanelment.
- f) Service Provider shall provide requisite support for equipment integration in case ETC/TMS system software is changed by IHMCL/NHAI. The integration of equipment with new TMS software shall be provided by the Service Provider without any

cost/conditions to IHMCL/NHAI, whatsoever. In case of any delay or holding the rollover any loss to the tolling agency shall be recovered from the service provider.

- g) Service Provider shall be fully responsible in case of any rejection of ETC transactions/non-uploading of ETC transactions to CCH at the toll plaza due to issue in ETC system and internet services. All such losses to Toll Agency shall be borne by Service Provider, IHMCL shall deduct the amount from payment of Service Provider throughout the Contract Period for such loss to toll operating agency.
 - h) In the event of a service provider appointed by any agency/contractor designated by the NHAI, the Service Provider shall bear full responsibility for any rejection of ETC transactions or failure to upload ETC transactions at the CCH, regardless of the reasons. All resulting losses incurred by the Toll Agency shall be the responsibility of the Service Provider. If the Service Provider fail to compensate for these losses to the Toll Agency, IHMCL reserves the right to remove the Service Provider from the empanelment list and the loss to the agency will be recovered from the Bank Guarantee. Also, IHMCL will recommend NHAI or any agency/contractor designated by the NHAI to terminate the contract with the appointed service provider.
 - i) Service Provider shall ensure for safeguarding the ETC system against potential risks such as short circuits, lightning strikes, voltage fluctuations, and pest damage in order to maintain adherence to SLA parameters. If any damage occurs to the ETC system as a result of these incidents, the Service Provider is obligated to repair or replace the affected equipment at its own expense, ensuring compliance with the SLA parameters specified in the Contract Agreement. No charges shall be levied on IHMCL/NHAI for these repair or replacement services. In event of delay in rectification of the fault within 24 hrs, IHMCL will impose a penalty of Rs 50000/- per day maximum upto Rs 5,00,000/. In case of non-submission of penalty amount within 7 days from the issuance of notice by IHMCL. IHMCL reserves the right to recover the penalty amount from the BG and de-listed the service provider from empanelment for a duration of six months.
 - j) Service Provider shall ensure to install Servo Stabilizer at each toll plaza to protect equipment from power fluctuation, and post installation of Servo Stabilizer, the safety of equipment from unstable voltage shall be under the liability of Service Provider throughout the Contract Period.
 - k) Service Provider shall ensure to make all allocated toll plazas live with ICD 2.5 or latest specification which includes provision of all certificates like SSL, firewall, domain etc. through the contract period.
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- l) The Service Provider shall provide minimum 03 Site Engineers (minimum one for each shift) with sufficient reliever at each fee plazas to ensure 24*7 onsite support. The site engineer shall be at least a Graduate or Diploma in Engineering, preferably in Electrical/Electronic/IT/Computer Science or equivalent. The relevant documents shall be required to be shared with the respective PIU and IHMCL. For the contract between IHMCL and the service provider, the appointment of manpower must receive approval from IHMCL. IHMCL reserves the right to interview the manpower deployed by the service provider.
- m) Service Provider shall ensure to comply to all applicable statutory requirements such as minimum wages, EPF, ESI etc. for the site engineers deployed at fee plazas. Service Provider shall submit the necessary proof/supporting evidence as and when sought by IHMCL. Service Provider shall indemnify IHMCL/NHAI in case of any claim or grievance raised by these site engineers.
- n) The Service Provider shall provide full support in plaza handover to new Service Provider engaged by IHMCL at the allocated toll plazas during the O&M period. The Service Provider shall be involved in the transition process till the toll plaza is taken over by the new Service Provider.
- o) 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.
- p) The scope of the service provider will also include providing earthing to all ETC system, minimum civil & electrical work, networking works required to complete installation/commissioning of ETC and Toll Management System and associated peripherals on the plaza.
- q) The Service Provider shall adhere to the maintenance of ETC & TMS Equipment, Periodic Preventive Maintenance of equipment, Timely Corrective Maintenance, Software Maintenance, Remote Software support for the ETC & Toll System.
- r) The Service Provider shall take prior approval from the respective PIU/IHMCL before updating any version of Lane / Plaza application, for which, a software modification request shall be submitted to PIU/ IHMCL for seeking approval.
- s) The Service Provider shall take adequate measures to protect ETC system from any Malware/Ransomware attack at toll plazas.
- t) The Service Provider shall ensure to provide hardware firewall device to protect against Malware entering the network.
- u) Service Provider shall be responsible for providing Pest Control services at the toll plaza to prevent equipment for getting faulty. Service Provider shall be responsible for repair/

replacement of equipment within the defined SLA which have got faulty due to cable/equipment damaged by Rodent. The cost of the same is the part of Total O&M Price.

- v) In case of descoping of plaza/termination of Contract/Expiry of Contract Agreement, Service Provide shall handover all equipment and data (entire contract duration) with the concerned PIU. Full and final shall not do unless the handing over and taking over process is not completed.
 - w) Any equipment which gets accidentally faulty/damaged during the Contract Period shall be repaired/replaced by the Service Provider in order to comply with the SLA. Any accidental damage not attributable to Service Provider as per RFE shall be repaired/replaced upon verification and duly recommendation by the respective PIU. After recommendation by the respective PIU, Service Provider shall ensure to repair/replace such equipment in order to comply with the SLA. The payment for a recommendation from the respective PIU shall be made as follows: -
 - i. Replacement cost shall be as per the latest unit rates discovered by IHMCL.
 - ii. Repairing cost shall be made as per actual on case-to-case basis.
 - x) Any equipment which gets accidentally faulty/damaged after the expiry of the Contract Period with the NHAI or any entity engaged by NHAI, shall be repaired/replaced by the existing Service Provider in order to comply with the SLA. The payment shall be made by NHAI: -
 - i. Replacement cost shall be as per the latest unit rates discovered by IHMCL.
 - ii. Repairing cost shall be made as per actual on a case-to-case basis.
 - y) After the contract period with any entity engaged by NHAI expires, the current service provider must continue to provide O&M services at the latest rates determined by IHMCL. If the service provider rejects the rates offered by NHAI, IHMCL will appoint a new service provider. During the transition from the current service provider to the newly appointed one, it is the responsibility of the current service provider to necessary support to the new service provider. In case of any deviation or failure at the part of the existing service provider, any losses incurred by the tolling agency during this transition will be recovered from the existing service provider, or if there is a failure, it will be recovered from the provided bank guarantee.
 - z) Service Provider shall ensure for the integration of the Weigh in Motion system and Static Weigh Bridge system (of any make & model) with its ETC system software.
 - aa) IHMCL/NHAI may verify the attendance of site engineers on daily basis through mobile app or any other software.
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- bb) Service Provider/empanelled System Integrator shall ensure to provide requisite support in sharing real time status of equipment for all critical equipment like RFID reader, AVCC, TLCC, LPIC, ICS, ETC Server and internet connectivity of all NH fee plazas with any authorised agency engaged by IHMCL/NHAI.
- cc) Service Provider/empanelled System Integrator shall provide data feed for all fee plazas to the central Toll Monitoring & Control Centre (TMCC) at IHMCL HQ/IHMCL for monitoring and remote viewing of all fee plazas.
- dd) Service Provider shall ensure to maintain and provide (02) internet services with static IP addresses, ensuring a minimum bandwidth equivalent to 02 Mbps per lane throughout the entire Contract period. For e.g. a plaza with 10 lanes shall have the minimum internet bandwidth of 20 Mbps. The primary purpose of these internet services is to facilitate the sharing/receiving of the ETC system data with entities such as the acquirer bank, TMCC vendor etc. Additionally, the same internet services will be utilized to transmit live feeds from cameras, including PTZ camera, Lane Camera, Plaza Camera, etc., to the Command Control Centre established by NHAI/IHMCL. For fee plazas of O&M services of existing ETC system, the Service Provider must include the recurring costs associated with the provision of internet services in the overall cost of O&M services, as quoted in the tender, for the duration of the Contract. Furthermore, as part of the contingency plan, the Service Provider is obligated to ensure internet connectivity through a dongle device as a backup mechanism, without imposing any additional costs on IHMCL.
- ee) The Service Provider shall take prior approval from respective IHMCL before updating any version of Lane / Plaza application, for which, a software modification request shall be submitted to IHMCL for seeking approval.
- ff) Service Provider shall provide full support in plaza handover to new Service Provider as and when in future engaged by IHMCL at the allocated toll plazas during the O&M period. The Service Provider shall be involved in the transition process till toll plaza take over by new Service Provider.
- gg) Service Provider shall ensure to keep the image backup captured through ANPR/LPIC and ICS/Lane Monitoring camera for a period of minimum 06 months. In case of insufficient space in the server, the Service Provider shall provide an external media device to keep the image backup for a period of minimum 06 months. The Service Provider shall factor the cost of external media device into the originally quoted O&M amount. IHMCL will not make any additional payments for the same.

- hh) The successful bidder shall assist and extend required support, at no additional cost to IHMCL, in integration or migration to the Unified tolling software (Centralized TMS) as mandated by IHMCL from time to time.
- ii) Service Provider shall be responsible for conducting audits of manually processed FASTag transactions before forwarding them to the Acquirer bank. These audits will rely on image evidence obtained through Automatic Number Plate Capture Cameras/AVCC data. The Service Provider must ensure that all manually processed transactions are sent only after a comprehensive audit has been performed. The audit for each manual transaction should be completed within 24 hrs of transaction generation. Daily report of manual transaction shall be shared with IHMCL.
- jj) Service Provider shall strictly ensure provisioning of necessary arrangement including but not limited to proper network infrastructure, mapping of correct IP address etc. for reflection of correct uptime of equipment on TMCC dashboard. In the event of non-compliance, penalties, as specified in the Contract Agreement, shall be imposed based on data recorded in the TMCC software.
- kk) System Integrators shall ensure that the Automatic Vehicle Counter cum Classifier (AVCC) system at all respective fee plazas should accurately count and classify the vehicles crossing from the lanes. The AVC accuracy should comply with the SLA parameters defined in the RFP. Necessary measures to achieve the desired accuracy level should be ensured by the System Integrator in close coordination with the respective toll operating agencies. In case of any non-compliance, applicable penalties shall be imposed in accordance with the RFP.
- ll) Service Provider shall be responsible for taking a complete backup of the database from the previous System Integrator and storing all fields of data in their system application. This activity shall be carried out in coordination with the previous System Integrator. The old data shall be generated through software application as provisioned by Service Provider. Whenever there is a need to share the old data with IHMCL/PIU, the Service Provider must ensure its timely provision.
- mm) Service Provider shall ensure to maintain some spare quantity of critical ETC equipment (Lane level) at the fee plaza, strictly adhering to the SLA parameters outlined in the RFP document. In the event of any damage/fault occurring to the equipment, regardless of the cause, the Service Provider must promptly replace the affected equipment with prior intimation to concerned PIU and IHMCL using the spare quantity. The spare quantity of critical ETC equipment should be no less than 50% of the total number of lanes at the

fee plaza to ensure timely corrective actions. These critical equipment components encompass: -

- RFID reader
- Toll Lane Controller
- Automatic Vehicle Counter and Classifier system
- License Plate Image Capture Camera/Automatic Number Plate Recognition Camera
- Automatic Barrier Gate
- Lane UPS with batteries

It is important to note that the Service Provider shall maintain the spare quantity at its own cost to adhere the SLA. IHMCL will not make any additional payments for the provision of the spare equipment.

- nn) Service provider shall provide Aadhar enabled Geofenced smart attendance system with time and face recognition for all deployed staff at fee plazas. Any change in personnel has to be reported by the System Integrator to IHMCL in writing before the change has taken place. If any staff other than reported staff is found present in the toll plaza, it will lead to penalties pertaining to absence of expected staff. The system should be designed to ensure that the attendance of service provider representative is monitored, and the attendance is verifiable on real time basis by IHMCL using a centralized software as provided by Service Provider for all their respective fee plazas under Contract Agreement. In case of non-availability of operator/personnel at the lane/plaza, applicable penalty shall be imposed on the service provider as per provision under the RFP and RFE

4.4. Defect Liability Period (DLP)

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

4.4.2. Maintenance, repair and replacement of all hardware, software, peripherals and subcomponents of all BOQ items (excluding scenario covers under Force Majeure) shall be the responsibility of Service Provider without any cost to IHMCL/NHAI. Service Provider shall ensure to resolve all faults of equipment/Sub-equipment/consumables which are linked to spare dependency within 24 hours from the time when the fault actual occurs and

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

- 4.4.3.** Corrective of all defective materials and workmanship in the installation will be carried out as required within this period. All de-snagging will be expediently completed within this period.
- 4.4.4.** Service provider shall adhere to the maintenance of ETC Equipment including MSWIM & SWB system which includes periodic Preventive Maintenance of equipment, Timely Corrective Maintenance, Software Maintenance, Remote Software support for the ETC & Toll System.
- 4.4.5.** IHMCL/NHAI holds the right to ask Service Provider to replace any staff if found to be unsuitable/ indulged in unwanted activities.

4.5. Operation and Maintenance

- 4.5.1.** Service provider shall adhere to the maintenance of ETC Equipment including MSWIM & SWB system which includes periodic Preventive Maintenance of equipment, Timely Corrective Maintenance, Software Maintenance, Remote Software support for the ETC & Toll System.
- 4.5.2.** In order to adhere the SLA parameters, Service Provider shall ensure for repair and replacement of hardware, software, peripherals and subcomponents during the O&M period part of Contract Agreement.
- 4.5.3.** Service provider shall intimate PIU/Toll operating agency for any corrective action to be taken on ground to resolve any major issue which takes more than 2 hours of lane closure.
- 4.5.4.** Service Provider shall take prior approval from the respective IHMCL/PIU before updating any version of Lane / Plaza application, for which, a software modification request shall be submitted to PIU for seeking approval.
- 4.5.5.** IHMCL/NHAI holds the right to ask the Service Provider to replace any staff if found and proved unsuitable/ indulged in unwanted activities.
- 4.5.6.** Any damage cause due to mishandling of equipment by the service provider employees shall be borne by service provider.

4.6. Other activities

4.6.1. Toll Management System should be able to support all kind of Fare structures & Payment methods including, but not limited to, Daily Pass, Return Pass, Monthly Pass, Discounted tariffs, Exemptions, Open / Closed fare schemes etc. and shall meet the Tolling System requirements of the respective Concession Agreement, including subsequent regulation/ notification thereon by IHMCL/NHAI/MoRTH time to time.

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

4.7. Service Level Requirements (SLA)

4.7.1.Plaza Building Equipment

- a) The uptime availability of all Critical equipment of the Plaza Building shall be 99% per lane per month(as per the Toll Monitoring Control Centre (TMCC)). The permissible downtime for all critical Equipment shall be 7 hours per critical plaza equipment per month.
- b) The downtime shall be calculated at a cumulative level when any of the critical plaza equipment as mentioned below is non-operational for that specific lane:
 - i. ETC Server including software
 - ii. Network Video Recorder
 - iii. Master Intercom
 - iv. 24 Port Network Switch
 - v. Plaza UPS
 - vi. All Lanes communication down with the ETC server
- c) Scheduled downtime is defined as a period of time when the system will remain unavailable for conducting necessary preventive maintenance, urgent repairs etc. The maximum scheduled downtime for any Site shall be 4 hours per lane per month.
- d) For all other equipment of the plaza building, the uptime availability shall be 98% per lane per month.
- e) The formula for the calculation of plaza building system availability shall be as follows:

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

A = Time for which the system is down per month based on scenarios in Hrs

B = Total time in a month

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

- f) The Service Provider shall maintain adequate inventory/spares to ensure the service levels prescribed in clause 4.7.1(a) & (d) are adhered.

- g) In case of non-adherence to service levels as defined in clause 4.7.1(a) & (d), the penalty for deficiency of services beyond permissible downtime and scheduled downtime shall be imposed as follows: -
- Upto 1 hr - 1% of the monthly O&M charges per plaza
 - >1 hr to ≤ 2 hrs - 2% of the monthly O&M charges per plaza
 - >2 hrs to ≤ 3 hrs - 3% of the monthly O&M charges per plaza
 - >3 hrs to ≤ 5 hrs - 5% of the monthly O&M charges per plaza
 - >5 hrs to ≤10 hrs - 10% of the monthly O&M charges per plaza
 - >10 hrs to ≤ 20 hrs - 25% of the monthly O&M charges per plaza
 - >20 hrs - 50% of the monthly O&M charges per plaza

4.7.2.Lane Equipment

- a) The uptime availability of all Critical equipment of the ETC system shall be 99% per lane per month. The permissible downtime for all critical Equipment shall be 7 hours per lane per month.
- b) The downtime for a toll lane shall be calculated at a cumulative level when any of the critical equipment as mentioned below is non-operational for that specific lane:
- RFID Reader
 - Toll Lane Controller System
 - Automatic Vehicles Classification Controller and Sensor
 - Automatic Barrier Gate
 - License Plate Image Capture Camera/ Automatic Number Plate Recognition Camera
 - Incident Capture Camera
 - Lane Application
- c) For all other lane equipment, the uptime availability shall be 98% per lane per month.
- d) Scheduled downtime is defined as a period of time when system will remain unavailable for conducting necessary preventive maintenance, urgent repairs etc. The maximum scheduled downtime for any Site shall be 4 hours per lane per month.
- e) The formula for calculation of ETC System availability shall be as follows:

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

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

B = Total time in a month

C = Scheduled downtime and Permissible downtime basis section 4.7.2(a) & (d)

- f) The Service Provider shall maintain adequate inventory/spares to ensure the service levels prescribed in clause 4.7.2(a) & (c) are adhered.
- g) In case of non-adherence to service levels as defined in clause 4.7.2(a) & (c), the penalty for deficiency of services beyond permissible downtime and scheduled downtime shall be imposed as follows: -
- Upto 1 hr - 5% of the monthly O&M charges per lane
 - 1 hr to <=2 hrs - 10% of the monthly O&M charges per lane
 - 2 hrs to <=5 hrs - 15% of the monthly O&M charges per lane
 - 5 hrs to <=10 hrs - 25% of the monthly O&M charges per lane
 - 10 hrs to <=24 hrs - 50% of the monthly O&M charges per lane
 - Greater than 24 hrs - No monthly O&M charges shall be paid for that lane.

4.7.3. In case the Service Level Requirements are violated repeatedly, IHMCL reserves the right to terminate the whole Contract or descope a particular toll plaza by giving a written notice of 7 days to the Service Provider.

4.7.4. AVC Accuracy

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

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

4.7.5. Manpower

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

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

(Day shall have 3 shifts of 8 hours each)

The manpower attendance shall be verified through Geo-fenced based smart attendance system /Manual attendance sheet maintained at plaza.

4.7.6. Double deduction/Overcharging in FASTag

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

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

- In case of double deduction/over-charging reported a penalty of – Rs 10000 per case will be imposed on the service provider.

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

4.7.7. Non-reading FASTag – Free Passage

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

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

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

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

In cases where the vehicle user has been permitted to pass the fee plazas without payment of any user fee, the Service Provider shall be liable to pay for all the losses incurred by the concessionaire/toll plaza operators on account of free passage of vehicle without payment of any user fee along with this a penalty of Rs 10000 per case will be imposed on the service provider.

