

IRB Infrastructure private limited

(A subsidiary of
IRB INFRASTRUCTURE DEVELOPERS LTD)



Registered Office :

IRB Complex, Chandivali Farm, Chandivali Village, Andheri (E), Mumbai-400 072
Tel: 91-22-6640 4299 • Fax: 91-22-6640 4274 • e-mail: info@irbfi.co.in • www.irbfi.co.in
CIN :U28920MH1997PTC112628

November 8, 2019

Corporate Relationship Department, BSE Limited Phiroze Jeejeebhoy Towers Dalal Street, Mumbai- 400001.	Listing Department, National Stock Exchange of India Limited Exchange Plaza, C-1 Block G Bandra Kurla Complex, Bandra (E), Mumbai.
---	---

Dear Sir/Madam,

Ref: Scrip Code: 540526, Symbol: IRBINVIT

Sub: Report for the half year ended September 30, 2019

Pursuant to Regulation 23 of SEBI (Infrastructure Investment Trusts) Regulations, 2014, as amended, please find attached Report of IRB InvIT Fund for the half year ended September 30, 2019.

Kindly take the same on your record.

Thanking you,

Yours faithfully,

**For IRB Infrastructure Private Limited
(Investment Manager to IRB InvIT Fund)**

**Swapna Vengurlekar
Company Secretary & Compliance Officer**

Encl: As above



Registered Office :

IRB Complex, Chandivali Farm, Chandivali Village, Andheri (E), Mumbai-400 072
Tel: 91-22-6640 4299 • Fax: 91-22-6640 4274 • e-mail: info@irbfl.co.in • www.irbfl.co.in

CIN : U28920MH1997PTC112628

Report for the half year ended September 30, 2019

To,
The Unitholders,
IRB InvIT Fund

We, IRB Infrastructure Private Limited, Investment Manager of IRB InvIT Fund (the Trust) hereby submit the Report for the half year ended September 30, 2019 to the Unitholders of the Trust together with Financial Statements and Valuation Report for the half year ended September 30, 2019.

1) Investment Manager's brief report of activities of the Trust and summary of the unaudited consolidated financial statements for the period of the Trust.

The Trust has been settled by IRB Infrastructure Developers Limited (the "Sponsor") pursuant to the Indenture of Trust in Mumbai, India, as an irrevocable trust in accordance with the Trusts Act. The Trust has been registered with SEBI as an infrastructure investment trust under the InvIT Regulations (Registration Number: IN/InvIT/15-16/0001). The object and purpose of the Trust is to carry on the activity of an infrastructure investment trust under the InvIT Regulations, to raise resources in accordance with the InvIT Regulations, and to make investments in accordance with its investment strategy.

The Trust own, operate and maintain a portfolio of seven toll-road assets in the Indian states of Maharashtra, Gujarat, Rajasthan, Karnataka, Tamil Nadu and Punjab. These toll roads are operated and maintained pursuant to concessions granted by the NHAI. The Trust is listed on both the Stock exchanges i.e. National Stock Exchange and Bombay Stock Exchange since 18th May 2017.

The Summary of financial information on Standalone and Consolidated Financial Statement of the Trust are annexed herewith as "Annexure A".

2) Brief details of all the assets of the Trust, project-wise

Project wise brief details of all the assets of the Trust are annexed herewith as "Annexure B".

3) Details of revenue during the period, project-wise from the underlying projects

Details of Project wise revenue from the underlying assets are annexed herewith as "Annexure C".

4) Details regarding the monies lent by the InvIT to the holding company or the special purpose vehicle in which it has investment

Details regarding the monies lent by the InvIT to the holding company or the special purpose vehicle in which it has investment is annexed herewith as "Annexure D".

5) Brief summary of the valuation as per full valuation report as at the end of the period

Please refer Valuation Report issued by Mr. Santosh Nagalingaswamy, Valuer for the half year ended September 30, 2019 is annexed herewith as "Annexure E".



6) Any information or report pertaining to the specific sector or sub-sector that may be relevant for an investor to invest in units of the Trust

The Toll Revenue and O&M Cost Projection Report issued by M/s. GMD Consultants, Technical Consultant, for each Project SPV is annexed herewith as “Annexure F”.

7) Details of changes during the period pertaining to:

a) Addition and divestment of assets including the identity of the buyers or sellers, purchase or sale prices and brief details of valuation for such transactions

During the period, the Trust has neither acquired any assets nor divested any of its Assets.

b) Valuation of assets and NAV (as per the full valuation reports)

Statement of Net Assets at Fair Value as at September 30, 2019

Particulars	Amt in Lakhs
A. Assets	1,415,581.78
B. Liabilities	814,883.18
C. Net Assets	600,698.60
Outstanding units	5,805
NAV at Fair Value (Per Unit)	103.48

c) Borrowings or repayment of borrowings (standalone and consolidated)

Details of Borrowings or repayment of borrowings on standalone and consolidated are annexed herewith as “Annexure G”.

d) Credit rating

CARE Ratings Limited has reaffirmed “CARE AAA” to the Trust’s long term bank facilities of ` 1,536.36 Crores with a stable outlook.

India Ratings and Research (Ind-Ra) has affirmed the Trust’s long term senior debt rating at “IND AAA” with stable outlook.

e) Sponsor, Investment Manager, Trustee, valuer, directors of the Trustee or Investment Manager or sponsor, etc.

Details of the Investment Manager

IRB Infrastructure Private Limited is the Investment Manager (IM) of the Trust, and has been designated as such pursuant to the Investment Management Agreement dated March 3, 2016. The Investment Manager is responsible for making investment decisions with respect to the underlying assets or projects of the Trust (Project SPVs), including any further investment or divestment of its assets, in accordance with Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014, as amended (the InvIT Regulations) and the Investment Management Agreement.

The details of the Investment Manager are as follows:





f) Details of the Investment Manager

- a) **Name:** IRB Infrastructure Private Limited (CIN : U28920MH1997PTC112628);
- b) **Registered Office:** IRB Complex, Chandivali Farm, Chandivali Village, Andheri (E), Mumbai - 400 072;
- c) **Correspondence Address:** IRB Complex, Chandivali Farm, Chandivali Village, Andheri (E), Mumbai - 400 072;
- d) **Telephone Number:** +91 22 6640 4299;
- e) **Fax:** +91 22 6640 4274; and
- f) **Website:** www.irbfl.co.in
- g) **E-mail:** info@irbfl.co.in

i) Details of the Contact Person of the Investment Manager

- a) **Name:** Ms. Swapna Vengurlekar, Compliance Officer ;
- b) **Telephone Number:**+91 22 6640 4299; and
- c) **Email:** swapna.vengurlekar@irbfl.co.in

ii) Past Experience of the Investment Manager

The Company has adequate net worth, experience, resources and personnel in the development of infrastructure and to perform functions of the Investment Manager. The Board of the Investment Manager comprises of majority of the Independent Directors having extensive experience in Infrastructure Sector and Project financing.

iii) Brief Profiles of the Investment Manager's Directors

a) Mr. Rajinder Pal Singh (DIN : 02943155)

Mr. Rajinder Pal Singh, aged 67 years, is an Independent Director and Chairman of the Board of the Investment Manager. He is a retired I.A.S. Officer and has experience in areas of finance, industry and infrastructure development. Previously, he was the chairman and managing director of Punjab & Sind Bank and the secretary to the Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India. Further, he was the chairman of National Highways Authority of India for a period of three years starting from June 2012. Currently, he is also a director on the board of directors of Maruti Suzuki India Limited, Bharti Infratel Limited and Macrotech Developers Limited.

b) Mr. Vinod Kumar Menon (DIN : 03075345)

Mr. Vinod Kumar Menon, aged 54 years is a whole time director & Chief Executive Officer of the Investment Manager. He holds a Bachelor of Technology degree in Civil Engineering. He has experience in the fields of infrastructure development and



management. Previously, he was the president (business development) of the Sponsor. He currently also serves as the vice-president of the National Highway Builder Federation – a non profit organisation.

c) **Mr. B. L. Gupta (DIN : 07175777)**

Mr. B. L. Gupta, aged 64 years, is an independent director of the Investment Manager. He holds a Bachelor's degree in commerce and a Master of Business Administration degree. He is a certificated associate of the Indian Institute of Bankers. He has experience in banking, corporate and project finance. Previously, he was the chief general manager of India Infrastructure Finance Company Limited.

d) **Mr. Sumit Banerjee (DIN : 00213826)**

Mr. Sumit Banerjee, aged 63 years, is an independent director of the Investment Manager. He holds a Bachelor of Technology degree in Mechanical Engineering and has completed a Management Education Programme. He is a fellow and a Chartered Engineer (India) of the Institution of Engineers. He has experience in the fields of management. Previously, he served as the managing director of ACC Limited.

iv) **Brief Profiles of the Investment Manager's Key Personnel**

a) **Mr. Vinod Kumar Menon**

For details in relation to Mr. Vinod Kumar Menon, see “- *Brief Profiles of the Investment Manager's Directors*”.

b) **Mr. Tushar Kawedia**

Mr. Tushar Kawedia, aged 39 years, is the chief financial officer of the Investment Manager. Previously, he served as the deputy chief financial officer of the Sponsor group. Mr. Kawedia holds a Bachelor's degree in commerce and is a qualified chartered accountant (ICAI). Prior to joining the Sponsor, he was deputy general manager (accounts and finance) at Reliance Infrastructure Limited. He has experience in the fields of accounts and finance.

c) **Ms. Swapna Vengurlekar**

Ms. Swapna Vengurlekar, aged 29 years, is the company secretary of the Investment Manager and has been designated as the Compliance Officer by the Investment Manager with respect to the Trust. She is an associate member of the Institute of Company Secretaries of India. She joined the sponsor group in May 2015. Prior to joining Sponsor Group, she was associated with M/s. Makarand M. Joshi & Co., Practising Company Secretary and SKP Crossborder Consulting Private Ltd. She has also done LL.B. from Mumbai University and she has several years of experience in secretarial and compliance functions.

v) **Details of the Holding or the Proposed Holding by the Investment Manager and its Directors in the Trust**



As on September 30, 2019, as per the disclosures received from the Directors of Investment Manager, except Mr. Rajinder Pal Singh, all the Investment Manager's Directors holds Units of the Trust as follows:

Sr. No.	Name of Director	No. of Units held
1	Mr. Vinod Kumar Menon	30,000
2	Mr. Sumit Banerjee	40,000
3	Mr. B. L. Gupta	5,000

Also, please find below details of Units held by the Key Managerial Personnel (KMP) of the Investment Manager.

Sr. No.	Name of KMP	No. of Units held
1	Mr. Tushar Kawedia (CFO)	30,000

vi) Summary of the Standalone Financial Statements of the Investment Manager

The Investment Manager has no subsidiaries. For a summary of the financial statements of the Investment Manager, as derived from the standalone financial statements of the Investment Manager, prepared in accordance with Indian GAAP and the Companies Act, as of and for the financial years ended March 31, 2019, please refer website of Investment Manager i.e. www.irbfl.co.in.

During the period, there is no change in the Board of Directors of the Investment Manager.

vii) Codes / Policies

In order to adhere to the good governance practices for the Trust, the Investment Manager has adopted the following policies in relation to the Trust:

Distribution Policy

The Investment Manager has adopted the Distribution Policy as disclosed in Final Offer Document to ensure proper, accurate and timely distribution for the Trust. The Distributable Income of the Trust is calculated in accordance with the Distribution Policy, the InvIT Regulations and any circular, notification or guidance issued thereunder.

Policy on unpublished price-sensitive information and dealing in units by the parties to the Trust (the "UPSI Policy")

The Investment Manager has adopted the UPSI Policy to ensure that the Trust complies with applicable law, including the InvIT Regulations or such other laws, regulations, rules or guidelines prohibiting insider trading and governing disclosure of material, unpublished price sensitive information.

Policy in relation to Related Party Transactions

To ensure proper approval, supervision and reporting of the transactions between the Trust and its Related Parties, the Board of Directors of the Investment Manager has



adopted the Policy in relation to Related Party Transactions as disclosed in Final Offer Document, to regulate the transactions between the Trust and its Related Parties.

Representatives on the Board of Directors of each Project SPVs

The Investment Manager, in consultation with the Trustee, has appointed the majority of the board of directors of Project SPVs. Further, the Investment Manager ensures that in every meeting, including annual general meeting of Project SPVs, the voting of the Trust is exercised.

viii) Committees

In compliance with requirement of the Companies Act, 2013 and Rules made thereunder, Investment Manager's Board of Directors constituted the following Committees:

- i) Audit Committee; and
- ii) Nomination and Remuneration Committee

The Chairman of the Board, in consultation with the Company Secretary and the respective Chairman of these Committees, determines the frequency of the meetings of these Committees. The recommendations of the Committees are submitted to the Board for approval.

(i) Audit Committee

The chairperson of the Audit Committee is an independent director. All members of the Audit Committee are financially literate and Chairman of the Committee has accounting and related financial management expertise.

The Composition of Audit Committee as on September 30, 2019 consists of the following members viz.:

- 1) Mr. B. L. Gupta, Chairman
- 2) Mr. Sumit Banerjee, Member
- 3) Mr. Vinod Kumar Menon, Member

The Company Secretary acts as the Secretary of the Audit Committee.

The composition, role, terms of reference as well as powers of the Audit Committee are in accordance with the Section 177 of the Companies Act, 2013 and InvIT Regulations, as applicable.

The brief terms of reference of the Audit Committee, inter alia, includes overseeing of the Company's financial reporting process, reviewing the financial statements with the Management, recommending appointment / re-appointment of auditors, fixation of audit fees, reviewing the adequacy of internal audit function, holding periodic discussions with auditors about their scope and adequacy of internal control systems, discussing on any significant findings made by Internal Auditor's and following it up with action. The Audit Committee also reviews the financials of the Trust and matters related thereto.

(ii) Nomination & Remuneration Committee

The Composition of Nomination & Remuneration Committee as on September 30, 2019 consists of the following members viz.:



- 1) Mr. Sumit Banerjee, Chairman
- 2) Mr. B. L. Gupta, Member
- 3) Mr. R. P. Singh, Member
- 4) Mr. Vinod Kumar Menon, Member

The Company Secretary acts as the Secretary of the Nomination and Remuneration Committee.

The brief terms of reference of the Nomination and Remuneration Committee are as follows:

To determine, persons who are qualified to become directors and who may be appointed in senior management in accordance with the criteria laid down, recommend to the Board their appointment and removal and shall carry out evaluation of every director's performance, formulate the criteria for determining qualifications, positive attributes and independence of a director and recommend to the Board a policy, relating to the remuneration for the directors, key managerial personnel and other employees.

Remuneration Policy

The Nomination and Remuneration Committee has laid down the criteria for determining qualifications, positive attributes and independence of a person proposed to be appointed as a Director and recommend to the Board a policy, relating to the remuneration for the Directors, Key Managerial Personnel and other employees.

The Policy ensures –

- (a) the level and composition of remuneration is reasonable and sufficient to attract, retain and motivate directors of the quality required to run the Company successfully;
- (b) relationship of remuneration to performance is clear and meets appropriate performance benchmarks; and
- (c) remuneration to Directors, Key Managerial Personnel and Senior Management involves a balance between fixed and incentive pay reflecting short and long-term performance objectives appropriate to the working of the Company and its goals.

ix) Functions, Duties and Responsibilities of the Investment Manager

The functions, duties and responsibilities of the Investment Manager are in accordance with the Investment Management Agreement and the InvIT Regulations. The Board of the Investment Manager comprises of majority of the Independent Directors having extensive experience in Infrastructure Sector and Project financing. The business operations of the Investment Manager are managed by a team of professionals with experience in the road infrastructure sector.

Details of the Sponsor

IRB Infrastructure Developers Limited (the Sponsor) is Sponsor of the Trust. The Sponsor is one of the largest infrastructure development and construction companies in India in terms of net worth in the roads and highways sector according to the NHAI's annual prequalification for public private partnerships in national highway projects report for 2016. The Sponsor has been listed on the Indian Stock Exchanges since 2008.



As of September 30, 2019; the Sponsor has 15 road projects, of which 11 are tolled and balance under various phases of development. The Sponsor has a large project portfolio of 11,682 Lane Kilometres of roads and highways in operation, under construction or under development as of September 30, 2019.

During the period, Mr. Sunil Tandon ceased to be the Director of the company w.e.f. May 28, 2019, other than this there was no change in the Board of Directors of the Sponsor.

For more details about the Sponsor, please refer website www.irb.co.in

Details of the Trustee

As per confirmation received from the Trustee, there is no change in their details except the Board of Directors. The Board of Directors of the Trustee as on September 30, 2019 is as follows:

Sr. No.	Name	Designation	DIN
1.	Mr. G. M. Yadwadkar	Chairman	01432796
2.	Ms. Sashikala Muralidharan	Director	08036523
3.	Mr. Ravishankar G. Shinde	Director	03106953
4.	Ms. Madhuri J. Kulkarni	Director	07787126
5.	Mr. Swapan Kumar Bagchi	Managing Director and CEO	07743570

Details of the Valuer

As per confirmation received from the Valuer, the details of the Valuer are as follows:

Mr. Santosh Nagalingaswamy

Unit No.303, 4th Floor,
 SKAV Lavelle 909, Lavelle Road, Bangalore,
 Karnataka - 560001

Tel: +91 80 61256100

IBBI Registration Number - IBBI/RV/05/2019/11458

g) Clauses in trust deed, investment management agreement or any other agreement entered into pertaining to activities of the Trust

During the period, there is no change in Clauses of Trust Deed, Investment Management Agreement or any other agreement entered into pertaining to activities of the Trust since listing of Units of the Trust.

h) Any regulatory changes that has impacted or may impact cash flows of the underlying projects

During the period, there are no material regulatory changes that had impacted or may impact cash flows of the underlying projects.

i) Change in material contracts or any new risk in performance of any contract pertaining to the Trust





During the period, there is no change in material contracts or any new risk in performance of any contract pertaining to the Trust.

j) Any legal proceedings which may have significant bearing on the activities or revenues or cash flows of the Trust

For details in relation to legal proceedings, please see "Brief details of material litigations and regulatory actions, which are pending, against the Trust, sponsor(s), Investment Manager, Project Manager(s), or any of their associates and the Trustee if any, as at the end of the period".

k) Any other material change during the period

The Board of Directors of Investment Manager at its meeting held on May 2, 2019 noted assignment of rights and obligations of Project Manager under Project Implementation Agreement(s) to IRB Infrastructure Developers Limited. Accordingly, the Trustee, the Investment Manager, MRM and the Sponsor have entered into assignment agreements dated May 14, 2019 with each of IDAA Infrastructure Limited, IRB Jaipur Deoli Tollway Limited, IRB Surat Dahisar Tollway Limited, IRB Talegaon Amravati Tollway Limited, IRB Tumkur Chitradurga Tollway Limited, MVR Infrastructure and Tollways Limited and IRB Pathankot Amritsar Toll Road Limited, pursuant to which all rights, interests and obligations of the MRM in the project implementation agreements have been assigned to the Sponsor and the Sponsor shall act as the Project Manager of the Trust with effect from May 16, 2019. Subject to the terms of such assignment agreements, the Sponsor shall stand substituted as a party in all the documents related to the projects of each of Project SPVs to which MRM was a party. The intimation to the National Highways Authority of India for this change in the Project Manager has been made vide a letter dated May 14, 2019. The intimation to SEBI for this change in the Project Manager has been made vide letter dated May 15, 2019.

Please note that pursuant to assignment agreements dated May 14, 2019 the Investment Manager has approved award of Operation & Maintenance work of the Project SPVs to the Project Manager (the Sponsor) for a longer duration of 10 years at a negotiated & most competitive pricing. The Investment Manager has carried out detailed evaluation based on the results of a competitive open tender process carried out for this purpose. This award of work to the Project Manager would result in improved visibility in O&M cost of the Project SPVs over next 10 years. During the period, there are no material changes except as disclosed in this Report.

8) Revenue of the Trust for the last 5 years, project-wise

Project wise revenue of the Trust is annexed herewith as "Annexure C".

9) Update on development of under-construction projects, if any

The Trust has not invested in under-construction projects.

10) Details of outstanding borrowings and deferred payments of the Trust including any credit rating(s), debt maturity profile, gearing ratios of the Trust on a consolidated and standalone basis as at the end of the period



Details of outstanding borrowings and deferred payments of the Trust including any credit rating(s), debt maturity profile, gearing ratios of the Trust on a consolidated and standalone basis as at the end of the period are annexed herewith as “Annexure G”.

11) The total operating expenses of the Trust along with detailed break-up, including all fees and charges paid to the Investment Manager and any other parties, if any during the period

The total operating expenses of the Trust along with detailed break-up, including all fees and charges paid to the Investment Manager and any other parties, if any during the period are annexed herewith as “Annexure H”.

12) Past performance of the Trust with respect to unit price, distributions made and yield for the last 5 years, as applicable

Particulars	BSE (Rs.)	NSE (Rs.)
Unit price quoted on the exchange at the beginning (Closing price of April 1, 2019)	67.60	67.30
Unit price quoted on the exchange at the end (Closing price of September 28, 2019)	73.53	74.45
highest unit price (April 16, 2019)	68.5	
highest unit price (May 2, 2019)		67.89
lowest unit price (September 26, 2019)	62.00	
lowest unit price (September 26, 2019)		61.36

During the half year ended September 30, 2019 the Investment Manager on behalf of the Trust has made distribution of Rs. 2.50/- per Unit to the Unitholders of the Trust (Rs.2.00/- per Unit in the form of Interest & Re.0.50/- in the form of Return of Capital). The Distribution was paid to Unitholders on November 2, 2019.

13) Unit price quoted on the exchange at the beginning and end of the period, the highest and lowest unit price and the average daily volume traded during the period

MONTHLY HIGHEST AND LOWEST UNIT PRICE

Month	BSE		NSE	
	High (Rs.)	Low (Rs.)	High (Rs.)	Low (Rs.)
April, 2019	69.50	65.81	67.54	66.68
May, 2019	68.50	64.00	67.89	63.85
June, 2019	66.33	63.85	66.00	64.58
July, 2019	67.00	65.22	66.60	65.40
August, 2019	66.00	64.00	66.43	63.98
September, 2019	64.99	59.11	64.59	61.36

AVERAGE DAILY VOLUME TRADED

Month	Average daily volume	
	BSE	NSE
April, 2019	44,667	2,67,368
May, 2019	17,895	2,85,000
June, 2019	45,000	4,57,105
July, 2019	28,824	2,34,565





August, 2019	28,333	4,05,250
September, 2019	80,357	2,60,526

14) Details of all related party transactions during the period, value of which exceeds five per cent of value of the Trust assets

Details of all related party transactions and related party balances are provided in financial press release annexed herewith as “Annexure A”.

15) Details of issue and buyback of units during the period, if any

During the Period, the Trust has not issued any additional Units.

16) Brief details of material and price sensitive information

During the period, the Trust, from time to time, has been providing details of material and price sensitive information to the stock exchanges in accordance with InvIT Regulations.

17) Brief details of material litigations and regulatory actions, which are pending, against the Trust, sponsor(s), Investment Manager, Project Manager(s), or any of their associates and the Trustee if any, as at the end of the period

Brief details of material litigations and regulatory actions, which are pending, against the Trust, sponsor(s), Investment Manager, Project Manager(s), or any of their associates and the Trustee if any, as at the end of the period are provided as “Annexure I”.

18) Risk factors

Risk factors are annexed herewith as “Annexure J”.

19) Information of the contact person of the Trust

Ms. Swapna Vengurlekar
 Compliance Officer
Address: IRB Complex, Chandivali Farm, Chandivali Village, Andheri (East),
 Mumbai – 400 072
Tel: +91 22 6640 4299
Fax: +91 22 6640 4274
E-mail: swapna.vengurlekar@irbfl.co.in

IRB INVIT FUND

**By Order of the Board IRB Infrastructure Private Limited
 (as the Investment Manager to IRB InvIT Fund)**

Vinod

**Vinod Kumar Menon
 Whole Time Director of the Investment Manager**



Encl.: As above

Suresh Surana & Associates LLP

Chartered Accountants

Suresh Surana & Associates LLP

City: Pune, Maharashtra

204, Newson Road

Mumbai - 400 072, India

T: +91 (0)20 2982 9778

www.sureshsurana.com

LLP (Company No. AAH-2518)

Review report on Half Yearly Consolidated Interim Financial Information

The Board of Directors
IRB Infrastructure Private Limited
(Investment Manager to IRB InvIT Fund)
IRB Complex, Chandivali Farm,
Chandivali Village,
Andheri (East),
Mumbai 400 072, India.

