



***Request for Proposal for  
Consultancy Services for Impact  
Study of NETC Programme and  
other Management Consultancy  
Services for IHMCL***

***RFP Reference – IHMCL/Consultant/2024/01  
Dated 24 April 2024***

**INDIAN HIGHWAYS MANAGEMENT COMPANY LTD.**



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1. **Fact Sheet**

Clause Reference	Topic
Cause 5.4	The method of selection is: QCBS (80:20)
Clause 3.1	RFP can be Downloaded from <a href="http://etenders.gov.in">http://etenders.gov.in</a> .  Document Fee of Rs. 10,000 to be paid online and proof of payment to be submitted as per terms defined in the RFP.
Clause 4.5.3	EMD of Rs. 5 lakhs in the form of Bank guarantee OR electronic Bank Guarantee under Structured Financial Messaging System (SFMS).
Section 2, Key dates	A pre-Bid meeting will be held as per timeline mentioned in Key Dates
Clause 4.6.2	Proposals should be submitted in the following language(s): English
Clause 4.12	Proposals must remain valid 120 days after the submission date
Clause 4.5.4	Bidders must upload and submit on the eProcurement portal <a href="http://etenders.gov.in">http://etenders.gov.in</a> all the items (documents), as per the folder structure specified on the eProcurement portal.
	The proposal address to: Chief Operating Officer, Indian Highways Management Company Limited (IHMCL) G- 5& 6, NHAI HQ New Delhi 110 075 Phone: +91-11- 25074100; 1804 Email: <a href="mailto:tenders@ihmcl.com">tenders@ihmcl.com</a> Website: <a href="http://www.ihmcl.co.in">www.ihmcl.co.in</a>
Clause 4.6.3	Proposals must be submitted no later than the date and time as mentioned in Key Dates. Proposals submitted after due date will not be accepted by the eProcurement portal

**2. Schedule of the Tender (Key dates)**

Sl. No.	Event Description	Date
1.	Invitation of RFP	24.04.2024
2.	Last date for receiving queries	29.04.2024
3.	Pre-Bid meeting <sup>1</sup>	30.04.2024@ 11:00 AM through VC
4.	Bid Due Date	15.05.2024 (Up to 15:00 Hrs IST)
5.	Opening of Technical Bids	16.05.2024 (16:00 Hrs IST)
6.	Validity of Bid	120 days from Bid Due Date

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<sup>1</sup> In case of a VC – Meeting details shall be sent to those email IDs from whom queries have been received by due date. Interested bidders may ask for meeting details one day prior to the pre-bid meeting.

### 3. Letter of Invitation and Background Information

#### 3.1. Notice Inviting Application

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

Name of Work	Document Fees (Non-refundable)	EMD (Earnest Money Deposit)	Closing Date and Time
Request for Proposal for Consultancy Services for Impact Study of NETC Programme and other Management Consultancy Services for IHMCL	Rs. 10,000/-	Rs. 5 lakhs	15.05.2024 (Up to 15:00 Hrs IST)

- b) Any contract that may result from this public procurement competition will be issued for a term of 6 months (“the Term”).
- c) The IHMCL reserves the right to extend the Term for a period by additional 6 months on the same terms and conditions.
- d) The complete Bidding Documents can be viewed / downloaded from e-procurement portal <http://etenders.gov.in>. The Bids shall be liable for summarily rejection unless accompanied by the requisite EMD as indicated above. Bids submitted after the closing date/time shall be summarily rejected.
- e) The prospective bidder are hereby invited to submit their bids comprising Technical and Financial bids through e-tendering mode only by the bid due date. No other mode of submission is accepted. Bid shall be valid for 120 days w.e.f. bid due date. The bids should be submitted online only on e-tender portal of Government of India and in the prescribed formats. No change in the formats and / or other mode of bid submission is permissible.
- f) No physical document shall be accepted unless and until the same is specifically stated in the RFP or it is a legal requirement.
- g) IHMCL reserves the right to accept or reject any or all bids received before signing of Contract Agreement without thereby incurring any financial or other liability to the affected Bidders.

#### 4. Instructions to the Bidders

##### 4.1. General

- a) IHMCL invites proposals/bids from eligible entities having the requisite technical and financial capabilities.
- b) The Bids would be evaluated on the basis of the evaluation criteria set out in this Request for Proposal (RFP) Document in order to identify the Successful Bidder for providing the services envisaged under this RFP.
- c) Terms used in this RFP Document which have not been defined herein shall have the meaning recognized thereto in the draft Contract Conditions.
- d) Pursuant to the release of this RFP Document, IHMCL shall receive bids, prepared and submitted in accordance with the terms set forth in this RFP Document and other documents provided by IHMCL pursuant to this RFP Document including annexure/ Appendix hereto (collectively referred to as the "Bid Documents"), as modified, altered, amended and clarified from time to time by IHMCL.
- e) This RFP Document and all attached documents are and shall remain the property of IHMCL and are transmitted to the Bidders solely for the purpose of preparation and the submission of their respective bids in accordance herewith. Bidders shall not use it for any purpose other than for preparation and submission of their bids.
- f) The statements and explanations contained in this RFP Document are intended to provide an understanding to the Bidders about the subject matter of this RFP Document and shall not be construed or interpreted as limiting, in any way or manner whatsoever, the scope of services, work and obligations of the Successful Bidder to be set forth in the RFP or IHMCL right to amend, alter, change, supplement or clarify the scope of service and work, the Contract conditions to be awarded pursuant to the RFP Document including the terms thereof, and this RFP Document including terms herein contained. Consequently, any omissions, conflicts or contradictions in the Bid Document are to be noted, interpreted and applied appropriately to give effect to this intent and no claim on that account shall be entertained by IHMCL.
- g) Bidders may note that IHMCL will not entertain any material deviations from the RFP Document at the time of submission of the Proposal or thereafter. The Proposal to be submitted by the Bidders will be unconditional and the Bidders would be deemed to have accepted the terms and conditions of the RFP Document with all its contents including the terms and conditions of the draft Master Service Agreement. Any conditional Proposal is liable for outright rejection.
- h) Conditional or incomplete proposals are liable to be treated as non-responsive and, therefore may be rejected at the sole discretion of IHMCL.
- i) While every effort has been made to provide comprehensive and accurate background information and requirements and specifications, Bidders and recipients of this RFP may wish to consult their own legal advisers in relation to this RFP.
- j) All information supplied by Bidders may be treated as contractually binding on the Bidders, on successful award of the assignment by IHMCL on the basis of this RFP
- k) No commitment of any kind, contractual or otherwise shall exist unless and until a formal written contract has been executed by or on behalf of IHMCL. Any notification of preferred bidder status

by IHMCL. IHMCL may cancel this public procurement at any time prior to a formal written contract being executed by or on behalf of IHMCL

- i) This RFP supersedes and replaces any previous public documentation & communications, and Bidders should place no reliance on such communications.

4.2. Preparation and submission of application

- a) Bid must be submitted online only at <http://etenders.gov.in> during the validity of registration with the e-Tendering Portal being managed by National Informatics Centre (NIC), i.e. <http://etenders.gov.in>. To participate in e-tendering, the intending participants shall register themselves in the website of URL.
- b) The Authorized Signatory holding Power of Attorney and the person whose DSC is used for submission of bids must be the same.**
- c) Bidders/Applicants are advised to go through the FAQs, guidelines, instructions, manuals, policies, system setting procedures etc. as provided in the e-Procurement portal.
- d) Tender form and relevant documents will not be sold /issued manually from offices.
- e) Bidders are required to upload scanned copies of Bid Security, proof of online payment of cost Bidding Documents, Power of Attorney and other relevant document on the e-procurement portal.
- f) All documents including Application Fee, EMD, Power of Attorney, relevant Appendices eligibility documents etc. need to be submitted on e-tender portal. The Bidder shall submit the scanned copy of the original documents as mentioned in the RFP along with the bid on or before due date of submission. Evaluation of bids shall be carried out with the available scanned copy of original document submitted by bidder as per RFP requirement. However, the successful bidder has to submit the original documents physically with IHMCL before the issue of LOA.
- g) The date and time for online submission as mentioned in the section RFP document shall be strictly followed in all cases. The bidder/Applicants should ensure that their tender is submitted online before the expiry of the scheduled date and time. No delay on account of any cause will be entertained. Tender(s) not submitted online will not be entertained.
- h) If for any reason, any interested bidder fails to complete any online stages during the complete tender cycle, IHMCL shall not be responsible for that and any grievance regarding that shall not be entertained.



4.3. Eligibility/Pre-Qualification Criteria

The bidder qualifying the following criteria shall be considered eligible to bid for this RFP. The Technical Proposals of the Bidders shall be evaluated for meeting the eligibility/pre-qualification criteria based on the parameters listed below:

S. NO.	Basic Requirement	Specific Requirements	Supporting Documents required
1)	Legal Entity	The Bidder should be Company registered under the Companies Act, 1956/2013 or a partnership firm registered under LLP Act, 2008 and registered with the GST Authority in India.	<ul style="list-style-type: none"> <li>• Copy of Certificate of Incorporation</li> <li>• Copy of GST Certificate</li> </ul>
2)	Relevant Business Continuity	The bidder should be in existence in Government and Management Consultancy services business for the last 10 years as on 31 <sup>st</sup> March 2024.	<ul style="list-style-type: none"> <li>• Copy of Certificate of Incorporation/ Partnership Deed, as applicable</li> <li>• Project details with supporting evidence.</li> </ul>
3)	Sales Turnover in Consulting	<p>Average Annual Sales Turnover generated from consulting services in the last three financial years i.e. FY 2020-21, 2021-22 and 2022-23 should be at least <b>Rs. 130 Cr.</b></p> <p>This turnover should be on account of Consulting only and should not comprise of sales revenues related to supply of hardware/IT infrastructure and their associated maintenance services, implementation of packaged software etc.</p>	<ul style="list-style-type: none"> <li>• Extracts from the audited Balance sheet and Profit &amp; Loss for the last 3 years as specified; AND</li> <li>• Certificate from the Statutory Auditor</li> </ul>
4)	Net Worth	The Net Worth of the Bidder must be <b>positive</b> as on 31 <sup>st</sup> March 2023	<ul style="list-style-type: none"> <li>• Certificate from the Statutory Auditor</li> </ul>
5)	Manpower strength	The bidder should have had an average of at least 500 employees in the last three financial years i.e. FY 2020-21, 2021-22 and 2022-23.	<ul style="list-style-type: none"> <li>• Notarized affidavit confirming number of number of employees.</li> </ul>
6)	Relevant Experience	<p>The Bidder must have experience of implementing projects of '<i>similar nature</i>' in India or abroad for Ministry/Department under Government/PSU/ Government Subsidiaries in the last 10 years as on bid due date as below:</p> <ul style="list-style-type: none"> <li>• At least <b>1 project</b> of contract value of <b>Rs. 1 Crore</b> or more (excluding taxes), Or,</li> <li>• At least <b>2 projects</b> of contract value of <b>Rs.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Extracts of Work Order + Completion Certificates from the client;</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• Extracts of Work Order + Self Certificate of Completion (Certified by the</li> </ul>

S. NO.	Basic Requirement	Specific Requirements	Supporting Documents required
		<p style="text-align: center;"><b>60 lakhs</b> or more (excluding taxes), Or,</p> <ul style="list-style-type: none"> <li>• At least 3 <b>projects</b> of contract value of <b>Rs. 50 lakhs</b> or more (excluding taxes)</li> </ul> <p><b>‘Similar nature’ for this criterion shall mean consulting assignments in the field of Impact Studies of Government Policy(ies) / Public Policy / e-Governance / IT System Audit of large or medium scale projects in the fields of ICT or Intelligent Transport system/Smart Mobility/Transit payments.</b></p> <p>Project experience of only the Bidding entity shall be considered for evaluation.</p> <p>Ongoing projects may also be considered if the relevant work/deliverable as required in this criterion has been completed as on the bid release date. For such ongoing projects, the certificate from client or self-certificate by the bidder shall clearly mention the work completion as on the bid release date</p>	<p>Statutory Auditor) or the Authorized Signatory holding Power of Attorney for the bid)</p> <p>The extracts of Work Order or the Self-Certificate should clearly demonstrate the relevant area of work/activities as required in the criterion. IHMCL reserves the right to seek further explanation or supporting documents in case any clarification is required during evaluation of a Self-certificate submitted by the Bidder</p>
7)	Consortiums	Consortiums are <b>not allowed.</b>	
8)	Debarment/ Blacklisting	The Bidder shall not be under a declaration of ineligibility for corrupt or fraudulent practices and should not be blacklisted by any State Govt./ Central Govt./ PSU in India for any reason.	Self-declaration from authorized signatory

4.3.1. For projects where contract value or any amount is in any currency other than Indian Rupees, than the foreign currency conversion rate available on Reserve Bank of India's portal as on the date of release of the RFP document shall be used for conversion of amount in foreign currency to Indian Rupees equivalent.

4.3.2. The Bidders must provide all supporting documents specified above in support of each eligibility requirement in line with the criteria stipulated in eligibility and technical evaluation criteria.

#### **4.4. Pre-Bid Meeting & Clarifications**

##### 4.4.1. Bidders Queries

- a) IHMCL shall hold a pre-bid meeting with the prospective bidders on date & time as mentioned in Key Dates.
- b) The Bidders will have to ensure that their queries for Pre-Bid meeting should be emailed one day before pre-bid meeting on email id [tenders@ihmcl.com](mailto:tenders@ihmcl.com).

- c) In case of a VC – Meeting details shall be sent to those email IDs from whom queries have been received by due date. Interested bidders may ask for meeting details one day prior to the pre-bid meeting.
- d) The queries should necessarily be submitted in the following format:

S.No.	RFP Document Reference(s) (Section & Page Number(s))	Content of RFP requiring Clarification(s)	Points of Clarification/Suggestion
1			
2			
3			

- e) Queries should be sent in excel format only.
- f) IHMCL shall not be responsible for ensuring that the bidders' queries have been received by them. Any requests for clarifications post the indicated date and time may not be entertained by IHMCL.

#### 4.4.2. Responses to Pre-Bid Queries and Issue of Corrigendum

- a) IHMCL will endeavour to provide timely response to all queries. However, IHMCL makes no representation or warranty as to the completeness or accuracy of any response made in good faith, nor does IHMCL undertake to answer all the queries that have been posed by the bidders.
- b) At any time prior to the last date for receipt of bids, IHMCL may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the RFP Document by a corrigendum.
- c) The Corrigendum (if any) & clarifications to the queries from all bidders will be posted on the e-tender website.
- d) Any such corrigendum shall be deemed to be incorporated into this RFP.
- e) In order to provide prospective Bidders reasonable time for taking the corrigendum into account, IHMCL may, at its discretion, extend the last date for the receipt of Proposals.

#### 4.5. Key Requirements of the Bid

##### 4.5.1. Right to Terminate the Process

- a) IHMCL may terminate the RFP process at any time and without assigning any reason. IHMCL makes no commitments, express or implied, that this process will result in a business transaction with anyone.
- b) This RFP does not constitute an offer by IHMCL. The bidder's participation in this process may result IHMCL selecting the bidder to engage towards execution of the contract.

##### 4.5.2. RFP Document Fees

- a) The RFP documents have been made available to be downloaded without any fee from the website [www.etenders.gov.in](http://www.etenders.gov.in).

- b) The document fee should be deposited in IHMCL bank account and proof of payment (receipt, UTR details etc.) shall be submitted in Bid Proposal. IHMCL bank account details for deposit of Document Fee is 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

#### 4.5.3. Earnest Money Deposit (EMD)

- a) Bidders shall submit, along with their Proposals, an EMD of Rs. 5 Lakhs only, in the form of a Electronic Bank Guarantee under Structured Financial Messaging System (SFMS). The payment transfer related information is as follows:

- i. EMD BG in the format specified in Appendix I: Form 3 issued by a scheduled commercial bank in favour of Account details as mentioned below. The EMD BG should remain valid for a period of 60 days beyond the final tender validity period.
- ii. Electronic Bank Guarantee under Structured Financial Messaging System (SFMS)

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

- b) The Successful Bidder's EMD will be returned, without any interest, upon the Successful Bidder signing the Contract and furnishing the Performance Security in accordance with the provisions thereof. IHMCL may, at the Successful Bidder's option, adjust the amount of EMD in the amount of Performance Security to be provided by him in accordance with the provisions of the Contract.
- c) Any bid not accompanied by an acceptable Earnest Money Deposit and Document Fee shall be rejected by IHMCL as non-responsive.
- d) The Earnest Money Deposit of the Successful Bidder will be discharged when the Successful Bidder has furnished the required Performance Security and signed the Contract Agreement.
- e) The Bid Security / Earnest Money will be forfeited:
- i. if the Bidder withdraws or modifies the Bid during the period of Bid validity;
  - ii. if the Bidder does not accept the correction of the bid price, pursuant to clause pertaining to imbalance bid;
  - iii. in the case of a Successful Bidder, if the Bidder fails within the specified time limit to sign the Contract; and/or
    - 1. Furnish the required Performance Security; or
    - 2. if the Bidder is found to be engaged in corrupt or fraudulent practices.

#### 4.5.4. Submission of Proposals

- a) All documents including Application Fee, EMD, Power of Attorney, relevant appendices, eligibility documents etc. need to be submitted on e-tender portal. The Bidder shall submit the scanned copy of the original documents as mentioned in the RFP along with the bid on or before due date of submission. Evaluation of bids shall be carried out with the available

scanned copy of original document submitted by bidder on e-portal as per RFP requirement. However, the successful bidder has to submit the original documents physically with IHMCL after the issue of LOA.

- b) Bidders should submit their responses as per the procedure specified in the e-Procurement portal (<http://etenders.gov.in>) being used for this purpose. Generally, the items to be uploaded on the portal would include all the related documents mentioned in this RFP, such as:
- Tender Fee
  - EMD
  - Pre-qualification response
  - Technical Proposal
  - Financial proposal
  - Additional certifications/documents E.g. Power of Attorney, certificates on turnover, etc.
  - All relevant appendices and supporting documents as required on RFP
- c) However, each of the above documents must be uploaded in the format specified for this purpose and as per the specified folder structure in the e-Procurement portal.
- d) The bidder must ensure that the bid is digitally signed by the Authorized Signatory of the bidding firm and has been duly submitted within the submission timelines. IHMCL will in no case be responsible if the bid is not submitted online within the specified timelines.
- e) All the pages of the Proposal document must be sequentially numbered and must contain the list of contents with page numbers. Any deficiency in the documentation may result in the rejection of the Bidder's Proposal.
- f) The Applicant shall provide all the information sought under this RFP. IHMCL will evaluate only those Applications that are received in the required formats and complete in all respects. Incomplete and /or conditional Applications shall be liable to rejection.
- g) The Application/Bid Documents uploaded on e-tender portal shall be typed or written in indelible ink and signed by the authorized signatory of the Applicant who shall also initial each page. In case of printed and published documents, only the cover shall be initialled. All the alterations, omissions, additions or any other amendments made to the Application shall be initialled by the person(s) signing the Application.

#### 4.5.5. Authentication of Bids

A Proposal should be accompanied by a power-of-attorney in the name of the signatory of the Proposal. A copy of the same should be uploaded under the relevant section/folder on the e-Procurement portal.

#### 4.6. Preparation and submission of Proposal

##### 4.6.1. Proposal Preparation Costs

The bidder shall be responsible for all costs incurred in connection with participation in the RFP process, including, but not limited to, costs incurred in conduct of informative and other diligence activities participation in meetings/discussions/presentations, preparation of proposal, in providing any additional information required by to facilitate the evaluation process, and in negotiating a definitive contract or all such activities related to the bid process. IHMCL will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

4.6.2. Language

The Proposal should be filled by the bidders in English language only. If any supporting documents submitted are in any language other than English, translation of the same in English language is to be duly attested by the Bidders. For purposes of interpretation of the documents, the English translation shall govern.

4.6.3. Deadline for Submission of proposals

The bid must be submitted on the eProcurement portal <http://etenders.gov.in> by the date and time specified for the RFP. Any proposal submitted on the portal after the above deadline will not be accepted and hence shall be automatically rejected. IHMCL shall not be responsible for any delay in the submission of the documents.

IHMCL may, at its discretion, extend the deadline for submission of Bids by issuing an amendment in which case all rights and obligations of IHMCL and the Bidders previously subject to the original deadline will thereafter be subject to the deadline extended.

Offer by fax / e-mail will not be accepted and shall be treated as void *ab-initio*.

4.6.4. Late Bids

Bids submitted after the due date will not be accepted by the eProcurement system (<http://etenders.gov.in>) and hence will automatically be rejected. IHMCL shall not be responsible for any delay in the online submission of the proposal.

4.7. Alternate Proposals by the Bidders

- 4.7.1. Bidder shall submit only one bid/offer for this RFP that fully complies with the requirement of the RFP including conditions of Contract. Conditional offer or alternate offer will not be considered further in the process of tender evaluation.

4.8. Deviations

The bidder may provide deviation to the contents of the RFP document. It may be noted that once the deviation is provided, the bidder would not be allowed that to withdraw the deviation submitted.

The Evaluation Committee would evaluate and classify them as “material deviation” or “nonmaterial deviation “. In case of any material deviations, the Committee would be entitled to reject the bid.

4.9. Evaluation process / Selection procedure

- a) IHMCL will constitute an Evaluation Committee to evaluate the responses of the bidders.
- b) The Evaluation Committee constituted by IHMCL shall evaluate the responses to the RFP and all supporting documents / documentary evidence. Inability to submit requisite supporting documents / documentary evidence, may lead to rejection.
- c) The decision of the Evaluation Committee in the evaluation of responses to the RFP shall be final. No correspondence will be entertained outside the process of evaluation with the Committee.

- d) The Evaluation Committee may ask for meetings with the Bidders to seek clarifications on their proposals, visit to Bidder's site and/ or arrange discussions with their professional, technical faculties to verify claims made in Technical Bid documentation from the Bidder on the already submitted Technical Proposal at any point of time before opening of the Financial Proposal.
- e) The Evaluation Committee reserves the right to reject any or all proposals on the basis of any deviations.
- f) Each of the responses shall be evaluated as per the criteria and requirements specified in this RFP.

4.10. Modifications/ substitution/ withdrawal of Applications

- a) The Applicant may modify, substitute or withdraw its Application after submission, provided that written notice of the modification, substitution or withdrawal is received by IHMCL prior to the Bid Due Date. No Application shall be modified, substituted or withdrawn by the Applicant on or after the Bid Due Date.
- b) Any alteration/ modification in the Application or additional information supplied subsequent to the Bid Due Date, unless the same has been expressly sought for by IHMCL, shall be disregarded.

4.11. Tender Opening

- a) IHMCL shall open the Applications as per Key Timelines mentioned in RFP, at the place specified in RFP and in the presence of the Applicants who choose to attend.
- b) Applications for which a notice of withdrawal has been submitted in accordance with Clause 4.10 shall not be opened.
- c) IHMCL will subsequently examine and evaluate Applications in accordance with the provisions set out in this RFP.
- d) Applicants are advised that selection of Applicants will be entirely at the discretion of IHMCL. Applicants will be deemed to have understood and agreed that no explanation or justification on any aspect of the Bidding Process or selection will be given.
- e) Any information contained in the Application shall not in any way be construed as binding on IHMCL, its agents, successors or assigns, but shall be binding against the Applicant if the Project is subsequently awarded to it on the basis of such information.
- f) IHMCL reserves the right not to proceed with the Bidding Process at any time without notice or liability and to reject any or all Application(s) without assigning any reasons.
- g) If any information furnished by the Applicant is found to be incomplete, or contained in formats other than those specified herein, IHMCL may, in its sole discretion, exclude the relevant project from computation of the Eligible Score of the Applicant.
- h) In the event that an Applicant claims credit for an Eligible Project, and such claim is determined by IHMCL as incorrect or erroneous, IHMCL shall reject such claim and exclude the same from computation of the Eligible Score, and may also, while computing the aggregate Experience Score of the Applicant, make a further deduction equivalent to the claim rejected hereunder. Where any information is found to be patently false or amounting to a material representation, IHMCL reserves the right to reject the Application and/ or Bid.

4.12. Tender Validity

- a) Bids shall remain valid for a period of 120 days from the Bid due date. Any Bid valid for a shorter period shall be rejected as non-responsive. IHMCL has sole discretion to extend the period beyond 120 days.
- b) In exceptional circumstances, IHMCL may solicit Bidder's consent to an extension of the period of validity. The request and the responses thereto shall be made in writing; however, no modification to such bid shall be permitted.

4.13. Tender Evaluation

- a) Initial Bid scrutiny will be held and incomplete details as given below will be treated as non-responsive. If Proposals;
  - Are not submitted in as specified in the RFP document.
  - Received without the Letter of Authorization (Power of Attorney)
  - Are found with suppression of details.
  - With incomplete information, subjective, conditional offers and partial offers submitted.
  - Submitted without the documents requested in the RFP.
  - Have non-compliance of any of the clauses stipulated in the RFP.
  - With lesser validity period
- b) All responsive Bids will be considered for further processing as below.
- c) IHMCL will prepare a list of responsive bidders, who comply with all the Terms and Conditions of the Tender. All eligible bids will be considered for further evaluation by a Committee according to the Evaluation process define in this RFP document. The decision of the Committee will be final in this regard.
- d) During evaluation and comparison of bids, IHMCL may, at his discretion, ask the bidder for clarifications on the bid. The request for clarification shall be given in writing via email, asking the Bidder to respond by a specified date, and also mentioning therein that, if the Bidder does not comply or respond by the date, his tender will be liable to be rejected. No post bid clarification at the initiative of the bidder shall be entertained. The shortfall information/ documents shall be sought only in case of historical documents which pre-existed at the time of the bid opening and which have not undergone change since then.

4.14. Award Criteria

IHMCL will award the Contract to the successful bidder whose proposal has been determined to be substantially responsive and has been determined as the most responsive bids as per RFP Clause 5.4.

4.15. Right to Accept Any Proposal and To Reject Any or All Proposal(s)

IHMCL reserves the right to accept or reject any proposal, and to annul the tendering process / Public procurement process and reject all proposals at any time prior to award of contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the grounds for IHMCL's action.



4.16. Notification of Award

- a) Prior to the expiration of the validity period, IHMCL will notify the successful bidder in writing or by email, that its proposal has been accepted. In case the tendering process / public procurement process has not been completed within the stipulated period, IHMCL, may like to request the bidders to extend the validity period of the bid.
- b) The notification of award will constitute the formation of the contract. Upon the successful bidder's furnishing of Performance Bank Guarantee and signing of Contract Agreement, IHMCL will notify each unsuccessful bidder and return their EMD.

4.17. Performance Guarantee

- a) IHMCL will require the selected bidder to provide a Performance Bank Guarantee, within 15 days from the Notification of award, for a value equivalent to 3% of the total cost of quoted by bidder. The Performance Guarantee should be valid for a period of 6 months after expiry of Contract Agreement and also should have claim period of 1-year post expiry. The selected bidder shall be responsible for extending the validity date and claim period of the Performance Guarantee as and when it is due on account of non-completion of the project. In case the selected bidder fails to submit performance guarantee within the time stipulated, IHMCL at its discretion may cancel the order placed on the selected bidder without giving any notice.
- b) IHMCL shall invoke the performance guarantee in case the selected bidder fails to discharge their contractual obligations during the period or IHMCL incurs any loss due to selected bidder's negligence in carrying out the project implementation as per the agreed terms & conditions.

4.18. Signing of Contract

Post submission of Performance Guarantee by the successful bidder, IHMCL shall enter into a contract, incorporating all clauses, pre-bid clarifications and the proposal of the bidder.

4.19. Failure to Agree with the Terms and Conditions of the RFP

Failure of the successful bidder to agree with the Proposed Contract terms and Terms & Conditions of the RFP shall constitute sufficient grounds for the annulment of the award, in which event IHMCL may award the contract to the next best value bidder or call for new proposals from the interested bidders.

In such a case, IHMCL shall invoke the PBG of the most responsive bidder.

4.20. Downstream work

The Consultant shall not be eligible to bid for the activities relating to the implementation of this project. Further, the consultant shall give a declaration that they do not have any interest in downstream business, which may ensue from this assignment.

4.21. Substitution of Key Personnel –

If any of the Key Personnel become unavailable for the extended validity period, the Consultant shall provide a written adequate justification and evidence satisfactory to the Client together with the substitution request. In such case, a replacement Key Expert shall have equal or better qualifications and experience than those of the originally proposed Key Personnel.

4.22. Complaint Proposals/ Completeness of Response

- a) Bidders are advised to study all instructions, forms, requirements, appendices and other information in the RFP documents carefully. Submission of the bid / proposal shall be deemed to have been done after careful study and examination of the RFP document with full understanding of its implications.
- b) Failure to comply with the requirements of this paragraph may render the Proposal non-compliant and the Proposal may be rejected. Bidders must:
  - i. Comply with all requirements as set out within this RFP.
  - ii. Submit the forms as specified in this RFP and respond to each element in the order as set out in this RFP.
  - iii. Include all supporting documentations specified in this RFP.

4.23. Change Request

The following would constitute a Change request

- a) Any work which has not been specifically mentioned in the scope of work.
- b) Any changes in the deliverables post approval by the client.
- c) Bid Process Management in case of re-tendering is to be done for reasons for which the consultants are not responsible.
- d) Any delay in the project timelines beyond the calendar time mentioned in the tender document for which Bidder is not directly responsible. In such a case, the additional effort estimated by the bidder and its costs would be discussed and finalized in discussions with the Bidder. The basis of this cost would be the commercial bid.

4.24. Fraud and Corrupt Practices

- a. The Applicants/Bidders and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the Selection Process. Notwithstanding anything to the contrary contained in this RFP, IHMCL shall reject a Proposal without being liable in any manner whatsoever to the Applicant, if it determines that the Bidder has, directly or indirectly or through an agent, engaged in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice (collectively the "Prohibited Practices") in the Selection Process. In such an event, IHMCL shall, without prejudice to its any other rights or remedies, forfeit and appropriate the EMD or PBG, as the case may be, as mutually agreed genuine pre-estimated compensation and damages payable to IHMCL for, inter alia, time, cost and effort of IHMCL, in regard to the RFP, including consideration and evaluation of such Applicant's Proposal.
- a. Without prejudice to the rights of IHMCL under Clause above and the rights and remedies which IHMCL may have under the LOI or the Contract, if an Applicant or Consultant, as the case may be, is found by IHMCL to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Selection Process, or after the issue of the LOI or the execution of the Contract, such Applicant or Consultant shall not be eligible to participate in any tender or RFP issued by IHMCL during a period 3 years of from the date such Applicant or Consultant, as the case may be, is found by IHMCL to have directly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice, as the case may be.

- b. For the purposes of this Section, the following terms shall have the meaning hereinafter respectively assigned to them:
- i. “corrupt practice” means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of any person connected with the Selection Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of IHMCL who is or has been associated in any manner, directly or indirectly with the Selection Process or the LOI or has dealt with matters concerning the Contract or arising there from, before or after the execution thereof, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of the IHMCL , shall be deemed to constitute influencing the actions of a person connected with the Selection Process); or (ii) save as provided herein, engaging in any manner whatsoever, whether during the Selection Process or after the issue of the LOA or after the execution of the Contract, as the case may be, any person in respect of any matter relating to the Project or the Award or the Contract, who at any time has been or is a legal, financial or technical consultant/ adviser of IHMCL in relation to any matter concerning the Project;
  - ii. “fraudulent practice” means a misrepresentation or omission of facts or disclosure of incomplete facts, in order to influence the Selection Process;
  - iii. “coercive practice” means impairing or harming or threatening to impair or harm, directly or indirectly, any persons or property to influence any person’s participation or action in the Selection Process;
  - iv. “undesirable practice” means (i) establishing contact with any person connected with or employed or engaged by IHMCL with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Selection Process; or (ii) having a Conflict of Interest; and
  - v. “restrictive practice” means forming a cartel or arriving at any understanding or arrangement among Applicants with the objective of restricting or manipulating a full and fair competition in the Selection Process.

#### 4.25. Conflict of Interest

- a. An Applicant shall not have a conflict of interest that may affect the Selection Process or the Consultancy (the “Conflict of Interest”). Any Applicant found to have a Conflict of Interest shall be disqualified. In the event of disqualification, the IHMCL shall forfeit and appropriate the EMD, if available, as mutually agreed genuine pre-estimated compensation and damages payable to IHMCL for, inter alia, the time, cost and effort of IHMCL including consideration of such Applicant’s Proposal, without prejudice to any other right or remedy that may be available to IHMCL hereunder or otherwise.
- b. IHMCL requires that the Consultant provides professional, objective, and impartial advice and at all times hold IHMCL’s interests paramount, avoid conflicts with other assignments or its own interests, and act without any consideration for future work. The Consultant shall not accept or engage in any assignment that would be in conflict with its prior or current obligations to other clients, or that may place it in a position of not being able to carry out the assignment in the best interests of IHMCL.
- c. Without limiting the generality of the above, an Applicant shall be deemed to have a Conflict of Interest affecting the Selection Process, if:

- i. the Bidder, or Associates (or any constituent thereof) and any other Bidder, or Associate (or any constituent thereof) have common controlling shareholders or other ownership interest;
  - ii. such Bidder or its Associate receives or has received any direct or indirect subsidy or grant from any other Bidder or its Associate; or
  - iii. such Bidder has a relationship with another Bidder, directly or through common third parties, that puts them in a position to have access to each others' information about, or to influence the Proposal of either or each of the other Bidder; or
  - iv. there is a conflict among this and other consulting assignments of the Bidder (including its personnel and other members, if any) and any subsidiaries or entities controlled by such Bidder or having common controlling shareholders. The duties of the Consultant will depend on the circumstances of each case. While providing consultancy services to IHMCL for this particular assignment, the Consultant shall not take up any assignment that by its nature will result in conflict with the present assignment; or
  - v. A firm hired to provide consulting services for the preparation or implementation of a project, and its Members or Associates, will be disqualified from subsequently providing goods or works or services related to the same project;
- d. An Bidder eventually appointed to provide Consultancy for this Project shall be disqualified from subsequently providing goods or services related to the same Project and any breach of this obligation shall be construed as Conflict of Interest; provided that the restriction herein shall not apply after a period of 12 months from the completion of this assignment; provided further that this restriction shall not apply to consultancy services performed for IHMCL in continuation of this Consultancy or to any subsequent consultancy/ advisory services performed for IHMCL where the conflict of interest situation does not arise.
- e. In the event that the Consultant, its Associates or affiliates are auditors or financial advisers to any of the Bidders (for System Integration or any other activity) for the Project, they shall make a disclosure to IHMCL as soon as any potential conflict comes to their notice but in no case later than 7 (seven) days from the receipt of such proposals and any breach of this obligation of disclosure shall be construed as Conflict of Interest. IHMCL shall, upon being notified by the Consultant under this Clause, decide whether it wishes to terminate this Consultancy or otherwise, and convey its decision to the Consultant within a period not exceeding 15 (fifteen) days.

## 5. Evaluation Criteria

### 5.1. Phase-1: - Pre-Qualification Criteria

- a) The Technical Bids will be evaluated by an Evaluation Committee. The Bidder shall have to fulfil all the Eligibility Criteria as specified in the RFP. Following documents shall be evaluated as per part of Pre-Qualification stage: - Document Fee, EMD/Bid Security, PoA and other Eligibility Documents and Appendices.
- b) The Bidder shall have to submit all the required documents as per various formats provided in Appendices. These documents will be scrutinized in this phase of evaluation. Those Bidders who do not fulfil the terms and conditions of Eligibility Criteria as specified in this tender will not be eligible for further evaluation.
- c) Evaluation of Technical Bids by the Evaluation Committee shall not be questioned by any of the Bidders. IHMCL may ask Bidder(s) for additional information, visit to Bidder's site and/ or arrange discussions with their professional, technical faculties to verify claims made in Technical Bid documentation from the Bidder on the already submitted Technical Proposal at any point of time before opening of the Financial Proposal.

### 5.2. Phase-2: - Technical Qualification Criteria

Based upon the evaluation of the documents and the conditions specified in the RFP, IHMCL shall announce the names of the Bidders who have qualified for Phase-2 Technical Qualification. It is hereby clarified that Technical Qualification evaluation of only such Bidders who are declared qualified as stated herein shall be performed.

#### 5.2.1. Technical Qualification Criteria - Technical Score

5.2.2. The Technical Proposals of the Bidders shall be evaluated based on the Technical Evaluation Framework as listed in the Table below and marks (ST) shall be provided accordingly:

Section #	Evaluation Criteria	Marks	Total Marks
<b>1</b>	<b>Bidder Profile</b>		
1.1.	Average Annual Turnover	10	20
1.2.	Relevant Experience of Firm	10	
<b>2</b>	<b>Relevant Experience</b>		
2.1.	Impact Studies of Government Policy(ies) / Public Policy / e-Governance / IT System Audit of large or medium scale projects in the fields of ICT or Intelligent Transport system/Smart Mobility/Transit payments.	40	40
<b>3</b>	<b>Approach &amp; Methodology</b>		
3.1.	Demonstration of understanding of the Project Objective, requirements, challenges likely to be encountered, scope of work, etc.	15	30
3.2.	Project work break down structure showcasing Overall Timelines, Resource assignments (relevance to the task assigned) and dependencies.	15	
<b>4</b>	<b>Resource Profile</b>		
4.1.	Team Leader	5	10
4.2.	Subject Matter Specialist (Impact Assessment)	5	
<b>Overall Technical Score Total</b>			<b>100</b>

5.2.3. Detailed Technical Scoring Criteria are as below -

S. No	Criteria Description	Max Marks	Marking Criteria	Marks	Supporting Documents
<b>1 Bidder Profile (Maximum Marks = 20)</b>					
1.1	Average Annual Turnover Average Annual Sales Turnover generated from consulting services in the last three financial years FY 2020-21, 2021-22 and 2022-23	10	More than INR 500 Crore	10	<ul style="list-style-type: none"> <li>•Extracts from the audited Balance sheet and Profit &amp; Loss for the last 3 years as specified;</li> <li>•Certificate from the Statutory Auditor</li> </ul>
			More than INR 300 Crore up to INR 500 Crore	8	
			INR 130 Crore up to INR 300 Crore	7	
1.2	Relevant Experience of the Firm Experience in Providing Services as Consultancy Firm in Infrastructure sector	10	More than 12 years of experience	10	<ul style="list-style-type: none"> <li>•Copy of Certificate of Incorporation/ Partnership Deed, as applicable</li> <li>•Project details with supporting evidence.</li> </ul>
			More than 12 years of experience	8	
			10 years up to 12 years of experience	7	
<b>2 Relevant Past Experience (Maximum Marks = 40)</b>					
2.1	<p>The Bidder must have experience of implementing projects of 'similar nature' in India or abroad for Government or International funding agencies in the last 10 years as on bid due date.</p> <p>'Similar nature' for this criterion shall mean consulting assignments in the field of <b>Impact Studies of Government Policy(ies) / Public Policy / e-Governance / IT System Audit</b> of large or medium scale projects in the fields of ICT or Intelligent Transport system/Smart Mobility/Transit payments.</p> <p>Project experience of only the Bidding entity shall be</p>	40	<p>Marks shall be allotted on the basis of number of projects cited by the Bidder, subject to maximum 40 marks.</p> <p>Marks shall be allotted as below –</p> <ul style="list-style-type: none"> <li>• More than 3 projects – 30 marks</li> <li>• 2 to 3 projects – 20 marks</li> <li>• 1 project – 10 marks</li> <li>• Experience of providing “similar nature” of consultancy services in NHAI/ MoRTH/ NHIDCL/IHMCL – 10 marks</li> </ul>		<ul style="list-style-type: none"> <li>•Extracts of Work Order + Completion Certificates from the client;</li> <li>Or</li> <li>•Extracts of Work Order + Self Certificate of Completion (Certified by the Statutory Auditor or the Authorized Signatory holding Power of Attorney for the bid)</li> </ul> <p>The extracts of Work Order or the Self-Certificate should clearly demonstrate</p>

S. No	Criteria Description	Max Marks	Marking Criteria	Marks	Supporting Documents
	<p>considered for evaluation. Ongoing projects may also be considered if the relevant work/deliverable as required in this criterion has been completed as on the bid release date. For such ongoing projects, the certificate from client or self-certificate by the bidder shall clearly mention the work completion as on the bid release date</p> <p><b>P.S. – Credentials of Proof of Concept and Free of Cost shall not be considered for evaluation.</b></p>				<p>the relevant area of work/activities as required in the criterion.</p> <p>IHMCL reserves the right to seek further explanation or supporting documents in case any clarification is required during evaluation of a Self-certificate submitted by the Bidder.</p>
<b>3</b>	<b>Approach and Methodology (Maximum Marks = 30)</b>				
3.1	Demonstration of understanding of the Project Objective, requirements, challenges likely to be encountered, scope of work, etc.	15	Approach & Methodology Note to be submitted by Bidder not exceeding <b>20 pages</b> .	15	<ul style="list-style-type: none"> <li>Assessment to be based on a note covering all requirements as mentioned &amp;</li> <li>Presentation made by Bidder before the Committee</li> </ul>
3.2	Project work break down structure showcasing Overall Timelines, Resource assignments (relevance to the task assigned) and dependencies.	15		15	
<b>4. Adequacy and Quality of Resources proposed for Deployment (Maximum Marks = 10) (Minimum requisite qualification provided in Resource requirement section)</b>					
4.1	<b>Team Leader</b>	5	More than 15 years' experience	5	CV to be submitted in prescribed format counter-signed by authorized signatory
			From 13 years – up to 15 years' experience	4	
			From 10 years – up to 12 years' experience	3	

S. No	Criteria Description	Max Marks	Marking Criteria	Marks	Supporting Documents
4.2	<b>Subject Matter Specialist (Impact Assessment)</b>	5	More than 15 years' experience	5	CV to be submitted in prescribed format counter-signed by authorized signatory
			From 13 years – up to 15 years' experience	4	
			From 10 years – up to 12 years' experience	3	



- a) Bidders, whose bids are responsive, based on minimum qualification criteria as in Pre-Qualification Criteria and score (ST) at least 70 marks out of total 100 from the technical evaluation criteria would be considered technically qualified.
- b) Evaluation Committee may, at its discretion, call for additional information from the bidder(s) through email/fax/telephone/meeting or any other mode of communication. Such information has to be supplied within the set out time frame as provided by Evaluation Committee, otherwise Evaluation Committee shall make its own reasonable assumptions at the total risk and cost of the bidders and the proposal is liable to be rejected. Seeking clarifications cannot be treated as acceptance of the proposal. For verification of information submitted by the bidders, the committee may visit bidder's offices at its own cost. The bidders shall provide all the necessary documents, samples and reference information as desired by the committee. The bidders shall also assist the committee in getting relevant information from the bidders' references.

5.2.4. Resource Requirement

**a) Key Resource Requirement - (CVs to be submitted for evaluation)**

SI #	Resources required	Minimum Total Years of Work Experience	No. of Resources	Deployment
1.	Team Leader	10 years	1	30%
2.	Subject Matter Expert (Impact Assessment)	10 years	1	40%

**b) Minimum requisite Qualification & Experience –**

S.No.	Key personnel	Requisite Minimum Qualification and Experience
1.	Team Leader	<ul style="list-style-type: none"> <li>• Graduate in Engineering and MBA from a reputed and recognized university or institution.</li> <li>• Minimum <b>10 years</b> of professional experience and with minimum <b>07 years</b> of overall experience in managing infrastructure programs/ schemes with Large Scale Firms /PSUs /Government Agencies.</li> <li>• Should have experience in managing various aspects of highway development processes including pre-construction, construction and operation and maintenance phases</li> </ul>
2.	Subject Matter Specialist (Impact Assessment)	<ul style="list-style-type: none"> <li>• Graduate in Engineering/ Economics/ Statistics and MBA from a reputed and recognized university or institution</li> <li>• Should have 10 years of experience in the fields of advanced data analysis and statistical data modelling etc. and at least <b>5 years of consultancy experience in carrying out Socio-Economic benefits of large-scale ICT/E-Governance/digital transformation projects with Government/PSUs</b></li> <li>• Should have carried out at least 2 impact assessment project of large-scale Government programme in India or abroad.</li> </ul>

**c) Other Resource Requirement (full time) –**

SI #	Resources required	Minimum Qualification	Minimum Work Experience	No. of Resources
1.	Sr. Associate	B. Tech / B. E. and Masters/PG/MBA	5 years	3
2.	Associate	B. Tech / B.E.	3 years	3
3.	Data Analyst	B. Tech / B.E.	3 years	1

5.3. Phase-3: - Financial Bid Evaluation

- a) The Financial Bids of technically qualified bidders will be opened on the prescribed date in the presence of bidder representatives.
- b) If a firm quotes NIL charges / consideration, the bid shall be treated as unresponsive and will not be considered.
- c) The bidder with lowest qualifying financial bid (L1) will be awarded 100% score (amongst the bidders which did not get disqualified on the basis of point b above). Financial Scores for other than L1 bidders will be evaluated using the following formula:
- d) Financial Score of a Bidder (SF) =  $\{(Lowest\ Total\ Financial\ Bid\ Quoted / Total\ Financial\ Bid\ Quoted\ by\ the\ Bidder) \times 100\}$ % (Adjusted to two decimal places)
- e) Only fixed price financial bids indicating total price for all the deliverables and services specified in this bid document will be considered.
- f) The bid price will include all taxes and levies except GST and shall be in Indian Rupees.
- g) Any conditional bid would be rejected
- h) Errors & Rectification: Arithmetical errors will be rectified on the following basis: "If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If there is a discrepancy between words and figures, the amount in words will prevail". If the bidder does not accept the correction of errors, its Bid shall be rejected and the EMD will be forfeited.

NOTE: Original documents in physical form -Physical Submission of original Bid Security, POA for signing the Bid, POA shall only be after declaration of Bid Evaluation Result by the Authority. Bidders failing to submit the original documents required as per above shall be unconditionally debarred from bidding in IHMCL projects for a period of 5 years.

5.4. Combined and Final Evaluation

- a) The technical and financial scores secured by each bidder will be added using weightage as mentioned in the RFP and respectively to compute a Composite Bid Score.
- b) The bidder securing the highest Composite Bid Score will be adjudicated as the **most responsive bidder** for award of the Project. The overall score will be calculated as follows: -

$$S = 80\% * ST + 20\% * SF$$

Where S = overall score of bidder.

- ST = Technical score of the bidder (out of maximum of 100 marks)
- SF = Normalized financial score of the bidder

c) In the event the bid composite bid scores are 'tied', IHMCL may: -

- i. Declare the bidder securing the highest technical score as the Preferred Bidder for award of the Project.
- ii. Take any such measure as may be deemed fit at its sole discretion, including annulment of the bidding process.

## 6. **Conditions of Contract**

As provided in Appendix – IV of this RFP.

## 7. Terms of Reference

### 7.1. About Indian Highways Management Company Ltd.

Indian Highways Management Company Limited (IHMCL) was incorporated on 26.12.2012 under the Companies Act, 1956. It was incorporated to carry out Electronic Tolling and other allied works by NHAI jointly with its Concessionaires and Financial Institutions. The shareholding pattern of stakeholders is NHAI-41.38%, Concessionaires-33.81% and Financial Institutions 24.81%.

For more information on IHMCL please visit [www.ihmcl.co.in](http://www.ihmcl.co.in)

### 7.2. National Electronic Toll Collection programme

7.2.1. NETC programme, the flagship initiative of Ministry of Road Transport & Highways, Government of India (MoRTH) and National Highways Authority of India (NHAI), provides a unified and interoperable electronic toll collection (ETC) solution for National Highways in India. through a RFID-based tag called FASTag. FASTag is a device that employs Radio Frequency Identification (RFID) technology and is affixed on the windscreen of the assigned vehicle and enables a customer to make the toll payments directly from the account which is linked to FASTag.

7.2.2. NETC programme is one of the key projects being implemented by Indian Highways Management Company Ltd. (IHMCL), a company promoted by NHAI.

#### 7.2.3. NETC Programme Objectives:

- To implement Electronic Toll Collection (ETC) solution for National Highways in India based on RFID technology
- To facilitate seamless movement by offering ETC services across all tolled roads in India

#### 7.2.4. Key Stakeholders of the NETC Programme

NHAI, IHMCL, NPCI, Issuer banks, Acquirer banks, Concessionaires/Toll Operators, System Integrators, Tag manufacturers, etc.

#### 7.2.5. Scaling up Electronic Toll Collection infrastructure across toll plazas

In order to remove the bottlenecks associated with manual toll collection and ensure seamless movement of traffic and collection of toll as per the notified rates, the Government had introduced Electronic Toll Collection (ETC) across National Highways in India. Electronic Toll Collection (ETC) entails payment of highway tolls electronically without stopping at the toll plazas. The unique number of the RFID Tag affixed on the wind shield of the vehicle is read by the Readers fitted in the dedicated "ETC" lanes of plazas and sent to the Central Clearing House (CCH) for financial settlement. Interoperable ETC offers the convenience of electronically paying toll at any toll collection point on a national highway across the country through a single ETC account.

#### 7.2.6. Current Status

As on date, over 1300 toll plazas are Live under the NETC programme. More than 8 Crore FASTags have been issued till date and the average electronic toll collection approx. INR 170 Crores per day, average FASTag transaction count was 1 Crore.

Ministry of Road Transport and Highways has mandated that all the lanes in Fee Plazas across India shall be declared as “FASTag lanes of Fee Plaza”. However, in order to facilitate and monitor the oversized vehicles, one lane at every toll plaza will be Hybrid lane accepting FASTags and other modes of payment.

#### 7.3. Scope of Work

The detailed scope of work is described in the sub-sections as below –

##### 1. **Workstream #1: Impact Assessment of NETC Programme**

The workstream shall be largely include the following -

- A. Quantitative and qualitative assessment of the NETC Programme - The previous study report for Impact Assessment of NETC Programme carried out in year 2021 is provided at **Appendix III** of the RFP.
- B. Suggestions on decongesting top 10 congested fee plazas
- C. Impact of ICD 2.5 over ICD 2.4 for transaction time

##### **A. Quantitative Impact Assessment of NETC Program**

- i. Carry out a study to quantify the tangible socio-economic benefits of NETC program. The quantification of tangible benefits should be backed up by reasonable assumptions.
- ii. Perform comparative data analysis vis-à-vis pre and post ETC implementation. The outcome of analysis shall cover the impact on the IHMCL, FASTag users, etc., impact on the Government (national/state), Impact on other Stakeholders, such as concessionaire, toll operating agencies, etc. and impact on environment.
- iii. Derive various quantifying factors for the analysis based on the obtained information / data.
- iv. Carrying out on ground traffic surveys at minimum 40 toll plazas spread across India as representative sample.
- v. The quantitative analysis shall include savings in monetary terms with respect to fuel, reduction in waiting time at toll plaza, savings in monetary terms with respect to manhours, reduction in carbon emissions at toll plazas, increase in Toll Revenue, average speed of commercial vehicles (3 axle and more) after implementation of Electronic Toll Collection at Toll Plazas.

- vi. Comparative data analysis vis-à-vis pre and post ETC implementation and provide a justified conclusion based on the analysis.

**B. Qualitative impact assessment of NETC program**

- a. Carry out a rapid survey of key stakeholders to understand their satisfaction with ETC. The stakeholders to include the following:
  - i. passenger vehicle users
  - ii. freight transporters (truck operators etc.)
  - iii. toll operation stakeholders (operators, operating agencies etc.)
- b. Prepare short questionnaires for rapid survey of different stakeholders, identify the survey channel, roll-out the survey and analyze the findings to provide insights on level of satisfaction across different aspects of the service.

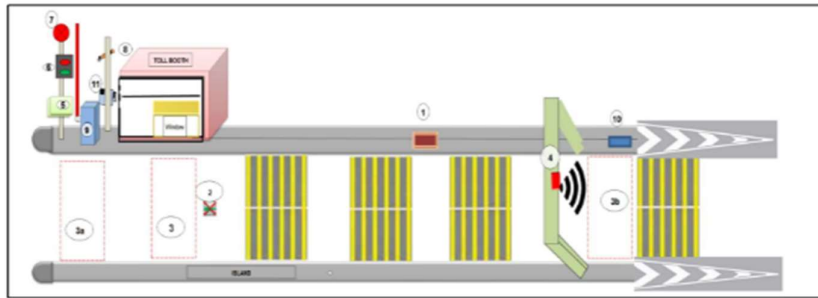
**C. Suggestions on decongesting top 10 congested fee plazas**

- i. Identification and categorization of key issues for delay/congestion at top 10 congested fee plazas.
- ii. Suggest key measures to reduce waiting time at 10 above toll plazas. Selection of Fee Plazas shall be done in consultation with IHMCL.

**D. Impact of implementation of ICD 2.5 (API based) over ICD 2.4 for transaction time.**

**2. Workstream #2: Improvement in FASTag transaction processing by implementation of Swift Flow Lane Concept**

Recently, IHMCL has introduced Swift Flow Lane concept at high transaction fee plazas. Swift flow lane involves repositioning of RFID reader and other related activities to the current Electronic Toll Collection (ETC) system setup as per the indicative layout outlined in below:



List of equipment's

S.No.	Equipment	Symbol	Location
1	Utility/Duct Chamber (size as per requirement)		Island
2	Overhead Lane Signal		Canopy
3	Loop		Lane
3a	Exit Loop		Lane
3b	Entry loop (Optional, as per requirement of Service Provider)		Lane
4	ETC Antenna/ RFID Reader		Pole
5	User fare Display		Toll Booth/Island
6	Traffic Light & Pole		Toll Booth/Island
7	Violation Alarm Light		Island
8	Incident Camera		Island
9	Automatic Lane Exit Barrier		Island
10	Vehicle Separator		Island
11	License Plate Image Capture Camera		Island
12	Chevron marking		Road
13	Bar Marking		Road

The primary objective of implementing the swift flow lane is to enhance the traffic throughput within that specific lane, for active FASTag vehicles, presently validated at Pay axis, and to expedite the validation process.

To achieve this, the automatic barrier gate in the swift flow lane shall remain open in normal condition to allow continuous movement of vehicles affixed with active FASTag, eliminating the need to stop at the toll booth for FASTag validation.

A crucial function of this system is the automatic barrier gate, which will promptly lower whenever a vehicle with an inactive/invalid FASTag or without any FASTag attempts to enter the swift flow lane. This mechanism ensures that only vehicles with active FASTag can freely pass through without any interruption, maintaining the swift flow.

To manage the queue of vehicles and ensure seamless operations, the Vehicle Separator plays a vital role. Vehicle Separator is responsible for detecting direction of vehicle (Forward/reverse), separating, and identifying vehicles within the lane. This allows for efficient queue management and helps in promptly lowering the barrier gate for vehicles without active FASTag, preventing any disruptions to the continuous flow of traffic in the swift flow lane. The combination of an open barrier for active FASTag vehicles and a closed barrier

for inactive or non-FASTag vehicles, along with the assistance of the Vehicle Separator, contributes to the overall objective of enhancing traffic throughput in the designated lane.

IHMCL has implemented Swift flow lane concept at 11 number of fee plazas which includes 24 lanes. Consultant shall carry out a study to quantify the tangible benefits of Swift flow lane.

The quantification of tangible benefits should be backed up by reasonable assumptions.

#### 7.4. Project Duration

The overall duration of the Consultancy Assignment shall be 6 months, extendable up to **additional 6 months** at sole discretion of IHMCL and mutual consent.

#### 7.5. Deliverables & Timelines

The Consultant shall submit the following deliverables as per timelines provided as below:

Deliverable		Timelines for submission
Report on Workstream #1 - Impact Assessment of NETC Programme	Submission & Presentation on of 1 <sup>st</sup> Draft Report	T + 5 months
	Submission of Final Report & Presentation	Within 1 month of presentation of 1 <sup>st</sup> Draft Report
Workstream #2: Improvement in FASTag transaction processing by implementation of Swift Flow Lane Concept	Submission & Presentation on of 1 <sup>st</sup> Draft Report	T + 4 months
	Submission of Final Report & Presentation	Within 15 days of presentation of 1 <sup>st</sup> Draft Report

T is the date of Contract Signing.



## 7.6. Payment Milestones

The Payment Milestones shall be as below:

Deliverable	Amount payable (in Rs.)	Payment Terms
Report on Workstream #1 - Impact Assessment of NETC Programme	70% of (I) in Form 2B	a) 50% of payable amount for the deliverable - On Submission of Final Report  b) Remaining 50% of payable amount for the deliverable – Upon approval of the Final Report
Report on Workstream #2 - Improvement in FASTag transaction processing by implementation of Swift Flow Lane Concept	30% of (I) in Form 2B	a) 50% of payable amount for the deliverable - On Submission of Final Report  b) Remaining 50% of payable amount for the deliverable – Upon approval of the Final Report

## 7.7. Support to be provided by IHMCL

IHMCL will provide the following support, post the award of the contract to the successful bidder:

1. Provide requisite information and data as available with IHMCL.
2. Provide the information on current NETC architecture
3. The aspirations / expectation of the system which is planned to be procured.

## 7.8. Obligations of Consultant

The Consultant shall observe, undertake, comply with and perform, in addition to and not in derogation of its obligations elsewhere set out in RFP, the obligations set forth in this clause:

- a. To perform the Scope of Work as set out in Section 7 of RFP;
- b. To be responsible for compliance with Applicable Laws;
- c. To procure, as required, the appropriate proprietary rights, licenses, agreements and permissions for, inter alia, materials, methods, processes, software, operating systems, designs, trademarks, documents and systems used.
- d. To provide Performance Security in the form of Bank Guarantee to IHMCL, in accordance with relevant section of RFP;

- e. To carry out its obligations hereunder with all due diligence, efficiency and economy, in accordance with generally accepted professional techniques and practices, and to observe sound management practices.
- f. To reasonably cooperate with IHMCL and other stakeholders concerned in relation to the matters covered under this Agreement; and
- g. To be responsible for safety and security of its staff;
- h. To deploy adequate number of resources with qualifications and skills commensurate to the job requirement;
- i. To maintain adequate insurance covers to safeguards its interest regarding any loss/damage/theft to its equipment and or personal during conduct of the assignment;
- j. Indemnify IHMCL against any damage/loss of property or personal of the agency during conduct of assignment.
- k. Sign the Non-Disclosure Agreement (NDA) with IHMCL.