4.7.8. Delay in Takeover of Fee Plaza (for O&M services of existing ETC system)

The Service Provider shall ensure to start operation and maintenance services using existing ETC system at all allocated toll plazas within timeline specified in the Contract Agreement.

Failure of the Service Provider to start O&M services within the specified timeline shall attract penalty as below:-

- Up to 10 days of delay - Rs 1,000/- for each day of delay (per fee plaza)
- After 10 days of delay – Rs. 2,000/ for each day of delay (per fee plaza)

The total levied penalty for this SLA, however, shall not exceed Rs 5,00,000/- for each toll plaza.

4.7.9. Non-functioning of Fee plaza with ICD 2.5 specification or latest: -

The Service Provider shall ensure to comply with ICD 2.5 specification document or latest for processing the transactions to respective Acquirer Bank at all allocated fee plazas. Failure of the Service Provider to comply with ICD 2.5 specification or latest at any allocated fee plaza, following penalty shall be imposed:-

- Up to 05 days - Rs 1,000/- for each day (per fee plaza)
- After 05 days of delay – Rs. 2,000/ for each day (per fee plaza)

The total levied penalty for this SLA, however, shall not exceed Rs 30,000/- for each toll plaza per month.

4.7.10. Accuracy of MSWIM system:

a) Weight Capturing

The Service Provider shall ensure for capturing of weight for all transaction through MSWIM system. Failure of the Service Provider to capture the weight of the vehicle using MSWIM system, following penalty shall be imposed:

- Up to 100 transaction- Rs 100/- per transaction for each lane (per Month)
- Greater than 100 transactions– Rs. 500/ transaction for each lane (per Month)

The total levied penalty for this SLA, however, shall not exceed Rs 10,00,000/- for each lane plaza per month.

b) Weight Accuracy

The Service Provider shall ensure for proper functioning of MSWIM system in all lanes. The weight as captured in MSWIM system should not vary $\pm 7\%$ as compared to weigh captured of same vehicle on SWB system. Failure of the Service Provider to maintain the accuracy, Rs 200 penalty shall be imposed per incident.

The total levied penalty for this SLA, however, shall not exceed Rs 25,000/- for each lane plaza per month.

4.7.11. The Service Provide shall ensure that all ETC transactions shall be uploaded and downloaded as per the ICD document (2.5 or the latest) and PG Guidelines. In case of any deficiency in adherence to ICD document and PG Guidelines, the Service Provider shall be fully responsible to provide settlement to the toll agencies for any rejection or non-uploading of ETC transaction. In case, settlement is not provided to toll agencies, IHMCL shall recover the same amount from Quarterly O&M Charges.

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

4.8. ASSIGNMENT MILESTONE & TIMELINES

4.8.1. Supply, Installation, Commissioning & Integration of ETC system including MSWIM & SWB system

Sl. No.	Milestone Description	Timelines
1.	Submission of design document of each toll plaza including but not limited to following:- <ul style="list-style-type: none"> • Plaza layout • Network Architecture • Equipment installation layout • Conduit layout • User guide Report should be prepared based on actual site condition with supporting images and schematic diagram.	Within 20 days from the of date of signing of Contract Agreement or date of issuance of instruction for commencement notice issued by IHMCL, whichever earlier.

2.	Supply, install and commission all the items except MSWIM and SWB system including Go-Live with CCH	<ul style="list-style-type: none"> • In case Site is FIT for Implementation: - Within 60 days* (inclusive of Sl. no. 1 from the of date of signing of Contract Agreement or date of issuance of instruction for commencement notice issued by IHMCL, whichever is earlier. SI shall have to carry out site survey and report site-readiness status to IHMCL. • In case Site is not FIT for Implementation: - Within 60 days* (inclusive of Sl. no. 1) from date of intimation for site readiness by IHMCL/concerned PIU
3.	Supply, install & commission MSWIM and SWB system including integration with ETC system	<ul style="list-style-type: none"> • In case Site is FIT for Implementation: - Within 90 days* (inclusive of Sl. no. 1 from the of date of signing of Contract Agreement or date of issuance of instruction for commencement notice issued by IHMCL, whichever is earlier. SI shall have to carry out site survey and report site-readiness status to IHMCL. • In case Site is not FIT for Implementation: - Within 90 days* (inclusive of Sl. no. 1) from date of intimation for site readiness by IHMCL/concerned PIU

4.8.2. For Fee Plazas (Providing O&M services of existing ETC system and Refurbishment & Integration of existing MSWIM and SWB system)

Service Provider shall ensure to start the Operation & Maintenance services (Software and Hardware work) of ETC system excluding MSWIM and SWB system within 30 days from date of signing of Contract Agreement/commencement instruction given by IHMCL at all allocated toll plazas which includes Software Migration in all lanes, repair/replacement of

existing faulty/damaged equipment, completion of installation & commissioning work of additional equipment which are not available at the fee plazas.

For the start of O&M services of MSWIM and SWB system, the Service Provider shall ensure to complete the refurbishment and integration work within 60 days from date of signing of Contract Agreement/commencement instruction given by IHMCL at all allocated toll plazas.

** Any delay shall attract penalties as provisioned in the RFE document.*

4.9. DAMAGES

4.9.1. Failure of the service provider to install and commission the ETC system within the timelines specified in the RFP shall attract liquidated damages @ 0.1 % of the Total Price of the toll plaza (as per financial proposal submitted by the bidder) for each day of delay in implementation. The total levied penalty, however, shall not exceed 10% of the assignment cost.

4.9.2. Once the liquidated damages reach maximum limit, IHMCL may terminate the contract and encash the performance bank guarantee. IHMCL also reserves the right to debar the Service Provider from further participation in IHMCL's subsequent tenders due to its non-performance.

4.9.3. Upon termination of the Agreement due to service defaults, IHMCL may choose to allocate the said site to any other Service Provider, at its sole discretion and at the risk and cost of the defaulting Service Provider.

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

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

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

4.9.7. In case of the Service Provider is not directly engaged by the IHMCL, and is engaged by the entity appointed by NHAI. The amount of the penalty or loss to the concessionaire/tolling agency will be recovered from the Bank Guarantee submitted by the service provider.

4.10. Type of maintenance work

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

4.10.1. Preventive Maintenance

- a) The work to be done consists of monthly inspection/cleaning and quarterly or bi-annual checking, cleaning, and servicing of various system components and related equipment. Minor deficiencies uncovered during the performance of preventive maintenance shall be corrected immediately. Any problems which require further attention or use of spare part(s) shall be recorded on the Fault Report Form.
- b) The objective of electronic equipment maintenance shall be to ensure reliability, to purpling/enhancing its economic life and to improve its efficiency.
- c) Scheduled downtime / Routine maintenance is defined as a period of time when system will remain unavailable for conducting necessary preventive maintenance, urgent repairs etc. The maximum scheduled downtime for any site shall be 4 hours per lane per month. The objective of electronic equipment maintenance shall be to ensure reliability, to enhance its economic life and to improve its efficiency.
- d) Routine maintenance consists of a fixed set of checks, measurements, cleaning and calibration. These activities shall be based on Equipment Service Provider's specifications and general maintenance practices that include but not limited to:
- e) Checking the condition of components, e.g., check connections for signs of deterioration.
- f) Check voltage levels: Power supply levels are crucial to the effective operation of electronic equipment. Borderline levels could lead to intermittent faults and damage to components. Voltage level changes are caused by the deterioration of capacitors, transformers and semiconductor components.
- g) Certain measurements can also be performed to check the status of elements of the system, i.e., impedance and isolation tests.
- h) Mechanical components need routine cleaning and lubrication to ensure their effective operations.
- i) The equipment supplier shall ensure that software maintenance and upgrades are possible during the maintenance period. Software test report of all service packs to be applied on the live plaza system shall be submitted to the Concessionaire well in advance. The service pack must be tested over the test rig in presence of the Concessionaire before its application to the live plaza system.

- j) The equipment supplier shall perform preventive maintenance of the software to be provided under the Contract as part of the maintenance work. The Contract shall exert the utmost care not to inadvertently damage the software and database and cause erroneous or abnormal operation of the toll management system.
- k) The items for software maintenance shall include but not be limited to the following:
 - Monitoring of CPU, Memory and disk utilization
 - Monitoring of system availability over TCP/IP
 - Monitoring of antivirus and system security software operation
 - Backup of system and restoration of the system when necessary
 - Monitoring and review of system and event logs.
 - Applying upgrade and patch of the software provided by third party including operating system and database management.

4.10.2. Corrective Maintenance

- a) The work to be done consists of correcting malfunctions resulting from any cause including but not limited to defective design, defective manufacturing process, equipment deterioration and failure under normal operating conditions, improper handling and inadequate operation by the Employer's staff, the equipment supplier's staff, or third party.
- b) The work to be done consists of repairing damages to the equipment due to accidents, vandalism, act of God, and pavement failures and includes clean-up of debris, erecting necessary warning and safety devices, and hook-up of temporary equipment if required to ensure the safety of the public.
- c) The equipment supplier shall maintain a comprehensive record of all maintenance and repair activities and spare parts consumptions. The records shall include as a minimum maintenance check list, fault reports, spare parts receiving and consumption records, and work orders. The Service Provider shall ensure to keep all requisite equipment maintenance tool at the toll plaza to carry out the maintenance activity.

4.10.3. Data Retention, Back-up and Restore Operations:

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

- ii. The Service provider shall ensure adequate security measures for safeguarding of Toll Transaction data, by providing, off off-site Disaster recovery or Data Storage mechanism.
- iii. The service provider shall also be responsible to extract and providing data /information based on the requirement of NHAI/IHMCL, Auditors, Law Enforcement Agencies of Govt. of India/ State based on specific approvals on a case-to-case basis.
- iv. However, it will be limited to the data captured in ETC and Toll Management Systems as per standard operations and the data being retained as per the retention schedule.

b) Data Back-up & Restore:

- i. Service provider shall also demonstrate the backup & restore procedure successfully. The Service Provider shall prepare and implement a proper Data Backup & Restore policy with IHMCL's approval, to ensure data safety and avoid data loss, in case of any untoward incidents.
- ii. Such policy shall ensure Back-up & Restore of Toll Transaction data at least once in a week.
- iii. Service Provider shall ensure to maintain the Data backup till Contract Expiry and ensure to submit the data backup with IHMCL and the concerned PIU after the expiry of Contract Agreement.
- iv. Data shall be backed up onto a removable medium on a regular basis start from plaza live date to end of Contract period.
- v. IHMCL/NHAI as per requirement shall intimate the Service Provider to restore the data for a specific period.
- vi. The data generated in the system shall be handed over to IHMCL in readable format after the expiry of Contract Agreement. Following reports shall be submitted with NHAI/IHMCL after expiry of Contract Agreement: -
 - Raw data for transactions
 - Month wise transaction History report
 - Month wise Traffic and Revenue report
 - Class wise monthly traffic and Revenue report
 - AVCC data for all lanes

c) Data Redundancy

- i. All transaction and incident data shall be retained duplicated and stored within the various levels of the toll collection system such that should any level or

component of that level suffer a partial or total failure, the data is not irretrievably lost to the system. In addition, it shall be possible to reconstruct and restore the data for the failed level from the stored data into its original format.

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

4.10.4. Statutory and Others

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

4.11. 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. MoRTH, NHAI/IHMCL reserves the right to amend the Technical Specifications & Standards as and when required from time to time.

4.12. Acceptance Test and Approvals

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

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

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

4.13. 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.

4.14. Other Works

4.14.1. Design and Drawing Responsibility

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

4.14.2. Electricity Requirements

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

4.14.3. Cabling to UPS Loads

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

4.14.4. Cable tray

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

4.14.5. Cable Numbering

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

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

5. FORMS AND ANNEXURES

5.1. APPLICATION FORM

To

Chief Operating Officer

Indian Highways Management Co. Ltd. (IHMCL)

NHAI HQ Building,

G-5&6, Sector 10, Dwarka,

New Delhi 110 075

Subject: Request for Empanelment(RFE) of System Integrators for Implementation of Electronic Toll Collection System Including Weigh-in-Motion & Static Weigh Bridge System at Toll Plazas

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

Dear Sir/Madam,

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

I/We understand that:

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

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

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

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

Yours sincerely,

(Signature of the Authorized signatory):

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

Phone, Fax & E-Mail

5.2. Annexure-1 - APPLICANT'S FINANCIAL CAPACITY

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

RFE Ref _____ (Date)

From,
(Name & Address of the Applicant)

To,
Chief Operating Officer,
Indian Highways Management Co. Ltd.
G-5&6, Sector 10, Dwarka
New Delhi 110 075

Subject: -----

Dear Sir/Madam,

We hereby certify that the average annual turnover of M/s. _____ (name of the Applicant) for the last three financial years (ending 31st March 2024) is as given below:

Annual Net worth for the last Financial Year (FY) in Indian Rupees (INR)	
FY 2023-24	Positive /Negative as on 31st March 2024

Annual Turnover for the last 3 Financial Years (FYs) in Indian Rupees (INR)		
FY 2021-22	FY 2022-23	FY 2023-24

Yours Sincerely,

(Signature of Authorised Signatory)

Name of the Statutory Auditor/CA:

Seal:

5.3 Annexure-2 - Power of Attorney

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

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

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

IN WITNESS WHEREOF WE,THE ABOVE-NAMED PRINCIPAL HAVE PURSUANT TO THE RESOLUTION DATED OF THE BOARD OF DIRECTORS IN THAT BEHALF CAUSED ITS COMMON SEAL, EXECUTED THIS POWER OF ATTORNEY ON THIS DAY OF, 202...

For
(Signature, name, designation and address)

Witnesses:

- 1.
- 2.

Notarized

Accepted

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

Notes: -

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

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

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

5.4 Annexure- 3: Undertaking

Subject: Selection of Bidder for _____

1. I, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct.
2. The undersigned also hereby certifies that neither our Company/firm M/s _____ have abandoned any work of National Highways Authority of India/IHMCL nor any contract awarded to us for such works have been rescinded, during last five years prior to the date of this bid.
3. The undersigned hereby authorize(s) and request(s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by IHMCL to verify this statement or regarding my (our) competence and general reputation.
4. The undersigned understands and agrees that IHMCL may ask for further qualifying information, and agrees to furnish any such information at the request of IHMCL.
5. We confirm that we have not been blacklisted /debarred by any central/state Government department/organization or Quasi Government agencies of PSU.
6. We confirm that no criminal proceeding is pending against our company/firm or any of its Directors/ Partners in any court of law.
7. We confirm that we have not been convicted by any court of law for any of the offences under any Indian laws.

(Signed by an Authorized Officer of the bidder)

Title of Officer

Name of bidder

DATE

5.5 Annexure-4- Undertaking for Toll Management System Software

(In the Bidding entity's Letter head)

(To be submitted by Applicant)

(Signed Copy of User Manual of each Module of TMS)

I/We, hereby certify and confirm that M/s.

....., (the name and address of the registered office of the Applicant have developed and implemented/integrated the ETC system with our own proprietary TMS software at the fee plazas.

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

Dated thisDay of, 202.....

Name of the Applicant

.....

Signature of the Authorised Signatory

.....

Name of the Authorised Signatory

5.6 Annexure 5: Self Certificate - Format for Project Citation by the Applicant

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

Name of the Project & Location	
Client's Name, Contract Details Complete Address	
Brief narrative description of Project – highlighting relevant scope of work such as <ul style="list-style-type: none"> • Number of toll plaza • Number of ETC Lanes, etc. 	
Contract Value for the Project as per work order (in INR)	
In case of an ongoing project, the value of work completed as per payment released by Client (in INR)	
Date of Start of Project	
Date of Completion of Project/Status of Completion	
Confirm for the implementation of following minimum equipment/system - <ul style="list-style-type: none"> • Toll Management Software • RFID reader • Toll Lane Controller • Automatic Vehicle Classifier • License Plate Image Capture Camera • Incident Capture camera • Automatic Boom Barrier 	

Name of the Applicant
.....

Signature of the Authorised Signatory
.....

Name of the Authorised Signatory

5.7 Annexure-6 – Undertaking on the Notarized 100 rupees Stamp Paper for the Implementation of the Manual Policy

(To be submitted by Applicant)

I/We, hereby certify and confirm that M/s., (the name and address of the registered office of the Applicant have implemented/integrated the manual policy as per the IHMCL Circular (E-123819), dated 13.04.2023 through our own proprietary TMS software. We undertake that, at any point of time any deviation found at our allocated fee plazas, IHMCL may suspend our empanelment with immediate effect and encash the Bank Guarantee.

Dated thisDay of, 202.....

Name of the Applicant
.....

Signature of the Authorised Signatory
.....

Name of the Authorised Signatory

5.8 Annexure -7: Format for Performance Security of NETC Program

To,
Chief Operating Officer,
Indian Highways Management Company Ltd
G-5&6, Sector 10 Dwarka
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 empanelment No._____ dated dd/mm/yyyy for “Request for Empanelment (RFE) For System Integrators for Implementation of electronic Toll Collection System at Toll Plazas”

” (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 RFE.
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 RFE 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 _____

5.9 Annexure-8 – Undertaking for the Implementation of the ICD-2.5 on all National Highways

(To be submitted by Applicant)

I/We, hereby certify and confirm that M/s.

....., (the name and address of the registered office of the Applicant have implemented/integrated the ICD-2.5 on all the Fee Plazas along the National Highways

We undertake that if any deviations are found at our designated fee plazas at any point in time, IHMCL reserves the right to immediately suspend our empanelment and forfeit the Bank Guarantee.

Dated thisDay of, 202.....

Name of the Applicant

.....

Signature of the Authorised Signatory

.....

Name of the Authorised Signatory

5.10 Annexure-9: Toll Management Software Modules for Toll Plazas

1. ADMIN MODULE

- i. User Credential and Access Management Master:
 - Admin Dashboard: A centralized interface accessible to system administrators for managing user accounts, permissions, and roles within the toll management system.
 - User Profiles: To create, modify, and delete user profiles for toll booth operators, administrators, and management staff, including details such as username, password, and assigned roles.
 - Authentication: The users attempting to access the toll management system, typically implemented with secure login mechanisms, including multi-factor authentication for heightened security.
- ii. Toll Rate Master:
 - Rate Management: Configuration of toll rates based on vehicle type, distance travelled, and other factors as per NH fee rules.
- iii. Vehicle Class Master:
 - Configuration of vehicle classes as per NH fee rules.
- iv. Method of Payment Master:
 - Configuration of various payment methods accepted at the toll plaza, including cash, credit/debit cards, electronic toll collection (such as FASTag), and other forms of payment.
- v. Exemption List Master:
 - Configuration of exemptions from user fee, such as for emergency vehicles, government vehicles, or specific categories of users, maintaining an up-to-date list of exempted vehicles.
- vi. Hardware Master:

- Maintaining hardware components deployed at toll booths, including RFID readers, automatic barrier gates, traffic lights, and other critical equipment, ensuring proper functionality and maintenance.
- Maintained IP Address for all network equipment.
- LSDU Implementation – A Lane Status Display Unit (LSDU) shall be provided in the TMS Software to monitor all lane equipment in at on single Graphical Unit. Automatically logs shall be generated on LSDU for all lane-level equipment at an interval of every 5 Sec. & logs reports shall also be automatically generated at an interval of every 24 hours.

vii. Shift Timing Master:

- Configuration of shift timings for toll booth operators and staff, defining work schedules and rotation patterns to ensure continuous operation of toll plazas.