1. We have reviewed the accompanying statement of unaudited consolidated financial information of IRB InvIT Fund ("Fund") and its subsidiaries (together referred to as the Group), consisting of the Consolidated Statement of profit and loss, explanatory notes thereto and the additional disclosures as required in paragraph 6 of Annexure A to the SEBI Circular No. CIR/IMD/DF/127/2016 dated November 29, 2016 (SEBI Circular") for the half year ended 30 September 2019 ('Statement') attached herewith, being submitted by IRB Infrastructure Private Limited ('Investment Manager') pursuant to the requirements of Regulation 23 of the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 as amended, read with the SEBI Circular.
2. The preparation of this Statement in accordance with recognition and measurement principles laid down in Indian Accounting Standard 34, Interim Financial Reporting (Ind AS 34) read with Rule 2(1)(a) of Companies (Indian Accounting Standards) Rules, 2015 and the SEBI Circular, is the responsibility of the Investment Manager and has been approved by the Board of Directors of the Investment Manager. Our responsibility is to issue a report on the Statement based on our review.
3. We conducted our review in accordance with the Standard on Review Engagements (SRE) 2410 – "Review of Interim Financial Information Performed by the Independent Auditor of the Entity" issued by The Institute of Chartered Accountants of India. This standard requires that we plan and perform the review to obtain moderate assurance as to whether the financial statements are free of material misstatement. A review is limited primarily to inquiries of Investment Manager's personnel and analytical procedures applied to financial data and thus provide less assurance than an audit. We have not performed an audit and accordingly, we do not express an audit opinion.
4. This financial information includes the results of the following entities which are subsidiaries of the Fund:
 - i. IRB Surat Dahisar Tollway Limited (Formerly known as IRB Surat Dahisar Tollway Private Limited)
 - ii. IDAA Infrastructure Limited (Formerly known as IDAA Infrastructure Private Limited)
 - iii. IRB Talegaon Amravati Tollway Limited (Formerly known as IRB Talegaon Amravati Tollway Private Limited)
 - iv. IRB Jaipur Deoli Tollway Limited (Formerly known as IRB Jaipur Deoli Tollway Private Limited)
 - v. M.V.R. Infrastructure and Tollways Limited (Formerly known as M.V.R. Infrastructure and Tollways Private Limited)
 - vi. IRB Tumkur Chitradurga Tollway Limited (Formerly known as IRB Tumkur Chitradurga Tollway Private Limited)
 - vii. IRB Pathankot and Amritsar Toll Road Limited (Formerly known as IRB Pathankot and Amritsar Toll Road Private Limited)



5. We did not review the Interim financial results of Seven subsidiary companies included in the Interim Financial Information, whose Interim financial results reflect total revenues (before eliminating intra-group transactions) of Rs. 62,054.27 Lacs for the half year ended 30 September 2019. These interim financial results have been reviewed by other auditors and whose limited review reports have been furnished to us and our report in respect thereof is based solely on the review reports of such auditors. Our review report is not qualified in respect of this matter.
6. Based on our review conducted as above and upon consideration of review reports of other auditors, nothing has come to our attention that causes us to believe that the accompanying Statement, prepared in accordance with the recognition and measurement principles laid down in the applicable Indian Accounting Standards (Ind AS) as defined in Rule 2(1)(a) of the Companies (Indian Accounting Standards) Rules, 2015 and other recognised accounting practices and policies has not disclosed the information required to be disclosed in terms of Regulation 23 of the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 as amended, read with the SEBI Circular, including the manner in which it is to be disclosed, or that it contains any material misstatement.

For Suresh Surana & Associates LLP
Chartered Accountants
Firm's Reg. No. 121750W / W-100010



(Ramesh Gupta)
Partner

Membership No.: 102306
UDIN: 19102306AAAACE5380
Place: Mumbai
Dated: 25 October 2019



Registered Offices: IRB Complex, Chandivali
Farm, Chandivali Village, Andheri (E),
Mumbai - 400 072, Maharashtra, India.
Tel: 022 6640 4299; Fax: 022 6640 4274;
E-mail: info@irbinvit.co.in; Website: www.irbinvit.co.in
SEBI Registration Number: IN/InvIT/15-16/0001;

IRB

IRB InvIT Fund

(An irrevocable trust set up under the Indian Trusts Act, 1882, and registered as an infrastructure investment trust with the Securities and Exchange Board of India)

(Rs. in lakhs, unless otherwise stated)

Part I					
Unaudited Consolidated Interim Financial Information for the half year ended September 30, 2019					
Sr. No.	Particulars	Six month ended September 30, 2019 (Unaudited)	Six month ended September 30, 2018 (Unaudited)	Six month ended March 31, 2019 (Audited - Refer Note 3)	Year ended March 31, 2019 (Audited)
I.	Incomes and gains				
	Revenue from operations	60,892.28	58,610.28	62,674.78	121,285.06
	Interest	256	205.38	182.34	387.72
	Profit on sale of investments/assets	326.87	656	692.71	1,348.71
	Other income *	951.85	222.13	96.97	319.1
	Total Income and gains	62,427.00	59,693.79	63,646.80	123,340.59
II.	Expenses and losses				
	Operation expenses	3,521.38	1,080.72	1,771.25	2,851.97
	Valuation expenses	16.18	17.09	23.65	40.74
	Annual listing fees	30.41	60.81	-	60.81
	Trustee fees	14.75	14.79	14.71	29.5
	Audit fees	26.42	37.75	45.84	83.59
	Insurance & security expenses	608.86	563.39	667.65	1,231.04
	Employee benefits expenses	1,378.15	1,243.73	1,280.51	2,524.24
	Investment management fees (Refer note b below)	602.07	607.85	638.94	1,246.79
	Project management fees**(Refer note c below)	5,800.05	6,968.50	6,968.50	13,937.00
	Depreciation on property, plant and equipment	1.40	1.98	2.05	4.03
	Amortisation of intangible assets	33,772.76	31,780.64	32,269.62	64,050.26
	Finance costs (Interest)	7,867.70	7,572.43	7,802.80	15,375.23
	Finance costs (Others)	571.49	246.51	286.95	533.46
	Repairs and maintenance	149.15	99.11	297.32	396.43
	Legal and professional fees	56.23	90.58	230.48	230.76
	Other expenses ***	585.23	430.74	296.43	817.47
	Total Expenses and losses	55,002.22	50,816.62	52,596.70	103,413.32
III.	Profit for the period before income tax (I) - (II)	7,424.78	8,877.17	11,050.10	19,927.27



IV.	Tax expenses (current tax and deferred tax) / reversal	100.90	80.13	70.64	150.77
V.	Profit for the period after income tax (III) - (IV)	7,323.88	8,797.04	10,979.46	19,776.50
VI.	Items of Other Comprehensive Income	-	-	(32.81)	(32.81)
VII.	Total Comprehensive Income (V) + (VI)	7,323.88	8,797.04	10,946.65	19,743.69

* Other income includes fair value gain and other non-operating income.

** Project management fees do not include major maintenance of Rs. 6,474.43 lakhs incurred during the six month ended September 2019 and for which the provision for major maintenance was made in earlier years.

*** Other expenses include printing and stationery, rent, rates and taxes and other miscellaneous expenses.

Notes to consolidated results:

- Investors can view the results of the IRB InvIT Fund ('Fund' or 'Trust') on the Trust's website (www.irbinvit.in) or on the websites of BSE (www.bseindia.com) or NSE (www.nseindia.com).
- The unaudited Consolidated Interim Financial Information comprises of the Consolidated Statement of profit and loss, explanatory notes thereto and additional disclosures as required in paragraph 6 of Annexure A to the SEBI Circular no. CIR/IMD/DF/127/2016 dated November 29, 2016 ('SEBI Circular') of IRB InvIT Fund ('Fund') for the half year ended September 30, 2019 ('Consolidated Financial Information'). The Consolidated Interim Financial Information has been prepared in accordance with recognition and measurement principles prescribed under Indian Accounting Standard -34, Interim Financial Reporting (Ind AS 34) read with Rule 2(1)(a) of Companies (Indian Accounting Standards) Rules, 2015 ('Ind AS') and the SEBI Circular.
- (i) Figures for the half year ended March 31, 2019 as reported in this Financial Information are the balancing figures between audited figures in respect of the financial year March, 2019 and the published year to date figures upto September 30, 2018.

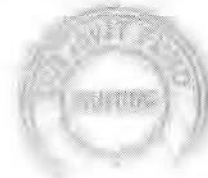
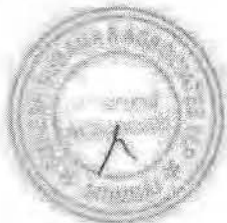
(ii) The Consolidated Financial Information for the half year ended March 31, 2019 and year ended March 31, 2019 have been prepared on the basis of the Consolidated Financial Information for the half year ended September 30, 2018, the audited annual Consolidated financial statements as at and for the year ended March 31, 2019, and the relevant requirements of the SEBI (Infrastructure Investment Trusts) Regulations, 2014, as amended from time to time read with SEBI Circular.
- The unaudited Consolidated Financial Information for the half year ended September 30, 2019 have been reviewed by the Audit Committee of the Investment Manager at their meeting held on October 25, 2019 and thereafter approved by the Board of Directors of the Investment Manager at their meeting held on October 25, 2019.
- The Board of Directors of the Investment Manager have declared 2nd Distribution of Rs. 2.50 per unit which comprises of Rs. 2.00 per unit as interest and Re. 0.50 per unit as return of capital in their meeting held on October 25, 2019.

Total distribution made by the Fund is Rs. 5.50 per unit (including 1st Distribution of Rs. 3.00 per unit) for the half year ended September, 2019.
- IRB InvIT Fund was registered as an irrevocable trust under the Indian Trusts Act, 1882 on October 16, 2015 and as an infrastructure investment trust under the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 on March 14, 2016. Units of IRB InvIT Fund have been listed on both the stock exchanges on May 18, 2017.
- The statutory Auditors of the Fund have carried out Limited Review of the above Consolidated Interim Financial Information.



Additional Disclosures as required by Paragraph 6 to SEBI Circular No. CIR/IMD/DF/127/2016:**a. Net Distributable Cash Flows for the half year ended September 30, 2019****(i) IRB InvIT Fund (Fund)****(Rs. in lakhs)**

Sr. No.	Particulars	Six month ended September 30, 2019	Six month ended September 30, 2018	Six month ended March 31, 2019	Year ended March 31, 2019
1	Cash flows received from Project SPVs in the form of Interest	29,981.19	31,367.83	30,358.12	61,725.95
2	Cash flows received from Project SPVs in the form of Dividend	-	-	-	-
3	Any other income accruing at the Trust level and not captured above, including but not limited to interest / return on surplus cash invested by the Trust	372.73	607.35	509.79	1,117.14
4	Cash flows received from the project SPVs towards the repayment (Net) of the debt issued to the Project SPVs by the Trust	11,642.95	13,670.74	17,438.78	31,109.52
5	Total cash inflow at the Trust level (A)	41,996.87	45,645.92	48,306.69	93,952.61
	Less:				
6	Any payment of fees, interest and expense incurred at the Trust level, including but not limited to the fees of the Investment Manager	(7,101.99)	(7,075.56)	(7,177.43)	(14,252.99)
7	Income tax (if applicable) at the Standalone Trust Level	-	-	-	-
8	Repayment of external debt	(2,314.46)	(1,749.50)	(1,562.19)	(3,311.69)
9	Total cash outflows / retention at the Trust level (B)	(9,416.45)	(8,825.06)	(8,739.62)	(17,564.68)
10	Net Distributable Cash Flows (C) = (A+B)	32,580.42	36,820.86	39,567.07	76,387.93



(ii) IDAA Infrastructure Limited (IDAATL)

(Rs. in lakhs)

Sr. No.	Description	Six months ended September 30, 2019	Six months ended September 30, 2018	Six Months ended March 31, 2019	Year ended March 31, 2019
1	Profit after tax as per Statement of profit and loss / income and expenditure (A)	(2,235.53)	(1,672.86)	(495.87)	(2,168.73)
2	Add: Depreciation and amortisation as per Statement of profit and loss/income and expenditure	8,991.65	7,760.30	7,906.97	15,667.27
3	Add/less: Any other item of non-cash expense / non cash income (net of actual cash flows for these items), if deemed necessary by the Investment Manager	-	-	-	-
4	Add: Interest paid to the Fund	2,013.47	2,742.21	2,439.84	5,182.05
5	Add :- Provision for Resurfacing Expenses	(95.44)	383.19	196.10	579.29
6	Add: Non-cash expenses	-	-	-	-
7	Less :- NHAI Premium	-	-	-	-
8	Less :- Principal repayment	-	-	-	-
9	Total Adjustments (B)	10,909.68	10,885.70	10,542.91	21,428.61
10	Net Distributable Cash Flows (C) = (A+B)	8,674.15	9,212.84	10,047.04	19,259.88

(iii) IRB Surat Dahisar Tollway Limited (ISDTL)

(Rs. in lakhs)

Sr. No.	Description	Six months ended September 30, 2019	Six months ended September 30, 2018	Six Months ended March 31, 2019	Year ended March 31, 2019
1	Profit after tax as per Statement of profit and loss/income and expenditure (A)	(947.27)	(2,550.18)	(772.96)	(3,323.14)
2	Add: Depreciation and amortisation as per Statement of profit and loss/income and expenditure	13,815.48	13,196.82	13,150.00	26,346.82
3	Add/less: Any other item of non-cash expense / non cash income (net of actual cash flows for these items), if deemed necessary by the Investment Manager	-	-	-	-
4	Add: Interest paid to the Fund	2,705.59	3,942.11	3,360.09	7,302.20
5	Add :- Provision for Resurfacing Expenses	(1,114.28)	(1,240.50)	(1,240.50)	(2,481.00)
6	Add: Non-cash expenses	-	-	-	-
7	Less :- NHAI Premium	-	-	-	-
8	Less :- Principal repayment	-	-	-	-
9	Total Adjustments (B)	15,406.79	15,898.43	15,269.59	31,168.02
10	Net Distributable Cash Flows (C) = (A+B)	14,459.52	13,348.25	14,496.63	27,844.88



(iv) IRB Talegaon Amravati Tollway Limited (ITATL)

(Rs. in lakhs)

Sr. No.	Description	Six months ended September 30, 2019	Six months ended September 30, 2018	Six Months ended March 31, 2019	Year ended March 31, 2019
1	Profit after tax as per Statement of profit and loss/income and expenditure (A)	(1,134.34)	(969.04)	(718.41)	(4,687.15)
2	Add: Depreciation and amortisation as per Statement of profit and loss/income and expenditure	548.26	484.37	478.18	962.55
3	Add/less: Any other item of non-cash expense / non cash income (net of actual cash flows for these items), if deemed necessary by the Investment Manager	-	-	-	-
4	Add: Interest paid to the Fund	3,013.74	3,002.06	2,985.65	5,987.71
5	Add: Provision for Resurfacing Expenses	176.13	158.00	158.00	316.00
6	Add: Non-cash expenses	-	-	-	-
7	Less: NHAI Premium	-	-	-	-
8	Less: Principal repayment	-	-	-	-
9	Total Adjustments (B)	3,738.13	3,644.43	3,621.83	7,266.26
10	Net Distributable Cash Flows (C) = (A+B)	2,603.79	2,675.39	2,903.42	5,578.81

(v) M.V.R Infrastructure and Tollways Limited (MITL)

(Rs. in lakhs)

Sr. No.	Description	Six months ended September 30, 2019	Six months ended September 30, 2018	Six Months ended March 31, 2019	Year ended March 31, 2019
1	Profit after tax as per Statement of profit and loss/income and expenditure (A)	476.57	14.46	259.57	274.03
2	Add: Depreciation and amortisation as per Statement of profit and loss/income and expenditure	1,202.86	1,032.89	1,036.52	2,063.41
3	Add/less: Any other item of non-cash expense / non cash income (net of actual cash flows for these items), if deemed necessary by the Investment Manager	-	-	-	-
4	Add :- Interest paid to the Fund	1,747.43	1,674.08	1,616.14	3,290.22
5	Add :- Provision for Resurfacing Expenses	(535.07)	(213.50)	(213.50)	(427.00)
6	Add: Non-cash expenses	-	-	-	-
7	Less :- NHAI Premium	-	-	-	-
8	Less :- Principal repayment	-	-	-	-
9	Total Adjustments (B)	2,415.22	2,493.47	2,433.16	4,926.63
10	Net Distributable Cash Flows (C) = (A+B)	2,891.79	2,507.93	2,692.73	5,200.66



(vi) **IRB Jaipur Deoli Tollway Limited (IJDTL)**

(Rs. in lakhs)

Sr. No.	Description	Six months ended September 30, 2019	Six months ended September 30, 2018	Six Months ended March 31, 2019	Year ended March 31, 2019
1	Profit after tax as per Statement of profit and loss/income and expenditure (A)	(4,727.48)	(3,386.25)	(3,372.46)	(6,758.71)
2	Add: Depreciation and amortisation as per Statement of profit and loss/income and expenditure	1,184.67	1,039.75	1,244.74	2,284.49
3	Add/less: Any other item of non-cash expense / non cash income (net of actual cash flows for these items), if deemed necessary by the Investment Manager	-	-	-	-
4	Add: Interest paid to the Fund	6,373.37	6,242.07	6,207.96	12,450.03
5	Add :- Provision for Resurfacing Expenses	(160.07)	404.28	191.36	595.64
6	Add: Non-cash expenses	-	-	-	-
7	Less :- NHAI Premium	-	-	-	-
8	Less :- Principal repayment	-	-	-	-
9	Total Adjustments (B)	7,397.97	7,686.10	7,644.06	15,330.16
10	Net Distributable Cash Flows (C) = (A+B)	2,670.49	4,299.85	4,271.60	8,571.45

(vii) **IRB Pathankot Amritsar Toll Road Limited (IPATRL)**

(Rs. in lakhs)

Sr. No.	Description	Six months ended September 30, 2019	Six months ended September 30, 2018	Six Months ended March 31, 2019	Year ended March 31, 2019
1	Profit after tax as per Statement of profit and loss/income and expenditure (A)	(4,361.12)	(5,090.84)	(4,928.11)	(10,018.95)
2	Add: Depreciation and amortisation as per Statement of profit and loss/income and expenditure	1,569.08	2,537.95	2,470.35	5,008.30
3	Add/less: Any other item of non-cash expense / non cash income (net of actual cash flows for these items), if deemed necessary by the Investment Manager	-	-	-	-
4	Add: Interest paid to the Fund	7,144.74	7,102.57	7,055.58	14,158.15
5	Add :- Provision for Resurfacing Expenses	(365.66)	497.68	494.96	992.64
6	Add: Non-cash expenses	-	-	-	-
7	Less :- NHAI Premium	-	-	-	-
8	Less :- Principal repayment	-	-	-	-
9	Total Adjustments (B)	8,348.16	10,138.20	10,020.89	20,159.09
10	Net Distributable Cash Flows (C) = (A+B)	3,987.04	5,047.36	5,092.78	10,140.14



(viii) IRB Tumkur Chitradurga Tollway Limited (ITCTL)

(Rs. in lakhs)

Sr. No.	Description	Six months ended September 30, 2019	Six months ended September 30, 2018	Six Months ended March 31, 2019	Year ended March 31, 2019
1	Profit after tax as per Statement of profit and loss/income and expenditure (A)	(3,450.62)	(2,579.50)	(2,835.03)	(5,414.53)
2	Add: Depreciation and amortisation as per Statement of profit and loss/income and expenditure	6,902.56	6,066.00	6,325.84	12,391.84
3	Add/less: Any other item of non-cash expense / non cash income (net of actual cash flows for these items), if deemed necessary by the Investment Manager	-	-	-	-
4	Add: Interest paid to the Fund	6,994.26	6,672.83	6,703.58	13,376.41
5	Add :- Provision for Resurfacing Expenses	(1,886.71)	480.96	186.02	666.98
6	Add: Non-cash expenses	1,509.22	-	-	-
7	Less :- NHAI Premium	(9,554.92)	(7,026.25)	(6,912.00)	(13,938.25)
8	Less :- Principal repayment	-	-	-	-
9	Total Adjustments (B)	3,964.41	6,193.54	6,303.44	12,496.98
10	Net Distributable Cash Flows (C) = (A+B)	513.79	3,614.04	3,468.41	7,082.45

- b. Pursuant to the Investment Management Agreement, the Investment Manager is entitled to an Investment Management fees to be calculated @ 1% per annum, exclusive of Service Tax / GST, of the consolidated toll revenue (net of premium paid / revenue shared with NHAI) of the Fund at the end of the reporting period subject to a floor of Rs. 100 million and a cap of Rs. 250 million.
- c. In accordance with the Project Implementation Agreements, the fees and remuneration payable by the Project SPVs to the Project Manager has been worked out and agreed upon for the duration of current financial year, between the Project Manager, Investment Manager and the respective Project SPV, on an arm's length basis, after taking into account the extent of work to be done in respect of maintenance and other services to be provided by the Project Manager to such Project SPV.

d. Statement of Earnings per unit

(Rs. in lakhs except for unit data)

Particulars	Six Months ended September 30, 2019	Six Months ended March 31, 2019	Six Months ended September 30, 2018	Year ended March 31, 2019
Profit for the period	7,323.88	10,979.46	8,797.04	19,776.50
Number of units outstanding for computation of basic and diluted earnings per unit	580,500,000	580,500,000	580,500,000	580,500,000
Earnings per unit (basic and diluted)	1.26	1.89	1.52	3.41



e. Statement of contingent liabilities and commitments**Contingent liabilities**

Contingent liabilities not provided for

(Rs. in lakhs).

Particulars	As at September 30, 2019	As at September 30, 2018	As at March 31, 2019
NHAI claim for shortfall in Revenue share	3,289.08	3,289.08	3,289.08
	3,289.08	3,289.08	3,289.08

Commitments

(Rs. in lakhs).