**8. Appendix I- Pre-Qualification & Technical Bid Templates**

The bidders are expected to respond to the RFP using the forms given in this section and all documents supporting Pre-Qualification / Technical Evaluation Criteria.

Pre-Qualification Bid & Technical Proposal shall comprise of following forms as provided in subsequent sections.

8.1. Form 1: Bid Covering Letter

(In the letterhead of the Bidder)

To

Chief Operating Officer

Indian Highways Management Co. Ltd. (IHMCL)

G5&6 Sector 10, Dwarka

New Delhi 110 075

Subject: Request for proposal (RFP) for \_\_\_\_\_

**Ref. No.** RFP. No. \_\_\_\_\_ dated \_\_\_\_\_ -

Dear Sir,

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

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

3. I/We understand that:

- (a) this Bid/Proposal, if found incomplete in any respect and/ or if found with conditional compliance or not accompanied with the requisite application fee and/ or prescribed supporting document shall be summarily rejected.
- (b) if at any time, any averments made or information furnished as part of this application is found incorrect, then the application will be rejected
- (c) IHMCL is not bound to accept any/ all Bid (s) it will receive.

4. I/We declare that:

- a) We do not have any conflict of interest in accordance with relevant clause and we or the our parent / subsidiary /sister concern company are NOT currently engaged by NHAI for user fee collection, tolling operations or system integrator at any NH Fee plazas across the country as on RFP release date. We further undertake that we shall not take up activities such as user fee collection, tolling operations or system integration at NH fee plazas allocated during the Contract period.
- b) I/We understand that you may cancel the Bidding Process at any time and that you are neither bound to accept any Proposal that you may receive nor to invite the Bidders to submit Proposals for \_\_\_\_\_, without incurring any liability to the Bidders, in accordance with relevant clause of the RFP Document
- c) We undertake that in case, due to any change in facts or circumstances during the Bidding Process, we become liable to be disqualified in terms of the provisions of disqualification, we shall intimate IHMCL of the same immediately.
- d) We agree and understand that the Proposal is subject to the provisions of the Bidding Documents. In no case, we shall have any claim or right of whatsoever nature if the contract is not awarded to us or our Proposal is not opened.

- e) We undertake that none of the hardware/software/other component being proposed by us infringes on any patent or intellectual property rights as per the applicable laws.
- f) **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.
- g) **I/We haven't been blacklisted by a Central/ State Government institution/ Public Sector Undertaking/ Autonomous body** and there has been *no litigation* with any Government Department/ PSU/ Autonomous body on account of similar services.

5. I/We declare that our bid is valid for 120 days.

Name .....

Designation/ Title of the Authorized Signatory.....

8.2. Form 2: Brief Information about the Applicant

(To be prepared on letterhead of the Applicant)

Subject: Selection of \_\_\_\_\_

1. Bidder Details
  - a) Name of Applicant:
  - b) Year of establishment:
  - c) Registered Address:
  - d) Constitution of the Applicant entity e.g. Government enterprise, private limited company, limited company, etc.
  - e) UTR No. of Document Fee
2. Address for correspondence with Telephone/ Fax numbers/ e-mail address:
  - a) Authorized Person with Complete postal address:
  - b) Fixed telephone number
  - c) Mobile number
  - d) E-mail address
3. Name of the Statutory Auditor certifying the documents along with his/ her Membership number, if applicable:
4. Applicant details

Required Info	Documentary Evidence Attached (Yes/No, along with page no.)
Field of business	
Registration Status	
Qualifying Projects – value, client, key features	(Summary of projects to be submitted for each Technical Evaluation criteria)
Average Turnover	
Is Bidder debarred by any Government entity (Yes/No)	

5. Financial details/projects meeting the qualifying criteria

Name .....

Designation/ Title of the Authorized Signatory.....

8.3. Form 3: Bank Guarantee for Earnest Money Deposit (EMD)

B.G. No.      Dated:

To,  
Chief Operating Officer,  
Indian Highways Management Company Ltd (IHMCL)  
G-5&6 Sector-10, Dwarka,  
New Delhi – 110075

1.      WHEREAS M/s..... (a company registered under the Companies Act, 2013) and having its registered office at ..... ) (hereinafter referred to as the "Bidder" which expression shall unless it be repugnant to the subject or context thereof include its/their executors, administrators, successors and assigns) desires to submit bids for "<RFP Name>" against IHMCL's RFP No. \_\_\_\_\_

2.      AND WHEREAS the said RFP requires the bidder(s) to furnish an Earnest Money Bank Guarantee (EMBG) along with their bids for the sum specified therein as security for compliance with his obligations in accordance with the said RFP.

3.      AND WHEREAS at the request of the Bidder, we (..... Name of the Bank) having our registered office at..... and one of its branches at ..... (hereinafter referred to as the "Bank"), have agreed to issue such a Bank Guarantee.

4.      NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Bidder for the sum of INR \_\_\_\_\_ (Rupees \_\_\_\_\_) only, and we undertake to pay you, upon your first written demand and without cavil or argument, and without reference to the Bidder, any sum or sums within the limits of INR \_\_\_\_\_ (Rupees \_\_\_\_\_) only as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

5.      Any such written demand made by the Authority stating that the Bidder is in default of the due and faithful fulfilment and compliance with the terms and conditions contained in the RFP Documents (hereinafter referred to as "Bidding Documents") shall be final, conclusive and binding on the Bank.

6.      We, the Bank, do hereby unconditionally undertake to pay the amounts due and payable under this Guarantee without any demur, reservation, recourse, contest or protest and without any reference to the Bidder or any other person and irrespective of whether the claim of the Authority is disputed by the Bidder or not, merely on the first demand from the Authority stating that the amount claimed is due to the Authority by reason of failure of the Bidder to fulfil and comply with the terms and conditions contained in the Bidding

Documents including failure of the said Bidder to keep its Bid open during the Bid validity period as set-forth in the said Bidding Documents for any reason whatsoever. Any such demand made on the Bank shall be conclusive as regards amount due and payable by the Bank under this Guarantee.

7. This Guarantee shall be irrevocable and remain in full force for a period of 180 (one hundred and eighty) days after the Bid Due Date. The claim period shall be 60 (sixty) days thereafter or for such extended period as may be mutually agreed between the Authority and the Bidder, and agreed to by the Bank, and shall continue to be enforceable till all amounts under this Guarantee have been paid.

8. We, the Bank, further agree that the Authority shall be the sole judge to decide as to whether the Bidder is in default of due and faithful fulfilment and compliance with the terms and conditions contained in the Bidding Documents including, inter alia, the failure of the Bidder to keep its Bid open during the Bid validity period set forth in the said Bidding Documents, and the decision of the Authority that the Bidder is in default as aforesaid shall be final and binding on us, notwithstanding any differences between the Authority and the Bidder or any dispute pending before any Court, Tribunal, Arbitrator or any other Authority.

9. The Guarantee shall not be affected by any change in the constitution or winding up of the Bidder or the Bank or any absorption, merger or amalgamation of the Bidder or the Bank with any other person.

10. In order to give full effect to this Guarantee, the Authority shall be entitled to treat the Bank as the principal debtor. The Authority shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee from time to time to vary any of the terms and conditions contained in the said Bidding Documents or to extend time for submission of the Bids or the Bid validity period or the period for conveying acceptance of Letter of Award by the Bidder or the period for fulfilment and compliance with all or any of the terms and conditions contained in the said Bidding Documents by the said Bidder or to postpone for any time and from time to time any of the powers exercisable by it against the said Bidder and either to enforce or forbear from enforcing any of the terms and conditions contained in the said Bidding Documents or the securities available to the Authority, and the Bank shall not be released from its liability under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the said Bidder or any other forbearance, act or omission on the part of the Authority or any indulgence by the Authority to the said Bidder or by any change in the constitution of the Authority or its absorption, merger or amalgamation with any other person or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have the effect of releasing the Bank from its such liability.



11. Any notice by way of request, demand or otherwise hereunder shall be sufficiently given or made if addressed to the Bank and sent by courier or by registered mail to the Bank at the address set forth herein.

12. We undertake to make the payment on receipt of your notice of claim on us addressed to name of Bank along with branch address and delivered at our above branch which shall be deemed to have been duly authorized to receive the said notice of claim. 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.

13. It shall not be necessary for the Authority to proceed against the said Bidder before proceeding against the Bank and the guarantee herein contained shall be enforceable against the Bank, notwithstanding any other security which the Authority may have obtained from the said Bidder or any other person and which shall, at the time when proceedings are taken against the Bank hereunder, be outstanding or unrealized.

14. We, the Bank, further undertake not to revoke this Guarantee during its currency except with the previous express consent of the Authority in writing.

15. The Bank declares that it has power to issue this Guarantee and discharge the obligations contemplated herein, the undersigned is duly authorized and has full power to execute this Guarantee for and on behalf of the Bank.

16. For the avoidance of doubt, the Bank's liability under this Guarantee shall be restricted to INR ..... (Rupees .....). The Bank shall be liable to pay the said amount or any part thereof only if.

the Authority serves a written claim on the Bank in accordance with relevant paragraph hereof, on or before ..... (indicate date falling 180+60 days after the Bid Due Date).

(Signature of the Authorized Signatory)

(Official Seal)

Name:

Date :

Designation:

Employee Code Number:  
Telephone Number:

Name of issuing bank branch _____
Address _____
Telephone number _____
E-mail: _____

Name of bank branch at New Delhi _____
Address _____
Telephone number _____
E-mail: _____

Name of controlling bank branch _____
Address _____
Telephone number _____
E-mail: _____

IHMCL bank account details for SFMS package are mentioned as 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

RFP for Consultancy Services for Impact Study of NETC Programme and other Management  
Consultancy Services for IHMCL

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8.4. Form 4: Bidder's Annual Turnover

RFP Ref \_\_\_\_\_ (Date)

From,  
(Name & Address of the Bidder)

\_\_\_\_\_  
\_\_\_\_\_

To,  
Chief Operating Officer,  
Indian Highways Management Co. Ltd.  
G-5&6, Sector –10, Dwarka, New Delhi 110075

**Subject:** -----

Dear Sir/Madam,

We hereby certify that the average annual turnover of M/s. \_\_\_\_\_ (name of the bidder) for the last three financial years (ending 31<sup>st</sup> March 2023) is as given below:

Annual Turnover for the last 3 Financial Years (FYs) in Indian Rupees (INR)			
FY 2022-23	FY 2021-22	FY 2020-21	Average

Annual Net worth for the last 3 Financial Years (FYs) in Indian Rupees (INR)			
FY 2022-23	FY 2021-22	FY 2020-21	Positive /Negative as on 31 <sup>st</sup> March 2023

Yours Sincerely,

(Signature of Statutory Auditor)

Name of the Statutory Auditor:

Name of the Statutory Auditor Firm:

Seal:

8.5. Form 5: Power of Attorney/Letter of Authorization

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 quotation for RFP Name -----, 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 ....., 2024

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 favor 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 certificate.

8.6. Form 6: Summary of Project Experience Submitted by Bidder

RFP Reference –

Name of Bidder - \_\_\_\_\_

Sl. No.	Name of Project	Client Name	Contract Value of Project (in Rs. Cr)	Start Date of Work	Completion Date of Work	Status (Completed/Ongoing)	Reference for Documentary Evidence to the Technical Proposal/Bid Submitted (Page no., Document name)
For Experience PQ							
For Experience TQ							

8.7. Form 7: Format for Submission of Performance Bank Guarantee

To,  
Chief Operating Officer,  
Indian Highways Management Company Ltd  
G-5&6, Sector 10 Dwarka,  
New Delhi – 110075, India

WHEREAS \_\_\_\_\_ [Name and address of Agency] (hereinafter called “the Consultant”) has decided to apply to IHMCL for providing services, in pursuance of IHMCL letter of work award No. \_\_\_\_\_ dated dd/mm/yyyy for “**Request for Proposal (RFP) For** \_\_\_\_\_ ” (hereinafter called the “Contract”).

1. AND WHEREAS it has been stipulated by IHMCL in the said letter that the Service Provider shall furnish a Bank Guarantee for the sum specified therein as security for compliance with his obligations in accordance with the terms & conditions of the Contract Agreement.
2. AND WHEREAS we have agreed to give the Consultant such a Bank Guarantee:
3. NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Consultant 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 Consultant before presenting us with the demand.
5. We further agree that no change or addition to or other modification of the terms of the Consultant or of the works to be performed there under or of any of the Contract documents which may be made between you and the Consultant 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 Consultant(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 Consultant(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 Consultant or of the Bank.
8. This guarantee shall also be operable at our \_\_\_\_\_ branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension/ renewal thereof shall be made available on demand. In the

contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

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

10. Notwithstanding anything contained herein:

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

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

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

Name:

Date:

Designation:

Employee Code Number:

Telephone Number:

Name of issuing bank branch _____
Address _____
Telephone number _____
E-mail: _____
Name of bank branch at New Delhi _____
Address _____
Telephone number _____
E-mail: _____
Name of controlling bank branch _____
Address _____
Telephone number _____
E-mail: _____



The bank guarantee shall be verified through SFMS package.

8.8. Form 8: Proposed Approach & Methodology

Approach and Methodology divided into the following sections:

- a) Understanding of the project
- b) Potential initiatives given the priorities
- c) Technical Approach and Methodology

Bidder should highlight the problems being addressed and their importance, and explain the technical approach you would adopt to address them. Bidder should also explain the methodologies you propose to adopt and highlight the compatibility of those methodologies with the proposed approach

8.9. Form 9: Proposed Work Schedule & Project Plan

In this section the Bidder should propose the main activities of the assignment, their content and duration, phasing and interrelations, milestones (including interim approvals by the Purchaser), and delivery dates of the reports.

The proposed work plan should be consistent with the technical approach and methodology, showing understanding of the TOR and ability to translate them into a feasible working plan. A list of the final documents, including reports to be delivered as final output, should be included here.

The above should be substantiated with the project plan, as per the following template. The project plan should be consistent with the Work Schedule

No.	Activity1	Dependenc y	Calendar Months												
			1	2	3	4	5	6	7	8	9	10	11	12	n
1															
2															
3															
4															
5															
N															

- Indicate all main activities of the assignment, including delivery of reports (e.g.: inception, interim, and final reports), and other benchmarks such as Purchaser approvals. For phased assignments indicate activities, delivery of reports, and benchmarks separately for each phase.
- Duration of activities shall be indicated in the form of a bar chart.

8.10. Form 10: Deviations/Assumptions

This section should contain any assumption on areas which have not been provided in the RFP OR any changes to the existing provisions of the RFP

A - On the Terms of Reference < Suggest and justify here any modifications or improvement to the Scope of Work you are proposing to improve performance in carrying out the assignment (such as deleting some activity you consider unnecessary, or adding another, or proposing a different phasing of the activities). Such suggestions should be concise and to the point, and incorporated in your Proposal>

B – Any other areas

8.11. Form 11-Team Composition and their Availability

Organization and Staffing. In this chapter the Bidder should propose the structure and composition of your team. You should list the main disciplines of the assignment, the key expert responsible, and proposed technical staff.

Form 9.1: Team composition and Key Tasks

<b>Name of Staff with Qualification and Experience</b>	<b>Area of Expertise</b>	<b>Position Assigned</b>	<b>Task Assigned</b>	<b>Time Committed for the Engagement</b>

8.12. Form 12: Curriculum Vitae (CV) of Key Personnel

1.	Proposed position				
2.	Name of firm				
3.	Name of staff	[First] [Middle] [Surname]			
4.	Date of birth	[]			
5.	Nationality				
6.	Education	[Indicate college/university and other specialized education of staff member, giving names of institutions, degrees obtained, and year of obtainment starting from the latest degree]			
	Name of Institution	Degree(s) / Diploma(s) obtained	Year		
7.	Membership of Professional Organizations				
8.	Training & Publications	[Indicate significant training since education degrees (under 5) were obtained]			
9.	Countries of Work Experience	List countries where staff has worked in the last 10 years)			
10.	Languages	Language	Proficiency (Good/ Fair/ Poor)		
			Speaking	Reading	Writing
		English			
11.	Employment record [Starting with present position, list in reverse order every employment held by staff member since graduation]	Name of Organization	Position held	Duration	
12.	Details of tasks Assigned				
13.	Work Undertaken that Best Illustrates Capability to	[Among the assignments in which the Staff has been involved, indicate the following information for those assignments that best illustrate staff capability to handle the			

	Assigned Handle the Tasks Assigned	tasks assigned]
	<p>Name of assignment or project:                  Year:                  Location:                  Client:                  Project Cost:                  Main project features:                  Positions held:                  Activities performed:</p> <p>Name of assignment or project:                  Year:                  Location:                  Client:                  Project Cost:                  Main project features:                  Positions held:                  Activities performed:</p>	
14.	<p>Certification</p> <p>I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.</p>	
	<p>Signature                  Date: [dd/mm/yyyy]                  Name of staff member:</p>	<p>Signature                  Date: [dd/mm/yyyy]                  Name of Authorized Signatory:</p>

8.13. Form 13: Deployment of Personnel

No	Name of Staff	Deliverables Involved	Staff input in Months (in the form of a bar chart) <sup>2</sup>													Total Staff man-Months Proposed
			1	2	3	4	5	6	7	8	9	10	11	12	N	Total
1																
2																
3																
N																
												Total				

- a. Professional Staff the input should be indicated individually; for Support Staff it should be indicated by category
- a. Months are counted from the start of the assignment.

8.14. Form 14: Format for Self -Certificate of Relevant Experience by bidder

(i) Self-Certificate for Project Experience

Name of Bidder - \_\_\_\_\_

<b>Relevant project experience –</b> (Bidder to specify the relevant clause for project experience to be considered.) For ex. S.No. 6 of Clause 4.3 - Eligibility/Pre-Qualification Criteria or S.No. 2.1 of clause 5.2.3. Technical Qualification Criteria.	
General Information	
Name of the project	
Client for which the project was executed	
Name and contact details of the client	
Project Details	
Description of the project	
Project Start Date	
Project End Date	
Project Status	(Completed or Ongoing)
Scope of services	
Total project cost (in Rs.) excluding taxes as applicable	



(ii) Summary of Project Experience by Bidder

Name of Bidder - \_\_\_\_\_

Sl. No.	Name of Project	Client Name	Contract Value of Project (in Rs. Cr)	Start Date of Work	Completion Date of Work	Status (Completed/Ongoing)	Reference for Documentary Evidence to the Technical Proposal/Bid Submitted (Page no., Document name)
For Experience in PQ							
For Experience TQ							

\*PQ – Eligibility/Pre-Qualification Criteria, TQ – Technical Qualification Criteria

**9. Appendix II :Financial Proposal**

The bidders are expected to respond to the RFP using the forms given in this section for  
Financial Proposal.

Form 1: Covering Letter - Deleted

Form 2: Financial Bid

9.1. Form 1: Covering Letter

(Deleted )

9.2. Financial/Commercial Bid Format

9.2.1. Form 2A: Summary of Costs

S. No.	Particulars	Amount (in Rs.)
A	Total Amount of Financial Proposal - (A) (refer Form 2B)	
B	Out of Pocket Expenses - (B) (refer Form 2D)	
C	Miscellaneous Expenses - (C) (refer Form 2E)	
D	GST as applicable (Applicable rate * (A+B+C))	
	<b>Total (A+B+C), excluding GST</b>	

9.2.2. Form 2B: Breakdown of Price

S. No.	Particulars	Qty	Unit Rate (in Rs.)	Amount (in Rs.)
1	Deliverable Task 1 and 2 - (I)	NA	NA	
	Total (Should be equal to "A" in Form 2 A)			

9.2.3. Form 2C: Breakdown of Remuneration (man month rate)

S. No.	Name of Resource	Position	Deliverables Involved	Unit Cost (per man month rate)	Total Man-month required / Total Remuneration	Amount (in Rs.)
1	<Bidder to put all the resources as mentioned in section 5.2.4>					
2						
3						
4						
5						
..						
..						
	<b>Total (Should be equal to (I) SI # 1 in Form 2B)</b>					



9.2.4. Form 2D: Estimate of Out of Pocket Expenses

S. No.	Description	Unit	Quantity	Unit Price (in Rs.)	Amount (in Rs.)
1					
2					
3					
...					
Total (Should be equal to "B" in Form 2 A)					

9.2.5. Form 2E: Miscellaneous Expenses

S. No.	Description	Unit	Quantity	Unit Price (in Rs.)	Amount (in Rs.)
1	< Any others, please specify >				
2					
3					
...					
Total (Should be equal to "C" in Form 2 A)					

10. **Appendix III - Study Report on Impact Assessment of NETC Programme carried out  
in year 2021.**



# Impact Assessment for National Electronic Toll Collection (NETC) Program

**Final Report**

**Indian Highway Management Company Limited**

**November 2021**





## Disclaimer

- This report has been prepared exclusively for Indian Highways Management Company Limited (IHMCL) (“Client”) based on the terms of the work order Ref: IHMCL/Impact Assessment/KPMG/2021/36 issued to us dated 08<sup>th</sup> February 2021, and our acceptance letter dated 10<sup>th</sup> February 2021.
- This report is confidential and for the use of management only. It is not to be distributed beyond the management nor is it to be copied, circulated, referred to or quoted in correspondence, or discussed with any other party, in whole or in part, without our prior written consent.
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- We have not performed an audit and do not express an opinion or any other form of assurance. Further, comments in our report are not intended, nor should they be interpreted to be legal advice or opinion.
- Our views are not binding on any person, entity, authority, or Court, and hence, no assurance is given that a position contrary to the opinions expressed herein will not be asserted by any person, entity, authority, and/or sustained by an appellate authority or a Court of law.
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## Glossary

Abbreviation	Full Form
NHAI	National Highways Authority of India
IHMCL	Indian Highways Management Company Limited
NH	National Highways
SH	State Highways
NPCI	National Payments Corporation of India
SRTU	State Road Transportation Undertakings
ETC	Electronic Toll Collection
NETC	National Electronic Toll Collection
IT	Information Technology
ASRTU	Association of State Road Transport Undertakings
AITWA	All India Transporters Welfare Association
AIMTC	All India Motor Transport Congress
NHBF	National Highways Builders Federation
HOAI	Highway Operators' Association of India
AIUCF	All-India User Fee Contractors' Federation
RO	Regional Office
PD	Project Director
SI	System Integrator



## Acknowledgment

This first-ever Impact Assessment for National Electronic Toll Collection (NETC) Program report has been prepared by the joint effort of the Mobility and Logistics professionals and Data Science team at KPMG India with inputs and guidance from several officials of the Ministry of Road Transport and Highways (MoRTH), National Highways Authority of India (NHAI), and Indian Highways Management Company Limited (IHMCL).

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It has been our privilege to support NHAI and IHMCL on this important agenda of the Government of India and contribute to nation-building.

**Sameer Bhatnagar**  
**Partner,**  
**KPMG India**

## Executive Summary

**National Highways (NH) constitute the backbone of India's transport sector**, hauling a large portion of passengers and cargo across the country. Over 37 km of new highways are being constructed each day. Increasing congestion and other associated inefficiencies at toll plazas arising from manual (cash based) toll collection necessitated the implementation of Electronic Toll Collection (ETC). The National ETC (NETC) program was launched in 2014 to implement the use of electronic tags (FASTag) for seamless toll payments. ETC was made mandatory on 16 February 2021 and facilitated nearly **93% of all toll payments** on National Highways in March 2021.








Under the NETC program, more than **4.09 Crore FASTags have been issued** which are facilitating **daily average of over 69 lakh toll transactions amounting to daily average toll revenue of more than ₹ 100 Crore across more than 650 NH toll plazas and over 160 toll plazas on State Highways (SH) and other road stretches** (Note: The figures are for the month of October 2021 as per NPCI portal as accessed on 18<sup>th</sup> November 2021). Achievement of these milestones has been made possible by IHMCL along with National Highways Authority of India (NHAI) and National Payments Corporation of India (NPCI) orchestrating **close collaboration between more than 150 diverse entities / organizations** including 100+ toll plaza operators, 30+ banks and 25+ technology partners. However, the **true impact of NETC program is far-reaching** and helping the country achieve tangible as well as intangible benefits, some of which are directly realized by the users and service providers while the others are realized by the wider economy and the country.

This report discusses the tangible and intangible impact of ETC system such as time savings, fuel savings, emissions reduction, improved user experience and others, as well as stakeholder perception of benefits and key improvement areas.

The analysis was undertaken based on historical data as well as primary and secondary research revealing important insights. The **overall annual economic impact of ETC is estimated to be ₹ 43,400+ Crore** on account of various benefits including 46+ Crore hours/year of travel time savings which is equivalent to ₹ 34,300+ Cr/year of economic benefit, toll revenue increase<sup>1</sup> of ₹ 6,100+ Cr, fuel savings of ₹ 2,800+ Cr/year, toll plaza cost savings of ₹ 40+ Cr/year and greenhouse gas emissions reductions of 9,78,200+ tons of CO<sub>2</sub> with estimated value of ₹ 170+ Cr/year. The fuel and transit time savings are helping facilitate expedited freight movement making logistics and mobility more efficient.

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<sup>1</sup> Please note that the tangible benefit of revenue increase is a one-time increase and not a recurring increase each subsequent year.

Summary of intangible benefits	
<p><b>46.3+ Cr hours/year</b></p> <p>Vehicle pass through time saved</p> 	<p><b>260+ vehicles/hour</b></p> <p>Throughput enhancement</p> 
<p><b>~35 Cr liters/year</b> equivalent to <b>₹ 2,800+ Cr/year</b></p> <p>Fuel saved</p> 	<p><b>₹ 6,100+ Cr</b></p> <p>Toll revenue increase</p> 
<p><b>₹ 34,300+ Cr/year</b></p> <p>Economic value of travel time saved</p> 	<p><b>₹ 40+ Cr/year</b></p> <p>Toll plaza savings</p> 
<p><b>9,78,200+ tons CO2e</b> equivalent to economic value of <b>₹ 170+ crores/year</b></p> <p>Emissions reduction</p> 	

In addition, ETC offers various intangible benefits including improved user experience, digitalization of toll transactions, enhanced data collection and improved connectivity. Deeper penetration of ETC system on SHs and other important roads will magnify these benefits. Furthermore, **FASTag itself can be leveraged for new innovative applications** such as payments for other services, law enforcement as well as utilizing transaction data for applications such as traffic visualization, infrastructure planning and data monetization.

Summary of intangible benefits				
Digital Enablement	Real-Time Data Collection and Use	Improved User Experience	Improved Connectivity and Urbanization	Improved Toll Plaza Operations
<ul style="list-style-type: none"> <li>• 3.6+ Cr FASTags issued</li> <li>• 97%+ of toll transactions on NHs via FASTag</li> <li>• 50+ lac transactions /day</li> <li>• INR 90+ Cr / day transacted in July 2021</li> </ul>	<ul style="list-style-type: none"> <li>• Granular toll data – can be used for better infrastructure planning</li> <li>• Real-time traffic visibility - improved traffic management</li> <li>• Anonymous data with monetization opportunity</li> </ul>	<ul style="list-style-type: none"> <li>• Standardized user experience</li> <li>• Higher convenience</li> <li>• Higher safety and security</li> <li>• Reduced stress</li> <li>• Improved air quality</li> </ul>	<ul style="list-style-type: none"> <li>• Improved ease of doing business</li> <li>• Outward expansion of cities</li> <li>• Increased visits to off-city leisure destinations</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced lead time for credit of toll revenue</li> <li>• Improved safety of toll plaza staff in view of COVID-19</li> <li>• Reduced security risk</li> <li>• Increased transparency of toll plaza operations</li> </ul>

The benefits of ETC have also been revealed in the stakeholder perception surveys conducted via online surveys, focus group discussions and interviews for 08 key stakeholder groups which witnessed **participation from 11,000+ individuals and 600+ entities**. These entities represent freight transporters owning a combined fleet of 10,000+ trucks, operators of 200+ toll plazas, 09 state road transport undertakings (SRTUs), 12 banks facilitating more than 90% of all toll transactions, 06 system integrators, besides NHAI and NPCI.

The surveys have further highlighted the benefits of ETC, with **respondents indicating a clear preference for electronic toll payment** over manual toll payment on account of reduced waiting and processing time at toll plaza as well as various other aspects contributing to a vastly improved user experience.

End users of ETC system such as passenger vehicle users, freight transporters and SRTUs have indicated reduced travel time, enhanced convenience, improved safety & security, reduced cash handling, easy reconciliation of toll payments and reduced pollution as key benefits of ETC. This view is also echoed by service providers and ETC ecosystem partners including toll plaza operators, issuer, and acquirer banks, NHAI officials, system integrators, and NPCI.

## Summary of perception on key benefits



### Significant Time Savings

A significant portion of the respondent groups highlighted reduced waiting and processing time at toll plazas, leading to lesser travel time



### Enhanced Safety and Security

Implementation of ETC has positively impacted security and safety due to reduced interaction at toll plazas, especially during pandemic



### Increased Revenue Collection

ETC system has increased transparency as well as facilitated reduction in revenue leakages, thereby increasing revenue collection



### Improved Convenience

ETC system procedures are convenient including tag issuance, recharge facilities and toll deduction alerts



### Reduced Pollution

ETC has ensured seamless travel through toll plazas, resulting in reduced pollution due to decreased idling time of vehicles at the plaza

Surveys also revealed the **key opportunities for improvement** to further enhance the ETC system service quality. Priority areas for improvement include enhancing FASTag quality & read reliability, use of reliable tag scanners at toll plazas, expedited resolution of blacklisted tags to ensure seamless servicing of users, ensuring reference to single database (NETC) by toll plaza operators for all use cases, real-time toll fee deduction updates to users, and increased public awareness to ensure compliant use of FASTag. Some of the other improvement areas pertain to establishment of robust payment dispute resolution mechanisms, reducing negative balance liability for issuer banks, provision for payment of fines for overloaded vehicles using FASTag and simplification of process for issue of new tags.

### Summary of key areas for improvement



#### Tag and Scanner Quality

Various stakeholder groups highlighted the need for improved and standardized tags and scanners, which will further enhance read reliability



#### Resolution of Blacklisted Tags

Time taken to change the blacklist status of a vehicle after FASTag recharge needs to be reduced, since this causes disputes at toll plazas



#### Technical Issues

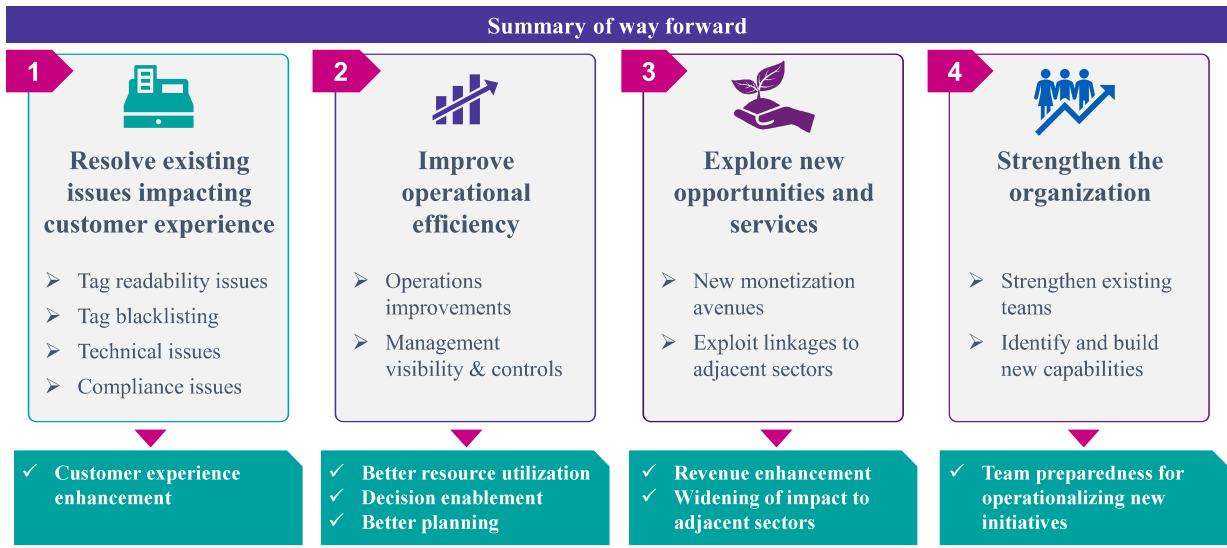
A small portion of users are still facing technical issues such as double payment, overcharging, fines, etc. which needs to be resolved



#### Process improvement and user awareness

Stakeholders indicated a need to improve processes to ensure only one tag per vehicle, adherence to SOPs, payment dispute resolution and user awareness on tag use to further streamline the processes and user experience

A transformative approach could be taken towards addressing above listed improvement areas as it would allow IHMCL to advance to its next growth trajectory. The key elements of such a transformation journey would entail resolving existing issues impacting customer experience, improving efficiency across existing operations, leveraging the ETC eco-system to explore new revenue generation opportunities, and strengthening the complete organization to enable it to leverage the growth opportunities.



Embarking on such a transformation journey founded on continuous innovation and improvement of the ETC ecosystem through customer-centric strategic initiatives will not only facilitate greater efficiencies and wider benefits but will also fundamentally transform the face of logistics and mobility in the country emerging as one of the leading ETC systems in the world.

# 1 Introduction

Highway traffic in India has been increasing at a fast pace each year. Over 50 lakh Indians use National Highways to commute every day. With a network of over 137,000 km\* of National Highways (NH) already existing, the **pace of highway construction has been steadily increasing** over the past few years (from less than 20 km per day to ~37 km<sup>2</sup> per day during FY21) – with Government targeting construction of 40 km per day in the coming years.

Rising traffic calls for increased construction, expenditure to build, operate and maintain highways. These costs are partly recovered through toll collection from individual vehicles upon use of the respective highways at toll plazas on the highways.

The toll fees were traditionally collected manually at the toll plazas against which receipts were issued to the vehicles. However, manual collection process has inherent inefficiencies. Issues with manual toll collection:

- Process entails **halting the vehicle and paying cash to the toll collector** by the side of the toll booth, after which the gate is opened either mechanically or electronically for the vehicle to get through the toll booth. This results in inefficiencies such as **high waiting and service time, congestion, wastage of fuel, high emissions**, reduced productivity, inefficient cash handling etc.
- Rapid pace of highway construction and growth in traffic necessitates an **efficient toll collection mechanism to avoid the wastages** as well as huge investments in physical infrastructure at toll plazas.

Considering various issues pertaining to manual toll collection and to be able to cater to India's ambitious highway development plans and traffic growth, **National Electronic Toll Collection (NETC) program** was launched to establish a common set of norms, processes, business rules, technical specifications etc. and develop a composite interoperable ecosystem for enabling electronic toll collection. Under this program, **Electronic Toll Collection (ETC) system has been implemented across the country by issuing FASTag**, a device that uses Radio Frequency Identification (RFID) technology, for electronic toll payments from a prepaid account linked to it digitally.

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<sup>2</sup> <https://pib.gov.in/PressReleaseDetail.aspx?PRID=1716299> Dated 05 May 2021

## Key Stakeholders involved in the NETC program

NETC program is facilitated by an ecosystem of 150+ entities. The key stakeholders involved in the NETC eco-system are listed below:

- **National Highways Authority of India (NHAI)** is primary implementation authority in India for the development, maintenance and management of national highways which was setup by an Act of Indian Parliament in 1988 and has been entrusted with the flagship National Highways Development Project (NHDP), Bharatmala and other highway development programs of Govt. of India.
- **Indian Highways Management Company Limited (IHMCL)** is the implementing agency for NETC program which was incorporated jointly by NHAI along with its Concessionaires and Financial Institutions with the objective of implementing NETC and allied works of NHAI.
- **National Payments Corporation of India (NPCI)** is an umbrella organization for operating retail payments and settlement systems in India. NPCI facilitates NETC Transactions among all member banks participating in the ‘NPCI network’ and acts as a centralized clearing and settlement body to settle the transactions and fee amount among the member banks.
- **Acquirer bank** is a member bank of NPCI which **acquires Toll Plazas to facilitate the acceptance of toll payment** through NETC system.
- **Issuer bank** is a member bank of NPCI which **issues FASTag** (RFID based ETC tag) to end users (vehicle owners) for toll payment through NETC System.
- **Toll plaza operator** provides infrastructure including NETC RFID Reader, Automatic Vehicle Classification (AVC), Weight in Motion (WIM), Cameras and Toll Plaza Server for the acceptance of FASTag for toll payment through NETC system.
- **End user** (vehicle owner) enrolls for a FASTag with any Issuer bank or IHMCL against which a digital wallet is created which should be adequately recharged by the user for deduction of toll fare.

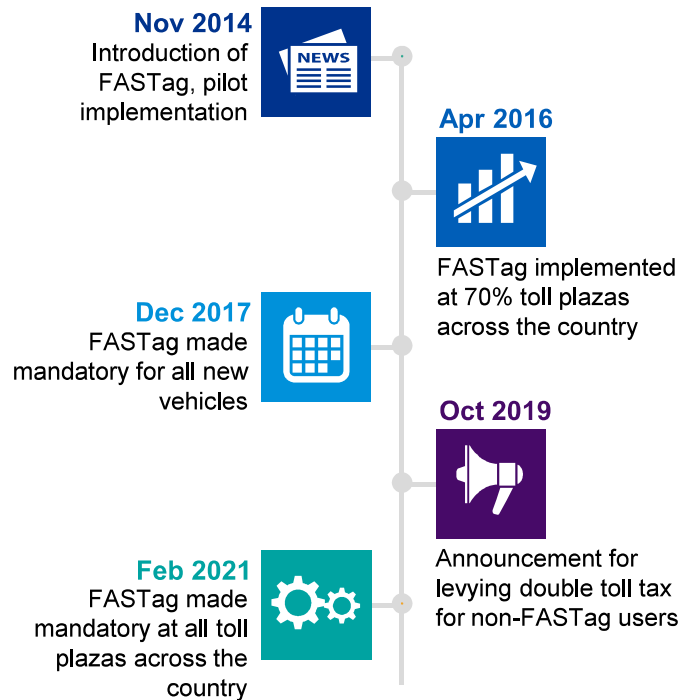
Apart from the stakeholders listed above, system integrators and RFID tag manufacturers are some the other important stakeholders in the overall ecosystem who provide, support, and maintain the requisite technology infrastructure for a seamless electronic toll collection experience to the end-user.



## NETC program – timeline, achievements, salient features, and benefits

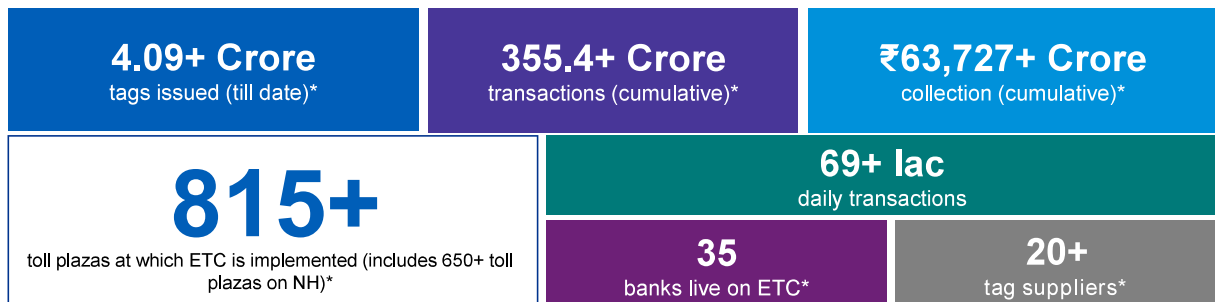
This eco-system of stakeholders has been developed over a period. The figure below provides a timeline of the key milestones achieved by the program since its launch in 2014.

**Figure 1: Timeline of key milestones of the NETC program**



NETC program launched in October 2014 is now facilitating over 69 lakh transactions per day across 815+ toll plazas which include 650+ toll plazas on National Highways. The following figure depicts the key achievements of the program since its inception.

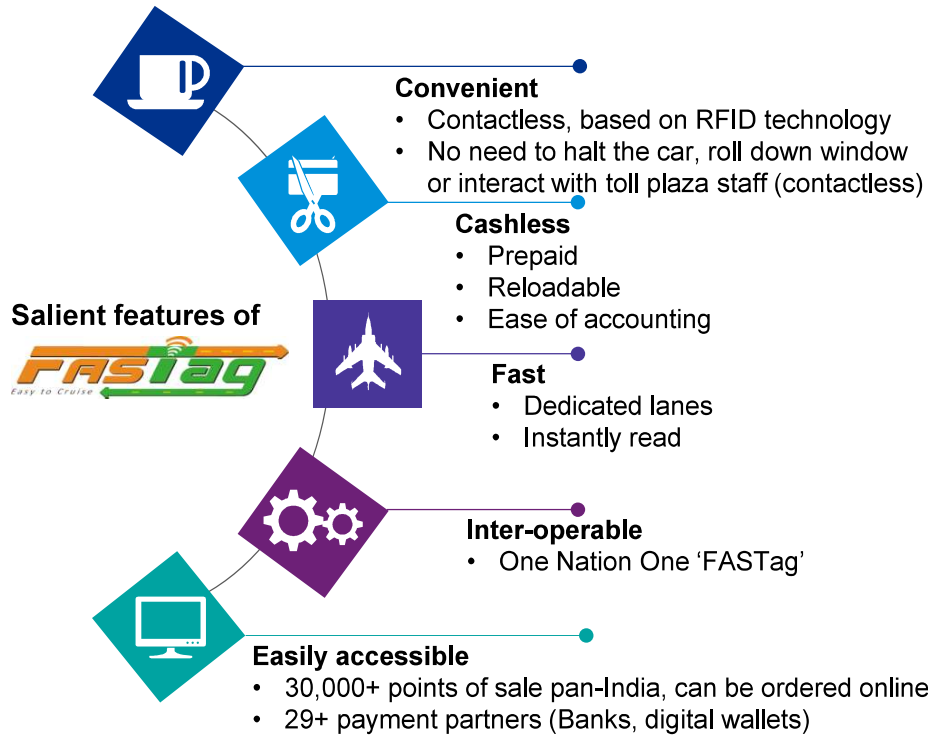
**Figure 2: Key achievements<sup>3</sup> of NETC program**



<sup>3</sup> Data till the month of October 2021 as per NPCI portal “<https://www.npci.org.in/what-we-do/netc-fastag/product-statistics>” as accessed on 18<sup>th</sup> November 2021 (includes 650+ NH toll plazas with balance toll plazas attributed to State Highways and other highways)

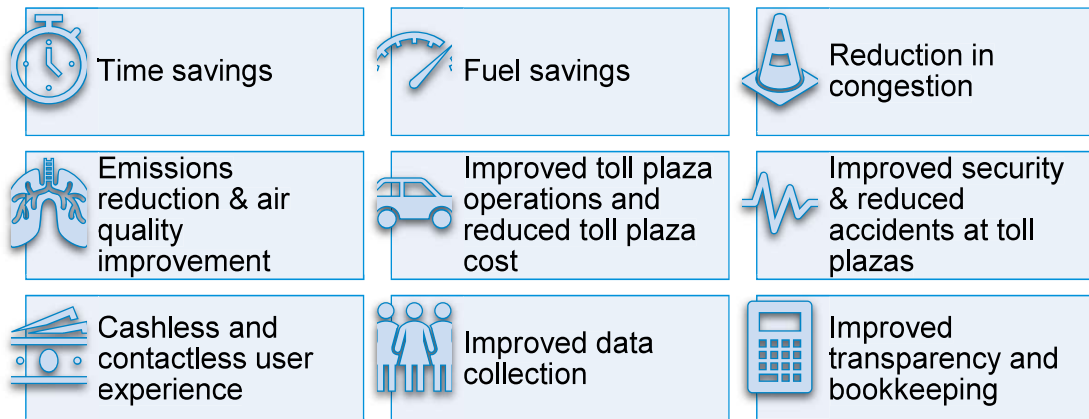
The achievements listed above have come on the back of enhanced user convenience and benefits offered by the system which is comparable to the leading ETC systems globally. Some of the key features of the ETC system implemented under the NETC program are shown in the following figure.

**Figure 3: Salient features of NETC system**



Some of the major benefits resulting from the ETC system are list in the following figure.

**Figure 4: Benefits of NETC system**



## What is in this report?

After a phased implementation of the program, ETC system was made mandatory across all NH toll plazas on 16 Feb 2021 and this report aims to assess the overall impact at national level of the ETC system. The broad aspects covered in this report are listed below:

- **Tangible and intangible benefits** of the ETC system for the users, service providers as well as wider economic and environmental impact
- **Stakeholder perception** of benefits and issues pertaining to ETC including users, service providers as well as ecosystem partners
- **Areas for improvement** based on stakeholder feedback

The scope of this report is limited to National Highways only.

## 2 Overall Approach

Impact of ETC system has been assessed by evaluating its tangible & intangible benefits while also understanding stakeholders' perception of its impact across various aspects.

### 2.1 Tangible and intangible benefits

— **Tangible benefits** are quantifiable benefits which have been further sub-classified into Direct Benefits and Indirect Benefits. These benefits have been quantified based on primary as well as secondary data sources backed by reasonable assumptions.

- **Direct benefits** are identified as the tangible benefits that are realized directly by the user or the service provider, such as reduced vehicle pass-through time, reduced fuel consumption etc.
- **Indirect benefits** are identified as the tangible benefits derived from direct benefits, such as reduced emission due to reduced fuel consumption etc.
- The benefits have been derived primarily through analysis of parameters such as vehicle traffic, processing time at toll booth, waiting time in queue, toll collection at toll plazas and other relevant parameters. Based on these parameters various direct and indirect benefits have been calculated such as vehicle pass-through time saved, toll lane throughput enhancement, fuel savings, emissions reduction etc. The detailed calculation methodology for different benefits is discussed in next chapter on tangible and intangible benefits.
- Key inputs used for calculating the benefits are listed below:
  - Historical toll transaction and toll collection data
  - Primary survey-based traffic count data of sample toll plaza locations across the country
  - Assumptions for calculations identified through secondary research as well as primary interactions with relevant stakeholders

— **Intangible benefits** are other associated unquantifiable benefits resulting from ETC system implementation. These bear both an immediate and long-term positive impact but are not easily quantifiable. Examples include digital enablement due to increased digital transactions, real-time data collection providing real-time visibility on the transactions, collections etc.

— Tangible benefits of ETC system have been quantified while other resultant intangible benefits have been identified as a part of this study.

## 2.2 Stakeholder Perception

- Stakeholder perception has been assessed for various beneficiaries of NETC program through online surveys, focus group discussions and interviews. These include the following:
  - **Passenger vehicle users:** Comprises the passenger vehicle users / owners and represent one of the largest sets of the end user beneficiaries
  - **State Road Transport Undertakings (SRTUs):** Provides bus based intra and inter-state public transportation services in the country - one of the key beneficiaries
  - **Freight transporters:** Provides road-based freight transportation services using trucks - represent the highest number of daily toll transactions
  - **Toll plaza operators:** Manages toll plaza operations and directly responsible for toll collections and providing seamless tolling service to road users
  - **NHAI regional offices, project directors, nodal officers:** Regional representatives of NHAI
  - **Issuer and Acquirer banks:** Facilitates tag issuance to users and toll payment transactions between users and service providers
  - **NPCI:** Umbrella organization for operating retail payments and settlement systems in India and the facilitator for NETC
  - **System integrators:** Technology partners in the ETC ecosystem providing and facilitating IT infrastructure and related support services
- Survey modes used to assess the stakeholder perception are listed below.
  - **Online surveys:** Tailored online survey questionnaires distributed to large respondent groups - Passenger Vehicle Users, Freight Transporters and Toll Plaza Operators
  - **Focus group discussions:** Detailed group discussions for in-depth insights from Freight Transporters, Toll Plaza Operators, State Road Transport Undertakings, Issuer and Acquirer Banks, and System Integrators
  - **Interviews:** One-to-one discussions with smaller stakeholder segments including NPCI, and NHAI Regional Offices/Project Directors/Nodal Officers
- Key aspects that were assessed in the perception survey are listed below.
  - **Demographics and general insights**
    - Demographic details e.g., age, gender, purpose of trips, cars owned etc. for car owners

- Fleet profile, regions of operation, FASTag adoption percentage, use pattern etc. – for freight transporters and toll plaza operators

Note: Anonymous responses were taken across all survey channels across all respondent types

○ **Key themes on which the feedback was taken are:**

- Preference for ETC system for toll collection vs Manual system for toll collection
- Waiting time at toll plaza
- Convenience in toll transactions
- Toll transaction information availability
- Safety and security
- Service experience
- Any areas of improvement

Note: Detailed questions and the responses received are discussed in relevant chapter on stakeholder perception.

### 2.3 Key project milestones and meetings

S.No.	Milestones	Date
1.	Letter of award	08 February 2021
2.	Kick-off meeting	16 February 2021
3.	Inception report submission	20 February 2021
4.	Meeting with CMD, IHMCL	04 March 2021
5.	Meeting with Chairman, NHAI	08 March 2021
6.	Project review meeting with COO, IHMCL	31 March 2021
7.	Project review meeting with COO IHMCL	07 April 2021
8.	Initiation of traffic survey at 25 locations	08 April 2021
9.	Completion of traffic survey at 25 locations with complete data	06 May 2021
10.	Project briefing and review meeting with new COO, IHMCL	07 May 2021
11.	Submission of Draft Report	22 May 2021
12.	Feedback from VP, Operations, IHMCL on Draft Report	31 May 2021 01 June 2021
13.	Feedback from COO, IHMCL over VC on Draft Report	14 June 2021
14.	Feedback from CMD, IHMCL on Draft Report	16 September 2021

### 3 Tangible and intangible benefits

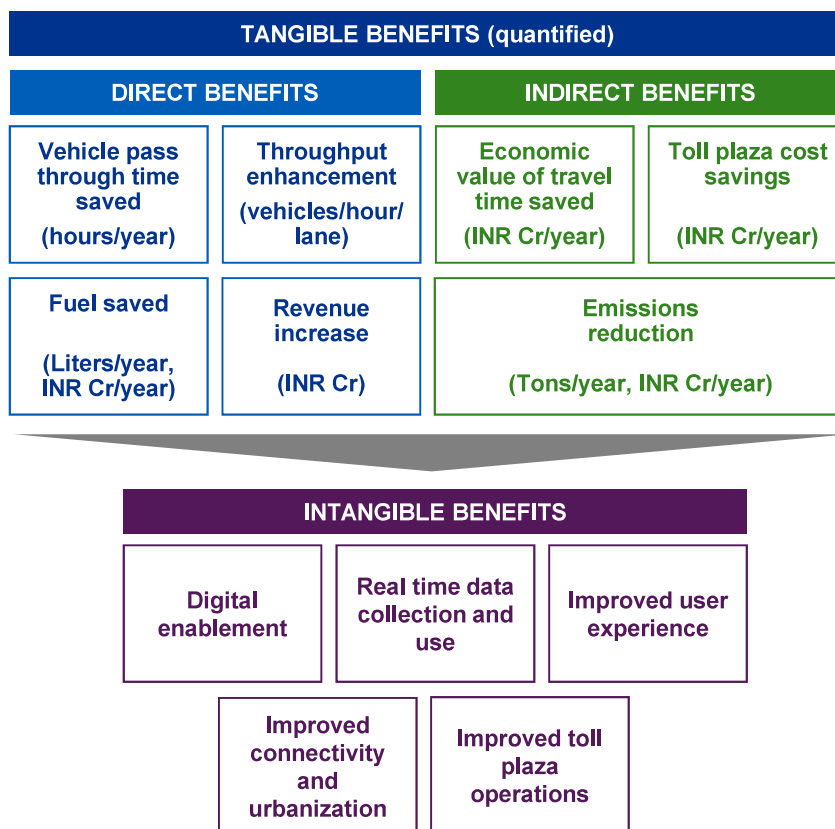
ETC system has reduced the time taken to complete a toll transaction which has reduced the time taken per vehicle to pass through a toll plaza (includes both waiting time in queue and processing time at toll booth until final exit from toll plaza) while also bringing with it fuel savings and emissions reduction.

Lower toll transaction time has enhanced the toll plaza throughput thereby benefitting service providers while also helping them bring down their costs. Reduced travel time and enhanced service quality of ETC system is also helping in higher revenue realization over and above normal growth rate.

Intangible benefits such as digitalization of economy, improved data availability, enhanced user experience etc. further supplement the tangible benefits.

In this study, 4 direct and 3 indirect benefits are quantified under tangible benefits along with multiple intangible benefits discussed under 5 broad categories as shown in the following figure.

**Figure 5: List of Tangible and Intangible Benefits**



The benefits shown in the figure above are discussed in detail in the subsequent sections of this chapter including the definition, methodology used for calculations and the derived values.



### 3.1 Tangible benefits

The tangible benefits, as shown in the previous figure, comprise benefits realized by the users and service providers as well as the economic and environmental benefits realized by the country at a macro level. The definition of these benefits is provided in the following table.

**Table 1: Definition of tangible benefits – direct and indirect**

S.No.	Name of Benefit	Type	Definition
1	<b>Vehicle pass through time saved</b>	Direct	<ul style="list-style-type: none"> <li>Time saved by vehicles in crossing a toll plaza - includes vehicle time saved while waiting in queue and time saved in toll payment</li> <li><i>Unit of measurement: Hours per year</i></li> </ul>
2	<b>Throughput enhancement</b>	Direct	<ul style="list-style-type: none"> <li>Increase in the number of vehicles that can be processed at a toll lane per hour</li> <li><i>Unit of measurement: Vehicles per hour per lane</i></li> </ul>
3	<b>Fuel savings</b>	Direct	<ul style="list-style-type: none"> <li>Fuel saved in the year due to reduced fuel consumption resulting from reduced vehicle idle time at toll plaza</li> <li><i>Unit of measurement: Litres per year, INR crores per year</i></li> </ul>
4	<b>Revenue increase<sup>4</sup></b>	Direct	<ul style="list-style-type: none"> <li>Increased revenue from toll collections resulting from mandatory implementation of ETC in the country</li> <li><i>Unit of measurement: INR crores</i></li> </ul>
5	<b>Economic value of travel time saved</b>	Indirect	<ul style="list-style-type: none"> <li>Monetary equivalent of total vehicle pass through time saved during the year due to ETC system</li> </ul>

<sup>4</sup> Please note that the tangible benefit of revenue increase is a one-time increase and not a recurring increase each subsequent year. The baseline revenue for the stakeholders will increase for FY22 on account of transactions done through ETC system and will remain higher in the subsequent years.

S.No.	Name of Benefit	Type	Definition
			<ul style="list-style-type: none"> <li>• <i>Unit of measurement: INR crores per year</i></li> </ul>
6	<b>Toll plaza savings</b>	Indirect	<ul style="list-style-type: none"> <li>• Savings on capital and operational expenditures associated with toll plazas due to reduced toll lane requirements in ETC scenario</li> <li>• <i>Unit of measurement: INR crores per year</i></li> </ul>
7	<b>Emissions reduction</b>	Indirect	<ul style="list-style-type: none"> <li>• Reduction in yearly vehicular emissions due to reduced idling time of vehicles at the toll plaza</li> <li>• <i>Unit of measurement: Tons per year, INR crores per year</i></li> </ul>

The following sub-sections discuss each of these benefits in further detail.

### 3.1.1 Vehicle pass through time saved

Vehicle pass-through time saved is essentially the sum of reduction in waiting time in the toll plaza queue and reduction in processing time at the toll plaza booth. This is the primary benefit derived from the implementation of the ETC system in the country resulting from reduced processing time leading to reduced queueing at the toll plaza thereby reducing the waiting time for the toll plaza users. All the other benefits are primarily derivatives of this benefit.

#### 3.1.1.1 Approach

The vehicle pass through time is essentially sum of:

- the vehicle time spent in the queue at the toll plaza, and
- vehicle time spent at the toll booth

Vehicle pass through time saved is calculated by first calculating the vehicle pass through time for a vehicle in case of a manual lane followed by calculating it for an ETC lane and the difference between the two is calculated to arrive at the vehicle pass through time saved.

#### Vehicle pass through time calculated using M/M/1 queueing model and Little's Law

Vehicle pass through time for a manual or ETC lane is calculated based on following assumptions<sup>5</sup>:

- Over a short period of time (5 min), the traffic flow at a toll plaza is constant.
- Traffic flow distributes itself across equally across the tollbooth lanes i.e. each driver is rational and tries to minimize his/her time in queue by joining shorter queue and not wasting time irrationally in a longer queue.
- Vehicle time spent in the queue in a toll plaza typically follows a Poisson process.
- Delay caused by vehicle waiting in the queue at the toll plaza is distributed exponentially.
- Time difference between two vehicles arriving at the toll plaza follows exponential distribution.