❖ **Performance of Admin Module: -**

- All the configurations are managed through respective forms under Master Tab with Accuracy
- The module must accurately calculate cash totals, ensuring that all transactions are accounted for correctly to prevent discrepancies.
- All the dashboards shall fetch the data with accuracy using optimized performance queries.
- Also, the data can be exported to excel with ease.

2. LANE MODULE

i. Personal-based Login feature:

- Allows toll booth operators to log in to their respective lanes using personal credentials, supplemented by biometric authentication, to ensure accountability for transactions conducted at each lane.
- Two-way factor shall be provided to protect the all transactions.
- Plaza shall managed by Login Id & single Login Id is allowed to only one lane at time. If, already used system logged then system shall be generate the pop-up in the Master Portal.

ii. LPIC/ANPR and ICS live video:

- Integration of License Plate Image Capture (LPIC), Automatic Number Plate Recognition (ANPR), and Incident Capture Camera System (ICS) live video feeds for real-time monitoring and verification of vehicles passing through the Lanes.
- Saves the LPIC image, ANPR image, ID Image, ICS image, AVC image, ICS video for every Transaction for audit purpose.

iii. Method of Payment auto/manual selection:

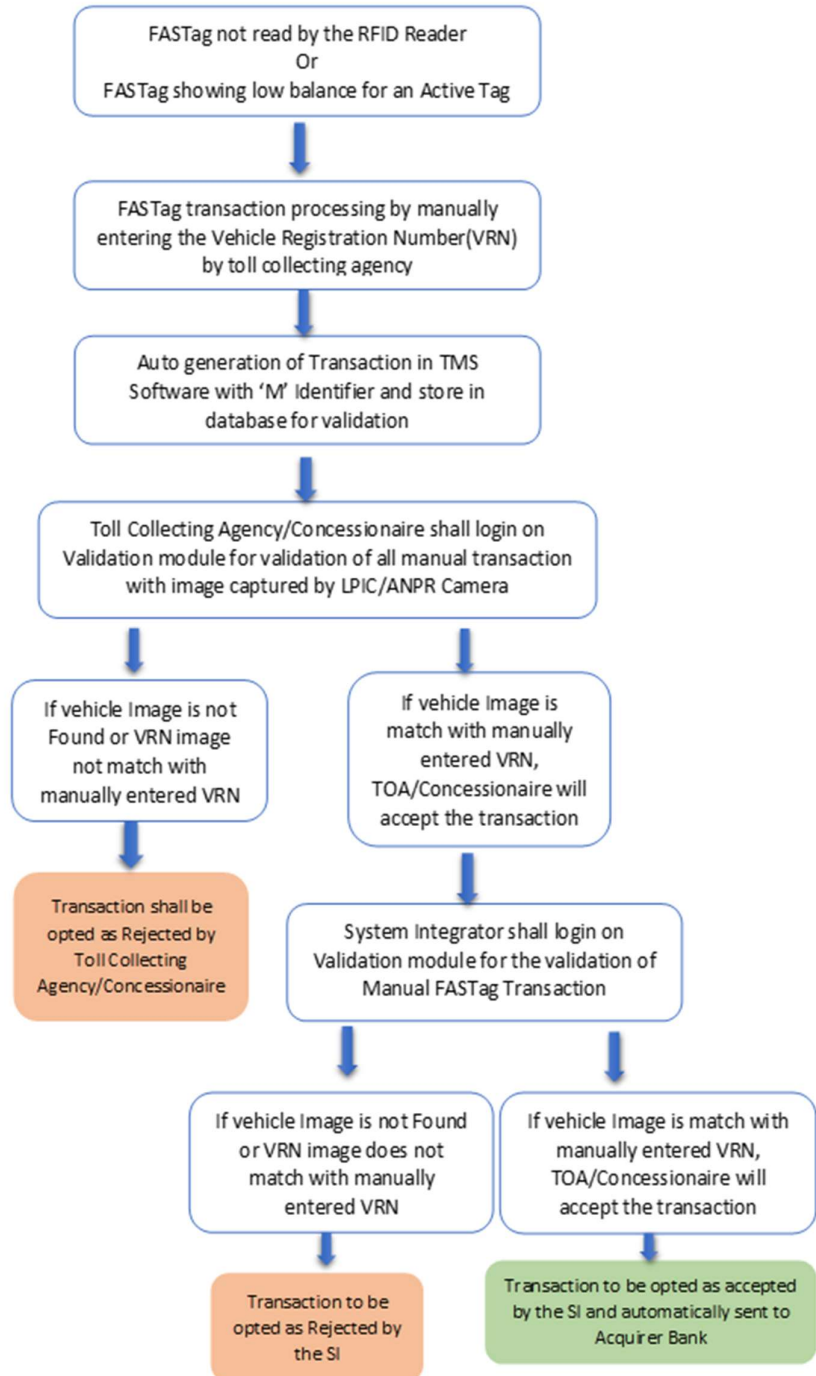
- Option for toll booth operators to select the method of payment (FASTag by default) for processing toll transactions, accommodating different payment preferences of users.
 - In cash Payment mode single and return journey tickets are available with barcode & QR code printing for validation at other plaza.
 - Local tags, smart card, daily & monthly pass Payment modes are available for ease customers.
- iv. TC operations
- TC can perform its operation using customize keyboards or using Touch screen
- v. Class selection option with image:
- Provides toll booth operators with a user-friendly interface to select the vehicle class using images or descriptions, ensuring accurate toll amount based on vehicle classification.
 - Provide the subclass selection for classes.
 - Hotkeys are available for visible exempt Categories to process emergency vehicles like ambulance and fire brigade.
- vi. Critical Equipment functional status:
- Monitoring and reporting of the operational status of critical toll booth equipment, given as below but not limited to:
 - RFID Reader
 - TLC
 - Automatic Barrier Gate
 - Traffic Light
 - OHLS
 - Lane Server Communication
 - Weigh in Motion system
- vii. Matching of FASTag VRN with ANPR VRN:
- Validation process to match the Vehicle Registration Number (VRN) associated with FASTag transactions with the VRN captured by ANPR cameras, preventing unauthorized access or toll evasion and not open the boom barrier.
- viii. ANPR camera confidence level:
- Measurement of the confidence level or accuracy of ANPR camera readings.

ix. Other Functionality:

- Process Manual FASTag Transactions: Ability to manually process FASTag transactions using VRN, with an automatic population of VRN in the lane application.
 - The software shall include a provision that automatically restricts manual transactions to no more than 2% per day.
 - Manual transactions shall be processed with a two-step verification procedure. The System Integrator (SI) shall implement a 2-stage validation process of Manual Transaction as below within the TMS software for the validation of all manual transactions.:
 - Stage-1 – All Manual transactions shall be validated by toll collecting agency.
 - Stage-2 – All validated transactions during Stage-1 shall be further validated by System Integrator of the toll plaza for rejection/approval of transaction before sending to Acquirer bank.
 - The credential for validation module of SI shall not be shared with the toll operating agency/concessionaire, failing which penal action shall be taken on the SI as per Manual Transaction Policy. Following shall be the scenarios for validation:
 - **Scenario-1**
Vehicle image/ VRN is not captured by the LPIC camera, transaction shall be rejected by the SI/Toll Operating agency/Concessionaire.
 - **Scenario -2**
Vehicle VRN image is not match with the VRN entered manually by the Toll collector, transaction shall be rejected by the SI/Toll Operating agency/Concessionaire.
 - **Scenario -3**
Vehicle VRN image is match with the VRN entered manually by the Toll collector, transaction shall be approved by the SI/Toll Operating agency/Concessionaire and the transaction shall be posted to Acquirer Bank for processing.

Annexure-1

Process flow for 02 Stage Validation process of Manual FASTag Transaction



- Process FASTag Transactions through ANPR Camera: Automated processing of FASTag transactions captured by ANPR cameras, with options for correcting VRN recognition errors.
- Request Tag Details as per ICD
- Tow, convey and pedestrian functionality is incorporated with lane application.
- The system captures violation and run-through transactions.
- OHLS Red and green functionality is available at both plaza and lane levels
- Exempt transaction authentication is also available at the plaza level.
- Pedestrian functionality is integrated to crossing the lane path.

x. Last Transactions queue Management:

- Displaying the details of the last transactions processed at each toll lane for quick reference

xi. Weigh in Motion features:

- Integration of Weigh in Motion (WIM) technology for automated axle-wise weight and gross weight measurement of vehicles, with features for detecting overloads, managing queues, and logging penalties for non-payment of overload fines.
- Multiple penalties methods available such as 1X, 2X, etc., and percentage-wise penalties like 5%, 10%, etc. and Up-classing and percentage-wise penalties for both class and subclass.
- Automatic population of Axle wise weight & Gross weight
- In case of overload, overload message and auto penalty calculation
- Queue Management and reverse direction deletion
- Log to be maintained for non-payment of overload penalty
- Vehicle Overload charged shall be linked with FASTag to deduct overload amount automatically.
- Suspicious Vehicle Tracking – Barrier gate shall not open in case Vehicle Number Plate shall not be matched.
- Suspicious Vehicle – Any enforcement agency shall share Vehicle Number Plate to any toll plaza in such case lane vehicle shall not be stopped but vehicle data shall be shareable to the enforcement agency.

❖ **Performance of Lane Module: -**

- 100 % Vehicle detection in lane
- After reading FASTag form RFID transaction performed & Barrier will open in 1400 millisecond
- Application should capable to capture 100 % violation in case of non-payment.

- Application should be capable to identify the critical hardware failure and update status centrally

3. WIM VS SWB DISPUTE MANAGEMENT SYSTEM MODULE:

- A dedicated module for managing disputes related to weigh-in-motion (WIM) measurements.
- Provides tools and workflows for resolving discrepancies or disputes arising from vehicle weight measurements obtained through WIM and SWB systems.
- WIM Audit Module – A separate Audit module shall be provided to monitor all WIM transactions & data.
- SWB Integration – SWB shall be integrated with the main TMS server.

❖ Performance of Wim Vs SWB Dispute Module: -

- accuracy of weight measurements & speed of vehicle processing

4. AUDIT/INCIDENT MANAGEMENT MODULE:

- Login Page
- Date and Time Selection
- Enables filtering of transactions based on various criteria such as toll lane, shift, vehicle class, method of payment, user etc.
- Tracks transactions that have been reviewed and those pending audit.
- Provides a search functionality based on Vehicle Registration Number (VRN).
- Displays images captured by License Plate Image Capture (LPIC) and Automatic Vehicle Classification (AVC) systems for audit purposes.
- Provide video clips related to transactions for auditing.
- Mandatory Audit of all Exception Transactions
 - Audits transactions with discrepancies between tag class, toll collector class, Automatic Vehicle Classification (AVC), Mapper Class etc.
- Audits transactions that are exempt from toll.

- Each violation and exemption must be audited. Discard transactions shall require authentication by the manager of the plaza.
- It utilizes a variety of images like ICS, LPIC, Profiler, and ICS Video to assist in this process. Auditors carefully examine these images to ensure transaction accuracy.
- The TR Application also includes several forms like OCR Audit, Challan Audit, Run-through to Tag Conversion, and Quick Search, making it versatile and efficient for auditing tasks.
- Quick search in TR is use to search Transaction by using VRN No, TXN No, CCH Tag ID, Customer Id, CCH TXN No etc.

❖ **Performance of Audit Module: -**

- 100% Discrepancy Transaction detection
- Accuracy to search Transaction by VRN No, TXN No, Tag ID, Customer Id, CCH TXN No etc.
- Exempt document with all images is available to download in PDF format for exempt transaction

5. CASH RECONCILIATION MODULE:

- Login: Secure access point for users to perform cash reconciliation tasks.
- Cash Float Issuance: Process of issuing cash floats to toll booth operators at the beginning of their shifts.
- Cash Declaration: Declaration of cash collected by toll booth operators at the end of their shifts for reconciliation purposes.

❖ **Performance of Cash Reconciliation Module: -**

- Application should be able to show accurate amount of debit and credit

6. DASHBOARD AND REPORTING MODULE:

- i. Acquirer Bank Performance Monitoring
 - Tracks performance metrics related to communication with acquirer banks, including response times for Get-exception API and Check-time API.
 - Monitors the overall response status.
- ii. Equipment up/downtime monitoring and logging:
 - Tracks the operational status and uptime/downtime of toll booth equipment, with logging for historical analysis.
- iii. Lane Status Display Unit:

- Provides real-time status updates on transactions processed at each toll lane.
- Provides real-time status of all hardware's available in lane.
- Warnings and Alerts for run-through Login and Logout

iv. Plaza's performance dashboard:

- AVC accuracy
- ANPR accuracy
- Plaza throughput
- Traffic throughput per lane
- RFID Reader Accuracy % out of total FASTag transactions
- WIM accuracy (WIM vs SWB)
- Exempt count analysis (lane, TC, supervisor, shift, class, category etc.)
- Independent AVC data stream for traffic count validation
- Validates traffic count data using an independent AVC data stream.
- FASTag related information like last transaction update and Bank response.
- Last DIFF file synchronization date time.
- Dashboard shall be customizable by users like user can pin or remove the any widget of listed details.

❖ **Performance of Dashboard & Reporting Module: -**

- All hardware status real time updating
- Transaction details are fetched and show properly on Realtime basis
- Alert for run-through Login and Logout
- Dashboards must be able to export data in pdf and excel format

7. TOLL PLAZA CONGESTION MONITORING SYSTEM:

The Fixed cameras at the toll plaza (as specified by IHMCL) should possess the capability to monitor the vehicle queue system through a Machine Learning System. If necessary, these feeds should be accessible to the TMCC at the NHAI headquarters in New Delhi.

8. TOLL PLAZA TMS SECURITY LEVELS:

- i. Data sharing between lanes and the plaza must be secure, utilizing protocols such as web APIs or MQTT. All data should be encrypted or token-based.
 - ii. The database server should be distinct from the application server.
 - iii. Internet connectivity is not required on the database server.
 - iv. The database should not be accessible by any other system.
-

- v. All servers and systems should utilize SSD or NVMe storage to optimize the speed of FASTag transactions.
- vi. The plaza application must be web-based.
- vii. All lane equipment should be operable from the plaza using an IP-based system.
- viii. Archived data should be stored in cloud storage.
- ix. There should be a provision for integrating all systems using cloud-based plaza server services if required.

9. MIS MODULE:

- i. Transaction Detailed Report: Provides detailed reports on toll transactions, including transaction time, amount, vehicle details, and method of payment.
- ii. AVC Accuracy Report: Analyzes the accuracy of Automatic Vehicle Classification (AVC) systems in classifying vehicles.
- iii. ANPR Accuracy Report: Evaluates the accuracy of Automatic Number Plate Recognition (ANPR) systems in capturing vehicle registration numbers.
- iv. Traffic and Revenue Report: Summarizes traffic volume and revenue generated at the toll plaza.
- v. Lane Wise Class Wise Traffic Count Report: Breaks down traffic counts by lane and vehicle class.
- vi. WIM Report: Provides reports on Weigh in Motion (WIM) measurements, including vehicle weights and compliance with weight limits.
- vii. Exempt and Run-Through Reports: provide the details of Exempted and Run-Through vehicles with summary
- viii. Cash Report: provide the details of total cash transaction perform on plaza with summary.
- ix. ETC Report: Provide details only CCH Transaction performed on plaza with master summary.
- x. All type of reports shall be automatically uploads to the NHAI – PIU, RO & Head Quarter through SFTP/VPN and only one IP address shall be allowed to upload the said reports.
- xi. Each report must have image of vehicle.
- xii. Automatic Audit report shall be generated for AVC & ANPR.

❖ **Performance of MIS Module: -**

- Export data to PDF & Excel easily
- Easy to understand reports
- Elaborated summary available for reports

10.UNAUTHORIZED REMOVABLE PENDRIVE, EXTERNAL HARDRIVE, USB DEVICES, SD-CARD ETC. ACCESS PREVENTION:

- The TMS should have a robust solution to prevent the use of unauthorized removable Pendrive, external Hard drive, USB Devises, SD-Card etc within the ETC infrastructure. This solution should ensure that only approved and secure removable Pendrive, external Hard drive, USB Devises, SD-Card etc can be accessed and used on organizational devices.
- The solution must include a whitelisting feature that allows only authorized removable Pendrive, external Hard drive, USB Devises, SD-Card etc to be recognized and accessed by the devices.
- Authorized removable Pendrive, external Hard drive, USB Devises, SD-Card etc must be registered in a central database and verified before access is granted.
- The solution must utilize unique device identifiers (e.g., serial numbers, hardware IDs) to distinguish authorized removable Pendrive, external Hard drive, USB Devises, SD-Card etc from unauthorized ones.
- Each authorized removable Pendrive, external Hard drive, USB Devises, SD-Card etc must have a unique identifier stored securely to prevent spoofing or duplication.
- Instant alerts and notifications should be sent to IT administrators upon detection of unauthorized access attempts.
- The solution must maintain detailed logs of all USB access events, including user identity, device details, and access time.

11.PREVENTION OF UNAUTHORIZED SOFTWARE INSTALLATION:

- The TMS shall have a comprehensive solution to prevent the installation and execution of unauthorized software on the systems, ensuring that only the approved Transportation Management Software (TMS) and other pre-approved applications are permitted.

- ii. Continuous real-time monitoring of all endpoints to detect and block attempts to install or execute unauthorized software. Immediate alerts and notifications must be sent to IT administrators upon any unauthorized software installation attempts.
- iii. Any installation of software outside the scope of the approved TMS software must receive prior written approval from the client or the designated authority.
- iv. The Service Provider is responsible for maintaining a secure and compliant software environment within the ETC system, and any deviation from this requirement may result in penalties, de-listing from the empanelment.
- v. Regular audits and inspections will be conducted to ensure compliance with this clause. The system integrator must cooperate fully during these audits and provide all necessary documentation and access to systems as required.

5.11 Annexure 10: Self Certificate - Integration of Weigh-in-Motion System with TMS on Highway toll plazas

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

Name of the Project & Location	
Client's Name, Contract Details Complete Address	
Brief narrative description of Project – highlighting relevant scope of work such as <ul style="list-style-type: none">• Number of toll plaza• Number of ETC Lanes, etc. integrated with WIM and SWB	

Name of the Applicant

.....

Signature of the Authorised Signatory

.....

Name of the Authorised Signatory

5.12Annexure 11 Undertaking - STQC Certification of Critical line item

(To be submitted by Applicant)

I/We, hereby certify and confirm that M/s., (the name and address of the registered office of the Applicant, undertake that the critical equipment mentioned in the RFE shall be procured only from those OEMs who have obtained STQC certificate for the equipment clearly mentioning that the equipment meets the specifications mentioned in RFE documents. The STQC certificate shall be submitted to the Authority/ IHMCL before FAT. For the purpose of this clause the critical line items shall comprise as under-

- RFID Reader along with the Antenna
- Automatic Lane Barrier
- Automatic Vehicle Count & Classifier (AVCC)
- Cameras - ICS, LPIC/ANPR, and PTZ
- Toll Lane Controller
- Toll Plaza Server

We undertake that if any deviations are found at our designated fee plazas at any point in time, IHMCL reserves the right to immediately suspend our empanelment and forfeit the Bank Guarantee.