Particulars	As at September 30, 2019	As at September 30, 2018	As at March 31, 2019
Estimated value of contracts in capital account remaining to be executed	-	-	-
Commitment for acquisition of toll equipment & machineries	-	-	-
Other commitments	-	32.98	-
	-	32.98	-

f. Statement of Related party transactions**I. List of Related Parties**

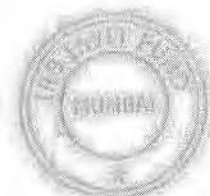
i. Parties to the Fund	IRB Infrastructure Developers Limited (IRBIDL) (Sponsor)
	IRB Infrastructure Private Limited (IRBFL) (Investment Manager)
	Modern Road Makers Private Limited (MRMPL) (Project Manager) (Up till 15 th May 2019)
	IRB Infrastructure Developers Limited (IRBIDL) (Project Manager) (w.e.f. 16 th May 2019)
	IDBI Trusteeship Services Limited (ITSL) (Trustee)



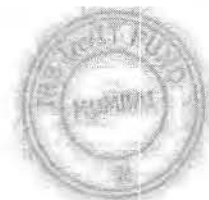
ii. Promoters/ Directors of the parties to the Fund specified in (i) above

Particulars	IRB Infrastructure Developers Limited (Sponsor & Project manager)	IRB Infrastructure Private Limited (Investment manager)	Modern Road Makers Private Limited (Project manager)	IDBI Trusteeship Services Limited (Trustee of the IRB InvIT Fund)
Promoters	Mr. Virendra D. Mhaikar Mrs. Deepali V. Mhaikar	IRB Infrastructure Developers Limited	IRB Infrastructure Developers Limited	IDBI Bank Limited
	Virendra D. Mhaikar HUF			Life Insurance Corporation of India General Insurance Corporation of India
Directors	Mr. Virendra D. Mhaikar Mrs. Deepali V. Mhaikar Mr. Mukeshlal Gupta Mr. Sudhir Rao Hoshing Mr. Chandrashekhar S. Kaptan Mr. Sunil H. Talati Mr. Sandeep J. Shah Mrs. Heena Raja (w.e.f. 30.03.2019)	Mr. Vinodkumar Menon Mr. Rajinder Pal Singh Mr. Bajrang Lal Gupta Mr. Sumit Banerjee	Mr. Mukeshlal Gupta Mr. Dhananjay K. Joshi Mr. Ajay P. Deshmukh Mr. Rajpaul S. Sharma Mr. Chandrashekhar S. Kaptan Mrs. Heena Raja	Mr. Gurudeo M. Yadwadkar Mr. Ravishankar G. Shiinde Ms. Madhuri J. Kulkarni Mr. Swapan Kumar Bagchi Ms. Sashikala Muralidharan Mr. Saurabh Chandra (upto 21.05.2019)

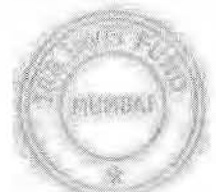
iii. Directors of Subsidiaries	Mr. Vinodkumar Menon
	Mr. Tushar Kawedia
	Mr. Urmil Shah (resigned on 26.06.2019)
	Mr. Bajrang Lal Gupta
	Mr. Sumit Banerjee
	Mr. Jitendra Sharma
	Mrs. Heena Raja (w.e.f.30.03.2019)



II. Transactions with related parties during the period						
(Rs in lakhs)						
Sr. No.	Particulars	Relation	Six Months ended September 30, 2019	Six Months ended September 30, 2018	Six Months ended March 31, 2019	Year ended March 31, 2019
1	Project Manager Fees		12,274.48	6,968.50	6,968.50	13,937.00
	MRMPL	Project Manager	3,874.25	6,968.50	6,968.50	13,937.00
	IRBIDL	Project Manager	8,400.23	-	-	-
2	Investment Management fees paid (including indirect taxes)		602.07	607.85	638.94	1,246.79
	IRBFL	Investment Manager	602.07	607.85	638.94	1,246.79
3	Secured advance Given		14,349.10	-	-	-
	IRBIDL	Project Manager	14,349.10	-	-	-
4	Secured advance recovered		11,734.39	-	-	-
	IRBIDL	Project Manager	11,734.39	-	-	-
5	Interest Income		195.03	-	-	-
	IRBIDL	Project Manager	195.03	-	-	-
6	Performance security repaid		2,950.00	-	-	-
	MRMPL	Project Manager	2,950.00	-	-	-
7	Director sitting fees	Director	18.18	14.72	12.74	27.46
	Mr. Vinodkumar Menon		3.01	2.60	1.86	4.46
	Mr. Tushar Kawedia		1.56	1.16	0.94	2.10
	Mr. Urmil Shah		0.93	1.16	0.94	2.10
	Mr. Sumit Banarjee		5.64	3.40	3.30	6.70
	Mrs. Heena Raja		5.54	3.90	4.10	8.00
	Mr. Jitendra Sharma		0.80	1.00	0.40	1.40
	Mr. Bajrang Lal Gupta		0.70	1.50	1.20	2.70
8	Trusteeship Fees		14.75	29.50	-	29.50
	ITSL	Trustee	14.75	29.50	-	29.50



9	Contract expenses		-	44.90	23.72	68.62
	MRMPL	Project Manager	-	44.90	23.72	68.62
10	Distribution in the form of interest		4,469.63	4,140.62	4,675.77	8,816.39
	IRBIDL	Sponsor and Project Manager	3,893.61	4,125.37	4,079.02	8,204.39
	Mr. Virendra D. Mhaikar	Director of Sponsor	491.40	5.56	514.80	520.36
	Mrs. Deepali V. Mhaikar	Director of Sponsor	65.10	5.46	63.80	69.26
	Mr. Sudhir Rao Hoshing	Director of Sponsor	4.20	3.34	4.40	7.74
	Mr. Mukeshlal Gupta	Director of Sponsor & Project Manager	5.88	-	4.29	4.29
	Mr. Vinodkumar Menon	Director of Investment Manager	1.26	-	1.32	1.32
	Mr. B.L.Gupta	Director of Investment Manager	0.21	0.22	0.22	0.44
	Mr. Sumit Banerjee	Director of Project Manager	1.46	0.67	1.10	1.77
	Mr. Dhananjay K. Joshi	Director of Project Manager	0.63	-	0.66	0.66
	Mr. Ajay P. Deshmukh	Director of Project Manager	5.46	-	5.72	5.72
	Mr. Rajpaul S. Sharma	Director of Project Manager	0.42	-	0.44	0.44
11	Distribution in the form of return of capital		2,022.00	1,488.76	1,806.71	3,295.47
	IRBIDL	Sponsor and Project Manager	1,761.40	1,483.28	1,575.99	3,059.27
	Mr. Virendra D. Mhaikar	Director of Sponsor	222.30	2.00	198.90	200.90
	Mrs. Deepali V. Mhaikar	Director of Sponsor	29.45	1.96	24.75	26.71
	Mr. Sudhir Rao Hoshing	Director of Sponsor	1.90	1.20	1.70	2.90
	Mr. Mukeshlal Gupta	Director of Sponsor	2.66	-	1.70	1.70
	Mr. Vinodkumar Menon	Director of Investment Manager	0.57	-	0.51	0.51
	Mr. B.L.Gupta	Director of Investment Manager	0.10	-	0.09	0.17
	Mr. Sumit Banerjee	Director of Investment Manager	0.67	-	0.43	0.67



	Mr. Dhunanjay K. Joshi	Director of Project Manager	0.29		0.26	0.26
	Mr. Ajay P. Deshmukh	Director of Project Manager	2.47		2.21	2.21
	Mr. Rajpaul S. Sharma	Director of Project Manager	0.19		0.17	0.17

III. Related party outstanding balances

(Rs in lakhs)

Sr. No.	Particulars	Relation	As on September 30, 2019	As on March 31, 2019	As on September 30, 2018
1	Trade Payables		519.05	9,291.09	132.15
	MRMPL	Project Manager	-	8,999.60	104.99
	IRBFL	Investment Manager	519.05	291.49	27.16
2	Secured Advance		2,614.70	-	-
	IRBIDL	Project Manager	2,614.70	-	-
3	Performance security		-	2,950.00	-
	MRMPL	Project Manager	-	2,950.00	-
4	Other Receivable		1,072.58	-	-
	IRBIDL	Project Manager	1,072.58	-	-
5	Director sitting fees payable		1.49	-	0.52
	Mr. Vinodkumar Menon	Director	0.27	-	0.08
	Mr. Tushar Kawedia		0.14	-	0.05
	Mr. Dmil Shah		-	-	0.05
	Mr. Sumit Banerjee		-	-	0.12
	Mrs. Heena Raja		0.54	-	0.13
	Mr. Jitendra Sharma		-	-	0.04
	Mr. Bajaranglal Gupta		0.54	-	0.05
6	Retention money/ Security Deposit		-	759.23	370.52
	MRMPL	Project Manager	-	759.23	370.52



IRB

IRB InvIT Fund

(An irrevocable trust set up under the Indian Trusts Act, 1882, and registered as an infrastructure investment trust with the Securities and Exchange Board of India)

The fund has not acquired any asset from related party during the six month period ended September 30, 2019 as well as in previous financial year ended March 31, 2019.

**For IRB Infrastructure Private Limited
(Investment Manager to IRB InvIT Fund)**



Vinodkumar Menon
Whole time Director

Place: Mumbai
Date: October 25, 2019



Suresh Surana & Associates LLP

13th Floor, Elnet Tower

225, Andheri Road

Mumbai - 400 021, India

Tel: 022-261275770

email: suresh@saal.com www.saal.com

LLP Registration No. AAST-7500

Review report on Half Yearly Standalone Interim Financial Information

The Board of Directors
IRB Infrastructure Private Limited
(Investment Manager to IRB InvIT Fund)
IRB Complex, Chandivali Farm,
Chandivali Village,
Andheri (East),
Mumbai 400 072, India.

1. We have reviewed the accompanying statement of unaudited standalone financial information of IRB InvIT Fund ("Fund"), consisting of the Statement of profit and loss, explanatory notes thereto and the additional disclosures as required in paragraph 6 of Annexure A to the SEBI Circular No. CIR/IMD/DF/127/2016 dated November 29, 2016 (SEBI Circular) for the half year ended 30 September 2019 ("Statement") attached herewith, being submitted by IRB Infrastructure Private Limited ("Investment Manager") pursuant to the requirements of Regulation 23 of the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 as amended, read with the SEBI Circular.
2. The preparation of this Statement in accordance with recognition and measurement principles laid down in Indian Accounting Standard 34, Interim Financial Reporting (Ind AS 34) read with Rule 2(1)(a) of Companies (Indian Accounting Standards) Rules, 2015 and the SEBI Circular, is the responsibility of the Investment Manager and has been approved by the Board of Directors of the Investment Manager. Our responsibility is to issue a report on the Statement based on our review.
3. We conducted our review in accordance with the Standard on Review Engagements (SRE) 2410 – "Review of Interim Financial Information Performed by the Independent Auditor of the Entity" issued by The Institute of Chartered Accountants of India. This standard requires that we plan and perform the review to obtain moderate assurance as to whether the financial statements are free of material misstatement. A review is limited primarily to inquiries of Investment Manager's personnel and analytical procedures applied to financial data and thus provide less assurance than an audit. We have not performed an audit and accordingly, we do not express an audit opinion.
4. Based on our review conducted as above, nothing has come to our attention that causes us to believe that the accompanying Statement, prepared in accordance with the recognition and measurement principles laid down in the applicable Indian Accounting Standards (Ind AS) as defined in Rule 2(1)(a) of the Companies (Indian Accounting Standards) Rules, 2015 and other recognised accounting practices and policies has not disclosed the information required to be disclosed in terms of Regulation 23 of the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 as amended, read with the SEBI Circular, including the manner in which it is to be disclosed, or that it contains any material misstatement.

For Suresh Surana & Associates LLP
Chartered Accountants
Firm's Reg. No. 121750W/W-100010

(Ramesh Gupta)
Partner

Membership No.: 102306
UDIN: 19102306AAAACD1142
Place: Mumbai
Dated: 25 October 2019



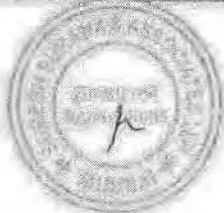
(Rs. in lakhs, except per unit data)

Part I					
Unaudited Standalone Interim Financial Information for the half year ended September 30, 2019					
Sr. No.	Particulars	Six month ended September 30, 2019 (Unaudited)	Six month ended September 30, 2018 (Unaudited)	Six month ended March 31, 2019 (Audited - Refer note 3)	Year ended March 31, 2019 (Audited)
I	Incomes and gains				
	Interest on loan	29,981.19	31,367.83	30,358.12	61,725.95
	Profit on sale of investments	220.06	408.88	353.00	761.88
	Interest on bank deposits	50.33	127.38	174.96	302.34
	Other income (fair value gain)	102.34	71.09	(18.17)	52.92
	Total income and gains	30,353.92	31,975.18	30,867.91	62,843.09
II	Expenditure				
	Valuation expenses	16.18	17.09	23.65	40.74
	Annual listing fee	30.41	60.81	-	60.81
	Audit fees	6.79	6.84	5.85	12.69
	Investment management fees (refer note b below)	602.07	607.85	638.94	1,246.79
	Trustee fees	14.75	14.79	14.71	29.50
	Finance cost (interest)	6,403.15	6,340.69	6,435.05	12,775.74
	Legal and professional expenses	11.89	8.23	58.96	67.19
	Other expenses*	16.75	19.26	0.27	19.53
	Total Expenses	7,101.99	7,075.56	7,177.43	14,252.99
III	Profit from ordinary activities before tax (I) - (II)	23,251.93	24,899.62	23,690.48	48,590.10
IV	Tax expense (current tax and deferred tax) / reversal	-	-	-	-
V	Profit for the period after income tax (III) - (IV)	23,251.93	24,899.62	23,690.48	48,590.10
VI	Items of Other Comprehensive Income	-	-	-	-
VII	Total Comprehensive Income (after tax) (V) + (VI)	23,251.93	24,899.62	23,690.48	48,590.10

*Other expenses include bank charges, rates & taxes, communication cost, printing & stationary and other miscellaneous expenses.

Notes:

- Investors can view the Financial Information of the IRB InvIT Fund ('Fund' or 'Trust') on the Trust's website (www.irbinvt.co.in) or on the websites of BSE (www.bseindia.com) or NSE (www.nseindia.com).



2. The unaudited Standalone Financial Information comprises of the Standalone Statement of profit and loss, explanatory notes thereto and additional disclosures as required in paragraph 6 of Annexure A to the SEBI Circular no. CIR/IMD/DF/127/2016 dated November 29, 2016 ('SEBI Circular') of IRB InvIT Fund ('Fund') for the half year ended September 30, 2019 ('Standalone Financial Information'). The Standalone Interim Financial Information has been prepared in accordance with recognition and measurement principles prescribed under Indian Accounting Standard -34, Interim Financial Reporting (Ind AS 34) read with Rule 2(1)(a) of Companies (Indian Accounting Standards) Rules, 2015('Ind AS') and the SEBI Circular.
3. (i) Figures for the half year ended March 31, 2019 as reported in this Financial Information are the balancing figures between audited figures in respect of the financial year March, 2019 and the published year to date figures upto September 30, 2018.
(ii) The Standalone Financial Information for the half year ended March 31, 2019 and year ended March 31, 2019 have been prepared on the basis of the Standalone Financial Information for the half year ended September 30, 2018, the audited annual Standalone financial statements as at and for the year ended March 31, 2019, and the relevant requirements of the SEBI (Infrastructure Investment Trusts) Regulations, 2014, as amended from time to time read with SEBI Circular.
4. The unaudited Standalone Financial Information for the half year ended September 30, 2019 have been reviewed by the Audit Committee of the Investment Manager at their meeting held on October 25, 2019 and thereafter approved by the Board of Directors of the Investment Manager at their meeting held on October 25, 2019.
5. The Board of Directors of the Investment Manager have declared 2nd Distribution of Rs. 2.50 per unit which comprises of Rs. 2.00 per unit as interest and Re.0.50 per unit as return of capital in their meeting held on October 25, 2019.

Total distribution made by the Fund is Rs. 5.50 per unit (including 1st Distribution of Rs. 3.00 per unit) for the half year ended September, 2019.
6. IRB InvIT Fund was registered as an irrevocable trust under the Indian Trusts Act, 1882 on October 16, 2015 and as an infrastructure investment trust under the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014 on March 14, 2016. Units of IRB InvIT Fund have been listed on both the stock exchanges on May 18, 2017.
7. The statutory Auditors of the Fund have carried out Limited Review of the above Financial Information.

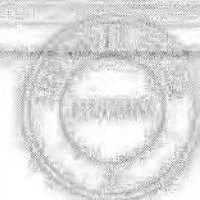
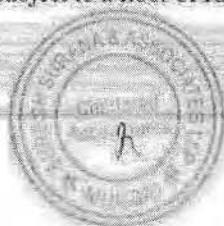


Additional Disclosures as required by Paragraph 6 of Annexure A to SEBI Circular No. CIR/IMD/DF/127/2016:
a) Net Distributable Cash Flows as at the Standalone Trust level

(Rs. in lakhs)

Sr. No.	Particulars	Six month ended September 30, 2019	Six month ended September 30, 2018	Six month ended March 31, 2019	Year ended March 31, 2019
1	Cash flows received from Project SPVs in the form of Interest	29,981.19	31,367.83	30,358.12	61,725.95
2	Cash flows received from Project SPVs in the form of Dividend	-	-	-	-
3	Any other income accruing at the Trust level and not captured above, including but not limited to interest/return on surplus cash invested by the Trust	372.73	607.35	509.79	1,117.14
4	Cash flows received from the project SPVs towards the repayment of the debt issued to the Project SPVs by the Trust	11,642.95	13,670.74	17,438.78	31,109.52
5	Total cash inflow at the Trust level (A)	41,996.87	45,645.92	48,306.69	93,952.61
	Less:				
6	Any payment of fees, interest and expense incurred at the Trust level, including but not limited to the fees of the Investment Manager	(7,101.99)	(7,075.56)	(7,177.43)	(14,252.99)
7	Income tax (if applicable) at the Standalone Trust Level	-	-	-	-
8	Repayment of external debt	(2,314.46)	(1,749.50)	(1,562.19)	(3,311.69)
9	Total cash outflows / retention at the Trust level (B)	(9,416.45)	(8,825.06)	(8,739.62)	(17,564.68)
10	Net Distributable Cash Flows (C) = (A+B)	32,580.42	36,820.86	39,567.07	76,387.93

- b) Pursuant to the Investment Management Agreement, the Investment Manager is entitled to an Investment Management fees to be calculated @ 1% per annum, exclusive of Service Tax / GST, of the consolidated toll revenue (net of premium paid / revenue shared with NHAI) of the Fund at the end of the each quarter subject to a floor of Rs. 100 million and a cap of Rs. 250 million.



c) Statement of earnings per unit
(Rs. in lakhs, except for unit data)

Particulars	Six month ended September 30, 2019	Six month ended September 30, 2018	Six month ended March 31, 2019	Year ended March 31, 2019
Profit for the period	23,251.93	24,899.62	23,690.48	48,590.10
Number of units outstanding for computation of basic and diluted earnings per unit	58,05,00,000	58,05,00,000	58,05,00,000	58,05,00,000
Earnings per unit in Rs. (basic and diluted)	4.01	4.29	4.08	8.37

d) Statement of contingent liabilities and commitments
(Rs. in lakhs)

Particulars	As at September 30, 2019	As at September 30, 2018	As at March 31, 2019
Contingent liabilities	Nil	Nil	Nil
Commitments	Nil	Nil	Nil

e) Statement of Related party transactions
I. List of Related Parties

I. Subsidiaries/ SPVs	IDAA Infrastructure Limited (IDAAIL) (Formerly known as IDAA Infrastructure Private Limited) IRB Jaipur Deoli Tollway Limited (JDTL) (Formerly known as IRB Jaipur Deoli Tollway Private Limited) IRB Pathankot Amritsar Toll Road Limited (IPATRL) (Formerly known as IRB Pathankot Amritsar Toll Road Private Limited) IRB Surat Dahisar Tollway Limited (ISDTL) (Formerly known as IRB Surat Dahisar Tollway Private Limited) IRB Talegaon Amravati Tollway Limited (ITATL) (Formerly known as IRB Talegaon Amravati Tollway Private Limited) IRB Tumkur Chitradurga Tollway Limited (ITCTL) (Formerly known as IRB Tumkur Chitradurga Tollway Private Limited) M.V.R. Infrastructure & Tollways Limited (MITL) (Formerly known as M.V.R. Infrastructure & Tollways Private Limited)
------------------------------	--



ii. Parties to the Fund	IRB Infrastructure Developers Limited (IRBIDL) (Sponsor)
	IRB Infrastructure Private Limited (IRBFL) (Investment Manager)
	Modern Road Makers Private Limited (MRMPL) (Project Manager) (Up till 15 th May 2019)
	IRB Infrastructure Developers Limited (IRBIDL) (Project Manager) (w.e.f. 16 th May 2019)
	IDBI Trusteeship Services Limited (ITSL) (Trustee)

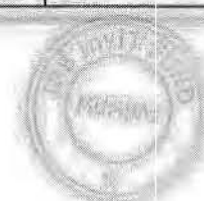
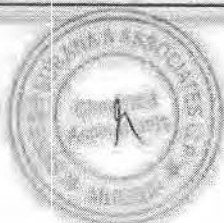
iii. Promoters/ Directors of the parties to the Fund specified in (ii) above

Particulars	IRB Infrastructure Developers Limited (Sponsor & Project manager)	IRB Infrastructure Private Limited (Investment manager)	Modern Road Makers Private Limited (Project manager)	IDBI Trusteeship Services Limited (Trustee of the IRB InvIT Fund)
Promoters	Mr. Virendra D. Mhaiskar Mrs. Deepali V. Mhaiskar Virendra D. Mhaiskar HUF	IRB Infrastructure Developers Limited	IRB Infrastructure Developers Limited	IDBI Bank Limited Life Insurance Corporation of India General Insurance Corporation of India
Directors	Mr. Virendra D. Mhaiskar Mrs. Deepali V. Mhaiskar Mr. Mukeshlal Gupta Mr. Sudhir Rao Hoshing Mr. Chandrashekhar S. Kaptan Mr. Sunil H. Talati Mr. Sandeep J. Shah Mrs. Heena Raja (w.e.f. 30.03.2019)	Mr. Vinodkumar Menon Mr. Rajinder Pal Singh Mr. Bajarang Lal Gupta Mr. Sumit Banerjee	Mr. Mukeshlal Gupta Mr. Dhananjay K. Joshi Mr. Ajay P. Deshmukh Mr. Rajpaul S. Sharma Mr. Chandrashekhar S. Kaptan Mrs. Heena Raja	Mr. Gurudeo M. Yadwadkar Mr. Ravishankar G. Shinde Ms. Madhuri J. Kulkarni Mr. Swapan Kumar Bagchi Ms. Sashikala Muralidharan Mr. Saurabh Chandra (Upto 21.05.2019)

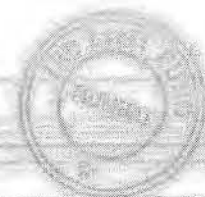
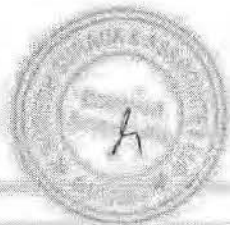


II. Transactions with related parties
(Rs. in lakhs)

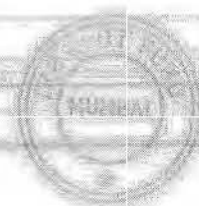
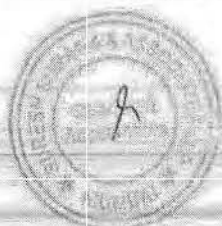
Sr. No.	Particulars	Relation	Six month ended September 30, 2019	Six month ended September 30, 2018	Six month ended March 31, 2019	Year ended March 31, 2019
1	Repayment of secured loan (Long term)		11,642.95	13,670.74	17,438.78	31,109.52
	ISDTL	Subsidiary	4,864.38	8,288.84	9,884.06	18,172.90
	IDAAIL	Subsidiary	6,402.00	4,456.68	6,870.07	11,326.75
	IPATRL	Subsidiary	196.57	144.88	4.89	149.77
	MITL	Subsidiary	180.00	780.34	679.76	1,460.10
2	Unsecured loans given (Short term)		40,275.00	1,000.00	1,110.00	2,110.00
	ISDTL	Subsidiary	2,070.00	-	-	-
	IJDTL	Subsidiary	7,552.00	-	-	-
	IDAAIL	Subsidiary	-	-	-	-
	IPATRL	Subsidiary	2,700.00	-	-	-
	ITATL	Subsidiary	800.00	-	-	-
	ITCTL	Subsidiary	11,173.00	1,000.00	1,110.00	2,110.00
	MITL	Subsidiary	15,980.00	-	-	-
3	Repayment of unsecured loan given (Short term)		24,902.00	-	20.00	20.00
	ISDTL	Subsidiary	-	-	-	-
	IJDTL	Subsidiary	7,552.00	-	-	-
	IDAAIL	Subsidiary	-	-	-	-
	IPATRL	Subsidiary	2,700.00	-	-	-
	ITATL	Subsidiary	800.00	-	-	-
	ITCTL	Subsidiary	13,850.00	-	20.00	20.00
	MITL	Subsidiary	-	-	-	-
5	Interest income		29,992.60	31,377.93	30,368.84	61,746.77
	ISDTL	Subsidiary	2,705.59	3,942.11	3,360.09	7,302.20
	IJDTL	Subsidiary	6,373.37	6,242.07	6,207.96	12,450.03
	IDAAIL	Subsidiary	2,013.47	2,742.21	2,439.84	5,182.05
	IPATRL	Subsidiary	7,144.74	7,102.57	7,055.58	14,158.15
	ITATL	Subsidiary	3,013.74	3,002.06	2,985.65	5,987.71
	ITCTL	Subsidiary	6,994.26	6,672.83	6,703.58	13,376.41
	MITL	Subsidiary	1,747.43	1,674.08	1,616.14	3,290.22



Sr. No.	Particulars	Relation	Six month ended September 30, 2019	Six month ended September 30, 2018	Six month ended March 31, 2019	Year ended March 31, 2019
6	Investment Management fees (including indirect taxes)		602.07	607.85	638.94	1246.79
	IRBFL	Investment Manager	602.07	607.85	638.94	1,246.79
7	Distribution in the form of interest		4,469.63	4,140.62	4,675.77	8,816.39
	IRBIDL	Sponsor and Project Manager	3,893.61	4,125.37	4,079.02	8,204.39
	Mr. Virendra D. Mhaiskar	Director of Sponsor	491.40	5.56	514.80	520.36
	Mrs. Deepali V. Mhaiskar	Director of Sponsor	65.10	5.46	63.80	69.26
	Mr. Sudhir Rao Hoshing	Director of Sponsor	4.20	3.34	4.40	7.74
	Mr. Mukeshlal Gupta	Director of Sponsor & Project Manager	5.88	-	4.29	4.29
	Mr. Vinodkumar Menon	Director of Investment Manager	1.26	-	1.32	1.32
	Mr. B.L.Gupta	Director of Investment Manager	0.21	0.22	0.22	0.44
	Mr. Sumit Banerjee	Director of Investment Manager	1.46	0.67	1.10	1.77
	Mr. Dhananjay K. Joshi	Director of Project Manager	0.63	-	0.66	0.66
	Mr. Ajay P. Deshmukh	Director of Project Manager	5.46	-	5.72	5.72
	Mr. Rajpaul S. Sharma	Director of Project Manager	0.42	-	0.44	0.44