Further, time spent by a vehicle in a manual or ETC lane is a function of below listed toll plaza level parameters:

- **Number of lanes:** The number of lanes at the toll plaza in the respective direction

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<sup>5</sup> Model for Calculation of Wasted Time at Pay-Toll Area (Authors - Ruben Nuredini, Jasmin Ramadani and Emilija Kamcheva)

- **Traffic Flow:** Total number of vehicles arriving at the toll plaza per unit time which changes based on the time of the day (peak traffic time etc.) as well as the day in the week and the month in the year
- **Processing time:** The number of vehicles that can be serviced / processed per unit time wherein processing one vehicle includes the time taken by the vehicle to start the transaction, pay the toll fee and cross the toll booth barrier till the next vehicle arrives at the toll booth and initiates the transaction. This should typically follow normal distribution with very small standard deviation due to standardized toll collection process in case of manual as well as ETC collection. Hence, this can be assumed to be constant.

**Using the abovementioned assumptions, the vehicle pass through time at a toll plaza has been derived using M/M/1 queueing model<sup>6,7,8</sup> for each lane where a single toll operator services the vehicles that arrive according to a Poisson process.** The results are then generalized across all lanes of the toll plaza and thereafter extrapolated to calculate values for the complete year. The M/M/1 queueing model applied along with Little’s Law to calculate vehicle pass through time for each lane is briefly explained below.

- Let ‘ $\lambda$ ’ be the average number of vehicles arriving per unit time (arrival rate) and ‘ $\mu$ ’ be the average number of vehicles served per unit time (processing rate), then the service intensity ‘ $\rho$ ’ of toll booth can be expressed as

$$\rho = \lambda / \mu$$

- Suppose, ‘ $K$ ’ is the variable denoting the number of vehicles in the queue. For a Markovian arrival process, the corresponding probability mass function of ‘ $K$ ’ can be expressed as below:

$$P(K = k) = (1 - \rho) \times \rho^k \quad \text{where } k = 0, 1, 2 \dots^*$$

- Suppose, ‘ $Q$ ’ is the variable denoting the number of vehicles in the queue excluding the vehicle being analysed. Then clearly,

$$Q = \begin{cases} K - 1 & \text{if } K \geq 2 \\ 0 & \text{if } K = 0, 1 \end{cases}$$

- Thus, the probability mass function of ‘ $Q$ ’ can be expressed as below:

<sup>6</sup> Study on Toll Plaza Design Based on M/M/1 Queue Theory (Author- Cheng Wang)

<sup>7</sup> Strategy to Reduce Queuing Time at Toll Plaza (Authors - A Kumar, A Thakare, A Tawalare)

<sup>8</sup> Performance Modelling of Communication Networks and Computer Architectures by Peter G Harrison, Naresh M. Patel

$$P(Q = q) = \begin{cases} P(K = 0) + P(K = 1) = 1 - \rho^2 & \text{if } q = 0 \\ P(K = q + 1) = (1 - \rho) \times \rho^{q+1} & \text{if } q > 0 \end{cases}$$

- From the probability mass function of ‘Q’, the expected value of ‘Q’ can be derived, which is:

$$E(Q) = \rho^2 / (1 - \rho)$$

- Suppose, ‘W’ is the variable denoting the waiting time of the vehicle in the queue. Then the expected value of ‘W’ can be calculated using Little’s Law as:

$$E(W) = E(Q) / \lambda = \rho / (\mu \times (1 - \rho))$$

- Suppose, ‘S’ is the variable denoting the service time or processing time for the vehicle. The expected value of the service time (processing time) can be expressed as:

$$E(S) = 1 / \mu$$

- Suppose ‘T’ denotes the time spent by the vehicle being analysed. Then the time spent by the vehicle (or vehicle pass-through time) will be the sum of the time spent in service (processing) and the time spent in the queue. In terms of expected value of ‘T’, this can be expressed as:

$$E(T) = E(W) + E(S) = \rho / (\mu \times (1 - \rho)) + 1 / \mu = 1 / (\mu - \lambda)$$

The time spent per vehicle per lane calculated based on above methodology is generalized across all the lanes of a toll plaza to derive total vehicle pass through time spent by all vehicles in the year across all NH toll plazas.

### 3.1.1.2 Calculating Inputs

Application of the methodology described above requires three key inputs which are:

- Processing time distribution
- Traffic arrival rate distribution
- Month-wise traffic for the year

The processing time and month-wise traffic could be calculated using the historical toll transaction data already available with IHMCL (approach discussed subsequently). However, no data was available on traffic arrival rate at the toll plazas and needed to be collected through primary traffic survey. The large number of toll plazas that would need to be surveyed to collect the vehicle arrival

rate information would adversely impact the timelines of the study and the associated costs will be extremely prohibitive.

Hence, an approach was adopted which involved data collection and analysis of a sample set of toll plazas. Accordingly, the processing time distribution and traffic arrival rate was studied for the identified list of sample toll plazas and extrapolated to all the other NH toll plazas. The methodology for identification of the sample toll plaza locations for the primary traffic survey is explained below in detail.

**Sampling methodology for identifying locations to assess processing time and traffic arrival rate**

**Determination of sample size**

At the time of the sample selection, there were 641 ETC enabled NH toll plazas operating in the country. Due to time and monetary constraints, it was not feasible to survey all 641 toll plazas. Accordingly, a representative sample was suitably selected for primary traffic survey which was then used to estimate population statistics.

Out of 641 NETC enabled toll plazas operating on the NH, 58 toll plazas were temporarily in-active and 10 toll plazas were either live with handheld devices or partially live. As the survey required study of locations with complete ETC implementation, these 68 toll plaza were eliminated from the list for sample location selection. Hence, after elimination, sample selection was done basis remaining 573 active toll plazas operating with ETC live across all lanes. Further, plazas at Yekeram and Nimbhi Jodhan were removed due to data paucity. Accordingly, sampling was carried out from the remaining 571 toll plazas.

There are two key parameters that are considered for creation of sample size for data with finite population viz. Confidence Interval (CI) and Margin of Error. The interpretation for this as an example is that for a 95% CI and 10% margin of error, the statistic calculated for the sample will be within 10% error range of the statistic for the population 95% of the time it is estimated. The table with different sample sizes at different CI and margin of error levels for a population size of 641 is provided below.

**Table 2: Sample sizes at different confidence intervals and margin of errors**

S.No.	Confidence Interval (%)	Margin of error (%)	Corresponding Sample Size (i.e. number of toll plazas to be surveyed)
1	95%	5%	~241

S.No.	Confidence Interval (%)	Margin of error (%)	Corresponding Sample Size (i.e. number of toll plazas to be surveyed)
2	95%	10%	~84
3	95%	20%	~24
4	90%	5%	~191
5	90%	10%	~62
6	90%	20%	~17

Considering the short time for completion of the physical survey and to incorporate the survey findings in the study, a larger sample size for the survey was not feasible. Hence, a smaller sample size of 25 toll plaza was identified leading to 95% CI and 19.6% margin of error. There are certain factors which may influence the vehicle arrival rate at a toll plaza such as total volume of vehicle, region, and type of plaza. Out of these, region and type of plaza are categorical variables and total volume is numerical variable.

**Criteria for sample selection**

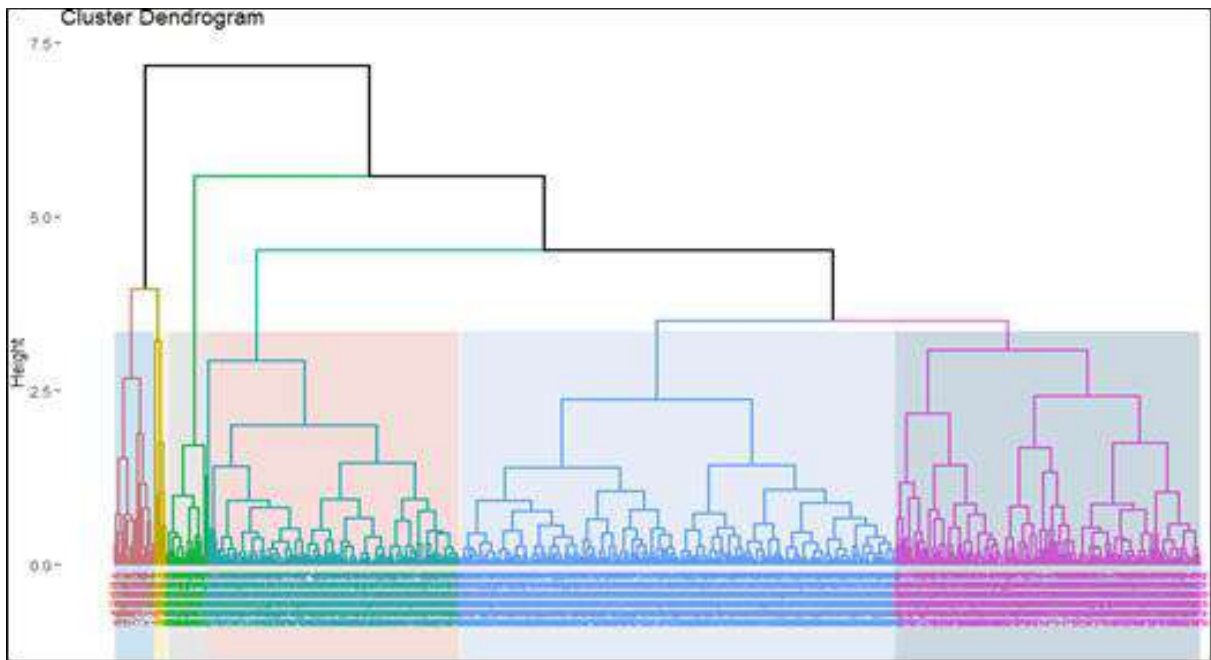
In order to ensure proper representation in the sample, certain criteria were identified for the selection. One of the key considerations in selection of the representative sample was to include major highway networks that connect the major cities of India. This includes the Golden Quadrilateral, North–South and East–West Corridors developed by Govt. of India connecting most of the major industrial, agricultural, and cultural centers of India. Out of the 571 toll plazas, 167 of them were identified to be part of Golden Quadrilateral, North-South and East-West Corridor. 18-19 toll plazas were selected from these so that it has an approximate share of 72-76% in the sample. The remaining sample locations were chosen from rest of the 404 toll plazas. Further, it was ensured that no state has more than two toll plazas in the sample and one toll plaza was selected from the North-Eastern Region. For proper traffic representation, hierarchical clustering was used to choose the sample.

**Hierarchical clustering**

The population was divided into two sub-population. One consisted of 167 strategically important toll plazas (because of being located on the Golden Quadrilateral, North-South and East-West Corridors) and the rest of 404 were made part of the second sub-population. Thereafter, hierarchical clustering

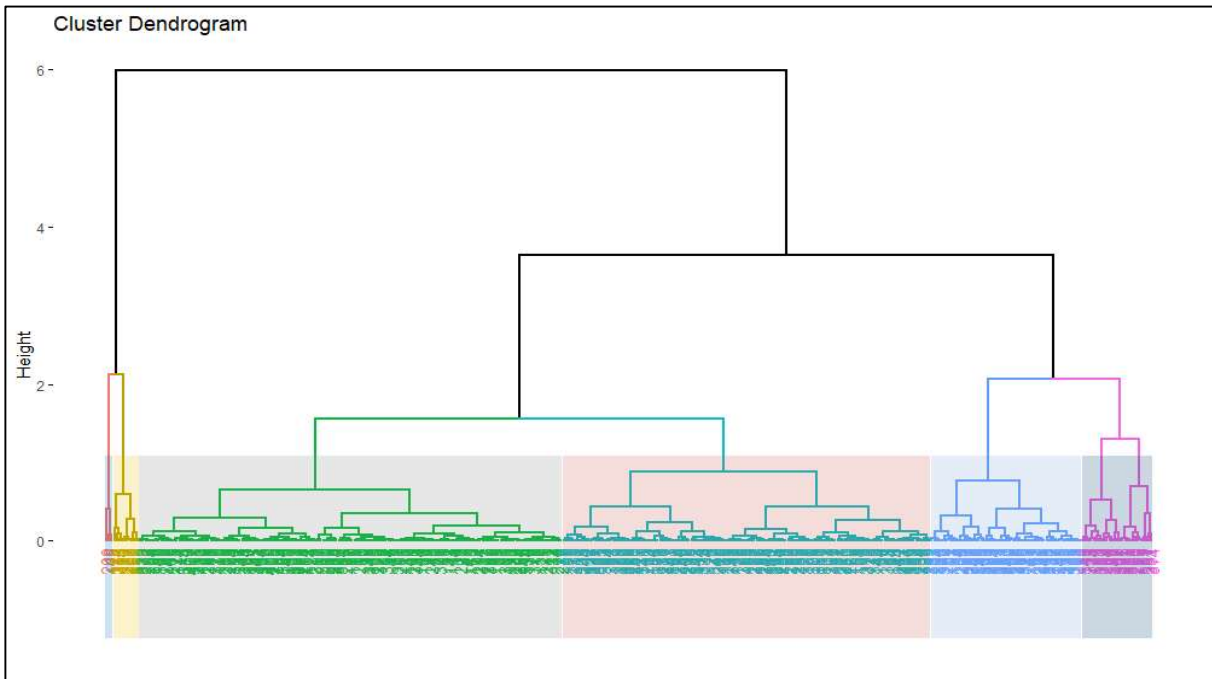
was used separately for the two types of population. Using total volume as the factor, hierarchical clustering was done with complete linkage and Euclidean distance of the first sub-population consisting of strategically important toll plazas. Using that, 7 clusters were identified. The dendrogram for 7 clusters is drawn below. Due to 167 data points plotted in the dendrogram, the data-labels are not legible. Similarly, for the rest 404 data points in the second sub-population, 6 clusters were identified and the dendrogram is drawn below.

**Figure 6: Cluster dendrogram for the first sub-population (167 data points)**





**Figure 7: Cluster dendrogram for the second sub-population (404 data points)**



### Stratified random sampling for sample creation

Stratified random sampling was used to identify 25 sample toll plaza locations for primary traffic survey. The sampling is done in a way that it preserves the representation of different states in India, plaza types (concessionaire, public funded), and volumes (high and low volume).

For the first sub-population, 4 of the 7 clusters identified through hierarchical clustering were small. Therefore, these four clusters were merged to make one cluster and thus a total of 4 clusters were obtained. For the second subpopulation, 4 of the 6 clusters identified through hierarchical clustering were small. Therefore, these four clusters were merged to make one cluster and thus a total of 3 clusters were obtained

A Simple Random Sampling (SRS) was carried out on each of the strata so that the proportion of the strata in the population is preserved. Thereafter, the representation was ensured by choosing a sample which satisfy all the sample selection criteria discussed earlier. Thus, a representative random sample of size 25 from the population was obtained with the distribution as provided in the following table.

**Table 3: Representation of various types of toll plazas in the selected sample**

Indian States Covered	High volume locations		Low volume locations		Total
	Concessionaire toll plazas	Public Funded toll plazas	Concessionaire toll plazas	Public Funded toll plazas	
17	11	2	1	11	13

Locations with 9,435 or more transactions per day (which is the average number of transactions per plaza) are considered as high-volume toll plazas while the locations with less than 9,435 transactions per day are considered as low volume toll plazas. Sample list covered a total of 17 states. List of 25 toll plazas selected for primary traffic survey and data analysis is provided in the following table.

**Table 4: List of 25 sample toll plazas for the study**

S.No.	Toll Plaza Name	State	NHAI Regional Office	NH No.
1	AIT	Uttar Pradesh	Lucknow - West	NH 27
2	Ramnagar	Madhya Pradesh	Bhopal	NH 27
3	Paschim Madeti	West Bengal	Kolkata	NH 31
4	Varahi	Gujarat	Gandhinagar	NH 15
5	Barsoni	Bihar	Patna	NH 31
6	Nazirakhet	Assam	Guwahati	NH 37
7	Vadodara	Gujarat	Gandhinagar	NE 1
8	Manguli	Odisha	Bhubaneswar	NH 16
9	Karajeevanahally	Karnataka	Bangalore	NH 48

S.No.	Toll Plaza Name	State	NHAI Regional Office	NH No.
10	Pallikonda	Tamil Nadu	Chennai	NH 48
11	Madapam	Andhra Pradesh	Vijayawada	NH 16
12	Bellupada	Andhra Pradesh	Bhubaneswar	NH 5
13	Khedki Daula	Haryana	Delhi	NH 48
14	Nemili (Sriperumbadur)	Tamil Nadu	Chennai	NH 48
15	Jaladhulagori	West Bengal	Kolkata	NH 6
16	Saiyan or Jajau	Madhya Pradesh	Bhopal	NH 3
17	Bann	J&K	Jammu	NH 44
18	Borkhedi	Maharashtra	Nagpur	NH 7
19	Indalwai	Telangana	Hyderabad	NH 44
20	Pipli	Odisha	Bhubaneswar	NH 316
21	Koyla	Uttar Pradesh	Dehradun	NH 9
22	Mashora	Chhattisgarh	Raipur	NH 30
23	Ashiv	Maharashtra	Nagpur	NH 361
24	Banushi	Uttarakhand	Dehradun	NH 125
25	Amoli	Rajasthan	Jaipur	NH 11

## Processing time

The processing time is calculated using the following data:

- Processing time for ETC lane calculated using EGCS data for the period October 2020 to January 2021 for the 25 sample toll plaza locations.
- Processing time for Manual lane calculated using TMS data for the sample toll plaza locations.

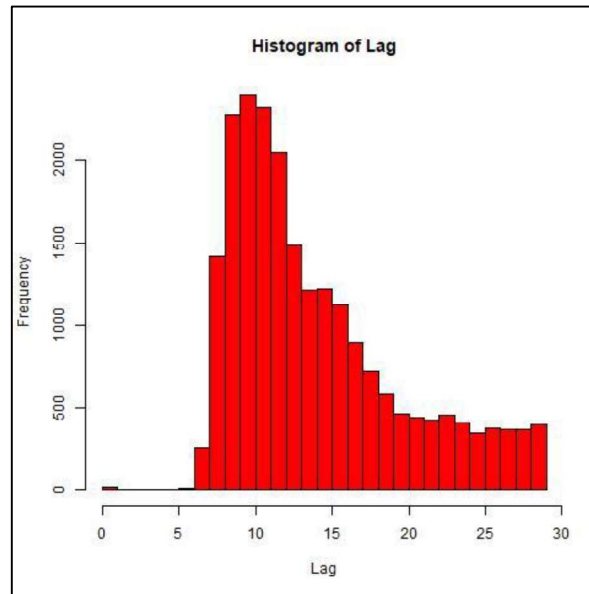
As described earlier, processing time is defined as the time taken to process one vehicle which includes the time taken by the vehicle to start the transaction, pay the toll fee and cross the toll booth barrier till the next vehicle arrives at the toll booth and initiates the transaction. In simpler terms, this is essentially vehicle-to-vehicle processing time.

Hence, processing time is calculated as the difference in the toll transaction time stamp of consecutive vehicles for a particular lane in a particular plaza. This assumes that the processing time doesn't vary based on the vehicle type and assumes it to be the same for all vehicle types. Thus, for each lane a profile for the time difference of two transactions is derived. Primary surveys highlighted that typically the ETC processing time does not exceed 30 seconds and typically the manual processing time does not exceed 60 seconds. It was assumed that any difference of more than these values in the respective scenarios (ETC and manual) is primarily attributable to absence of queue or operational issues. Accordingly, vehicle-to-vehicle processing time observations which were greater than 30 seconds and 60 seconds in the ETC and manual scenarios respectively were removed from the processing time data set. The following sub-sections describe the analyses undertaken to derive the processing time in ETC and Manual system scenario.

### Processing time in ETC Scenario

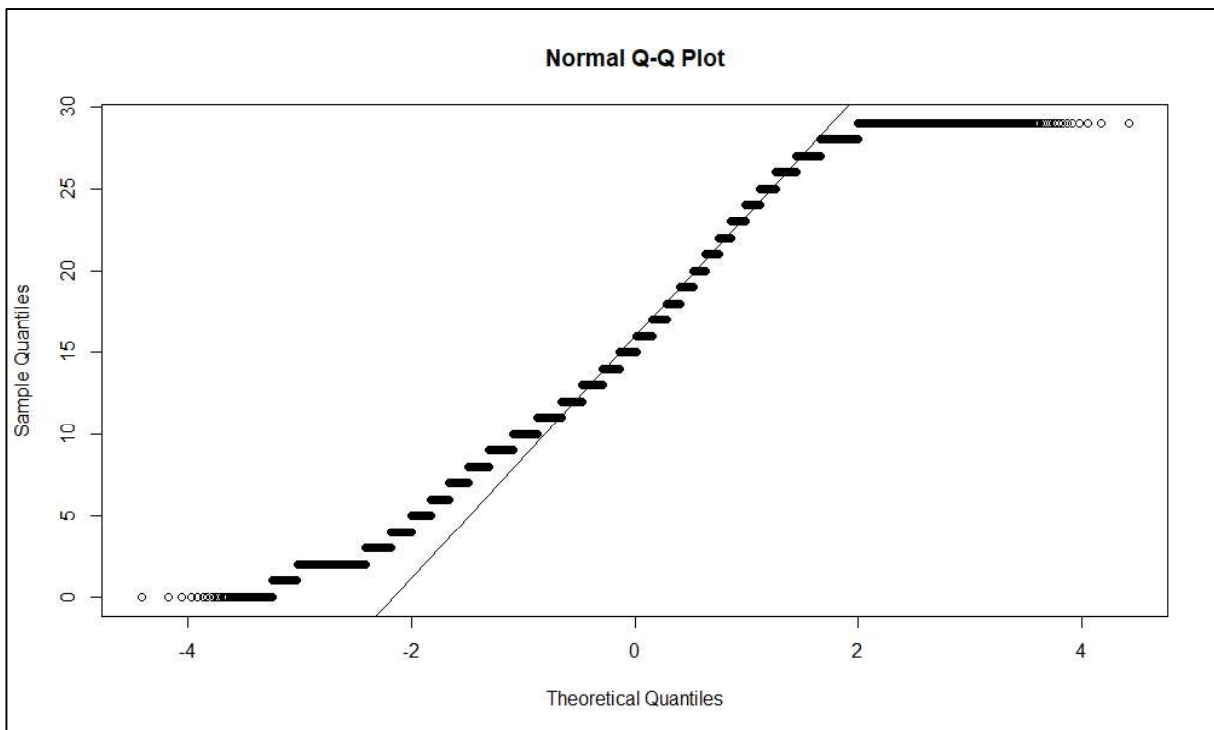
The toll plaza-wise lane-wise processing time was calculated, and histograms prepared based on the EGCS data as mentioned above. As an example, the following histogram depicts the distribution of the processing time for Manguli toll plaza for the 1<sup>st</sup> lane in the west direction. Here lag refers to the time difference between two consecutive vehicles on that lane.

**Figure 8: Histogram of processing time on a sample basis - ETC**



It was further investigated whether the processing time varies with hour and day type (weekdays and weekends, Saturday, and Sunday). The processing time data was therefore tested to see if it is normally distributed to test for statistically significant difference in the processing time across day-type. Quantile-quantile plot was used to achieve this which is shown below.

**Figure 9: Quantile-quantile plot to check if the data is normally distributed - ETC**



The plot shown above suggests that the data is not normally distributed. To further establish this, Kolmogorov Smirnov Test was conducted on the data and the result shown in the following figure was obtained which further suggests that the data was not normally distributed.

**Figure 10: One-sample Kolmogorov-Smirnov test - ETC**

```
data: Data$LagTime[1:1e+05]
D = 0.079636, p-value < 2.2e-16
alternative hypothesis: two-sided
```

Subsequently, Wilcoxon signed-rank test was used to check for difference, and it was concluded that the day-type is a statistically significant factor in the case of ETC processing time. This is shown in the following figure where the first test corresponds to the difference between weekday and weekend and the second one corresponds to the difference between Saturday and Sunday.

**Figure 11: Wilcoxon signed-rank test - ETC**

```
weekday vs weekend

wilcoxon rank sum test with continuity correction

data: Data[Data$WDay == "weekend", ]$LagTime[1:1e+05] and Data[Data$WDay ==
"weekday", ]$LagTime[1:1e+05]
W = 5175107060, p-value < 2.2e-16
alternative hypothesis: true location shift is not equal to 0
95 percent confidence interval:
 4.835935e-05 1.846982e-05
sample estimates:
difference in location
 6.726718e-05

Saturday vs Sunday

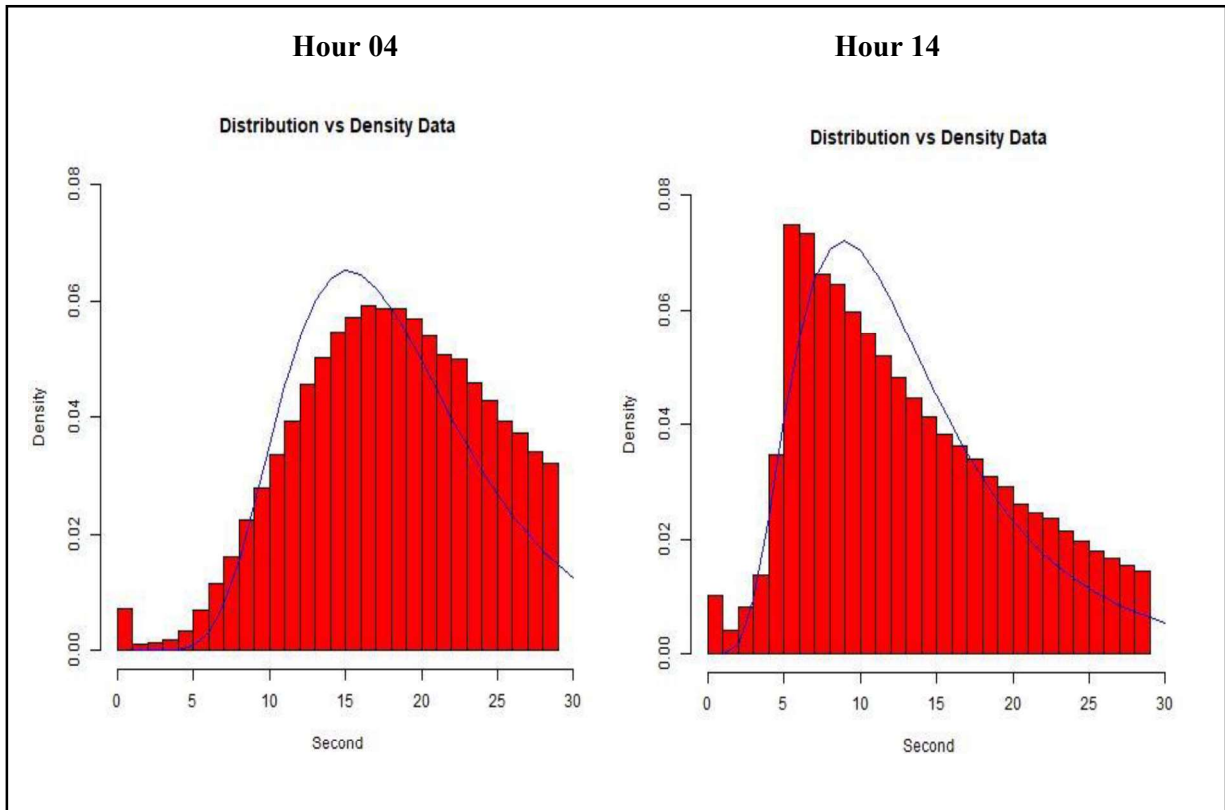
wilcoxon rank sum test with continuity correction

data: Data[Data$weekday == "Sunday", ]$LagTime[1:1e+05] and Data[Data$weekda
y == "Saturday", ]$LagTime[1:1e+05]
W = 4912458624, p-value = 1.129e-11
alternative hypothesis: true location shift is not equal to 0
99 percent confidence interval:
-1.008957e-05 -7.117912e-05
sample estimates:
difference in location
-2.824782e-05
```

Also, the distribution of processing time (lag) varied with hour in the day. Thus, hour in the day was considered as a factor to calculate the ETC processing time distribution across different times. This is

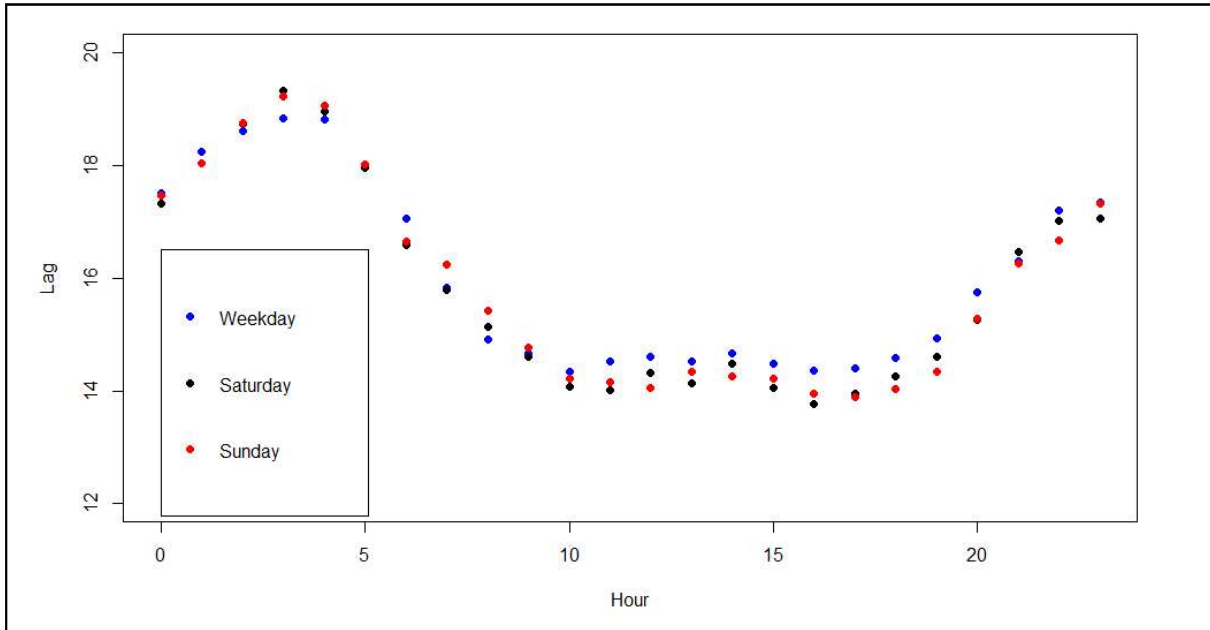
demonstrated as an example through the following figures where processing time is plotted for hour 04 and hour 14 in the day. It can be observed that for hour 04 the peak (mode) is to the right as compared to hour 14.

**Figure 12: Example of difference in processing time distribution in different hours – ETC**



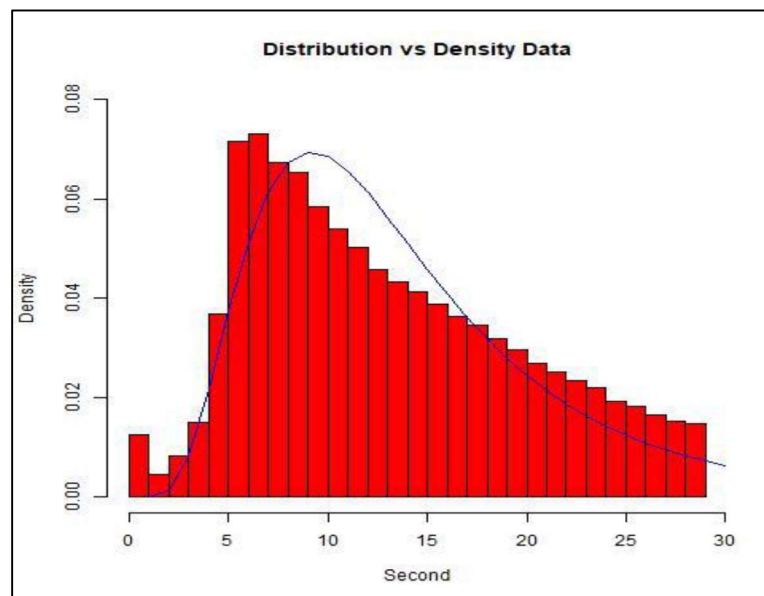
The processing time gradually shifts across different hours. A plot of the mean processing time of different lanes and locations is shown in the following figure where the lag corresponds to the difference in the transaction of two consecutive vehicles. It can be observed that the mean processing time is lower in the daytime which holds true across the day types.

**Figure 13: Plot of mean processing time (lag in seconds) across different hours in the day – ETC**



The graph provided above, and the histogram provided previously suggest that the ETC processing time is lower in the daytime. Thus, to estimate processing time, it was assumed that between hour 9 and hour 20 the ETC processing time doesn't exceed 20 seconds. Further, log-normal distribution was found to be the best distribution that fit the processing time data across different hours and day-type. The following diagram shows the same for hour 9 and Saturday.

**Figure 14: Histogram and Fitted Distribution for Hour 9 on Saturday – ETC**





It was observed that in some of the hours, the fit of the distribution with the density of the actual value was significantly different. Accordingly, the mean of the processing time was considered for calculations. Based on this, the hourly and day-type profile for the vehicle-to-vehicle ETC processing time was derived which is provided in the following table.

**Table 5: Processing time distribution in seconds across days and hours – ETC**

Hour (24 hour format)	On Weekday (seconds)	On Saturday (seconds)	On Sunday (seconds)
1	16.83410	16.58494	16.68402
2	17.76239	17.38550	17.73700
3	18.39621	18.08367	18.36896
4	18.47594	18.15736	18.60999
5	18.31734	18.06853	18.63569
6	17.24790	17.28214	17.76174
7	15.88983	15.74900	16.43306
8	14.37811	14.65694	15.39390
9	10.77860	11.38271	12.20958
10	10.66862	11.23989	12.03628
11	10.93622	11.13124	11.77233
12	11.03638	11.01108	11.46421
13	11.05714	10.87214	11.28655

Hour (24 hour format)	On Weekday (seconds)	On Saturday (seconds)	On Sunday (seconds)
14	11.06066	10.84529	11.14798
15	10.99334	10.88911	11.17706
16	10.90365	10.82783	11.03912
17	10.84079	10.69288	10.99309
18	10.52463	10.47629	10.88717
19	10.39606	10.48675	11.05947
20	10.78391	10.79687	11.30238
21	14.62470	14.31687	14.60685
22	15.23932	15.41374	15.45153
23	15.91670	15.88253	15.87678
24	16.36174	16.51319	16.74798

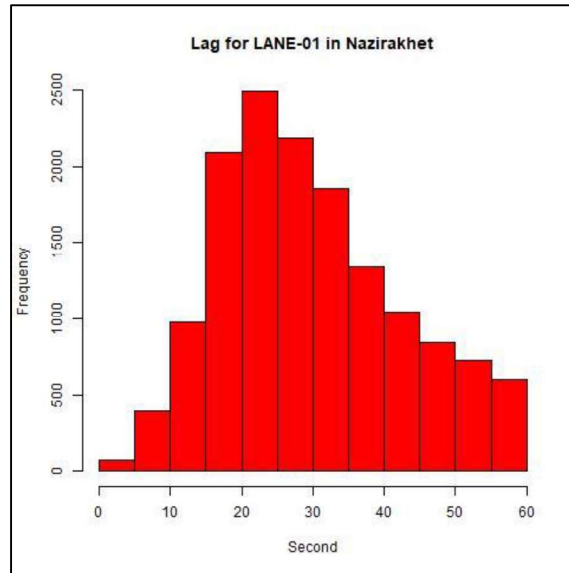
Based on the above analysis, the average ETC processing time is derived to be **~14 seconds/vehicle**.

**Processing time in Manual Scenario**

The TMS data for 21 locations was shared for the purpose of calculating the processing time in the manual scenario. However, the shared data was found to be inconsistent on account of missing data, inconsistent granularity, and different file formats. The inconsistencies result due to use to different systems by different toll plaza operators leading the variations in the way the data is captured in the local TMS systems. As a result, data for only 4 locations was found to be usable which includes Amoli, Mashora, Khedki Dhaula, and Nazirakhet toll plazas for the month of December and January.

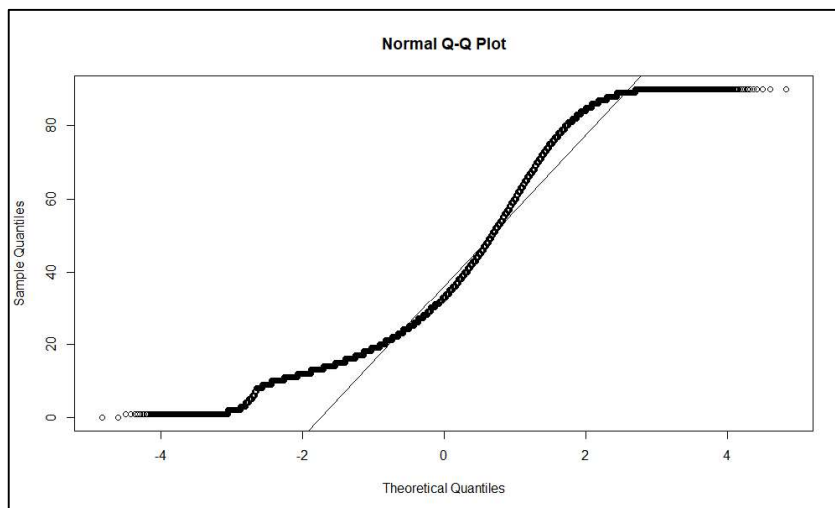
The toll plaza-wise lane-wise processing time was calculated, and histograms prepared based on the TMS data. As an example, the following histogram depicts the distribution of the processing time for Nazirakhet toll plaza for the 1st lane. Here lag refers to the time difference between two consecutive vehicles on that lane.

**Figure 15: Histogram of processing time on a sample basis – Manual**



It was further investigated whether the processing time varies with hour and day type (weekdays and weekends, Saturday, and Sunday). The processing time data was therefore tested to see if it is normally distributed to test for statistically significant difference in the processing time across day-type. Quantile-quantile plot was used to achieve this which is shown in the following figure.

**Figure 16: Quantile-quantile plot to check if the data is normally distributed – Manual**

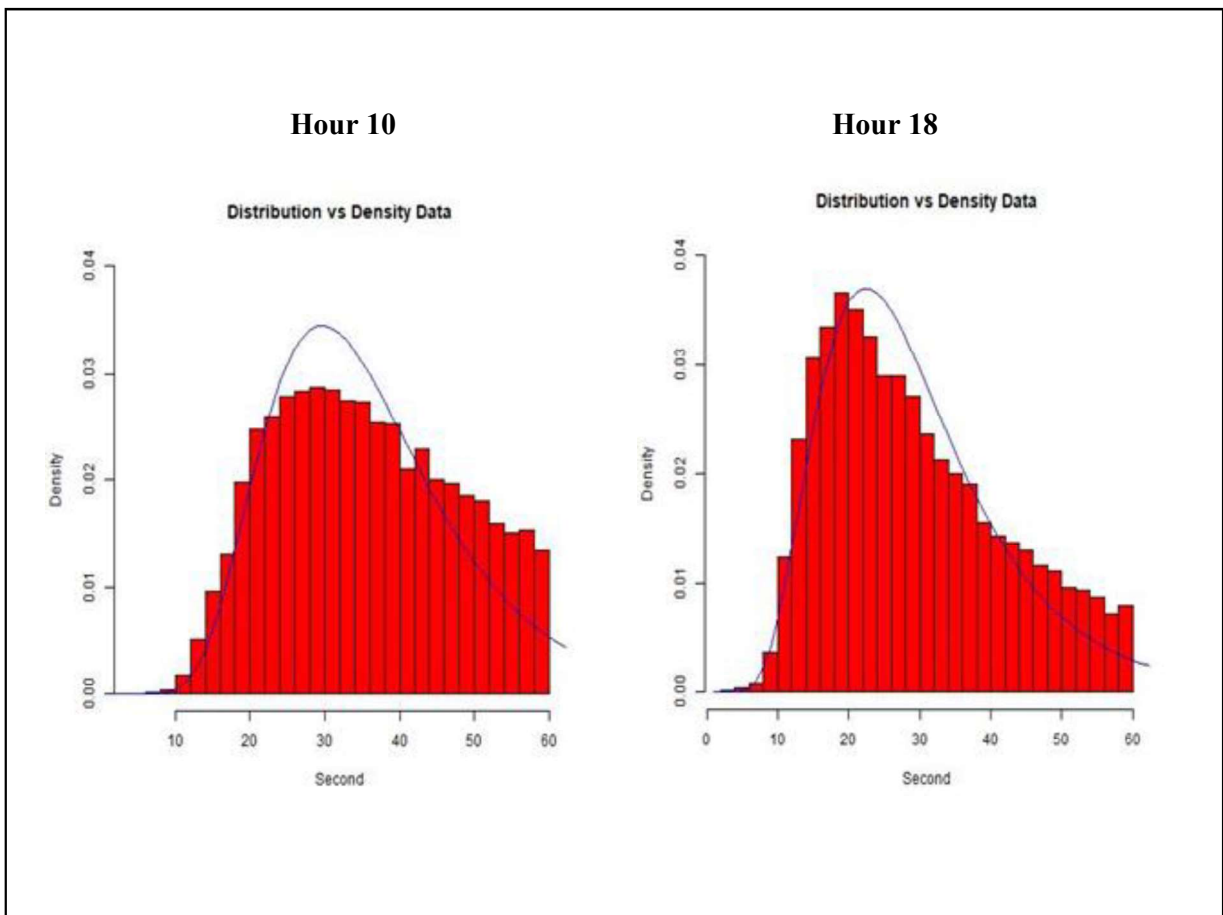


The quantile-quantile plot strongly suggests that the data is not normally distributed.

To check for statistical difference, a non-parametric test was conducted. Hence, Wilcoxon signed-rank test was used to check for difference, and it was concluded that the day of the week is not a statistically significant factor in the case of manual processing time.

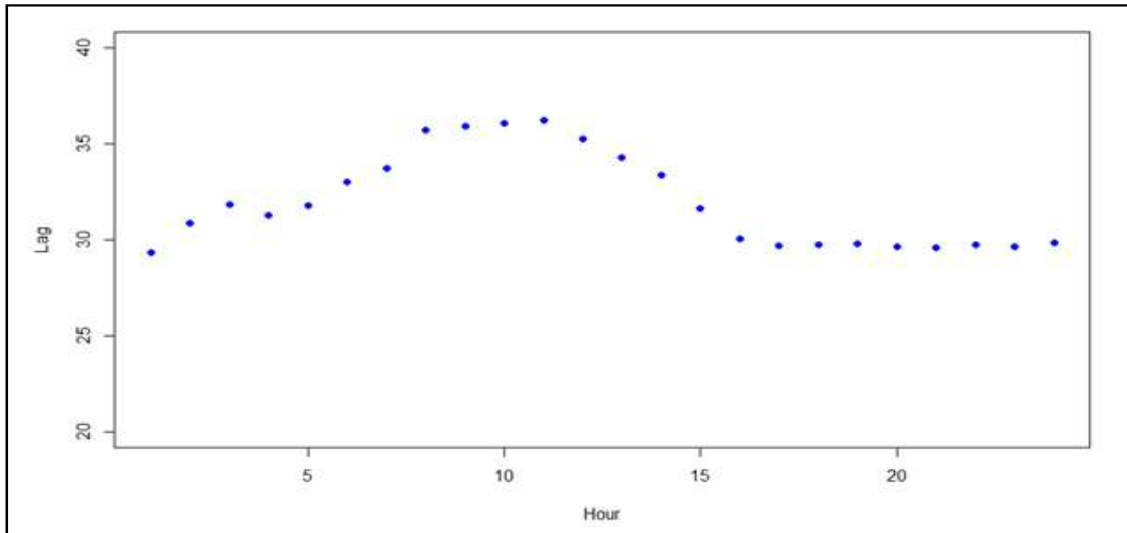
Also, the distribution of processing time (lag) varied with hour in the day. Thus, hour in the day was considered as a factor to calculate the Manual processing time distribution across different times. This is demonstrated as an example through the following figures where processing time is plotted for hour 10 and hour 18 in the day. It can be observed that for hour 10 the distribution is flatter as compared to hour 18 in the day.

**Figure 17: Example of difference in processing time distribution in different hours – Manual**



The processing time gradually shifts across different hours. A plot of the mean processing time across different lanes and locations is shown below where the lag corresponds to the processing time.

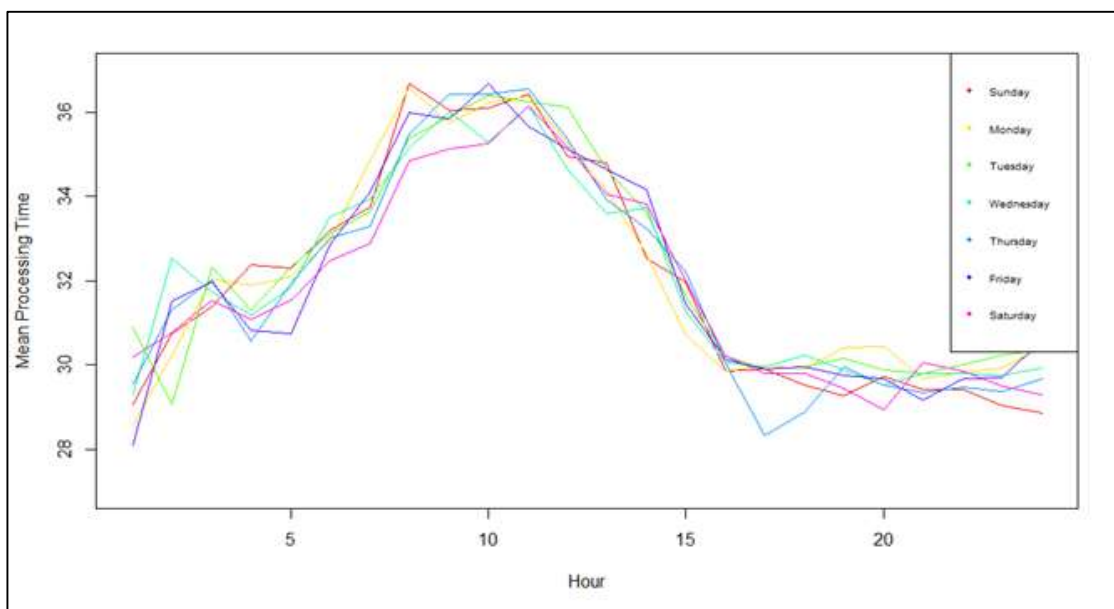
**Figure 18: Plot of mean processing time (lag in seconds) across different hours in the day – Manual**



It can be observed that the mean processing time is higher in the daytime.

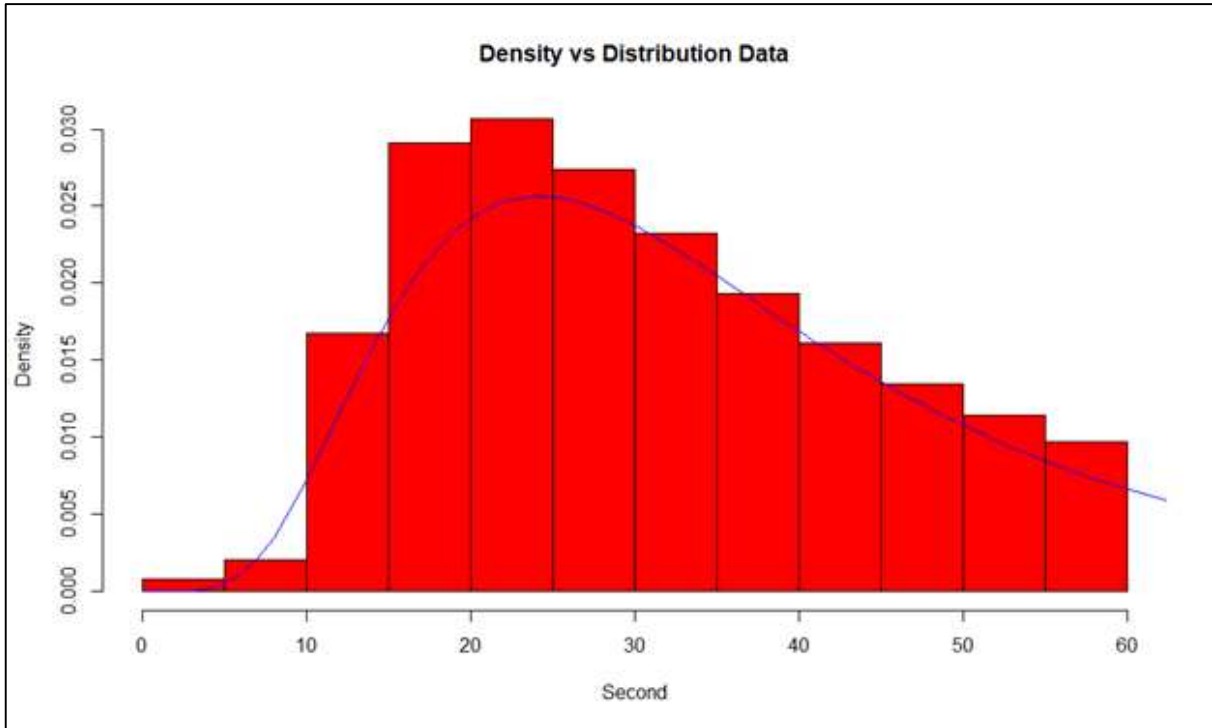
Similar plot is observed across different days of the week, as shown in the following figure, which confirms that day of week is not a factor influencing the processing time. However, the processing time varies across different hours.

**Figure 19: Plot of mean processing time (in seconds) across different hours and days – Manual**



Further, evaluation was done to identify the best distribution that fits the processing time data. Log-normal distribution was found to be the best-fit for processing time total and each hour. The following diagram shows the same for overall data.

**Figure 20: Histogram and Fitted Distribution for overall data - Manual**



It was observed that in some of the hours, the fit of the distribution with the density of the actual value was significantly different. Accordingly, the mean of the processing time across hours was considered for calculations. Based on this, the hourly vehicle to vehicle manual processing time was derived. This is provided in the following table.

**Table 6: Processing time distribution in seconds across hours on all days – Manual**

Hour (24 hour format)	On all days (seconds)
1	29.34071
2	30.86572
3	31.84559
4	31.29041

Hour (24 hour format)	On all days (seconds)
5	31.80600
6	33.01542
7	33.71112
8	35.70131
9	35.89032
10	36.05105
11	36.21803
12	35.23661
13	34.25970
14	33.37245
15	31.61145
16	30.04893
17	29.68683
18	29.75117
19	29.81103
20	29.64674
21	29.60374
22	29.72210
23	29.62767
24	29.82618

Based on the above analysis, the average manual processing time is derived to be **~32 seconds/vehicle**.

**Traffic arrival rate**

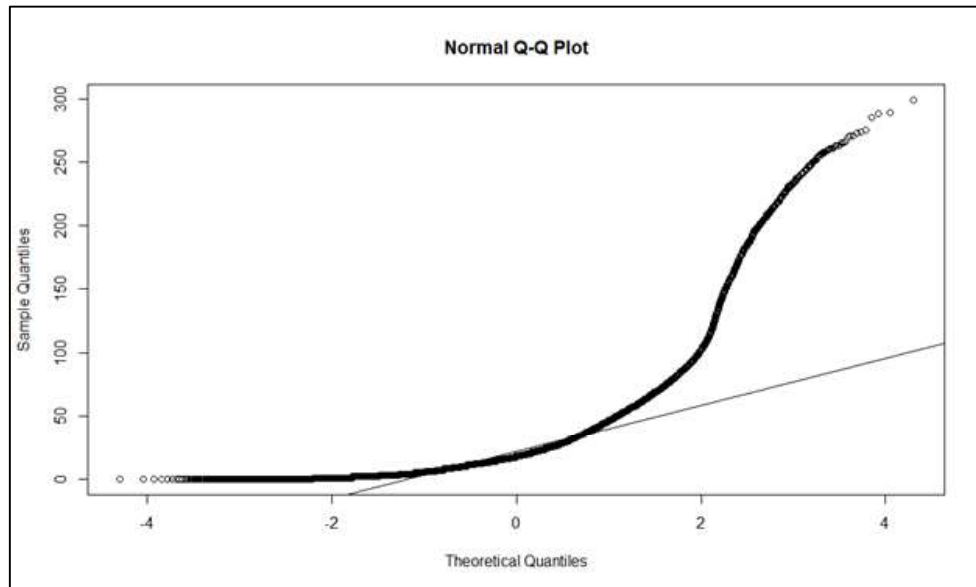
The traffic arrival rate is assessed through primary traffic survey of the 25 sample toll plaza locations that was done for 4 days continuously in a week starting from Friday till Monday (i.e. 96 continuous hours) to understand total number of incoming vehicles from each direction in the toll plazas at every 5-minute interval. This allowed to understand the weekday as well as weekend traffic trend while also providing understanding of the hourly traffic variation between peak and non-peak traffic hours.

Assuming that vehicle drivers typically enter the shortest queue, the arrival rate at lane level was calculated as total number of vehicles arriving at the plaza in a particular direction divided by the total number of toll plaza lanes in that direction.

Similar to the analyses for processing time, quantile-quantile plot as well as Kolmogorov-Smirnov test was conducted to confirm if the arrival rate is normally distributed.

The quantile-quantile plot shown below strongly suggests that the traffic arrival rate data is not normally distributed.

**Figure 21: Quantile-quantile plot to check if data is normally distributed - Traffic arrival rate**



Subsequently, Wilcoxon signed-rank test was used to check for difference, and it was concluded that the day-type is a statistically significant factor for vehicle arrival rate. This is shown in the following figure where the first test corresponds to the difference between weekday and weekend and the second one corresponds to the difference between Saturday and Sunday.



**Figure 22: Wilcoxon signed-rank test – Traffic arrival rate**

```

Weekday vs Weekend

wilcoxon rank sum test with continuity correction

data: Data[Data$DayType == "Norm", ]$Total and Data[Data$Weekday == "Saturday" | Data$weekday == "sunday", ]$Total
W = 425326756, p-value = 1.055e-07
alternative hypothesis: true location shift is not equal to 0
99 percent confidence interval:
 2.102894e-05 9.999474e-01
sample estimates:
difference in location
      0.9999366

Saturday vs Sunday

wilcoxon rank sum test with continuity correction

data: Data[Data$weekday == "Sunday", ]$Total and Data[Data$Weekday == "Saturday", ]$Total
W = 97453851, p-value < 2.2e-16
alternative hypothesis: true location shift is not equal to 0
  
```

Traffic distribution from the traffic survey of 25 sample locations was extrapolated to all the 653 toll plaza locations based on month-wise traffic projection for each of the toll plazas for FY 2022 (projection methodology explained subsequently in this section) based on the assumption that the traffic distribution across hours, weekdays, Sundays, and Saturdays would be same for all the plazas in a cluster as identified using hierarchical clustering explained previously.

**Month-wise toll-plaza wise traffic projection for FY 2022**

The month-wise toll plaza wise traffic projection is derived using the following data:

- March 2021 ETC traffic data as provided in the MIS shared by IHMCL
- FY16-20 revenue data as provided by NHAI CO Division
- Traffic survey data conducted during the period (Apr 2021 and May 2021)

**Using March 2021 ETC traffic data to derive total traffic for the month**

All the benefits are calculated based on projected traffic volume for FY22 which is projected using the March 2021 traffic volume data as provided by IHMCL. The March 2021 data is considered for FY22 traffic projection due to the following reasons:

- March 2021 traffic data represents the full impact of ETC for a complete month due to its mandatory implementation effective since 16 Feb 2021
- March 2021 saw highest ever average daily toll collections during any month (over and above historical growth) despite economic impact of COVID-19 indicating stable operations and growing economic activity

Before projecting FY22 volume, the March 2021 ETC traffic volume data was adjusted for the following:

- The month witnessed 7% manual transactions not captured in ETC transactions. Accordingly, the March ETC traffic count was adjusted for additional 7% to derive the complete month traffic including ETC and manual transactions.
- Also, there were 74 inactive or partially active toll plazas (out of 653 toll plazas) during March 2021 saw due to external factors. There would have been traffic on these toll plazas under business-as-usual (BAU) scenario, which wasn't the case during the time of the study. Hence, average traffic of these locations was assumed to be equal to:
  - Average traffic for all the active toll plazas when there is no traffic data available for the toll plaza for March 2021, or
  - Daily average traffic for the days on which the respective toll plaza was operational during March 2021 (typically in the case of new toll plazas being added)

Hence, based on above approach, the March 2021 ETC transaction data was adjusted to estimate the total BAU traffic for the month of March 2021. This data was thereafter used for projecting future BAU traffic for FY22.

### **Using historical revenue collection data and estimated March 2021 traffic for FY22 traffic projection**

The above estimated BAU traffic for the month of March 2021 was thereafter extrapolated for projecting month-wise BAU traffic for FY22 based on the historical monthly per toll plaza traffic revenue collection trends for FY18-20. Traffic revenue distribution for FY21 was excluded for the purpose of extrapolation due to adverse impact of COVID-19 on the traffic for most of the months during the year. The projection was done assuming no new ETC enabled toll plazas are added during FY22. Hence, benefit is only calculated for 653 toll plazas in the business-as-usual scenario.

### **Deriving toll plaza wise day wise hour-wise FY22 traffic arrival rate based on traffic survey**

- Month-wise BAU traffic volume projection at country level was distributed across the toll plazas as per the estimated BAU March 2021 traffic volume distribution across different toll plazas (in percentage terms) to derive month-wise toll-plaza wise BAU traffic volume.
- Month-wise toll-plaza wise traffic estimated above is then distributed across the different days and hours in a month based on the traffic arrival rate survey as described below.
  - All toll plazas within a strata/cluster (as identified earlier) have been assumed to have similar hourly traffic distribution across 24 hours in a particular day type (weekday, Saturday or Sunday) as observed in the traffic survey of the sample survey location.
  - Within each strata/cluster of toll plaza, the hourly traffic distribution (in percentage terms) for Monday and Friday as observed in the traffic survey was assumed to be representative of traffic during all weekdays in the month and the hourly traffic distribution (in percentage terms) for Saturday and Sunday as observed in the traffic survey was assumed to be representative of traffic during all weekends in the month.
  - Hourly traffic distribution (in percentage terms) was assumed as per the survey because the hourly traffic flow (in percentage terms) is primarily driven by peak and non-peak hours of business activity which is not impacted by COVID-19.