Dated thisDay of, 202.....

Name of the Applicant
.....

Signature of the Authorised Signatory
.....

Name of the Authorised Signatory

5.13 Annexure-A

5.13.1 ETC equipment

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

Lane Level			
S. No	Equipment Description	Unit	Qty
1	RFID ETC transceiver near Pay-axis - mounted on canopy	No	1
2	Electronics Enclosure	No	1
3	Lane Controller with Industrial PC	No	1
4	AVC including sensors and controller	Set	1
5	User Fare Display with mounting pole	Set	1
6	Automatic Barrier Gate	No	1
7	Overhead Lane Status light (OHLS)	No	1
8	Traffic light with mounting pole	Set	1
9	Loops with detector	Set	2
10	Incident Capture Camera with mounting pole	Set	1
11	License Plate Image Capture Camera with mounting poles	Set	1
12	TFT Monitor	No	1
13	Customized industrial grade keyboard	No	1
14	Thermal Receipt Printer	No	1
15	Violation light & Alarm (on existing pole) and Foot switch in booth	No	1
16	Booth CCTV camera with voice recording	No	1
17	Cabling/Networking/Installation/Commissioning (Lump sum)	LS	1

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18	Software – Lane Level	No	1
19	Intercom Slave unit in booth	No	1
20	Lane Level UPS	No	1
Plaza Level			
21	ETC Server (Plaza)	No	1
22	Workstations for MIS, Cashup, Audit & LSDU System (in control room)	No	4
23	24 Port Network switch (Layer 3)	No	2
24	Software – Plaza level	Job	1
25	Broadband/Dedicated Internet Lease Line (01 Static IP) with minimum 04 Mbps link for CCH connectivity	Facility	2
26	UPS system as required for complete ETC Toll Plaza system (10 KVA or above)	No	2
27	Network Video Recorder (NVR) for CCTV recording along with 21.5” LED Display	No	1
28	CCTV cameras for Plaza building surveillance (server room, control room, cash room, admin)	No	4
29	Master Intercom System	No	1
30	Servo Stabilizer (60 KVA -03 phase)	No	1
31	Firewall Hardware	No	1
Operation and Maintenance per Toll Plaza			
32	Quarterly O&M Charges	Quarter	1

6 TOLL PLAZA EQUIPMENT AND SOFTWARE SPECIFICATIONS

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

6.1 RFID ETC Transceiver near pay axis (mounted on canopy)

6.1.1 General:

S. No	Parameter	Minimum Specifications
1	Frequency	UHF 865 MHZ to 867 MHZ *
2	Communication	Ethernet/ Serial communication (EIA standard RS 232 C / RS 485)
3	RF Power Maximum	1 W – transmitted & 4 W – EIRP (Equivalent Isotropically 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.

6.1.2 Environmental:

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

6.1.3 Operating Characteristics

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

6.2 Electronics Enclosure

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

- 6.2.2 Locking System: Enclosure shall have a unique key allowing access to the electronic.
- 6.2.3 Door monitoring: The cabinet door shall be monitored utilizing proximity switch. Door open / close events shall be recorded as incidents identified by time and Lane. The incidents are to be displayed on the plaza software subsystem.
- 6.2.4 Cabling Layout: All external cables shall be protected against the effects of lightning and shall comply with all requirements for the control of interference from EMI. All data cables shall be screened and shall be properly separated and shielded from all power cables.
- 6.2.5 Ventilation and internal temperature: All equipment endorsed by the cabinet shall be kept at a temperature consistent with manufacturers recommendations.
- 6.2.6 Finishing: The cabinet surfaces shall be protected from the environment in which it shall be used, and the Equipment Contractor shall specify the surface treatments to be applied. Each cabinet shall be painted and numbered in a manner consistent with the toll lanes and consistent with all equipment related functions (e.g., reporting to the plaza software subsystem).
- 6.2.7 Cable dressing: All cables (power & signal) shall be properly routed and dressed with suitable railings inside the enclosure and ties.
- 6.2.8 Cable numbering: The signal & power cable terminations shall be identified by proper numbering. In addition to the termination at the controller end, this numbering shall also be maintained at locations where the cables are exposed (like manholes, junctions) and at the peripheral end. Further, all the individual component boards shall be properly identified by labelling.
- 6.2.9 Cable terminations: The signal & power cable (from the peripherals) terminations shall be kept separated inside the cabinet. The cable routing inside the enclosures shall be done in a proper manner, so that, aesthetics apart, the cable faults can be traced, and faulty cables replaced, easily and less time-consuming.

6.3 Lane Controller with Industrial PC

6.3.1 Functional Requirements

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

- b) All hardware, software, TLC interface to peripherals and local ETC Server shall be supplied by the equipment supplier.
- c) The TLC software shall be developed to operate any type of toll lanes such as dedicated ETC toll lanes, Normal Hybrid ETC toll lanes, Extra wide Hybrid ETC toll lanes, Bike Lane etc. as is defined under earlier section of this document.
- d) All lane operating data shall be stored in the local Solid-State drive in the lane. Adequate RAM shall be provided to prevent “Thrashing” of the Solid-State drive. The Solid-State Drive shall have enough memory to load and maintain all necessary program tables (like ETC blacklist, whitelist, discount list etc.) and data in memory, to optimize the toll collection functionality. Each transaction data collected from the lane peripherals shall be stored in the Solid-State Drive of the TLC in a separate encrypted file placed in a folder automatically created with the month’s name at the start of each month, before being transmitted to the master database in the local ETC server. This data shall remain in the Solid-State Drive irrespective of transmission to the local ETC server until a period of 1 month. At the start of the 7th month, the 1stweek’s data shall be deleted from the Solid-State Drive on the basis of FIFO logic.
- e) Further, there should be a mechanism for auditing the real time data transmission (including incidents) over a predetermined time period (say 30 minutes) and automatic data retrieval from the lane in case of data mismatch.
- f) The TLC must be capable of storing the following minimum information:
 - i. 6 months of transaction data and at least 1 month of images associated with transaction
 - ii. 500000 Blacklist and discount files of FASTag
 - iii. 5 Tariff Table (active and pending)
- g) A transaction record shall contain all the necessary information to enable complete control and auditing of the system.
- h) The minimum required fields are as follows: -
 - Transaction Sequence Number
 - Date
 - Time
 - Plaza
 - Lane
 - Shift
 - Collector Id
 - Manual Vehicle Class
 - Tag Vehicle Class (TVC)

- Automatic Vehicle Class (AVC)
 - Supervisor Class
 - Mapper Vehicle Class
 - Method of Payment
 - Image ID (in case of a violation transaction)
 - Tag Id
 - VRN no. (XXXXXXX in case of FASTag)
 - Transaction Amount
- i) The transaction time shall be the time when a Tag is detected at transaction area or when the toll collector validates the MOP for manual transaction.
- j) The TLC shall be capable of interfacing with at least the following peripheral equipment:
- RFID Reader
 - Toll Collector Display
 - User Fare Display
 - Vehicle guidance signals (Traffic Lights)
 - Overhead Lane Sign
 - Automatic Exit Barrier
 - Exit Barrier Loop
 - AVC system including AVC loop
 - Electronic Toll Collection Equipment
 - Incident Recording (CCTV) System
 - ANPR
 - Thermal Receipt Printer
- k) The TLC shall further allow for interfacing via three additional (spare) high-speed serial devices. All components of toll lane controller (TLC) should be available in open market including Digital I/O board of industrial grade, there should not be any customise panel/card inside TLC.
- l) The TLC shall be capable of communicating with the local ETC server. Communication shall consist of data necessary to build a complete database in the local ETC server, from which the required financial and operating reports and statistics can be generated. The local ETC server shall also receive and log any reportable incidents occurring in the lane, which shall be transmitted real-time to the Incidents Computer (IC) for action by the toll supervision staff. In terms of incidents, real-time shall mean the time from the occurrence of the incident to the storage of the incident and the subsequent display of the incident on the IC; shall not be greater than 2 seconds.
-

- m) As described above, all data entries shall be sequentially numbered and referenced to other related entities. The incidents that occur during a transaction shall refer to that transaction. Transactions and incidents shall refer to the applicable financial entity in which they occur.
- n) An automatic / manual data validation process is required to check for data continuity and missing/duplicate data. An audit trail of manual corrections is required. The data validation process shall be linked to a “data not complete” message that will be indicated on reports if data is missing / pending validation / consolidation.
- o) Further, the TLC (via the AVC) shall monitor the lane at all times for any traffic violation or incident; and for failure of any of the toll equipment. The level of incident reported to plaza via the peripherals in the toll lane or reported to the LOCAL ETC SERVER shall be a parameter setting in the software available at a definable level.
- p) The TLC shall also be capable of receiving messages from the local ETC Server. These messages will contain data on the Tariff tables, classification table, whitelist, tag blacklists, ETC account balance, etc. Should the link between the TLC and the LOCAL ETC SERVER fail, a system to download such information locally into either end (TLC & LOCAL ETC SERVER) is to be made available.
- q) The CCH maintains a vehicle class description that is generic to all toll plazas. However, as the vehicle class description at each toll plaza for the same vehicle may be different, the TLC shall maintain a mapping of the CCH Vehicle class to the Plaza Vehicle class. The TLC generated transaction shall always refer to the Plaza vehicle class.
- r) Extended operation of the TLC in the Local Mode must be possible. The system shall manage its data storage capacity to ensure adequate free space for the operating system, application and data. The system shall provide warnings regarding free space when the storage capacity reduces to predefined critical limits. If the data storage on the TLC reaches this critical limit, it shall immediately instruct the plaza to stop processing of transactions any further and inform the supervisory staff to initiate a data extraction procedure. The data extraction shall be carried out via a thumb drive or portable computer and restored in the LOCAL ETC SERVER.
- s) The Equipment Supplier shall provide the details on the TLC data management strategy.
- t) The TLC shall be capable of producing a printed report in the lane (mini shift) for each period worked (each login to logout period). The system shall allow generation of such reports only for certain predefined privilege levels. Time throughout the entire toll collection system shall be synchronized with reference to the LOCAL ETC SERVER.

6.3.2 TLC PC Specification:

The following minimum configuration requirements shall be met:

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

	Overall MTTR: 0.5 hrs – 1 hrs
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6.3.3 Enclosure Cabinet

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

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

6.4 AVC including Controller, sensors, loop and detector

6.4.1 Accuracy Level: The system shall be profiler based and 100% auditable, accuracy of vehicle counting should be 100% and classification shall not be less than 98%.

6.4.2 Auditability: The AVC System shall comply with the following auditability criteria:

- a) Each transaction recorded by the system shall be uniquely and sequentially numbered.
- b) The AVC sensors shall be able to provide information to a computer connected to the same network as on AVC PC computer that shall be used for auditing the classification of the AVC as well as the classification of the lane operator.
- c) The audit function shall be done in the following manner. The auditor shall
- d) connect to the AVC computer through network or RS-232 port of the AVC computer.
 - i. Start audit application/data extraction application
 - ii. Enter Plaza name, AVC number, User id and Password
 - iii. Enter the date and duration for the audit.
 - iv. Press enter to start data extraction (any time the auditor shall be able to cancel current command to start with other specific duration).
- e) Obtain output of the audit report in XLS format and it shall contain at least the following:
 - Transaction sequence number
 - Date & time of the transaction
 - Lane ID
 - Shift ID
 - TLC class
 - AVC class
 - MOP
 - Incident type and details associated with the transaction, if any

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

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

6.4.5 Description and Functions

- a) The automatic vehicle classification equipment shall be installed in the lane after pay-axis.

- b) The purpose of the AVC is to sense the presence of a vehicle (differentiate it from non-vehicular crossing), to measure and interpret certain physical characteristics of the vehicle as it passes through the AVC.
- c) The AVC shall be able to generate profile image which shall be used for auditing purpose.
- d) The AVC shall be able to distinguish between classes as per the applicable notifications of MORTH
- e) This class information shall be stored locally at AVC level and communicated to the TLC. Simultaneously a still image of the vehicle shall be captured / grabbed by the Incident Capture System (ICS) Camera as the vehicle triggers the AVC sensors. The TLC shall then check whether this AVC class matches the vehicle class (the CCH Class mapped to the Toll Plaza class) as read from the tag. If there is a discrepancy between the two classifications, the license plate image (captured when the vehicle passed through the ETC exit) and the ICS camera image shall be saved and stored with all transaction and incident information watermarked on them. The images and discrepancy information shall be communicated to the Local ETC server for further action and processing by the toll supervision staff.
- f) The Equipment Service Provider shall submit details of the performance of existing AVC systems duly validated by the existing operators of the systems.
- g) The AVC shall be capable of detecting and reporting the following vehicle movements and incidents in the lane to the TLC:
 - i. The AVC system must be able to count and distinguish two wheelers, autos and four-wheelers separately.
 - ii. Vehicle Standing – the vehicle presence sensing equipment stays active for longer than a preset time. The preset time shall be parameter settable.
 - iii. All AVC elements (loops, Profiler based sensor, cameras, etc.) shall be fully weatherproof and installed in a location where vehicle damage by accident is not possible.
 - iv. When the TLC is inoperative, or communication between the TLC and the AVC is severed, the AVC shall record the last transaction number transmitted and shall be able to independently count and record (store) vehicle classes passing through or over it. A sequential vehicle counter at AVC level shall be implemented to reconcile. The AVC shall have its own battery backup and data extraction facility on to a CD or to a laptop computer.
 - v. The AVC shall have its own battery backup at least 8 hours and data extraction facility to a computer.

- vi. The AVC shall be able to generate violation if the ETC lane is not logged- in and a vehicle passes through it.
- vii. In following cases, the AVC shall generate an alarm on the plaza level and send record to incident control system for supervisory action apart from the incidents defined:
 - Degraded classification (in case of any single Transmit / Receive failure)
- h) The accuracy of the AVC shall not be affected by temperature or any weather /environmental conditions and shall be independent of vehicle speed / weight.

6.4.6 AVC System Design

- a) Functional requirements:
 - i. The AVC shall be able to automatically classify the classes of vehicles as indicated in the vehicle class table to an accuracy of 99.60% without manual intervention and class correction or validation. Unless the above criteria are achieved, the AVC shall never classify a vehicle to any defined category in the Classification table; it shall be categorized as unable to classify so that it triggers an incident and there is no chance for revenue loss. This can be used to fine tune the AVC to improve the accuracy later.
 - ii. The functional specification for the AVC shall include the hardware, software and operational requirements. The design requirements of the AVC are to be seen as a system in which all failures, events and other events are logged, stored and managed. The following design criteria shall be used in the AVC:
 - ✓ AVC Classification Table
 - ✓ AVC Configuration
 - ✓ Vehicle Detection and Classification
 - ✓ AVC Interfaces
 - ✓ AVC Technical Requirements
 - ✓ Data Storage
 - iii. All operating data shall be stored on the local Solid-State Drive of the AVC computer. “Thrashing” of the Solid-State Drive shall be prevented. The AVC shall have enough memory to load and maintain all necessary program tables and data in memory. All other transaction data shall be stored on the local hard drive of the AVC and a copy to be transmitted to the LOCAL ETC SERVER.
 - iv. The following minimum information is to be stored at AVC level:
 - Classification table
 - AVC configuration

- Data of at least one year (transaction, event, AVC centric incident etc.)
- v. Two separate streams of data, carrying vehicle classification information from TLC and AVC shall be copied at LOCAL ETC SERVER level for comparison, evaluation and audit purposes. There shall be provisions for drawing separate reports for TLC and AVC classifications at LOCAL ETC SERVER level. An AVC accuracy and reconciliation report shall be present in the toll system.
- vi. The performance of the AVC shall form the basis for the accuracy checks, functional tests, installation, commissioning and handover to achieve the required accuracy and performance. All design and installation approvals shall be obtained from IHMCL before installation and commissioning. The Contractor shall submit a detailed list of vehicles with photographs and Indian RTO authorized classification category of all models of vehicles found in India as part of technical specifications delivery. The configuration of AVC classification table into the system shall be done in the presence of the authorized representative of IHMCL.
- vii. The plaza lane area detailed AVC layout including the following items shall be provided at the time of technical specifications delivery by the Contractor so that the design process can be implemented at site. The Contractor shall ensure that the equipment layout is in conformance with the Lane Design Drawings as provided by the Authority.
- viii. The system architecture shall provide the details of the equipment layouts and the physical location of each component of the system in the ETC toll lane.
- ix. The loop detector units/cards shall conform to the following minimum requirements.
 - x. The unit shall be easily removable and shall be fitted with at least two (2) loops per card.
 - xi. The unit shall have a minimum of 4 separate adjustable sensitivity and frequency levels.
 - xii. The unit shall have indicators for vehicle presence, loop on/off and failure.
- xiii. The AVC Profiler shall comply with the following specification and are mounted in a manner as to ensure that the following minimum specifications are adhered to at all times.
 - Ensure that no vehicle can pass through the AVC and miss axle counting.
 - Number of Axles per vehicle is accurately counted for every vehicle passage
 - Ensure to generate profile image of each vehicle.
 - Sensor replacement time shall not exceed 30 minutes.

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- xiv. It shall be noted that the equipment enclosures shall be mounted in the tunnel/booth at the toll plaza, sufficient ventilation shall be provided by the equipment Service Provider for this enclosure and the enclosure shall have IP65 protection.
 - xv. The AVC enclosure shall be mounted in the tunnel/booth. The AVC enclosure shall be secured using suitable corrosion resistant fixtures, and all fixtures shall be approved before the mounting of the AVC can take place.
 - xvi. The AVC enclosure shall be provided with a switch to detect that the AVC door is open or closed, and the status shall be updated at plaza level in real time.
 - xvii. All mounting shall be done in a neat and professional manner and shall be approved by the Authority.
 - xviii. All AVC cables that enter the enclosure shall be protected between the enclosure and the sensors, using a suitable flexible steel re-enforced trunking / cable tray / ducting as approved by the Authority to reduce the risk of tampering. All the cable entries to the AVC enclosure shall be sealed properly with glands / sealant, as approved.
 - xix. The quality control procedure manual shall be provided with the proposal by the equipment Contractor, which shall include a minimum of:
 - AVC Installation Log Sheet
 - Loop Resistance Testing and Loop Earth Testing Procedure
 - Crosstalk Verification Process
 - Loop Chatter (Bobbing) Verification Process
 - Basis of classification logic of AVC

6.4.7 AVC Controller Configuration

The following minimum configuration requirements shall be met:

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

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

6.4.8 AVC Enclosure

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

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

- c) Cabling Layout: All external cables shall be protected against the effects of lightning and shall comply with all requirements for the control of interference from EMI. All data cables shall be screened and shall be properly separated and shielded from all power cables.
- d) Ventilation and internal temperature: All equipment endorsed by the cabinet shall be kept at a temperature consistent with manufacturers recommendations.
- e) Finishing: The cabinet surfaces shall be protected from the environment in which it shall be used, and the Equipment Contractor shall specify the surface treatments to be applied. Each cabinet shall be painted and numbered in a manner consistent with the toll lanes and consistent with all equipment related functions (e.g., reporting to the plaza software subsystem).
- f) Cable dressing: All cables (power & signal) shall be properly routed and dressed with suitable railings inside the enclosure and ties.
- g) Cable numbering: The signal & power cable terminations shall be identified by proper numbering. In addition to the termination at the controller end, this numbering shall also be maintained at locations where the cables are exposed (like manholes, junctions) and at the peripheral end. Further, all the individual component boards shall be properly identified by labelling.
- h) Cable terminations: The signal & power cable (from the peripherals) terminations shall be kept separated inside the cabinet. The cable routing inside the enclosures shall be done in a proper manner, so that, aesthetics apart, the cable faults can be traced, and faulty cables replaced, easily and less time consuming.