Sr. No.	Particulars	Relation	Six month ended September 30, 2019	Six month ended September 30, 2018	Six month ended March 31, 2019	Year ended March 31, 2019
8	Distribution in form of capital		2022.00	1,488.76	1806.71	3295.47
	IRBIDL	Sponsor and Project Manager	1,761.40	1,483.28	1,575.99	3,059.27
	Mr. Virendra D. Mhaiskar	Director of Sponsor	222.30	2.00	198.90	200.90
	Mrs. Deepali V. Mhaiskar	Director of Sponsor	29.45	1.96	24.75	26.71
	Mr. Sudhir Rao Hoshing	Director of Sponsor	1.90	1.20	1.70	2.90
	Mr. Mukeshlal Gupta	Director of Sponsor & Project Manager	2.66	-	1.70	1.70
	Mr. Vinodkumar Menon	Director of Investment Manager	0.57	-	0.51	0.51
	Mr. B.L.Gupta	Director of Investment Manager	0.10	0.08	0.09	0.17
	Mr. Sumit Banerjee	Director of Investment Manager	0.67	0.24	0.43	0.67
	Mr. Dhananjay K. Joshi	Director of Project Manager	0.29	-	0.26	0.26
	Mr. Ajay P. Deshmukh	Director of Project Manager	2.47	-	2.21	2.21
	Mr. Rajpaul S. Sharma	Director of Project Manager	0.19	-	0.17	0.17
9	Trustee fee		14.75	29.50	-	29.50
	ITSL	Trustee	14.75	29.50	-	29.50



III. Related party outstanding balances
(Rs. in lakhs)

Sr. No	Particulars	Relation	As on September 30, 2019	As on September 30, 2018	As on March 31, 2019
1	Equity Investment		1,27,505.48	1,27,505.48	1,27,505.48
	ISDTL	Subsidiary	53,232.48	53,232.48	53,232.48
	IJDTL	Subsidiary	13,175.00	13,175.00	13,175.00
	IDAAIL	Subsidiary	19,812.00	19,812.00	19,812.00
	IPATRL	Subsidiary	9,909.00	9,909.00	9,909.00
	ITATL	Subsidiary	4,925.00	4,925.00	4,925.00
	ITCTL	Subsidiary	15,550.00	15,550.00	15,550.00
	MITL	Subsidiary	10,902.00	10,902.00	10,902.00
2	Subordinated debt		99,431.00	99,431.00	99,431.00
	IJDTL	Subsidiary	39,525.00	39,525.00	39,525.00
	IPATRL	Subsidiary	29,581.00	29,581.00	29,581.00
	ITATL	Subsidiary	14,775.00	14,775.00	14,775.00
	ITCTL	Subsidiary	15,550.00	15,550.00	15,550.00
3	Secured loan receivable (Long term)		3,64,215.06	3,93,296.78	3,75,858.01
	ISDTL	Subsidiary	28,723.01	43,471.45	33,587.39
	IJDTL	Subsidiary	92,661.77	92,661.77	92,661.77
	IDAAIL	Subsidiary	-	13,272.08	6,402.00
	IPATRL	Subsidiary	93,154.16	93,355.59	93,350.71
	ITATL	Subsidiary	37,153.84	37,153.84	37,153.84
	ITCTL	Subsidiary	93,712.75	93,712.76	93,712.76
	MITL	Subsidiary	18,809.53	19,669.29	18,989.54
4	Unsecured loan receivable (Long term)		73,258.47	73,258.47	73,258.47
	ISDTL	Subsidiary	11,006.23	11,006.23	11,006.23
	IJDTL	Subsidiary	3,107.71	3,107.71	3,107.71
	IDAAIL	Subsidiary	25,767.36	25,767.36	25,767.36
	IPATRL	Subsidiary	15,490.04	15,490.04	15,490.04
	ITATL	Subsidiary	8,905.47	8,905.47	8,905.47
	ITCTL	Subsidiary	7,338.07	7,338.07	7,338.07
	MITL	Subsidiary	1,643.59	1,643.59	1,643.59



Sr. No	Particulars	Relation	As on September 30, 2019	As on September 30, 2018	As on March 31, 2019
5	Unsecured loan receivable (Short term)		22,090.20	5,627.20	6,717.20
	ISDTL	Subsidiary	2,070.00	-	-
	IJDTL	Subsidiary	-	-	-
	IDAAIL	Subsidiary	-	-	-
	IPATRL	Subsidiary	-	-	-
	ITATL	Subsidiary	-	-	-
	ITCTL	Subsidiary	265.20	1,852.20	2,942.20
	MITL	Subsidiary	19,755.00	3,775.00	3,775.00
6	Trade payables		519.05	271.63	291.49
	IRBFL	Investment Manager	519.05	271.63	291.49

- * The fund has not acquired any asset from related party during the six month period ended September 30, 2019 as well as in previous financial year ended March 31, 2019.

For IRB Infrastructure Private Limited
(Investment Manager to IRB InvIT Fund)

Vinodkumar Menon

Vinodkumar Menon
Whole-time Director



Place: Mumbai
Date: October 25, 2019

Annexure B – Project wise details of all assets

Particulars	IDAA Infrastru cture Limited (IDAA)	IRB Surat Dahisar Tollway Limited (IRBSD)	IRB Talegaon Amravati Tollway Limited (IRBTA)	IRB Jaipur Deoli Tollway Limited (IRBJD)	IRB Tumkur Chitradur ga Tollway Limited (IRBTC)	M.V.R. Infrastru cture And Tollway s Limited (MVR)	IRB Pathanko t Amritsar Toll Road Limited (IRBPA)
Concession period (in years)	15	12	22	25	26	20	20
Concession start date	January 2, 2007	February 20, 2009	September 3, 2010	June 14, 2010	June 4, 2011	August 14, 2006	December 30, 2010
Tolling start date	September 25, 2009	February 20, 2009	April 24, 2013	September 27, 2013	June 4, 2011	August 14, 2006	November 27, 2014
Total project cost (Rs. in Lakhs)	140,549.00	252,857.40	89,259.50	177,469.60	114,200.00	30,759.90	144,531.00
No. of Toll plazas	1	4	1	2	2	1	2
Km Length	65.00	239.00	66.73	148.77	114.00	68.63	102.42
Lane Km	390.00	1,434.00	267.00	595.00	684.00	275.00	410.00
State	Gujarat	Gujarat	Maharashtra	Rajasthan	Karnataka	Tamil Nadu	Punjab
National Highway	NH 8	NH 8	NH 6	NH 12	NH 4	NH 7	NH 15



Annexure C – Details of Project-wise Gross Toll revenue

(Amt in lakhs)

Particulars	Quarter ended September, 2019	Quarter ended June, 2019	Half year ended September, 2019	Year ended March 31, 2019
IRBSD	17,040	17990	35,030	67,717
IRBTC	5,880	6300	12,180	24,751
IDAA	5,770	6030	11,800	22,819
IRBPA	2,860	3350	6,210	12,186
MVR	2,500	2540	5,040	9,601
IRBJD	2,310	2650	4,960	9,756
IRBTA	1,690	1860	3,550	6,836
Total	38,050	40,720	78,770	153,666



Annexure D – Details regarding the monies lent by the InvIT to the holding company or the special purpose vehicle in which it has investment

(Rs. in lakhs)

Sr. No.	Particulars	Six month ended September 30, 2019
1	Unsecured loans given (Short term)	40,275.00
	IRB Surat Dahisar Tollway Limited (ISDTL)	2,070.00
	IRB Jaipur Deoli Tollway Limited (IJDTL)	7,552.00
	IRB Pathankot Amritsar Toll Road Limited (IPATRL)	2,700.00
	IRB Talegaon Amravati Tollway Limited (ITATL)	800.00
	IRB Tumkur Chitradurga Tollway Limited (ITCTL)	11,173.00
	M.V.R. Infrastructure & Tollways Limited (MITL)	15,980.00
2	Repayment of unsecured loan given (Short term)	24,902.00
	IRB Jaipur Deoli Tollway Limited (IJDTL)	7,552.00
	IRB Pathankot Amritsar Toll Road Limited (IPATRL)	2,700.00
	IRB Talegaon Amravati Tollway Limited (ITATL)	800
	IRB Tumkur Chitradurga Tollway Limited (ITCTL)	13,850.00



Santosh N

Unit No. 303, 4th Floor,
SKAV Lavelle 909, Lavelle Road, Bangalore.
Karnataka - 560001
T +91 80 6125 6100

Registered Valuer No.: IBBI/RV/05/2019/11458

IRB InvIT Fund
IRB Complex,
Chandivali Farm, Chandivali Village
Andheri (E), Mumbai - 400 072
India

October 24, 2019

IRB Infrastructure Private Limited
3rd Floor, IRB Complex
Chandivali Farm, Chandivali Village
Andheri (E), Mumbai - 400 072
India

Re: Valuation of InvIT Assets as of September 30, 2019 in accordance with the SEBI InvIT regulations required for NAV reporting purposes.

Dear Sir / Madam,

In accordance with the terms of our Agreement dated September 30, 2019, I, Mr. Santosh Nagalingaswamy ("Santosh" or "RV") (Registered Valuer registration number – IBBI/RV/05/2019/11458) enclose my report regarding the valuation of InvIT Fund ("Report") as of September 30, 2019 ("Valuation Date") in accordance with the requirements of the Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014, as amended (the "SEBI InvIT Regulations").

I understand that IRB Infrastructure Developers Limited ("IRB" or "Sponsor") has set up IRB InvIT Fund (the "Trust") which is an irrevocable trust set up under the Indian Trusts Act, 1882, and registered with the Securities and Exchange Board of India as an infrastructure investment trust under the SEBI InvIT Regulations.

The Investment Manager of the Trust is IRB Infrastructure Private Limited (the "Investment Manager") is a wholly-owned subsidiary of the Sponsor. The Investment Manager has approximately 18 years of experience in operating road Build Operate Transfer ("BOT") projects and is also experienced in developing, operating and maintaining toll plazas.

IRB InvIT Fund has acquired the following 7 Road Projects from the Sponsor (together referred to as "InvIT Assets"):

1. IDAA Infrastructure Limited ("IDAA")
2. IRB Surat Dahisar Tollway Limited ("IRBSD")
3. IRB Talegaon Amravati Tollway Limited ("IRBTA")
4. IRB Jaipur Deoli Tollway Limited ("IRBJD")
5. IRB Tumkur Chitradurga Tollway Limited ("IRBTC")
6. MVR Infrastructure & Tollways Limited ("MVR")
7. IRB Pathankot Amritsar Toll Road Limited ("IRBPA")

As per the requirements of the SEBI InvIT Regulations, IRB InvIT Fund / Investment Manager requires to appoint a Valuer who should perform valuation of the InvIT Assets twice every financial year, i.e. as at 30th September and 31st March of every financial year.

Considering the above requirement, IRB InvIT Fund and the Investment Manager (together referred to as the "Client") has appointed me to perform valuation of the InvIT Assets as of September 30, 2019 in accordance with the SEBI InvIT regulations required for NAV reporting purposes.

This report expresses an independent estimate of the Enterprise Values ("EV") of the InvIT Assets. In the process of formulating the estimate of Value, discussions were held with the Management of the Client (the "Management") regarding the history and nature of operations, economic and competitive landscape and prospects of the InvIT Assets.

Basis of preparation

For this valuation, financials, represented to be as of the Valuation Date, documents and other records, and prospective financial information pertaining to the InvIT Assets were furnished by the Management. RV has made no representation as to the achievability of this prospective financial information, as actual results may differ, and these differences could be material. However, RV did perform certain procedures to determine that the prospective financial information was reasonable and appropriate for use in the valuation process.

In addition, the Management provided financial details for this analysis. This data was utilized without verification as correctly representing the operations of the respective InvIT Assets. Regarding the information provided, RV has not carried out any form of audit, independent confirmation or verification of the reliability, accuracy or completeness of the information. Accordingly, RV assumes no responsibility and makes no representations with respect to the accuracy or completeness of the information provided by the Management.

Please note that the valuation has been performed as of September 30, 2019 and reflects the information available as of that date. Economic conditions, market factors and performance change may result in the conclusions becoming quickly outdated.

The valuation of businesses or assets is not a precise science and the conclusions arrived at in many cases will of necessity be subjective and dependent on the exercise of individual judgment. There is therefore, no indisputable single value of the InvIT Assets. Whilst RV considers this valuation to be both reasonable and defensible based on the information made available by the Management, others may place a different value to the respective InvIT Assets.

RV expressly disclaims all liability for any loss or damage of whatever kind which may arise from any person acting on any information and estimates contained in this report which are contrary to the stated purpose. Full terms and conditions of the work are included in our Agreement dated September 30, 2019.

This Report should be read in its entirety but especially in conjunction with the Assumptions and Limiting Conditions.

Sincerely,



Mr. Santosh N

Registered Valuer registration number – IBB/RV/05/2019/11458

Table of Content

A. EXECUTIVE SUMMARY	4
B. INDUSTRY OVERVIEW	7
C. BUSINESS OVERVIEW	11
D. VALUATION METHODOLOGIES	23
E. VALUATION APPROACH.....	24
F. SOURCES OF INFORMATION	28
G. ASSUMPTIONS AND LIMITING CONDITIONS.....	29
H. GLOSSARY	31
I. ANNEXURES	33

A. EXECUTIVE SUMMARY

1. Introduction

IRB InvIT Fund is an Indian infrastructure investment trust sponsored by IRB. IRB is a listed infrastructure development company, undertaking development of various infrastructure projects via the Public Private Partnership ("PPP") model in the toll road sector.

IRB has sponsored and floated an Infrastructure Investment Trust which has been registered as IRB InvIT Fund under the SEBI InvIT Regulations, 2014. The Units issued by the Trust were listed on both the BSE and NSE on May 18, 2017.

The Trust operates and maintains the following InvIT Assets:

- I. IDAA Infrastructure Limited ("IDAA"): On July 7, 2006, the NHA and IDAA entered into a concession agreement in respect of the Bharuch-Surat NH 8 Project. IDAA was engaged to expand a 65.00 km section of NH 8 between Bharuch and Surat in Gujarat to four or six lanes on a BOT basis. Construction on the project commenced on January 02, 2007. The collection of toll commenced on September 25, 2009. As per the relevant concession agreement, the Bharuch-Surat NH 8 Project comprises the section of NH 8 from km 198.0 to km 263.0.
- II. IRB Surat Dahisar Tollway Limited ("IRBSD"): On April 30, 2008, the National Highway Authority of India (hereafter referred as "NHA") and IRBSD entered into a concession agreement in respect of the Surat-Dahisar NH 8 Project. IRBSD was engaged to expand a 239 km section of NH 8 between Surat in Gujarat and Dahisar in Maharashtra from four lanes to six lanes on a BOT basis or a DBFOT pattern. The concession period and the collection of tolls commenced on February 20, 2009. As per the relevant concession agreement, the Surat-Dahisar NH 8 Project comprises the section of NH 8 from km 263.0 to km 502.0.
- III. IRB Talegaon Amravati Tollway Limited ("IRBTA"): On November 18, 2009, the NHA and IRBTA entered into a concession agreement in respect of the Talegaon-Amravati NH 6 Project. IRBTA was engaged to construct a 66.725 km four-lane road on the section of NH 6 from Talegaon to Amravati in Maharashtra on a DBFOT basis. As per the relevant concession agreement, the Talegaon-Amravati NH 6 Project comprises the section of NH 6 from km 100.0 to km 166.7.
- IV. IRB Jaipur Deoli Tollway Limited ("IRBJD"): On December 16, 2009, the NHA and IRBJD entered into a concession agreement in respect of the Jaipur-Deoli NH 12 Project. IRBJD was engaged to expand a 146.3 km section of NH 12 between Jaipur and Deoli in Rajasthan from two lanes to four lanes on a DBFOT basis. On September 27, 2013 IRBJD commenced partial tolling for a project length of 119.75 kms. The collection of tolls commenced with effect from April 01, 2016 for the rest of the project length. As per the relevant concession agreement, the Jaipur-Deoli NH 12 Project comprises the section of NH 12 from km 18.7 to km 165.0.
- V. IRB Tumkur Chitradurga Tollway Limited ("IRBTC"): On August 16, 2010, the NHA and IRBTC entered into a concession agreement in respect of the Tumkur-Chitradurga NH 4 Project. IRBTC was engaged to expand a 114.00 km section of NH 4 between Tumkur and Chitradurga in Karnataka from four to six lanes on a BOT basis in the DBFOT format. As per the relevant concession agreement, the Tumkur-Chitradurga NH 4 Project comprises the section of NH 4 from km 75.0 to km 189.0.

- VI. MVR Infrastructure & Tollways Limited ("MVR"): MVR is a 41.575 km section of NH 7 from Salem to Namakkal in Tamil Nadu from two lanes to four lanes and to improve, operate and maintain a 7.85 km section of NH 7 from Omalur to Salem in Tamil Nadu, in each case on a BOT basis pursuant to a concession agreement dated February 16, 2006 between MVR and the NHA. As per the relevant concession agreement, the Omalur–Salem–Namakkal NH 7 Project comprises the sections of NH 7 from km 207.05 to km 248.625 and from km 180.0 to 207.05.
- VII. IRB Pathankot Amritsar Toll Road Limited ("IRBPA"): On November 16, 2009, the NHA and IRBPA (a Concessionaire), entered into a Concession Agreement to develop, operate and maintain the Pathankot – Amritsar section of NH 15 Project. The concession period of the Project is 20 years from the Appointed Date. IRBPA was entrusted to expand a 102.42 Km section of NH 15 between Pathankot and Amritsar in Punjab from two lanes to four lanes on a DBFOT basis. The Pathankot – Amritsar NH 15 Project comprises the section of NH 15 from km 6.082 to km 108.502.

The RV declares that:

- The RV is competent to undertake the valuation
- The RV is independent and has prepared the report on a fair and unbiased basis
- The RV has valued the InvIT Assets based on internationally accepted valuation standards.

2. Summary of Values

The Fair Value of InvIT Assets has been estimated using a Sum of the Parts (SOTP) method. Enterprise Value of each InvIT Asset has been estimated individually, post this, adjustments have been made for debt, working capital and other long-term assets/liabilities based on the standalone unaudited financials of the Trust as of September 30, 2019.

Enterprise Value of each of the Road Project has been estimated using the Discounted Cash Flows (DCF) method under the Income Approach.

Management provided the financial projections for each of the InvIT Asset as of the Valuation Date. The projected financial information is based on Management's estimate of future cash flows which are derived using the traffic & technical study report given by M/s GMD Consultants for each of the InvIT Asset.

Based on the information and analysis summarized in this report, RV's estimates of the Enterprise Values of the InvIT Assets as of the Valuation Date is as follows:

Particulars	Amount (INR Mn)
IDAA Infrastructure Limited	4,557.0
IRB Surat Dahisar Tollway Limited	10,644.0
IRB Talegaon Amravati Tollway Limited	9,486.0
IRB Jaipur Deoli Tollway Limited	15,826.0
IRB Tumkur Chitradurga Tollway Limited	14,912.0
MVR Infrastructure & Tollways Limited	4,702.0
IRB Pathankot Amritsar Toll Road Limited	14,837.0
Total Enterprise Value	74,964.0
Less: Debt at Trust level	(14,898.4)
Add: Cash & Bank Balance (consolidated)	1,411.6
Less: Present value of IM & other fee payable by the Trust ¹	(1,572.0)
Add / (Less): Other working capital related adjustments-Consolidated	167.1
Estimated Value of IRB InvIT Fund	60,072.3

Please refer to Exhibit 1 for further details.

The detailed analysis of the above conclusion is presented in different sections of this report.

¹ Refer Exhibit 9

B. INDUSTRY OVERVIEW

Road Infrastructure in India²

India has second largest road networks in the world, spanning over a total of 5.5 Mn kms. Over 64.5% of all goods in the country are transported through roads, while, 90.0% of the total passenger traffic uses road network to commute. Greater connectivity between different cities, towns and villages has led to increased road traffic over the years.



Growth Drivers

- Growing demand
 - Rise in two-wheeler and four-wheeler vehicles due to higher individual discretionary spending.
 - Increasing freight traffic owing to growing domestic trade flows between states.
- Support from policy
 - Greater government focus on infrastructure.
 - Standardized processes for bidding and tolling; clear policy framework.
 - Tax sops, Foreign Direct Investment (FDI), Foreign Institutional Investor (FII) encouragement.
- Increasing investment
 - NHAI implementing one of the largest road projects.
 - Rising private sector participation through PPP (Public-Private Partnership) model.

Highway construction in India increased at 23.3% CAGR between FY14-18. In FY18, 9,829.0 km of highways were constructed with an expenditure of Rs 1.2 trillion (USD 18.1 Bn). The Government of India aims to construct 65,000.0 km of national highways at the cost of Rs 5.4 lakh crore (USD 741.5 Bn) by 2022. The Government of India has set a target for construction of 10,000.0 km national highway in FY19. During April-December 2018 a total of length of 6,715.0 km of national highways were constructed. As of May 03, 2019, there were 1,755 PPP projects in India, of which 763 were related to roads and bridges.

Policy initiatives

Rural development

² IBEF report – Roads – August 2019

- The Prime Minister's Gram Sadak Yojana (PMGSY) is a scheme for development of rural roads in India. The Government of India has succeeded in providing road connectivity to 85.0 % of the 178,184 eligible rural habitations and all villages are expected to be connected through a road network by 2019. Total length of roads constructed were 47,447.0 km in 2017-18.
- In April 2018, the Government of India signed a USD 210.0 million deal with World Bank to improve rural roads at a stretch of 10,510.0 km in Madhya Pradesh under the Gram Sadak Yojana programme.
- In May 2018, the Government of India signed USD 500.0 million loan agreement with World Bank to provide additional funding for construction of 7,000.0 km climate resilient roads out of which 3,500.0 km will be built using green technologies under Pradhan Mantri Gram Sadak Yojna (PMGSY).
- Under the Union Budget 2019-20, the Government of India allocated Rs 19,000.0 crore (USD 2.6 Bn) for the Pradhan Mantri Gram Sadak Yojana (PMGSY).
- The Government of India will spend around INR 1 lakh crore (USD 15.3 Bn) during FY18-20 to build roads in the country under Pradhan Mantri Gram Sadak Yojana (PMGSY).

Encouragement of Infrastructure Debt Funds (IDFs)

- Government of India has set up the India Infrastructure Finance Company (IIFCL) to provide long-term funding for infrastructure projects.
- Interest payments on External Commercial Borrowings for infrastructure are now subject to a lower withholding tax of 5.0% vis-à-vis 20.0% earlier.
- IDF income is exempt from income tax.
- In May 2018, IIFCL Mutual Fund launched infrastructure debt fund (IDF) scheme with Corporation Bank, Oriental Bank of Commerce & IIFCL as investors and Canara bank & HUDCO as strategic investors.

Bharatmala Pariyojana (BMP)³

An umbrella program for the highway sector to improve National Corridor Efficiency of 34,800.0 kms to be implemented over a period of 2017-18 to 2021-22 at a cost of USD 82.0 Bn. Additionally, to fast track process, 10.0% of funds will be ear-marked under the Grand Challenge Mechanism for the state Government. It is also proposed that 1911.0 kms of International Connectivity Roads and 3319.0 kms. of Border Roads will be developed under the project. And, first phase would entail development of 2000.0 kms of International Connectivity and Border Roads at an estimated cost of USD 3.8 Bn.

Components under Bharatmala Pariyojana Phase-1 are as given below:

Component	Length (Km)	Outlay (USD Bn)
Economic corridors development	9,000.0	18.5
Inter-corridor & feeder roads	6,000.0	12.3
National Corridors Efficiency	5,000.0	15.4
Border & International connectivity	2,000.0	3.8
Coastal & port connectivity roads	2,000.0	3.1
Expressways	800.0	6.2
Other works - under NHDP	-	23.1
Total	24,800.0	82.3

³ Roads and highways – Make In India

Major developments in the industry⁴:

Toll-Operate-Transfer: (TOT)

- With the sharp increase in award and construction of highway projects, the Government has been rapidly trying to monetize existing road projects to meet the excess capital requirements to fund new projects. It has been successful in doing so by awarding the first bundle of highways under the TOT model. The first bundle with 9 projects totaling approximately 680.0 km of roads in the two highly industrialized states of Andhra Pradesh and Gujarat was awarded in March 2018.
- The first bundle of projects fetched INR 9,861.0 crore which was 1.5 times the estimated turnover. The high interest for TOT in these states could be attributed to their traffic profile and prospect, given the high rate of industrialization and development and aggressive bidding to certain extent.
- A second bundle with 586.0 kms of highways spreads across four states of Rajasthan, Gujarat, West Bengal and Bihar is currently open for bidding and is expected to be awarded over the next 2 months to prospective buyers.
- More TOT project bundles across other coastal states are expected to follow and may evince higher interest. But the scope to raise funds through this medium may be short term and has limited prospect given the limited number of projects which can be bundled and offered by the NHAI.