Based on the above methodology, toll plaza-wise month-wise day-wise hourly traffic arrival rate was estimated for FY22 and used along with processing time distribution (calculated previously) to estimate the vehicle pass through time saved.

### 3.1.1.3 Outputs

The vehicle pass-through time in manual tolling as well as ETC based tolling scenario was calculated separately for each toll plaza based on the hourly traffic volume for each day and month for FY22 and the processing time distribution in manual and ETC scenario. The calculation using Little's Law and Queuing theory for deriving vehicle pass-through time is already explained in the previous section.

Vehicle pass through time was calculated at 5 minute-granularity, same as the traffic survey data granularity. The methodology requires arrival rate to be lower than the processing rate to be able to calculate the average waiting time. However, in case of vehicle pass-through time calculation in manual tolling scenario, it was observed that for some of the time-blocks the arrival rate was higher than the processing rate. In these cases, it was assumed that while the traffic may not clear 5-minute time block, it will get cleared in 1 hour. Thus, in such scenarios, 5-minute vehicle arrival rate was replaced with average hourly vehicle arrival rate and the analysis was undertaken for the complete

hour rather than 5-minute time block. Despite this, for some locations the arrival rate was still higher than the processing rate. In these cases, it was assumed that additional manpower typically be deployed on the ground and additional measures would be taken by the toll plaza to expedite clearing of the queue thereby decreasing the average processing time. Accordingly, for the calculations it was assumed that the processing rate changes dynamically in manual tolling in case of long queues such that the average waiting time does not exceed beyond 1 hour.

Based on this, the vehicle pass through time was calculated assuming all toll plaza lanes are 100% manual toll lanes followed by calculation assuming all toll plaza lanes are 100% ETC lanes for all 653 toll plaza locations. Accordingly, vehicle pass-through time estimated for all toll plazas was aggregated to derive the country level vehicle pass-through time in manual and in ETC scenario. Thereafter, the difference between the two is calculated to derive vehicle pass through time saved for the year which is the same as the total travel time saved during the year. This is also depicted in the following formula.

$$\text{Vehicle pass-through time saved (hour/year)} = \text{Vehicle pass-through time in manual lanes (hours/year)} - \text{Vehicle pass-through time in ETC lanes (hours/year)}$$

This calculation led to the results summarized in the following table.

**Table 7: Vehicle pass-through time calculation results**

Month (FY22)	Vehicle Count	Total Manual Vehicle Pass Through Time (Hour)	Total ETC Vehicle Pass Through Time (Hour)	Total Vehicle Pass Through Time Saved (Hour)	Weighted Average Manual Wait Time (Seconds)	Weighted Average ETC Wait Time (Seconds)
Apr	204,195,820	43,731,406	2,718,441	41,012,965	771.0	47.9
May	212,788,529	46,275,047	2,849,469	43,425,578	782.9	48.2
Jun	199,947,765	40,949,755	2,623,277	38,326,478	737.3	47.2
Jul	191,928,608	33,685,466	2,353,971	31,331,495	631.8	44.2
Aug	195,069,045	35,346,681	2,436,793	32,909,888	652.3	45.0
Sep	190,202,760	35,054,834	2,399,887	32,654,947	663.5	45.4

Month (FY22)	Vehicle Count	Total Manual Vehicle Pass Through Time (Hour)	Total ETC Vehicle Pass Through Time (Hour)	Total Vehicle Pass Through Time Saved (Hour)	Weighted Average Manual Wait Time (Seconds)	Weighted Average ETC Wait Time (Seconds)
Oct	207,829,075	42,988,551	2,739,922	40,248,629	744.6	47.5
Nov	203,041,962	42,964,266	2,693,440	40,270,826	761.8	47.8
Dec	211,097,779	45,271,153	2,810,656	42,460,497	772.0	47.9
Jan	209,243,398	43,923,515	2,773,404	41,150,111	755.7	47.7
Feb	195,704,623	44,309,181	2,650,024	41,659,156	815.1	48.7
Mar	203,732,320	40,536,216	2,653,390	37,882,826	716.3	46.9
Total	2,424,781,684	495,036,071	31,702,674	463,333,397	734	47

The results from the table shown above are summarized below.

- ✓ **Vehicle pass-through time saved: 46.3+ Crore hours/year are estimated to be saved by the vehicles crossing the toll plazas in the country**
- ✓ **It now only takes 47 seconds/vehicle to cross a toll plaza in ETC system which earlier used to take 12.23 minutes/vehicle in manual tolling system. As a result, vehicles are estimated to save time equivalent to 52,800+ years per annum.**
- ✓ **Time saving is driven by over 56% reduction in toll processing time from 32 seconds/vehicle in manual toll collection system to ~14 seconds/vehicle in ETC system.**

### 3.1.2 Throughput enhancement

The throughput enhancement is calculated based on the following formulas.

➤ ***Throughput enhancement (vehicles/hour) = 1 / Average processing time (hours/vehicle)***

This value is calculated as per below:

1. Value is calculated based on the average processing time derived previously.
2. For comparison, the value for manual toll system and ETC system is calculated separately.

The results of the calculation are summarized below.

- ✓ **Throughput enhancement: 260+ vehicles/hour can be processed per ETC lane per hour compared to 112 vehicles/hour per manual toll collection lane**
- ✓ **Processing time has reduced by 56% due to ETC implementation which is enabling a toll booth operator to process 148 additional vehicles/hour per lane translating to 130% increase in productivity compared to manual system.**
- ✓ **This indirectly also contributes to improved health and reduced fatigue of toll booth staff while improving toll plaza operations.**

### 3.1.3 Fuel savings

The fuel savings is calculated based on the following formulas.

- *Fuel quantity saved (litres/year) = Vehicle pass-through time saved (hours/year) x Share of vehicle type (%) x Fuel consumption rate of Petrol or Diesel for the vehicle type (ml/hour) / 1000*
- *Fuel cost saved (INR Cr/year) = Fuel quantity saved for different vehicle classification as calculated above (litres/year) x Fuel price of petrol or diesel depending on the vehicle type (INR/litre) / 10<sup>7</sup>*

These values are calculated based on the following approach:

1. Fuel savings calculated separately for petrol and diesel vehicles and the results added thereafter to derive the total benefit.
2. Vehicle pass-through time saved was considered as calculated previously.
3. Share of vehicle type for all toll plazas at national level was assumed based on vehicle classification distribution as per the ETC transaction data for the period October 2020 to January 2021 for the 25 sample locations.

**Table 8: Vehicle type distribution**

Vehicle Type	Distribution (%)
Car	49.92%
Bus	5.36%
LCV	23.67%
HCV	21.05%

4. Within passenger vehicle (cars), share of petrol cars was assumed to be 62.24% and that of diesel cars was assumed to be 37.76%<sup>9</sup>.

<sup>9</sup> The share of petrol and diesel cars on National Highways is as per the “Vehicle Class Wise Vehicle Category Group Data for All States” as provided on Parivahan Portal of MoRTH for LMV category till date. It is assumed that cars of other fuel types are not plying on National Highways

5. Assumptions of fuel consumption rate of different vehicle type was based on the study titled “Estimation of fuel loss due to idling of vehicles at signalized intersection in Ahmedabad, India (2013)”<sup>10</sup> as provided in the following table. Fuel consumption rate for buses was assumed as per HCV vehicle type.

**Table 9: Idling fuel consumption rate for different vehicle types**

Vehicle Type	Fuel consumption rate (ml/hour)
Car (petrol)	663
Car (diesel)	752
LCV (diesel)	690
HCV (diesel)	920

6. Fuel price<sup>11</sup> of petrol was assumed as INR 84.78 per litre and that of diesel as INR 76.55 per litre. The results of the calculation are summarized below.

- ✓ **Fuel saved: ~35 Crore Litres/year equivalent to ₹ 2,800+ Crore/year in fuel savings due to reduced idling of vehicles at toll plazas**
- ✓ **ETC is enabling users to reduce their petrol consumption by ~9.5 Crore litres/year and diesel consumption by ~25.4 Crore litres/year translating to ₹820+ Crore/year in petrol cost and ₹1,980+ Crore/year in diesel cost savings.**
- ✓ **Reduced fuel consumption also brings with it the environmental benefit of reduced emissions.**

<sup>10</sup> This study derives fuel consumption values based on tests using idling flow measurement system comprising FP 213S detectors DF 210A flow meters

<sup>11</sup> Assumed as per the average fuel prices during the period from March 2020 to March 2021 for 04 metro cities viz. Delhi, Mumbai, Kolkata and Chennai from Mypetrolprice.com



### 3.1.4 Revenue increase

Revenue increase<sup>12</sup> is calculated as per the following formula:

➤ *Revenue increase (INR Cr) = Estimated revenue for FY22 based on March 2021 revenue (INR Cr.) – Estimated revenue for FY22 based on historical revenue CAGR for FY16-20 (INR Cr.)*

1. **Estimated revenue for FY 2022 based on historical CAGR for FY16-20** was calculated along with estimation of March 2021 revenue and corresponding number of toll plazas (635 toll plazas) as per historical CAGR. It was assumed that all the toll plazas projected would be ETC enabled. The analysis also assumes no addition of new ETC toll plazas during FY22 for which the revenue increase calculation. Accordingly, FY22 revenue was projected based on historical trends and adjusted downwards for revenue from addition of new toll plazas projected to be added during FY22. Based on this, total revenue for FY22 for 635 locations was derived based on historical CAGR.

2. **Estimated revenue for FY22 based on March 2021 revenue:**

- a. March 2021 ETC revenue (the month with highest ever toll collection) was first adjusted for additional 7% traffic volume to account for manual transactions<sup>13</sup> taking place at the toll plazas. The revenue was also adjusted thereafter for 56 out of 74 inactive or partially active toll plazas during the month by assuming their average revenue equal to the average revenue for active toll plazas or based on their daily average in March 2021 which ensures priority inclusion of partially active toll plaza in the list of 56 toll plazas. Based on this, adjusted March 2021 revenue for 635 toll plazas was estimated.
- b. **Projecting revenue for FY22 factoring seasonality:** Month-wise revenue for entire 12-month period for FY22 is projected by extrapolating the adjusted March 2021 revenue (calculated as above) based on the historical monthly per toll plaza revenue collection trends for FY18 to 20. Distribution for FY 21 is excluded due to adverse impact of COVID-19 on the traffic for most of the months during the year except during March 2021 wherein the economic activity had progressively normalized which is reflected in the highest ever daily toll collections by IHMCL

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<sup>12</sup> Please note that the tangible benefit of revenue increase is a one-time increase and not a recurring increase each subsequent year. The baseline revenue for the stakeholders will increase for FY22 on account of transactions done through ETC system and will remain higher in the subsequent years.

<sup>13</sup> As per statement by Hon'ble Minister of Road Transport and Highways in Parliament on 18 March 2021

(over and above historical growth). The projections assume no new addition of ETC toll plazas during the year and all the benefits are calculated for 635 toll plazas only.

The results of the calculation are summarized below.

- ✓ **Revenue increase: ₹ 6,100+ Cr increase in toll revenue due to ETC system**
- ✓ **ETC implementation is estimated to enable 18% additional toll collection over and above the historical growth rate of ~12% leading to additional revenue for service providers.**
- ✓ **Clear evidence of this is the record average daily NH toll collection of ₹ 90+ Cr during March 2021, despite economic activity impacted by COVID-19 pandemic and over 55 toll plazas inactive.**
- ✓ **Key reasons for revenue augmentation are - reduced travel time resulting in more trips, route compliance by truck drivers which earlier took alternate routes to avoid tolls, reduced revenue leakage due to digitalization and other related factors.**

### 3.1.5 Economic value of travel time saved

Economic value of travel time saved is calculated as per the following formula:

$$\begin{aligned} &\text{➤ Economic value of travel time saved (INR Cr/year) =} \\ &\quad \{ \text{Vehicle pass-through time saved (hours/year)} \times \text{Share of vehicle type carrying passengers (\%)} \\ &\quad \times \text{Vehicle occupancy factor for the vehicle type (passengers/vehicle)} \times \text{Value of time per} \\ &\quad \text{passenger (INR/hour)} / 10^7 \} \\ &\quad + \\ &\quad \{ \text{Vehicle pass-through time saved (hours/year)} \times \text{Share of commercial vehicle type (\%)} \times \\ &\quad \text{Commodity holding cost for the vehicle type (INR/hour)} / 10^7 \} \end{aligned}$$

1. Above calculation is done for:
  - a. Passengers of cars and buses and added to arrive at total economic value of passenger time saved
  - b. Above calculation is done for LCV and HCV and added to arrive at commodity holding cost saved
2. Vehicle pass-through time saved was taken as calculated previously.
3. Share of vehicle type for all toll plazas at national level was assumed based on vehicle classification distribution as per the ETC transaction data for the period October 2020 to January 2021 for the 25 sample locations (as shown earlier).
4. Value of time of car and bus passengers and commodity holding cost for LCV and HCV are assumed based on “Indian Roads Congress (IRC) – Manual on Economic Evaluation of Highway Projects in India” as provided in the following table. The prices provided in the manual at 2019 levels are adjusted for inflation to the current price levels based on:
  - a. Consumer price indices<sup>14</sup> for value of time of car and bus passengers for i.e. 139.6 in 2019 (base year 2012) and 156.8 in 2021 (base year 2012).
  - b. Wholesale price indices<sup>15</sup> for commodity holding cost for LCV and HCV i.e. 120.0 in 2019 (base year 2011-12) and 129.3 in 2021 (base year 2011-12).

<sup>14</sup> Consumer Price Index (CPI) as published by Reserve Bank of India and the Ministry of Statistics and Program Implementation

<sup>15</sup> Wholesale Price Index (WPI) as published by Office of the Economic Advisor, Department for Promotion of Industry and Internal Trade

**Table 10: Value of time of passengers travelling of different vehicle types**

Vehicle type for journey by passengers	Value of time at 2019 price levels (INR/hour)	Inflation adjusted value of time in 2021 (INR/hour)
Car	218.25	245.14
Bus	109.00	122.43

**Table 11: Commodity holding cost for different vehicle types**

Vehicle Type	Commodity holding cost at 2019 price levels (INR/hour)	Inflation adjusted commodity holding cost in 2021
LCV	9.50	10.24
HCV	68.95	74.29

5. Vehicle occupancy factor<sup>16</sup> was assumed as 3.76 passengers/vehicle for cars and 40 passengers/vehicle for buses.

The results of the calculation are summarized below.

- ✓ **Economic value of travel time saved**
  - ₹ 33,500+ Cr/year - Estimated value of time saved for passengers traveling in cars and buses
  - ₹ 800+ Cr/year - Estimated value of time saved for freight segment
- ✓ **Total economic value of travel time saved is estimated at ₹ 34,300+ Cr/year.**
- ✓ **Economic value is derived from time saved which can be used alternatively in other economic activities or prevent costs associated with higher time.**

<sup>16</sup> Vehicle occupancy factor as provided in “Indian Roads Congress – Manual on Economic Evaluation of Highway Projects in India”



- ✓ **Time saved by passengers at toll plazas can be utilized in other productive work or leisure activities while time saved in freight movement can reduce associated commodity holding cost as it facilitates higher number of trips.**

### 3.1.6 Toll plaza savings

Toll plaza savings are calculated as per the following formula:

- *Toll plaza savings – Capex (INR Cr/year) = Number of new toll plazas to be added during the year x Percentage of toll plazas where number of lanes can be reduced (%) x Number of lanes reduced x Capex per toll plaza lane (INR/lane) / 10<sup>7</sup>*
- *Toll plaza savings – Opex (INR Cr/year) = Number of ETC enabled NH toll plazas x Percentage of toll plazas where number of lanes can be reduced (%) x Number of lanes reduced x Opex per toll plaza lane per month x 12 months / 10<sup>7</sup>*

#### Common factors considered for calculation

1. Percentage of toll plazas where number of lanes can be reduced was assumed to be 5.67% and 4.67% which is equal to the existing share of 14-lane and 16-lane toll plazas in the country respectively. Lane reduction was not considered for toll plazas having up to 12 lanes which constitute the balance toll plazas basis primary discussions with toll plaza operators.
2. Number of lanes reduced was assumed as 2 lanes for both 14-lane and 16-lane toll plazas i.e. reduced requirement of 12 lanes for 14-lane toll plazas and reduced requirement of 14 lanes for 16-lane toll plazas.

#### Capex savings specific factors considered for calculation

3. Number of new toll plazas to be added during the year was estimated based on historical CAGR of ~12% between FY16 to FY20 for tolled km of NH toll plazas.
4. Capex per toll plaza lane was assumed at INR 15 lakhs per toll plaza lane based on primary interactions with toll plaza operators.

#### Opex savings specific factors considered for calculation

5. Number of ETC enabled NH toll plazas in the year considered for the calculation includes the new toll plazas added each year (based on CAGR projection detailed in S.No. 3 above) as well as the existing 653 NH toll plazas (March 2021).
6. Opex per toll plaza lane was assumed at INR 2 lakhs per toll plaza lane per month based on primary interactions with toll plaza operators.

The results of the calculation are summarized below.

- ✓ **Toll plaza savings: ₹ 40+ Cr/year savings in toll plaza capex and opex related spending**

- ✓ **Enhanced ETC lane throughput marginally reduces the requirement of active number of toll plaza lanes in larger toll plazas (14 lanes and above), resulting in:**
  - **Reduced capex requirement for new toll plazas (yet to be planned) over the next 5 years, estimated to be ₹ 2+ Cr/year.**
  - **Reduced opex spending by toll operators due to reduced number of active lanes required, estimated to be ₹ ~38+ Cr/year.**

### 3.1.7 Emissions reduction

Emission reduction is calculated as per the following formula:

- *Emissions reduction (tons/year) = Vehicle pass-through time saved (hours/year) x Share of vehicle type (%) x Fuel consumption rate for the vehicle type (ml/hour) x Fuel efficiency for the vehicle type (km/lit) x Emission factors for the vehicle type (g/km) / 10<sup>9</sup>*
- *Economic value of emissions reduction (INR Cr/year) = Emissions reduction (tons/year) x CO<sub>2</sub>-eq conversion factor for pollutant type x Global price of carbon (USD/tCO<sub>2</sub>-eq) x INR per USD / 10<sup>7</sup>*

1. Emission reduction (tons/year) calculation is done for all vehicle types based on the following.
  - a. Vehicle pass-through time saved was taken as calculated previously.
  - b. Share of vehicle type for all toll plazas at national level was assumed based on vehicle classification distribution as per the ETC transaction data for the period October 2020 to January 2021 for the 25 sample locations, and within cars, share of petrol cars is assumed to be 62.24% and that of diesel cars is 37.76% (as shown earlier).
  - c. Fuel consumption rate was taken as per fuel saved calculation methodology.
  - d. Emission factors for key pollutants for different vehicle types are based on ARAI document<sup>17</sup> titled “Emission Factor Development for Indian Vehicles (2008)” as provided in the following table.

**Table 12: Emission factors for key pollutants for different vehicle types (g/km)**

Vehicle Type	CO	Hydrocarbons	NO <sub>x</sub>	CO <sub>2</sub>	PM
Car (petrol)	0.84	0.12	0.09	172.95	0.002
Car(diesel)	0.06	0.08	0.28	148.76	0.015
LCV	3.66	1.35	2.12	401.25	0.475
HCV	6.00	0.37	9.30	762.39	1.24

<sup>17</sup> The study considers full driving cycle of the vehicle, the actual emissions for vehicles idling at toll plazas are expected to be higher. Hence, the outcome of this analysis is on the conservative side



- e. Fuel efficiency<sup>18</sup> of different vehicle types are based on “India GHG program - India specific road transport emission factors (2015)”, shown in the following table.

**Table 13: Fuel efficiency for different vehicle types (km/liter)**

Car (petrol)	Car (diesel)	LCV (diesel)	HCV (diesel)
14.30	17.33	8.58	3.59

2. Economic value of emissions reduction (INR Cr/year) calculation is done for CO<sub>2</sub> and hydrocarbons based on the following
  - a. Emissions reduction for each pollutant type is calculated as per the methodology provided above.
  - b. Factor for converting hydrocarbon emission to CO<sub>2</sub><sup>19</sup> equivalent is 3.35. Only CO<sub>2</sub> and hydrocarbons are the greenhouse gases which may be converted to tons of CO<sub>2</sub> equivalent (tCO<sub>2</sub>e).
  - c. The average weighted global price of carbon was taken as \$24.05 USD/tCO<sub>2</sub>e as per the IHS Markit’s Global Carbon Index<sup>20</sup> for CY 2020.
  - d. USD to INR conversion rate is taken as INR 74.08 per USD based on average reference rate during 30 Apr 2020 - 30 Apr 2021 as per Financial Benchmarks India Pvt Ltd.

The results of the calculation are summarized below.

- ✓ **Emissions reduction: 9,78,200+ tons of CO<sub>2</sub> equivalent is the net reduction in greenhouse gas emissions at national level, in addition to reduction in emission of local pollutants**
  - **CO<sub>2</sub> (Carbon dioxide): 9,74,000 tons reduction/year, primary contributor to greenhouse effect.**

<sup>18</sup> Emission factors and fuel efficiency for buses is assumed as per HCV

<sup>19</sup> Out of the different pollutants, only CO<sub>2</sub> and hydrocarbons are greenhouse gases and hence can be monetized. The conversion factors are provided in the following link: [http://www.ipcc.ch/publications\\_and\\_data/publications\\_ipcc\\_fourth\\_assessment\\_report\\_wg1\\_report\\_the\\_physical\\_science\\_basis.htm](http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm)

<sup>20</sup> IHS Markit’s Global Carbon Index is made up of prices from the California Compliance Allowance, RGGI, and European Allowance prices

- **CO (Carbon Monoxide): 6,000 tons reduction/year, linked with toxicity in higher concentrations.**
- **Hydrocarbon: 1,200 tons reduction/year, greenhouse impact equivalent to 4,288 tons CO<sub>2</sub>.**
- **NO<sub>x</sub>: 5,575 tons reduction/year, linked with inflammation of respiratory airways.**
- **Particulate matter: 825 tons reduction/year, linked with health issues and haze (reduced visibility).**
- ✓ **Over 93% reduction in vehicle idling at toll plazas equivalent to 46.3+ Cr hours/year and 34.93+ Cr Litres/year of fuel saved is the key driver of emissions reduction leading to improvement in air quality at toll plazas.**
- ✓ **Economic value of emissions reduction: ₹ 170+ Cr/year**
  - **Reduction in greenhouse gas emissions time bear an economic implication which is derived based on the INR equivalent of per unit of emission reduced.**

### 3.2 Intangible benefits

The intangible benefits, as discussed earlier, are other associated unquantifiable benefits resulting from ETC system implementation that bear both an immediate and long-term positive impact but are not easily quantifiable. These are re-listed below and discussed in detail subsequently in this sub-section.

1. Digital enablement
2. Real-Time Data Collection and Use
3. Improved User Experience
4. Improved Connectivity and Urbanization
5. Improved Toll Plaza Operations

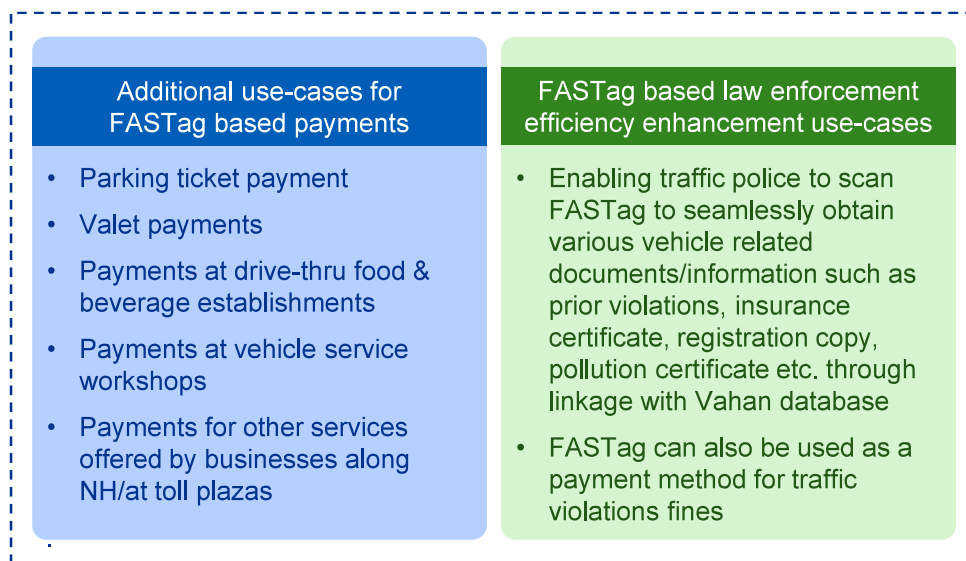
### 3.2.1 Digital enablement

ETC has enabled the digital economy by facilitating online toll transactions. Continuously expanding FASTag user base and increasing share of ETC transactions, which stood at approximately 96%<sup>21</sup> in August 2021, leveraging e-wallet for toll payments is an evidence of growing user appreciation of the benefits of the ETC system which is further driving expansion of the digital first economy. Some of the key metrics which are an evidence of this are<sup>22</sup>:

- ✓ 4.09+ Crore tags issued
- ✓ 69+ lakh daily average number of transactions
- ✓ Daily average transaction value of more than INR 100+ Crore

ETC which is also implemented in 160+ toll plazas on the State Highways as well as other important roads can be further expanded to cover more of such road assets. However, it is also important to leverage ETC ecosystem to drive new innovative use cases. Some of the potential use cases are shown in the following figure.

**Figure 23: Other potential digital use-cases of ETC**



Implementation of some of the above listed use cases can potentially lead to realization of further benefits enabled by the existing digital infrastructure of ETC ecosystem.

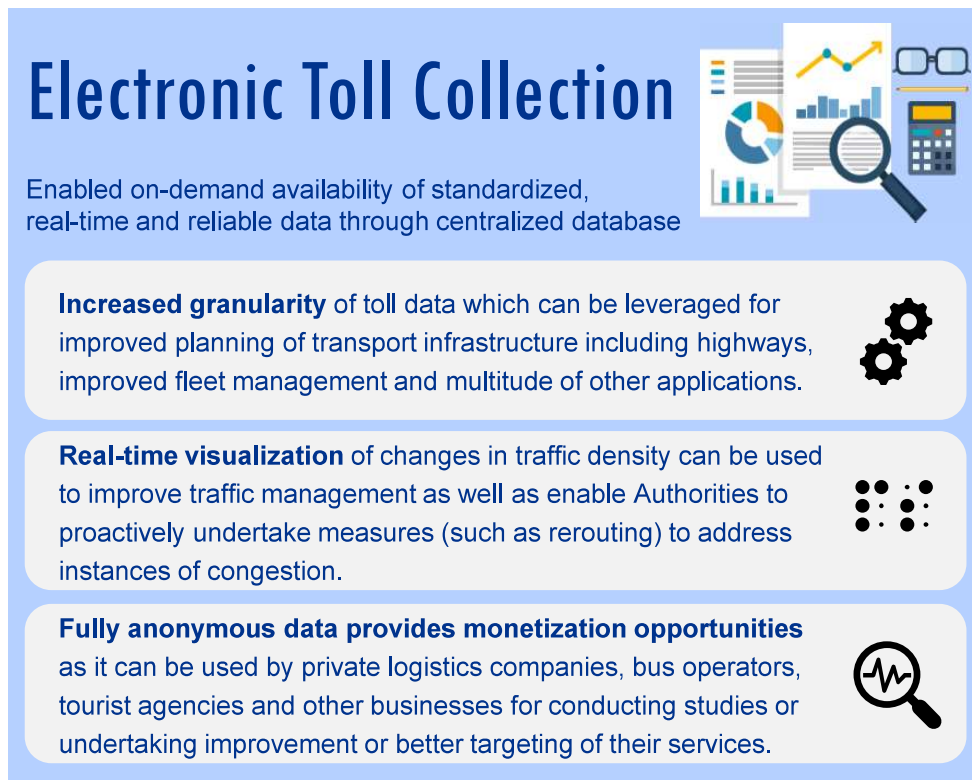
<sup>21</sup> <https://pib.gov.in/PressReleasePage.aspx?PRID=1744025>

<sup>22</sup> Data till the month of October 2021 as per NPCI portal “<https://www.npci.org.in/what-we-do/netc-fastag/product-statistics>” as accessed on 18<sup>th</sup> November 2021 (includes 650+ NH toll plazas with balance toll plazas attributed to State Highways and other highways)

### 3.2.2 Real-Time Data Collection and Use

The toll transaction data collection process in case of manual tolling was a long and cumbersome process which involved manual or local collation of data by individual toll plazas (653+ in numbers) and submission to respective NHAI Regional Offices (27 ROs) followed by consolidation of data including subsequent validation at ROs as well as HQ. This led to long lead time for obtaining pan-India data, no real-time visibility on traffic count or collections, significant waste of productive time in coordinating, consolidating, and sharing of data, and high probability of errors in the data obtained due to manual data collection. ETC system has been able to address these issues leading to enhanced real-time data collection thereby providing a unique set of decision enablement opportunities. The availability of the rich data also opens new monetization opportunities. Some of these are shown in the following figure.

**Figure 24: Potential opportunities to leverage the real-time data collected from ETC transactions**



### 3.2.3 Improved User Experience

ETC has significantly improved the user experience across multi-aspects. Some of these are highlighted below.

— Standardized user experience

- Under manual toll collection, user experience varied across different toll plazas on account of multiple factors such as speed of toll booth operators within the same plaza, variation in currency notations, language barriers, varying type of toll receipts. ETC has eliminated all such variations leading to a truly standardized user experience.

— Higher convenience due to multiple reasons

- No need for arranging cash
- No need for stopping at toll booth
- No interaction with toll booth staff
- No petty cash handling
- No need to handle receipts

— Higher safety & security

- Improved perception of personal security (particularly for solo travellers and women) at toll plazas due to elimination of need to stay in long queues, roll down window for payment or interact with any other person.
- ETC inherently facilitates COVID-19 pandemic appropriate behaviours due to elimination of human interaction, besides elimination of cash handling.

— Reduced stress

- Reduced driver fatigue which is contributed by long wait times at toll plazas is expected to improve safety, since driver fatigue and resulting sleep deprivation have been linked with reduced alertness and impaired judgement.
- Reduced traveller anxiety due to better predictability of travel times, time savings and better use of the day.

— Improved air quality



- Truck drivers plying on NH used to spend an estimated 1 hour per day at manual toll plazas (assuming 5 toll plazas passed per day and ~12 minutes spent per toll plaza) with majority of them non air-conditioned. Passenger cars would also spend ~12 minutes per toll plaza with fewer of them.
- This time has reduced by 93% to under 1 minute per toll plaza, reducing the emission of harmful pollutants and improving air quality at toll plazas. This benefits not only the passing truck drivers and passengers but also toll booth operators and local populace.

### 3.2.4 Improved Connectivity and Urbanization

Reduction in vehicle pass through time by ~11.45 mins and increased throughput at toll plazas (130%) leads to significant reduction in congestion across all toll plazas in the country, driving the following benefits:

- **Improved ease of doing business:** Significant reduction of transit times is improving ease of doing business. For instance, a 300 km truck journey on NH would typically include crossing ~6 toll plazas. In manual scenario, a truck would typically spend ~1.2 hours (~72 minutes) at the toll plazas which has now reduced to under 6 minutes.
- **Outward expansion of cities:** Reduced congestion enables cities to expand horizontally outwards due to reduced travel time from the outer city limits to other parts of the city, thus facilitating new residential, commercial as well as industrial development. This also improves the attractiveness of various regions outside/at boundary of city limits as potential investments destinations.
- **Increased visits to off-city leisure destinations:** Reduced congestion also enables higher number of weekend/leisure/off-city trips by car owners on account of no more waiting time at toll plazas.










### 3.2.5 Improved Toll Plaza Operations

The toll plaza operations have also been significantly improved on account of digitalization of the complete toll collection process.

- **Reduced lead time for credit of toll revenue:** In manual collections, at the end of each shift, reconciliation and transfer of cash is required to be done by the toll booth operator to accounts personnel. Collected cash was then deposited in banks on the following day and transferred to NHAI's account subsequently. This leads to a long lead time in receiving the toll revenue. With ETC, complete process is digitized, and time reduced to a single day.
- **Improved safety of toll plaza staff in view of COVID-19:** Complete elimination of manual cash transaction related touch points (from at least four to zero) has improved safety of toll plaza staff during the pandemic.
- **Reduced security risk:** No more cash handling has also reduced security risk and eliminated the need for use of secure vans.

## 3.3 Summary

Impact of ETC system on the country has been fundamental and profound driving annual benefits estimated at **INR 43,400+ Cr** apart from other associated intangible benefits. The tangible and intangible benefits are summarized below:

Summary of intangible benefits	
<b>46.3+ Cr hours/year</b>  Vehicle pass through time saved	<b>260+ vehicles/hour</b>  Throughput enhancement
<b>~35 Cr liters/year</b> equivalent to <b>₹ 2,800+ Cr/year</b> <b>Fuel saved</b> 	<b>₹ 6,100+ Cr</b> <b>Toll revenue increase</b> 
<b>₹ 34,300+ Cr/year</b> <b>Economic value of travel time saved</b> 	<b>₹ 40+ Cr/year</b> <b>Toll plaza savings</b> 
<b>9,78,200+ tons CO<sub>2</sub>e</b> equivalent to economic value of <b>₹ 170+ crores/year</b> <b>Emissions reduction</b> 	

Summary of intangible benefits				
Digital Enablement	Real-Time Data Collection and Use	Improved User Experience	Improved Connectivity and Urbanization	Improved Toll Plaza Operations
<ul style="list-style-type: none"> <li>• 3.6+ Cr FASTags issued</li> <li>• 97%+ of toll transactions on NHs via FASTag</li> <li>• 50+ lac transactions /day</li> <li>• INR 90+ Cr / day transacted in July 2021</li> </ul>	<ul style="list-style-type: none"> <li>• Granular toll data – can be used for better infrastructure planning</li> <li>• Real-time traffic visibility - improved traffic management</li> <li>• Anonymous data with monetization opportunity</li> </ul>	<ul style="list-style-type: none"> <li>• Standardized user experience</li> <li>• Higher convenience</li> <li>• Higher safety and security</li> <li>• Reduced stress</li> <li>• Improved air quality</li> </ul>	<ul style="list-style-type: none"> <li>• Improved ease of doing business</li> <li>• Outward expansion of cities</li> <li>• Increased visits to off-city leisure destinations</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced lead time for credit of toll revenue</li> <li>• Improved safety of toll plaza staff in view of COVID-19</li> <li>• Reduced security risk</li> <li>• Increased transparency of toll plaza operations</li> </ul>

Benefits of the ETC system for the different stakeholders are further highlighted in the perception surveys discussed in subsequent section.

## 4 Stakeholder perception

To gain valuable insight into various stakeholders’ perception and to elicit their feedback on the ETC system, stakeholder perception surveys were conducted across multiple survey modes as part of this study. Relevant stakeholder groups associated with the ETC ecosystem were engaged to obtain various insights such as –

- *Demographics and general insights (such as age, gender, and purpose of trips for passenger vehicle owners and fleet profile in case of freight transporters)*
- *Indication of overall preference towards ETC versus manual toll collection*
- *Perception on benefits such as convenience, visibility, safety, security, and service experience*
- *Improvement areas for ETC*

The above insights were gathered through a mix of the following survey modes –

- *Online surveys*
- *Focus group discussions (FGDs)*
- *Interviews*

The following table provides the list of stakeholder groups surveyed and the participation from each of them as part of the perception surveys.

**Table 14: List of stakeholder groups engaged as part of stakeholder perception surveys and quantum of representation from each of them**

S. No.	Stakeholder group	Significance of stakeholder group	Quantum of representation
1	Passenger vehicle users	Comprises the passenger vehicle users / owners and represent one of the largest sets of the end user beneficiaries	11,000+ responses received from users across the country through online survey with representation from different demographics

S. No.	Stakeholder group	Significance of stakeholder group	Quantum of representation
2	State Road Transport Undertakings (SRTUs)	Provides bus based intra and inter-state public transportation services in the country - one of the key beneficiaries	15% SRTUs represented by 9 entities in the FGD
3	Freight transporters	Provides road-based freight transportation services using trucks - represent the highest number of daily toll transactions	Representation from owners with combined fleet of 5,000+ trucks through online survey (500+ responses) and 9,500+ trucks through 11 entities in FGD
4	Toll plaza operators	Manages toll plaza operations and directly responsible for toll collections and providing seamless tolling service to road users	100+ responses received through online survey from concessionaires and tolling contractors and 200+ toll plazas represented by 12 entities in FGD
5	NHAI Regional Offices (ROs) / Project Directors (PDs) / Nodal Officers	Represents the Authority / implementing agency	Representation of 15 officers from different regions
6	Issuer / Acquirer Banks	Facilitates tag issuance to users and toll payment transactions between users and service providers	Representation from 12 banks handling 90% of daily ETC transactions in the country
7	System Integrators	Technology partners in the ETC ecosystem providing and	Representation of 6 out of 8 system integrators empanelled with IHMCL

S. No.	Stakeholder group	Significance of stakeholder group	Quantum of representation
		facilitating IT infrastructure and related support services	
8	National Payments Corporation of India	Represents the umbrella organization for operating retail payments and settlement systems in India and facilitator for FASTag transactions	Single stakeholder

The following table provides the mode(s) of survey adopted for each of the above listed stakeholder groups.

**Table 15: Survey modes and channels of engagement utilized for stakeholder perception surveys**

S. No.	Stakeholder group	Survey mode	Channel of engagement
1	Passenger vehicle users	Online surveys	Email, SMS, and app notification containing online survey link sent by Issuer Banks to their FASTag end users
2	State Road Transport Undertakings (SRTUs)	Focus Group Discussions	Emails sent and discussions conducted through members of Association of State Road Transport Undertakings (ASRTU)
3	Freight Transporters	Online surveys	Emails sent by All India Transporters Welfare Association (AITWA), All India Motor Transport Congress (AIMTC) and WheelsEye to their members

<b>S. No.</b>	<b>Stakeholder group</b>	<b>Survey mode</b>	<b>Channel of engagement</b>
		Focus Group Discussions	Discussions with members of AITWA, AIMTC and WheelsEye through Video Conferencing
4	Toll Plaza Operators	Online surveys	Emails sent by National Highways Builders Federation (NHBF), Highway Operators' Association of India (HOAI) and All-India User Fee Contractors' Federation (AIUCF) to their members
		Focus Group Discussions	Discussions with members of NHBF, HOAI and AIUCF through Video Conferencing
5	NHAI Regional Offices, Project Directors and Nodal Officers	Interviews	Telephonic interviews conducted by utilizing NHAI / IHMCL officers' database
6	Issuer / Acquirer Banks	Focus Group Discussions	Telephonic interviews conducted by utilizing database of banks from IHMCL
7	System Integrators	Focus Group Discussions	Video conference discussions conducted by utilizing IHMCL System Integrator database
8	National Payments Corporation of India (NPCI)	Interviews	Telephonic interview conducted with representative of NPCI

The following sub-sections provide the outcome of perception surveys for each of stakeholder groups.

## 4.1 Passenger vehicle users

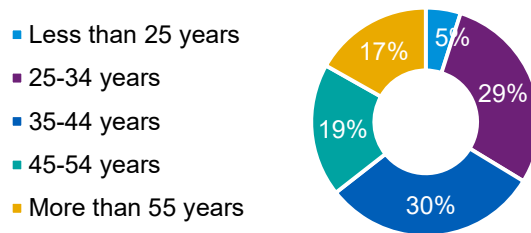
The passenger vehicle segment represents the largest end user group of ETC system. To obtain a sizeable representative sample of responses for this large stakeholder group, a link to an anonymous survey was circulated by issuer banks to users of FASTag issued by them through email, SMS, and app notifications.

**The online survey obtained responses from 11,156 users across age profiles, regions and economic background**

### 4.1.1 Respondent profile

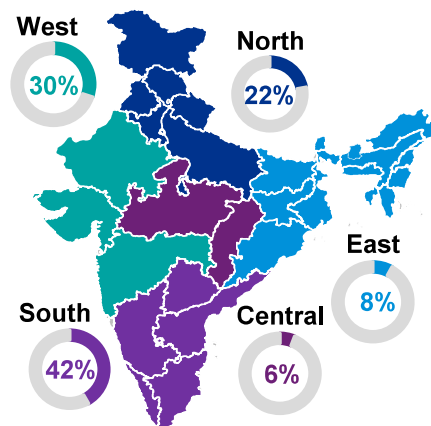
Responses received for the online survey had a good mix of representation of respondents from different age profiles. The following figure provides the age distribution of survey respondents.

**Figure 25: Age profile of respondents to online survey for passenger vehicle users**



The following figure provides the regional distribution of survey respondents.

**Figure 26: Regions of FASTag use indicated by passenger vehicle segment online respondents**



Note: Percentages in the above figure indicate the share of respondents commuting in the respective region, sum is greater than 100% since some respondents commute in multiple regions

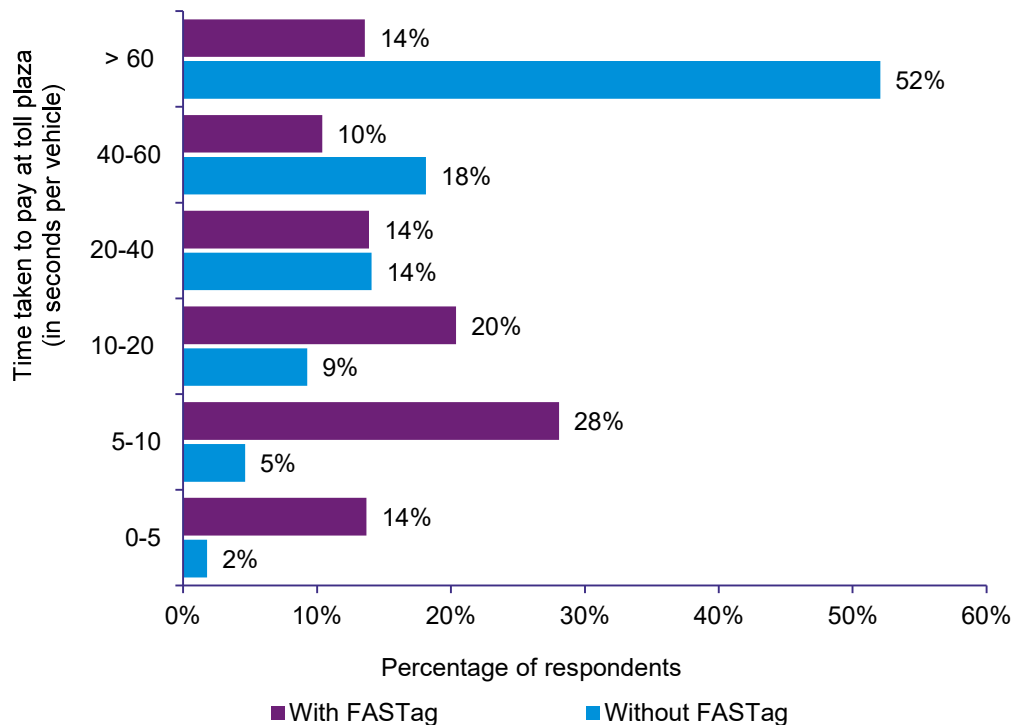
### 4.1.2 Preference for ETC

- ✓ **78% of all survey respondents indicated a preference for FASTag (ETC) over manual toll collection**

Further insight was sought on the time taken to pay at toll plaza as well as waiting time, with a selection of options on time ranges which could be selected by the respondents.

**Time taken to pay toll at toll plaza** - The following figure provides respondent feedback on time taken to pay at toll plaza in case of both ETC (FASTag) and manual (cash-based payment without FASTag) toll collection.

**Figure 27: Passenger vehicle user feedback on time to pay toll at toll plaza**



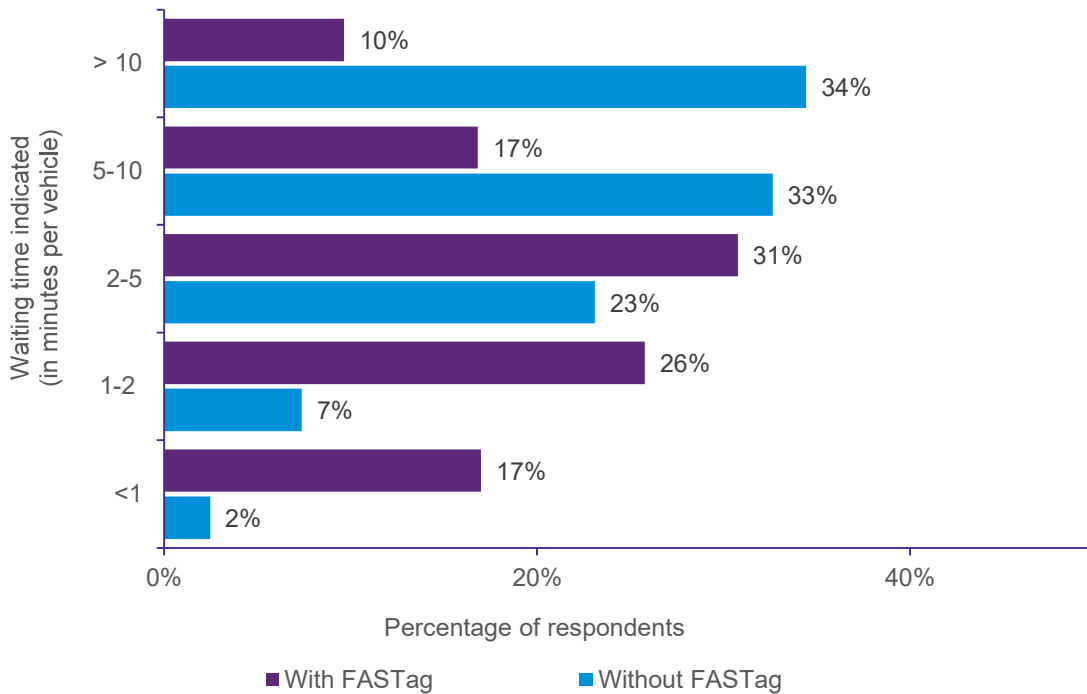
It can be interpreted from the above figure that:

- ✓ **70% respondents indicated time taken to pay toll fee was more than 40 seconds in case of manual toll payment**
- ✓ **62% respondents indicated that time taken to pay toll fee has now reduced to less than 20 seconds with FASTag**



**Waiting time at toll plaza** - The following figure provides respondent feedback on time taken to pay at toll plaza in case of both ETC (FASTag) and manual (cash-based payment without FASTag) toll collection.

**Figure 28: Passenger vehicle user feedback on waiting time at toll plaza**

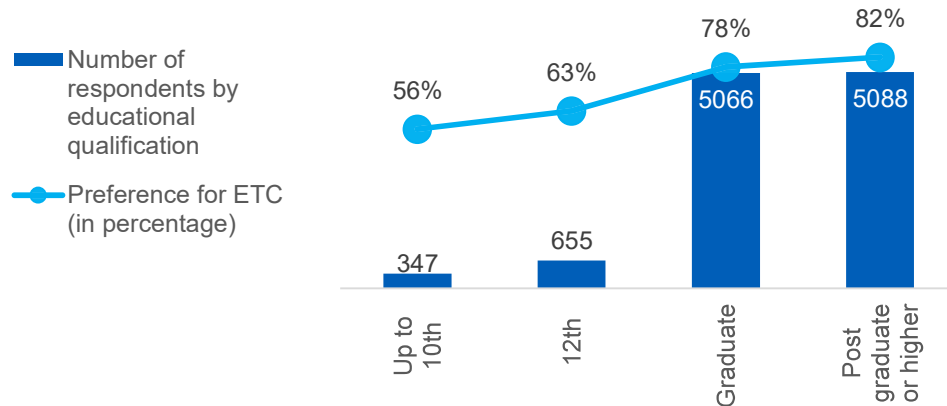


It can be interpreted from the above figure that:

- ✓ **67% respondents indicated that waiting time was more than 5 minutes in case of manual toll payment**
- ✓ **74% respondents indicated that waiting time has now reduced to less than 5 minutes with FASTag**

**Preference for ETC by educational qualification** – The following figure provides ETC preference by educational qualification indicated by the respondents.

**Figure 29: Passenger vehicle user preference for ETC by educational qualification**

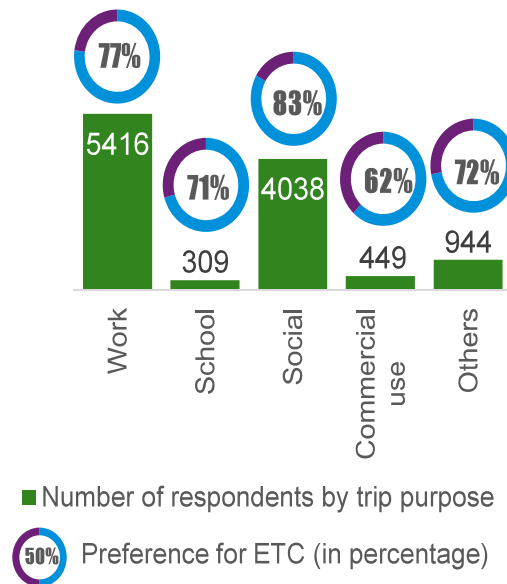


It can be interpreted from the above figure that:

- ✓ **More than 90% respondents indicated their highest educational qualification as graduate or above.**
- ✓ **Survey responses have clearly indicated that respondents with higher educational qualifications are more likely to prefer ETC over cash payment.**

**Preference by purpose of trip** – The following figure provides ETC preference by purpose of trip indicated by the respondents.

**Figure 30: Passenger vehicle user preference for ETC by purpose of trip**



It can be interpreted from the preceding figure that:

- ✓ **Work and social trips were indicated as the most common purposes of trips and together they constitute more than 84% of all survey responses.**
- ✓ **Respondents with social and work-related trips have shown the highest preference for ETC compared to other trip purposes.**

**Other insights –**

- ✓ **80% of passenger vehicle users in the western region of the country preferred toll fee payment through ETC mode, which is highest among all regions.**
- ✓ **Higher the number of visits to the toll plaza in a week, the higher the preference for ETC. 81% of commuters who visit toll plazas more than 5 times in a week prefer ETC over toll fee through cash payment.**

### **4.1.3 Perception on benefits and improvement areas**

User perception on various benefits of ETC was also sought as part of the online surveys. The major portion of respondents have indicated the realization of various benefits since the implementation of ETC.

- ✓ **89% of passenger vehicle users were of the view that security was enhanced due to reduced need to open car window due to ETC**
- ✓ **86% users agreed that keeping track of toll transactions has become easier due to ETC**
- ✓ **84% users felt that toll payments are faster due to no cash involvement**
- ✓ **82% users indicated that their journey has improved due to ETC**

The key improvement areas indicated by respondents include concerns on payment errors, tag readability and receipt of timely fee deduction messages. Following are the percentages of online survey respondents who have indicated these as concerns –

- **56% passenger vehicle users indicated concerns on payment errors – technical issues such as double payment, fines etc.**
- **54% users indicated concerns on tag read reliability**
- **33% users also indicated concerns on receipt of timely fee deduction updates**



Even though 78% of respondents indicated a preference for ETC, it is observed that certain issues / improvement areas pertaining to ETC are likely to have influenced a preference for cash payment for the remaining 22% respondents. These include technical glitches such as double payment, challenges in tracking toll fee payment, inadequate perception of improved security, unsatisfactory user journey experience and no experience of faster payments.

Detailed information on responses received from each stakeholder group is provided in the Annexure.

## 4.2 State Road Transport Undertakings (SRTUs)

The State Road Transport Undertakings (SRTUs) represent the largest user group of public transport operators in the country which operate intra as well as inter-state bus services. **Focus group discussions (FGDs) were conducted with 9 SRTU entities representing 15% of all SRTUs in the country**, to elicit their feedback on the ETC system.

The SRTUs have indicated a preference for ETC. Following is the list of benefits of ETC indicated by SRTUs in the FGDs –

- ✓ **Reduced waiting time at the toll plazas is the key benefit derived from the ETC based tolling**
- ✓ **Ability to recharge ETC wallet through multiple modes of payment like IMPS, NEFT, RTGS, Internet Banking and UPI has significantly enhanced the convenience**
- ✓ **More trips per vehicle are now possible due to faster toll payments which earlier used to take much longer time**
- ✓ **Accounting and bookkeeping with respect to toll payments has also improved due to digital trail of the transactions done thereby eliminating the need to keep paper receipts**
- ✓ **Passenger security has also improved due to touchless transaction enabled by ETC**
- ✓ **Reduced pollution on account of reduced waiting time at toll plazas**

The respondents also mentioned certain improvement areas for ETC system as provided below –

- **66% respondents indicated that tag read reliability could be improved to further reduce**
- **44% respondents indicated that they face difficulties during revenue reconciliation**
- **33% respondents indicated that improved scanners and real time toll fee updates need to be implemented to avoid double payment of tolls**
- **22% respondents indicated that bottlenecks occurring due to monthly pass issuance via different issuer and acquirer banks could be resolved**

Detailed information on responses received from each stakeholder group is provided in the Annexure.

### 4.3 Freight transporters

The freight transporter segment comprises the trucks and other commercial vehicle operators in the country that transport the freight in the country. Two survey modes were used simultaneously for this stakeholder group which are:

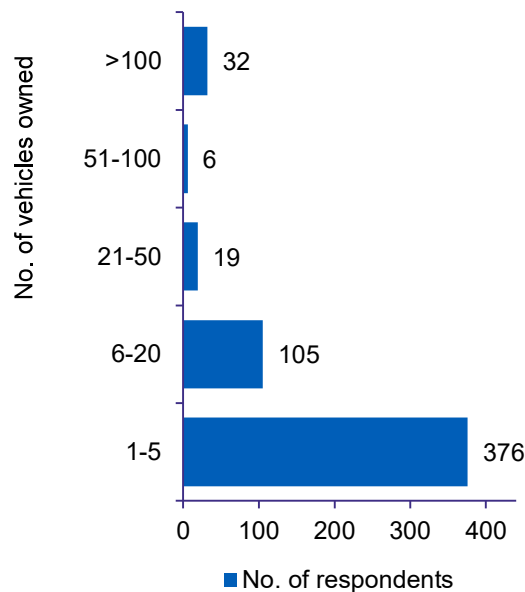
- Emails containing online survey sent by All India Transporters Welfare Association (AITWA), All India Motor Transport Congress (AIMTC) and WheelsEye to their members, and
- Focus group discussions (FGDs) with members of AITWA, AIMTC and WheelsEye through Video Conferencing

**The online survey obtained 548 responses from transporters with a combined fleet of 5,000+ trucks and 11 entities participated in the FGDs collectively representing a fleet of 9,500+ trucks**

#### 4.3.1 Respondent profile

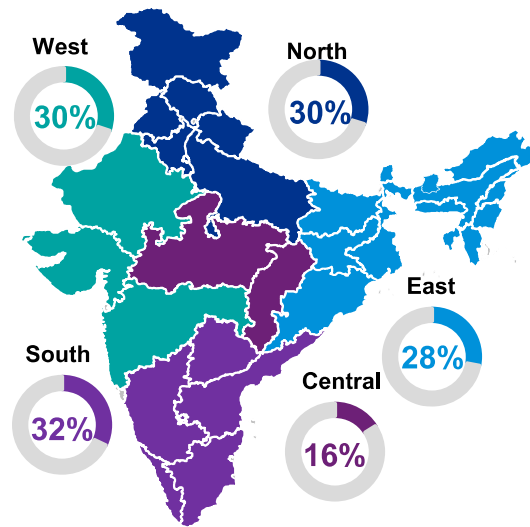
Responses received for the online survey had a good mix of representation of freight transport owners by fleet size as well as region of operation. The following figure provides the fleet ownership profile indicated by survey respondents.

**Figure 31: Fleet ownership profile of online survey respondents in freight transporter segment**



The following figure provides the region of operation indicated by survey respondents.

**Figure 32: Region of operation of online survey respondents in freight transporter segment**



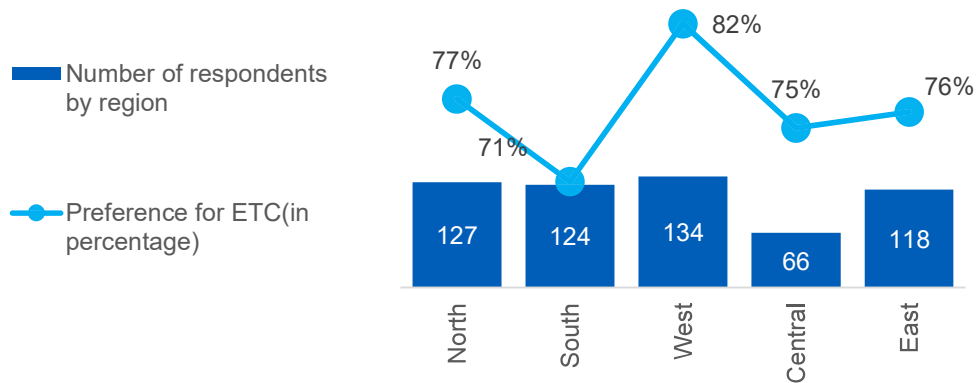
Note: Percentages in the above figure indicate the share of respondents whose fleet is operating in the respective region, sum is greater than 100% since some respondents operate in multiple regions

### 4.3.2 Preference for ETC

- ✓ 75% of all survey respondents indicated a preference for FASTag (ETC) over manual toll collection

The following figure provides the preference for ETC based on region of operation indicated by online freight segment respondents.