6.5 User Fare Display with mounting pole

6.5.1 Description and Function

- a) The User Fare Display (UFD) shall be located in the toll lane in a position where it is readily visible to and readable by Users from the pay point. The display has the primary purpose of informing the User of the vehicle. It shall convey ETC balance information & low balance warnings, public relations and seasonal messages.
- b) The UFD shall be of variable message type and shall have high intensity LED or similar Operator approved display of 16 characters per line in three lines with the option of scrolling for displaying seasonal messages.
- c) The UFD shall send status information to the TLC for interface with plaza subsystem.

6.5.2 Specifications

The following minimum specifications shall be met:

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

6.5.3 Power Source

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

6.5.4 Protection

The UFD shall be IP 65 rated or better.

6.6 Automatic Barrier Gate

6.6.1 Description and Functions – Automatic Barriers

- a) The lane exit barrier shall be suitable for high- speed ETC transactions. One full open-close cycle shall not take more than 1.2 seconds. The barriers are being used in the ETC express lane; the barriers shall be capable of full lane open from a close state in less than 0.6 seconds.
- b) The housing and any mounting frame shall be fabricated from corrosion-resistant materials. They shall be IP 55 rated. The barrier shall be driven electrically. The motor shall not be damaged when the barrier is blocked in any position. Exit barriers shall have presence detectors independent to the AVC system to prevent barrier arms coming down on vehicles while passing. This shall be in the form of infrared units and dedicated embedded loops. Apart from the barrier arm, the mechanism may not have any moving protrusions that pose a risk to persons standing in close proximity to the barrier.
- c) The barrier arm shall be fabricated from a light, corrosion resistant material readily and inexpensively available in India. The barrier arm shall further have a protective mechanism whereby controlled fracture of the barrier arm occurs without damage to the housing or motor in the event of frontal collision. Preference will be given to non-

destructive break-away mechanisms. Further, there shall be a protection mechanism to detect the presence of vehicles to avoid accidental hitting on the vehicles, whenever the boom is triggered for closing.

- d) Suitable power supply scheme shall be implemented by the Contractor to feed the Exit barrier to protect the source from being damaged due to electrical surges / spikes injected by the dynamic (inductive) load. Further, the drive shall be so designed as to the damping factor is just sufficient for the drive to operate the booms without any jerks during open / close to avoid freak hitting by the exiting vehicles.
- e) Barrier arms shall have retro-reflective red stripes in accordance with the local traffic sign standards.

6.6.2 Specifications

The following minimum specifications shall be met:

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

6.6.3 Power Source

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

6.6.4 Protection

The Automatic Barrier Gate shall be IP 55 rated.

6.7 Overhead Lane Status Sign (OHLS)

6.7.1 Description and Functions

- a) The Overhead Lane Sign (OHLS) is located above the centre of the lane at the lane entrance. The purpose of the OHLS is to indicate to the User whether the toll lane is open for the processing of vehicle or closed. A red cross is used to signal that the lane is closed, whilst a green arrow is used to indicate that the lane is open to traffic.
- b) Signs must be sufficiently bright and directed to indicate to a motorist, approaching the toll plaza, at a distance of 300 m on a bright cloud free day that the lane is available for use. The OHLS status shall also be visible up to a peripheral view of 45 degrees from the travel axis.
- c) At any situation, both RED and GREEN part shall not glow simultaneously. Under failure conditions, only Red Cross shall be displayed until rectification.

6.7.2 Specifications

The following minimum specifications shall be met:

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

6.7.3 Power Source

The OHLS shall receive UPS power from the TLC.

6.7.4 Protection

The OHLS shall be IP 65 rated or better.

6.8 Traffic lights with mounting pole

6.8.1 Description and Functions

- a) The Traffic Light (TL) shall be located in the toll lanes in a position where it is readily visible to users of the toll road, usually on the side of the lane beyond the toll booth. The traffic light shall consist of two traffic light heads mounted on a suitable pole. A red signal is used to indicate that the user should stop whilst the green signal is used to indicate that the user should proceed.
- b) At any situation, both RED and GREEN part shall not glow simultaneously. Under failure conditions, only RED arrow shall be displayed until rectification.

6.8.2 Specifications

The following minimum specifications shall be met:

- Size : 200 mm with sun visor
- Display (Stop) : Red LED
- Display (Start) : Green LED

- Visibility Range : 20 m (under normal visibility conditions)
- Enclosure : MS Housing
- Mounting : On Pole

6.8.3 Power Source

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

6.8.4 Protection

The TL shall be IP 65 rated or better.

6.9 Violation Light & Alarm

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

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

6.10 Loops with detector

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

6.11 Pan Tilt Zoom (PTZ) Camera

Camera shall be for industrial use, capable of continuous operation under harsh environment on the highway. The camera shall be IP based full HD colour type with 1/1.9" image sensor (CMOS) or better. It shall have frame rate of up to 60 frames per second in

all compression mode and shall have 3 simultaneous streams and live view for more than 5 users. Hardware Specification:

Feature	Specification
Image Sensor	1/3" or better
Active Pixels	1280(H) x 960(V) or better (2 MP)
Resolution	Minimum 2 MP
Sensitivity	0.005 lux (B/W), less than 0.06 lux (Colour) or better
Focus	3.5mm to 129mm or better
Optical Zoom	35x or better
Digital Zoom	16x
Night Vision	up to 100m
Signal to Noise	> 54 dB
AGC	Automatic
White Balance	Automatic
Electronic Shutter	Auto/Manual, 1/1 ~ 1/30,000s
Iris Control	Automatic
Encoding	H.264 or H.265 or JPEG
Video Output	Ethernet 10/100 Base-T
Pan Range	0 to 360 degrees, Auto flip at 180 degrees
Pan Speed	variable 0.2 degrees per sec. to 80 degrees per sec.
Tilt Range	+10 to -90 degrees
Tilt Speed	variable 0.2 degrees per sec. to 40 degrees per sec.
Pre-set Positions	255 minimum
Housing	IP66 or better
Power	230V, 50 Hz domestic supply
Protection Class	D for data/signal lines and class B for power

i. Quality

- PTZ camera system shall be designed to operate 24 hours a day and 7 days a week without shutdown. Thus, high reliability and availability shall be achieved.
- Design target of MTBF shall be 3×10^4 hours or better except the mechanical part of pan-tilt head. Expected MTBF shall be calculated based on the announced reliability of parts and component, or operation record of similar products.
- Availability of the system and each camera shall be 99% or better.

ii. PTZ Camera Pole

Camera pole design shall adhere to site requirements and conditions, featuring a Hot Dipped Galvanized finish, an octagonal shape, and a length of 8 meters (may vary as per toll plaza size), complete with appropriate mounting arrangements. Additionally, ensure that separate pole earthing is included to mitigate the risk of lightning incidents.

iii. Surge Protector

The surveillance systems i.e, camera, video, data and power signal shall be fully surge protected at camera as well as on the NVR.

iv. Cabinet

The cabinet shall be installed near the camera pole and shall accommodate the camera power supply, surge protector and other field equipment.

v. Communication

There shall be Point-to-point (P2P) communication via RF devices between the PTZ camera and the Network Video Recorder for data communication. The cost of RF devices shall be included in the cost of PTZ Camera.

vi. Camera Location

The placement of the PTZ Camera shall be communicated by IHMCL in coordination with Service Provider. The Service Provider shall obtain written confirmation from IHMCL to ascertain the specific location of the PTZ camera.

vii. Video Analytical

The camera shall be used for analytical functions, including monitoring traffic congestion in lanes and counting vehicles.

viii. Other Miscellaneous Works (Civil/Electrical)

Any additional civil, electrical arrangement, and networking work required to complete the installation and commissioning of the PTZ Surveillance System is the responsibility of the Service Provider. This includes tasks such as trenching, erection, ducting, laying cables, installing power sources, and any necessary construction or electrical work.

6.12 Aadhar enabled Geofenced smart attendance system with time and face recognition:-

- i. Attendance should be Aadhar enabled along with Geo-fencing Capability to define geographical boundaries within which attendance can be marked.
- ii. The system should ensure accuracy in tracking attendance based on location.
- iii. System should be capable of utilizing advanced algorithms for reliable face detection and recognition.
- iv. System should ensure security and accuracy in identifying individuals.
- v. Implement encryption protocols to secure attendance data.
- vi. The system should be tamperproof and should have necessary controls to prevent unauthorized usage or tampering.
- vii. System should seamlessly integrate local as well as central system including TMCC.
- viii. Real-time Monitoring and Reporting:
- ix. Provide administrators with real-time attendance tracking system through central application.
- x. Generate comprehensive reports on attendance trends, tardiness, etc.
- xi. Send notifications to employees for attendance reminders or updates.
- xii. Alert administrators of any anomalies or suspicious activities.
- xiii. Scalability and Customization.
- xiv. Backup and Redundancy:
- xv. Adhere to industry standards and best practices for technology and security.

Any type of license/renewal/patch upgrade/storage requirement etc shall be borne by the service provider

6.13 Automatic Number Plate Recognition (ANPR) Camera

- i. ANPR Cameras shall be installed in each lane to detect and recognize the Vehicle Registration Number (VRN) and classification of each passing vehicle ANPR Cameras should also be capable to detect and recognize the vehicle classification of each passing vehicle with accuracy more than 95%.
- ii. The Lane computer should have an active integration with ANPR camera system to get the live Vehicle Registration number of each passing vehicle.
- iii. In case of Cash transaction, TC should get the Vehicle Registration Number automatically in Lane application through ANPR Camera.
- iv. In case of FASTag Transaction, ANPR camera shall be used as a backup of RFID reader, if RFID reader fails to read the TAG or RFID reader is down, Lane system should have an option to fetch the FASTag details using the Vehicle Registration Number detected by ANPR System.

- v. ANPR Recognition system shall have count accuracy of 99.50% for all types of vehicles.
- vi. ANPR Recognition Accuracy shall be > 98% for all HSRP Plates and > 90% for all Non-HSRP plates.
- vii. ANPR engine should provide the class of each vehicle and it should be able to filter out the Non-tollable vehicles like Tractor, Two-wheeler, and Three-wheelers.
- viii. ANPR Camera should have the following minimum specifications:
 - A camera of 4MP at 25 FPS / 2MP at 50 FPS shall be provided. The IP camera shall be POE powered bullet type with inbuilt IR of 100 meters with illumination at 0.1 lux for colour image and black & white at 0 lux with IR.
 - The lens shall be of 5-50 mm motorized varifocal with true WDR (120 dB), 3D DNR, BLC, HLC, AGC and triple simultaneous streaming.
 - The Camera shall have inbuilt SD card slot and shall be provided with at least 128 GB class 10 SD card. The shutter speed of the camera shall be 1/3 second to 1/100000 seconds for capturing the motion detection even during low light condition and provide proper image. The housing shall be IP 67 & NEMA-4X rated with IK10 protection against vandalism. The camera shall support one alarm I/O port and audio I/O.
 - The camera shall also detect any object addition, object removal, and lane crossing. e. Whenever any event is triggered, the camera shall record the event on SD card. f. ONVIF (S, G & T) Supports. Compression: H.264, H.265 & MJPEG
 - The Camera shall have applicable CE, UL, and IEC 62368-1 certifications
- ix. The ANPR Camera should have functionality to address the Alpha numerical character of irregular font sizes.
- x. The night vision should not affect the accuracy.
- xi. In case of Non-FASTag transaction and ANPR camera is unable to read/recognize the number plate, the system shall create an incident and send an alert to the Lane Application.
- xii. ANPR Camera should have functionality to assess the confidence level for recognition of Vehicle Registration Number and share the same to the lane application as per below details:
 - - Confidence level - Good (100% Accuracy)
 - Confidence level - Average (95% to 99.99%)
 - Confidence level - Poor (<95%)

For case, where FASTag is not read through Fixed RFID reader, transaction shall be processed based on VRN no. as recognised by ANPR camera and Confidence level >95%.

6.14 Incident Capture Camera with mounting Poles

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

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

6.14.3 Camera Location: The Equipment Service Provider shall determine the best mounting positions for the cameras so that effects, such as, direct sunlight and stray lighting is negated. The cameras shall also be protected from or be resistant to high winds and moisture. Vibration shall be minimised such that the image quality is never compromised. Each camera shall view and detect vehicle images for its lane. The cameras shall be located so that sidelong profile of the vehicle is obtained as it crosses the AVC, so that the number of axles of the vehicle crossing the AVC shall be clearly visible when the vehicle is exiting the lane. The camera shall have an automatic adjustment of brightness. The housing shall be an IP-67 rated enclosure to withstand adverse weather conditions. The housing shall be equipped with a hood to protect the camera under direct sunlight / canopy light. The Incident Capture Camera is installed at a convenient location on the island to capture images and video clips of the vehicles for the following incidents:

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

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

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

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

6.14.6 Specification: -

Description	Specifications
Image Sensor	1/3", progressive scan CMOS
Minimum Resolution	4MP (2592×1520)
Lens Type	Varifocal
Field of View	Horizontal field of view: 105° to 35°
	Vertical field of view: 56° to 20° Diagonal field of view: 126° to 40.5°
Shutter Time	1/3 s to 1/100,000 sec. or better
Day/Night	Removable IR-cut filter for day & night function
Minimum Illumination	Colour: 0.005 Lux @ (F1.2, AGC ON), 0 Lux with IR
	Colour: 0.0068 Lux @ (F1.4, AGC ON), 0 Lux with IR
IR Illuminators	Built-in IR illuminators, effective up to 50 meters
On-board Storage	Slot type: SD/SDHC/SDXC card slot
	Seamless Recording
Video Compression	H.265+/H.265/H.264+/H.264/MJPEG
Maximum Frame Rate	30 fps
	In both compression modes
Maximum Streams	4 simultaneous streams
S/N Ratio	50 dB or better
Dynamic Range	95 dB or better
Video Streaming	Adjustable resolution, quality and bitrate, Stream
Image Settings	Adjustable image size, quality and bit rate, Time stamp, text overlay, flip & mirror, Configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks, Scheduled profile settings, 3D Noise Reduction, Video
	Rotation, Defog, WDR, HLC
Image Enhancement	BLC/3D DNR/HLC

Description	Specifications
Audio Capability	Two-way audio (full duplex)
Audio Compression	G.711/G.722.1/G.726/MP2L2/PCM
Interface	External microphone input
	Audio output
Users	Live viewing for up to 10 clients
Protocols	IPv4, IPv6, TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP, IGMP,
	SMTP, FTP, DHCP, NTP, DNS, DDNS, PPPoE, CoS, QoS, SNMP, 802.1X, UDP, ICMP, ARP, SSL, TLS
Interface	10 Base-T/100 Base TX Ethernet (RJ-45)
ONVIF	Supported
Alarm Triggers	Video motion detection, manual trigger, digital input, periodical trigger, system boot, recording notification, camera tampering detection,
	audio detection
Alarm Events	Event notification using digital output, HTTP, SMTP, FTP and NAS
	server, SD Card
	File upload via HTTP, SMTP, FTP, NAS server and SD card
Smart Focus System	Fixed Focus
Connectors	RJ-45 cable connector for Network/PoE connection
	Audio input
	Audio output
	DC 12V power input
	Digital input: 1, Digital output:1
LED Indicator	System power and status indicator
Casing	Weather-proof IP66-rated housing
	Vandal-proof IK10-rated metal housing (Casing Only)
Safety Certifications	CE, LVD, FCC Class A, VCCI, C-Tick
Operating Temperature	10°C to 60°C

6.15 License Plate Image Capture Cameras:

- 6.15.1 The cameras shall be charge coupled device (CCD) colour cameras equipped with fixed focal manual iris lenses and night vision capabilities. The CCTV systems shall have adequate surge and lightning protection.
- 6.15.2 The model selected shall have image compensation capability to ignore stray lighting / vehicle lighting so that LPIC shall render meaningful output for verification. The camera should be able to capture snapshots also.
- 6.15.3 Each camera shall view and capture vehicle images for its lane. The cameras shall be so located so that the front license plate of the vehicle is clearly within the view of the camera, so that the real time feed of this camera shall be displayed as a section in the TCD. The camera shall have an automatic adjustment of brightness. The housing shall be an IP-67 rated enclosure to withstand adverse weather conditions. The housing shall be equipped with a hood to protect the camera under direct sunlight / canopy light.

6.15.4 Specifications

Description	Specifications
Image Sensor	1/3", progressive scan CMOS
Minimum Resolution	4MP (2592×1520)
Lens Type	Varifocal
Field of View	Horizontal field of view: 105° to 35°
	Vertical field of view: 56° to 20° Diagonal field of view: 126° to 40.5°
Shutter Time	1/3 s to 1/100,000 sec. or better
Day/Night	Removable IR-cut filter for day & night function
Minimum Illumination	Color: 0.005 Lux @ (F1.2, AGC ON), 0 Lux with IR
	Color: 0.0068 Lux @ (F1.4, AGC ON), 0 Lux with IR
IR Illuminators	Built-in IR illuminators, effective up to 50 meters
On-board Storage	Slot type: SD/SDHC/SDXC card slot
	Seamless Recording
Video Compression	H.265+/H.265/H.264+/H.264/MJPEG
Maximum Frame Rate	30 fps
	In both compression modes
Maximum Streams	4 simultaneous streams
S/N Ratio	50 dB or better
Dynamic Range	95 dB or better
Video Streaming	Adjustable resolution, quality and bitrate, Stream
Image Settings	Adjustable image size, quality and bit rate, Time stamp, text overlay, flip & mirror, Configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks, Scheduled profile settings, 3D Noise Reduction, Video
	Rotation, Defog, WDR, HLC

Description	Specifications
Image Enhancement	BLC/3D DNR/HLC
Audio Capability	Two-way audio (full duplex)
Audio Compression	G.711/G.722.1/G.726/MP2L2/PCM
Interface	External microphone input
	Audio output
Users	Live viewing for up to 10 clients
Protocols	IPv4, IPv6, TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP, IGMP,
	SMTP, FTP, DHCP, NTP, DNS, DDNS, PPPoE, CoS, QoS, SNMP, 802.1X, UDP, ICMP, ARP, SSL, TLS
Interface	10 Base-T/100 Base TX Ethernet (RJ-45)
ONVIF	Supported
Alarm Triggers	Video motion detection, manual trigger, digital input, periodical trigger, system boot, recording notification, camera tampering detection,
	audio detection
Alarm Events	Event notification using digital output, HTTP, SMTP, FTP and NAS server, SD Card
	File upload via HTTP, SMTP, FTP, NAS server and SD card
Smart Focus System	Fixed Focus
Connectors	RJ-45 cable connector for Network/PoE connection
	Audio input
	Audio output
	DC 12V power input
	Digital input: 1, Digital output:1
LED Indicator	System power and status indicator
Casing	Weather-proof IP66-rated housing
	Vandal-proof IK10-rated metal housing (Casing Only)
Safety Certifications	CE, LVD, FCC Class A, VCCI, C-Tick
Operating Temperature	10°C to 60°C

6.16 TFT Display

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

and bolts are used to secure the TFT to the booth countertop shall be stainless steel. It shall be the system's interface to the fee collector, to display the status of transactions and status of the lane peripherals.