FASTag: Improving efficiency

- FASTag aims at improving and enabling Electronic Toll Collection. NHAI has been able to achieve a major milestone by enabling one dedicated FASTag Lane at all its toll plazas. FASTag enabled vehicles can pass through the dedicated FASTag lane without stopping at toll plazas.
- As of August 2018, the total share of toll collected through FASTag has increased to 24.0% and it is expected that the same would increase to 30.0% by the end of FY19.

Outlook⁵

CRISIL Research projects NHAI awarding to be around 4,300.0-4,700.0 km in fiscal 2020, after a slump in fiscal 2019, because of a strong pipeline of projects under Bharatmala. Based on our analysis of tenders floated by NHAI up to June 2019, there are ~6,000.0 km of tenders unawarded. NHAI awarded only 2,200.0 km of highway projects in fiscal 2019, down from a high of ~7,400.0 km in fiscal 2018, because of financial constraints and delays in land acquisitions. As observed historically, awarding typically picks up in the year after the general elections.

About 75.0-80.0% of HAM projects, in terms of km, of key players such as Dilip Buildcon, Ashoka Buildcon, IRB Infra, Sadbhav, Welspun, KNR and PNC awarded between fiscals 2016 and 2018, have now received appointed dates. These players account for 50.0% of total HAM awarding during this time. Over the medium term, that is between fiscals 2020 and 2024, CRISIL Research forecasts that awarding will be stable at 4,000.0-4,300.0 km per year. Future awarding would be linked to NHAIs ability to raise funds, as it would focus on execution of already awarded projects. Awarding under the BMP has begun from fiscal 2018 and CRISIL forecasts that awarding of phase 1 of BMP will stretch at least until fiscal 2024; NHDP awarding will phase out by fiscal 2021. ~450.0 kms of projects under Bharatmala were awarded in Q1FY2020.

In FY2019, 60.0 % of projects awarded were EPC and only 40.0% were HAM. This trend may continue going forward as the balance sheets key players in the HAM space are stretched at leverage of ~3x. Currently, most HAM players are looking to sell their equity stake in operational as well as under-construction projects,

⁴ CARE Industry research H1FY19

⁵ CRISIL - <https://www.crisil.com/en/home/ou-analysis/reports/2017/09/sector-report-roads-and-highways.html>, September 2019

including newly awarded HAM projects. If this trend of selling their equity stake in under-construction projects continues, giving eligible players the bandwidth to bid for new projects, the share of HAM projects in future could increase. MoRTH awarding including NHIDCL, too, slowed to ~3,250.0 kms in fiscal 2019 from a high of ~9,650.0 kms the year before. MoRTH also focused on clearing backlog of projects already awarded & tackle road blocks in construction.

C. BUSINESS OVERVIEW

1. Overview of the InvIT Assets

Particulars (INR Mn)	IDAA	IRBSD	IRBTA	IRBJD	IRBTC	MVR	IRBPA
Purchase Price at EV level paid by the Trust	7,069.5	13,042.1	6,575.9	14,846.9	13,290.3	3,399.5	14,856.6
Fair EV as on 31 March 2017	7,170.3	13,879.1	7,176.1	23,114.6	15,503.8	3,663.9	17,857.3
Fair EV as on 31 March 2018	6,257.4	12,570.9	7,748.9	19,508.8	13,689.7	4,132.1	16,451.7
Fair EV as on 31 March 2019	5,714.4	11,304.5	8,664.4	16,244.2	14,409.6	4,334.4	14,844.5
Stake held by the Trust (%)	100%	100%	100%	100%	100%	100%	100%

• IDAA Infrastructure Limited

IDAA project covers the Bharuch and Surat section of NH-8 from km 198.0 to km 263.0. NH 8 is a four- to six-lane national highway in India. It connects the national capital Delhi to the financial capital Mumbai, and other major cities along the way, including Gurgaon, Jaipur, Ajmer, Udaipur, Ahmedabad, Vadodara and Surat. The Bharuch–Surat NH 8 Project is part of the most ambitious and prestigious Golden Quadrilateral project undertaken by the NHAI and is part of the first section of that project to be completed. The Bharuch–Surat NH 8 Project passes through certain semi-urban and business centres, including Pipodra, Palod and Ankleshwar. The project has been implemented on a BOT basis by the NHAI. This project has been awarded to IDAA for a concession period of 15 years starting from January 02, 2007 on the basis of the negative grant of INR 5040.0 Mn paid upfront to NHAI. The project is in the state of Gujarat and passes through the districts of Surat and Bharuch. IDAA project has been commissioned and is currently in the operation / maintenance phase.

The project includes 1 toll fee plaza, 10 pedestrian underpasses, 1 vehicular underpasses, 83 Culverts, 19 Bus Bays, 6 Flyovers, 33 Minor bridges, 14 Major bridges and 6 Major Intersections. It has 47.35 Km Six-Lane Carriageway and 27.5 Km long Service road.

Due to the suspension in toll for a period of 24 days in the year FY17 due to demonetization IDAA was entitled to extension of additional 24 days.

Site visit date – October 1, 2019

IDAA Road Project photographs



- **IRB Surat Dahisar Tollway Limited**

NH 8 is a four to six-lane National Highway in India. It connects India's national capital, New Delhi, with its financial capital, Mumbai and other important cities along the way, including Gurgaon, Jaipur, Ajmer, Udaipur, Ahmedabad, Vadodara and Surat. The Surat–Dahisar NH 8 Project is part of the most ambitious and prestigious Golden Quadrilateral project undertaken by the NHAI and was the first section of that project to be completed. The Delhi Mumbai Industrial Corridor also runs parallel to NH 8 in length. According to the Traffic Reports, the Surat–Dahisar NH 8 Project falls on one of the busiest sections of NH-8, as it passes through business hubs like Surat, Vapi, Navsari, Valsad and Dahisar.

IRBSD project covers the Surat and Dahisar section of NH-8 from 263.0 km to 502.0 km. IRBSD project which has been awarded for a concession period of 12 years starting from February 20, 2009 has been commissioned and is currently in the operation / maintenance phase. The project has been awarded to IRBSD on a revenue sharing basis with the NHAI.

The project includes 4 Toll Fee Plaza, 2 railway over bridges, 12 pedestrian underpasses, 16 vehicular underpasses, 496 Culverts, 304 Intersections, 37 Minor bridges and 17 Major bridges. It has 239 Km long Six Lane Carriageway and 283.369 Km long service road.

The project highway passes through two states namely Gujarat and Maharashtra. Approximately 120 km of stretch lies in the state of Gujarat and the balance 120 km lies in the state of Maharashtra. The project is joined and/or intersected by number of State Highways, Major District Roads and Other District Roads.

Modification in the Concession Period

As per the Clause 29 of the concession agreement between NHAI and IRBSD provided to us by the Management, if the actual traffic falls short or exceeds target traffic on a defined date, the concession period shall be revised

subject to calculation specified therein. The target date and target traffic as provided in the concession agreement along with the projected traffic as on the target date are given below:

Target Date – January 01, 2017

Target Traffic — 82,043 Passenger Car Units ("PCUs")

Actual Traffic as on Target Date — 73,272 PCUs

As informed to us by the Management, the actual traffic volume date fell short of the target traffic as on the target date. This warranted for an extension of the concession period, Further, due to the suspension in toll for a period of 24 days in the year FY17 due to demonetization IRBSD was entitled to extension of additional 24 days. Hence, the total concession period was extended to 13.87 years (from the original 12 years) up to January 01, 2023 by the Management.

Site visit date – October 1, 2019

IRBSD Road Project photographs



• **IRB Talegaon Amravati Tollway Limited**

NH 6 connects Hazira and Kolkata via Surat, Dhule, Amravati, Nagpur, Raipur, and Sambalpur. It intersects with several other national highways, including NH 3 near Dhule, NH 5 near Jharkoparia, NH 7 near Nagpur and NH 8 near Surat. NH 6 passes through five states, namely Gujarat, Madhya Pradesh, Orissa, Chhattisgarh and West Bengal. The Talegaon–Amravati NH 6 Project caters to various types of traffic such as urban, suburban and regional traffic. IRBTA project covers the Talegaon and Amravati section of NH-6 from 100 km to 166.7 km. The project has been implemented on a BOT basis by the NHAI. This project has been awarded to IRBTA for a concession period of 22 years starting from September 3, 2010 on the basis of a grant of INR 2,160 Mn receivable from the NHAI during the construction period. The project includes 66 Entry/Exit Ramps,

38 Bus Bays, 20 pedestrian underpasses, 21 Minor bridges, 3 Major bridges and 36 Major Intersections. It has 114.45 Km Four-Lane Service Carriageway and 4.2 Km long Service road.

The project includes 1 Toll Fee Plaza, 15 Bus Bays, 1 Rail over Bridge, 11 Vehicular Underpasses, 11 pedestrian underpasses, 2 Flyovers, 25 Minor bridges, 1 Major bridge and 36 Major Intersections. It has 66.7 Km Four-Lane Service Carriageway and 26.5 Km long Service Road.

The project is in the state of Maharashtra and passes through Amravati district. En-route, it passes few major/minor urban centres, viz. Nandgaon Peth, Mozri, Tivsa, and Ramdara etc. before reaching end of project stretch at Talegaon. The corridor of the project is also known as Amravati — Nagpur Highway.

The project has been commissioned and is currently in the operation / maintenance phase.

Modification in the Concession Period

As per the Clause 29 of the concession agreement between NHA and IRBTA provided to us by the Management, if the actual traffic falls short or exceeds target traffic on a defined date, the concession period shall be revised subject to calculation specified therein. The target date and target traffic as provided in the concession agreement along with the projected traffic as on the target date are given below:

Target Date – April 01, 2020

Target Traffic — 41,052 PCUs

Projected Traffic as on Target Date —25,590 PCUs

As per the traffic projections provided by the Management, the traffic volume falls short of the target traffic as on the target date. This warrants for an extension of the concession period. Further, due to the suspension in toll for a period of 24 days in the year FY17 due to demonetization IRBTA was entitled to extension of additional 24 days. Hence, the total concession period has been extended to 26.9 years (from the original 22 years) up to February 19, 2037 by the Management.

Site visit date – October 5, 2019

IRBTA Road Project Photographs



• IRB Jaipur Deoli Tollway Limited

NH 12 connects Jaipur and Jabalpur via Tonk, Kota, and Bhopal. It intersects with several other national highways like NH 3 at Biora, NH 7 at Jabalpur, NH 8 at Jaipur, NH 11 at Jaipur, and NH 69 at Bhopal. NH 12 passes through two states via Rajasthan and Madhya Pradesh. IRBJD project covers the Jaipur and Deoli section of NH-12 from km 18.7 to km 165.0. IRBJD project has been implemented on a BOT basis by the NHAI. The project is in the state of Rajasthan and passes through districts, viz. Jaipur and Tonk. En-route, it passes few major/minor urban centres, viz. Shivdasapura, Chaksu, Tonk, and Deoli.

The project includes 2 toll fee plaza, 3 pedestrian underpasses, 11 vehicular underpasses, 5 cattle underpasses, 124 Culverts, 32 Bus Bays, 4 Flyovers, 23 Minor bridges, 1 Major bridges and 25 Major Intersections. It has 148.77Km Four-Lane Service Carriageway and 36.76 Km long Service road.

This project has been awarded to IRBJD for a concession period of 30 years starting from June 14, 2010 on the basis of a grant given by NHAI of INR 3,060.0 Mn during the concession period. The project has been commissioned and is currently in the operation / maintenance phase.

Due to the suspension in toll for a period of 24 days in the year FY17 due to demonetization IRBJD was entitled to extension of additional 24 days.

Modification in the Concession Period

As per the Clause 29 of the concession agreement between NHAI and IRBJD provided to us by the Management, if actual traffic on the project falls short or exceeds Target Traffic on project highway on defined date, concession period shall be modified subject to calculation stipulated therein. For Jaipur - Deoli project, the Target Date and Target Traffic are defined as under:

Target Date – October 01, 2018

Target Traffic — 30,344 PCUs

Actual Traffic as on Target Date —17,670 PCUs

As informed to us by the Management, the actual traffic volume fell short of the target traffic as on the target date. This has warranted for an extension of the concession period. Hence, the total concession period has been extended by about 5 years up to July 06, 2040 by the Management.

Site visit date – October 5, 2019

IRBJD Road Project photographs



● **IREB Tumkur Chitradurga Tollway Limited**

NH 4 is a four- to six-lane National highway in India. It connects Mumbai and Chennai via Pune, Kolhapur and Belgaum and intersects NH 9 at Pune, NH 4A at Belgaum, NH 63 and NH 218 at Dharwad, NH 13 at Chitradurga, NH 206 at Tumkur, NH 48 and NH 207 at Nelamangala.

NH 4 passes through three states, namely, Maharashtra, Karnataka and Tamil Nadu.

Between Thane and Chennai, it connects major urban centres and state capitals, such as Thane, Pune, Kolhapur, Belgaum, Dharwad, Hubli, Chitradurga, Tumkur, Bangalore and Chennai.

The Tumkur–Chitradurga NH 4 Project caters to various types of traffic, including urban, suburban and regional traffic. IRBTC project covers the Tumkur and Chitradurga section of NH-4 from 75.0 km to 189.0 km. The project has been implemented on a BOT basis by the NHAI. This project has been awarded for a concession period of 26 years starting from 4 June 2011 on the basis of a premium of INR 1,404.0 Mn payable to the NHAI in the first year of concession period increased annually at 5%.

The project includes 2 Toll Fee Plazas, 66 Entry/Exit Ramps, 7 Truck Lay Bys, 147 Culverts, 6 Flyovers, 38 Bus Bays, 20 pedestrian underpasses, 21 Minor bridges, 3 Major bridges and 36 Major Intersections. It has 114.45 Km Four-Lane Service Carriageway and 4.2 Km long Service road.

The project is in the state of Karnataka and passes through districts, viz. Tumkur and Chitradurga. En-route, it passes few major/minor urban centres, viz. Tumkur, Sira, Hiriyur and Chitradurga. The project has been commissioned and is currently in the operation / maintenance phase.

Due to the suspension in toll for a period of 24 days in the year FY17 due to demonetization IRBTC was entitled to extension of additional 24 days.

Modification in the Concession Period

As per the Clause 29 of the concession agreement between NHAI and IRBTC provided to us by the Management, if the actual traffic falls short or exceeds target traffic on a defined date, the concession period shall be revised subject to calculation specified therein. The target date and target traffic as provided in the concession agreement along with the projected traffic as on the target date are given below:

Target Date – April 01, 2020

Target Traffic — 54,558 PCUs

Projected Traffic as on Target Date —53,515 PCUs

As informed to us by the Management, the actual traffic volume has fallen short of the target traffic as on the target date. However, the concession agreement states that only in the event that the Actual Average Traffic has fallen short of the Target Traffic by more than 2.5% (two point five per cent) thereof or exceeded the Target Traffic by more than 2.5% (two point five per cent) thereof, the Concession Period shall be deemed to be modified in accordance with Clause 29.2.

Since the shortfall is less than 2.5%, it does not warrant to extension of the concession period.

Site visit date – October 4, 2019

IRBTC Road Project photographs



- **MVR Infrastructure & Tollways Limited**

NH 7 is one of India's busiest traffic routes, connecting the north and south of India via commercial hubs like Varanasi, Rewa, Jabalpur, Nagpur, Adilabad, Nirmal, Armoor in (Nizamabad), Kamareddy, Hyderabad, Kurmool, Anantapur, Chikkaballapur, Bangalore, Krishnagiri, Salem, Madurai, Tirunelveli and Kanyakumari.

The Omalur–Salem–Namakkal NH 7 Project stretches from Omalur to Namakkal, passing through the Salem and Namakkal districts.

MVR project covers the Omalur and Namakkal section of NH 7 from 180.0 km to 248.6 km. The project has been implemented on a BOT basis by the NHAI and is a combination of construction and maintenance packages as given under:

Maintenance package - From 180 km to 207.5 km

Construction & Maintenance Package - From 207.5 km to 248.625 km

The project covers the stretch from Omalur to Namakkal and passes through two districts namely Salem and Namakkal. This project has been awarded for a concession period of 20 years starting from August 14, 2006. The project has been commissioned and is currently in the operation / maintenance phase. The project includes 1 Toll Fee Plaza, 8 Vehicular Underpasses, 36 Culverts, 11 pedestrian underpasses, 5 Flyovers & Railways Overbridges, 14 Minor bridges, and 16 Major Intersections. It has 68.625 Km Four-Lane Service Carriageway.

Due to the suspension in toll for a period of 24 days in the year FY17 due to demonetization MVR was entitled to extension of additional 24 days.

Site visit date – October 3, 2019

MVR Road Project photographs



- **IRB Pathankot Amritsar Toll Road Limited**

NH 15 is a two to four lane National Highway in India. The NH 15 is one of the major highways of northwestern India, starting at Pathankot in the state of Punjab and traversing through the states of Punjab, Rajasthan and ending at Samakhiali of Gujarat. Important cities and towns, en-route, are Amritsar, Bhatinda, Ganganagar, Bikaner, Jaisalmer and Barmer. In the state of Punjab, NH 15 passes through the districts of Gurudaspur, Amritsar, Firozpur, Faridkot, Moga, Mukatsar and Bhatinda. The Pathankot – Amritsar NH 15 Project is part of the high-density traffic corridor, catering to various types of traffic, including urban, suburban and regional traffic.

IRBPA project covers the Pathankot and Amritsar section of NH 15 from 6.082 km to 108.502 km. The project has been awarded to IRBPA for a concession period of 20 years starting from December 31, 2010 on the basis of grant given by NHA of INR 1,269.0 Mn.

The project is in the state of Punjab, and passes through the districts of Gurudaspur, Amritsar, Firozpur, Faridkot, Moga, Mukatsar & Bhatinda. The project stretch provides connectivity for traffic from the states of Punjab and Rajasthan to Jammu and Kashmir. The project has been commissioned and is currently in the operation/ maintenance phase. The project includes 2 Toll Fee Plaza, 30 Bus Bays, 317 Culverts, 5 Truck Lay Bys, 14 Vehicular Underpasses, 5 Flyovers, 5 Railways Over bridges, 6 Minor bridges, 4 Major Bridges and 168 Major Intersections. It has 102.420 Km Four-Lane Service Carriageway and 44.180Km.

Modification in the Concession Period

As per the Clause 29 of the concession agreement between NHA and IRBPA provided to us by the Management, if the actual traffic falls short or exceeds target traffic on a defined date, the concession period shall be revised subject to calculation specified therein. The target date and target traffic as provided in the concession agreement along with the projected traffic as on the target date are given below:

Target Date – January 01, 2019

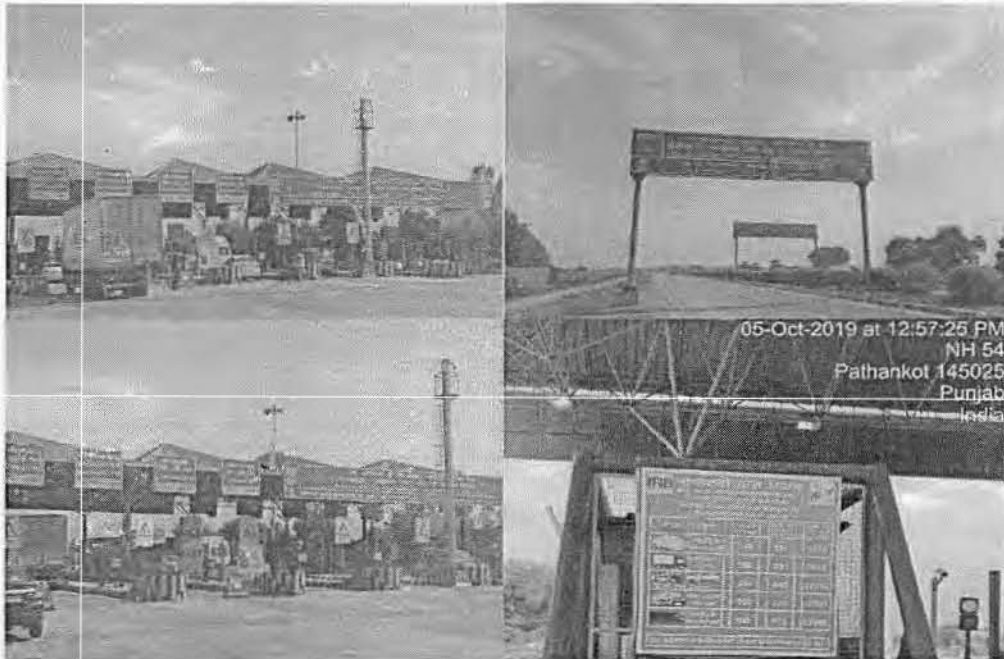
Target Traffic — 34,498 PCUs

Actual Traffic as on Target Date —20,776 PCUs

As informed to us by the Management, the actual traffic volume has fallen short of the target traffic as on the target date. This warranted for an extension of the concession period. Further, due to the suspension in toll for a period of 24 days in the year FY17 due to demonetization, IRBPA was entitled to extension of additional 24 days. Accordingly, the total concession period has been extended to 24.08 years i.e. up to January 22 , 2035 (from the original 20 years) by the Management.

Site visit date – October 5, 2019

IRBPA Road Project photographs



2. On-going litigations

As informed by the Management, no key changes have occurred from the previous six months of the half yearly valuation report in the list of all material litigations, (including tax litigations, if any) against the InvIT Assets. We have been informed by the Management that the sponsor i.e. IRB would indemnify the Trust and its InvIT Assets against any financial losses suffered or incurred in connection with any pending or threatened claims against the Trust made prior to the transfer of the assets to the Trust, hence no impact has been factored on the valuation of the InvIT Assets.

3. Details of major repairs for each InvIT Asset

Historical major repairs (INR Mn):

InvIT Asset	FY 18	FY 19
IRBSD	157.6	403.8
MVR	-	127.8

As informed by the Management there were no major repairs incurred historically for InvIT Assets other than IRBSD and MVR.

Forecasted major repairs (INR Mn):

InvIT Asset	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26	FY 27	FY 28	FY 29
IDAA	236.3	-	660.8	-	-	-	-	-	-	-
IRBSD	384.0	-	-	-	-	-	-	-	-	-
IRBTA	36.2	-	243.0	244.2	-	-	-	-	330.4	405.3
IRBJD	363.2	392.3	423.7	-	-	-	-	770.3	830.5	1083.7
IRBTC	309.9	-	-	-	-	431.7	-	-	-	-
MVR	82.3	-	-	-	171.9	169.8	-	-	-	-
IRBPA	283.7	259.3	219.2	-	-	326.5	295.8	81.0	-	150.0

InvIT Asset	FY 30	FY 31	FY 32	FY 33	FY 34	FY 35	FY 36	FY 37	FY 38	FY 39
IDAA	-	-	-	-	-	-	-	-	-	-
IRBSD	-	-	-	-	-	-	-	-	-	-
IRBTA	50.0	-	-	-	216.5	216.5	-	-	-	-
IRBJD	200.0	-	-	37.0	375.5	250.9	-	-	-	-
IRBTC	549.1	-	-	-	-	335.6	-	-	-	-
MVR	-	-	-	-	-	-	-	-	-	-
IRBPA	473.7	-	-	-	-	-	-	-	-	-

4. Permits & Licenses for InvIT Assets

We have been informed by the Management about the updated permits and licenses of the individual InvIT Asset which has been disclosed in the Annexure 2. We understand from the Management that there are no permit and licenses pending as on the Valuation Date which may affect the operations of the InvIT Assets. We have not independently verified the documents related to the permits and licenses and have relied on the representation by the Management regarding the same.

5. Other disclosures

5.1 List of up to date/overdue periodic clearances

The Management has confirmed that there are no up to date/overdue periodic clearances.

5.2 Details of revenue pendency including local authority rates associated with InvIT asset and compounding charges:

The Management has confirmed that there is no revenue pendency including local authority rates and compounding charges associated with the InvIT Assets.