**Figure 33: Preference for ETC based on region of operation indicated by online survey respondents in freight transporter segment**

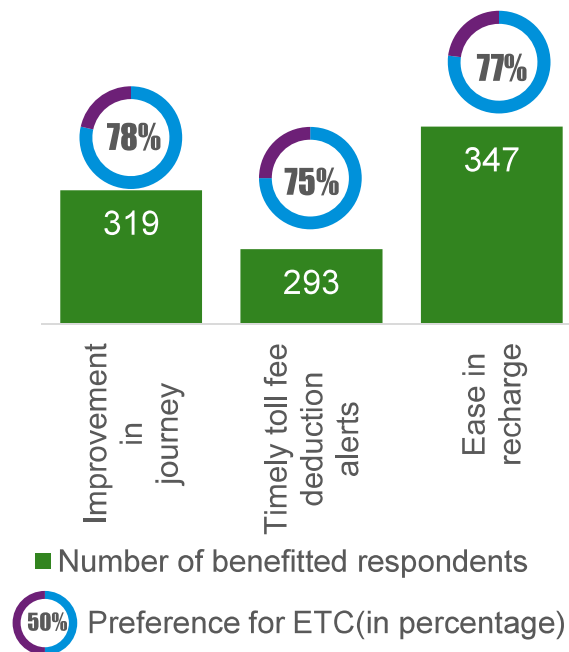


It can be observed from the preceding figure that:

- ✓ Among all regions, 82% respondents from western region have shown preference for ETC - which is the highest among all regions. One of the factors influencing this perception could be the higher presence of ports and waterways in the western region of India.

The following figure provides the preference for ETC based on perception of key benefits.

**Figure 34: Preference for ETC based on perception on key benefits indicated by online survey respondents in freight transporter segment**



It can be inferred from the above figure that:

- ✓ Freight segment users that agreed to ease of recharging FASTag had an ETC preference of 77%
- ✓ Users indicating betterment of journey had an ETC preference of 78%
- ✓ Among the users satisfied with timely toll fee deduction updates, 75% prefer ETC

### 4.3.3 Perception on benefits and improvement areas

Perception of freight transporters on various benefits of ETC was also sought as part of the online surveys. The major portion of respondents have indicated the realization of multiple benefits since the implementation of ETC.



- ✓ **74% respondents felt that journeys have improved due to ETC**
- ✓ **74% respondents agreed that ETC has improved safety during the pandemic**
- ✓ **73% respondents were of the view that reconciliation of toll fee has become simpler with ETC**
- ✓ **64% respondents stated that ETC has improved goods security**

The key improvement areas indicated by freight segment online survey respondents include the following

- **74% respondents still worry about potential technical issues they might face during toll payment using ETC such as double payment of tolls, fines etc.**
- **64% respondents expressed reservations regarding readability of tags**

The focus group discussions conducted for freight transporters further validated the realization of various benefits of ETC including –

- ✓ **Waiting time and processing time at the toll plaza has reduced due to faster toll payments enabled by the ETC system**
- ✓ **Due to completely digital process for toll payment, the operational difficulties associated with arranging for cash required by drivers to pay toll at toll plazas has reduced significantly**
- ✓ **Reduced congestion at the toll plazas due to significant reduction in queuing at the toll plazas for the toll payments**
- ✓ **Timely toll fee deduction updates has made the toll payment accounting easier while also enhancing the accountability and route compliance by drivers due to enhanced visibility of the toll plazas crossed by the truck / vehicle as indicated in the updates**
- ✓ **Reduced waiting time at the toll plazas has also reduced the pollution**
- ✓ **Higher visibility and route compliance enabled by ETC has enhanced the goods safety while also ensuring the safety of the drivers from the COVID pandemic**
- ✓ **Due to the benefits of the ETC system, almost 100% of the fleet of the respondents have FASTags for toll payments**

Following are the improvement areas indicated by participants in the FGDs –

- **91% participants indicated that tag read reliability could be improved to avoid manual payments**

- **91% participants also expressed that technical issues like double payment, overcharging need to be minimized**
- **64% participants felt that waiting time could be further reduced**
- **55% respondents were of the opinion that there is a need for improved public awareness on FASTag**

Detailed information on responses received from each stakeholder group is provided in the Annexure.

## 4.4 Toll plaza operators

Toll plaza operators represent the core service provider group for tolling, who have transitioned their operations from manual tolling to ETC. For the toll plaza operators also, a mix of survey modes was utilized viz.

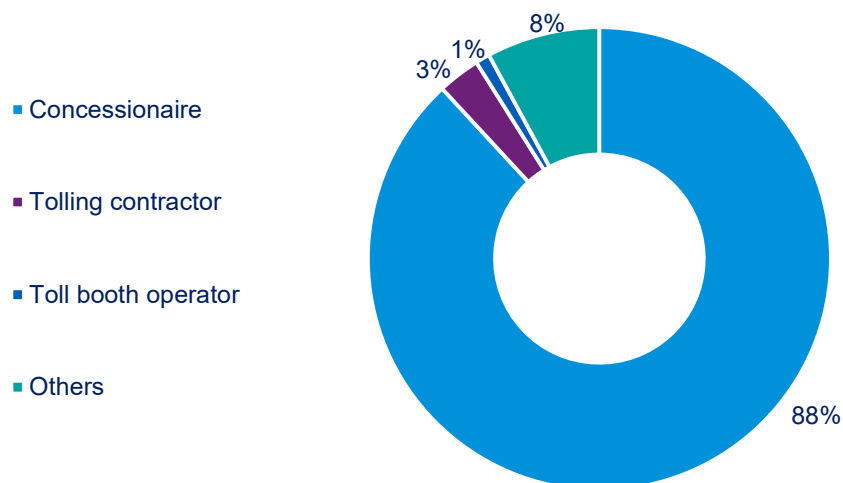
- Online surveys through emails sent by National Highways Builders Federation (NHBF), Highway Operators' Association of India (HOAI) and All-India User Fee Contractors' Federation (AIUCF) to their members, and
- Focus group discussions (FGDs) with members of NHBF, HOAI and AIUCF through Video Conferencing.

**The online survey received 101 responses from toll operators while 12 entities representing 200+ toll plazas participated in the FGDs.**

### 4.4.1 Respondent profile

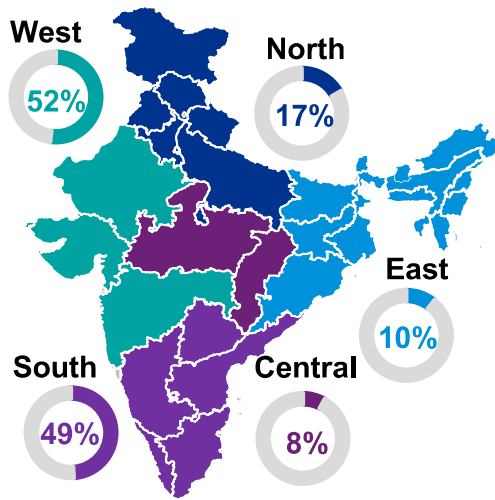
Responses received for the online survey had a good mix of representation of operator type as well as region in which the respondents had operations. The following figure depicts operator type as indicated by respondents.

**Figure 35: Representation of different types of toll operators in the online survey**



The following figure indicates the distribution of survey respondents with respect to region of operation.

**Figure 36: Area of operation indicated by respondents to online survey for toll operators**



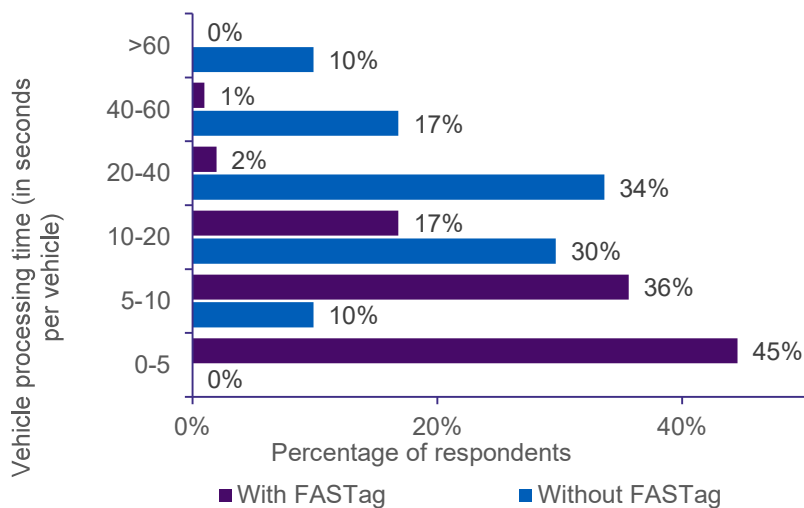
Note: Percentages in the above figure indicate the share of respondents operating toll plaza(s) in the respective region, sum is greater than 100% since some respondents operate toll plazas in multiple regions

#### 4.4.2 Preference for ETC

- ✓ **94% of all survey respondents indicated their preference for ETC over manual toll collection system**

**Processing time** - The following figure provides respondent feedback on processing time in case of both ETC (FASTag) and manual (cash-based payment without FASTag) toll collection system.

**Figure 37: Toll operator feedback on processing time at toll plazas**

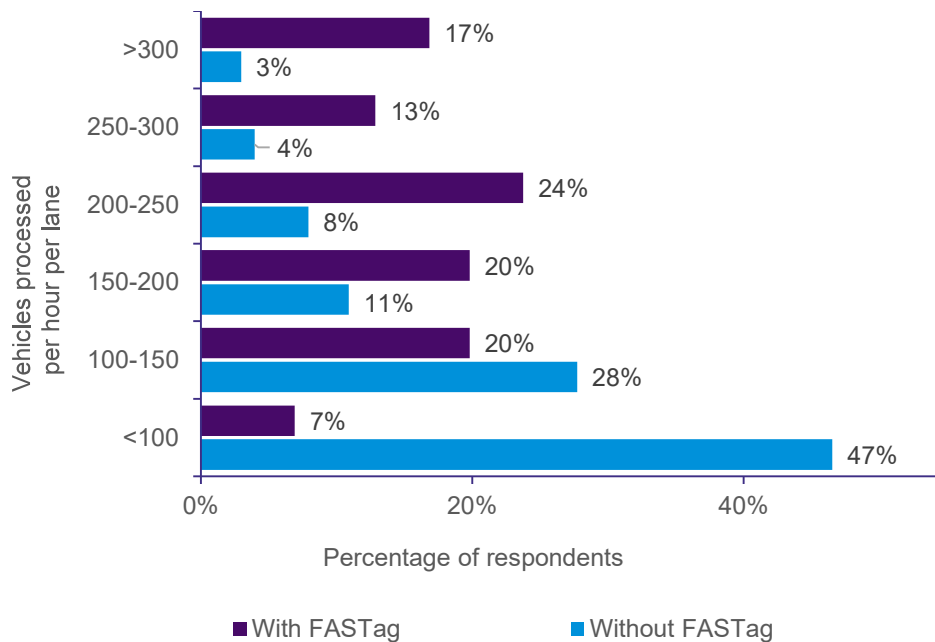


It can be interpreted from the above figure that:

- ✓ **61% respondents indicated that processing time was more than 20 seconds per vehicle in case of manual toll payment**
- ✓ **81% respondents indicated that processing time has now reduced to less than 10 seconds per vehicle with ETC**

**Number of vehicles processed** - The following figure provides respondent feedback on number of vehicles processed per hour per lane in case of both ETC (FASTag) and manual (cash-based payment without FASTag) toll collection system.

**Figure 38: Respondent feedback on waiting time in case of both ETC and manual toll collection for passenger vehicle owners**



It can be interpreted from the above figure that:

- ✓ **75% respondents indicated that number of vehicles processed per hour was less than 150 in case of manual toll payment**
- ✓ **74% respondents indicated that number of vehicles processed per hour per lane has now increased to more than 150 with FASTag**

#### 4.4.3 Perception on benefits and improvement areas

The online survey sought respondent feedback on perception on key benefits of ETC. The key outcomes are provided below.

- ✓ **More than 98% respondents agreed that waiting time has reduced leading to lesser travel time as a key benefit of ETC**
- ✓ **93% respondents felt that safety has enhanced due to reduced cash handling during the pandemic**
- ✓ **93% respondents indicated that congestion has reduced at toll plazas**
- ✓ **90% respondents also indicated improved operational efficiency in toll collection**

The online survey also elicited respondent feedback on improvement areas for ETC and the outcomes are provided below.

- **41% respondents felt that toll reconciliation process may not have become simpler**
- **26% respondents indicated that the disputes at toll plazas may not have reduced**

The focus group discussions (FGDs) conducted with 12 entities representing 200+ toll plazas across the country further validated the positive perception on key benefits of ETC as described below.

- ✓ **ETC has significantly reduced the vehicle waiting time and processing time at the toll plazas**
- ✓ **Due to ETC system, there has been significant reduction in the operational difficulties associated with manual toll processing e.g. cash handling and its management, paper consumables management, operations monitoring etc.**
- ✓ **Toll plazas witnessing fewer cash-based tolling as more users prefer ETC leading to more than 90% transactions through FASTag**
- ✓ **Faster transaction has led to reduced congestion at the toll plazas due to significant reduction in queuing at toll plazas**
- ✓ **ETC usage has also led to fewer customer complaints as there is lesser queuing and the complete process is digitized**
- ✓ **Reduced congestion at toll plazas has led to lesser pollution which has also improved the working conditions for the toll plaza staff**
- ✓ **Improved safety on account of touchless transactions has allowed the toll plaza staff to continue operating despite the COVID19 pandemic**

Improvement areas indicated by participants in FGDs are provided below.

- **50% participants felt that lesser time should be taken for updating blacklisted vehicles, since it causes congestion and disputes at toll plazas**
- **42% participants highlighted that tag quality and affixing procedures need further standardization to improve tag readability**
- **42% participants indicated the need for a common mechanism to address toll fee related issues of locals**
- **33% participants mentioned that accurate FASTag issuance to avoid misuse and incorrect vehicle classification is a challenge**
- **25% participants agreed that vehicle classification norms need further standardization to avoid revenue loss to tolling authorities**

Detailed information on responses received from each stakeholder group is provided in the Annexure.

## **4.5 National Highway Authority of India (NHAI) Regional Offices (ROs), Project Directors (PDs) and Nodal Officers**

The NHAI stakeholder group represents the central Authority for highways sector and primary beneficiary of ETC in India. Interviews were conducted with 15 officials from various regions across the country. NHAI officials have indicated the following key benefits of ETC.

- ✓ **Reduction in long queues at the toll plazas**
- ✓ **Reduced waiting time for the vehicles**
- ✓ **Reduced pollution due to reduced queueing and time spent by vehicle at the toll plazas**
- ✓ **Improved transparency in the toll collection, vehicular traffic, and other information**
- ✓ **Higher revenue collection witnessed due to reduced revenue leakage as well as traffic increase**
- ✓ **Fewer quarrels at the toll plazas due to complete digitalization of the toll collection process**
- ✓ **In particular, the respondents indicated that there is improved transparency in accounting process and seamless movement of traffic at toll plazas resulting in time savings**

The respondents also indicated the following improvement areas for ETC.

- **40% respondents felt that locals should be issued FASTags to reduce disputes and congestion at toll plazas**
- **26% respondents felt that lesser time should be taken for updating blacklisted vehicles, since it sometimes causes congestion and disputes at toll plazas**
- **26% respondents felt that ETC penetration can be increased if exempted vehicles are expeditiously brought under the ambit of FASTag**
- **13% respondents were of the view that integration of fines for overloaded vehicles within FASTag would further reduce the processing time and also simplify the process**

Detailed information on responses received from each stakeholder group is provided in the Annexure.



## 4.6 Issuer and acquirer banks

Issuer and acquirer banks represent a key stakeholder in the ETC ecosystem, as financial institutions / banks who have either acquired the toll plazas or issued tags to end users of FASTag. For this stakeholder group, focus group discussions (FGDs) were conducted with participation from 12 banks handling 90% of daily ETC transactions in the country. The banks have indicated four major improvement areas for the ETC system as briefly described in the following paragraphs.

### — Need for improvement in toll infrastructure

Banks indicated that they are facing issues of double payment, wrong identification of tags as blacklisted and charges triggered manually by toll plazas at the back-end (for tags of active users as well as tags not yet issued). These issues are due to poor infrastructure, use of local/out-of-date databases by toll plazas (causing multiple issues) and inability of toll plazas to initiate transactions manually without physical scanning of tags.

The banks suggested few measures to address this challenge including improved infrastructure, ensuring single-factor authentication (by scanning of tag) and disallowing any use of local databases by toll plazas.

### — Dispute resolution mechanisms

Banks mentioned that since they serve as the single point of contact for end users, FASTag users hold them accountable on all issues including wrong payments, tags not read etc. even though the majority of issues may be traced to issues at individual toll plazas.

Accordingly, the banks indicated a need for a dispute resolution mechanism between the banks, toll plazas and end users.

### — Tag issuance – KYC compliance and uploading of RC

Banks indicated that KYC is emerging as a major challenge due to difficulty in carrying out full KYC which requires physical visit by either customer or bank representative.

To address this challenge, it was suggested that Vaahan API may be used as a substitute for manual uploading of Vehicle Registration Certificate (RC). The same may also be used for validating vehicle number, class etc. for issue of FASTags. These measures will eliminate the need for users to upload RC copies, as well as any risk associated with wrong information / forged RC copy submitted by FASTag applicants.

### — Negative balances

Banks mentioned that after removal of threshold limit for FASTag wallet, negative balance has increased by 2-3 times for majority of banks since 16 March 2021. Banks were of the view that minimum threshold of INR 100 is required to address the challenge of losses being incurred by issuer banks due to negative balance and constant re-issue of new tags by certain users.

Detailed information on responses received from each stakeholder group is provided in the Annexure.

## 4.7 System integrators

System integrators represent the technical agencies responsible for smooth functioning of the ETC system which involves a number of stakeholders and technology platforms. For this stakeholder group, focus group discussions (FGDs) were conducted with participation from 6 out of total 8 system integrators empanelled with IHMCL. The system integrators have indicated the following key benefits of ETC.

- ✓ **ETC system has led to reduction in long queues and congestion at toll plazas**
- ✓ **Processing time for toll payment has reduced by 80% to 90% in ETC system when compared to manual cash-based tolling**
- ✓ **There has been drastic reduction in disputes at toll plaza which were earlier a common occurrence**

The respondents further indicated the following improvement areas for ETC system.

- **100% respondents felt that system downtime management needs improvement**
- **83% respondents indicated that system infrastructure needs upgradation to process large amounts of data generated by large volume of toll transactions facilitated by the system**
- **50% respondents expressed the view that tag quality and tag reading infrastructure may be improved to improve tag read reliability**
- **33% respondents suggested that tag affixing procedures should be standardized to avoid tag quality and readability issues**

Detailed information on responses received from each stakeholder group is provided in the Annexure.

## 4.8 National Payments Corporation of India (NPCI)

NPCI represents the umbrella organization for operating retail payments and settlement systems in India and is the key facilitator for FASTag transactions. To obtain the viewpoint of this important stakeholder, an interview was conducted with representative from NPCI. NPCI indicated the following key benefits of ETC.

- ✓ **ETC has led to multiple benefits for the road users including reduced waiting time at toll plaza, fuel cost saving, and enhanced convenience with respect to toll payments**
- ✓ **ETC has also led to increased revenue collection for all parties involved in the eco-system from service side**
- ✓ **Significantly improved visibility of the traffic across the toll plazas in the country is likely to enable higher future asset monetization bid in the road infrastructure sector while also reducing the probability of extension of existing concessionaire periods**

NPCI also indicated the following improvement areas for ETC system.

- **There is a need to improve the quality of toll plaza infrastructure including regular audit and monitoring of toll plaza infrastructure to improve the user experience**
- **The technology also may need upgradation to receive timely toll fee deduction confirmation as well as updating blacklisted vehicles**
- **User awareness about tag affixing procedures also needs to be improved because tag readability issues can occur if one tries to attempt re-affixing a tag on a vehicle**

Detailed information on responses received from each stakeholder group is provided in the Annexure.

## 4.9 Summary

The stakeholder perception surveys revealed that the majority of respondents from every stakeholder group indicated a clear preference for ETC over manual toll collection, and that the majority of stakeholders and end-users have benefitted from time savings and improved overall tolling experience as a result of ETC implementation. Following are the key benefits and improvement areas indicated by respondents across various stakeholder groups.

### Summary of perception on key benefits



#### Significant Time Savings

A significant portion of the respondent groups highlighted reduced waiting and processing time at toll plazas, leading to lesser travel time



#### Enhanced Safety and Security

Implementation of ETC has positively impacted security and safety due to reduced interaction at toll plazas, especially during pandemic



#### Increased Revenue Collection

ETC system has increased transparency as well as facilitated reduction in revenue leakages, thereby increasing revenue collection



#### Improved Convenience

ETC system procedures are convenient including tag issuance, recharge facilities and toll deduction alerts



#### Reduced Pollution

ETC has ensured seamless travel through toll plazas, resulting in reduced pollution due to decreased idling time of vehicles at the plaza

### Summary of key areas for improvement



#### Tag and Scanner Quality

Various stakeholder groups highlighted the need for improved and standardized tags and scanners, which will further enhance read reliability



#### Resolution of Blacklisted Tags

Time taken to change the blacklist status of a vehicle after FASTag recharge needs to be reduced, since this causes disputes at toll plazas



#### Technical Issues

A small portion of users are still facing technical issues such as double payment, overcharging, fines, etc. which needs to be resolved



#### Process improvement and user awareness

Stakeholders indicated a need to improve processes to ensure only one tag per vehicle, adherence to SOPs, payment dispute resolution and user awareness on tag use to further streamline the processes and user experience

## 5 Conclusion and the way forward

The implementation of ETC has resulted in significant economic benefits as well as improvement of user experience as examined in this study. The **overall annual economic impact of ETC is estimated to be ₹43,400+ Crore** and various stakeholder groups including end users (passenger vehicle owners, SRTUs and freight transporters), toll plaza operators and others have all indicated an overwhelming preference for ETC as compared to manual toll collection due to realization of important benefits including reduced travel time, improved convenience, easier tracking of toll payments, and improved security.

With the implementation of ETC completed, there is a need to shift focus to continuous improvement as well as expansion of the program. This section describes some of the major programs IHMCL may initiate on that note.

### 5.1 Resolve existing issues impacting customer experience

The stakeholder perception surveys conducted as part of this study identified certain issues impacting overall customer experience at toll plazas, including tag quality issues, reader issues, technical issues, tag blacklisting and compliance issues. The small portion of respondents who preferred manual toll collection over ETC system had also cited these issues.

While some teething issues are expected to result from the mandatory implementation of any large technology-enabled pan-India program involving financial transactions, it has been the endeavour of IHMCL to ensure that FASTag emerges as one of the most successful and seamless ETC systems in the world. To realize this objective, it is incumbent upon IHMCL to now undertake specific efforts to reduce the frequency of issues as well as the overall effort being invested in resolution of the issues.

Accordingly, IHMCL may consider initiating a diagnostic study to assess toll plazas with the highest frequency of technical issues or disputes and identify key root causes or factors contributing to them. The contributory factors so identified may be related to use of multiple databases, use of sub-optimal or legacy scanner hardware, poor connectivity, or linkage to the NETC mapper, incorrect placement of tags or other issues. Based on the findings of the diagnostic study, suitable solutions in the form of well-thought interventions may be planned in a phased manner as part of a structured roadmap which will reduce the frequency of the issues as well as the effort required to resolve these issues. These interventions are expected to involve various stakeholders associated with the ETC system and may

include upgradation of select hardware, ensuring compliance to use of single database, clear SOPs on blacklisting and de-blacklisting of tags and other initiatives.

## 5.2 Improve operational efficiency

In addition to resolving the existing issues with the electronic tolling, IHMCL should also explore operational efficiency improvement opportunities which can result in reduced operational costs, enhanced resource utilization, decision enablement, better planning, and other associated benefits.

IHMCL may consider initiating a comprehensive operations efficiency program for toll plazas which would entail study of existing toll plaza operations and tolling process, conduct of time & motion studies to assess key bottlenecks, defining the “to-be” state including Key Performance Indicator (KPI) linked improvement goals. The outcome of this exercise would provide a list of toll plaza level, NHAI / IHMCL level and Government level interventions.

Apart from toll operations improvement, there is also a requirement to enhance the management visibility on the toll operations across the country in the form of near-real time management information systems leveraging the toll transaction data generated by the ETC system to enable faster decisions and better planning. This may be explored by IHMCL along with NPCI as part of the operational efficiency program under which a structured approach may be used to ideate and identify the information requirements of the IHMCL management and other relevant stakeholders followed by designing of the management information systems for the IHMCL leading improved decision-making ability and better operational control of the toll plaza operations.

## 5.3 Leverage ETC eco-system to explore new opportunities and services

The ETC system is a large and first of its kind pan-India program. The successful implementation of ETC entailed association and close engagement between a number of stakeholders including NPCI, banks, toll plazas, system integrators and others. The primary outcome of the ETC program was to enable seamless toll fee payments by vehicles across the country using a tag affixed on the windscreen of the vehicle.

This pre-existing capability of RFID tag-enabled payment offers a unique opportunity to IHMCL to explore potential new services, functions and revenue streams. In this regard, IHMCL may explore certain novel initiatives as provided below.

### **FASTag for other (non-toll) payments**

- **Payments for services** – The FASTag payment system can be expanded for enabling various other non-toll payments such as use of parking facilities, valet services, purchases at drive-thru food & beverage establishments, car repair workshops, car wash services and other services offered by businesses along National Highways. Such payments could entail two-factor authentication i.e. by the service provider / receiver as well as the vehicle / FASTag owner.
- **Payments for traffic violations** – FASTag could be leveraged to improve the efficiency of law enforcement by enabling payments for traffic violation fines/challans etc.

Fine deductions could be triggered by law enforcement personnel, supported with encrypted and secure video evidence of the traffic violations. This is expected to save a significant amount of time currently being spent by law enforcement personnel on collection of fines/challan amounts manually (through cash or card payment) and enable the personnel to focus on improving overall compliance and safety on highways.

Given existing capabilities, the provision for additional payments entail only incremental effort from IHMCL and hence represent a “low-hanging fruit” which could rapidly expand the scope of FASTag. IHMCL may consider undertaking pre-feasibility studies for non-toll payments including services by private firms and for law enforcement. The feasibility studies may be aimed at developing an implementation plan to expand the scope of FASTag.

### **Data monetization**

The earlier mechanism for collation of toll data on National Highways entailed a long process including submission of data by individual toll plazas to respective NHAI ROs and data consolidation including cleaning of data at various levels. This led to a long lead time for obtaining pan-India data, no real-time visibility, significant waste of productive time and error-prone nature of data. FASTag has eliminated these processes and enabled the on-demand availability of standardized, real-time and reliable data through centralized NETC database. This data can be used for multiple purposes as discussed below.

- **Improved planning of transport infrastructure projects** – Increased granularity of user commute data can be leveraged towards improved planning of highways, improved fleet management and other applications.
- **Real-time traffic management** – Real-time visualization of changes in traffic density based on ETC data combined with other data can be used to improve traffic management and enable



Authorities to proactively undertake measures (such as traffic rerouting) to proactively address instances of congestion.

- **Data monetization** – Fully anonymous user data can be monetized by selling to private logistics companies, bus operators, tourist agencies and other businesses for conducting studies or undertaking improvement or better targeting of their services.

The above opportunities necessitate the **development of a nuanced framework** to –

- Assess the nature of data becoming available including limitations
- Identify measures to improve the usability of data
- Identify specific uses of the data to improve transport planning and traffic management.
- Engagement with relevant Central & State Government stakeholders to handhold them in optimum use of the data to help improve their functions.
- Develop a framework for anonymizing the data
- Identify channels for monetization of anonymous data based on engagement with potential users of the data (private sector entities)
- Maximize the value of data based on requirements of customers & markets
- Ensuring cyber security and risk management for the ETC system

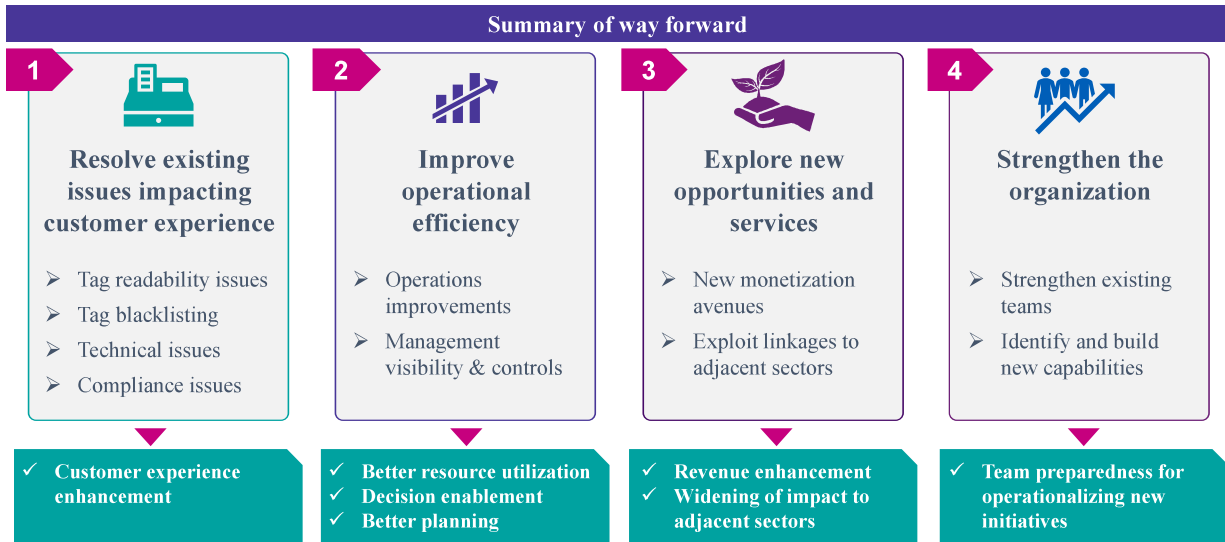
Based on the outcomes on the above aspects, IHMCL may leverage the existing ecosystem of system integrators and explore further strategic alliances with global technology companies, IT service providers, data analytics firms and relevant Government stakeholders.

A detailed study can be commissioned by IHMCL to explore the various new opportunities and services which can be provided by IHMCL either by directly leveraging ETC eco-system or by exploring adjacent sectors/services leveraging the wider NHAI/MoRTH eco-system.

### 5.4 Strengthen the organization

Given that IHMCL had been established to discharge a specific mandate of enabling electronic tolling, the number of existing employees and their current competencies may be inadequate for exploring and embarking on many of the above-mentioned initiatives. However, it is critical to plan for building the team and people competencies to drive the future growth of the organization for its existing fast expanding operations as well as future business endeavours. Hence, IHMCL may consider enhancing its organizational strength to add more people with existing capabilities as well as new capabilities

such as operations excellence, data sciences and others to enable IHMCL to efficiently leverage the various opportunities. Furthermore, IHMCL may consider imparting suitable trainings to existing staff to improve the organization’s competencies. The requisite organizational strengthening requirements can be identified as a part of the various studies suggested above or can be undertaken by IHMCL as a part of its regular business planning activity for future growth.



*In conclusion, undertaking some or all of the above listed initiatives will enable IHMCL to embark on the journey towards continuous improvement of its existing service while allowing it to make strategic investments in future growth areas thereby allowing it to transform the FASTag eco-system in the country and position it as one of the leading and most innovative systems in the world.*

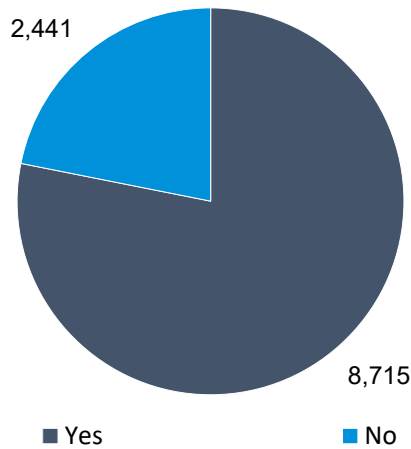
# Annexure

## Perception survey responses

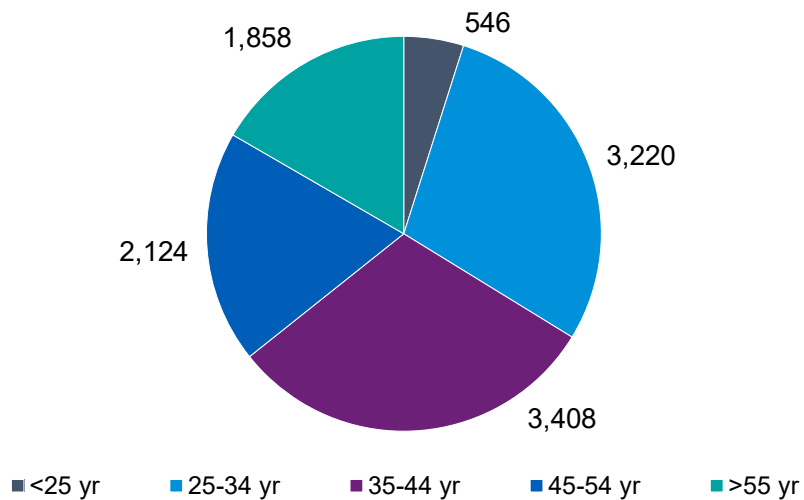
### 5.4.1 Annexure 1. Passenger Vehicle Users

Online survey was carried out for passenger vehicle users which received responses from 11,156 respondents. The analysis / findings from the responses received are presented below where the numbers indicate the number of respondents providing the corresponding response.

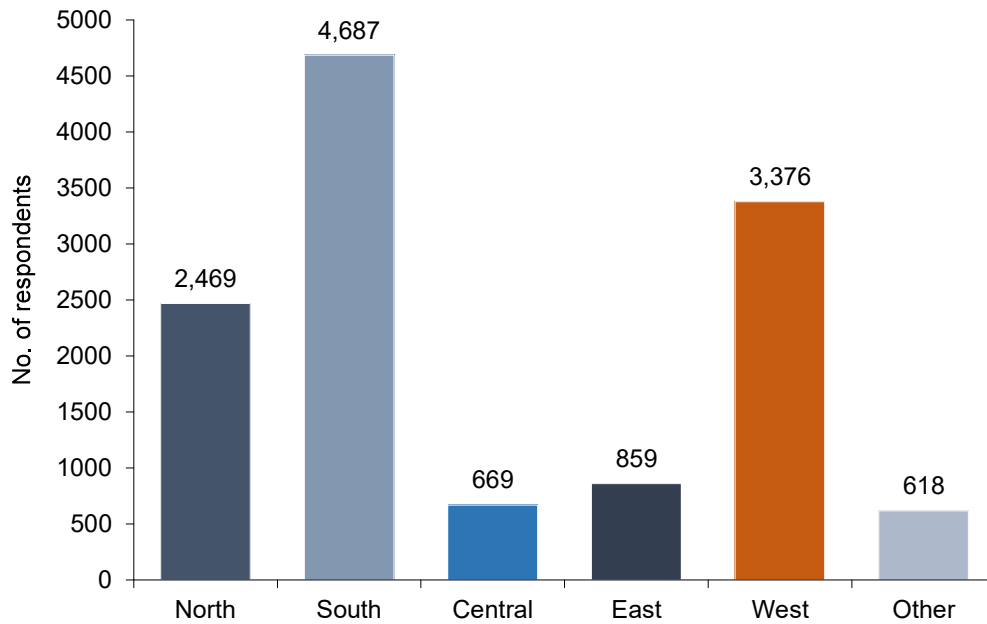
#### 1. Do you prefer Electronic Toll System over toll fee payment in cash?



#### 2. What is your age?

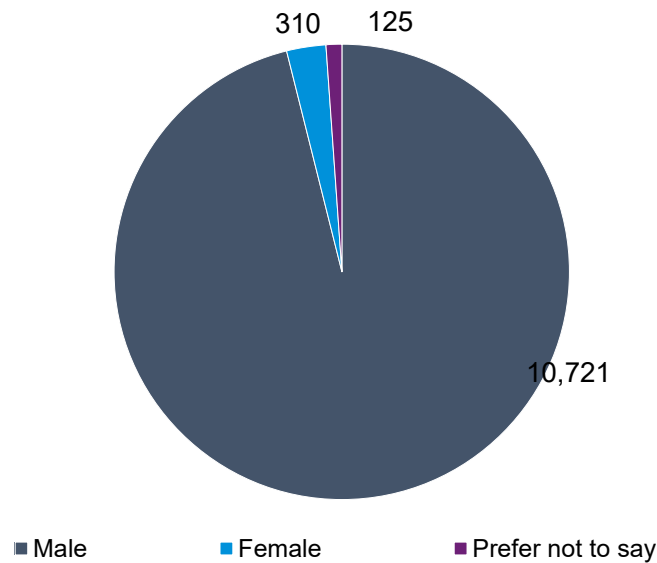


**3. In which part of India do you normally use your vehicle? (Other corresponds to those respondents who ply their vehicle in more than one region)**

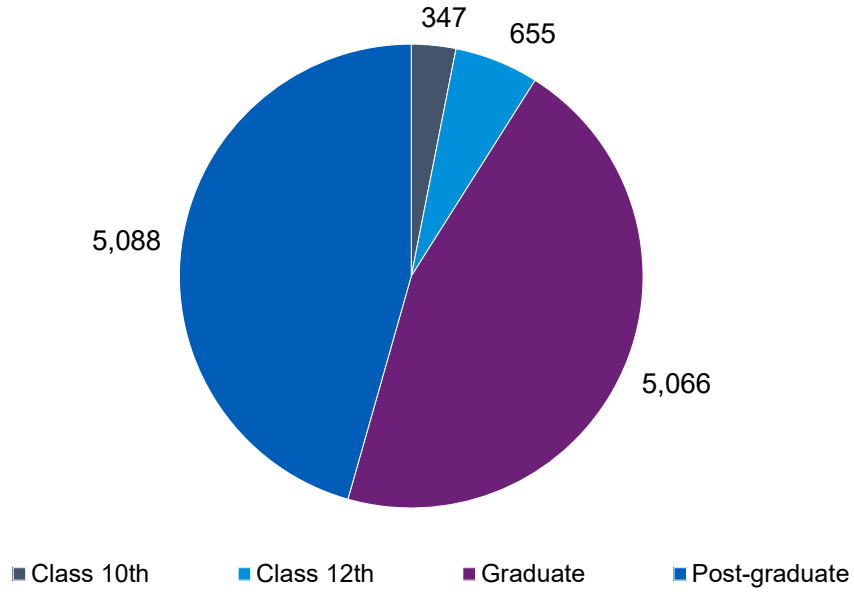


*Other corresponds to those respondents who ply their vehicle in more than one region*

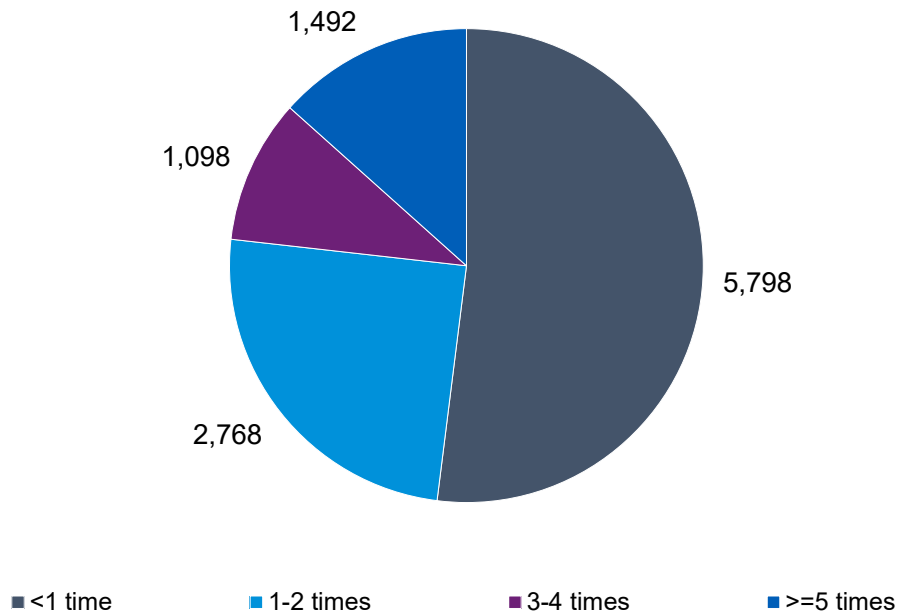
**4. What is your gender?**



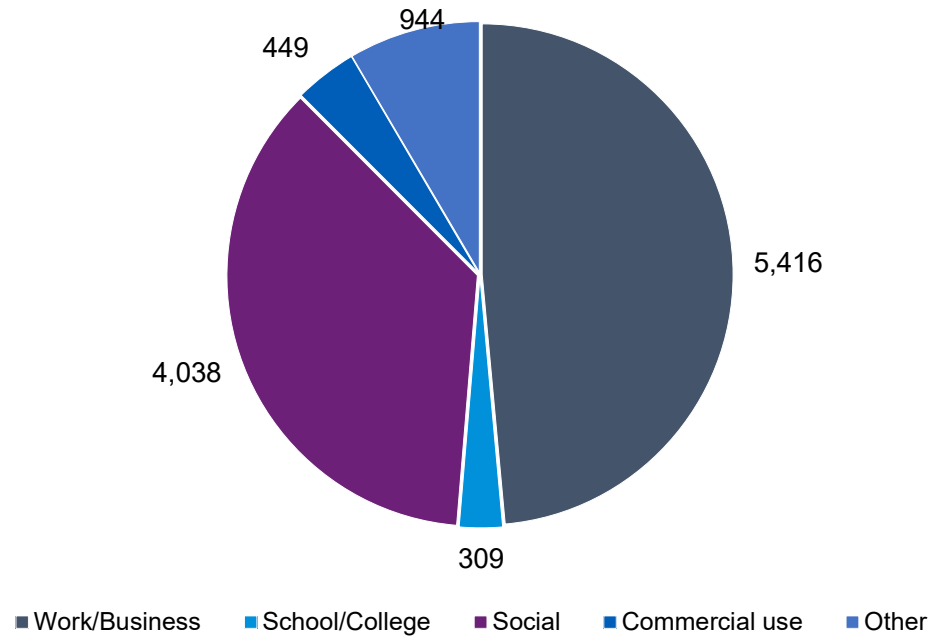
**5. What is the highest level of your education?**



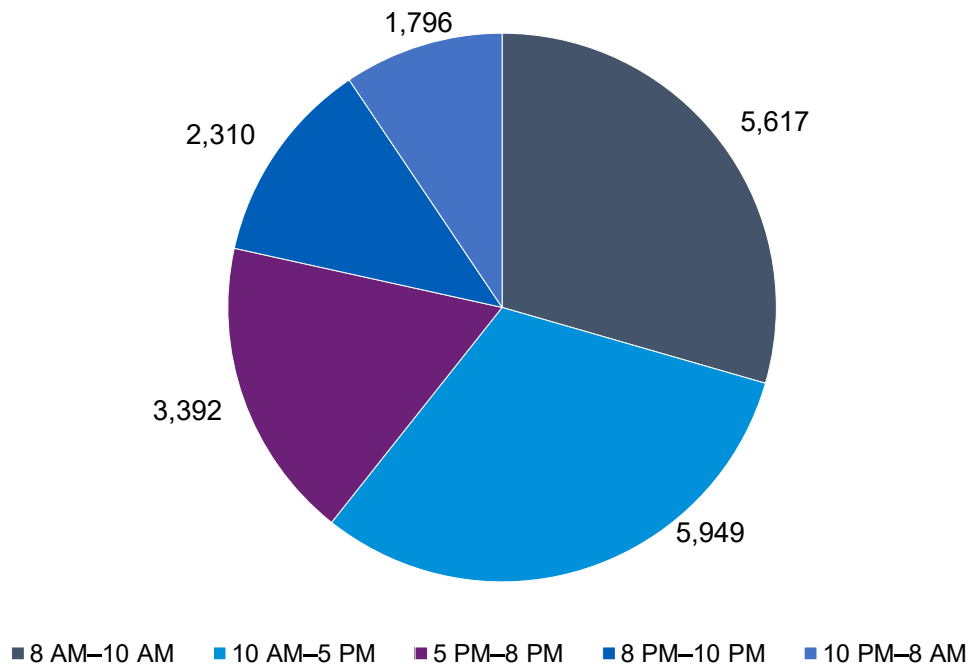
**6. How often do you pass through toll plazas in a week?**



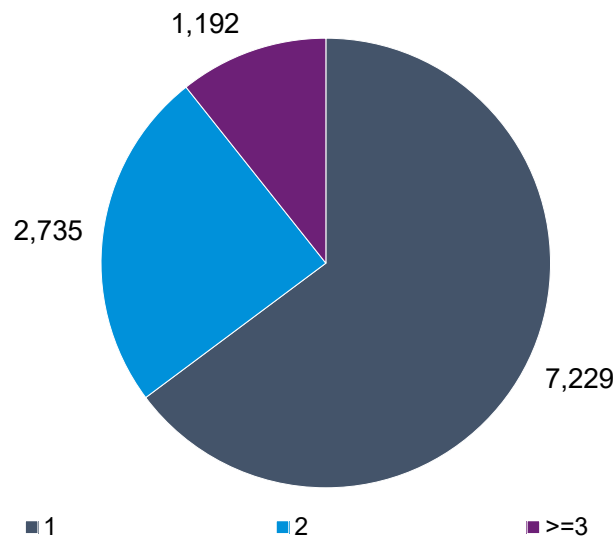
**7. What is the most common purpose of your trip? (trip involving using FASTag)**



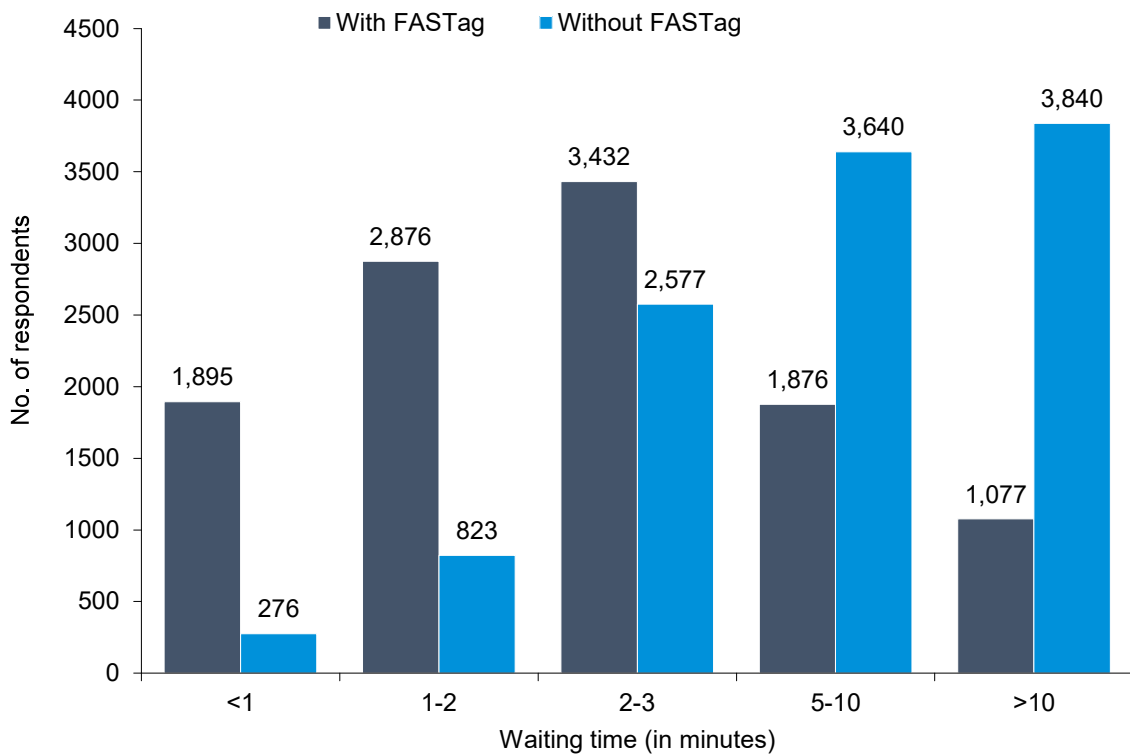
**8. What are your most frequent commute times (more than one option allowed)**



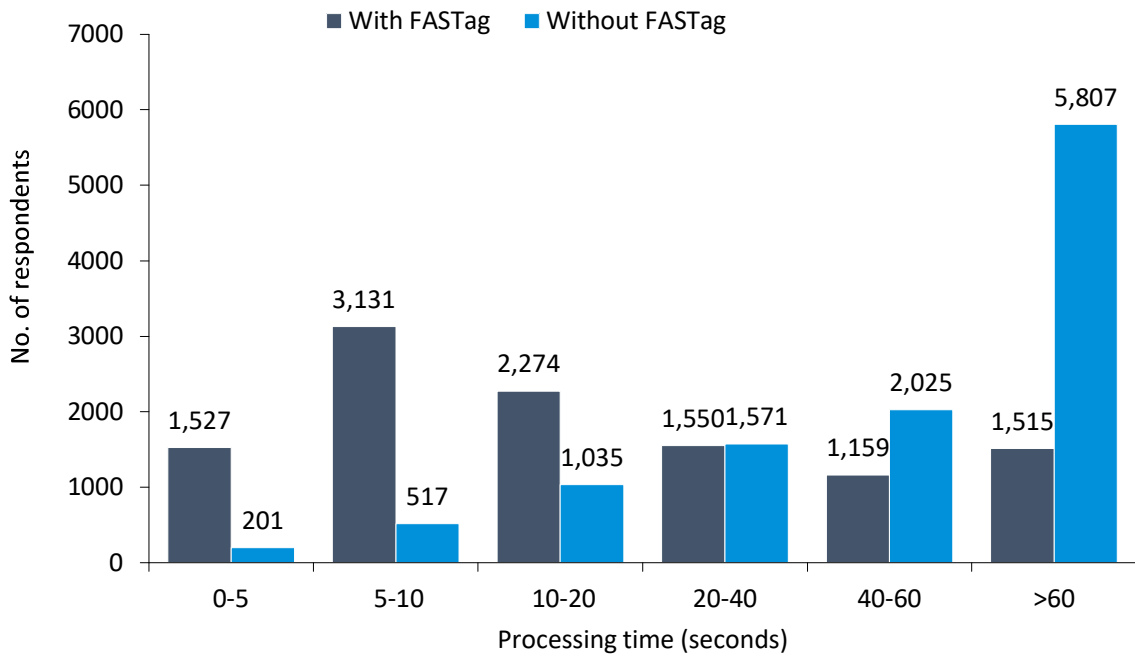
**9. How many cars are there in your household?**



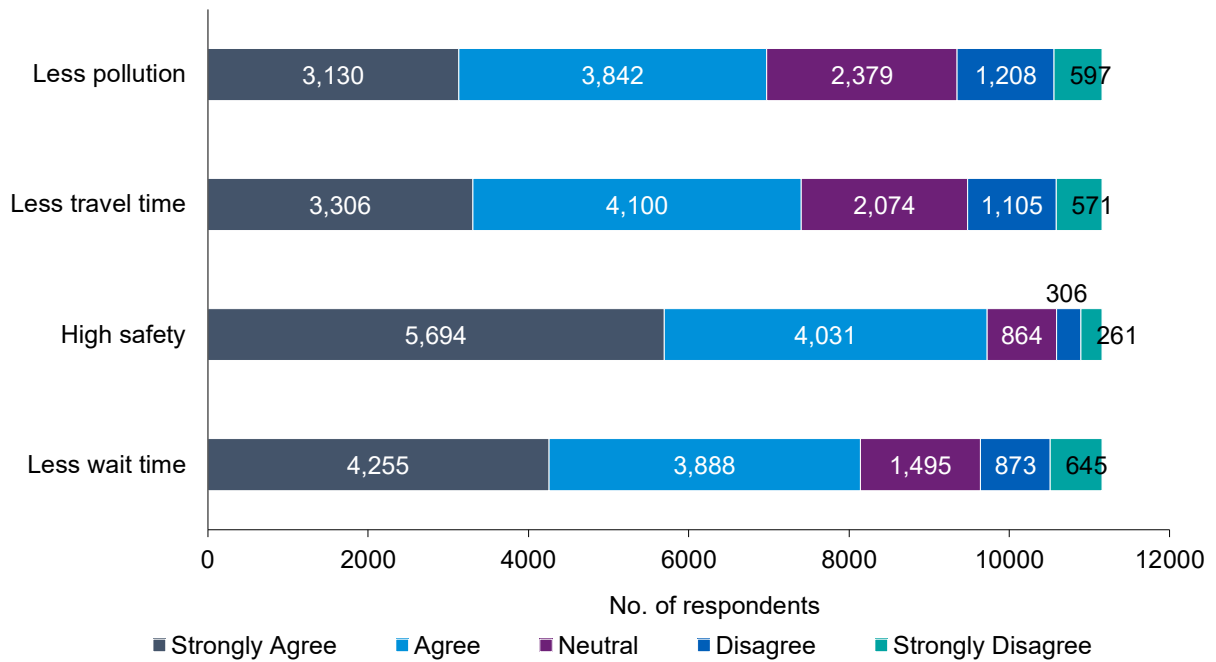
10. What is the “waiting time” at the toll plaza? (Waiting Time – Total time taken from entering the toll plaza till exit including waiting time in line and toll payment time)



11. What is the time taken to pay toll at toll plaza booth?

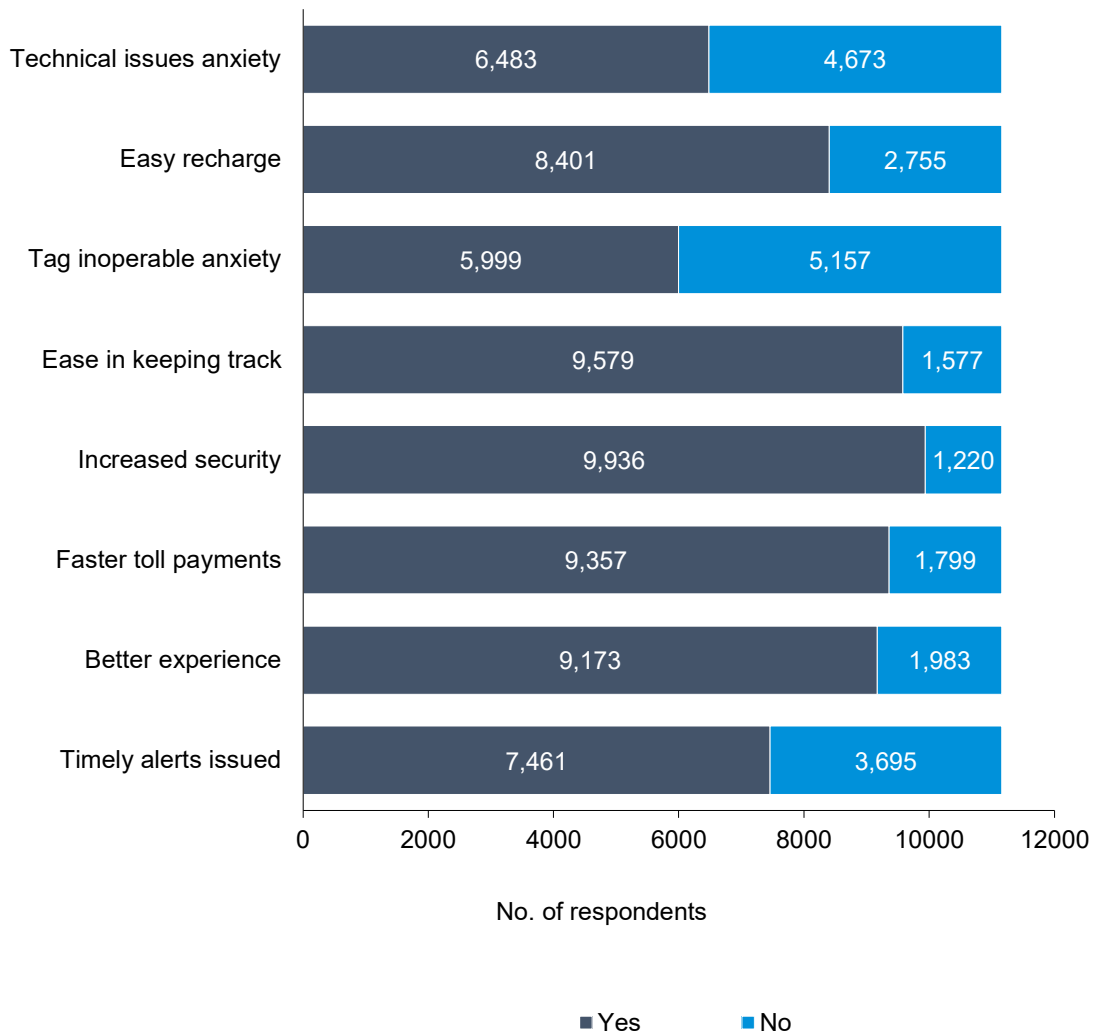


## 12. Please provide your responses on the following aspects of FASTag



## 13. Please provide your responses on the following aspects of FASTag





**14. FASTag has benefited me the most for the following reason (please provide your answer in the space provided below up to 150 words)**

Summary of the responses received is provided below:

- It has reduced the wait time and processing time.
- Cashless system. Safe in COVID times
- Security enhanced due to fewer human interactions
- Less congestion at the toll plaza
- Better air quality due to less emissions

**15. FASTag experience can be further improved by (please provide your answer in the space provided below up to 150 words)**

Summary of the responses received is provided below:

- All incorrect debit adjustment to process immediately and refund within 3 days.
- Better customer service
- Advanced scanners for fast scanning
- Ease of online recharge and better payment gateways
- FASTag should be linked with driving license, vehicle registration etc.