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

Description	Remarks
Display Type	TFT with Diagonal Size of 18.5" Minimum
Cables	Power Cable 1 x VGA/HDMI Cable (15- pin HD D – Sub)
Cable routes	Power cable is terminated to the Lane Controller power distribution block via booth ducting. VGA/HDMI Cable is terminated to the SVGA/HDMI Port at the Lane Controller via booth ducting
Color	Manufacturer's Original Color
Voltage Requirement	AC 230 V (50 / 60 Hz)
Power Consumption	28 W
IP Rating	66
Operating Temperature	0 degree C to 50 degree C
Relative Humidity	20 % to 80 %
Design Criteria	<ul style="list-style-type: none"> - Min. Resolution: 1920 x 1080 @ 60 Hz - Aspect Ratio: 4:3 - Number of Colours: 16.2 M, (6bit+FRC) - Video bandwidth: 70 MHz - Viewable size: 18.5" Minimum - MTBF: 50,000 hrs - MTTR: 0.25 hrs

6.17 TOLL COLLECTOR TERMINAL (TCT) /Customized Keyboard

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

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

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

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

- Shall have Powerful programming capability
- Programming under DOS and Windows, multiple pages, multiple level, whole range key content, time delay, position sense answer back code, etc.
- True spill-resistant design
- Optional blank key, double key for alternative key group layout
- Optional MSR
- 70 programming keys + 6 position control key
- Key top size: 18 mm x 22 mm for single key
- Interface: PS/2 or USB
- Dimension (maximum): 340 mm (W) x 150 mm (D) x 58 mm (H) or vendor/OEM specific
- Weight: upto 1.2 kg
- Color: OEM Specific

6.18 Thermal Receipt Printer

6.18.1 The thermal receipt printer shall be located in the tollbooth and mounted in a position that will allow the operator to easily reach the receipts printed on the printer. The thermal receipt printer (RPR) shall be used to print receipts in the lanes. The printer shall be provided with the automatic advance function of the paper after printing so that the space for the first line of printing is aligned under the print head thus reducing the time taken to produce a receipt.

The print rate should be sufficiently fast to print the details of a receipt or of a transaction in not more than 1 second.

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

6.18.3 Minimum Technical specifications for the RPR shall be as follows:

Descriptions	Remarks
Dimension	Maximum up to 145mm (W) x 195mm (D) x 148 (H)
Weight	Shall be less than 2 kg
Installation and Fixing Details	Installed and fixed on the Fee Collector desk
Cables	- Power cable - Serial RS232C/ Parallel /USB
Cable routes	Power cable is terminated to the TLC Termination Block via booth ducting. Data cable is connected to the TLC
Color	Cool White/Dark Grey
Power Supply Requirement	24 VDC + 7%
Access for maintenance, modularity of construction	The cover can be opened for maintenance. It also has paper sensors. Off-the-shelf product
Operating Temperature	5 C to 50 C
Relative Humidity	5 % to 90 %
Design Criteria	Print Speed: 47 LPS Print font: 9x17/12x24 Print column capacity: 56/42 columns
	Character size (mm): 0.99(W) x 2.4 (H) / 1.41 (W) x 3.4 (H) Paper dimension (mm): 79.5 + 0.5 (W) x 83 (diameter) Paper thickness: 0.06-0.07 mm Auto cutter life: 2 million cuts Real-time printer status: Auto status back (ASB) messages

	MCBF: 52 million lines MTBF: 360,000 hours, Overall MTTR: 0.25 hrs
Speed	Min. 60 receipts/ minutes.
Power/Normal Operation	Green LED
Paper Low	Amber LED
Error LED	Red

6.19 Intercom Slave Unit inside Booth

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

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

6.19.3 ISCU shall have the following functions:

- Voice communication installed in the booths shall provide hands free two-way verbal communication between the supervision staff in the control room and the Collectors. The Collector shall be able to attract the attention of the auditor in the control room by pressing a single button on the intercom slave unit in the booth.
- The equipment shall also have the facility to allow the supervision staff to monitor communication in the booth between the Collector and the user or between any booth without alerting the Collector.
- The voice communication system shall operate independently of the Plaza Toll management system.
- Voice communication shall also be implemented in various rooms of the plaza building and at building access points.
- Two-way communications shall be possible as soon as the auditor responds by selecting the appropriate lane button on the Master Communication unit
- One-way communication shall be possible from the Control Room intercom to all lanes simultaneously (broadcast)

6.19.4 ISCU shall meet the following minimum technical specifications:

Descriptions	Minimum Specifications
Installation and Fixing Details	Fixed in the booth. (wall/desktop mount)
Speech Method	Hands-free

Wiring distance	120 meters with 0.202 mm diameter (33 AWG) cable, 300 meters with 1.024 mm diameter (18AWG) cable
Speaker	20 ohms
Power Consumption	6 W (max.)
Power Supply Requirement	Power supply from Master System
Wiring	2 wires, non-twisted
Environmental Considerations	Operating Temperature of 10OC to 50OC
Reliability	30,000 hrs

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

6.20 Master Communication Unit (MCU)

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

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

6.20.3 Technical Specifications:

Descriptions	Remarks
Power Source	24V DC
Current Consumption	Max. 1A, 80mA in standby
Communication	Push-to-talk at master station hands free at sub
Calling	LED and intermittent ringing tone at master until answered
Frequency Response	770 – 6800Hz
Total Harmonic Distortion	3% @ 1000Hz at 20 ohms
Mounting	Wall or desk mount
Wiring	2 conductor per sub station
MTBF	30,000 hrs

6.21 Closed Circuit TV (CCTV)

6.21.1 General

- a) This part of the RFE covers the equipment and services to be supplied under CCTV equipment to be installed at the Plazas. The CCTV equipment shall be categorized as two types, CCTV for lanes and CCTV for Plaza surveillance. Earthing of the Camera equipment must be done with a resistance value of less than 3 Ohms. Earth spikes with suitable cable shall be used for this purpose.
- b) The CCTV for lanes shall be:
 - i. Booth CCTV cameras
- c) The CCTV for Plaza surveillance are:
 - i. Network Video Recorder (NVR)
 - ii. Video Management Software (VMS)
 - iii. Plaza Building Security CCTV cameras
 - iv. Display (LED Monitor)
- d) All the cameras shall be IP based and shall be connected to the Plaza Network video recorder (NVR). The video management software (VMS) installed on NVR shall provide the facility to control the cameras at the Supervision Control room at the Plaza Buildings. The video recording of each camera shall be stored at for a period of minimum 30 days.
- e) The functionality of the CCTV cameras provided by the Applicant shall be described as follows:
 - i. Booth CCTV cameras – These cameras shall be installed inside of the booth to capture the activities of the Collector all the time and especially when doing the transactions along with the view of the paying vehicle. The position of the booth camera shall be decided accordingly. These cameras shall have inbuilt voice recording and SD memory card of minimum 32GB for local storage of videos and voice recordings.
 - ii. Plaza Building Security CCTV cameras – These cameras shall be intended for monitoring of security areas such as the plaza compound, general parking area, Toll Control Room, cash room, plaza building lobby, Collector walkway, server room, UPS room, tunnel, parking, staircase, cash van loading area, etc. The bullet cameras installed outdoor shall be weatherproof enclosure.
 - iii. The design of the CCTV system for the plaza shall consider the following: -
 - Provide effective supervision and control
 - Easy to use
 - Self-contained system
 - Increase span of management

- Reduce unnecessary travel
- View / evaluate situations quickly
- Motion detection
- Savings on time and manpower
- Easy access to video information and quick playback
- Minimize the use of security guards
- Eliminate unnecessary responses to false alarms
- Provision for future scalability

f) Booth Level CCTV

- i. The booth CCTV camera shall be an IP based fixed dome type colour cameras installed inside the booth to capture the activities of the Fee Collector while performing his operations. The camera also shall capture the view of the paying vehicle while capturing the transaction video.
- ii. These cameras shall have inbuilt voice recording and SD memory card of minimum 32GB for local storage of videos and voice recordings.
- iii. These cameras shall be connected to the NVR installed at the control/server room at each Plaza building.
- iv. The camera and NVMS shall be capable of triggering alarms in case of Video motion detection, manual trigger, digital input, periodical trigger, system boot, recording notification, camera tampering detection and audio detection. The triggering alerts can be controlled by the control room operator.
- v. Technical Specifications of the Booth Cameras shall be as follows:
- vi. The technical specifications mentioned hereunder are minimum guidelines. The Applicant shall not deviate materially from the specifications specified herein.

Description	Specifications
Image Sensor	1/2.8" Progressive CMOS
Min Resolution	4MP (2592×1520)
Lens Type	Fixed Focal
Field of View	110° (Horizontal), 64° (Vertical) ,135° (Diagonal)
Shutter Time	1/5 sec. to 1/30,000 sec.
Day/Night	Removable IR-cut filter for day & night function
Minimum Illumination	0.08 Lux @ F1.8 (Color)
	0.001 Lux @ F1.8 (B/W)

Request for Empanelment(RFE) of System Integrators for Implementation of Electronic Toll Collection System Including Weigh-in-Motion & Static Weigh Bridge System at Toll Plazas

Description	Specifications
IR Illuminators	Built-in IR illuminators, effective up to 25 meters or better
	IR LED*8
On-board Storage	SD/SDHC/SDXC card slot
Compression	H.264 & MJPEG
Maximum Frame Rate	30 fps in both compression modes
Maximum Streams	4 simultaneous streams
S/N Ratio	Above 55dB
Dynamic Range	97dB or better
Video Streaming	Adjustable resolution, quality and bitrate
Image Settings	Adjustable image size, quality and bit rate, time stamp, text overlay, flip & mirror, configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks, scheduled profile settings, seamless recording, smart stream, 3D Noise Reduction,
	Video Rotation
Audio Capability	Audio input /output (full duplex)
Compression	G.711, G.726
Interface	External microphone input Audio output
Protocols	IPv4, IPv6, TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP, IGMP, SMTP, FTP, DHCP, NTP, DNS, DDNS, PPPoE, CoS,
	QoS, SNMP, 802.1X, UDP, ICMP
Interface	10 Base-T/100 BaseTX Ethernet (RJ-45)
ONVIF	Supported
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

Description	Specifications
Connectors	RJ-45 cable connector for Network/PoE connection Audio output
	DC 12V power input Digital input*1
	Digital output*1
LED Indicator	System power and status indicator
Power Input	Max. 9 W (PoE)
Safety Certifications	CE, LVD, FCC Class B, VCCI, C-Tick
Operating Temperature	Starting Temperature: -10°C to 50°C (14°F~ 122°F)

g) Network Video Recorder (NVR)

- i. H.265 Linux-based embedded standalone NVR shall be provided. Shall support 16-Channel /24-Channel / 32-Channel network cameras. The NVR shall be ONVIF compliant and scalable configuration with features to help users to set up and manage advanced IP surveillance systems with ease. The NVR shall also support remote and mobile access, via web-based application, and app for both iOS and Android devices.
- ii. The NVR shall have minimum following technical features:
 - H.265 Compression Technology
 - Plug & Play One Button Auto Setup
 - Intuitive, Intelligent and Interactive UI
 - Live viewing, recording and Playback features
 - Embedded Linux OS or OEM Specific
 - Support RAID 0/1/5 Storage
 - Up to 12MP Camera Live view & Playback
 - Dual Lan Network Ports with Failover Function
 - ONVIF Open Platform
 - Storage capacity: min. 30 days with HD resolution @ 30fps

Description	Specifications
Video and Audio	
IP Video Input	32-ch

Request for Empanelment(RFE) of System Integrators for Implementation of Electronic Toll Collection System Including Weigh-in-Motion & Static Weigh Bridge System at Toll Plazas

Description	Specifications
Two-way audio input	1-ch, RCA
Network	
Incoming bandwidth	320Mbps
Outgoing bandwidth	320 Mbps
Remote connection	128
Video/Audio Output	
HDMI/VGA Output	HDMI1/VGA: 1920x1080p /60Hz, 1920x1080p /50Hz, 1600x1200 /60Hz, 1280x1024 /60Hz, 1280x720 /60Hz, 1024x768 /60Hz
	HDMI2: 4K (3840x2160) /60Hz, 4K (3840x2160) /30Hz, 1920x1080p
	/60Hz, 1920x1080p /50Hz, 1600x1200 /60Hz, 1280x1024 /60Hz, 1280x720 /60Hz, 1024x768 /60Hz
Audio Output	1-ch, RCA
Recording Resolution	8MP/6MP/5MP/4MP/3MP/1080p/960p/720p/D1/2CIF/CIF
Synchronous Playback	16-ch
Decoding	
Compression	H.265 / H.264
Live view/Playback	8MP/6MP/5MP/4MP/3MP/1080p/960p/720p/D1/2CIF/CIF
Capability	4 x 4K@30, 8 x 4MP@20, 16 x 1080p@25, 32 x 720p@25
Hard Disk	
SATA	Minimum 4 SATA interface
Capacity	Minimum 8TB for each disk
Disk Array	
Array type	RAID1, RAID5
External Interface	
Network Interface	2 RJ-45 10M/100M/1000M self-adaptive Ethernet Interfaces

Description	Specifications
Network Function	HTTP, TCP/IP, IPV4, UPNP, RTSP, UDP, SMTP, NTP, DHCP, DNS, IP
	Filter, PPPOE, DDNS, FTP, IP Server, P2P
Serial Interface	1 x RS-485
USB Interface	Front panel: 1 x USB2.0
	Rear panel: 1 x USB2.0, 1 x USB3.0
Alarm In	16-ch
Alarm Out	4-ch
General	
Power Supply	12V DC
Consumption (without HDD and PoE)	≤ 12 W
Working Temperature	
Working Humidity	10% ~ 90%

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

- i. The system shall be connected to the NVR. The VMS installed on NVR shall provide the facility to control the cameras at the Supervision Control room at the Plaza Buildings.
- ii. The cameras shall be for monitoring of security areas such as plaza compound, security garage, Control Room, Change of Shift Room and Cash Counting Room, Lobby, Hallway, Tunnel, Fee Collector Walkway, parking, staircase, DG room, electrical room, server room, UPS room, Loading Bay, etc.
- iii. These cameras shall be – Fixed lens Bullet CCTV night vision colour cameras. The bullet cameras installed outdoor shall be weatherproof enclosure.
- iv. Technical Specifications of the Plaza Surveillance Cameras shall be as stated hereunder. The technical specifications mentioned hereunder are minimum guidelines. The Applicant shall not deviate materially from the specification specified while preparing the Technical Proposal of the Tender.

Request for Empanelment(RFE) of System Integrators for Implementation of Electronic Toll Collection System Including Weigh-in-Motion & Static Weigh Bridge System at Toll Plazas

Description	Specifications
Image Sensor	1/2.8" Progressive CMOS
Min Resolution	4MP (2592×1520)
Lens Type	Fixed-focal
Field of View	83° (Horizontal), 53° (Vertical), 91° (Diagonal)
Shutter Time	1/5 sec. to 1/30,000 sec. or better
Day/Night	Removable IR-cut filter for day & night function
Minimum Illumination	0.06 Lux @ F2.1 (Color)
	0.001 Lux @ F2.1 (B/W)
IR Illuminators	Built-in IR illuminators, effective up to 30 meters
On-board Storage	Slot type: SD/SDHC/SDXC card slot
	Seamless Recording
Compression	H.265 & MJPEG
Maximum Frame Rate	30 fps
	In both compression modes
Maximum Streams	4 simultaneous streams
S/N Ratio	50 dB or better
Dynamic Range	95 dB or better
Video Streaming	Adjustable resolution, quality and bitrate, Stream
Image Settings	Adjustable image size, quality and bit rate, Time stamp, text overlay, flip & mirror, Configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks, Scheduled profile settings, 3D Noise
	Reduction, Video Rotation, Defog
Audio Capability	Two-way audio (full duplex)
Compression	G.711, G.726
Interface	External microphone input
	Audio output
Users	Live viewing for up to 10 clients
Protocols	IPv4, IPv6, TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP,

Description	Specifications
	IGMP, SMTP, FTP, DHCP, NTP, DNS, DDNS, PPPoE, CoS, QoS, SNMP, 802.1X, UDP, ICMP, ARP, SSL, TLS
Interface	10 Base-T/100 BaseTX Ethernet (RJ-45)
ONVIF	Supported
Alarm Triggers	Video motion detection, manual trigger, digital input, periodical trigger, system boot, recording notification, camera tampering
	detection, audio detection
Alarm Events	Event notification using digital output, HTTP, SMTP, FTP and NAS
	server, SD Card
	File upload via HTTP, SMTP, FTP, NAS server and SD card
Smart Focus System	Fixed Focus
Connectors	RJ-45 cable connector for Network/PoE connection
	Audio input
	Audio output
	DC 12V power input
	Digital input: 1, Digital output:1
LED Indicator	System power and status indicator
Casing	Weather-proof IP66-rated housing
	Vandal-proof IK10-rated metal housing (Casing Only)
Safety Certifications	CE, LVD, FCC Class A, VCCI, C-Tick
Operating Temperature	10°C to 60°C

6.22 Network Switches (Layer 3)

6.22.1 General

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

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

6.22.2 8-Port PoE industrial grade rugged managed switch with 2 fibre port

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

6.22.3 24 Port Layer 3 Switch with 4 Fiber Port

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

6.22.4 Specification

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

6.23 ETC Server (Plaza Server)

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

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

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

6.23.4 General Requirements

- a) The manufacturer of the server and workstations shall:
 - i. Be a well-known and established company worldwide in the field of Information Technology.
 - ii. Have an established and appointed representative or authorized agency in project location.
- b) The Service Provider shall ensure that the OEM of the server and workstations shall: -
 - i. Be a well-known and established IT hardware supply company in project location.
 - ii. Be a registered representative of the original equipment manufacturer in project location.
 - iii. Be capable of supplying adequate after-sales service and support on 24X7 basis.