5.3 Vulnerability to natural or induced hazards that may not have been covered in town planning/building control:

The Management has confirmed that there is no vulnerability to natural or induced hazards that may not have been covered in town planning/building.

D. VALUATION METHODOLOGIES

The standard of value used in this analysis is the Fair value which can be defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

Fair value has been established based on premises of value in accordance with commonly used and internationally accepted methods of valuation and underlying analytical approaches appropriate to the facts and circumstances pertaining to the InvIT Assets valued.

This valuation considered the three basic approaches to value: income, market and cost. These three approaches are summarized as follows:

1. Income Approach

The income approach uses valuation techniques to convert future monetary benefits (for example, cash flows or earnings) to a single present value indicated by current market expectations about those future benefits. The income approach can indicate the value of a business, business ownership interest, asset or liability.

2. Market Approach

The market approach uses prices and other relevant information generated by market transactions involving identical or comparable assets or liabilities. It can be applied to indicate the value of a business, business ownership interest, asset or liability by using one or more methods that derive market value multiples of a specific performance metric from a set of identical or similar businesses, business ownership interests, assets or liabilities that have been sold.

3. Cost (Asset-Based) Approach

The cost approach is based on the principle of substitution, which suggests that a market participant (buyer) will pay no more for an asset than the current cost to acquire or construct a substitute asset of equal or comparable utility (often referred to as replacement cost new). When the cost to reproduce an asset exceeds the cost to replace it, if measurable, the replacement cost new is normally the proper starting point to develop an indication of value using the cost approach. Therefore, a value indicated by the cost approach is based on the replacement cost new less depreciation allowances for physical deterioration and functional and economic obsolescence, when present and measurable.

The usefulness of each approach has been evaluated based on the premise of value, the type of asset or liability, the applicability of the approach to that asset or liability and the nature of the data available.

The premise of value, selected approaches and specific methodologies applied in the valuation of each of the asset and liability classes are described in the related sections of this report.

E. VALUATION APPROACH

1. Approach

In case of estimating the Enterprise Values of the InvIT Assets, the Discounted Cash Flow (DCF) method of the income approach was considered the most appropriate method for valuation.

The income approach explicitly recognizes that the current value of an investment is premised on the expected receipt of future economic benefits such as cost savings, periodic income or sale proceeds. An indication of value is developed by discounting expected future cash flows available to the providers of the invested capital at a rate that reflects both the current return requirements of the market and the risks inherent in the specific investment. Using an invested capital approach based on a normalized capital structure reflects the earning power of the enterprise without the impact of entity-specific funding decisions.

In the DCF method of the income approach, annual future cash flows are estimated then individually discounted to present value. The summation of the discounted cash flows during the project life provides an indication of the value of the amount a prudent investor would pay for the business.

In case of road projects, the life of the project is limited to the concession period, and since it is not a going concern, there will not be a terminal value.

The cash flow projections were provided by the Management. After establishing the cash flows to be used, the DCF method typically involves:

- Estimating the free cash flow to the firm for the balance project life;
- Determining an appropriate discount rate to reflect the present day value of money and risk; and
- Discounting the free cash flows to arrive at their Net Present Value ("NPV").

Accordingly, for this analysis, the financial projections for the remaining life of each Road Project have been relied upon.

2. Key Inputs

The key inputs of the projections as provided by the Management are as follows:

Toll Revenues: Toll revenues are collected from each toll plaza and the categories of vehicles include car/van/jeep, bus, LCV, truck (2 axle), truck (3 axle) and MAV. Also, the passes are divided into single, daily, monthly and local pass. Each of these factors for computing the toll revenues through the concession period for each Road Project were provided by the Management. I understand that the Management relied on an external professional agency (M/s GMD Consultants) for the traffic related inputs (traffic growth rates, etc.) which was one of the most important input in projecting the toll revenues. As confirmed by the Management, the traffic volumes for each InvIT Asset has been estimated by the traffic consultant after considering overall structure and condition of the projects including analysis of demand and supply and strategic geographical locations of the individual InvIT Assets. The current toll rates provided by the Management have been validated based on site visits carried out by us. The toll rates have been projected to grow in the manner stipulated in the individual concession agreements of the InvIT Assets. The variable factor determining the escalation in toll tariff is "Wholesale price Index" (WPI) which is considered as 5.0% p.a. through the projected period based on the discussion with the Management.

Operating & Maintenance Expenses: O&M expenditures estimated by the Management over the Projected Period are based on the Technical study report by the external professional agency (M/s GMD Consultants) and the actuals incurred during the historical period.

Major Maintenance & Repair Expenses (MMR): Major maintenance expenses are costs that are incurred to bring the road asset back to an earlier condition or to keep the road asset operating at its present condition. I understand that the Management relied on an external professional agency (GMD Consultants) for the MMR estimates.

Depreciation and Amortization: The toll collection rights for the 7 InvIT Assets have been amortized over the period of concession, using revenue based amortization. Further, for other Fixed assets, the depreciation method prescribed by the Companies Act has been followed. Since depreciation and amortization is a non-cash expenditure, it has been added back to arrive at the net cash flows.

NHAI Premium: NHAI premium is the money offered by the concessionaire to NHAI to bag the right to widen a road, maintain it, and collect toll from road users during the concession period. Further, developers can defer premium payment only if they do not collect enough toll revenue in a year to pay for it after servicing debt and operations and maintenance costs. They have to pay interest on the premium deferred. For DCF, the NHAI premium provision (which is expensed out in the P&L) is added back since it's a non-cash expenditure and the actual premium paid in each of these years is deducted to arrive net cash flows. Based on information provided by the Management, in case of IRBTC, deferred NHAI premium interest is assumed at 7.65% per annum through the balance project life. (based on rate applicable as of September 30, 2019)

Revenue Share: The revenues collected from the toll would be shared annually and paid to the NHAI in the form of a concession fee. The percentage of revenue that the Road Project has to share with the NHAI is defined in the Concession Agreement. This is applicable in case of IRBSD and MVR only.

Taxes: The taxes payable during the project life are estimated by the Management using the MAT rates and normalised tax rates, whichever applicable. 80IA tax benefits have been accounted for wherever applicable while projecting the tax numbers.

3. Discount Rate Development

When applying the DCF methodology, the cash flows expected to be generated by a business are discounted to their present value equivalent using a rate of return that reflects the relative risk of the investment, as well as the time value of money.

Since the purpose is to discount free cash flows available to firm, WACC is calculated by multiplying cost of equity and cost of debt with their respective weights in the overall capital structure of the InvIT Assets and adding both.

The WACC provides an expected rate of return based on the capital structure, the required return on the equity, and the required yield on the interest-bearing debt. Since value is premised on a current transaction between willing parties, industry specific estimates relative to capital structure, required return on equity, and required yield on interest-bearing debt have been applied. The formula for calculating WACC is:

$$\begin{aligned} \text{WACC} &= (W_e)(K_e) + (W_d)(K_d)(1-t) \\ \text{Where } W_e &= \text{Equity weight in total capital} \\ K_e &= \text{Cost of equity} \\ K_d &= \text{Cost of debt} \end{aligned}$$

T = Tax rate
 W_d = Debt weight in total capital

The costs of equity and debt are weighted in terms of a typical industry capital structure to arrive at an estimated WACC.

The derivation of each of the inputs is described below.

Required Rate of Return on the Equity ("Cost of Equity" or "COE")

The rate of return on equity capital is estimated using the Capital Asset Pricing Model ("CAPM"). The CAPM has been empirically tested and is widely accepted for the purpose of estimating a company's required return on equity capital. In applying the CAPM, the rate of return on common equity is estimated as the current risk-free rate of return on a long-term government bond plus a market risk premium, multiplied by the beta for the shares. Beta is defined as a risk measure that reflects the sensitivity of a company's share price to the movements of the stock market as a whole.

K_e = $RFR + \beta \times (ERP) + CSRP$
 where:
 RFR = Risk-free rate
 β = Security's beta statistic
 ERP = Equity Risk Premium over RFR
 CSRP = Company Specific Risk factor

R_f = Risk-free rate of return = The yield on the India 10-Year Govt. Bond Yield as of the Valuation Date was used as a proxy for the risk-free rate. A yield of 6.702 percent for India was considered to reasonably represent a consensus viewpoint of the risk-free rate of return.

β = Beta = Beta is a measure of the risk of a given security relative to that of the overall market. The concluded beta is based on the median of the unlevered beta(s) of the selected guideline companies, which was then re-levered based on the concluded capital structure for the Company. Further, for re-levering the beta, the tax rate applicable to the project is considered. The following companies were considered relevant to the INVT Assets for this analysis:

1. IRB Infrastructure Developers Limited
2. MEP Infrastructure Developers Limited
3. Sadbhav Infrastructure Project Limited
4. Bharat Road Network Limited

ERP = Equity risk premium: The market equity risk premium is estimated based on consideration of historical realized returns on equity investments over a risk-free rate as represented by 10-year government bonds and forward-looking equity risk premium estimates. Data sources reviewed generated a range of equity risk premium indications. However, a 7.0% equity risk premium for India was considered to reasonably represent a consensus viewpoint of the market equity risk premium.

Employing the preceding inputs, the cost of equity (K_e) in India was estimated as follows:

K_e	=	$R_f + \beta * (ERP)$
K_e	=	6.7% + 0.9* (7.0%)
K_e	=	12.7%

CSRP = Company Specific Risk Premium = The estimated cost of equity has been further adjusted for company specific risk factors. This includes risk based on the fundamentals of each of the InvIT Asset. Keeping all these factors in mind, 1.0% CSRP has been considered for IDAA & IRBSD and 2.0% CSRP has been considered for IRBTA, IRBJD, IRBTC, MVR & IRBPA. The concluded Cost of Equity is as provided in the table below:

Particulars	Concluded Ke
For IDAA & IRBSD	13.7%
For IRBTA, IRBJD, IRBTC, MVR & IRBPA	14.7%

Cost of Debt (K_d)

The cost of debt capital (K_d) is the current average borrowing cost that a market participant would expect to pay, to obtain its debt financing assuming the InvIT assets being operational. However, because interest expense is tax deductible, the effective cost of debt is the after-tax cost. The tax rate used is the average of tax rates expected to be paid over the remaining project life of each InvIT asset.

K _d	=	K * (1-t)
Where		
K	=	Pre-tax rate of return on debt capital
K _d	=	After-tax rate of return on debt capital
t	=	Tax rate applicable for the InvIT asset

The after-tax cost of debt is calculated as follows:

Pre-tax cost of debt	Tax-rate	Concluded Cost of debt
9.5%	17.5%	7.8%

Capital Structure

Based on the average debt:equity ratio of Road BOT projects over its life of concession, the following is considered as the capital structure for the InvIT Assets:

Debt/Total Capital	Equity/Total Capital	Capital Structure
50.0%	50.0%	50:50

Concluded Discount Rate

Based on these inputs, discount rate for the InvIT Assets is as provided in the table below:

Particulars	Cost of equity	Cost of debt	Debt: Equity	WACC
IDAA & IRBSD	13.7%	7.8 %	50:50	11.0%
IRBTA, IRBJD, IRBTC, MVR & IRBPA	14.7%	7.8%	50:50	11.5%

Please refer to WACC exhibit for the respective InvIT Assets for detailed analysis

F. SOURCES OF INFORMATION

During this valuation analysis, reliance was placed on financial and other information, including prospective financial information, obtained from Management and from various public, financial, and industry sources. The concluded estimate is dependent on such information being complete and accurate in all material respects.

The principal sources of information used in performing the valuation include:

- Discussions with, and other information provided by the Management, including an overview of the background of the InvIT Assets;
- Projected financial information for the remaining project life for each of the Road Project;
- Unaudited provisional financial statements of the InvIT Assets & Trust as of September 30, 2019
- Traffic study report and Technical study report by M/s GMD Consultants for all the InvIT Assets,
- List of licenses / approvals, details of tax litigations, civil proceeding and arbitrations of the InvIT Assets as provided by the Management;
- Capital IQ's database of publicly traded companies;
- Bloomberg on-line database covering financial markets, commodities, and news;
- MSCI Barra Beta Database for guideline companies market beta; and
- Publicly available information (i.e. analyst reports, articles, studies, websites).

RV has relied upon the information provided to it and referred to above and has not endeavoured to seek any independent confirmation of its reliability, accuracy or completeness. It does not imply, and it should not be construed, that RV has carried out any form of audit or other verification of the information that it has relied upon. RV has not conducted any audit of the financial projections of the InvIT Assets.

Accordingly, whilst the statements made in this report are given in good faith, RV does not accept any responsibility neither for any errors in the information on which they are based nor for the effect of any such errors on the valuation.

G. ASSUMPTIONS AND LIMITING CONDITIONS

This service was performed with the following general assumptions and limiting conditions.

RV's valuation report for the estimation of Enterprise Value of InvIT Assets does not constitute an audit in accordance with auditing standards. RV has relied on explanations and information provided by Management and accepted the information and projections provided to be accurate. Although, RV has reviewed such data for consistency and reasonableness, RV has not independently assessed or otherwise verified the data provided. Nothing has come to RV's attention to indicate that the information provided had material misstatements or would not afford reasonable grounds upon which to base the Report.

RV's valuation is primarily from a business perspective and has not taken into account various legal and other corporate structures beyond the limited information made available.

The responsibility for forecasts and the assumptions on which they are based is solely that of Management. However, RV did perform certain procedures to determine that the prospective financial information was reasonable and appropriate for use in the valuation process. It must be emphasized that revenue and profit forecasts necessarily depend upon subjective judgment. They are to a greater or lesser extent, according to the nature of the business and the period covered by the forecasts, subject to substantial inherent uncertainties. In consequence, they are not capable of being audited or substantiated in the same way as financial statements, which present the results of completed periods. RV has relied on Management judgment and has not done an in-depth market assessment.

Similarly, RV has relied on data from external sources. These sources are considered to be reliable and therefore, RV assumes no liability for the accuracy of the data. RV has assumed that the business continues normally without any disruptions due to statutory or other external/internal occurrences.

The scope of work has been limited both in terms of the areas of the business and operations which have been reviewed. There may be matters, other than those noted in this report, which might be relevant in the context of the transaction and which a wider scope might uncover.

Please note that the valuation has been performed as of the Valuation Date and reflects the information available to the RV as at the date of the report, which RV was instructed would have been available as at September 30, 2019. Economic conditions, market factors and performance change may result in RV's conclusions becoming quickly outdated.

This report is issued on the understanding that Management has drawn RV's attention to all matters of which they are aware concerning the financial position of the InvIT Assets, which may have an impact on this report up to the date of issue. RV has no responsibility to update this report for events and circumstances occurring after the date of this Report.

The valuation has been carried out independently for estimation of Enterprise Value of the InvIT Assets. RV has no present or planned future interest in the Trust or any of the InvIT Assets and the fee for this report is not contingent upon the values reported herein. RV's valuation should not be construed as investment advice; specifically, RV does not express any estimate on the suitability or otherwise of entering into any transaction with the Trust or InvIT Assets.

These are the conditions and assumptions upon which RV's reports are normally prepared and form an integral part of appointment together with the Agreement, Addendum and Terms of Engagement. These conditions and assumptions apply to the report that is the subject of this instruction. RV has made certain

assumptions in relation to facts, conditions or situations affecting the subject of, or approach to, this exercise that has not been verified as part of the engagement but rather, treated as "a supposition taken to be true". In the event that any of these assumptions prove to be incorrect then RV's estimate on value will need to be reviewed.

The Trust is the sole intended user of this report, and the use of the report is restricted to The Trust for the purpose indicated herein. This restriction does not preclude the Trust from providing a copy of the report to a third party whose review would be consistent with the intended use. RV is not responsible for the unauthorized use of this report.

H. GLOSSARY

BMP	Bharatmala Pariyojana
Bn	Billion
BOT	Build – Operate – Transfer
BSE	Bombay Stock Exchange of India
CAGR	Compounded Annual Growth Rate
Capex	Capital Expenditure
CAPM	Capital Asset Pricing Model
CSRP	Company Specific Risk Premium
DBFOT	Design Build Finance Operate Transfer
DCF	Discounted Cash Flow
EBIT	Earnings Before Interest and Tax
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortization
EPC	Engineering, Procurement and Construction
ERP	Equity Risk Premium
EV	Enterprise Value
FDI	Foreign Direct Investment
FII	Foreign Institutional Investor
FV	Fair Value
FY	Financial Year
HAM	Hybrid Annuity Model
HTMS	Highway Traffic Management Systems
HUDCO	Housing and Urban Development Corporation Limited
IBBI	Insolvency and Bankruptcy Board of India
IDAA	IDAA Infrastructure Limited
IDF	Infrastructure Debt Fund
IIFCL	India Infrastructure Finance Company Limited
Ind-AS	Indian Accounting Standard
INR	Indian National Rupee
Investment Manager	IRB Infrastructure Private Limited
IPO	Initial Public Offer
IRB	IRB Infrastructure Developers Limited
IRBJD	IRB Jaipur Deoli Tollway Limited
IRBPA	IRB Pathankot Amritsar Toll Road Limited
IRBSD	IRB Surat Dahisar Tollway Limited
IRBTA	IRB Talegaon Amravati Tollway Limited
IRBTC	IRB Tumkur Chitradurga Tollway Limited
Ke	Cost of Equity

Km	Kilometer
LCV	Light Commercial Vehicle
Management	Trust's management
MAV	Multi-axle Vehicle
MMR	Major Maintenance & Repairs
Mn	Million
MoRTH	Ministry of Road Transport & Highways
MVR	MVR Infrastructure & Tollways Limited
NH	National Highway
NHAI	National Highways Authority of India
NHDP	National Highways Development Plan
NHIDCL	National Highways and Infrastructure Development Corporation
NPV	Net Present Value
NSE	National Stock Exchange of India
O&M	Operations & Maintenance
P&L	Profit & Loss

I. ANNEXURES

ANNEXURE 1 : DESCRIPTION OF GUIDELINE PUBLIC COMPANIES

After looking for companies operating in the sector relevant to the InvIT Assets, the following companies were shortlisted as guideline companies:

Company Name	Business Description
IRB Infrastructure Developers Limited	IRB Infrastructure Developers Limited engages in the construction, development, and operation and maintenance of roads and highways on build-operate-transfer (BOT) basis in India. The company operates in two segments, BOT Projects and Construction. It is also involved in real estate development; generation and sale of electricity through windmill; and hospitality and airport infrastructure activities. As of March 31, 2018, the company had 17 BOT projects with 12,800 lane kilometers of roads and highways. The company was incorporated in 1998 and is based in Mumbai, India. IRB Infrastructure Developers Limited is a subsidiary of Mhaiskar Ventures Private Limited.
MEP Infrastructure Developers Limited	MEP Infrastructure Developers Limited, together with its subsidiaries, engages in toll operation, maintenance, and collection of road infrastructure assets in India. The company also constructs and repairs roads, maintains structures, flyovers, etc.; and installs toll equipment, cameras, weigh bridges, etc. It operates 5 toll collection projects with a total of 129 toll plazas; 3 operate, maintain, and transfer projects covering an area of 1,361.32 lane kilometers with a total of 9 toll plazas; and 1 build, operate, and transfer project covering an area of 42 lane kilometers with a total of 5 toll plazas. MEP Infrastructure Developers Limited was founded in 2002 and is headquartered in Mumbai, India.
Sadbhav Infrastructure Project Limited	Sadbhav Infrastructure Project Limited engages in the development, construction, operation, and maintenance of infrastructure projects, as well as provision of related consulting and advisory services in India. It develops highways, roads, and related projects on a build, operate, and transfer (BOT) basis. The company was incorporated in 2007 and is based in Ahmedabad, India. Sadbhav Infrastructure Project Limited is a subsidiary of Sadbhav Engineering Limited.
Bharat Road Network Limited	Bharat Road Network Limited develops, implements, operates, and maintains roads/highways projects in India. It offers project, financial, and concession management services; tolling operations and management services; and specialized toll plaza construction and integration with the selected TMS services, as well as corridor and incident management integrated with HTMS services. The company was incorporated in 2006 and is based in Kolkata, India. Bharat Road Network Limited is a subsidiary of SREI Infrastructure Finance Limited.

ANNEXURE 2 : List of Permits and Licenses of the InvIT Assets

I. IDAA

Sr. No.	Description of the permits	Issuing Authority	Current status
1	Labour License under Contract Labour (Regulation and Abolition) Act 1970 and Contract Labour (Regulation and Abolition) Contract Rules 1971		
i	Labour License No. BRC/ALC/REG/57 (20)/2011 dated 21.03.2011 issued to IDAA Infrastructure Limited	Regional Labour Commissioner, Vadodara	Valid up to 28.06.2023
ii	Labour License No. BRC/RLC/LIC/46 (390)/2014 dated 29.12.2014 issued to IDAA Infrastructure Limited	Regional Labour Commissioner, Vadodara	Valid up to 28.12.2019
2	Inspection Certificate, static weigh bridge of Choryasi Toll Plaza	Legal Metrology officer, Surat, Book no. 90, Sr. no. 78/2	Valid up to 19.05.2020
3	Inspection Certificate, static weigh bridge of Choryasi Toll Plaza	Legal Metrology officer, Surat, Book no. 90, Sr. no. 79/2	Valid up to 19.05.2020

II. IRBSD

Sr. No.	Description of the permits	Issuing Authority	Remark	Current status
1	Consolidated Consent and Authorization (CC&A) No. CCA-NAV-240/224/64798 dtd. 04.12.10 under section 25 of Water (Prevention and Control of Pollution) Act, 1974 and Section 21 of Air (Prevention and Control of Pollution) Act, 1981	Environmental Engineer, Gujarat Pollution Control Board	Alipore Hot Mix Plant	Valid up to 08.07.2020
2	Factory License - Registration no. 479/26960/2012 and License no. 15153 dtd.01.01.2012	Joint Director Industrial Safety and Health Surat Region.	Alipore Hot Mix Plant	Valid up to 31.12.2021
3	Registration in Way bridge Calibration Certification No. & Validity Period. VC Number:44012 dtd. 06.05.2014.	Jr. Inspector, Legal Metrology Officer, Bilimora	Alipore Hot Mix Plant	Applied for renewal up to 23.04.2020
4	Registration in Way bridge Calibration Certification No. & Validity Period. VC Number:0213901 dtd. 25.02.2017.	Jr. Inspector, Legal Metrology Officer, palghar	Manor Hot Mix Plant	Valid up to 29.09.2019. Applied for renewal
5	Permission from Pollution Control Board for installation of HMP - No. MPCB/ROT/TR-II/1030/34 dated 07.06.2014	RO, MPCB Thane	Manor Hot Mix Plant	Valid up to 31.03.2024
6	License from the inspector of factories- No. Vasai /2 cm (i) 19201/M-0292/329913 dated 16.07.2014	Director, Ind.safety & health, Mumbai	Manor Hot Mix Plant	Valid up to 31.12.2020

7	Permission for Installation of 25KVA, 40KVA, 100KVA, 380 KVA DG Set	Electrical Inspector, Inspection Department -1 , Thane	Manor Hot Mix Plant	Permanent License
8	Labour License under Contract Labour (Regulation and Abolition) Act 1970 and Contract Labour (Regulation and Abolition) Contract Rules 1971			
i	Labour License No. BRC /ALC/LIC/46 (157)/2009 dated 21.03.2016 issued to IRB Surat Dahisar Tollway Private Limited	Regional Labour Commissioner, Vadodara		Valid up to 13.05.2020
ii	Labour License No. BRC /ALC/LIC/46 (122)/2009 dated 10.03.2016 issued to Modern Road Makers Private Limited	Regional Labour Commissioner, Vadodara		Valid up to 07.04.2020
iii	Labour License No. B. ALC (c)-I /46 (203)/2012-L dated 02.07.2012 issued to IRB Surat Dahisar Tollway Private Limited	Regional Labour Commissioner, Mumbai		Valid up to 01.07.2020
iv	Labour License No. B. ALC (c)-I /46 (273)/2014-L dated 07.08.2014 issued to IRB Surat Dahisar Tollway Private Limited	Regional Labour Commissioner, Mumbai		Valid up to 05.03.2020