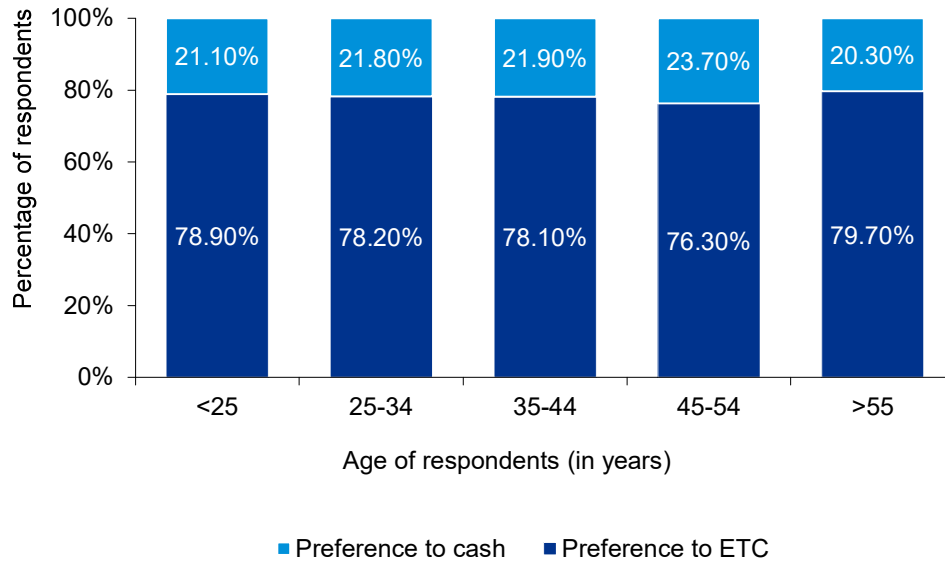
**16. Please provide your most frequently used Toll plaza's name and state.**

The topmost frequent respondents were from the following states:

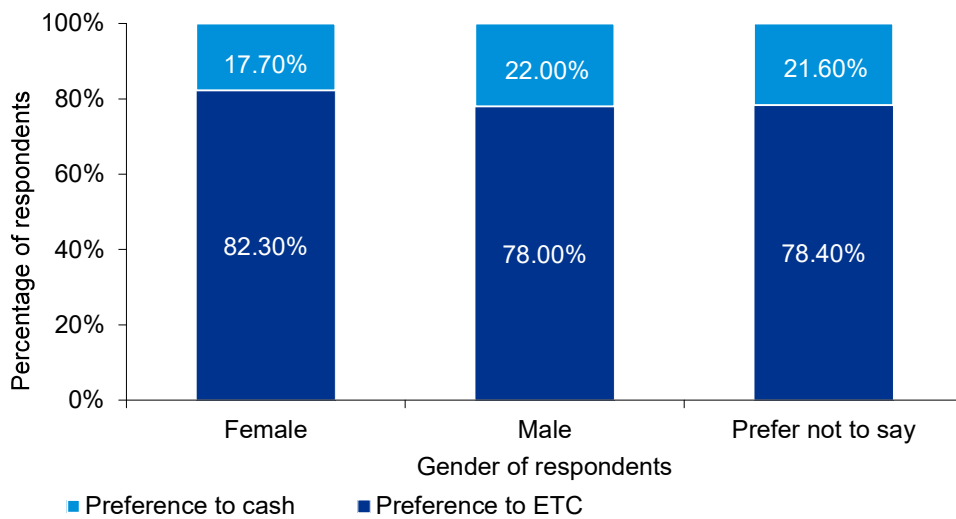
- Maharashtra
- Karnataka
- Tamil Nadu
- Telangana
- Gujarat

**Passenger vehicle users:** The inferences derived from the analysis of the online responses received is discussed below.

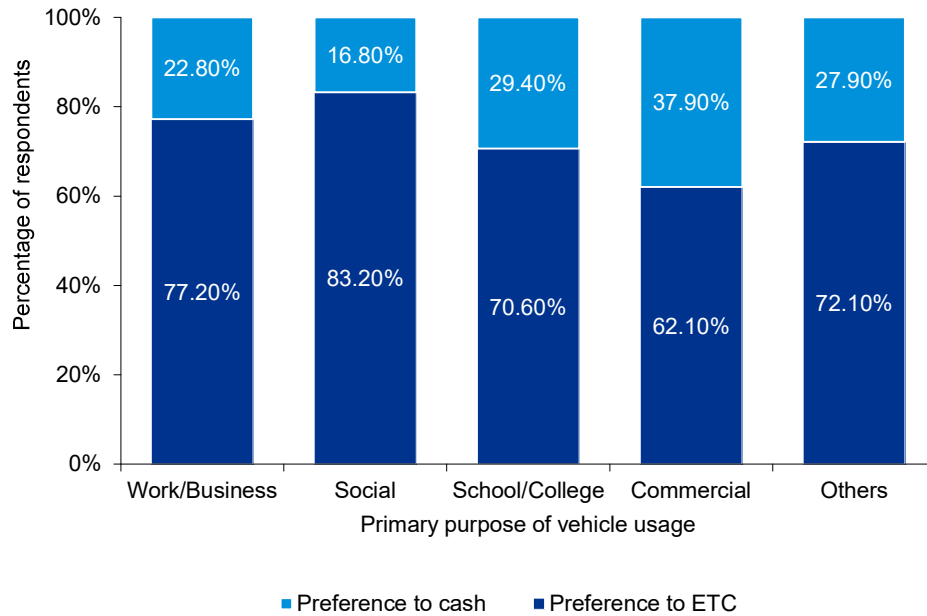
**1. Age is a significant variable for the preference of a respondent. According to the logit model younger population is more likely to prefer FASTag though it is not inferred from the plot below. Possible reason might be that age group may have correlation with other factors.**



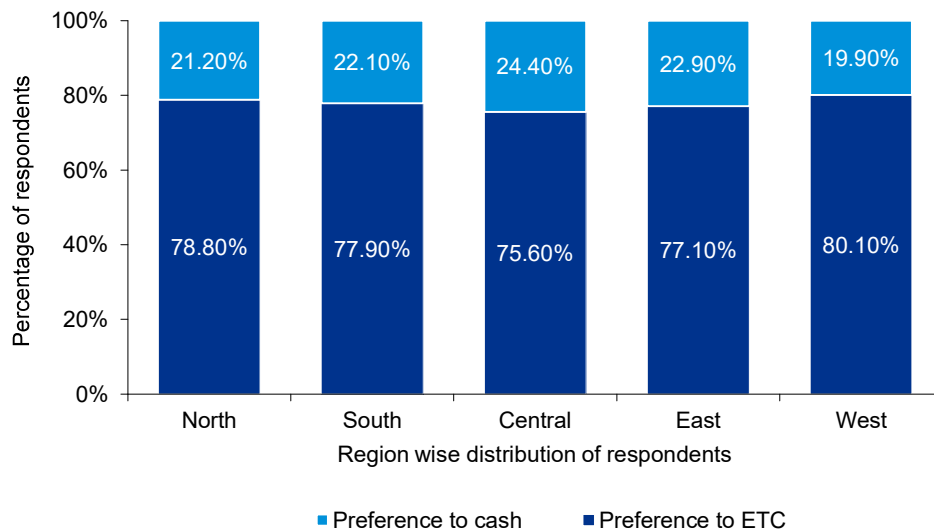
**2. According to the Logit model, gender does not play a role in the preference.**



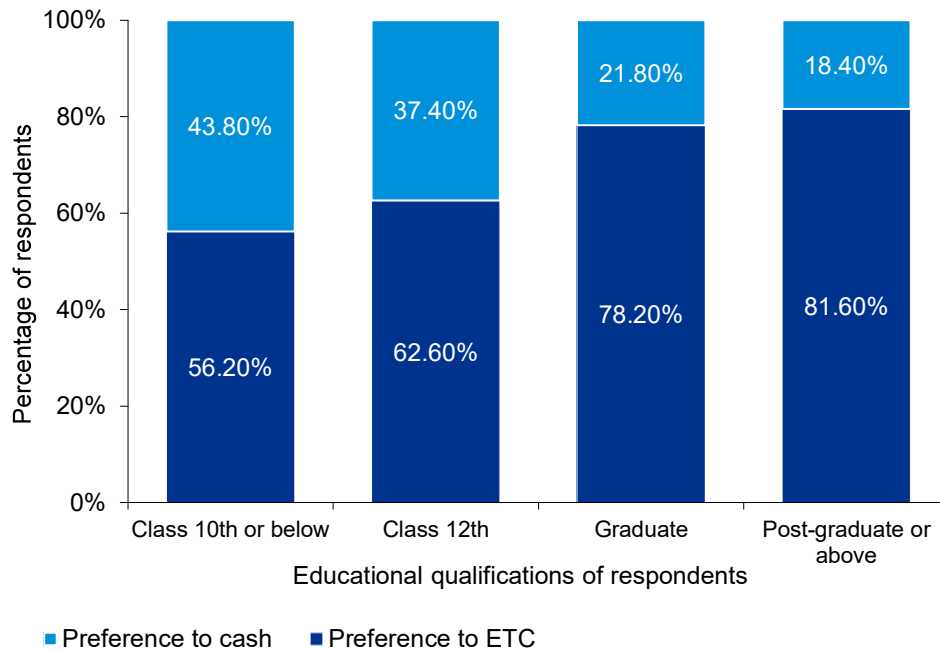
**3. The purpose of visit is significant for some of the groups. For example, respondents who use their vehicle for social or other personal reasons are the most likely group to prefer FASTag.**



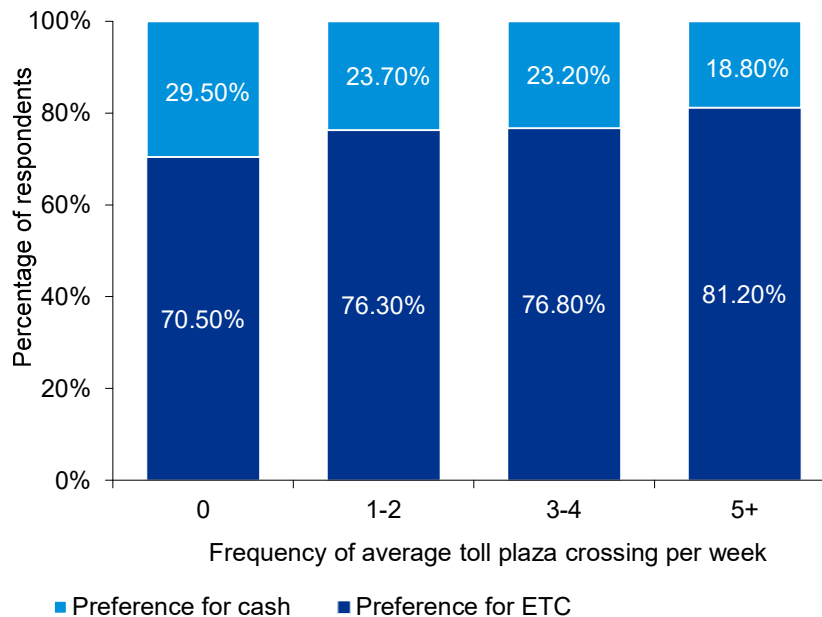
**4. Respondents who ply their vehicle in the western region have the highest affinity to prefer FASTag. Following that, preference for FASTag comes in Northern and Southern region respectively. Central region has the least preference for FASTag. Preference for FASTag in the eastern region is insignificant.**



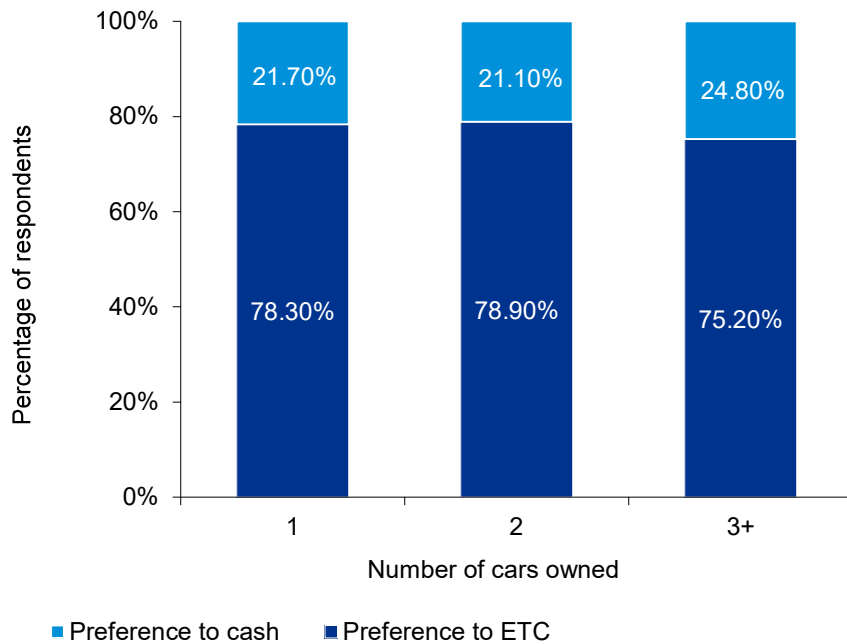
**5. Educational qualifications plays a significant role on the preference. More educated respondents are more likely to prefer FASTag.**



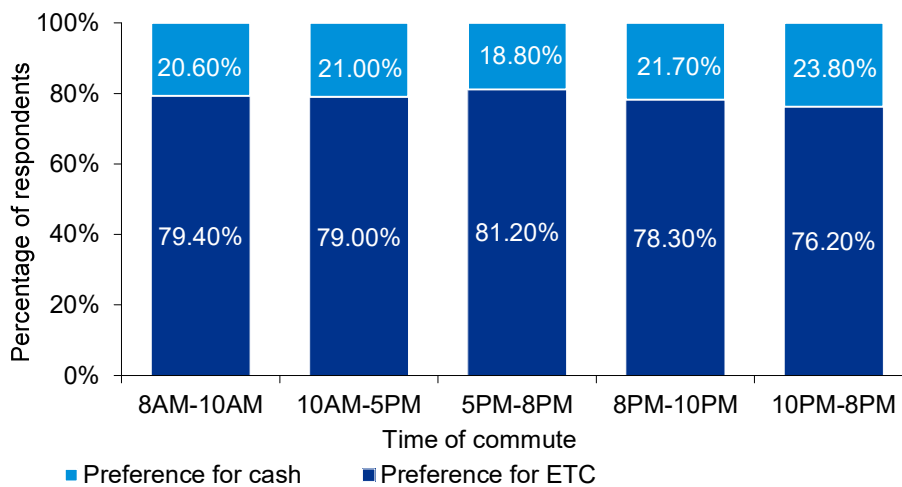
**6. Visit frequency is a significant factor. Rise in the frequency of visit to a toll increases the likelihood of preference to FASTag.**



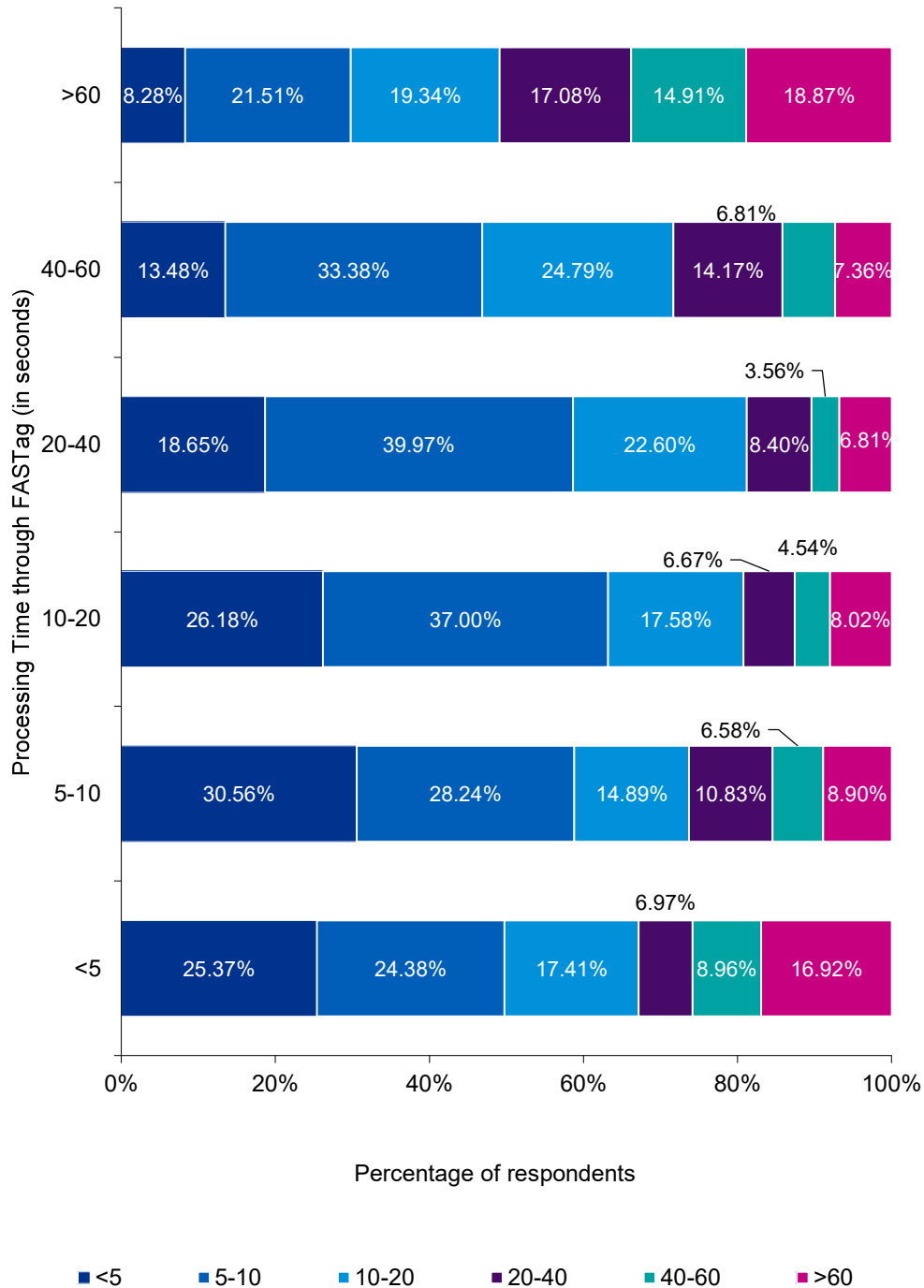
**7. Number of vehicles owned (proxy for income/wealth) is not a significant factor.**



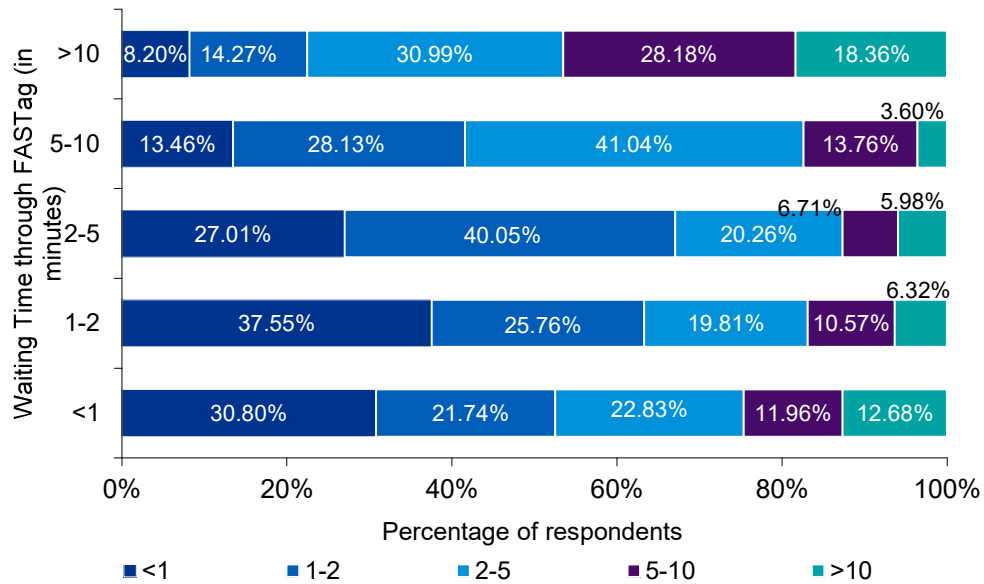
**8. Time of visit is a significant factor only when the respondents ply their vehicles between 8 am and 8 pm. Any respondent who uses his/her vehicle during this period is more likely to prefer FASTag than a respondent who travels at night.**



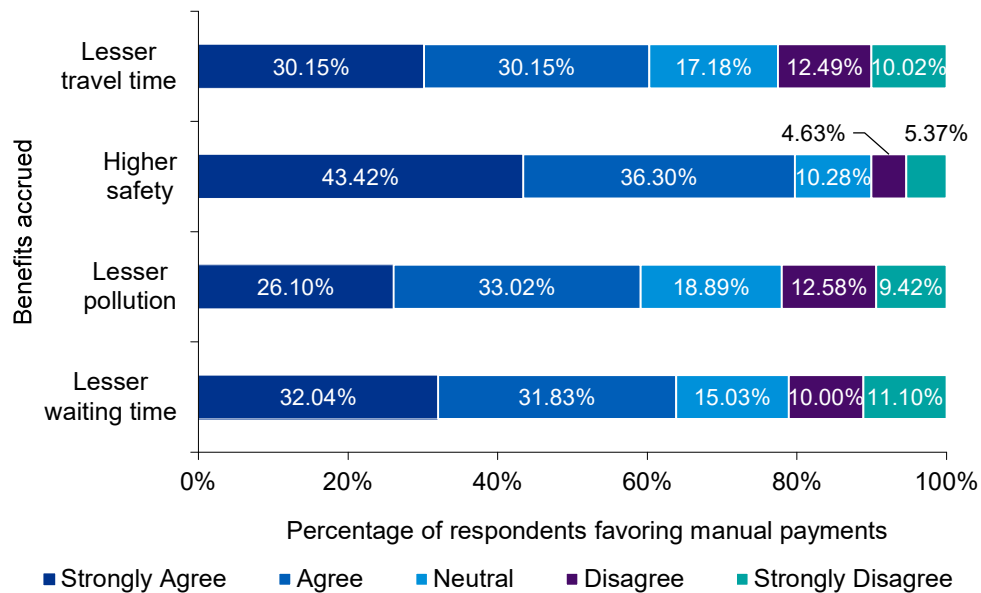
**9. Conditional Processing Time - This suggests that irrespective of the estimate of manual processing time, a large proportion from each group (by Manual Processing Time) think that the FASTag processing time is between 5 and 10 seconds**



**10. Conditional Waiting Time - This suggests that respondents who expect higher waiting time for cash payment also estimate comparatively longer waiting time for FASTag.**

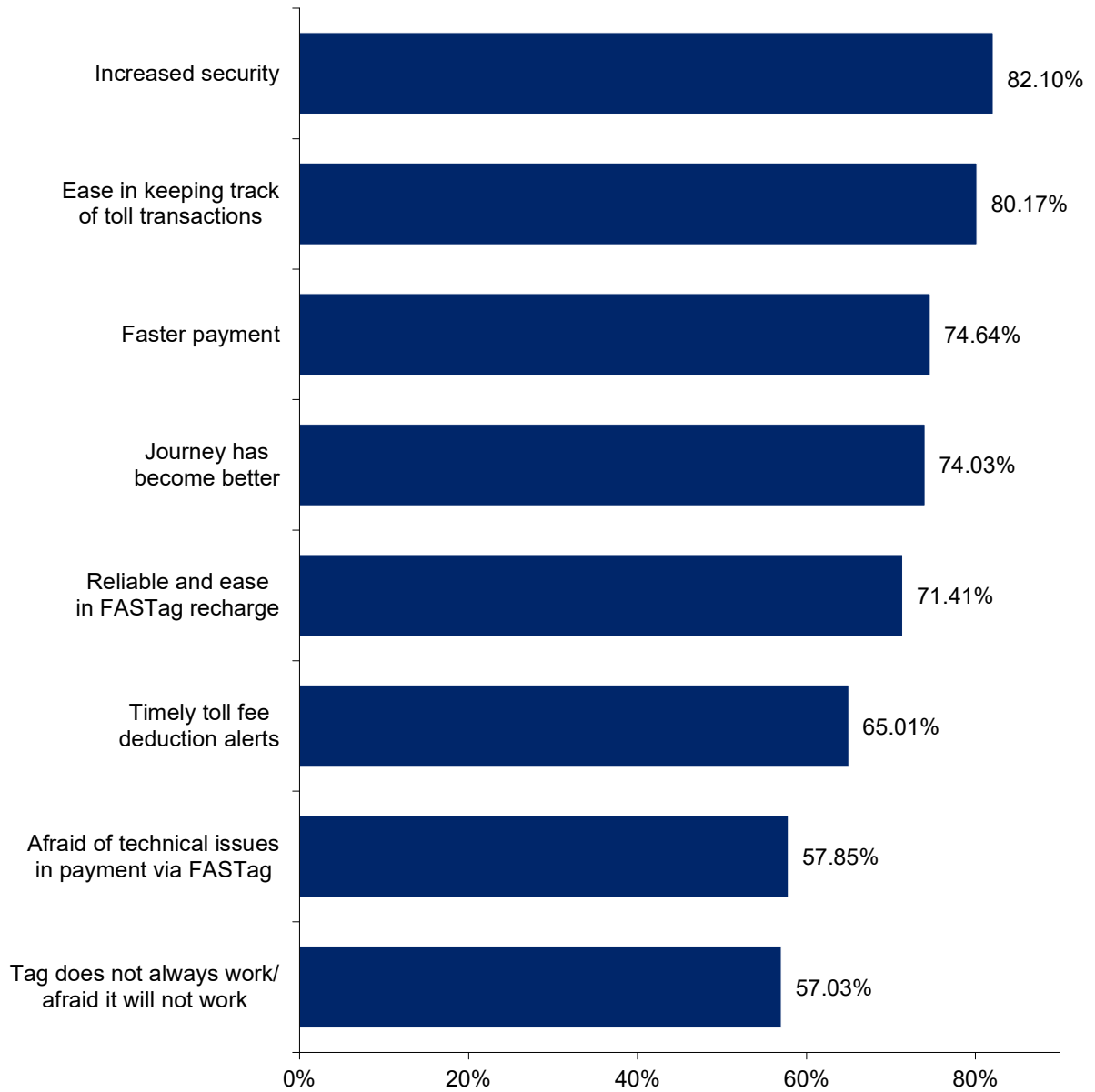


**11. Conditional Benefit Perception -** The plot below shows the perception of benefit for those who prefer cash to FASTag. They also recognize the benefit of FASTag in majority. Most of them agree or strongly agree with the benefits although that perception is lower than those who prefers FASTag.



**12.** The below graph corresponds to the respondents who prefer cash. The perception of these respondents is similar to respondents who prefer FASTag though the intensity of perception of benefit is smaller.



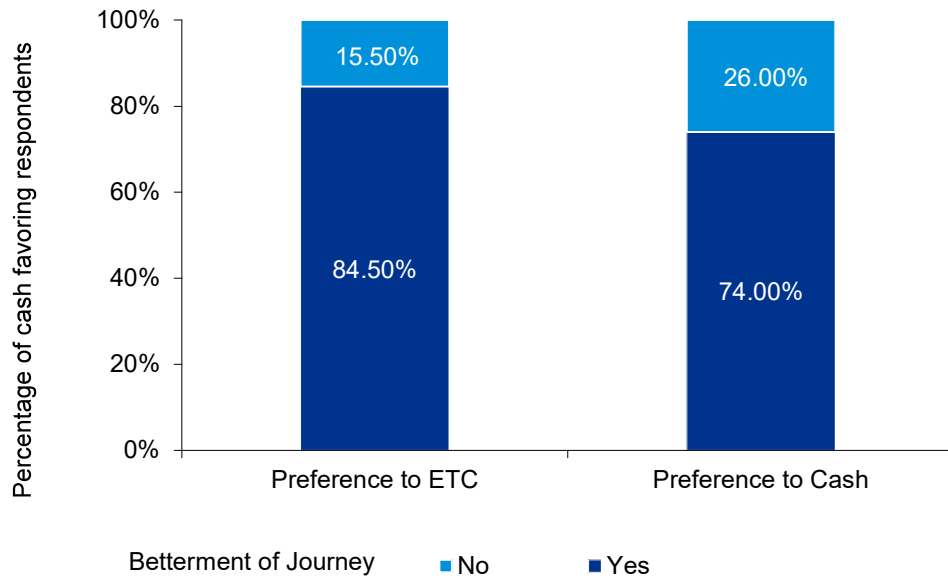


Percentage of respondents favoring manual payments

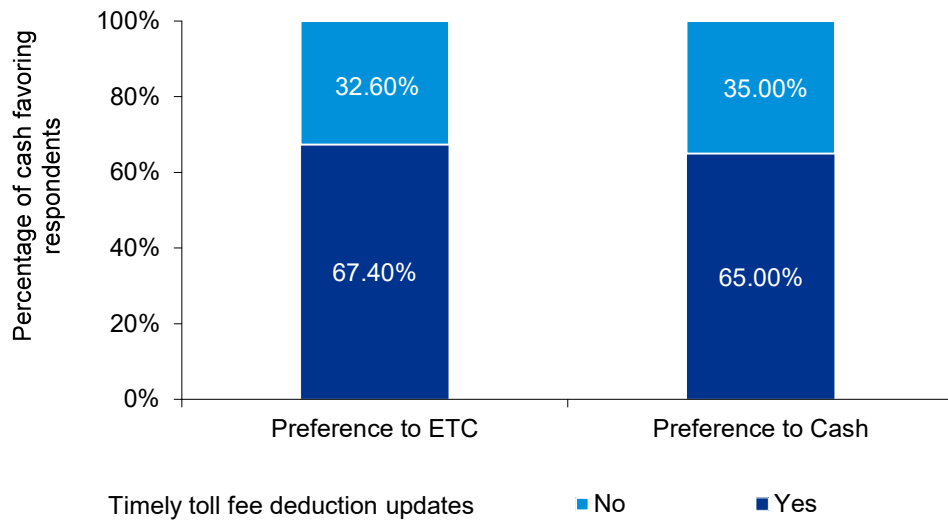
**13. Recognition of one benefit of FASTag does not change the probability of recognition of another benefit, with the exception of correlation between journey betterment and faster payment.**

	Timely Deduction Alert	Better journey	Faster Payment	Increased security	Ease of tracking toll payments	Afraid that tag might not work	Ease of recharge	Afraid of technical issues
Timely Deduction Alert	1	0.28	0.23	0.2	0.35	-0.18	0.22	-0.24
Better journey	0.28	1	0.55	0.4	0.36	-0.19	0.28	-0.21
Faster Payment	0.23	0.55	1	0.39	0.31	-0.17	0.24	-0.16
Increased security	0.2	0.4	0.39	1	0.36	-0.14	0.21	-0.12
Ease of tracking toll payments	0.35	0.36	0.31	0.36	1	-0.14	0.29	-0.19
Afraid that tag might not work	-0.18	-0.19	-0.17	-0.14	-0.14	1	-0.2	0.42
Ease of recharge	0.22	0.28	0.24	0.21	0.29	-0.2	1	-0.22
Afraid of technical issues	-0.24	-0.21	-0.16	-0.12	-0.19	0.42	-0.22	1

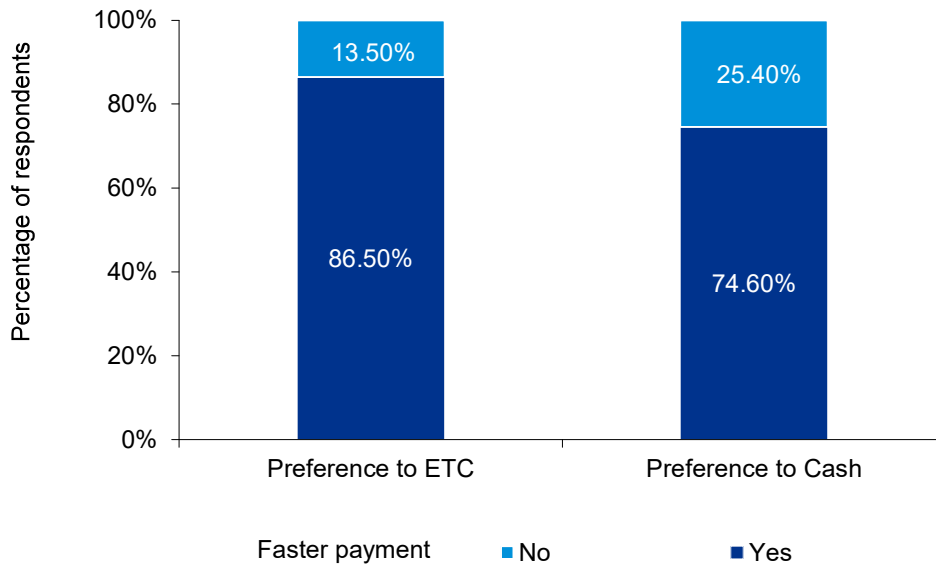
14. Respondents preferring cash recognize the improvement in journey due to FASTag by majority but to a lesser extent than respondents who prefer FASTag.



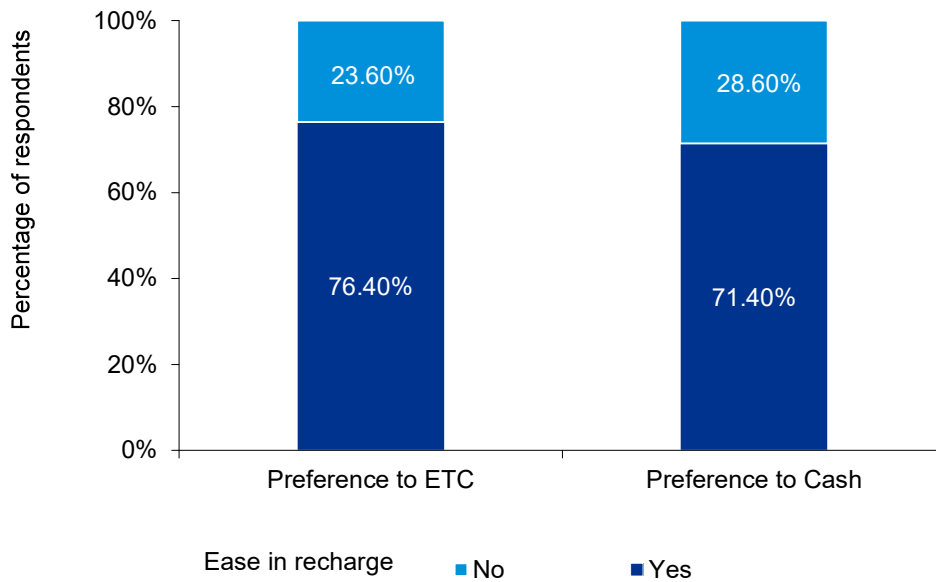
15. Respondents with preference to cash indicated that they get timely deduction alert from FASTag in majority but to a lesser extent than those who prefer FASTag. Around 33% of respondents do not get deduction alert in a timely manner which is a scope of improvement.



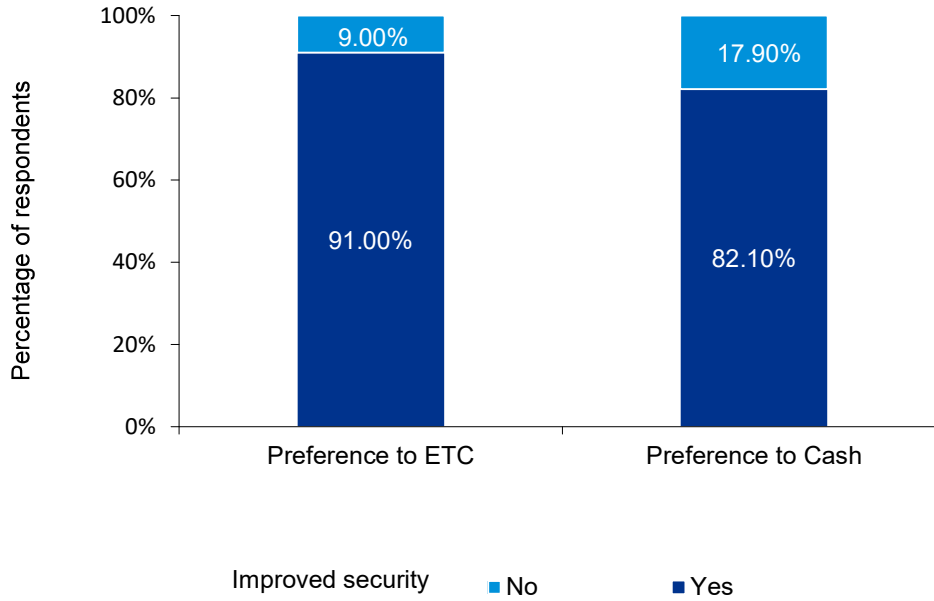
16. Respondents preferring cash recognize faster payment due to FASTag in majority but to a lesser extent than FASTag preferring respondents.



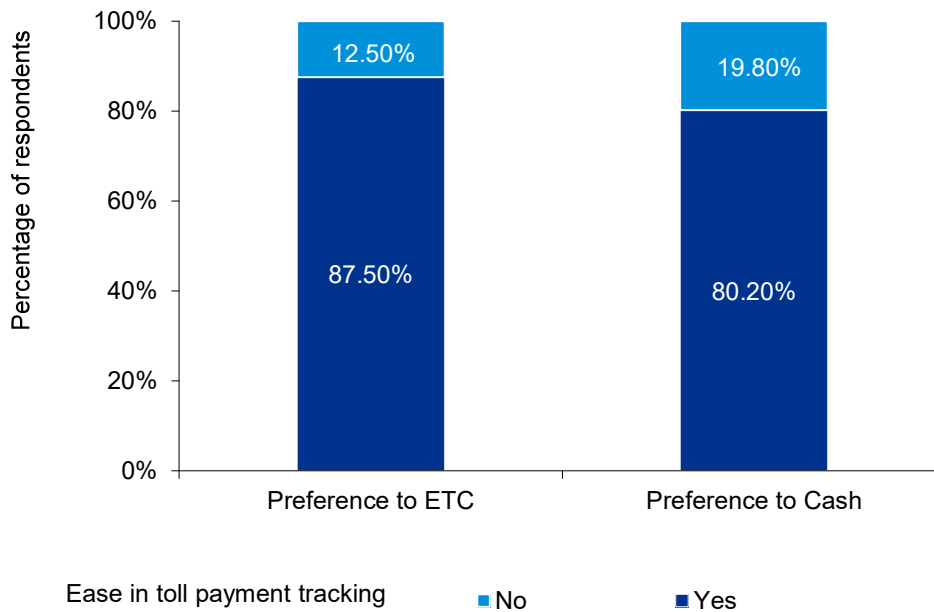
**17. Respondents with preference to cash indicated the ease in recharging for FASTag in majority but to a lesser extent than FASTag preferring respondents.**



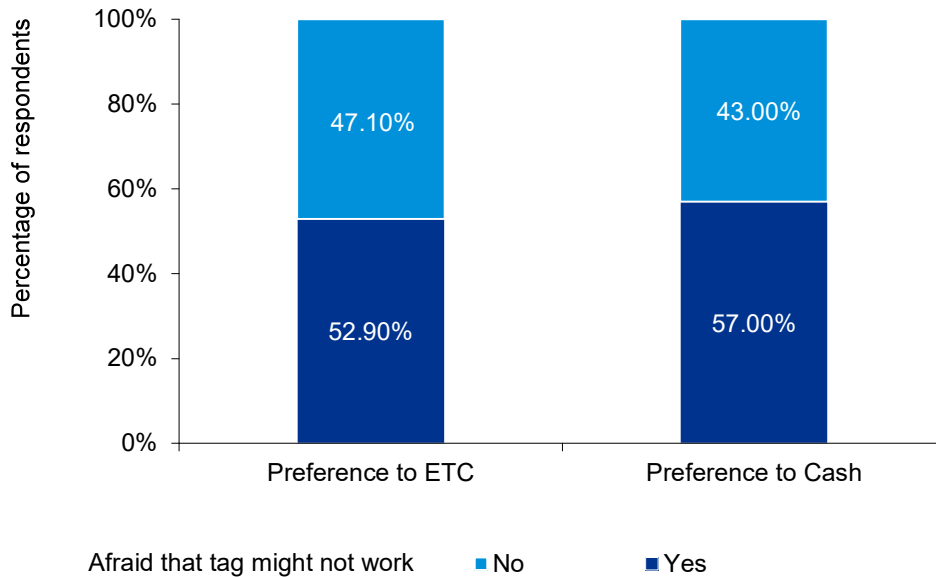
**18. Respondents preferring cash recognize enhanced security due to FASTag but to a lesser extent than FASTag preferring respondents. Around 90% of all the respondents do agree that FASTag is a more secure option, especially during the pandemic.**



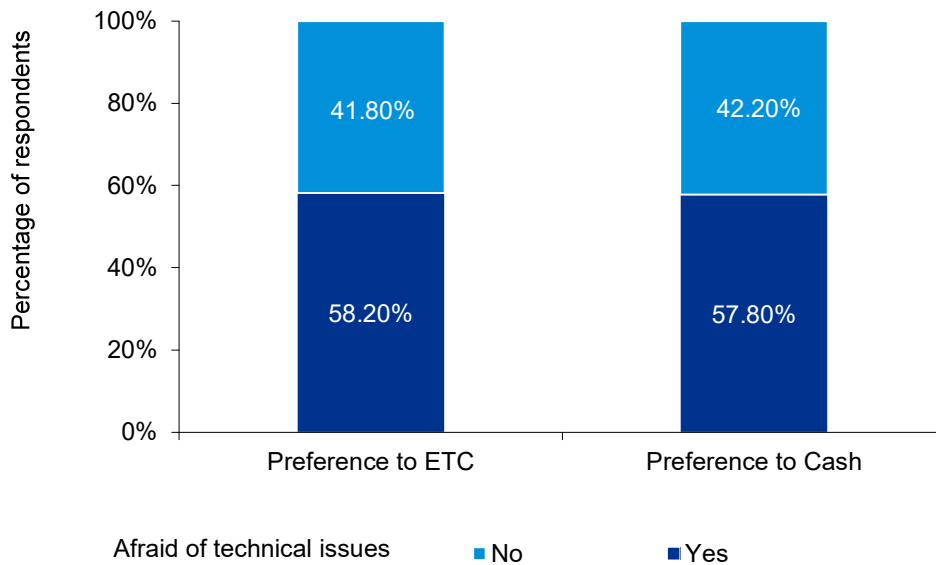
**19. Respondents with preference to cash recognize the ease in tracking transaction with FASTag but to a lesser extent than FASTag preferring respondents**



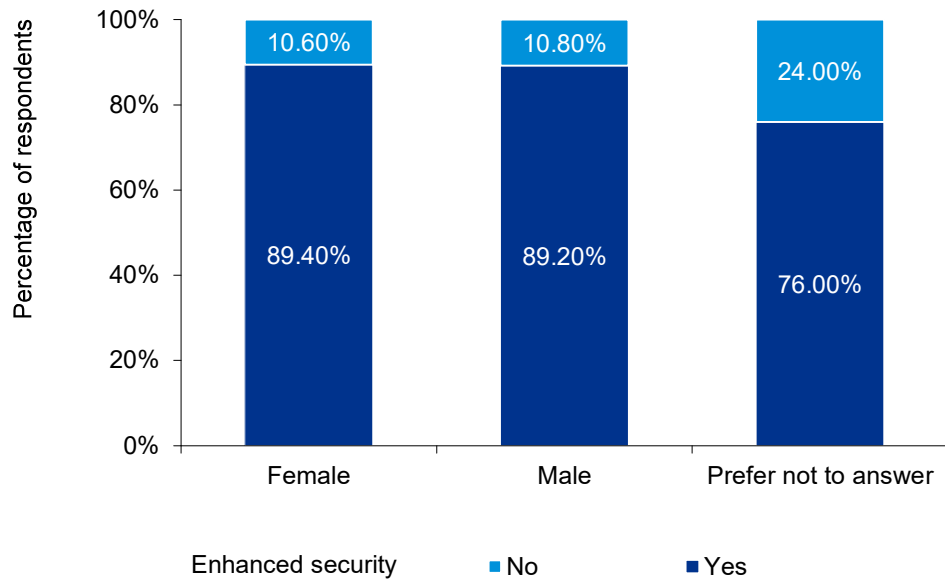
**20. Most respondents are afraid that the tag may not work at toll plaza. Respondents with preference to cash may put higher weightage to this attribute, and this might have influenced him/her to prefer cash.**



**21. Most respondents are frightened that there can be technical issues with FASTag like double payment, fines etc. Respondents who prefer cash may put higher weightage to this attribute and this might have influenced him/her to prefer cash.**



**22. Respondents of both sexes recognize the enhancement in security due to FASTag**



**Passenger Vehicle Users: Logit Model Result**

A few models based on the independent variables were developed to derive insights from the online survey responses. Among them, the model based on AIC (Akaike Information Criteria) has been selected. A positive coefficient (Estimate column) implies higher probability of preference to cash-payment.

	Estimate	Std. Error	Z-value	Pr (>  z )	
(Intercept)	0.331559	0.186885	1.774134	0.076041	.
Age25-34 years	0.244145	0.117547	2.076991	0.037802	*
Age35-44 years	0.248648	0.117497	2.116215	0.034326	*
Age45-54 years	0.33152	0.121319	2.732619	0.006283	**
AgeMore than 55 years	0.18071	0.125084	1.444704	0.148541	
NorthNorth	-0.17414	0.073172	-2.37982	0.017321	*
SouthSouth	-0.11732	0.068937	-1.70192	0.088771	.
CentralCentral	0.185074	0.096601	1.915867	0.055382	.
EastEast	-0.10853	0.095755	-1.13343	0.257035	
WestWest	-0.30497	0.069302	-4.40058	1.08E-05	***
EducationClass 12th	-0.15732	0.137932	-1.14056	0.254052	
EducationGraduate	-0.82042	0.117838	-6.96229	3.35E-12	***
EducationPost-graduate or above	-1.04683	0.119292	-8.77536	1.70E-18	***
Weekly.Visit1 to 2	-0.19854	0.076035	-2.61117	0.009023	**



	Estimate	Std. Error	Z-value	Pr (>  z )	
Weekly.Visit3 to 4	-0.27124	0.094015	-2.88502	0.003914	**
Weekly.Visit5+	-0.43569	0.073058	-5.96363	2.47E-09	***
Purpose Others	-0.00784	0.13198	-0.0594	0.952632	
Purpose School/College	0.102869	0.167629	0.613671	0.539432	
Purpose Social/Other					
Personal	-0.54545	0.118445	-4.60511	4.12E-06	***
Purpose Work/Business	-0.29567	0.110932	-2.6653	0.007692	**
X8AM_10AM8 AM-10AM	-0.17393	0.054521	-3.1901	0.001422	**
X10AM_5PM10AM-5PM	-0.16849	0.053135	-3.17094	0.001519	**
X5PM_8PM5PM-8PM	-0.25135	0.055558	-4.52413	6.06E-06	***
X8PM_10PM8PM-10PM	0.079466	0.063612	1.249227	0.211582	
X10PM_8AM10PM-8AM	0.104552	0.066799	1.565179	0.117541	
<i>Signif. Codes : 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1</i>					

**Passenger Vehicle Users: Logit Model Interpretation**

The exponent of a coefficient is the odd's ratio for that variable. Odds is the ratio of the probability of a respondent to prefer cash over the probability to prefer FASTag. Odds ratio is the ratio of the odds for that variable. If the odds ratio for a binary variable X is b, then we can interpret that holding other variables constant, the respondent with X=1 has b times the odds to prefer cash than the odds for a respondent with X=0. No inference can be drawn from the coefficient of statistically insignificant variables.

Term	Coefficient	Odds Ratio	Odds Ratio -1
(Intercept)	0.33	1.39	39%
Age25-34 years	0.24	1.28	28%
Age35-44 years	0.25	1.28	28%
Age45-54 years	0.33	1.39	39%
AgeMore than 55 years	0.18	1.2	20%
NorthNorth	-0.17	0.84	-16%
SouthSouth	-0.12	0.89	-11%
CentralCentral	0.19	1.2	20%
EastEast	-0.11	0.9	-10%
WestWest	-0.3	0.74	-26%
EducationClass 12th	-0.16	0.85	-15%
EducationGraduate	-0.82	0.44	-56%
EducationPost-graduate or above	-1.05	0.35	-65%
Weekly.Visit1 to 2	-0.2	0.82	-18%
Weekly.Visit3 to 4	-0.27	0.76	-24%
Weekly.Visit5+	-0.44	0.65	-35%
PurposeOthers	-0.01	0.99	-1%
PurposeSchool/College	0.1	1.11	11%
PurposeSocial/Other Personal	-0.55	0.58	-42%

Term	Coefficient	Odds Ratio	Odds Ratio -1
PurposeWork/Business	-0.3	0.74	-26%
X8AM_10AM8 AM-10AM	-0.17	0.84	-16%
X10AM_5PM10AM-5PM	-0.17	0.84	-16%
X5PM_8PM5PM-8PM	-0.25	0.78	-22%
X8PM_10PM8PM-10PM	0.08	1.08	8%
X10PM_8AM10PM-8AM	0.1	1.11	11%

The interpretation of the table for odds ratio is as follows:

S.No	Interpretation
1	Holding other variables at a fixed value, the odds to prefer cash for respondents who ply in Central India (Central=1) are 20% higher than the odds for the respondents who do not ply in Central India (Central=0).
2	Holding other variables at a fixed value, the odds to prefer cash for respondents who ply in North India (North=1) are 16% lower than the odds for the respondents who do not ply in North India (North=0).
3	Holding other variables at a fixed value, the odds to prefer cash for respondents who ply in South India (South=1) are 11% lower than the odds for the respondents who do not ply in South India (South=0).
4	Holding other variables at a fixed value, the odds to prefer cash for respondents who ply in West India (West=1) are 26% lower than the odds for the respondents who do not ply in West India (West=0).

S.No	Interpretation
5	Holding other variables at a fixed value, the odds to prefer cash for respondents who are of the age group 25-34 (Age=1) are 28% higher than the odds for the respondents of the age group below 25 (Age=0).
6	Holding other variables at a fixed value, the odds to prefer cash for respondents who are of the age group 35-44 (Age=2) are 28% higher than the odds for the respondents of the age group below 25 (Age=0).
7	Holding other variables at a fixed value, the odds to prefer cash for respondents who are of the age group 45-54 (Age=3) are 39% higher than the odds for the respondents of the age group below 25 (Age=0).
8	Holding other variables at a fixed value, the odds to prefer cash for respondents who are only graduate (Education=2) are 56% lower than the odds for the respondents with highest qualification 10 <sup>th</sup> class or below (Education=0).
9	Holding other variables at a fixed value, the odds to prefer cash for respondents who are post-graduate or above (Education=3) are 65% lower than the odds for the respondents with highest qualification 10 <sup>th</sup> class or below (Education=0).
10	Holding other variables at a fixed value, the odds to prefer cash for respondents who visit a toll once or twice in a week (Weekly.Visit=1) are 18% lower than the odds for the respondents who does not visit a toll frequently (Weekly.Visit =0).
11	Holding other variables at a fixed value, the odds to prefer cash for respondents who visit a toll 3-4 times in a week (Weekly.Visit=2) are 24% lower than the odds for the respondents who does not visit a toll frequently (Weekly.Visit =0).
12	Holding other variables at a fixed value, the odds to prefer cash for respondents who visit a toll more than 5 times in a week (Weekly.Visit=3) are 35% lower than the odds for the respondents who does not visit a toll frequently (Weekly.Visit =0).

S.No	Interpretation
13	Holding other variables at a fixed value, the odds to prefer cash for respondents who visit for social or other personal reasons (Purpose=3) are 42% lower than the odds for the respondents who use their vehicles for commercial reason (Purpose =0).
14	Holding other variables at a fixed value, the odds to prefer cash for respondents who visit for work or business (Purpose=4) are 26% lower than the odds for the respondents who use their vehicles for commercial reasons (Purpose =0).
15	Holding other variables at a fixed value, the odds to prefer cash for respondents who ply between 8 am and 10 am (X8AM_10AM=1) are 16% lower than the odds for the respondents who do not ply between 8 am and 10 am (X8AM_10AM=0).
16	Holding other variables at a fixed value, the odds to prefer cash for respondents who ply between 10 am and 5 pm (X10AM_5PM=1) are 16% lower than the odds for the respondents who do not ply between 10 am and 5 pm (X10AM_5PM=0).
17	Holding other variables at a fixed value, the odds to prefer cash for respondents who ply between 5 pm and 8 pm (X5PM_8PM=1) are 22% lower than the odds for the respondents who do not ply between 5 pm and 8 pm (X5PM_8PM=0).

### 5.4.2 Annexure 2. State Road Transport Undertakings

A total of 9 entities participated in Focus Group Discussions. The questions and the anonymous responses against different respondent are detailed below:

Respondent	1. Among the vehicles in your fleet, what percentage have adopted FASTag?	2. What is the average number of daily toll plaza crossings per vehicle in your fleet?	3. What percentage of FASTag payments is linked to inter-state movement?
1	10%	3	100%
2	75%	4	35%
3	81%	5	12%
4	100%	2.5	12%
5	95%	2.5-3	91%
6	90%	2	21%
7	29.55%	1	0%
8	100%	4	5%
9	70-100%	3	30-50%

Respondent	4. Do you feel that you have accrued benefits through the implementation of FASTag in terms of reduced waiting time, travel time, pollution, usage of cash, interaction with toll plaza staff etc. and improved safety, passenger security and convenience, more trips per vehicle, bookkeeping and accountability?
1	Yes. 5% cashback was also received till January 2021.
2	Yes
3	Yes
4	<p>Toll plaza staff should be supportive in cases where a tag readability issue is observed at one plaza, but not at the other toll plazas.</p> <p>Benefits like improved passenger security and convenience, more trips per vehicle, bookkeeping and accountability have been accrued.</p>
5	Yes
6	Yes
7	We are at the initial stage for the implementation of FASTag, so the study on accrued benefits through the implementation of FASTag will be made shortly.
8	Yes
9	Yes

Respondent	5. Do you feel that access to tag payment data of the fleet (by vehicle/ category/highway) Would help improve the organization's services?	6. Do you think that FASTag use has resulted in increased ticket price for passengers?
1	Yes	No
2	Yes	No
3	Yes	No
4	Yes	No
5	Yes	No
6	Yes	No
7	The preliminary study is under process.	The revision or hike of passenger ticket is only depending upon the State Government policy.
8	Yes	No
9	Yes	No



Respondent	7. Have you faced any issues regarding reliability, double payment, overcharging, fines etc.?
1	No
2	Issues such as faulty reading instruments, blacklist despite sufficient balance in the wallet resulting in double payments, unnecessary pecuniary loss to corporation, delays and passenger inconvenience still exist
3	Frequent issues regarding reliability, double payment, overcharging and fines
4	Yes. Despite of gazette stating that only non FASTag vehicles would be charged twice, toll plazas are occasionally charging twice even if tag is affixed and has worked properly across all toll plazas en-route. Sensitization of toll staff is necessary in reference to various circulars issued.
5	Not any more
6	Yes. At some toll plazas where transponders are not working, double payment in the form of manual toll fee and deduction from FASTag wallet is common. At some plazas, amount was deducted even when the vehicle has not passed through that plaza.
7	Double payment and fines have been common after the implementation of FASTag. As per the gazette in May 2018, if it is difficult to get the radio frequency identification of the tag scanned and there is a sufficient balance in the valid FASTag account, then the user is exempted from paying any fee. By transgressing the rule, toll officials have been facilitating the situation to make the unfair recovery of toll fee with the penalty.

8	No issues
9	Readability issues sometimes lead to manual payments

Respondent	8. How would you describe your experience of recharging FASTag?	9. Please provide your suggestions for improving tag read reliability.
1	Convenient due to auto recharge to each tag from CUG account in issuer bank	Prevailing system is good
2	Easy	Perfect FASTag reading instruments will help avoid unnecessary detention of buses.
3	Issuer bank takes care of FASTag recharge	There is a serious issue regarding tag readability. Also, uniformity should be introduced since different plazas maintain different timings for daily pass / round trip calculation.
4	Comfortable. Multiple modes of IMPS, NEFT, RTGS, Internet Banking and UPI available.	Quality of tags and readers should be improved. Occasionally, hand scanners are used, causing delays and defeating the purpose of seamless travel.