6.23.5 Platform

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

6.23.6 Configuration

- Processor board: shall have the capacity to accept up to 4, 64-bit central processor units.
- Central Processor Unit/s: shall be 64-bit, Xenon 3 GHz or superior latest available speed at the time of delivery to the site.
- Number of Processors: 2
- RAM: 64 GB DDR4 8SFF (2.5inch) Hot Plug SAS/SATA SAS/SATA H240 Smart HBA RAID 0/1/5

- RAID (Redundant Array of Inexpensive Disks): shall use RAID5 with hardware RAID controller.
- SCSI Controller: shall have a minimum of two channels
- HDD: hot swap disks of latest available speed; capacity shall be based on data retention of all data for a period of 5 years but not less than 10 x 1.8TB 12G SAS 15K 2.5 in SC ENT HDD or latest available RMP
- DVD R/W: latest available speed
- Network Devices: 3X10G (Gigabit) LAN NIC (Network Interface Card)
- Power Supply: shall have a dual hot swap power supply to provide redundancy
- Connectivity: Two (2) standard communications ports (D sub 9 pin), Four USB (Universal Serial Bus) ports (High Speed USB 2.0), SVGA Screen port, PS2 Mouse port, PS2 keyboard port
- Light path diagnostic with external visible panel
- LCD display for server operational log (events)
- Integrated system management processor on board
- Redundant hot swap fans
- Optical scroll Mouse
- 21.5" TFT monitor

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

6.23.8 Software Compatibility

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

6.23.9 Operating System:

- Windows
- UNIX
- LINUX (64bit platform) or compatible

6.23.10 Database:

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

The Service Provider shall be capable of providing an undertaking for a pre-determined time period for ETC server. The Service Provider shall provide undertaking for extensive

support & maintenance actions on a 24-hour, 7-days-a-week basis and also shall ensure that a four (4) hour response time and a two (2) hour repair time can be achieved.

6.23.11 Archive Storage Device (USB HDD Device minimum 2 TB)

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

6.23.12 Licensing

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

6.23.13 Database Management System

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

6.23.14 Data Network

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

6.23.15 Remote Access

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

6.23.16 Hardware and Software Control System

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

6.23.17 Help Menu

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

6.23.18 Security System

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

6.23.19 Workstations Management

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

6.23.20 Interfaces

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

6.23.21 Data Management and Integrity

- The basic need for data integrity is the account closing at the administrative level. The closing process assumes that all data from the lanes has been introduced into the database.
- This can be resumed to:
 - Guarantee the data in database is complete
 - Guarantee the data in database is correct

- This is accomplished with:
 - Checksum: let detect errors in data
 - Data type sequencing: let detect missing sequence
 - Communication sequence: this is a periodic messaging to allow detection of communication failure
- Since, the whole Toll Collection system is designed to detect and subsequently prevent misuse in any manner and collect all collectible revenues, any transaction / operation performed in any level of the Plaza ETC system shall be recorded in the system on detecting a definitive positive / negative confirmation only. Usage of any other irrelevant keys under such conditions shall display a warning message to use the correct keys.

6.23.22 Data Sequence

Each message / transaction shall have its own sequential number.

6.23.23 Missing Data Detection and Resolution

- The conditions to be sure all data is in the database in a given moment are:
 - All message sequences received were correct (no checksum errors)
 - There were no jumps in message sequential number
 - There were no jumps in message type sequential number
 - The Communication sequence is being received with no gaps and small permissible delays.
 - The message sequence type counters into Communication sequence are in accordance with the counters received in actual messages.
- The program used to insert lane messages into the database keeps making the above checks. If any problem is detected, it is signalized to plaza level.
- If any of the conditions above fail, the system signals a problem with the data on a connected workstation in graphical form i.e., for each lane by hour. The resolution of the problem is:
 - If there is a data error (message received with bad checksum or bad data fields) the system automatically tries to read the TLC / AVC message again.
 - If data is missing, the normal way to solve this will be to make an export from TLC and import in Administrative System using lane data import function. If the problem persists,
- The specific situation will have to be analysed by going in details like which kind of data sequence is missing - revenue or non-revenue, the missing sequence

details shall be made available just by clicking on the failure block of the lane data as represented by the lane data failure graphics.

6.23.24 Data Import / Export System

➤ Reports Information

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

6.23.25 Data Transfer

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

6.24 Incident Management Workstation

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

6.24.2 Incident Management

- a) The GUI shall be so designed that it shall be possible for the Supervisor to view at least the following information corresponding to each incident:
- Plaza ID
 - Lane ID
 - User ID (of the user who was logged in lane at the time of incident generation)
 - Username (corresponding to above User ID)
 - Transaction Number
 - Transaction Date & time
 - TLC/TAG Class
 - TLC / TAG VRN
 - TLC MOP
 - AVC Class
 - Axle Count
 - Processed by (User ID of the Supervisor who processed the incident)
 - Supervisor Name (corresponding to Processed by User ID)
 - Corrected Class
 - Corrected VRN
 - Supervisor Action

- TAG Media ID
 - ICS image (with watermarked Date / Time stamp, transaction number, incident type, etc.)
 - LPIC image (with watermarked Date / Time stamp, transaction number, lane VRN, etc.)
 - AVC Output Graph
 - Event details (events / anomalies associated with this transaction – each transaction starts when Valid TAG Media is detected – for media-based transactions / AVC Loop is triggered – for violations and ends when the vehicle liberates the AVC loop)
- b) For processing of incidents / review of processed incidents, the Supervisor can filter the list of incidents based on the following:
- Plaza ID (Default – All) Drop down menu form
 - Lane ID (Default – All) Drop down menu form
 - User ID (Default – All) Drop down menu form
 - Transaction Date & time duration – From & To (Default – Current Date) User configurable
 - TLC Class (Default – All) Drop down menu form
 - TLC MOP (Default – All) Drop down menu form
 - AVC Class (Default – All) Drop down menu form
 - Axle Count (Default – All) Drop down menu form
 - Processed by (Default – All) Drop down menu form including blank which shall be the case until incident is processed.
 - Corrected Class (Default – All) Drop down menu form including blank which shall be the case until incident is processed.
 - Supervisor Action (Default – All) Drop down menu form including blank which shall be the case until incident is processed.
 - Event details (Default – All) Drop down menu form
 - Processed Incidents / Not Processed Incidents
- c) In addition to the above, it shall be possible for the Supervisor to search for a particular record based on any / combination of the following search criteria:
- User ID
 - Transaction Number
 - TLC Class
 - TLC / Media VRN

- TLC MOP
 - Processed by
 - Corrected Class
 - Corrected VRN
 - Supervisor Action
 - TAG Media ID
- d) Based on the MOPs defined in the system and the Incident configuration, it shall be possible for the Supervisor to correct the class of the vehicle, Vehicle Registration Number (VRN) and Confirm / Reject the Lane MOP selected by TC.
- e) The incidents can normally be processed by Supervisor by performing selections / feeding information on one and / or all of the below fields:
- Corrected Class
 - Corrected VRN
 - Comments (optional)
- f) It shall be possible for the Supervisor to perform these actions only by double clicking on a particular incident to view all information in detailed view before processing the incident.
- g) It shall be possible at Plaza ETC system level to configure following on selection menu basis in order to activate and deactivate by administrator level function:
- Capture of ICS image none, for selected type of incident, for all types of incidents, for all transaction.
 - Capture of LPIC image none, for selected type of incident, for all types of incidents, for all transaction.
 - Record and report incident transaction at incident management system, none, for selected type of transaction, for all transaction.
- h) Other functions
- i. In addition to the above primary function of the Supervisor, the following functions shall be performed by the Supervisor:
 - Data Completeness
 - Shift Consolidation
 - Day Consolidation
 - Month Closure
 - Lists Transfer Status

The above functionalities are explained in detail below.

- i) Data Completeness

- i. The Supervisor can verify the status of data transfer between the lanes and workstations on an hourly basis. Wherever, the data transfer status is not OK, a separate process shall be available through which the Supervisor can re-request data transfer to correct the status.
 - ii. The Data completeness procedure shall check at least the following minimum items:
 - Transaction sequence jump
 - Transaction sequence reset
 - Gap in time (if regular data packets are not updated), etc.
- j) The Data completeness procedure needs to be defined and a separate document shall be provided by the TCE Supplier on how this feature is to be accomplished in the system.
- k) Day Closure
- i. The Day Closure option is used by the Supervisor to close each Operational day. When the Supervisor selects this option, the system shall display the current status of Operation in terms of data exchange.
 - ii. When, the supervisor closes the day, the following conditions shall be verified by the system before generation of Day Closure Report:
 - Data completeness
 - Data transfer to CCH completeness
 - iii. If any of the above checks fail, the system shall display an alert (POP-UP) to the Supervisor to perform these pending operations before day closure.
 - iv. This procedure shall ensure that no data generated is left unattended for review / reconciliation.
- l) Month Closure
- i. Month closure is performed on a monthly basis on a complete calendar month. Once, this option is selected any day pending closure shall be brought to the notice of the Supervisor. For ensuring that all data and all corrections are complete and no deconsolidation whatsoever shall be required
 - ii. any further, the month closure for a particular month shall be performed on the 2nd day of the subsequent month (configurable).
 - iii. Once, this operation is performed, no changes whatsoever can be made through the application to the transaction data of the corresponding month whatsoever. Deconsolidation option shall not be available and all manual overrides with respect to these transactions shall not be possible.

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

m) Lists Transfer Status

- i. In addition to the transaction data, there can be various lists related to users, media, classification, fare, configuration, parameters etc. which shall be transferred between server and workstations / lanes.
- ii. The status of all such lists shall be displayed on selection of this option. The status shall include the following:
 - Name of the list
 - Version of current transfer
 - Version of previous transfer
 - Date & time
 - Frequency of transfer (in HH:MM format)
 - Transfer Status
- iii. It shall be possible for the supervisor to re-request / re-transfer any failed list transfers.
- iv. Also, all lists shall be retained in the system along with date of activation and date of expiry in addition to the version details.
- v. All the above listed functionalities are the core responsibilities of the Supervisor and only he / she can perform the above functions. Any user of a higher user-group though can view the actions performed by the Supervisor / current status but cannot modify anything unless explicitly so mentioned.

n) Fare table management

The following functions shall be performed by the Toll Manager:

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

o) Other Toll Manager Functions

- i. Incident Management

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

ii. Data Completeness

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

p) Users Management

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

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

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

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

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

q) Administrator Functions

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

- Lists Transfer Management

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

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

r) Incident Recording

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

s) System Configuration for Incident Management Workstation

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

The following minimum configuration requirements shall be met:

Description	Specifications
Make	Reputed Brand
Grade	Business Desktop
HDD	1TB of latest RPM
RAM	32 GB
RAM Slot	4 DDR4 memory slots
Processor	Intel Core i7 (8th Gen) or Higher
Processor speed	Intel Core i7(6600 3.3 2133 4C CPU) or latest available in the market
Optical drive	DVD-writer
PCI Slot	4 Nos. Spare
USB Port	6 nos. (high speed)

Description	Specifications
NIC	10/100/1000 Mbps and Intel 8260 802.11 a/b/g/n/ac PCIe WLAN NIC
RS232 port	2
LPT port	1
PS2 port (mouse)	1
PS2 port (Keyboard)	1
ENERGY STAR	Yes
Monitor	Colour 22"
Mouse	Optical
Keyboard	Standard

6.25 FIREWALL HARDWARE

6.25.1 Physical Interfaces

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

6.25.2 Network Requirements

- Firewall should operate in Route mode and transparent mode.
- Traffic shaping/bandwidth management on a per policy basis for specific network/IP/Interface/Zone (individual or shared) and should be able to define guaranteed, burstable/maximum bandwidth per policy. Also, able to set different level of priority.
- Support DHCP server, DHCP client, DHCP relay, DNS client and NTP client. xix. Support NAT (SNAT and DNAT) with following modes Static, Dynamic, PAT and IPv6 to IPv4 (vice a versa).
- Support both IPv4 and IPv6
- The appliance should support Link aggregation (IEEE 802.3ad) technology to group multiple physical links into a single logical link of higher bandwidth and link fail over capability
- Remote access VPN (client-to-site), site-to-site VPN

- IPsec NAT traversal (VPN pass-through)

6.25.3 Data Leak Prevention requirements: -

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

6.25.4 Support SSL VPN with following requirements: -

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

6.25.5 Support IPS with following requirements

- ICSA and NSS certified preferred.
- Anomaly detection and prevention up to layer 7 traffic including application type, SSL/TLS and must be applicable on any firewall policy
- Should be able to respond to any unauthorized activity, Dos/Distributed Dos, network missuses, pre-attack probes like various types of TCP/UDP scanners etc. that originate from both inside and outside network.

- Management over GUI using HTTPS or equivalent secure mechanism, SSH and console access.
- Generate GUI based reports categorized by alerts, attackers, severity wise, protocol etc.

6.25.6 Web content filtering

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

6.25.7 Gateway Antivirus

- Should provide protection against viruses, worms or any other malicious content in traffic like SMTP, POP3, IMAP, HTTP/S, FTP etc. and must be configurable/applicable on specific firewall Policy.
- Should be able to scan the file either on the basis of flow or buffering.
- Should have option to respond to virus detection in several ways like delete/quarantine the file and send notification via e-mail/SMS.
- Antivirus signature updates must be done automatically/schedule and should not require reboot of the appliance.
- Management over GUI using HTTPS or equivalent secures mechanism, SSH and console access.
- Support at least 1 million or more signatures
- The antivirus signature database of proposed solution should comprise of up-to-date list of signatures of virus, malwares, spyware etc.
- Support on quarantined facility on the appliance or on a remote system. • Allow/Block/quarantine file type extensions
- Generate GUI based reports categorized by virus signatures, host/user infected etc.

6.25.8 Logging and Reporting

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

6.26 Medium Speed Weigh-in-Motion System

Description	Specifications
Capacity of the Platform	30 Ton/Axle
Stationary Accuracy	±0.1% FSR
In Motion Accuracy	±7% FSR up to speed 50 Km/h; and
Overload capacity of the platform	150% of rated capacity
Vehicle separator	IR Based curtain housed in Weather Proof, IP 65 Rated pillars with proper sealing
Controller Housing	Water/ weather proof with anti-rust coating; IP 65 rated
Approval/ Certification	Weights & Measures Approved Model, Duly stamped & sealed by W&M Department on Installation
Re-calibration/ Stamping & Verification	Every 12 (Twelve) months
Downtime allowed for Periodic Maintenance	Maximum 24 (Twenty Four) hour/ Quarter

6.27 Static Weigh Bridge System

Description	Specifications (Pit/Pit less/Mobile)
Body/Platform	Steel

Size	18 meter x 3 meter
Capacity	120 Tonnes
Structure	I-Beam complying BIS 2062. Top Plate - 10 mm or more – Steel as per BIS 2062
Structure	Duly certified for Structural Analysis And Design(STAAD)-III
Number of Load cells	8
Type of Load Cells	Compression Type/Double Ended Shear Beam – Stainless Steel 17-4 Ph
Protection Class for the Load Cells	IP 68 or better, Operational Temp: -10 to 65 Degrees
Protection Class for the Weighing Indicator	IP 65 or better, Operational Temp: -10 to 65 Degrees
Overload capacity	150% of rated capacity
Accuracy Class	OIML - C-IV
Accuracy Tolerance	Up to 0.02%
Painting	Anti-rust & anti-corrosion painting
BIS Specification	IS-9281(Part-III)
Compliant	Legal Metrology Act 2009 (1 of 2010) & Rules framed there under from time to time - Duly sealed by the Weights & Measures Dept.
Approval/ Certification	Weights & Measures Approved Model

6.28 Lane Status Display Unit (LSDU)

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

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

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

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

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

6.28.6 System Configuration

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

6.28.7 Functionality

a) Graphical status indications:

- i. Schematic of all lanes.
- ii. Overhead lane sign: indicating the status of the lane.
- iii. Direction that the lane is opened.
- iv. Lane mode selection and status: Idle; Open; Fault; or Maintenance.
- v. Indication of whether lane is operating as FASTag lane

- vi. Approximate traffic processed per hour shown for each lane and also for the entire plaza
 - vii. Traffic count averages over user defined time spans per direction.
 - viii. Exit barrier mode: barriers in automatic or open mode.
 - ix. TLC & AVC network status: local mode or connected to the TMS.
 - x. TLC & AVC power supply: UPS or mains power.
 - xi. Downloaded table status for most recently implemented tariff table.
 - xii. Server Database status
 - xiii. All Other Lane peripheral status
 - xiv. Total traffic processed per hour shown for each lane and also for the entire plaza (Lane traffic per calendar day Vs Direction traffic per calendar day Vs Plaza Traffic per calendar day for current as well as previous calendar day)
- b) On selecting particular traffic information, it shall be possible to see the class wise / MOP wise traffic processed.
- i. Toll collector control functions:
 - Toll collector login and logout requests.
 - Permission to open and close lanes.
 - Open / Close lanes.
 - Perform Special transactions (manual capture key, SIM key, Convoy key, exempt, LTO, etc.)
 - Reset lanes.
 - ii. LSDU operator functions:
 - Operator login.
 - Operator logout.
 - iii. Configuration:
 - Incidents level configuration.
 - Incident Capture System parameters configuration per lane.
 - License plate image capture parameters configuration per lane.
 - Boom Gate operation per lane.
 - UFD messages per lane.
 - Transaction timeouts (timeout with AVC communication).
 - iv. Single Lane Status Display:

Shows the chosen lane onscreen with the following information:

 - Schematic of the lane
-

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

v. Incident Display and Acknowledgement:

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

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

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

vi. Equipment Fault Display and Reporting:

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

- A message in the Incident Display
- A change in the lane graphical status display

- All the lane and booth equipment are subject to fault detection.

vii. Traffic Count Displays:

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

viii. UFD Message Handling:

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

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

ix. Access Security and Logon Control:

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

x. Information Timeliness and Screen Refresh Cycle:

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

Date / hour change
Manual lane open
FASTag lane open
Hybrid ETC lane open
Lane closed
Request to open lane

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

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

6.29 The specification of other 02 workstations shall remain same as of LSDU

6.30 Uninterruptible Power Supply Unit

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

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

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

6.30.4 Lane Status Display Unit (LSDU) workstation shall display the status of each such UPSs in real time. The LSDU shall record every change in status (mains off, low battery, mains on, any change in input or output power of more than 3 volts, link failure, or any other failure) of the UPSs as incident and shall require acknowledgement.

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

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

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

6.30.7 Specification for Lane Level UPS (1 KVA):

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

6.31 Geofenced smart attendance system with time and face recognition: -

- 6.31.1 Geo-fencing Capability to define geographical boundaries within which attendance can be marked.
- 6.31.2 The system should ensure accuracy in tracking attendance based on location.
- 6.31.3 System should be capable of utilizing advanced algorithms for reliable face detection and recognition.
- 6.31.4 System should ensure security and accuracy in identifying individuals.
- 6.31.5 Implement encryption protocols to secure attendance data.
- 6.31.6 The system should be tamperproof and should have necessary controls to prevent unauthorized usage or tampering.
- 6.31.7 System should seamlessly integrate local as well as central system including TMCC.
- 6.31.8 Real-time Monitoring and Reporting:
- 6.31.9 Provide administrators with real-time attendance tracking system through central application.
- 6.31.10 Generate comprehensive reports on attendance trends, tardiness, etc.
- 6.31.11 Send notifications to employees for attendance reminders or updates.
- 6.31.12 Alert administrators of any anomalies or suspicious activities.
- 6.31.13 Scalability and Customization.
- 6.31.14 Backup and Redundancy:
- 6.31.15 Adhere to industry standards and best practices for technology and security.
- 6.31.16 Any type of license/renewal/patch upgrade/storage requirement etc shall be borne by the service provider.