III. IRBTA

Sr. No.	Description of the permits	Issuing Authority	Current status
1	Principle employer registration - No. (Labour License No. ALCN/46(L)/158/2010-CL, dated 20.11.2018)	Office the Regional Labour, Nagpur	Valid up to 20.12.2019
2	License for Building & Other Construction activities s No. ALCN/42 (R)/150/2010/BOCW, dated 20/11/2018	Office the Regional Labour, Nagpur	Valid up to 20.12.2019
3	Inspection Certificate for WIM installed at Nandagaon Toll Plaza	Inspector, Legal Metrology , Amravati	Valid up to 16.05.2020
4	Inspection Certificate for Static Weigh Bridge at Nandagaon Toll :Plaza (Amravati Side)	Inspector, Legal Metrology , Amravati	Valid up to 06.12.2020
5	Inspection Certificate for Static Weigh Bridge at Nandagaon Toll :Plaza (Nagpur Side)	Inspector, Legal Metrology , Amravati	Valid up to 19.03.2020

IV. IRBJD

Sr.No	Description of the permits	Issuing Authority	Current Status
1	Labour License under Contract Labour(Regulation and Abolition)Act 1970 and contract Labour (Regulation and Abolition) Contract Rules 1971		

i	Labour License No.JP-46(153)/2013-RLC,dated 03.10.2013	Regional Labour Commissioner (Central), Jaipur	Valid up to 02.10.2020 (copy enclosed)
2	Provisional permission for energization of Installation (DG) set/Captive power) under Rule 63 & 47 A of Indian Electricity Rule 1956		
i	Barkheda-Chandlai Toll Plaza	Sr.Electrical Inspector, Jaipur	Valid up to March 2021. (copy enclosed)
ii	Sonwa Toll Plaza	Sr.Electrical Inspector, Jaipur	Valid up to March 2021. (copy enclosed)
3	WIM System		
i	Inspection certificate for Barkheda -Chandlai Toll Plaza	Weigh and Measure Department, Jaipur	Stamping Certificate renewed up to 20.11.2019
ii	Inspection certificate for Sonwa Toll Plaza	Weigh and Measure Department, Tonk	Stamping Certificate renewed up to 31.10.2019
4	Static Weigh Bridge		
i	Inspection Certificate for Static Weight Bridge at Barkheda-Chandlai Toll Plaza	Weigh and Measure Department, Jaipur	Stamping Certificate for WBE 44 (Jaipur Side)-Renewed upto 07.01.2020, Stamping Certificate for WBE 47 (Tonk Side)-Renewed up to 03.05.2019
ii	Inspection Certificate for Static Weight Bridge at Sonwa Toll Plaza	Weigh and Measure Department, Tonk	Stamping Certificate for WBE 45 (Jaipur Side)-Renewed upto 21.02.2020, Stamping Certificate for WBE 46 (Tonk Side)-Renewed up to 13.03.2020

V. IRBTC

Sr. No.	Description of the permits	Issuing Authority	Current status
1	Certificate of Shop & establishments for Project office, Hiriyyur	Labour Inspector, Hiriyyur	Permission renewed up to date 31.12.2020
2	Certificate of Principle employer registration	Asst. Labour Commissioner (Central), Bangalore	One time permission
3	Labour License for Local Labours	Asst. Labour Commissioner (Central), Hubli	Valid up to 05.04.2020

4	Labour License for Local Labours	Asst. Labour Commissioner (Central), Bangalore	Valid up to 30.03.2020
5	License for Generator more than 5 KVA (40kva 62.5 kva and 125 kva)	a) Electrical Inspector, Tumkur (Karjeevana halli toll) b) Electrical Inspector, Chitradurga (Guilalu Toll). c). Electrical inspector chitradurga (Project office, Hiriyur).	a) Valid up to 05.03.2020 b) Valid up to 13.05.2020 c) Valid up to 13.05.2020
6	Inspection Certificate for WIM installed at Guilalu Toll	Assistant Controller, Legal Metrology Department, Davangere	a) Valid up to 16.09.2020 (4 Nos. indicators restamping work done + Repaired 2 Nos Indicators restamping) b) Valid up to 02.05.2020 (1 No. Indicator restamping work done) c) Valid up to 18.12.2019 (5 Nos. Indicator restamping work done)
7	Inspection Certificate for WIM installed at Karjeevanhalli Toll No. 9120160352273 and 9120160352274 dated 16.03.2016	Assistant Controller, Legal Metrology Department, Tumkur	1. Valid up to 02.12.2019. 2. Valid up to 12.09.2020
8	a) 01 No of 100 MT Static Weigh Bridge at Guilalu Toll Plaza towards Tumkur side	Assistant Controller of Legal Metrology, Chitradurga	Valid up to 23.04.2020
	b) 01 No of 100 MT Static Weigh Bridge at Guilalu Toll Plaza towards Chitradurga side		Valid up to 18.12.2019
9	a).01 No of 100 MT Static Weigh Bridge at Karjeevanahally Toll Plaza (Towards Tumkur Side)	Assistant Controller of Legal Metrology, Tumkur	Valid up to 15.03.2020
	b) 01 No of 100 MT Static Weigh Bridge at Karjeevanahally Toll Plaza (Towards Chitradurga Side)	Assistant Controller of Legal Metrology, Tumkur	Valid up to 23.11.2019

VI. MVR

S. No.	Description of the Permits	Issuing Authority	Current Status
1	License No. M/46/17/2013/B3 under the Contract Labour (Regulation and Abolition) Act, 1970 Dt. 14.02.2018	Regional Labour Commissioner (Central), Chennai	Valid up to 03.02.2020
2	Certificate for registration of DG Sets (40KVA and 125KVA no. 03/2012-13)	Government of Tamil Nadu, Electrical Inspector, Salem	Valid up to 23.04.2021

VII. IRBPA

Sr. No.	Approval	Issuing Authority	Current Status
1	Labour License for Contract Labours 46 (L-112)/2013/ACH/Pb dated 30.08.2018	Office of the Assist. Labour Commissioner , Jalandhar	Valid up to 01.9.20
2	Inspection Certificate, WIM at Ladpalwan Toll Plaza Certificate No. 377470 and Receipt No. 153470	Controller Legal Metrology, Punjab, Pathankot	Valid up to 16.12.19
3	Inspection Certificate, Static Weigh Bridge at Ladpalwan Toll Plaza PTK Side Certificate No. 377343 and Receipt No. 153343	Controller Legal Metrology, Punjab, Pathankot	Valid up to 03.12.19
4	Inspection Certificate, Static Weigh Bridge at Ladpalwan Toll Plaza ASR Side Certificate No. 377342 and Receipt No. 153342	Controller Legal Metrology, Punjab, Pathankot	Valid up to 03.12.19
5	Inspection Certificate, WIM at Waryam Nangal Toll Plaza Certificate No. 356631 and Receipt No. 362631	Controller Legal Metrology, Punjab, Amritsar	Valid up to 12.12.19
6	Inspection Certificate, Static Weigh Bridge at Waryam Nangal Toll Plaza PTK Side Certificate No. 362003 and Receipt No. 356003	Controller Legal Metrology, Punjab, Amritsar	Valid up to 04.11.19
7	Inspection Certificate, Static Weigh Bridge at Waryam Nangal Toll Plaza ASR Side Certificate No. 362002 and Receipt No. 356002	Controller Legal Metrology, Punjab, Amritsar	Valid up to 04.11.19

ANNEXURE 3 :Exhibits

Private & Confidential
IRB InvIT Fund
Valuation of InvIT Assets
Valuation as of September 30, 2019
Table of Contents

Exhibits

Exhibit 1	Valuation Summary
IDAA Infrastructure Limited ("IDAA")	
Exhibit 2	Discounted Cash Flow Analysis - IDAA
Exhibit 2.1	Weighted Average Cost of Capital
IRB Surat Dahisar Tollway Limited ("IRBSD")	
Exhibit 3	Discounted Cash Flow Analysis - IRBSD
Exhibit 3.1	Weighted Average Cost of Capital - IRBSD
IRB Talegaon Amravati Tollway Limited ("IRBTA")	
Exhibit 4	Discounted Cash Flow Analysis - IRBTA
Exhibit 4.1	Weighted Average Cost of Capital - IRBTA
IRB Jaipur Deoli Tollway Limited ("IRBJD")	
Exhibit 5	Discounted Cash Flow Analysis - IRBJD
Exhibit 5.1	Weighted Average Cost of Capital - IRBJD
IRB Tumkur Chitradurga Tollway Limited ("IRBTC")	
Exhibit 6	Discounted Cash Flow Analysis - IRBTC
Exhibit 6.1	Weighted Average Cost of Capital - IRBTC
MVR Infrastructure & Tollways Limited ("MVR")	
Exhibit 7	Discounted Cash Flow Analysis - MVR
Exhibit 7.1	Weighted Average Cost of Capital - MVR
IRB Pathankot Amritsar Toll Road Limited ("IRBPA")	
Exhibit 8	Discounted Cash Flow Analysis - IRBPA
Exhibit 8.1	Weighted Average Cost of Capital - IRBPA
Exhibit 9	Present value of IM & other fee payable by the Trust

Private & Confidential

IRB InvIT Fund

Exhibit 1

Valuation of InvIT Assets

Valuation as of September 30, 2019

Valuation Summary

INR millions

Particulars	Enterprise Value
(1) Enterprise Value - IDAA	4,557.0
(2) Enterprise Value - IRBSD	10,644.0
(3) Enterprise Value - IRBTA	9,486.0
(4) Enterprise Value - IRBJD	15,826.0
(5) Enterprise Value - IRBTC	14,912.0
(6) Enterprise Value - MVR	4,702.0
(7) Enterprise Value - IRBPA	14,837.0
Total Enterprise value	74,964.0
(8) Less: Debt at Trust level	(14,898.4)
(8) Add: Cash & Bank Balance (consolidated)	1,411.6
(9) Less: Present value of IM & other expense payable by the Trust	(1,572.0)
(8) Add / (Less): Other working capital related adjustment (consolidated)	167.1
Value of IRB InvIT Fund	60,072.3

Notes:

- (1) Refer Exhibit 2
- (2) Refer Exhibit 3
- (3) Refer Exhibit 4
- (4) Refer Exhibit 5
- (5) Refer Exhibit 6
- (6) Refer Exhibit 7
- (7) Refer Exhibit 8
- (8) Based on the provisional consolidated financials of IRB InvIT Trust as of 30 September 2019, provided by the Management.
- (9) Refer Exhibit 9

Private & Confidential
 IRB InvIT Fund
 Valuation of IDAA Infrastructure Limited ("IDAA")
 Valuation as of September 30, 2019
 Discounted Cash Flow Analysis
 INR millions

Exhibit 2

IDAA Infrastructure Limited ("IDAA")

Assumptions					
(1) Discount Rate		11.0%			
		Projected 6m	Projected 31-Mar-21	Projected 10m	
	Fiscal year ended 31 March,	31-Mar-20	31-Mar-21	25-Jan-22	
Revenues		1,422.3	2,901.5	2,857.9	
% Growth		nmt	11.5%	nmt	
Operating and maintenance expense (including major maintenance)		329.3	366.0	1,056.1	
EBITDA		1,093.0	2,535.5	1,801.8	
Depreciation & Amortization		935.9	2,045.9	1,874.2	
(2) Operating EBIT		157.1	489.6	(272.4)	
Estimated Income Taxes		27.5	85.5	-	
As % of Operating EBIT		17.5%	17.5%	0.0%	
Net Operating Profit After Tax (NOPAT)		129.7	404.1	(272.4)	
(2) Add: Depreciation and Amortisation		935.9	2,045.9	1,874.2	
FREE CASH FLOW TO THE FIRM		1,065.6	2,450.0	1,601.8	
Partial Period		0.50	1.00	0.82	
Discount Periods		0.25	1.00	1.91	
Present Value Factor		0.97	0.90	0.82	
PRESENT VALUE		1,038.1	2,206.9	1,312.0	
Present Value of Cash Flows		4,557.0			
ENTERPRISE VALUE		4,557.0			
CONCLUDED ENTERPRISE VALUE (Rounded)		4,557.0			

Notes:

- (1) Refer to Exhibit 2.1
 (2) Provided by Management

WEIGHTED AVERAGE COST OF CAPITAL			
	Equity	Cost of Capital	Capital Structure (7)
	Debt	7.8%	50.0%
			50.0%
			11.0%
COST OF EQUITY			
(1)	Risk Free Rate		6.7%
(2)	Market Equity Risk Premium	7.0%	
(3)	Times Levered / Re-levered Beta	0.86	
	Beta Adjusted Equity Risk Premium		6.0%
			12.7%
(4)	Add: Company Specific Risk Premium		1.0%
	Concluded Cost of Equity		13.7%
COST OF DEBT			
(5)	Pre-tax cost of debt		9.5%
(6)	Tax Rate		17.5%
	Post tax Cost of Debt		7.8%

Notes:

- (1) Based on the India 10-Year Government Bond Rate. Source: Bloomberg
- (2) The market equity risk premium is estimated based on consideration of historical realized returns on equity investments over a risk-free rate as represented by 10-year government bonds and forward-looking equity risk premium estimates. Data sources reviewed generated a range of equity risk premium indications. However, a 7.0% equity risk premium was considered to reasonably represent a consensus viewpoint of the market equity risk premium.
- (3) The concluded beta is based on the median of the unlevered betas of the selected guideline companies, which was then re-levered based on the concluded capital structure for the Project.
- (4) Additional risk based on the fundamentals of the Project.
- (5) We understand that Cost of Debt for operational Road BOT Projects is in the range of 9.25% to 9.80%. Hence, we have considered 9.5% as the pre-tax cost of debt.
- (6) Based on the tax rate applicable for the project for the remaining concession period.
- (7) Based on the average debt:equity ratio of Road BOT projects over its life of concession.

Private & Confidential
 IRB InviT Fund
 Valuation of IRB Sural Dahisar Tollway Limited ("IRBSD")
 Valuation as of September 30, 2019
 Discounted Cash Flow Analysis
 INR millions

Exhibit 3

IRB Surat Dahisar Tollway Limited ("IRBSD")

Assumptions					
(1) Discount Rate	11.0%				
		Projected 6m	Projected 31-Mar-21	Projected 31-Mar-22	Projected 9m
	Fiscal year ended 31 March	31-Mar-20	31-Mar-21	31-Mar-22	1-Jan-23
Revenues		2,151.1	4,340.0	4,771.8	4,625.0
% Growth		nmt	9.2%	8.9%	nmt
Operating and maintenance expense (including major maintenance)		420.5	440.0	365.8	308.6
EBITDA		1,730.6	3,900.0	4,406.0	3,716.5
Depreciation & Amortization		741.6	2,319.4	2,550.1	2,151.0
(2) Operating EBIT		989.0	1,590.7	1,855.9	1,565.5
Estimated Income Taxes		172.6	278.2	324.3	273.5
As % of Operating EBIT		17.5%	17.5%	17.5%	17.5%
Net Operating Profit After Tax (NOPAT)		816.2	1,304.5	1,531.6	1,292.0
(2) Add: Depreciation and Amortisation		741.6	2,319.4	2,550.1	2,151.0
FREE CASH FLOW TO THE FIRM		1,457.8	3,623.8	4,081.7	3,443.0
Partial Period		0.50	1.00	1.00	0.76
Discount Periods		0.25	1.00	2.00	2.88
Present Value Factor		0.97	0.90	0.81	0.74
PRESENT VALUE		1,517.6	3,264.2	3,312.3	2,549.4
Present Value of Cash Flows		10,643.5			
ENTERPRISE VALUE		10,643.5			
CONCLUDED ENTERPRISE VALUE (Rounded)		10,644.0			

Notes:

- (1) Refer to Exhibit 3.1
- (2) Provided by Management

Private & Confidential

IRB InvIT Fund

Valuation of IRB Surat Dahisar Tollway Limited ("IRBSD")

Valuation as of September 30, 2019

Weighted Average Cost of Capital

Exhibit 3.1

WEIGHTED AVERAGE COST OF CAPITAL

	Equity	Cost of Capital	Capital Structure (7)	
		13.7%	50.0%	
	Debt	7.8%	50.0%	
				11.0%

COST OF EQUITY

(1)	Risk Free Rate		6.7%
(2)	Market Equity Risk Premium	7.0%	
(3)	Times Levered / Re-levered Beta	0.86	
	Beta Adjusted Equity Risk Premium		6.0%
			12.7%
(4)	Add: Company Specific Risk Premium		1.0%
	Concluded Cost of Equity		13.7%

COST OF DEBT

(5)	Pre-tax cost of debt		9.5%
(6)	Tax Rate		17.5%
	Post tax Cost of Debt		7.8%

Notes:

- (1) Based on the India 10-Year Government Bond Rate. Source: Bloomberg
- (2) The market equity risk premium is estimated based on consideration of historical realized returns on equity investments over a risk-free rate as represented by 10-year government bonds and forward-looking equity risk premium estimates. Data sources reviewed generated a range of equity risk premium indications. However, a 7.0% equity risk premium was considered to reasonably represent a consensus viewpoint of the market equity risk premium.
- (3) The concluded beta is based on the median of the unlevered betas of the selected guideline companies, which was then re-levered based on the concluded capital structure for the Project.
- (4) Additional risk based on the fundamentals of the Project.
- (5) We understand that Cost of Debt for operational Road BOT Projects is in the range of 9.25% to 9.80%. Hence, we have considered 9.5% as the pre-tax cost of debt.
- (6) Based on the tax rate applicable for the project for the remaining concession period.
- (7) Based on the average debt:equity ratio of Road BOT projects over its life of concession.

Private & Confidential

IRB InvIT Fund

Valuation of IRB Talegaon Amravati Tollway Limited ("IRBTA")

Valuation as of September 30, 2019

Discounted Cash Flow Analysis

INR millions

Exhibit 4

IRB Talegaon Amravati Tollway Limited ("IRBTA")

Assumptions

(1) Discount Rate 11.5%

	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	31-Mar-20	31-Mar-21	31-Mar-22	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28
	6m								
	Fiscal year ended 31 March								
Revenues	417.4	862.4	965.1	1,077.8	1,212.9	1,354.0	1,512.6	1,680.5	1,879.2
% Growth	n/a	11.7%	11.9%	11.7%	12.5%	11.6%	11.7%	11.1%	11.8%
Operating and maintenance expense (including m/o or maintenance)	102.1	150.7	394.2	396.6	151.6	159.2	167.2	175.5	520.0
EBITDA	315.2	731.7	580.9	681.1	1,061.3	1,194.8	1,345.5	1,505.0	1,359.2
Depreciation & Amortization	61.7	130.1	145.6	162.6	183.0	204.2	229.2	253.6	293.5
(2) Operating EBIT	253.6	601.6	435.3	518.6	878.3	990.5	1,117.3	1,251.5	1,075.7
Estimated Income Taxes	44.3	105.1	76.1	90.6	153.5	173.1	195.2	219.7	197.9
As % of Operating EBIT	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
Net Operating Profit After Tax (NOPAT)	209.3	496.5	359.2	428.0	724.8	817.4	922.1	1,032.8	887.8
(2) Add: Depreciation and Amortisation	61.7	130.1	145.6	162.6	183.0	204.2	229.2	253.6	293.5
FREE CASH FLOW TO THE FIRM	270.9	626.6	504.8	590.5	907.8	1,021.7	1,150.3	1,286.3	1,171.3
Partial Period	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Discount Periods	0.25	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
Present Value Factor	0.97	0.90	0.80	0.72	0.65	0.59	0.52	0.47	0.42
PRESENT VALUE	263.6	561.9	406.0	425.9	597.2	592.8	598.5	600.3	490.2
Present Value of Cash Flows	8,485.6								
ENTERPRISE VALUE	8,485.6								
CONCLUDED ENTERPRISE VALUE (Rounded)	8,486.0								

Notes:

(1) Refer to Exhibit 4.1

(2) Provided by Management

Private & Confidential

IRB InvIT Fund

Valuation of IRB Talegaon Amravati Tollway Limited ("IRBTA")

Valuation as of September 30, 2019

Discounted Cash Flow Analysis

INR millions

Exhibit 4

IRB Talegaon Amravati Tollway Limited ("IRBTA")

Assumptions

(1) Discount Rate 11.5%

	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	31-Mar-29	31-Mar-30	31-Mar-31	31-Mar-32	31-Mar-33	31-Mar-34	31-Mar-35	31-Mar-36	31-Mar-37	19-Feb-37
	Fiscal year ended 31 March									
Revenues	2,089.6	2,328.2	2,586.8	2,880.1	3,195.3	3,547.4	3,941.2	4,375.3	4,304.5	
% Growth	11.2%	11.4%	11.1%	11.3%	10.9%	11.0%	11.1%	11.0%	nmt	
Operating and maintenance expense (including major maintenance)	610.0	253.6	267.2	280.6	284.8	802.0	900.0	341.7	358.8	
EBITDA	1,479.6	2,074.6	2,319.6	2,599.6	2,900.7	2,745.4	3,041.2	4,033.6	3,945.7	
Depreciation & Amortization	315.2	351.2	390.2	434.5	482.0	535.1	594.5	660.0	649.3	
(2) Operating EBIT	1,164.4	1,723.4	1,929.4	2,165.1	2,418.7	2,210.3	2,446.6	3,373.6	3,296.4	
Estimated Income Taxes	203.4	301.1	337.1	378.3	422.6	388.2	427.5	814.3	829.6	
As % of Operating EBIT	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	24.1%	25.2%	
Net Operating Profit After Tax (NOPAT)	961.0	1,422.3	1,592.3	1,786.8	1,996.1	1,824.1	2,019.1	2,559.3	2,466.8	
(2) Add: Depreciation and Amortisation	315.2	351.2	390.2	434.5	482.0	535.1	594.5	660.0	649.3	
FREE CASH FLOW TO THE FIRM	1,276.2	1,773.5	1,982.5	2,221.3	2,478.1	2,359.2	2,613.7	3,219.3	3,116.1	
Partial Period	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.89	
Discount Periods	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	16.95	
Present Value Factor	0.38	0.34	0.30	0.27	0.24	0.22	0.20	0.18	0.16	
PRESENT VALUE	479.0	597.1	598.6	601.5	601.8	513.9	510.6	564.0	492.6	
Present Value of Cash Flows	9,485.6									
ENTERPRISE VALUE	9,485.6									
CONCLUDED ENTERPRISE VALUE (Rounded)	9,486.0									

Notes:

(1) Refer to Exhibit 4.1

(2) Provided by Management

WEIGHTED AVERAGE COST OF CAPITAL			
	Equity	Cost of Capital	Capital Structure (7)
	Debt	14.7%	50.0%
		7.8%	50.0%
			11.5%
COST OF EQUITY			
(1)	Risk Free Rate		8.7%
(2)	Market Equity Risk Premium		7.0%
(3)	Times Levered / Re-levered Beta		0.86
	Beta Adjusted Equity Risk Premium		6.0%
			12.7%
(4)	Add: Company Specific Risk Premium		2.0%
	Concluded Cost of Equity		14.7%
COST OF DEBT			
(5)	Pre-tax cost of debt		9.5%
(6)	Tax Rate		17.5%
	Post tax Cost of Debt		7.8%

Notes:

- (1) Based on the India 10-Year Government Bond Rate. Source: Bloomberg
- (2) The market equity risk premium is estimated based on consideration of historical realized returns on equity investments over a risk-free rate as represented by 10-year government bonds and forward-looking equity risk premium estimates. Data sources reviewed generated a range of equity risk premium indications. However, a 7.0% equity risk premium was considered to reasonably represent a consensus viewpoint of the market equity risk premium.
- (3) The concluded beta is based on the median of the unlevered betas of the selected guideline companies, which was then re-levered based on the concluded capital structure for the Project.
- (4) Additional risk based on the fundamentals of the Project.
- (5) We understand that Cost of Debt for operational Road BOT Projects is in the range of 9.25% to 9.80%. Hence, we have considered 9.5% as the pre-tax cost of debt.
- (6) Based on the tax rate applicable for the project for the remaining concession period.
- (7) Based on the average debt/equity ratio of Road BOT projects over its life of concession.