5	Comfortable	Not anymore. 95% readability is observed
6	Comfortable	Transponder capacity could be improved.
7	<p>A common portal for recharge/renew FASTag account which may be linked with all bankers will result in convenient functions related to FASTag Agreed with the views of other accounting. Monthly passes are participants issued at toll plazas which are banking with the issuer bank. At any other toll plaza, a cheque needs to be deposited for FASTag recharge.</p>	
8	Comfortable	Not anymore.
9	Tag is shown blacklisted despite having balance	Provide better and faster scanning equipment

Respondent	10. Do you feel congestion still exists at toll plazas due to low adoption of FASTag technology?	11. How convenient is the process for the issue of FASTag?
1	Yes	Very convenient
2	Yes	The responsibility of tag issuance can be shifted from issuer bank headquarters to a

		regional office. This will help in improving efficiency and reducing the time taken for tag issuance.
3	Yes	Easy
4		Congestion occurs due to tag reading issues. All lanes are now FASTag enabled, and if any multi-axle vehicle is stuck, there is difficulty in reversing the vehicle. Comfortable and convenient. Plazas need to work on their infrastructure handling for introducing bypass facility to change to other lanes for such scenarios. Instant issuance is possible.
5	No	Comfortable
6	No	It is easy to affix FASTag stickers. However, occasionally, there are some issues due to different Acquirer and Issuer banks.
7	No	
8	Yes	Very convenient
9	Only on some toll plazas	Satisfactory

Respondent	12. Do you think that public awareness needs to be generated for the correct usage of FASTag?
1	Yes
2	No
3	Yes
4	Yes. Slowly people are getting aware about the same. Awareness needs to be generated regarding the distance which should be maintained between vehicles entering the FASTag lanes. Around 10 feet should be maintained between vehicles at toll plazas to avoid congestion and extra debits due to double reading of vehicles standing close to the actual vehicle.
5	Local bus drivers should be made aware of discounts available
6	Yes
7	Agreed with the views of other participants
8	Yes
9	Yes

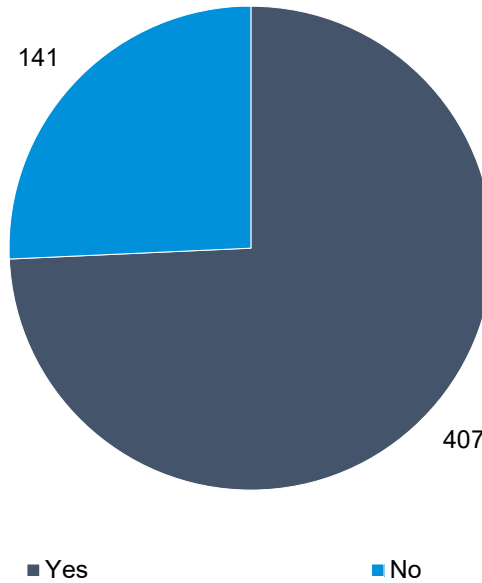
Respondent	13. What are the implications on your organization's financial system due to toll payments? What are the challenges faced in terms of payment recovery?
1	None

2	<p>With Electronic Toll Payment, manual interference is eliminated, paperwork is reduced, and accounting is completed on a real-time basis. There is no implication on the financial system.</p>
3	<p>There are problems of reconciliation with issuer bank and corporation</p>
4	<p>Reconciliation of toll statements is a challenge due to multiple entries and debits. A controlling and monitoring authority /mechanism for grievance redressal should be in place.</p>
5	<p>Revenue reconciliation is an issue at depots.</p>
6	<p>There is a severe financial crunch, leading to unmet operational expenditure. Loans add a huge interest burden to the corporation resulting in increasing loses.</p>
7	<p>The implementation of FASTag has resulted in increased our expenditure. Plazas functioning under the National Highways (Rate of fee) Rules 1997 are admitting without any trip restriction for our monthly pass obtained buses, but the remaining toll plazas functioning under National Highways Fee (Determination of Rates and Collection) Rules, 2008 have restricted the monthly pass obtained buses to 50 single trips. Most of the buses are travel through both types of toll plazas which causes issues in the day-to-day operations.</p>
8	<p>Very easy, no issues</p>
9	<p>Revenue reconciliation is an issue. Occasionally, transaction data and reconciliation data do not match.</p>

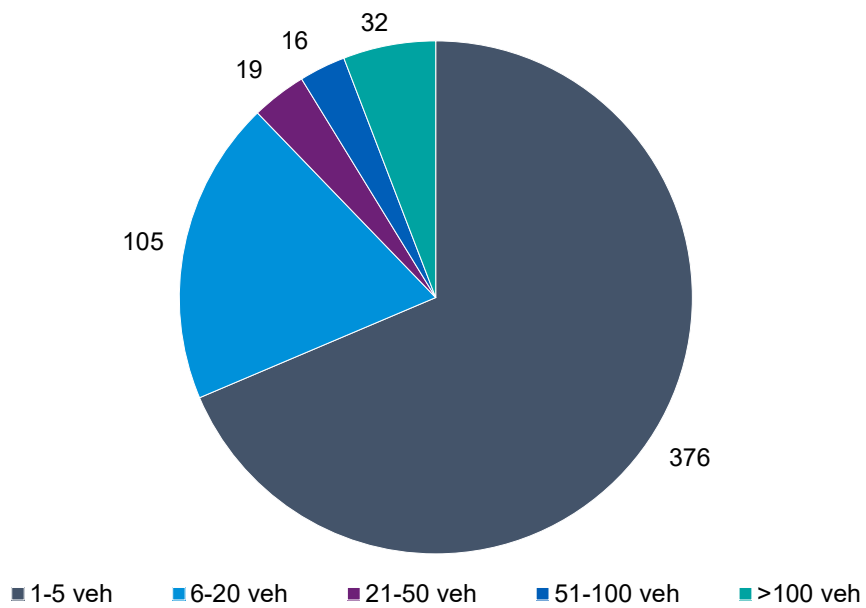
### 5.4.3 Annexure 3. Freight Transporters

Online survey was carried out for freight transporters which received responses from 548 respondents. The analysis / findings from the responses received are presented below.

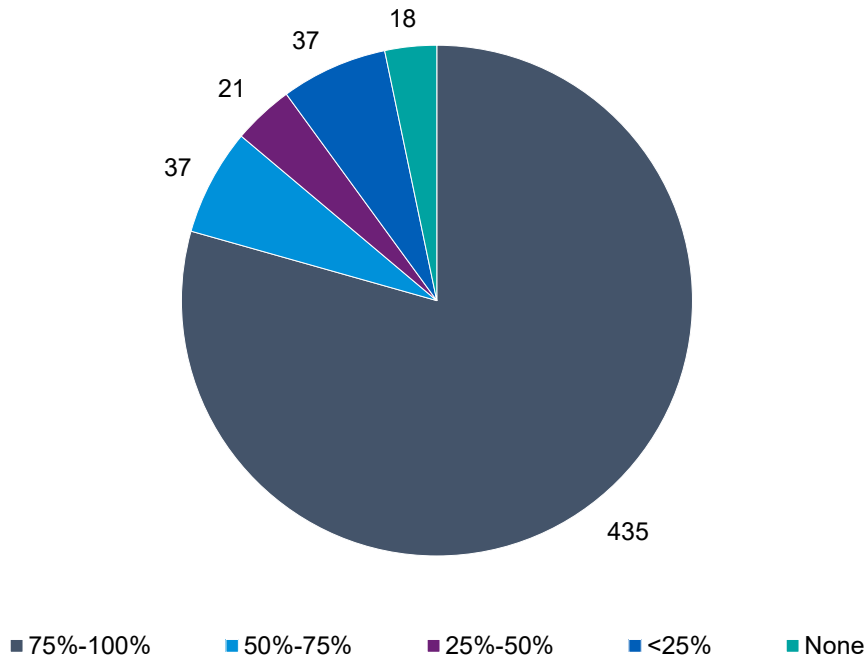
#### 1. Do you prefer Electronic Toll System over cash payment?



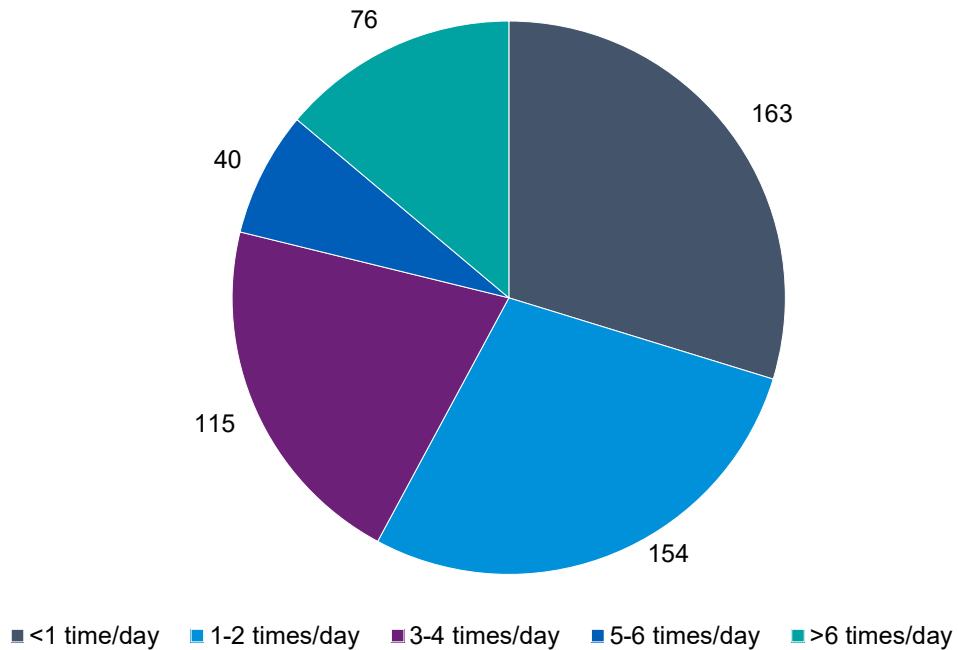
#### 2. How many vehicles are there in your fleet?



**3. Among the vehicles in your fleet, what % have FASTag?**

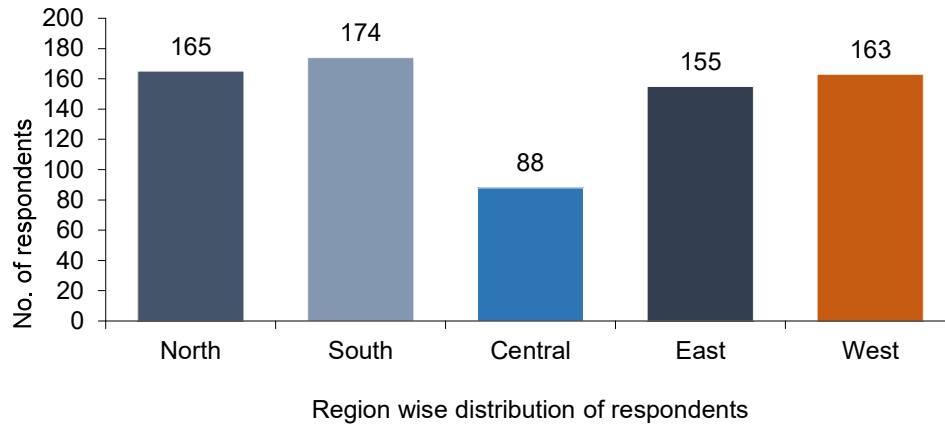


**4. What is the average number of daily toll plaza crossings per vehicle in your fleet?**

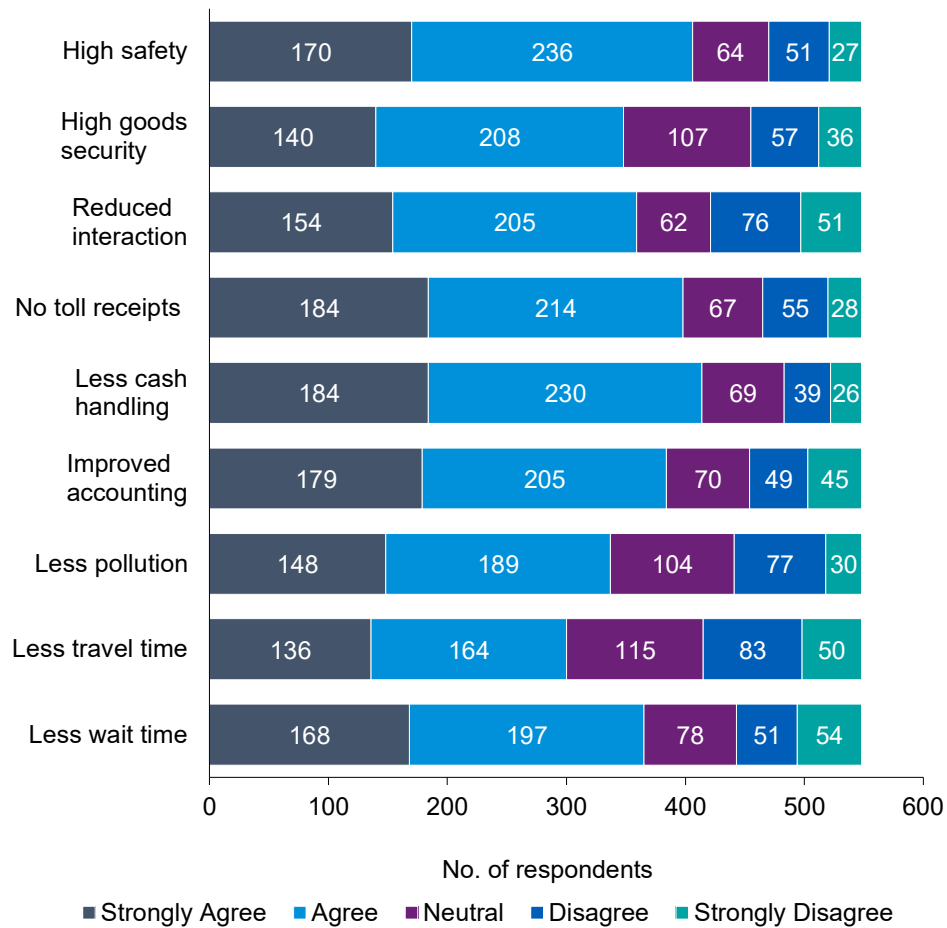




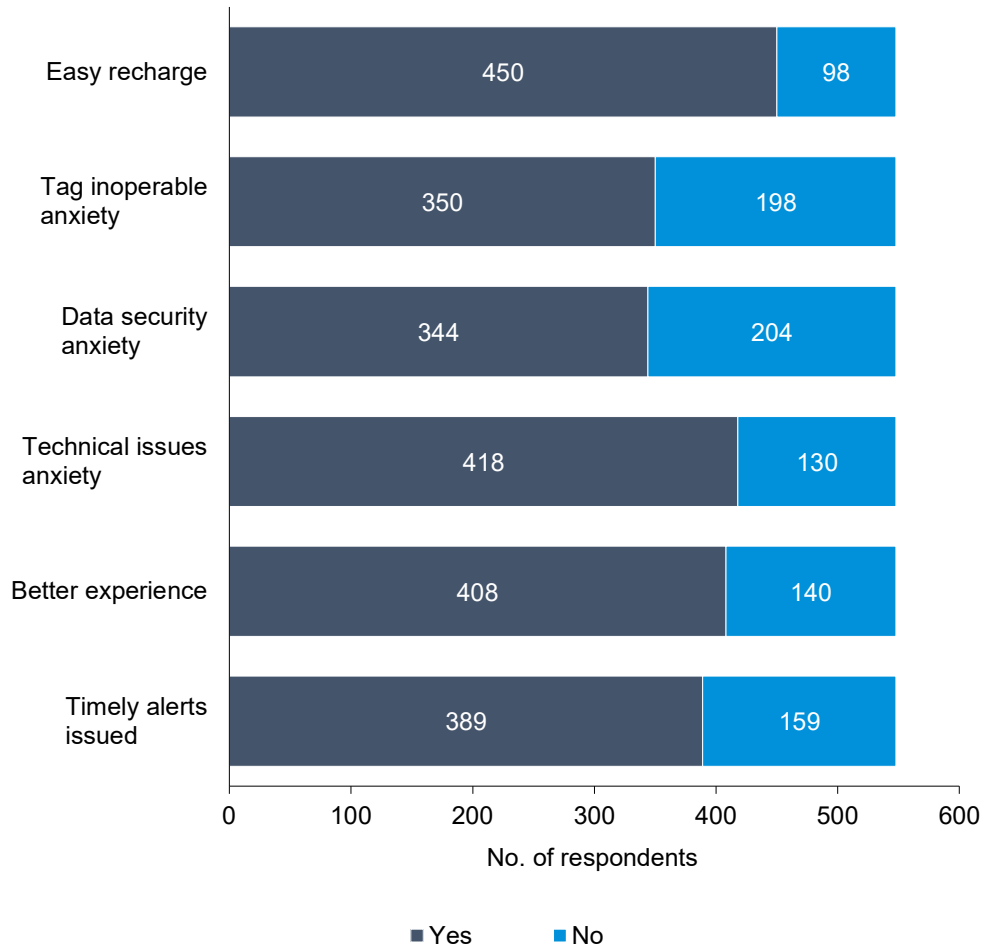
**5. In which part of the country does your fleet operate frequently? You can select more than one option.**



**6. Please provide your responses on the following aspects of FASTag**



**7. Please provide your responses for the following aspects of FASTag.**



**8. FASTag has benefited me the most for the following reason (please provide your answer in the space provided below up to 150 words)**

Summary of the responses received is provided below:

- Time saving and reduced wait time, more trips per vehicle.
- No accounting problems with drivers.
- No need to carry cash in the long journey for toll payments.
- Better tracking and monitoring of the vehicle for route compliance
- Fuel saving due to less wait time in the queue.

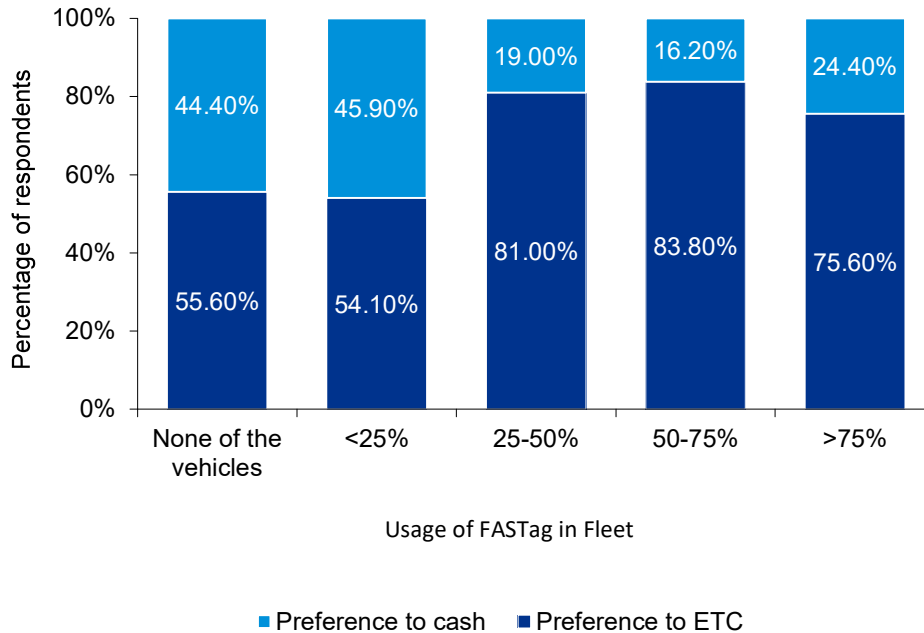
**9. FASTag experience can be further improved by (please provide your answer in the space provided below up to 150 words)**

Summary of the responses received is provided below:

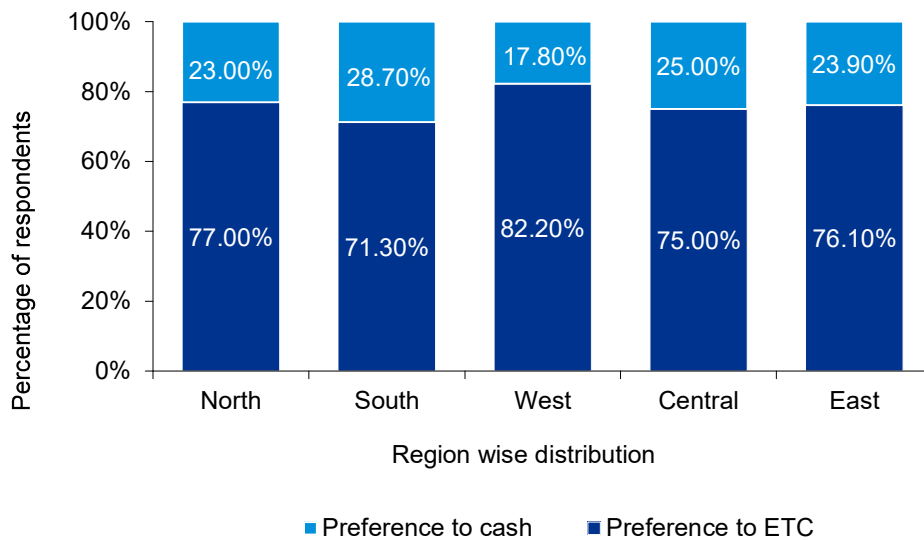
- All debit adjustment to process immediately and refund within 3 days.
- Local passes for neighbouring villages.
- Double billing problem could be resolved
- Update the scanner at toll plaza with high frequency to reduce manual scanning of tags
- Reduce the minimum balance to zero in the FASTag wallet.

**Freight Transporters:** The inferences derived from the analysis of the online responses received from 548 freight transporter respondents is discussed below.

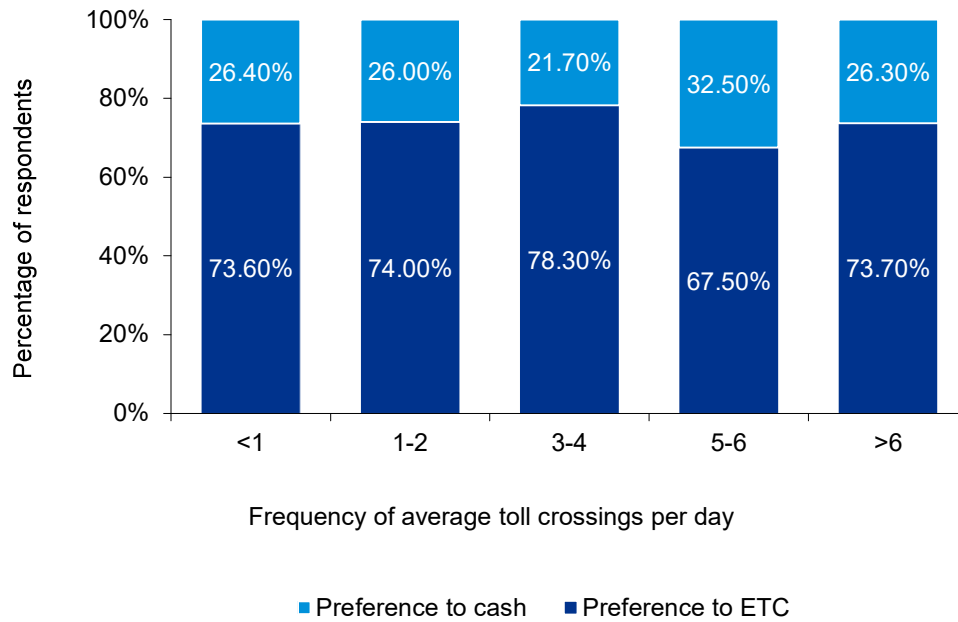
**1. FASTag usage is a significant factor. Users who prefer FASTag have also implemented FASTag in their fleet.**



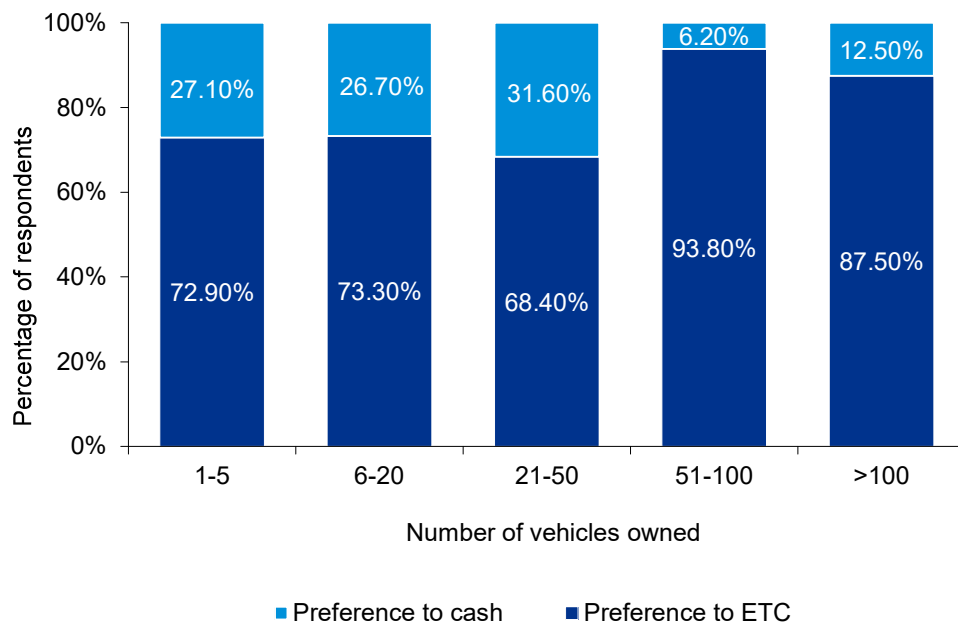
**2. Among the regions, only Western region is statistically significant and those in that region prefer FASTag more than who do not ply on that region as per Logit Model**



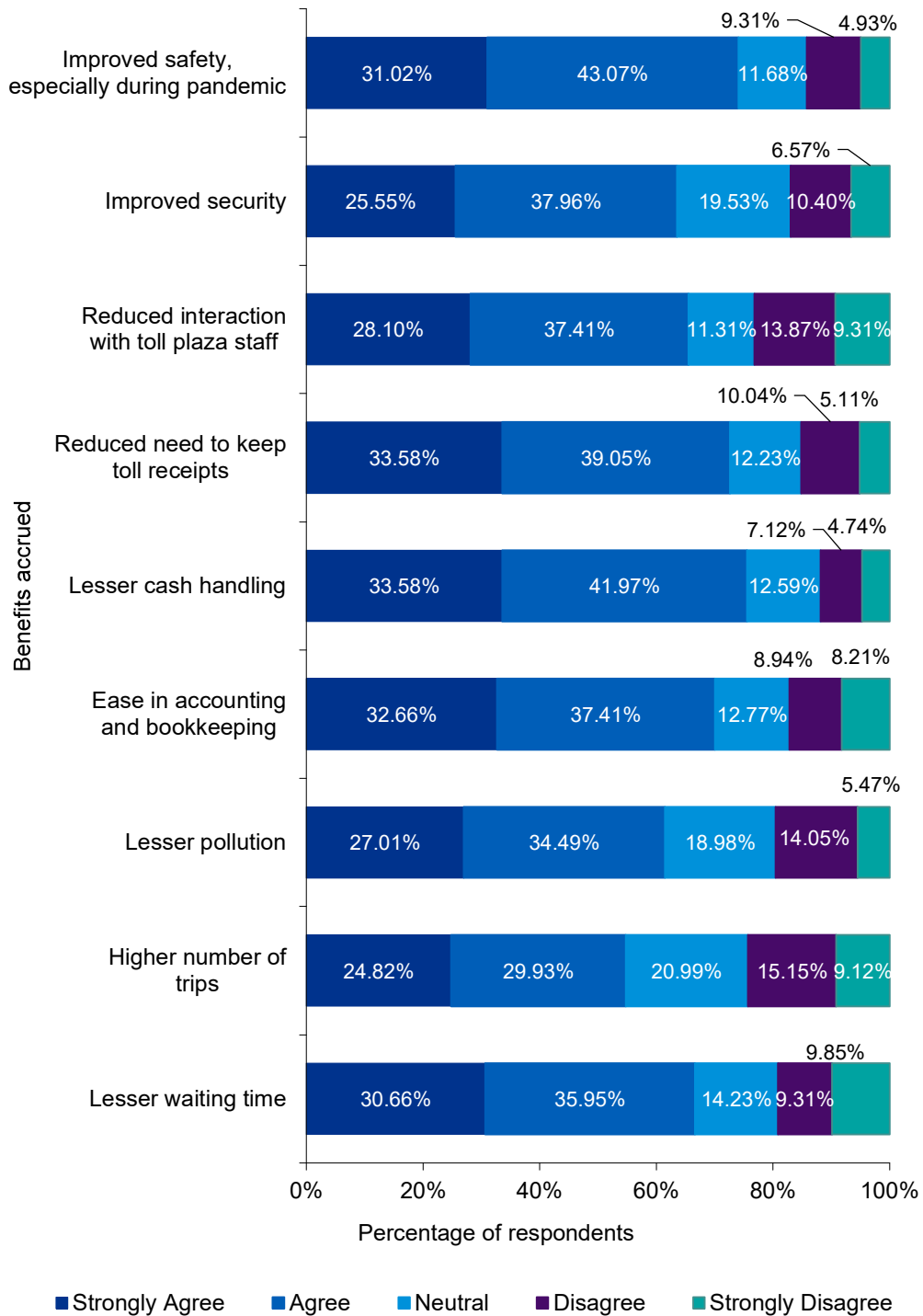
**3. Preference of respondents is agnostic of the frequency of toll crossing and is an insignificant factor.**



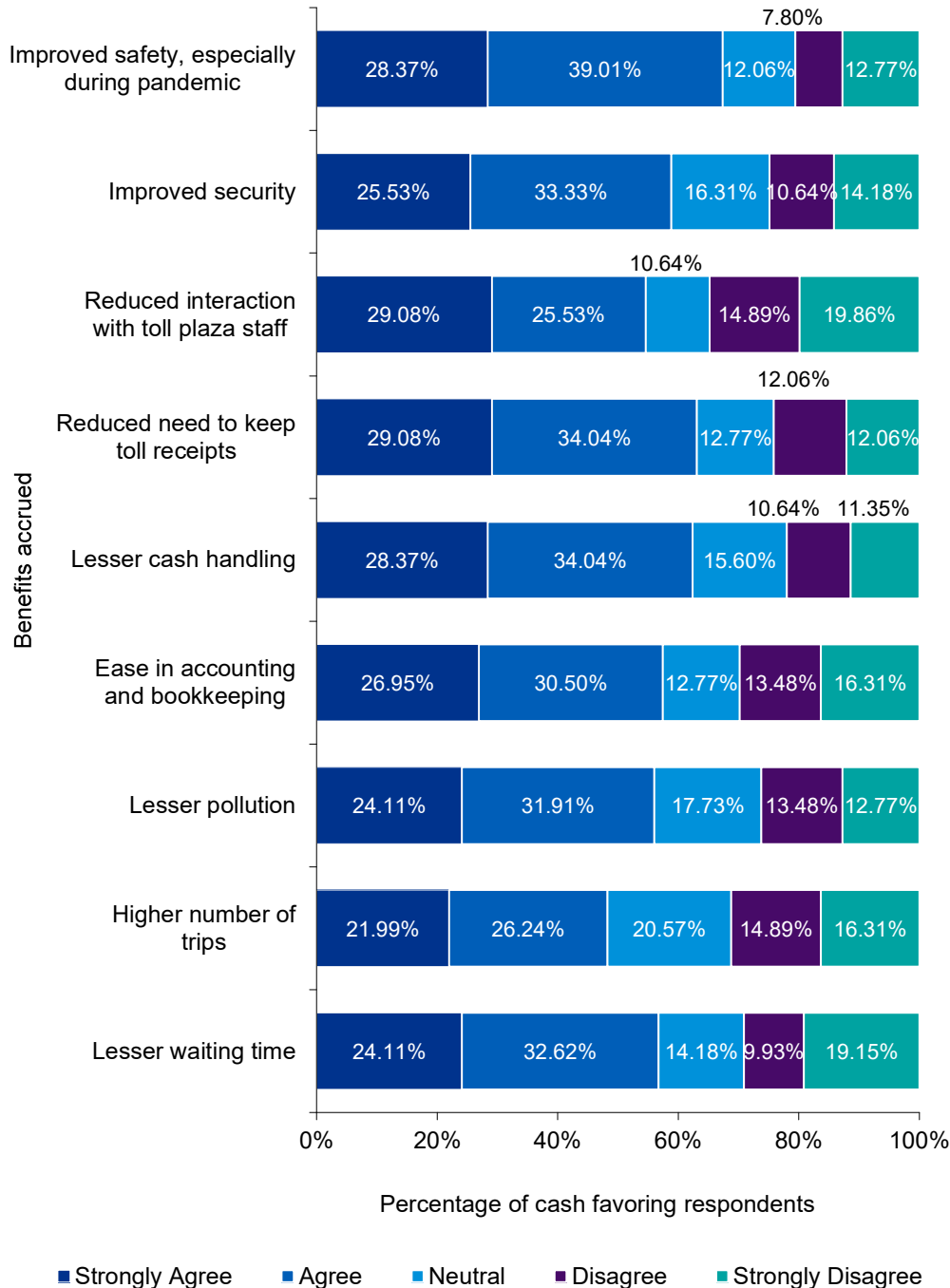
**4. Vehicle ownership is not a statistically significant factor. The size of large fleet owners is too low in the survey to draw any conclusion**



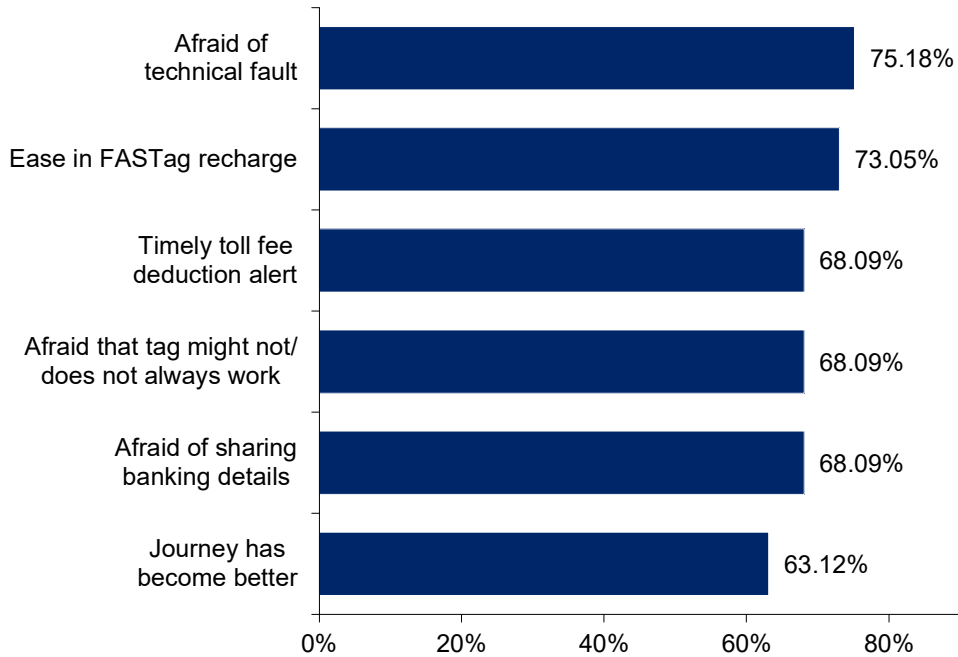
## 5. Respondents majorly perceive the benefits of FASTag. Most of the users agree with the benefits that FASTag brings.



**6. Most of the respondents favouring cash recognize the benefits of FASTag but to a lesser margin. Among the benefits, strong disagreement is high for benefits in terms of reduction in waiting time and lesser interaction with toll staff**

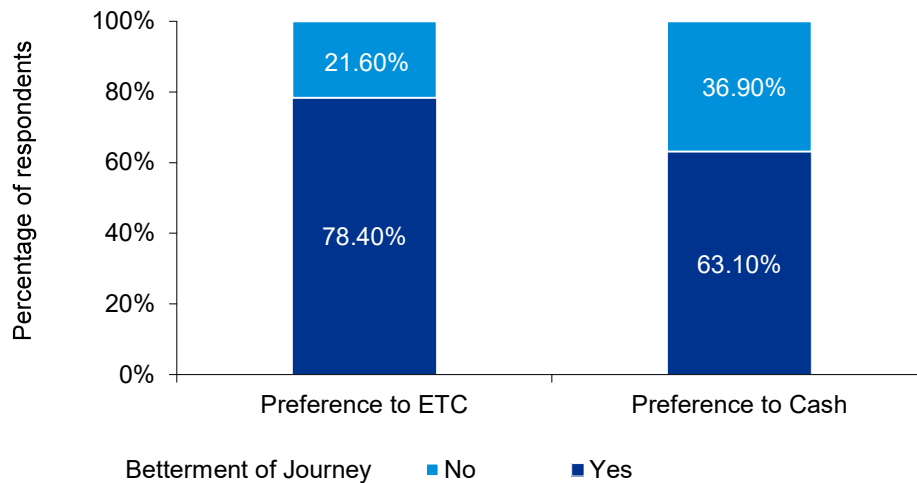


**7. The graph below corresponds to the respondents who prefer cash. The perception across those respondents are also similar though the intensity of perception of benefit is lesser than those who prefer FASTag**



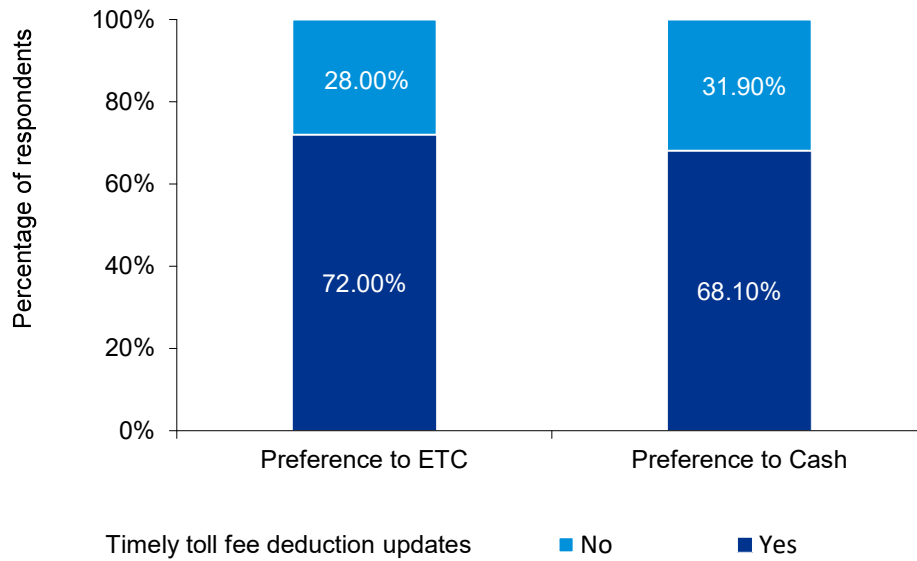
Percentage of respondents favoring manual payments

### 8. Respondents preferring cash recognize the improvement in journey due to FASTag but to a lesser extent

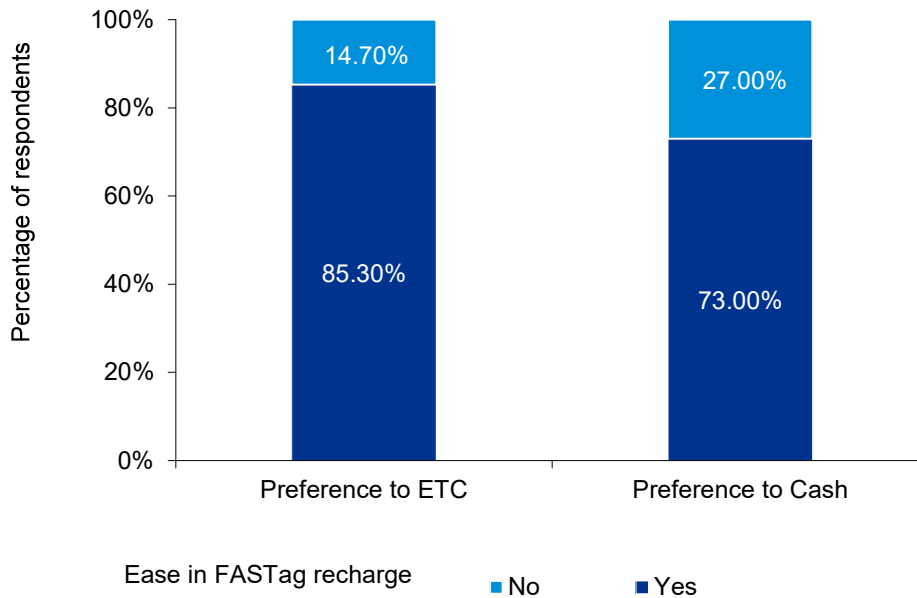


### 9. Respondents preferring cash recognize that they get timely deduction alert in majority but to a lesser extent. Around 30% of respondents do not get timely deduction alert which may be a scope of improvement

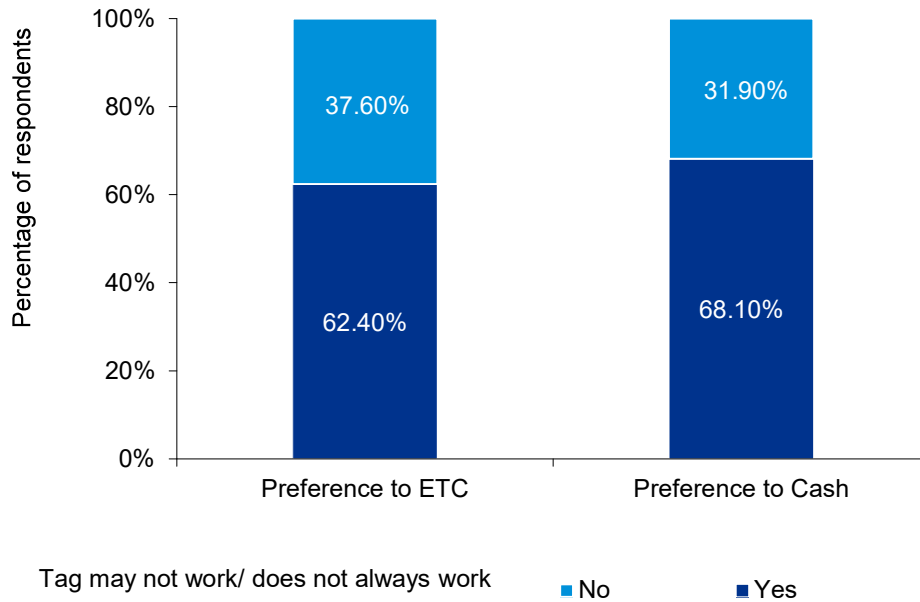




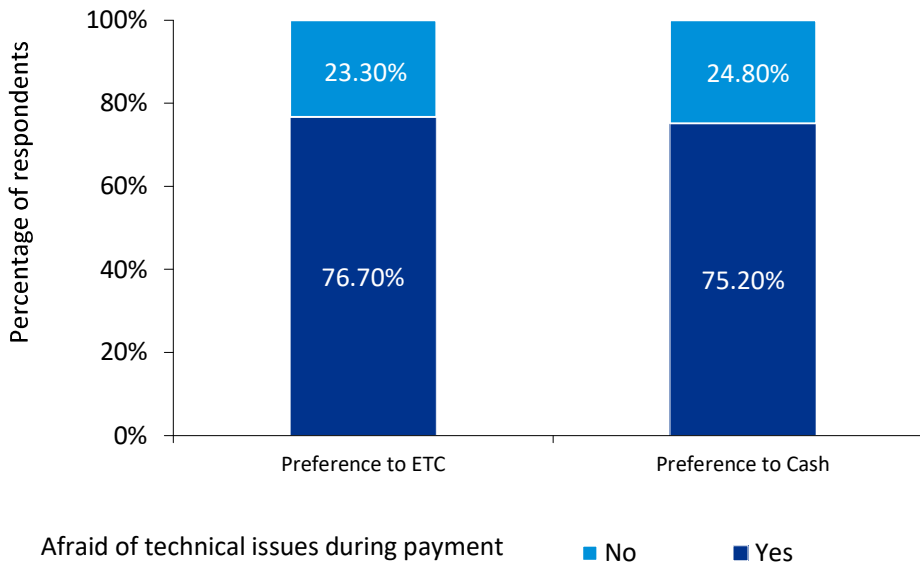
**10. Respondents preferring cash recognize the ease in recharge for FASTag but to a lesser extent**



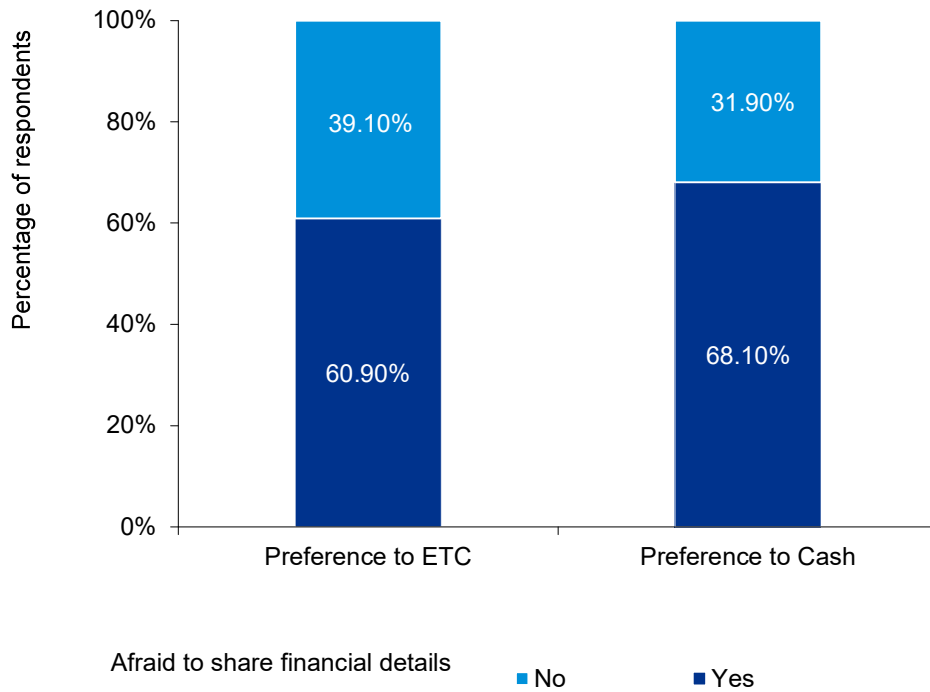
**11. Most respondents are frightened that their tag may not work at toll plaza. Users who prefer cash may put higher weightage to this attribute and this might have influenced him/her to prefer cash**



**12. Most respondents are frightened that there can be technical issues with FASTag like double payment, fines etc. Users who prefer cash may put higher weightage to this attribute and this might have influenced him/her to prefer cash.**



**13. Most respondents are frightened about sharing financial details during the processing of FASTag. Respondents preferring cash may put higher weight to this attribute**



**Freight Transporters: Logit Model Result and Interpretation**

A few models based on the independent variables were developed to derive insights from the online survey responses. Among them, the model based on AIC (Akaike Information Criteria) was selected. A positive coefficient (Estimate Column) implies higher probability of preference to cash-payment.

	Estimate	Std. Error	Z-value	Pr (>  z )
(Intercept)	-0.01931	0.484962	-0.03982	0.968234
FastagUsageLess than 25%	-0.01148	0.584	-0.01966	0.984313
FastagUsage25% - 50%	-1.32595	0.736627	-1.80002	0.071857 .
FastagUsage50% - 75%	-1.43127	0.656487	-2.18019	0.029243 *
FastagUsage75% - 100%	-0.94372	0.492705	-1.91538	0.055443 .
WestWest	-0.63069	0.236482	-2.66695	0.007654 **

Estimate	Std. Error	Z-value	Pr (> z )
<i>Signif. Codes : 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1</i>			

The exponent of a coefficient is the odd's ratio for that variable. Odds is the ratio of the probability of a respondent to prefer cash over the probability to prefer FASTag. Odds ratio is the ratio of the odds for that variable. If the odds ratio for a binary variable X is b, then we can interpret that holding other variables constant, the respondent with X=1 has b times the odds to prefer cash than the odds for a respondent with X=0. No inference can be drawn from the coefficient of statistically insignificant variables.

Term	Coefficient	Odds Ratio	Odds Ratio -1
(Intercept)	-0.02	0.98	-2%
FastagUsageLess than 25%	-0.01	0.99	-1%
FastagUsage25% - 50%	-1.33	0.27	-73%
FastagUsage50% - 75%	-1.43	0.24	-76%
FastagUsage75% - 100%	-0.94	0.39	-61%
WestWest	-0.63	0.53	-47%

The interpretation of the table for odds ratio is as follows:

S.No	Interpretation
------	----------------

1	<p>Holding other variables at a fixed value, the odds to prefer cash for respondents who Weekly. Visit implemented Fastag in 25-50% of their vehicles (FastagUsage=2) are 73% lower than the odds for the respondents who did not implement Fastag in their vehicles (FastagUsage=0).</p>
2	<p>Holding other variables at a fixed value, the odds to prefer cash for respondents who implemented Fastag in 50-75% of their vehicles (FastagUsage=3) are 76% lower than the odds for the respondents who did not implement Fastag in their vehicles (FastagUsage=0).</p>
3	<p>Holding other variables at a fixed value, the odds to prefer cash for respondents who implemented Fastag in 75-100% of their vehicles (FastagUsage=4) are 61% lower than the odds for the respondents who did not implement Fastag in their vehicles (FastagUsage=0).</p>
4	<p>Holding other variables at a fixed value, the odds to prefer cash for respondents who ply in West India (West=1) are 47% lower than the odds for the respondents who do not ply in West India (West=0).</p>

**Freight Transporters: Focus Group Discussion** - 11 entities also participated in the Focus Group Discussions conducted for this segment. The questions and the anonymous responses against different respondent are detailed below:

Respondent	1. Among the vehicles in your fleet, what percentage have adopted FASTag?	2. Toll plazas in which region of the country are normally used by your vehicles?
1	100%	Pan India
2	100%	North, West, and South
3	100%	Pan India
4	100%	West
5	100%	Pan India
6	100%	Pan India
7	100%	West
8	95-100%	Pan India
9	100%	Pan India
10	100%	Pan India
11	100%	Pan India

Respondent	3. Do you feel that you have accrued benefits through the implementation of FASTag in terms of reduced waiting time, travel time, pollution, usage of cash, interaction with toll plaza staff etc. and improved safety, bookkeeping and accountability?
1	All benefits mentioned are being accrued. There is no impact on travel time of vehicle since predefined vehicle kilometers are assigned to the driver.
2	It has benefitted in terms of waiting time and passthrough time. Interaction with the toll plaza is now minimum. Overall, it has benefitted the transporters industry.
3	All benefits are accrued
4	100% FASTag implementation has helped in terms of reduced interaction with toll plaza staff. It has significantly reduced congestion and pollution at the toll plaza.
5	Agreed with the views of other participants
6	FASTag has enabled the transporters to track the planned route. FASTag has also mandated almost 100% route compliance by the drivers. Such change in driver behavior has resulted in less damage to the goods by avoiding routes with deteriorated road quality.
7	Many benefits have definitely been accrued due to FASTag. FASTag implementation has resulted in time savings. But persistent issues like double payment are creating chaos at the toll plaza. Blacklisting issue is predominant.
8	FASTag has accrued all the benefits listed.

9	Agreed with the views presented by other participants in the discussion.
10	FASTag has led to 10 to 15 percent easing of congestion at the toll plaza, but queues are still present. Due to less cash involvement in the system, accounting has improved significantly.
11	FASTag implementation has resulted in significant improvement in bookkeeping and accountability. FASTag has led to reduced cash handling.

<b>Respondent</b>	<b>4. Have you faced any issues regarding reliability, double payment, overcharging, fines, delayed information receipt on fee deduction etc.?</b>
1	Reliability and double payments issues are present in the system. Transporters community is largely impacted due to these issues. Significant progress has not been achieved towards resolving these issues.
2	We haven't faced any such issue. Even if such issues are present in the system, they are well manageable.
3	Double payment is the major issue. As per toll fee rule, 1.5 times of toll fee should be collected from the users for return journey. However, twice of toll fee amount is still being collected from the users at some toll plazas. Before 100 percent mandate of FASTag implementation, drivers used to travel on the roads with bad condition to avoid toll which led to material damage. Now, it has almost stopped due to better accountability.



4	Mentioned issues are present in the system. However, there are issues are due to human mismanagement. They can be minimized by providing right training to the system administrators.
5	Double payment is a frequent problem faced by our drivers.
6	Double payment and cumulative delay due to some unavoidable reasons are still the major causes of concern.
7	No or less visibility of double toll deduction and blacklisting. System should be automated. There is no requirement of boom barriers. Presence of boom barrier leads to wastage of time. Since roads and vehicles are upgraded to the international standard level, vehicular movement has become efficient and faster especially for express trucking. In such situations, recharge reflection time can be improved to avoid unnecessary delay at the toll plaza.
8	There is still no control and visibility for the issues like double payment and blacklisting
9	Agreed with the views of other participants
10	Despite wallet balance, system still reads tag as blacklisted tag. Multiple FASTags on a single vehicle creates problem pertaining to readability. Ideally, a new tag should be issued after the closure of previous tag against the same vehicle.
11	Double payment is a predominant issue experienced by the transporters.

Respondent	5. How would You-describe-your experience-of recharging FASTag?	6. Please provide your suggestions for improving tag read reliability.
1	Good	Use of high-tech sensors
2	Good	Improvisation is needs in sensors. Use of hi-tech sensors is necessary
3	Good	Hi-tech sensors and proper tag reading infrastructure.
4	Good	Agreed with the views of other participants
5	Good	Issues are present with existing sensors at the toll plaza. Tag reading is time consuming. Sensors need to be improved
6	Agreed with the views of other participants	Hi-tech sensors should be installed. In case of higher traffic at the toll plaza, batch processing should be initiated.
7	Agreed with the views of other participants	Toll plaza operators are keeping system slow to manage the traffic at the toll plaza
8	Agreed with the views of other participants	Hi-tech sensors are needed

9	Conversion of blacklisted tag is time consuming. Recharging should be easy and real-time.	Sensor quality should be improved
10	Recharging experience is good. Security amount requirement by some banks should be removed	Sensor detection speed can be improvised. Sensor certification should be placed at each toll plaza to make users aware about sensor quality. Sensor quality should be standardized.
11	Tag replacement charges should be levied	Improvement is needed.

Respondent	7. Do you feel congestion still exists at toll plazas due to low adoption of FASTag technology?	8. How convenient is the process for issue of FASTag?
1	Congestion is still present at the toll plaza	Process is smooth
2	FASTag penetration in Commercial Vehicle is 96-97%. Most of the time, free flow of traffic is present. Only in certain road stretches like Mumbai-Pune expressway congestion is still present. Congestion is due to lack of proper infrastructure. Journey should be made	Process is smooth

	seamless by removal of toll plazas. Alternate technology should also be implemented in metro cities	
3	Agreed with the views of other participants	Process is smooth
4	Agreed with the views of other participants	Agreed with the views of other participants
5	Congestion is present due to local vehicles without FASTag.	No issues with the process
6	Issue pertaining to local vehicles should be resolved on priority	Process is easy. Cashback should be reintroduced.
7	Blacklisted vehicles are a major challenge. Situation has improved compared to toll fee through manual payment	Process is easy
8	Agreed with the views of other participants	Process is smooth
9	Congestion is present at the toll plaza	Process can be improved by integration with Vahaan data.
10	Agreed with the views of other participants	Process should be easy
11	Commercial and passenger vehicles are not following lane	Though commercial vehicles are paying are

	discipline. Idling of vehicle led to double toll deduction.	higher toll, preference is given to the passenger car users
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9. Do you think that public awareness needs to be generated for the correct usage of FASTag?	
1	Awareness should be generated through television advertisements.
2	Transporters are already aware about FASTag
3	Training should be given to drivers about usage of FASTag. Generally, drivers are hired based on kilometers of distance to be covered. Due to lack of awareness about usage of FASTag, driver is not aware of penalty imposed at the toll plaza. Such situations lead into deduction of driver's salary by the owner. Proper education should be provided to the drivers. Toll plazas in Madhya Pradesh still operate on toll fee through manual payment.
4	Agreed with the views of other participants
5	Yes, it is needed. Most of the problems like accountability and time savings are addressed through FASTag. Webinars should be conducted to generate awareness.
6	People are aware about the ETC system
7	Awareness is necessary especially for drivers and small fleet owners
8	Awareness about wrong toll fee deducted and refund procedure should be generated.

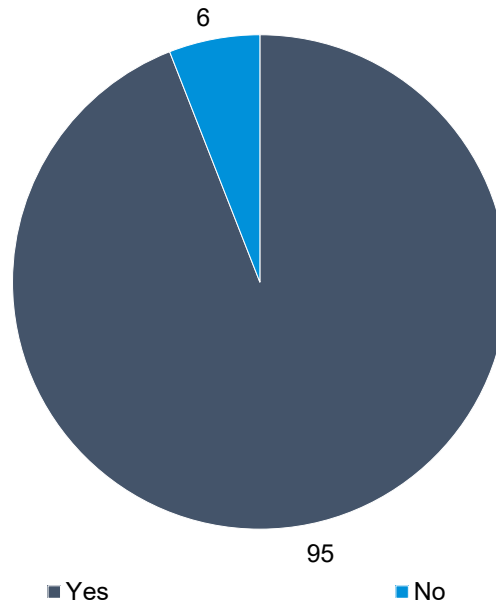


9	Agreed with the views of other participants
10	Agreed with the views of other participants
11	Agreed with the views of other participants

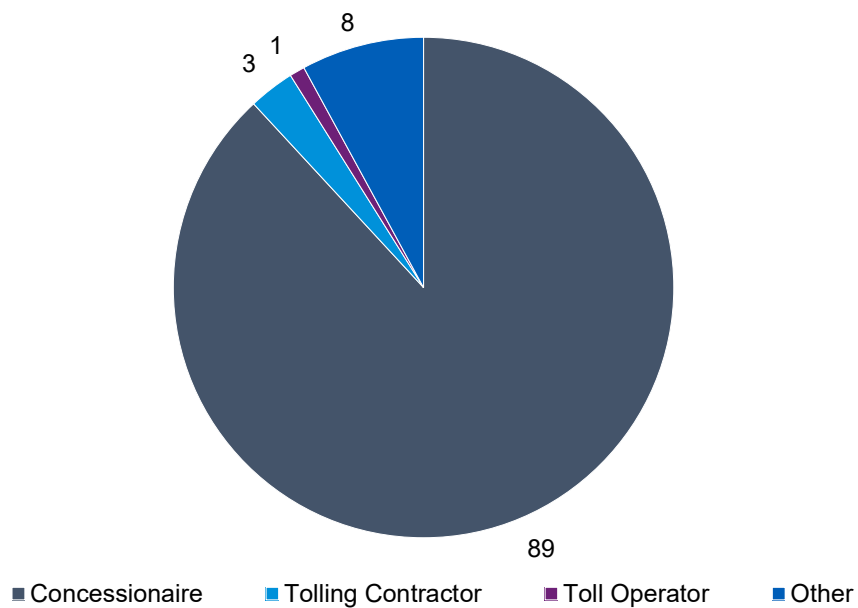
### 5.4.4 Annexure 4. Toll Plaza Operators

Online survey was carried out for toll plaza operators which received responses from 101 respondents. The analysis / findings from the responses received are presented below.