6.32 ETC system Software Specifications

a) Functional Requirements

i. General Requirements

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

ii. Transaction Data Format:

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

- Transaction ID
- Tag ID (TID, EPC, and User Memory)
- Plaza and Lane ID
- Date and Time Stamp

- AVC Class
- Image of vehicle (AVC, License Plate and Incident Capture Camera)

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

iii. Transaction Processing

The System shall:

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

iv. Security

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

v. Scalability

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

Automatic Lane closure

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

vi. Reports

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

- Plaza ID
- Lane ID
- User ID (of the user who was logged in lane at the time of incident generation)
- Username (corresponding to above User ID)
- Transaction Number
- Transaction Date & time
- TLC Class
- TLC / TAG VRN
- TLC MOP
- AVC Class
- Axle Count
- Processed by (User ID of the Supervisor who processed the incident)
- Supervisor Name (corresponding to Processed by User ID)
- Corrected Class
- Corrected VRN
- Supervisor Action
- TAG Media ID
- ICS image (with watermarked Date / Time stamp, transaction number, incident type, etc.)
- LPIC image (with watermarked Date / Time stamp, transaction number, lane VRN, etc.)

- Event details (events / anomalies associated with this transaction – each transaction starts when Valid TAG Media is detected – for media-based transactions / AVC Loop is triggered – for violations and ends when the vehicle liberates the AVC loop)

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

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

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

- User ID
- Transaction Number
- TLC Class
- TLC / Media VRN
- TLC MOP
- Processed by
- Corrected Class
- Corrected VRN
- Supervisor Action

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

7 PROCESS FOR SUBMISSION OF APPLICATION FOR EMPANELMENT ON WEB-PORTAL

Step	Activity
Registration Process	
1.	<p>a) Applicant shall visit IHMCL website and click on Section/Tab “Empanelment of System Integrator” which will redirect to web portal for empanelment or can directly visit the website https://empanelment.ihmcl.co.in (RFE Portal)</p> <p>b) Applicant will register themselves providing details as mentioned below:</p> <ol style="list-style-type: none"> i. Applicant Name ii. Company Email iii. Company Name iv. Phone Number v. Password vi. Confirm Password <p>c) After entering above details, applicant shall click on option “Register”</p> <ol style="list-style-type: none"> i. A Verification link shall be sent to Email Id provided by Applicant and the applicant shall double click on the verification link to verify their credentials. ii. After successful verification, the applicant shall be able to login on the empanelment portal using the email id and password provided during the registration.
Application Process	
2.	<p>a) After login, Applicant shall click on option “Apply Now” option to apply for the fresh empanelment.</p> <p>b) Applicant shall upload all requisite documents as per Eligibility Criteria mentioned on web portal</p> <p>c) After After uploading all requisite documents, Applicant shall have following options to proceed with: -</p> <ol style="list-style-type: none"> i. Save and review the application ii. Final Submission <p>Note: Applicant cannot proceed for Final Submission unless all requisite mandatory documents are uploaded in each field of requirement parameter.</p>
View Submitted Application	
3.	<p>a) Upon successful submission of Application, the applicant can log in on the portal and view the details of their submitted application by using option “View Application Details”.</p> <p>b) The applicant needs to enter the application number to view the application details.</p>
Check Application Status	

Step	Activity
4.	a) Upon successful submission of Application, the applicant can log in on to the portal and track the status of their application through option “Check Application Status” b) Applicant needs to provide the Application number to get the Application status. c) Applicant can get the status as per below: <ul style="list-style-type: none"> • Accepted – Application has been approved by IHMCL • Under Evaluation – Application is under evaluation • Clarification sought – Clarification/query is sought by IHMCL for their application. • Rejected – Application has been rejected by IHMCL due to non-fulfilling the Eligibility Criteria
Clarification Sought	
5.	a) Upon receipt of Clarification sought status, applicant needs to read the clarification sought by IHMCL and provide the response to the clarification with the option provided in the portal. b) IHMCL shall seek clarification of a particular application up to maximum 02 times. After the 02 attempts of clarifications, if the applicant is not found to be fulfilling the eligibility criteria as per RFE document, the application shall be rejected by IHMCL.

Important Note:

- a) In case of any query/clarifications sought by IHMCL during application evaluation on the RFE Portal, the applicant shall be required to revert with clarification within **7 calendar days** on the web-portal only, beyond which the application shall be liable to be rejected.
- b) Applicant are requested to read the RFE document carefully and submit all the requisite documents along with their application. In case. Of rejection of application, the applicant can reapply only after the period of 06 months.
- c) Upon receipt of an application, IHMCL shall endeavour to complete the evaluation of the application within 3 weeks’ time, subject to volume to applications and clarification received from Applicant.
- d) IHMCL shall regularly publish the list of empanelled System Integrators as updated from time to time.
- e) If for any reason, any interested Applicant fails to submit application due to any technical glitch, or any reasons, IHMCL shall not be responsible for that and any grievance regarding that shall not be entertained.

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

Manul Policy Circular:



भारतीय राजमार्ग प्रबंधन कंपनी लिमिटेड
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FASTag Programme Policy Circular
(Decision taken on e-office file no. E-123819)

Date: 13.04.2023

Sub: - Policy for processing an ETC transaction under exceptional case of non-reading by RFID readers and reporting of cash collection from vehicles having "Low Balance" at toll plaza - Reg

With reference to the above-mentioned subject, please find enclosed the policy circular aimed at facilitating a fail-proof mechanism to process an electronic toll collection via FASTag from a vehicle at a toll lane under exceptional cases when the FASTag not being read automatically by fixed RFID readers owing to any reason at local level and ensure that there is no revenue loss. The policy also outlines the process of reporting of cash collection from vehicles affixed with FASTag with "Low Balance" at toll plaza.

2. This issues with the approval of Competent Authority.

Regards,


(Abhijeet Kumar)
Chief Operating Officer

To,

- i. All Acquirer Banks and Issuer banks under FASTag Programme
- ii. All Concessionaires - through NHBF & HOAI
- iii. All User Fee Agencies - through NHAI CO Division
- iv. All System Integrators
- v. NPCI

Copy to: -

- i. CMD, IHMCL
- ii. CGM(CO), NHAI
- iii. All ROs/ PDs through web admin- For further circulation to all concerned officials

Policy for processing an ETC transaction under exceptional case of non-reading by RFID readers and reporting of cash collection from vehicles having “Low Balance” at toll plaza

1. Background

Following the implementation of the FASTag mandate by the Government of India on February 15, 2021, there has been a considerable increase in digital collection of user fee through FASTag at NH toll plazas, resulting in substantial time and cost savings for the public. However, there have been instances where the fixed RFID reader fails to read the FASTag affixed on windscreen of vehicles at toll plazas. To prevent revenue loss in such scenarios, certain functionalities have been incorporated in the lane and plaza applications to enable toll operating agencies/concessionaires to manually create a FASTag transaction by entering the Vehicle Registration Number (VRN) arriving at toll lane and then processing these transactions as regular FASTag transactions. However, the manual entry of VRN numbers/Tag ids in TMS software increases the chances of errors and also lead to incorrect deductions. Worth mentioning, various complaints have also been received wherein FASTag users have reported cases where their accounts got deducted without passing through that toll plaza for the reported transaction.

Accordingly, in order to address the issue, IHMCL, vide letter dated 25th February, 2021, had issued instructions to all System Integrators that the practice of creating and processing of FASTag transaction by manual feeding of vehicle / tag details are not deemed authorised and strict action shall be taken against the defaulters involved in such fraudulent cases.

It is important to note that while processing of such unauthorised FASTag transactions are not allowed as the primary means of electronic toll collection at any toll plaza, it is also important to facilitate a fail-proof mechanism to process an electronic toll collection from a vehicle at a toll lane under exceptional cases of FASTag not being read automatically by fixed RFID readers owing to any reason and ensure that there is no revenue loss. The primary objective of this policy document is to outline the process to be adhered under such exceptional cases of FASTag not identified at toll lane.

2. Procedure of handling exceptional cases at toll lane

It is be noted that that currently processing of a manually created FASTag transactions is not allowed at NH toll plazas. However, in order to avoid any hassle at toll lane and revenue losses, this document outlines a fail-proof mechanism to process an electronic toll collection from a vehicle at a toll lane under exceptional cases of FASTag not being read automatically by fixed RFID readers owing to any reason. The procedure for processing an ETC transaction under

exceptional case of non-reading by RFID readers and reporting of cash collection from vehicles having "Low Balance" at toll plaza under different scenarios is elaborated as under :

A) Scenario 1 - Non-reading of affixed FASTag automatically by fixed RFID Reader at toll lanes –

In case, FASTag affixed on vehicle is not automatically read by fixed RFID reader due to any issue either in RFID reader or mechanical wear & tear of the tag, tampering, quality issue etc., plaza user fee collection agency/concessionaire shall follow the following process:

- Check the status of the vehicle by using the VRN as input for the "Request Tag Details" API for ICD 2.5 complaint fee plazas.
- If the tag status is indicated as "**Low Balance**", the user shall be asked to pay double the applicable user fee in cash/other payment modes at the fee plaza. Simultaneously, an manual entry in the TMS shall be done and sent to the Acquirer host with the **identifier "C"** (identifying Cash).
- If the FASTag is found to be in an "**Active**" state, toll operator shall process the transaction in the FASTag under "exempt" category in the TMS and ensure that a legible image of Vehicle Registration Number (VRN) of the vehicle is captured through the License Plate Image Capture camera, with date & time stamp of plaza crossing.
- Based on transactions processed in the TMS under FASTag "exempt" category, further manual FASTag transactions shall be generated and sent to the Acquirer host with the identifier "M" (identifying Manual) and the Acquirer Bank shall further process the transaction as part of the normal process to the NPCI
- The user fee collection agency or concessionaire and the concerned System Integrator shall keep the LPIC images of such transactions for a **minimum period of one year**. In case any FASTag user dispute arises, regarding the deduction of amount from a user without crossing the toll plaza, the user fee collection agency/concessionaire shall provide the image clearly showing the plaza name, date & time of crossing, and VRN of the vehicle evidence.

B) Scenario 2 – Active tag on a vehicle showing "Low balance" in lane

In such a scenario where FASTag affixed on vehicle is read as "Low balance" whereas the user claims that his/her FASTag wallet has got sufficient balance, the toll operator shall ensure to check the live status of that FASTag as follows:-

- Use "Request Tag Details" API from plaza system to Acquirer host
- If the status is received as "Active", the vehicle shall be allowed to cross the plaza as per Active status as normal transaction which is to be sent to Acquirer bank.

- If the status is received as "Low Balance", it shall be treated as an invalid, non-functional FASTag and the user shall be asked to pay the double applicable user fee at the fee plaza in cash/other payment mode with identifier as "C".

(Note:- Users are required to affix the FASTag on front windscreen of the vehicle as per Government policy and any FASTag which is not fixed on windscreen of the assigned vehicle shall not be considered for valid transaction).

3. Penal provisions

- a) After implementation of the two functionalities at plazas, if any complaint is received regarding the deduction of user fee from FASTag account without the vehicle crossing the plaza, and the concessionaire/toll operating agency shall provide image of vehicle clearing showing the VRN, date & times of its crossing within 48 Hrs of its notice by IHMCL or its authorized representative. In case of no evidence of bona fide usage, a penalty of Rs. 1 Lakh shall be imposed on the defaulting user fee collection agency or concessionaire. The penalty amount shall be recovered within 7 days through NPCI settlement process or other mechanism as finalised by IHMCL.
- b) In addition, the system integrator responsible for the plaza shall be debarred from the empanelled list of System Integrators by IHMCL for a period of 6 months.
- c) Issuer banks shall be accountable for any cases of poor tag quality and damages/tampering etc. respectively and would be liable to bear the respective cost including liability of double user payment.
- d) If it is found that adequate action/steps have not been undertaken by Issuer banks to reach out to user, sensitise and replace such tags, as the case may be, the Programme Management Fee of transaction amount processed any FASTag use cases (tolling, Parking etc.) through such tags shall be liable to be recovered in due course of time.
- e) System integrator or concessionaire shall be held accountable for bad quality readers. Concessionaire or user fee collection agency shall be liable to exempt any such bonafide user, having valid & proper FASTag, from paying toll if delay is more than 10 seconds after arriving at toll window/ pay axis.

4. Benefits

- a) **Zero down the unauthorised transaction processing** - After implementing the above two functionalities at plazas and proper enforcement thereof, the occurrence of unauthorised transactions shall be eliminated, thereby reducing the various customer complaints.
- b) Easy identification of manual FASTag transactions with the identifier manual as "M" and double penalty as "C".

- c) **Identification and Replacement of damaged or poor quality FASTags:** - Based on the weekly report received from NPCI for manual transactions, the cases will be identified for poor quality FASTag, damaged FASTag and quality of FASTag readers where a FASTag is not read at multiple plazas. Such cases shall be shared with Issuer banks for further needful action.

5. Roles and Responsibilities of entities involved

a) NPCI

- Finalization of specification API document for posting manual FASTag transactions with identifier "M and identifier "C" within 15 days from issuance of this policy.
- Sharing the weekly report with IHMCL and concerned issuer banks for FASTags that are not read at toll plazas.

b) Acquirer Bank

- Ensure the implementation of the "Request Tag Details" API at all allocated fee plazas in coordination with their respective SIs.
- Test and implement transaction processing based on the document/specification for identifier "M and identifier "C" shared by NPCI in coordination with their respective SIs.
- Ensure migration of all fee plazas to ICD 2.5 specifications by 31 May 2023.

c) Issuer Bank

- Reach out FASTag user and ensure the replacement of damaged/poor quality FASTags free of cost within 30 days, as per the report shared by NPCI/IHMCL.

d) System Integrator

- Immediate disabling of any existing functionality for manually creating ETC transactions by entering VRN/Tag ID, vide IHMCL letter dated 25.02.2021.
- Ensure the implementation of the "Request Tag Details" API at all allocated fee plazas in coordination with the respective Acquirer Bank.
- Test & implement manual transaction processing based on the document/specification and ensure that no manual transaction is posted without identifier "M" and identifier "C"
- Provide a provision for storing LPIC images with date & time stamp of such transactions for a minimum period of 1 year.
- Ensure migration of all fee plazas to ICCD 2.5 specifications by 31 May 2023.



भारतीय राजमार्ग प्रबंधन कंपनी लिमिटेड
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IHMCL/ManualFASTagTransactions/Policy/123819/269

Date: 25.05.2024

Amendment to Manual Transaction Policy
(Decision Taken on e-office file No. E-123819)

- Ref: i. Manual Policy Circular E-123819, dated 13.04.2023
ii. IHMCL/ManualFASTagTransactions/Policy/123819, dated 03.10.2023

Sub: Two Stage Validation of Manual FASTag Transactions under FASTag Programme -Reg.

IHMCL vide letter No. Manual Policy Circular E-123819, dated 13.04.2023 and subsequent letter No. IHMCL/ManualFASTagTransactions/Policy/123819, dated 03.10.23, issued Manual Transaction Policy for VRN based transaction under exceptional circumstances in cases of poor-quality tags and active tag showing low balance in lane.

2. Post implementation of Manual FASTag transaction policy, there is an alarming increase in False Deduction complaints wherein the road users complain about deduction of User Fee even when their vehicle has not crossed the Toll Plaza. It is learnt that the Toll Collecting Agencies are entering incorrect VRN during the manual processing of FASTag transactions. In some cases, it is also observed that the manual transactions are being done through back-office system of System Integrators without any checks. Such transactions are directly sent to the respective Acquirer bank for further processing, leading to the deduction of the User Fee from the FASTag accounts of users who have actually not crossed the toll plaza, thus creating a fraud on road users.

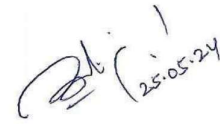
3. In order to check such False Transaction Cases, it has been decided to implement 2 Stage Validation Process as outlined in **Annexure-A** in all VRN based Manual Transaction so that the accountability of both Toll Collection Agency and the System Integrator can be fixed.

1/2

4. All System Integrators at NH/SH/State Government Toll Plazas are instructed to implement the 2-Stage Validation Process (**Annexure-A**) by **June 10, 2024**, at their assigned Toll Plazas. After June 10, 2024, any instances of false deductions or failure to implement the 2-Stage Validation Process will be dealt in accordance with the de-empanelment provisions outlined in the Manual Transaction Policy.

5. This issues with approval of the Competent Authority.

Encl: As above



(A.R. Chitranshi)
Chief Operating Officer

To,

- i. All Concessionaires - through NHBF & HOAI
- ii. All User Fee Agencies - through NHAI CO Division
- iii. All System Integrators
- iv. All State Authorities
- v. NPCI
- vi. All Member Banks

Copy to: -

- i. CMD, IHMCL
- ii. CGM(CO), NHAI – For circulation to all empanelled user fee collection agencies
- iii. All ROs/PDs- For further circulation to all concerned Contractors/Concessionaires

Annexure-A

Two Stage Validation process for Manual FASTag Transactions

(Amendment to Manual Transaction Policy issued vide IHMCL Letter No E-123819, dated 13.04.23)

1. Post implementation of Manual FASTag transaction policy, there is an alarming increase in False Deduction complaints wherein the road users complain about deduction of User Fee even when their vehicle has not crossed the Toll Plaza.
2. In order to put a check on such cases it has been decided that such transactions will no longer be directly sent to the Acquirer bank. Instead, a Two-stage validation mechanism shall be provisioned into the Toll Management System (TMS) software to scrutinize these transactions before sending to the Acquirer host. The Two-stage validation process will entail cross-referencing the Vehicle Registration Number (VRN) entered by the toll collector with the VRN image captured by the License Plate Image Capture Camera (LPIC) or Automatic Number Plate Recognition (ANPR) camera installed in the lane. The System Integrator (SI) shall implement a Two-stage validation process of Manual Transaction as below within the TMS software for the validation of all manual transactions.:
 - a. Stage-1 – All Manual transactions shall be validated by toll collecting agency.
 - b. Stage-2 – All validated transactions during Stage-1 shall be further validated by System Integrator of the toll plaza for rejection/approval of transaction before sending to Acquirer bank.

The credential for validation module of SI shall not be shared with the toll operating agency/concessionaire, failing which penal action shall be taken on the SI as per Manual Transaction Policy.

Following shall be the scenarios for validation:

a. **Scenario -1**

Vehicle image/ VRN is not captured by the LPIC camera, transaction shall be rejected by the SI/Toll Operating agency/Concessionaire.

b. **Scenario -2**

Vehicle VRN image is not match with the VRN entered manually by the Toll collector, transaction shall be rejected by the SI/Toll Operating agency/Concessionaire.

c. **Scenario -3**

Vehicle VRN image is match with the VRN entered manually by the Toll collector, transaction shall be approved by the SI/Toll Operating agency/Concessionaire and the transaction shall be posted to Acquirer Bank for processing.

The process flow diagram for the above scenarios is provided in Fig-1 below:

Fig-1

Process flow for 02 Stage Validation process of Manual FASTag Transaction