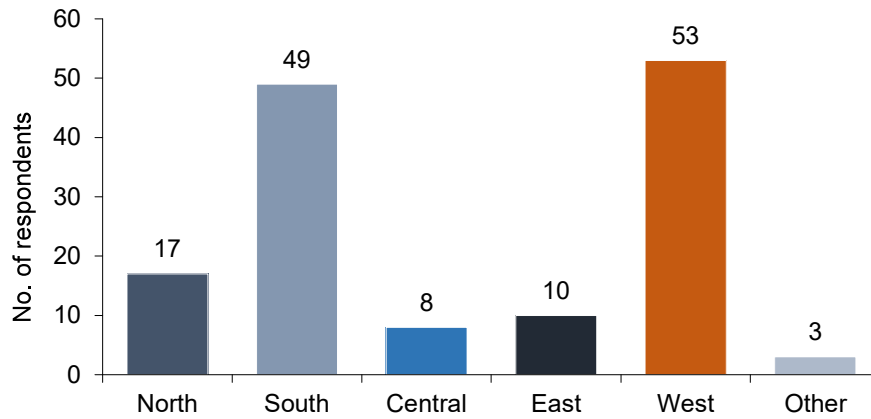
#### 1. Do you prefer Electronic Toll System over cash payment?



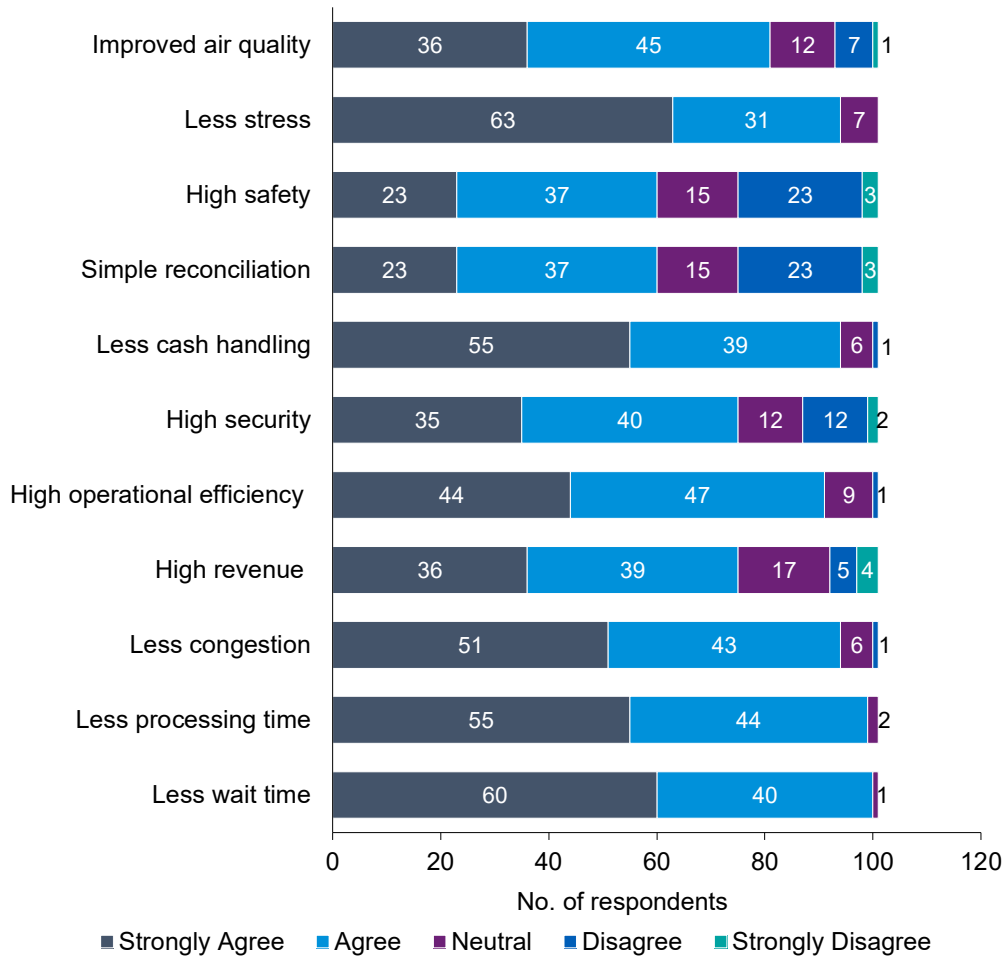
#### 2. Respondent category.



#### 3. In which part of India are your operating toll plazas in? You can select more than one option.

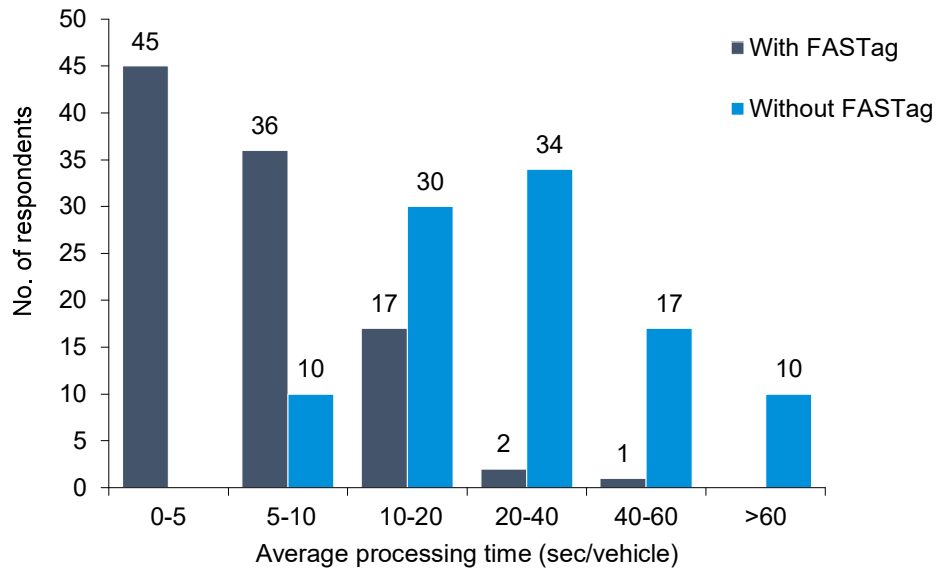


**4. Please provide your responses on the following aspects of FASTag.**

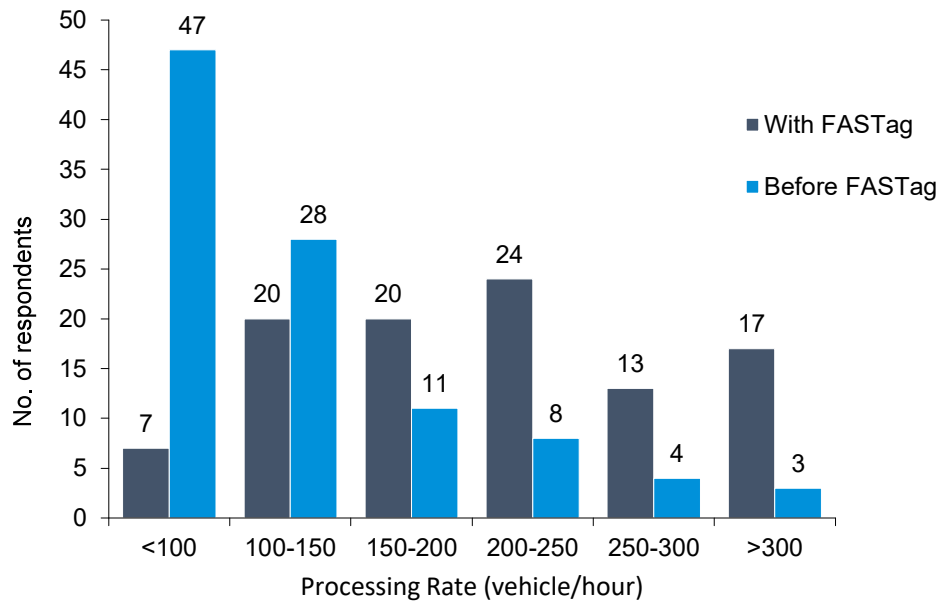


**5. Average processing time at toll booth (seconds per vehicle).**





**6. Number of vehicles serviced per hour per toll lane (Processing rate – Number of vehicles processed at a toll booth lane within time duration of one hour)**



**7. FASTag has benefited me the most for the following reason (please provide your answer in the space provided below up to 150 words)**

Summary of the responses received is provided below:

- Less waiting and processing time per vehicle.
- User exemptions have gone down.
- Fuel saving and less cash handling.
- Revenue collection enhanced.
- Increased transparency and better settlement of transactions.

**8. FASTag experience can be further improved by (please provide your answer in the space provided below up to 150 words)**

Summary of the responses received is provided below:

- Availability of renewal / recharge facility every time.
- Blacklisted tags & vehicle class violations need to be penalized.
- Downtime of system could be improved.
- Include parking and various other payments through FASTag.
- Proper awareness drive of FASTag guidelines and usage to the passenger.

**Toll Plaza Operators: Focus Group Discussion** - 12 entities also participated in the Focus Group Discussions. The questions and the anonymous responses against different respondent are detailed below:

Respondent	1. Among the vehicles arriving at your toll plazas, what percentage have adopted FASTag?	2. What is the most frequent commute time?	3. Which region of the country does your toll plaza operate in?
1	96%	Agreed with the views of other participants	West
2	95%	4pm - 12am	South
3	95% on weekdays, 96% on weekends	5pm - 9pm	South
4	Agreed with the views of other participants	5pm-9pm	South
5	Agreed with the views of other participants	8am - 11am, 4pm-8pm	South
6	Ranging from 80-85%	For passenger vehicles, office hours. For freight vehicles, late evening, or night	East

7	Ranging from 85-90%	For passenger vehicles, office hours. For freight vehicles, late evening, or night	North
8	More than 80%	Office hours	South
9	Ranging from 81-98%	Office hours	Pan India
10	Ranging from 92-95%	9am-12pm, 6pm-8pm	Pan India
11	Ranging from 82-95% across plazas	8am-11 am, 5-8pm	Pan India
12	More than 90%	8am-11 am, 5-8pm	Pan India

<p><b>4. Do you feel that you have accrued benefits through the implementation of FASTag in terms of reduced waiting time, travel time, pollution, usage of cash, interaction with toll plaza staff etc. and improved safety, bookkeeping and accountability?</b></p>	
Respondent	
1	Bookkeeping and accountability is a challenging process. Mapping and keeping track of toll according to vehicle classification is difficult.
2	There has been a positive push on all aspects except bookkeeping and accounting since settlement happens after T+2 days.

3	With more data coming in, system specifications need to be re-visited. Blacklisting needs to happen real-time. There is a lag from the banks' side.
4	Agreed with the views of other participants
5	There are problems with issuance of tags. Also, class number needs to be updated every 15 days based on classification and violation; this process is not happening actively. This results in loss of revenue.
6	There have been benefits in bookkeeping and accountability. However, there is an acute shortage of toll lanes. Places with adequate lanes have seen a reduction in waiting time. Accountability for user convenience needs to be shared between stakeholders
7	Reduced waiting time, travel time, usage of cash, pollution and improved bookkeeping and accountability has been seen. Occasionally, the tag is valid but is not tied to any issuer bank. This results in declined transactions and revenue loss to concessionaire. Manpower for reconciliation has increased due to these problems.
8	Reduced travel time, usage of cash, pollution. Occasionally, cash users cause congestion and increase waiting time. Vehicle mapping is also a major issue.
9	System Integrator system needs improvement. Vehicle mapping and multiple tags on a single vehicle are also major hurdles. There should be an automated system of penalty for such cases. There has been definite improvement in safety during COVID and usage of cash.

10	Occasionally, multiple tags are issued by same Issuer bank. There should be helpline number for concessionaires to reach out to the banks. Communication through mail is difficult.
11	Registration should be through vehicle number rather than chassis number. Helpline number operators should be made more aware about handling issues like low balance and blacklisting, since there is an unnecessary pressure to let blacklisted vehicles pass the toll booths.
12	Issues in bookkeeping and reconciliation since chargeback is issued after T+2 days. Also, monthly pass amount deducted is not reflected on time.

<b>Respondent</b>	<b>5. Have you received any complaints regarding reliability, double payment, overcharging, fines etc.?</b>
1	Initial period was difficult. No complaints now.
2	Initial period was difficult. No complaints now.
3	There needs to be periodicity for changing tags. Public should be made aware about timely changing the tags so that issue of damage does that come up and readability improves
4	No
5	There have been recent complaints about quality of tags which result in non-readability. Furthermore, there is no equipment to identify the condition of tags.

6	Numerous complaints have been received. Updating blacklist data is takes time. Concessionaires suffer because users complain of double cash payments.
7	No
8	It is difficult to stop overweight vehicles and collect fines from them under Electronic Toll Collection system, since this increases pass through time for other vehicles.
9	There are double payment complaints. Since the System Integrator system is not up to the mark, Toll plaza operators face the heat due to double payment
10	Any revenue loss occurring due to incorrect vehicle mapping should go to the concessionaire
11	No
12	No

Respondent	6. Did you experience operational difficulties due to cash users using FASTag lanes at toll plazas?	7. Do you feel congestion still exists at toll plazas due to low adoption-of-FASTag technology?
1	Agreed with the views of other participants	Agreed with the views of other participants
2	Not a major issue anymore.	12 lane toll plazas can process around 2000 vehicles/hour. No congestion is being faced.

3	Bandwidth at bank level needs to be enhanced to reduce the issue of recharging FASTag. Along with chassis number, the recharge should be facilitated through vehicle registration number as well. Facilitation from RTOs is required for the same.	Agreed with the views of other participants
4	Agreed with the views of other participants	Agreed with the views of other participants
5	Not a major issue anymore.	Congestion only on weekends or odd instances due to tag readability.
6	People are ready to pay double cash fee but refuse to use FASTag. This increases waiting time for other users.	Congestion is due to lesser number of lanes and not due to low adoption of FASTag
7	Disputes with toll staff is a persistent issue	FASTag has been adopted with high penetration. Congestion is only due to cash users
8	Agreed with the views of other participants	Local people cause congestion since they are unwilling to pay toll
9	Cash users do not give exact change. This takes 2-3 minutes instead of 2-3 seconds while using FASTag	Active users are sometimes shown as blacklisted. This causes quarrels and congestion, but such incidents have reduced considerably



10	Agreed with the views of other participants	Agreed with the views of other participants
11	Agreed with the views of other participants	Agreed with the views of other participants
12	Agreed with the views of other participants	Agreed with the views of other participants

Respondent	8. How convenient is the process for issue of FASTag?
1	Agreed with the views of other participants
2	The procedure for issuance of tags needs to be streamlined. Banks also need to strictly verify vehicle classification, since this leads to revenue loss for the concessionaire. Also, if the tag is not used in 2-3 months, there have been occasions where the wallet balance did not reflect or was shown blacklisted.
3	Banks should ensure stricter vehicle class mapping.
4	If smartphone is available with user, FASTag is issued within 2-3 minutes. Else it takes around 10 minutes for the same.
5	Agreed with the views of other participants
6	The process for issuance of FASTag is extremely easy. This has resulted in people obtaining multiple FASTags of any vehicle class.

7	Online/roadside selling of FASTags should be stopped since tags are simply handed to the user and are not affixed as per SOP on the windshield.
8	People are misusing the ready availability of tags. Furthermore, banks need to ensure stricter vehicle class mapping.
9	Agreed with the views of other participants
10	The process for issuance of FASTag is extremely easy. This has resulted in people obtaining multiple FASTags of any vehicle class.
11	Agreed with the views of other participants
12	Agreed with the views of other participants

Respondent	9. Do you think that public awareness needs to be generated for the correct usage of FASTag?	10. Are there any concerns or issues raised by the residents living close to toll plazas?
1	List of exempted vehicles needs to be updated and circulated.	No issues from local people. Toll plazas located at city outskirts.
2	NHAI, MoRTH, and RTOs need to contribute to generating awareness.	No issues from local people. Toll plazas located at city outskirts.

3	Agreed with the views of other participants	No issues from local people. Toll plazas located at city outskirts.
4	People need to know about their low balance before they reach the toll plaza, since they insist on recharging at the toll plazas. This increases pass through time for other vehicles.	No issues from local people. Toll plazas located at city outskirts.
5	Agreed with the views of other participants	Local people are now unwilling to use FASTag or use local buses.
6	Improved guidelines for recharge need to be issued. Recharge is instantaneous, but non-blacklisting takes 45-50 minutes.	Local people do not want to avail FASTag. They are unwilling to pay toll and occasionally cause congestion.
7	Agreed with the views of other participants	Initially, residents living around toll plazas were exempted from paying toll fee and used to pay very nominal monthly fee. But now they are now unwilling to purchase FASTag.
8	Agreed with the views of other participants	Local users are unwilling to pay toll and cause congestion
9	Agreed with the views of other participants	Handling local passenger vehicle segment is difficult since they are unwilling to pay toll fee. It results up to delays up to 30 minutes

10	Agreed with the views of other participants	Agreed with the views of other participants
11	Issuer banks and NHAI need to generate awareness. There should be an automated program to educate on the usage of FASTag.	Agreed with the views of other participants
12	Freight transporters not carrying FASTag could be penalized for the same.	Local people are unwilling to pay toll if toll plaza area and vehicle registration number are from different states.

### 5.4.5 Annexure 5. NHAI Regional Officers, Project Directors and Nodal Officers

Interviews were conducted with a total of 15 officers. The questions and the anonymous responses against different respondent are detailed below:

Respondent	1. How many Point-of-Sales (PoS) terminals do you have in your area of jurisdiction? Do you feel that there is a need to increase the number of PoS terminals after mandated FASTag tags for all vehicles?
1	237 PoS terminals exist in the area of jurisdiction. There is currently no need to increase the number of PoS terminals.
2	48 PoS terminals exist in the area of jurisdiction. The existing system needs to be strengthened before introducing more PoS terminals
3	45 PoS terminals exist in the area of jurisdiction. No need to increase the number of PoS terminals since ETC penetration is more than 90%
4	26 PoS terminals exist in the area of jurisdiction. There is currently no need to increase the number of PoS terminals.
5	98 PoS terminals exist in the area of jurisdiction. No need to increase the number of PoS terminals since ETC penetration is more than 95%
6	15-20 PoS terminals exist in the area of jurisdiction. No need to increase the number of PoS terminals since ETC penetration is more than 97%
7	12 PoS terminals exist in the area of jurisdiction. There is a need to increase PoS terminals, especially for public funded plazas.
8	29 PoS terminals exist in the area of jurisdiction. No need to increase the number of PoS terminals since ETC penetration is more than 95%

9	9 PoS terminals exist in the area of jurisdiction. No need to increase the number of PoS terminals since ETC penetration is more than 96%
10	12 PoS terminals exist in the area of jurisdiction. No need to increase the number of PoS terminals since ETC penetration is more than 85%
11	70 PoS terminals exist in the area of jurisdiction. No need to increase the number of PoS terminals since ETC penetration is more than 90%
12	52 PoS terminals exist in the area of jurisdiction. There is a need to increase PoS terminals, especially for public funded plazas.
13	6 PoS terminals exist in the area of jurisdiction. No need to increase the number of PoS terminals since ETC penetration is more than 96%
14	8 PoS terminals exist in the area of jurisdiction. No need to increase the number of PoS terminals since ETC penetration is more than 80%
15	10 PoS terminals exist in the area of jurisdiction. No need to increase the number of PoS terminals since ETC penetration is more than 94%

**2. In your opinion, what additional benefits will be accrued by Respondent the Government due to the compulsory implementation of FASTag across the country?**

1 Reduction in long queue is a definite benefit which is being accrued. The average waiting time is now less than 3 minutes during peak hours. Pollution has also decreased. Cashless transactions are now captured in confidence, improving transparency. Accurate determination of annual potential collection will reduce the need for consultancy in bidding for appointment of Toll plaza operators. This

	will also lead to reduction in land acquisition costs due to fewer toll booths.
2	There is a definite reduction in waiting time, processing time and human interaction at toll plazas
3	Forced exemption has been minimized due to implementation of FASTag. There is improved transparency in accounting process. Seamless movement of traffic at toll plazas has resulted in time savings. Furthermore, toll collection amount has also increased.
4	Queue is now short and distributed, with reduced pollution. Efficiency has also increased, with no hassle or deliberation at toll plazas
5	Quarrels, congestion, and issues of local people have reduced. There has been an increase in revenue collection and efficiency. The process is now user friendly
6	Traffic queue and cash transactions have reduced. There has been an increased transparency in traffic figures
7	Waiting and processing time have reduced, and tag readability is no longer an issue
8	Cash transactions and quarrels at toll plazas have reduced
9	Number of exempted people, pollution, congestion, and waiting/processing time have been significantly reduced.
10	Number of illegal vehicles and revenue leakage has reduced

11	Implementation of Electronic Toll Collection has encouraged fuel cost savings and seamless travel. There has been a definite reduction in pollution.
12	Higher revenue collection has helped kickstart commercial operations and maintenance of several toll plazas. This has also given direct employment opportunities to 1000+ local people
13	There has been a definite reduction in congestion, pollution and waiting time
14	Processing time and manpower requirements have reduced, encouraging fuel cost savings
15	Waiting time has reduced

Respondent	3. At a RO level, how are you planning to ensure 100 per cent implementation of FASTag?
1	<p>a) Exempted vehicles/departments need to be covered expeditiously to increase ETC penetration</p> <p>b) SRTUs are currently unwilling to pay toll fee beyond 50 trips, which needs to be resolved</p> <p>c) Taxi operator associations prefer paying double fine in cash while charging the same from users, since there is scepticism about reimbursement from usage of FASTag. This is a common practice in tourist places.</p>
2	Cash users need to be brought under the ambit of FASTag
3	Awareness needs to be provided to the public. A corporate recharge facility can be introduced in the IHMCL wallet.



4	<ul style="list-style-type: none"> <li>a) Exempted vehicles need to be brought under FASTag</li> <li>b) RTOs should facilitate the use of ETC</li> <li>c) Fine from overload vehicles should be integrated with FASTag.</li> </ul>
5	Exempted vehicles and local people unwilling to pay toll need to be brought under FASTag
6	Local people unwilling to pay toll and need to be brought under FASTag
7	IHMCL could coordinate with RTO to also fine vehicles without FASTag within the city limits
8	<ul style="list-style-type: none"> <li>a) Local people unwilling to pay toll need to be brought under FASTag</li> <li>b) Recharge issues still exist. If internet connectivity isn't available near a toll plaza, remote recharging facility should be provided</li> </ul>
9	-
10	<ul style="list-style-type: none"> <li>a) Exempted vehicles and certain freight vehicles unwilling to pay toll need to be brought under FASTag</li> <li>b) Online sale of FASTags should be banned. These tags are handed over to the driver without checking and are often with incorrect vehicle classification.</li> <li>c) Overload vehicles fine should be integrated with FASTag</li> </ul>
11	Exempted vehicles and local people unwilling to pay toll need to be brought under FASTag
12	Local people unwilling to pay toll need to be brought under FASTag



13	Updating blacklist vehicles could be faster
14	PoS terminal operators are not incentivized to sell tags.
15	Updating blacklist vehicles could be faster

### 5.4.6 Annexure 6. Issuer and Acquirer Banks

12 entities participated in focused group discussions. The questions and the anonymous responses against different respondent are detailed below:

Respondent	1. How many users of your bank have adopted FASTag?
1	3 million
2	1.3 million
3	0.3-0.4 million
4	2.5 million
5	Adoption level of FASTag is good. It has received a push since mandatory-implementation. Existing challenges need to be addressed, post which program scope can be further expanded into other areas such as parking, refuelling and other one-stop solutions using a single e-wallet.
6	Agreed with the views of other participants
7	Agreed with the views of other participants
8	Agreed with the views of other participants
9	Agreed with the views of other participants
10	Agreed with the views of other participants
11	Agreed with the views of other participants
12	We have witnessed an increasing trend of value of toll transactions. This is expected to continue for at least several months.

2. Have you received any complaints regarding double payment, overcharging, fines delayed information receipt on fee deduction etc.?	
1	We receive around 1000 cases daily
2	We have rarely received any complaints regarding double payment. Only 10-15 such cases received from project inception.
3	Yes. 20 complaints per month
4	We receive such complaints on regular basis. Almost 2000-3000 cases
5	Readers at toll plazas are unreliable. This is resulting in losses for customers as well as banks due to double charging.
6	Negative balance has increased three times since removal of threshold from 16 March 2021
7	Blacklisting of tags is a major issue. Even though tag is not blacklisted, certain users are charged double. Bank has shared data with NPCI on transactions triggered for tags which are not existing in the bank's inventory. Our bank has incurred a loss of INR 12 lakhs during Jan-Mar 2021. There is a need to push toll plazas to improve their hardware and processes. In case of any issue, users are likely to blame the bank and not the toll plaza.
8	NPCI mapper is the authentic central database. Users which are reflected as active on NPCI mapper are sometimes charged double

	<p>due to toll plazas not referring to NPCI mapper but to some other local resource which may not be updated.</p>
9	<p>There is a major spike in customer complaints since 16th Feb 2021. There is no mechanism for issuer banks to raise a dispute with toll plazas. Hence, issuer banks are facing the brunt of double charges. We receive around 10-15 complaints in a day. Notwithstanding the overall count, social media noise around these issues has the potential to create negative perception around the program.</p> <p>There have been clear instances of charges triggered on tags which have not yet manufactured or issued by the bank.</p>
10	<p>We are receiving 2-3 complaints per day. In certain instances, an active tag (which is working at various plazas) is sometimes not read at a particular toll plaza. This indicates an issue at a certain toll plaza's hardware or system.</p>
11	<p>Toll plazas are unable to initiate transactions for certain tags since they are reflecting as blacklisted on the local system. SI's need to address this challenge, by ensuring that only NETC mapper is used as primary database by all parties.</p>
12	<p>Infrastructure at toll plazas is not up to the mark which causes delays in data flow, reading of tags by handheld readers etc.</p>

<b>Respondent 3. Please provide your suggestions for improving tag read reliability.</b>	
1	<p>Proper fixing of tag and improvement in the tag reading infrastructure.</p>

2	Tag should be fixed at the center of car window. Improvement in tag reading infrastructure is necessary awareness should be generated about vehicle speed during tag reading.
3	Affixing of tag is a problem. Tag should be fixed properly.
4	Mandatory QA/QC is required to avoid tag quality issue. Improvement in tag reading infrastructure is needed.
5	SIs have started maintaining local databases of users which is against the principles of the program. Transactions must be based on single factor authentication (reading of physical tag) and not based on any other factor (validation using locally available database).
6	NPCI may consider implementing a system for viewing real time balance of tags across all issuer banks for implementation of new use cases.
7	Certain toll plazas are maintaining local database of vehicle and tag ID mapping. They are storing this information from transactions conducted at the toll plaza. If a user who was blacklisted gets issued a new tag, he/she will continue to be identified as blacklisted by the toll plaza due to its internal database referring vehicle number and its mapping to the older FASTag ID.
8	Agreed with the views of other participants
9	<p>Certain toll plazas are capturing vehicle number from video footage and further using data provided by issuer banks to create manual transactions.</p> <p>Several users have complained of being toll being deducted when the vehicle/user were not near toll plazas. Chajunagar toll plaza on eastern peripheral expressway is a distance-based toll plaza. Transaction amount depends on timely data flow of</p>

	both entry and exit points. Sometimes this pairing does not happen properly, which results in extra charges being levied to certain users.
10	Agreed with the views of other participants
11	Agreed with the views of other participants
12	IHMCL may conduct a review/performance testing/quality audit of toll plazas to identify problematic toll plazas. All new use cases should be implemented using online and not offline implementation.

Respondent 4. How convenient is the process for issue of FASTag?	
1	FASTag is highly regulated like any other bank product. However, standardization of onboarding a FASTag user is necessary.
2	No problems in the issuance of FASTag, but KYC process is time consuming
3	Process is convenient and smooth
4	Process is smooth and linking through KYC wallet is easy. However full KYC is time consuming.
5	<p>Around 70,000 tags being issued daily out of which 40-50% are issued at toll plazas. This makes it difficult for users to carry out full KYC.</p> <p>Vaahan API should be agreed upon as a genuine source for validation of vehicle class. The bank's compliance team has raised validation of vehicle class as a red flag.</p>

	The need for uploading RC copy is impacting user experience and results in instances of need for re-uploading.
6	KYC is a major challenge for issuer banks. While banks have been issuing tags based on minimum KYC for a period of 2 years, a number of users are likely to become non-KYC compliant during this or the next year. It is difficult to carry out full KYC which requires physical visit by either the customer or bank representative.
7	Agreed with the views of other participants
8	Agreed with the views of other participants
9	Vaahan API may be used as a mechanism for validating vehicle number, class etc. for issue of FASTags. This will eliminate the need for users to upload RC copies, as well as eliminating risk due to wrong information/forged RC copy submitted by FASTag applicants.
10	Agreed with the views of other participants
11	Agreed with the views of other participants
12	Agreed with the views of other participants

Respondent	5. What is your opinion on removal of mandatory threshold for the FASTag account / wallet?
1	A threshold for wallet should not be mandatory. Banks should have authority to decide it.



2	We don't see any challenge here. However, it has led to negative balance.
3	Remittance should be classified based on commercial and non-commercial vehicles. Commercial users should have a minimum threshold limit
4	Quite flexible. However, it should be revisited for commercial vehicle
5	Threshold limits should be reintroduced to curb the challenge of negative balance. Threshold of INR 100 is deemed appropriate.
6	Agreed with the views of other participants
7	Threshold should be INR 100. Furthermore, there is a common exception code for replaced tags, closed tags, and tags with low balance. This allows certain users to continue to replace tags which have run into negative balance, since there is no incentive to clear the negative balance of previously used and discarded tags. NPCI mapper allows issuance of new tags for the existing exception code. Hence, this issue needs to be solved by separating the exception code in the NETC system for replaced and closed tag.
8	Agreed with the views of other participants
9	Agreed with the views of other participants
10	Agreed with the views of other participants
11	Agreed with the views of other participants

12	Agreed with the views of other participants
----	---

Respondent	6. Do you think that public awareness needs to be generated for the correct usage of FASTag?
1	Agreed with the views of other participants
2	Public is already aware. Campaigning is in place. We don't see any challenges.
3	Public should make aware of benefits of FASTag through electronic media
4	Brochures should be distributed while issuing FASTag. Regular alerts are already being sent to the customers for wallet related information.
5	Agreed with the views of other participants
6	Agreed with the views of other participants
7	IHMCL may wish to seek feedback from banks in a standard format on the following: (a) Focus areas for IHMCL for user awareness (b) Viewpoint on improving user experience
8	Agreed with the views of other participants
9	Agreed with the views of other participants
10	Agreed with the views of other participants



11	Agreed with the views of other participants
12	Agreed with the views of other participants

### 5.4.7 Annexure 7. System Integrators

A total of 6 entities participated in the focus group discussions. The questions and the anonymous responses against different respondent are detailed below:

Respondent	1.Please provide your suggestions for improving tag read reliability.	2. What are your views on data management after implementation of ETC system?
1	We are faced with operational challenges due lack of user discipline. Tag quality is not up to the mark. Proper tag reading infrastructure is not in place at the toll plazas	Existing servers are not capable of handling the data.
2	Improper placing of tag by users. Infrastructure at the toll plaza needs to be improved. Lack of SOPs for fixing of tag on vehicle.	In ICD 2.5, data volume has increased enormously. Server specifications need to be reviewed. Response time and data sizing needs to be reviewed. Files sizes can be monitored.
3	Internet connectivity issue can be resolved.	System hardware at some toll plaza is inadequate.
4	Damaged tag or incorrect fixing of tag are creating problem for tag reading.	Server oriented specification needs to be revisited. Old toll plaza servers need to be upgraded.
5	Standardization of tag fixing, is required. Tag quality can be improved.	No issue of data management. Requirement of regularly providing Init files can be investigated

		judiciously. Time to receive Init files is also not consistent.
6	Multiple tags on single vehicle are creating difficulty in tag reading. Tag fixing issue can be resolved.	Init files processing is a challenge. Accountability of SIs has increased tremendously. Almost 93% FASTag implementation is achieved. Issue regarding Init files has already been discussed with NPCI.

Respondent	3. How has Processing time been affected by the transition from Manual Cash Payment to Electronic Toll Collection?	4. What is the effect on system downtime with the transition from manual cash payment to Electronic Toll Collection system?
1	Processing time has improved from 15 seconds to 3 seconds for ETC	In current situation, SIs do not have any buffer time. System downtime management is a huge task for SI. Changes in SSL certificate is time consuming.
2	Processing time has improved. Processing time is dependent upon vehicle class. During cash transactions, 1-4 vehicles per minute were being processed. In ETC system, 12-20 vehicles are being processed per minute.	Pre ETC era, SI had other alternatives for downtime management.

3	ETC system requires 3-4 seconds to complete the transaction excluding exceptional cases.	Consistent internet connectivity is needed to manage system downtime effectively.
4	Earlier at heavy traffic plazas (10,000 vehicles/day), 1-2 km queue was observed during peak hours. Traffic is moving freely after implementation of FASTag	Pre ETC, downtime was manageable.
5	ETC: 4-5 seconds Cash: 50-80 seconds	Internet connectivity is a major concern.
6	Processing time has improved under ETC system. (2-3 seconds)	System downtime is not affected. 100% Internet connectivity should be ensured

Respondent	<p>5. Have you received any complaints regarding double payment, overcharging, fines etc.? How frequently you receive it? What is the average Resolution time to resolve it? Please add if you receive any other complaints /issue/ technical glitches apart from that mentioned above</p>	<p>6. What are your views on entire ETC ecosystem from the perspective of an SI? Please enlist the challenges/ issue/benefits/ways to improve the system.</p>
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1	Complaints are not because of system failure. It is due to lack of proper training to the system administrators.	Toll plaza infrastructure needs to be standardized. Servers must be improved. Post implementation of FASTag, current server specification cannot handle the data.
2	Double payments complaints are received on regular basis. From heavy traffic toll plazas and toll plazas with inadequate infrastructure. Generally, it takes 1-2 days to resolve the issue	Blacklisting and tag fixing are major challenges. Benefits to SIs are very limited
3	Not many complaints are received.	SLA adherence is very difficult to implement.
4	Most of the complaints are resolved through banks and concessionaires.	ETC has been beneficial to a major extent. However, there are no benefits at commercial level for SIs.
5	Occasionally, tags having adequate wallet balance still show low balance. Real time updates are not provided during FASTag recharge.	Concessionaire toll plaza do not have any issues in terms of internet connectivity. Low balance reflection however takes time
6	Tag wallet balance creates issue at the toll plaza.	Proper handling of Init files, blacklisting files and proper tag distribution are key to seamless functioning of ETC system

### 5.4.8 Annexure 8. National Payments Corporation of India

Interview was conducted with NPCI and the following responses were gathered during the interview.

Questions	Responses
<p>In your opinion, what additional benefits will be accrued by the Government due to the compulsory implementation of FASTag across the country?</p>	<ul style="list-style-type: none"> <li>a) Despite lockdown, revenue collection has been higher than last year</li> <li>b) The Government has been able to get better visibility on actual traffic. Going forward, there may be a reduced need to hire consultants for bidding of PPP projects.</li> <li>c) Future asset monetization will return higher yields</li> <li>d) Probability of extension of existing concession periods will be lower</li> <li>e) Improved transparency, addressing revenue leakages</li> <li>f) Fuel cost saving due to less idle time</li> <li>g) Convenience for users</li> <li>h) Integration with other Government projects and programs will show futuristic benefits</li> </ul>
<p>Have you experienced a surge in the number of ETC transactions as reflected in the NPCI system after mandatory usage of FASTag? What have been the challenges in handling the O&amp;M of the system?</p>	<p>Banks have played a huge role in ETC penetration. Since the mandate, there has been a 40% increase in number of transactions, 35-36% increase in value of transactions and 80% increase in number of tag issuance.</p>



<p>A maximum of 10-minute delay is generally noted in receiving a confirmation after an ETC transaction. How do you plan to reduce this delay and make the system more reliable and available?</p>	<p>a) There is a need to focus on infrastructure, its audit and monitoring (RFID readers, boom barriers) since these are a major challenge towards improvement of user experience</p> <p>b) There is a need to upgrade the technology used. This will help reduce time taken to receive deduction confirmation to 2 minutes and reduce non-blacklisting time from 45-50 minutes to 3 minutes</p> <p>c) Internet connectivity needs to be improved at toll plazas</p>
<p>Do you think there will be an increase in the number of member banks in the system after the mandated use of FASTag?</p>	<p>There is a cap on the number of acquirer banks. However, there is no limit on the number of issuer banks in the system. There are currently more than 30 issuer banks, which can be increased to 45.</p>
<p>Any other feedback?</p>	<p>Tags do not work if one tries to remove it after it has been affixed. The connection between the antenna and the RFID is lost. Awareness needs to be generated for the same.</p>

## 11. Appendix IV – Conditions of Contract

### CONTRACT AGREEMENT

This Agreement (hereinafter called the “Agreement”) is made on this XX day of the month of XXX, 2024.

#### BETWEEN

Indian Highways Management Company Limited (IHMCL), constituted under Companies Act, 1956 and having its registered office at NHAI, G 5 & 6, Sector 10, Dwarka, New Delhi-110075 (hereinafter referred to as the “IHMCL”), which expression shall, unless repugnant to or inconsistent with the context, mean and include its successors and assigns) of the FIRST PART.

#### AND

\_\_\_\_\_ a company incorporated under the provisions of the Companies Act, 1956/2013 and having its registered office \_\_\_\_\_ (hereinafter referred to as the “.....”

(hereinafter collectively referred to as “**Consultant/Consultant**” which expression shall unless repugnant to or inconsistent with the context, mean and include its successors and assigns) of the OTHER PART

#### WHEREAS

- (A) IHMCL is a company incorporated under the Companies Act, 1956 with equity participation from NHAI, concessionaires and financial institutions for implementation of Electronic Toll Collection and other Intelligent Transportation System and allied works in road transport sector in India.
- (B) In this regard, IHMCL had invited bids (hereinafter referred to as the RFP NAME or “**RFP**”) for RFP NAME (hereinafter referred to as the “**Services**”).
- (C) The Consultant, in the ordinary course of its business, is engaged in providing similar services to their clients, and had represented to IHMCL through their bid against the RFP (hereinafter called the “**Bid**”) that they have the required professional skills, personnel and technical resources to undertake the Project;
- (D) After evaluation of the bids received, IHMCL had accepted the Bid of the Consultant and issued its Letter of Award No. \_\_\_\_\_ dated \_\_\_\_\_, (hereinafter called the “**LOA**”) to the selected bidder requiring, *inter alia*, to convey its acceptance to the LOA.
- (E) By its letter dated \_\_\_\_\_ the Consultant has conveyed its acceptance of the LOA to IHMCL including the obligation to enter into this Agreement pursuant to the LOA.
- (F) The Consultant, in accordance with the terms of the LOA and Clause \_\_\_ of the RFP, has also submitted the Performance Security in the form of Bank Guarantee, \_\_\_\_\_ dated \_\_\_\_\_ of \_\_\_\_\_ (Rupees \_\_\_\_\_) drawn on \_\_\_\_\_, as per prescribed format.

**NOW, THEREFORE**, in consideration of the foregoing and the respective covenants and agreements set forth in this Agreement, the receipt and sufficiency of which is hereby acknowledged, and intending to be legally bound hereby, the Parties agree as follows:

1. The mutual rights and obligations of the Contractor and IHMCL shall be as set forth in this Contract Agreement, in particular:
  - (a) The Contractor shall carry out the Services in accordance with the provisions of the Contract; and
  - (b) IHMCL shall make payments to the Contractor in accordance with the provisions of the Contract.
2. The following schedules/ appendices shall be deemed to form and be read and construed as part of this Contract Agreement viz.

- |                 |  |
|-----------------|--|
| (a) Schedule A: | Conditions of Contract   |
| (b) Schedule B: | Terms of Reference (TOR) and Payment Terms   |
| (c) Appendices: |  |
| Appendix A      | Copy of Financial Bid of the Contractor  |
| Appendix B      | Letter of Award issued by IHMCL.   |
| Appendix C      | Letter of Acceptance submitted by the Contractor   |
| Appendix D      | Copy of the Performance Security submitted by the Contractor including copies of confirmation provided by the respective bank. |
| Appendix E      | Copy of the Technical Bid and/or any subsequent correspondence of the Contractor/ IHMCL  |
| Appendix F      | Copy of RFP Document and subsequent amendment / addendum including Minutes of Pre-bid Meeting, if any                          |

IN WITNESS WHEREOF, the parties hereto have caused this Contract Agreement to be executed by their respective authorized representatives on the day and year first before written.

FOR AND ON BEHALF OF  
Indian Highways Management Company  
Ltd.  
(Authorized Representative)

Name : \_\_\_\_\_  
Designation \_\_\_\_\_  
Indian Highways Management Company  
Ltd. G-5&6, Sector-10 Dwarka New Delhi –  
110 075

FOR AND ON BEHALF OF  
M/s \_\_\_\_\_  
(Authorized Representative)

Name : \_\_\_\_\_  
Designation : \_\_\_\_\_  
M/s \_\_\_\_\_  
Address : \_\_\_\_\_

In the presence of following witnesses:

Name: \_\_\_\_\_  
Designation: \_\_\_\_\_  
Indian Highways Management Company  
Ltd.  
G-5&6, Sector-10 Dwarka New Delhi – 110  
075

Name : \_\_\_\_\_  
Designation: \_\_\_\_\_  
M/s \_\_\_\_\_  
Address : \_\_\_\_\_

Name : \_\_\_\_\_  
Designation \_\_\_\_\_  
Indian Highways Management Company  
Ltd.  
G-5&6, Sector-10 Dwarka New Delhi – 110  
075

Name : \_\_\_\_\_  
Designation : \_\_\_\_\_  
M/s \_\_\_\_\_  
Address : \_\_\_\_\_

#### 11.1. Application

These general conditions shall apply to the extent that provisions in other parts of the Contract do not supersede them. For interpretation of any clause in the RFP or Contract Agreement, the interpretation of IHMCL shall be final and binding.

#### 11.2. Relationship between the Parties

Nothing mentioned herein shall be constructed as relationship of master and servant or of principal and agent as between IHMCL and the Consultant. The Consultant subject to this contract for selection has complete charge of its personnel in performing the services under the Project from time to time. The Consultant shall be fully responsible for the services performed by it or any of its personnel on behalf of the Consultant hereunder.

#### 11.3. Standards of Performance

The Consultant shall perform the services and carry out its obligations under the Contract with due diligence, efficiency and economy in accordance with generally accepted professional standards and practices. The Consultant shall always act in respect of any matter relating to this contract as faithful advisor to the IHMCL. The Consultant shall always support and safeguard the legitimate interests of the IHMCL, in any dealings with the third party. The Consultant shall abide by all the provisions/Acts/Rules etc. of Information Technology prevalent in the country. The Consultant shall conform to the standards laid down in the RFP in totality.

#### 11.4. Consultant's Downstream Business Interest

The Consultant shall not be eligible to bid for the activities relating to the implementation of this project. Further, the consultant shall give a declaration that they do not have any interest in downstream business, which may ensue from the RFP prepared through this assignment.

#### 11.5. Consultant Personnel

11.5.1. Bidders would deploy on-site team consisting of members / consultants as proposed in the bid. No separate/ additional payment shall be made for any type of off-site deployment.

11.5.2. The Consultant shall deploy and provide such qualified and experienced personnel as may be required to perform the services under the project. It is desirable from the Consultant to deploy the domain/ subject specialists, from time to time, who have adequate experience in the domain related with the project.

11.5.3. Each member of the team must be a full- time employee of the bidder, either on its payroll or as retainer/contract.

11.5.4. The team shall be deployed on an exclusive basis; no resource deployed under this project will work on any other engagement during Contract Period and a declaration for the same to be provided.

11.5.5. In addition to the minimum manpower & manpower profiles asked for, Consultant may take any kind of specialized/ expert advice/resources, at his own cost, during the currency of the project to meet the project deliverable/ Timelines.

11.5.6. The successful bidder shall ensure confidentiality of the information/data provided by IHMCL/NHAI and shall not share any data with any external 3rd party without explicit written approval of IHMCL.

#### 11.6. Working Hours / Days

11.6.1. When engaged, the consultant will keep to the normal working schedule of IHMCL/NHAI. However, IHMCL will have the right to decide the working schedule of the resources deployed keeping in view the exigencies of the work.

11.6.2. The daily attendance of consultant on-site resources will be marked in the register maintained by IHMCL at its premises or as advised by IHMCL.

#### 11.7. Reporting

11.7.1. Consultant shall submit a fortnightly/weekly report update regarding the status updates of deliverables, as required by IHMCL.

11.7.2. Consultant shall maintain complete record for any delay along with clearly mentioned reasons for each delay in any milestone. Any delay shall be reported to the IHMCL within the timelines of concerned milestone duly in writing along with documentary proof immediately.

#### 11.8. Outsourcing

11.8.1. Consultant shall not outsource any work related to the project or the part thereof to any other associated/franchisee/third party.

11.8.2. Outsourcing of any resources by consultant may lead to termination of contract along with forfeiture of PBG.

11.8.3. However, Consultant may be allowed to outsource only geographical survey related work only after award of contract.

#### 11.9. Applicable Law

11.9.1. Applicable Law means the laws and any other instruments having the force of law in India as may be issued and in force from time to time. The Contract shall be interpreted in accordance with the laws of the Union of India and the State of Delhi.

#### 11.10. Intellectual Property Rights

No services covered under the Contract shall be sold or disposed by the Consultant in violation of any right whatsoever of third party, and in particular, but without prejudice to the generality of the foregoing, of any patent right, trademark or similar right, or any charge mortgage or lien. The Consultant shall indemnify IHMCL from all actions, costs, claims, demands, expenses and liabilities, whatsoever, resulting from any actual or alleged infringement as aforesaid and at the expenses of the Consultant, IHMCL shall be defended in the defence of such proceedings.

#### 11.11. Governing Language

The Contract shall be written in English Language. All correspondences and other documents pertaining to the contract, which are exchanged between the parties, shall be written in the English Language.

#### 11.12. Penalty

##### 11.12.1. Deliverable Timelines:

Consultants need to adhere the deliverable timelines as specified in contract / any related document failing which penalties shall be levied as below:

Sr. No.	Parameter	Penalty
1	Delay in deliverables	1% of the consultancy fees payable for the deliverable for each week delay
2	Replacement of Key Personnel during Contract period for any reasons other those mentioned in Clause 11.12.3	<ul style="list-style-type: none"><li>• Rs. 1,00,000/- per replacement</li><li>• Rs. 3,00,000/- per replacement if the Key Personnel is one of those being evaluated in Technical Evaluation stage</li></ul>

11.12.2. If the delay in any of above deliverable is beyond 8 weeks, then IHMCL reserves the right to terminate the Contract and forfeit the PBG. Further, IHMCL shall be free to get the work done from some other source at the risk and costs of the Consultant. The Consultant may be debarred for applying in future project consultancy assignments with IHMCL.

11.12.3. The substitution of Key Personnel at the negotiations may be considered if due solely to circumstances outside the reasonable control of and not foreseeable by the Consultant, including but not limited to resignation, death or medical incapacity. In such case, the Consultant shall offer a substitute Key Personnel within the period of time specified in the letter of invitation to negotiate the Contract, who shall have equivalent or better qualifications and experience than the original candidate.

11.12.4. Any replaced / substituted must qualify the RFP criteria and shall be approved/evaluated by the IHMCL. The required documents for evaluation must be provided to the IHMCL as per standard format of technical bid. IHMCL may ask for extra documentation for support wherever required.

11.12.5. All above penalties shall be levied on the consultant for any failure happened on consultant part in any of the agreed Timelines/ SLAs/ Terms & Condition. However, in any case, the total penalty value shall not be greater than 15% of the total contract value.

#### 11.13. Payment Terms

11.13.1. Milestone based payment will be made as per the schedule defined in Clause 7.6 Payment Milestone.

11.14. Taxes and Duties

11.14.1. All taxes, duties and any statutory levies etc. payable by the Consultant during the contract tenure shall be the sole responsibility of the Consultant.

11.14.2. All taxes, duties and statutory levies payable to the Consultant shall be paid as per prevailing rates.

11.15. Termination of Contract

Following reasons shall lead to the termination of contract:

11.15.1. Failure of the successful bidder to accept the contract and furnish the Performance Bank Guarantee within specified time period

11.15.2. The term of Contract expires

11.15.3. Termination of Contract by the IHMCL due to non-adherence of contract/RFP terms and conditions

11.16. Termination for Insolvency, Dissolution etc

11.16.1. IHMCL may at any time terminate the Contract by giving written notice to the Consultant, if the Consultant becomes bankrupt or otherwise insolvent or in case of dissolution of firm/company or winding up of firm/company. In this event termination will be without compensation to the Consultant, provided that such termination will not prejudice or affect any right of action or remedy, which has accrued or will accrue thereafter to IHMCL.

11.17. Termination for Convenience

11.17.1. IHMCL reserves the right to terminate, by prior written notice, the whole or part of the contract, at any time for its convenience. The notice of termination shall specify that termination is for IHMCL's convenience, the extent to which performance of work under the contract is terminated, and the date upon which such termination becomes effective.

11.18. Force Majeure

11.18.1. The Consultant shall not be liable for forfeiture of its PBG or termination of contract for default if and to the extent that delays in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

11.18.2. For purposes of this clause, "Force Majeure" means an event beyond the control of the Consultant and not involving the Consultant's fault or negligence, and not foreseeable. Such events may include, but are not restricted to, acts of IHMCL in their sovereign capacity, wars or revolutions, riot or commotion, earthquake, fires, floods, epidemics, and quarantine restrictions.

11.18.3. If a Force Majeure situation arises, the Consultant shall promptly notify IHMCL in writing of such condition and the cause thereof. Unless otherwise directed by IHMCL in writing, the Consultant shall continue to perform its obligations under the Contract as far as is



reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

#### 11.19. Resolution of Disputes

If any dispute arises between parties, then these would be resolved in following ways:

##### 11.19.1. Amicable Settlement

Performance of the Contract is governed by the terms and conditions of the Contract, however at times dispute may arise about any interpretation of any term or condition of Contract including the scope of work, the clauses of payments etc. In such a situation either party of the contract may send a written notice of dispute to the other party. The party receiving the notice of dispute will consider the Notice and respond to it in writing within 30 days after receipt. If that party fails to respond within 30 days, or the dispute cannot be amicably settled within 60 days following the response of that party, then the second Sub\_clause of resolution of disputes shall become applicable.

##### 11.19.2. Arbitration

Any dispute or difference whatsoever arising between the parties to this Contract out of or relating to the construction, meaning, scope, operation or effect of this Contract or the validity of the breach thereof shall be referred to a sole Arbitrator to be appointed by mutual consent of both the parties herein. If the parties cannot agree on the appointment of the Arbitrator within a period of one month from the notification by one party to the other of existence of such dispute, then the Arbitrator shall be appointed the provisions of the Arbitration and Conciliation Act, 1996 will be applicable and the award made there under shall be final and binding upon the parties hereto, subject to legal remedies available under the law. Such differences shall be deemed to be a submission to arbitration under the Indian Arbitration and Conciliation Act, 1996, or of any modifications, Rules or reenactments thereof. The Arbitration proceedings will be held at Delhi, India.”

#### 11.20. Legal Jurisdiction

All legal disputes between the parties shall be subject to the jurisdiction of the Courts situated in Delhi only.

#### 11.21. Indemnity

11.21.1. Subject to Clause 11.21.2 below, Consultant (the "Indemnifying Party") undertakes to indemnify IHMCL (the "Indemnified Party") from and against all Losses on account of bodily injury, death or damage to tangible personal property arising in favour of any person, corporation or other entity (including the Indemnified Party) attributable to the Indemnifying Party's negligence or wilful default in performance or non-performance under this Agreement. If the Indemnified Party promptly notifies Indemnifying Party in writing of a third party claim against Indemnified Party that any Service provided by the Indemnifying Party infringes a copyright, trade secret or Indian patents of any third party, Indemnifying Party will defend such claim at its expense and will pay any costs or damages that may be finally awarded against Indemnified Party. Indemnifying Party will not indemnify the

Indemnified Party, however, if the claim of infringement is caused by (a) Indemnified Party's misuse or modification of the Service; (b) Indemnified Party's failure to use corrections or enhancements made available by the Indemnifying Party; (c) Indemnified Party's use of the Service in combination with any product or information not owned or developed by Indemnifying Party; (d) Indemnified Party's distribution, marketing or use for the benefit of third parties of the Service; or (e) information, direction, specification or materials provided by Indemnified Party or any third party contracted to it. If any Service is or likely to be held to be infringing, Indemnifying Party shall at its expense and option either (i) *procure the right for Indemnified Party to continue using it*, (ii) *replace it with a non-infringing equivalent*, (iii) *modify it to make it noninfringing*. *The foregoing remedies constitute Indemnified Party's sole and exclusive remedies and Indemnifying Party's entire liability with respect to infringement.*

- 11.21.2. The indemnities set out in Clause 11.21.1 shall be subject to the following conditions:
- 11.21.3. the Indemnified Party as promptly as practicable informs the Indemnifying Party in writing of the claim or proceedings and provides all relevant evidence, documentary or otherwise;
- 11.21.4. the Indemnified Party shall, at the cost of the Indemnifying Party, give the Indemnifying Party all reasonable assistance in the Defense of such claim including reasonable access to all relevant information, documentation and personnel provided that the Indemnified Party may, at its sole cost and expense, reasonably participate, through its attorneys or otherwise, in such Defense;
- 11.21.5. if the Indemnifying Party does not assume full control over the Defense of a claim as provided in this Article, the Indemnifying Party may participate in such Defense at its sole cost and expense, and the Indemnified Party will have the right to defend the claim in such manner as it may deem appropriate, and the cost and expense of the Indemnified Party will be included in Losses;
- 11.21.6. the Indemnified Party shall not prejudice, pay or accept any proceedings or claim, or compromise any proceedings or claim, without the written consent of the Indemnifying Party;
- 11.21.7. all settlements of claims subject to indemnification under this Clause will:
- 11.21.7.1.1. be entered into only with the consent of the Indemnified Party, which consent will not be unreasonably withheld and include an unconditional release to the Indemnified Party from the claimant or plaintiff for all liability in respect of such claim; and
- 11.21.7.1.2. include any appropriate confidentiality agreement prohibiting disclosure of the terms of such settlement;
- 11.21.8. the Indemnified Party shall account to the Indemnifying Party for all awards, settlements, damages and costs (if any) finally awarded in favour of the Indemnified Party which are to be paid to it in connection with any such claim or proceedings;
- 11.21.9. the Indemnified Party shall take steps that the Indemnifying Party may reasonably require to mitigate or reduce its loss as a result of such a claim or proceedings;

11.21.10. in the event that the Indemnifying Party is obligated to indemnify an Indemnified Party pursuant to this Article, the Indemnifying Party will, upon payment of such indemnity in full, be subrogated to all rights and defenses of the Indemnified Party with respect to the claims to which such indemnification relates; and

11.21.11. if a Party makes a claim under the indemnity set out under Clause 11.21 above in respect of any particular Loss or Losses, then that Party shall not be entitled to make any further claim in respect of that Loss or Losses (including any claim for damages).

11.22. Liability

11.22.1. The liability of Consultant (whether in contract, tort, negligence, strict liability in tort, by statute or otherwise) for any claim in any manner related to this Agreement, including the work, deliverables or Services covered by this Agreement, shall be the payment of direct damages only which shall in no event in the aggregate exceed the Total Contract Value. The liability cap given under this Clause 11.22.1 shall not be applicable to the indemnification obligations set out in Clause 11.21.

11.22.2. In no event shall either party be liable for any consequential, incidental, indirect, special or punitive damage, loss or expenses (including but not limited to business interruption, lost business, lost profits, or lost savings) even if it has been advised of their possible existence.

11.22.3. The allocations of liability in this clause 11.22 represent the agreed and bargained-for understanding of the parties and compensation for the Services reflects such allocations. Each Party has a duty to mitigate the damages and any amounts payable under an indemnity that would otherwise be recoverable from the other Party pursuant to this Agreement by taking appropriate and commercially reasonable actions to reduce or limit the amount of such damages or amounts.