Private & Confidential

IRB InvIT Fund

Valuation of IRB Jaipur Deoli Tollway Limited ("IRBJD")

Valuation as of September 30, 2019

Discounted Cash Flow Analysis

INR millions

Exhibit 5

IRB Jaipur Deoli Tollway Limited ("IRBJD")

Assumptions

(1) Discount Rate 11.5%

	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	6m										
Fiscal year ended 31 March	31-Mar-20	31-Mar-21	31-Mar-22	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30
Revenues	592.5	1,254.7	1,403.2	1,566.1	1,762.7	1,961.1	2,180.9	2,438.8	2,720.4	3,027.3	3,377.5
% Growth	nmt	15.2%	11.6%	11.6%	12.5%	11.3%	11.2%	11.6%	11.5%	11.3%	11.6%
Operating and maintenance expense (including major maintenance)	286.3	547.8	591.7	152.0	160.0	181.5	196.0	982.0	1,059.2	1,330.7	466.7
EBITDA	306.2	706.8	811.5	1,414.1	1,602.7	1,779.6	1,984.8	1,456.8	1,661.3	1,696.6	2,910.8
Depreciation & Amortization	56.2	201.3	225.1	251.3	292.8	314.7	349.9	391.3	436.5	485.7	541.9
(2) Operating EBIT	249.9	505.5	586.3	1,162.9	1,319.9	1,465.0	1,634.9	1,065.5	1,224.8	1,210.9	2,368.9
Estimated Income Taxes	43.7	89.3	102.4	203.2	230.6	256.0	285.7	186.2	214.0	211.6	413.9
As % of Operating EBIT	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
Net Operating Profit After Tax (NOPAT)	206.3	417.2	483.9	959.7	1,089.3	1,209.0	1,349.2	879.3	1,010.8	999.3	1,955.0
(2) Add: Depreciation and Amortisation	56.2	201.3	225.1	251.3	292.8	314.7	349.9	391.3	436.5	485.7	541.9
FREE CASH FLOW TO THE FIRM	262.5	618.5	709.1	1,210.9	1,372.1	1,523.6	1,699.1	1,270.6	1,447.3	1,485.0	2,496.9
Partial Period	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Discount Periods	0.25	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
Present Value Factor	0.97	0.90	0.80	0.72	0.65	0.58	0.52	0.47	0.42	0.38	0.34
PRESENT VALUE	255.4	554.6	570.2	873.4	887.6	884.0	884.1	592.9	605.7	557.4	840.6
Present Value of Cash Flows	15,826.3										
ENTERPRISE VALUE	15,826.3										
CONCLUDED ENTERPRISE VALUE (Rounded)	15,826.0										

Notes:

(1) Refer to Exhibit 5.1

(2) Provided by Management

IRB Jaipur Deoli Tollway Limited ("IRBJD")

Assumptions												
(1) Discount Rate	11.5%											
		Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	Fiscal year ended 31 March	31-Mar-31	31-Mar-32	31-Mar-33	31-Mar-34	31-Mar-35	31-Mar-36	31-Mar-37	31-Mar-38	31-Mar-39	31-Mar-40	3m 6-Jul-40
Revenues		3,750.2	4,194.8	4,607.5	5,118.8	5,684.8	6,309.1	6,958.8	7,701.7	8,524.5	9,460.2	2,763.2
% Growth		11.0%	11.1%	10.6%	11.1%	11.1%	11.0%	10.3%	10.7%	10.7%	11.0%	not
Operating and maintenance expense (including major maintenance)		360.1	385.3	435.2	1,607.7	1,199.9	489.6	483.1	517.7	543.6	572.3	159.3
EBITDA		3,390.1	3,778.3	4,072.3	3,511.2	4,484.9	5,839.5	6,465.7	7,183.5	7,980.9	8,887.8	2,604.0
Depreciation & Amortization		601.7	668.2	739.2	821.3	912.1	1,012.3	1,116.5	1,235.6	1,367.7	1,517.8	443.3
(2) Operating EBIT		2,788.4	3,111.1	3,333.0	2,689.9	3,572.8	4,827.2	5,349.2	5,947.8	6,613.2	7,370.0	2,160.6
Estimated Income Taxes		487.2	543.6	602.3	470.0	624.2	843.4	1,291.0	1,487.0	1,664.4	1,854.9	543.8
As % of Operating EBIT		17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	24.1%	25.2%	25.2%	25.2%	25.2%
Net Operating Profit After Tax (NOPAT)		2,301.2	2,567.5	2,730.7	2,219.9	2,948.6	3,983.8	4,058.2	4,450.8	4,948.8	5,515.1	1,616.8
(2) Add: Depreciation and Amortization		601.7	668.2	739.2	821.3	912.1	1,012.3	1,116.5	1,235.6	1,367.7	1,517.8	443.3
FREE CASH FLOW TO THE FIRM		2,902.9	3,235.7	3,469.9	3,041.2	3,860.7	4,996.1	5,174.7	5,686.5	6,316.5	7,032.9	2,060.2
Partial Period		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.27
Discount Periods		11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	20.63
Present Value Factor		0.30	0.27	0.24	0.22	0.20	0.18	0.16	0.14	0.13	0.11	0.11
PRESENT VALUE		876.5	876.2	847.6	662.4	754.2	875.3	813.1	801.4	798.3	797.2	218.0
Present Value of Cash Flows		15,826.3										
ENTERPRISE VALUE		15,826.3										
CONCLUDED ENTERPRISE VALUE (Rounded)		15,826.0										

Notes:

- (1) Refer to Exhibit 5.1
- (2) Provided by Management

Private & Confidential

IRB InvIT Fund

Valuation of IRB Jaipur Deoli Tollway Limited ("IRBJD")

Valuation as of September 30, 2019

Weighted Average Cost of Capital

Exhibit 5.1

WEIGHTED AVERAGE COST OF CAPITAL

	Cost of Capital	Capital Structure (7)	
Equity	14.7%	50.0%	
Debt	7.8%	50.0%	
			<u>11.5%</u>

COST OF EQUITY

(1) Risk Free Rate		6.7%
(2) Market Equity Risk Premium	7.0%	
(3) Times Levered / Re-levered Beta	0.86	
Beta Adjusted Equity Risk Premium		<u>6.0%</u>
		12.7%
(4) Add: Company Specific Risk Premium		2.0%
Concluded Cost of Equity		<u>14.7%</u>

COST OF DEBT

(5) Pre-tax cost of debt		9.5%
(6) Tax Rate		17.5%
Post tax Cost of Debt		<u>7.8%</u>

Notes:

- (1) Based on the India 10-Year Government Bond Rate. Source: Bloomberg
- (2) The market equity risk premium is estimated based on consideration of historical realized returns on equity investments over a risk-free rate as represented by 10-year government bonds and forward-looking equity risk premium estimates. Data sources reviewed generated a range of equity risk premium indications. However, a 7.0% equity risk premium was considered to reasonably represent a consensus viewpoint of the market equity risk premium
- (3) The concluded beta is based on the median of the unlevered betas of the selected guideline companies, which was then re-levered based on the concluded capital structure for the Project.
- (4) Additional risk based on the fundamentals of the Project.
- (5) We understand that Cost of Debt for operational Road BOT Projects is in the range of 9.25% to 9.80%. Hence, we have considered 9.5% as the pre-tax cost of debt.
- (6) Based on the tax rate applicable for the project for the remaining concession period.
- (7) Based on the average debt:equity ratio of Road BOT projects over its life of concession.

Private & Confidential

RBI InVIT Fund
Valuation of RBI Tunkur Chitradurga Tollway Limited ("RBTCL")
Valuation as of September 30, 2019
Discounted Cash Flow Analysis
INR millions

Exhibit 6

RBI Tunkur Chitradurga Tollway Limited ("RBTCL")

Assumptions

(1) Discount Rate 11.2%

	INR									
	31-Mar-20	31-Mar-21	31-Mar-22	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29
Forecast year ended 31-Mar	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Revenues	1,366.8	2,807.8	3,215.5	3,609.3	4,055.8	4,499.5	5,005.7	5,549.7	6,150.0	6,822.8
% Growth	na	10.3%	14.4%	12.2%	11.0%	11.2%	11.0%	10.8%	10.8%	11.4%
Operating and maintenance expense (excluding major maintenance)	249.3	88.0	88.0	90.0	104.0	541.9	112.0	120.0	128.0	136.0
EBITDA	1,116.1	2,719.8	3,119.5	3,513.6	3,951.8	3,945.8	4,893.7	5,429.7	6,022.0	6,710.6
Interest on premium deferral	137.2	307.8	237.4	376.3	439.0	470.0	439.3	360.7	245.2	74.3
Operating Margin before Depreciation	978.9	2,412.0	2,792.0	3,135.6	3,482.1	3,475.8	4,454.3	5,049.0	5,776.9	6,642.3
As % of Revenues	72.1%	86.3%	86.5%	86.3%	85.6%	77.4%	89.0%	91.0%	93.9%	96.9%
Amortization - Project Cost & Premium asset	728.9	1,873.8	1,752.6	1,887.5	2,199.7	2,447.0	3,126.4	3,024.8	3,352.1	3,735.0
(2) Operating EBIT	250.0	538.2	1,039.4	1,248.1	1,282.4	1,028.8	1,328.0	2,024.1	2,424.8	2,907.3
Estimated Income Taxes	47.2	165.4	176.0	204.1	225.8	179.7	301.2	353.9	429.7	509.0
As % of Operating EBIT	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
Net Operating Profit After Tax (NOPAT)	202.8	372.8	863.4	1,044.0	1,056.6	849.1	1,026.8	1,670.2	1,995.1	2,398.3
(2) Add: Depreciation and Amortization	728.9	1,873.8	1,752.6	1,887.5	2,199.7	2,447.0	3,126.4	3,024.8	3,352.1	3,735.0
Add: Interest on premium deferral	137.2	307.8	237.4	376.3	439.0	470.0	439.3	360.7	245.2	74.3
Less: Payment of Premium and Deferred Premium	(1,246.5)	(2,243.8)	(2,257.8)	(2,236.4)	(1,836.5)	(3,417.6)	(3,751.4)	(4,287.5)	(5,931.4)	(5,200.3)
FREE CASH FLOW TO THE FIRM	(169.2)	203.6	635.0	1,071.2	1,849.4	248.5	744.8	119.8	(233.6)	897.3
Partial Period	8.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Discount Periods	0.25	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00
Present Value Factor	0.87	0.90	0.80	0.72	0.65	0.58	0.52	0.47	0.42	0.38
PRESENT VALUE	(154.9)	209.5	709.3	772.7	1,209.3	202.1	437.4	335.2	(109.4)	277.6
Present Value of Cash Flow:	14,811.7									
ENTERPRISE VALUE	14,656.7									
CONCI JUDO ENTERPRISE VALUE (Rounded)	14,812.0									

Notes:
(1) Refer to Exhibit 6.1
(2) Provided by Management

Private & Confidential

IRB InvT Fund

Valuation of IRB Tunkur Chitradurga Tollway Limited ("IRBTC")

Valuation as of September 30, 2018

Discounted Cash Flow Analysis

INR millions

Exhibit 6

IRB Tunkur Chitradurga Tollway Limited ("IRBTC")

Assumptions

(1) Discount Rate: 11.5%

	Historical	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	Period ending 31 March	31-Mar-20	31-Mar-21	31-Mar-22	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27
Revenues	7,632.3	8,464.0	9,371.2	10,260.4	11,472.2	12,730.4	14,065.7	15,488.9	4,114.1
% Growth	71.4%	10.5%	10.7%	10.6%	10.7%	11.0%	10.5%	10.1%	var
Operating and maintenance expense (including major maintenance)	695.0	130.0	130.0	230.0	219.0	1,110.0	230.0	250.0	61.3
EBITDA	5,937.3	8,294.0	9,191.2	10,030.4	11,253.2	11,620.4	13,835.7	15,238.9	4,052.8
Interest on premium deferment	-	-	-	-	-	-	-	-	-
Operating Margin before Depreciation	8,977.2	8,294.0	9,191.2	10,030.4	11,253.2	11,620.4	13,835.7	15,238.9	4,052.8
As % of Revenues	80.9%	97.9%	96.9%	96.1%	98.2%	97.2%	96.4%	96.4%	98.5%
Amortization - Project Cost & Premium asset	4,180.8	4,813.3	5,107.8	5,847.0	6,293.5	6,826.7	7,699.5	8,442.3	2,242.4
(2) Operating EBIT	2,796.4	3,479.7	4,083.4	4,183.4	4,959.7	4,793.8	6,136.2	6,796.6	1,810.4
Estimated Income Taxes	485.2	541.3	711.7	788.8	875.3	816.0	1,077.9	1,187.5	318.0
As % of Operating EBIT	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
Net Operating Profit After Tax (NOPAT)	2,311.2	2,938.4	3,371.7	3,394.6	4,084.4	3,977.8	5,058.3	5,609.1	1,492.4
(2) Add: Depreciation and Amortisation	4,180.8	4,813.3	5,107.8	5,847.0	6,293.5	6,826.7	7,699.5	8,442.3	2,242.4
Add: Interest on premium deferment	-	-	-	-	-	-	-	-	-
Less: Payment of Premium and Deferred Premium	(3,379.9)	(3,547.8)	(3,725.2)	(3,511.5)	(4,107.1)	(4,312.4)	(4,528.0)	(4,754.4)	(822.0)
FREE CASH FLOW TO THE FIRM	3,012.1	4,094.9	4,744.4	5,460.3	6,280.8	6,499.9	8,229.7	9,297.0	2,902.8
Partial Period	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.34
Discount Period	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	17.82
Present Value Factor	0.34	0.30	0.27	0.24	0.22	0.20	0.18	0.16	0.15
PRESENT VALUE	1,034.6	1,236.4	1,284.8	1,326.1	1,366.1	1,397.8	1,441.9	1,460.8	426.3
Present Value of Cash Flow									14,911.7
ENTERPRISE VALUE									14,911.7
CONCLUDED ENTERPRISE VALUE (Rounded)									14,912.0

Notes:

(1) Refer to Exhibit 6.1

(2) Provided by Management

Private & Confidential
 IRB InvIT Fund
 Valuation of IRB Tumkur Chitradurga Tollway Limited ("IRBTC")
 Valuation as of September 30, 2019
 Weighted Average Cost of Capital

Exhibit 6.1

WEIGHTED AVERAGE COST OF CAPITAL

	Equity	Cost of Capital	Capital Structure (7)	
		14.7%	50.0%	
	Debt	7.8%	50.0%	
				11.5%

COST OF EQUITY

(1)	Risk Free Rate		6.7%
(2)	Market Equity Risk Premium	7.0%	
(3)	Times Levered / Re-levered Beta	0.66	
	Beta Adjusted Equity Risk Premium		6.0%
			12.7%
(4)	Add: Company Specific Risk Premium		2.0%
	Concluded Cost of Equity		14.7%

COST OF DEBT

(5)	Pre-tax cost of debt		9.5%
(6)	Tax Rate		17.5%
	Post tax Cost of Debt		7.8%

Notes:

- (1) Based on the India 10-Year Government Bond Rate. Source: Bloomberg
- (2) The market equity risk premium is estimated based on consideration of historical realized returns on equity investments over a risk-free rate as represented by 10-year government bonds and forward-looking equity risk premium estimates. Data sources reviewed generated a range of equity risk premium indications. However, a 7.0% equity risk premium was considered to reasonably represent a consensus viewpoint of the market equity risk premium.
- (3) The concluded beta is based on the median of the unlevered betas of the selected guideline companies, which was then re-levered based on the concluded capital structure for the Project.
- (4) Additional risk based on the fundamentals of the Project.
- (5) We understand that Cost of Debt for operational Road BOT Projects is in the range of 9.25% to 9.80%. Hence, we have considered 9.5% as the pre-tax cost of debt.
- (6) Based on the tax rate applicable for the project for the remaining concession period.
- (7) Based on the average debt/equity ratio of Road BOT projects over its life of concession.

Private & Confidential

IRB InvIT Fund

Valuation of MVR Infrastructure & Tollways Limited ("MVR")

Valuation as of September 30, 2019

Discounted Cash Flow Analysis

INR millions

Exhibit 7

MVR Infrastructure & Tollways Limited ("MVR")

Assumptions

(1) Discount Rate 11.5%

	Projected 6m	Projected 6m	Projected 6m	Projected 6m	Projected 6m	Projected 6m	Projected 6m	Projected 6m
Fiscal year ended 31 March,	31-Mar-20	31-Mar-21	31-Mar-22	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	21-Sep-26
Revenues	451.9	932.7	1,045.6	1,168.7	1,313.7	1,468.1	1,638.6	867.6
% Growth	nmt	10.7%	12.1%	11.8%	12.4%	11.6%	11.6%	nmt
Operating and maintenance expense (including major maintenance)	109.2	56.7	59.6	62.5	239.4	242.7	72.4	76.0
EBITDA	342.8	875.9	986.0	1,106.1	1,074.3	1,225.4	1,566.2	791.6
Depreciation & Amortization	138.7	266.8	321.5	359.4	404.0	451.4	503.9	266.8
(2) Operating EBIT	204.1	589.1	664.5	746.7	670.3	774.0	1,062.3	524.8
Estimated Income Taxes	35.6	102.9	116.1	130.5	117.1	135.2	165.6	91.7
As % of Operating EBIT	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
Net Operating Profit After Tax (NOPAT)	168.4	486.2	548.4	616.2	553.2	638.8	876.7	433.1
(2) Add: Depreciation and Amortisation	138.7	266.8	321.5	359.4	404.0	451.4	503.9	266.8
FREE CASH FLOW TO THE FIRM	307.1	773.0	869.9	975.6	957.2	1,090.2	1,380.6	699.9
Partial Period	0.50	1.00	1.00	1.00	1.00	1.00	1.00	0.48
Discount Periods	0.25	1.00	2.00	3.00	4.00	5.00	6.00	6.74
Present Value Factor	0.97	0.90	0.80	0.72	0.65	0.58	0.52	0.48
PRESENT VALUE	298.9	693.2	699.6	703.7	619.2	632.5	718.4	336.1
Present Value of Cash Flows	4,701.5							
ENTERPRISE VALUE	4,701.5							
CONCLUDED ENTERPRISE VALUE (Rounded)	4,702.0							

Notes:

(1) Refer to Exhibit 7.1

(2) Provided by Management

Private & Confidential

IRB InvIT Fund

Valuation of MVR Infrastructure & Tollways Limited ("MVR")

Valuation as of September 30, 2019

Weighted Average Cost of Capital

Exhibit 7.1

WEIGHTED AVERAGE COST OF CAPITAL

	<u>Cost of Capital</u>	<u>Capital Structure (7)</u>	
Equity	14.7%	50.0%	
Debt	7.8%	50.0%	
			<u>11.5%</u>

COST OF EQUITY

(1) Risk Free Rate		6.7%
(2) Market Equity Risk Premium	7.0%	
(3) Times Levered / Re-levered Beta	<u>0.86</u>	
Beta Adjusted Equity Risk Premium		<u>6.0%</u>
		12.7%
(4) Add: Company Specific Risk Premium		<u>2.0%</u>
Concluded Cost of Equity		<u>14.7%</u>

COST OF DEBT

(5) Pre-tax cost of debt		9.5%
(6) Tax Rate		<u>17.5%</u>
Post tax Cost of Debt		<u>7.8%</u>

Notes:

- (1) Based on the India 10-Year Government Bond Rate. Source: Bloomberg
- (2) The market equity risk premium is estimated based on consideration of historical realized returns on equity investments over a risk-free rate as represented by 10-year government bonds and forward-looking equity risk premium estimates. Data sources reviewed generated a range of equity risk premium indications. However, a 7.0% equity risk premium was considered to reasonably represent a consensus viewpoint of the market equity risk premium.
- (3) The concluded beta is based on the median of the unlevered betas of the selected guideline companies, which was then re-levered based on the concluded capital structure for the Project.
- (4) Additional risk based on the fundamentals of the Project.
- (5) We understand that Cost of Debt for operational Road BOT Projects is in the range of 9.25% to 9.80%. Hence, we have considered 9.5% as the pre-tax cost of debt.
- (6) Based on the tax rate applicable for the project for the remaining concession period.
- (7) Based on the average debt:equity ratio of Road BOT projects over its life of concession.

Private & Confidential

IRB InvT Fund
Valuation of IRB Pathankot Amritsar Toll Road Limited ("IRBPA")
Valuation as of September 30, 2019
Discounted Cash Flow Analysis
INR millions

Exhibit 8

IRB Pathankot Amritsar Toll Road Limited ("IRBPA")

Assumptions										
(1) Discount Rate	11.5%									
		Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	
		€m	€m	€m	€m	€m	€m	€m	€m	
Fiscal year ended 31 March		31-Mar-20	31-Mar-21	31-Mar-22	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	
Revenues		747.3	1,525.1	1,766.6	1,893.5	2,106.8	2,330.3	2,574.1	2,874.4	
% Growth		nmf	11.6%	11.4%	11.0%	11.3%	10.6%	10.5%	11.7%	
Operating and maintenance expense (including major maintenance)		299.9	494.8	466.5	225.8	249.5	588.5	570.9	395.8	
EBITDA		447.4	1,031.3	1,240.1	1,667.7	1,857.3	1,741.8	2,003.2	2,504.6	
Depreciation & Amortization		208.9	408.1	456.4	506.3	563.4	623.1	688.3	788.7	
(2) Operating EBIT		238.5	623.2	783.8	1,161.4	1,293.9	1,118.8	1,314.8	1,735.9	
Estimated Income Taxes		41.7	108.9	136.9	202.9	226.1	195.4	229.7	303.3	
As % of Operating EBIT		17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	
Net Operating Profit After Tax (NOPAT)		196.8	514.3	646.9	958.5	1,067.8	923.2	1,085.1	1,432.6	
(2) Add: Depreciation and Amortisation		208.9	408.1	456.4	506.3	563.4	623.1	688.3	788.7	
FREE CASH FLOW TO THE FIRM		405.7	922.4	1,103.2	1,464.8	1,631.2	1,546.3	1,773.4	2,201.3	
Partial Period		0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Discount Periods		0.25	1.00	2.00	3.00	4.00	5.00	6.00	7.00	
Present Value Factor		0.97	0.80	0.80	0.72	0.65	0.58	0.52	0.47	
PRESENT VALUE		394.8	827.1	887.2	1,056.6	1,055.2	897.1	922.8	1,027.3	
Present Value of Cash Flows		14,837.3								
ENTERPRISE VALUE		14,837.3								
CONCLUDED ENTERPRISE VALUE (Rounded)		14,837.0								

Notes:

- (1) Refer to Exhibit B.1
- (2) Provided by Management

Private & Confidential

IRB InvIT Fund

Valuation of IRB Pathankot Amritsar Toll Road Limited ("IRBPA")

Valuation as of September 30, 2019

Discounted Cash Flow Analysis

INR millions

Exhibit 8

IRB Pathankot Amritsar Toll Road Limited ("IRBPA")

Assumptions

(1) Discount Rate 11.5%

	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31	31-Mar-32	31-Mar-33	31-Mar-34	22-Jan-35
	10m							
	Fiscal year ended 31 March							
Revenues	3,160.2	3,468.1	3,817.7	4,196.2	4,635.0	5,040.1	5,489.5	4,887.4
% Growth	9.9%	9.7%	10.1%	9.9%	10.5%	8.7%	8.9%	nrf
Operating and maintenance expense (including major maintenance)	305.8	471.9	811.6	294.0	302.0	310.0	318.0	326.0
EBITDA	2,854.5	2,996.2	3,006.0	3,902.2	4,333.0	4,730.1	5,171.5	4,561.4
Depreciation & Amortization	845.1	927.4	1,020.9	1,122.1	1,239.5	1,347.8	1,468.0	1,307.0
(2) Operating EBIT	2,009.4	2,068.8	1,985.1	2,780.0	3,093.5	3,382.3	3,703.5	3,254.4
Estimated Income Taxes	351.1	381.5	346.8	485.7	540.5	591.0	647.1	588.6
As % of Operating EBIT	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%	17.5%
Net Operating Profit After Tax (NOPAT)	1,658.3	1,707.3	1,638.3	2,294.3	2,553.0	2,791.3	3,056.5	2,665.8
(2) Add: Depreciation and Amortization	845.1	927.4	1,020.9	1,122.1	1,239.5	1,347.8	1,468.0	1,307.0
FREE CASH FLOW TO THE FIRIM	2,503.4	2,634.8	2,659.2	3,416.4	3,792.5	4,139.1	4,524.4	3,992.8
Partial Period	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91
Discount Periods	8.00	9.00	10.00	11.00	12.00	13.00	14.00	14.91
Present Value Factor	0.42	0.38	0.34	0.30	0.27	0.24	0.22	0.20
PRESENT VALUE	1,647.8	989.0	895.2	1,031.5	1,027.0	1,005.2	985.5	787.9
Present Value of Cash Flows	14,837.3							
ENTERPRISE VALUE	14,837.3							
CONCLUDED ENTERPRISE VALUE (Rounded)	14,837.0							

Notes:

- (1) Refer to Exhibit 8.1
 (2) Provided by Management

Private & Confidential

IRB InvIT Fund

Valuation of IRB Pathankot Amritsar Toll Road Limited ("IRBPA")

Valuation as of September 30, 2019

Weighted Average Cost of Capital

Exhibit 8.1

WEIGHTED AVERAGE COST OF CAPITAL

	Equity	Cost of Capital	Capital Structure (7)	
		14.7%	50.0%	
	Debt	7.8%	50.0%	
				11.5%

COST OF EQUITY

(1)	Risk Free Rate		6.7%
(2)	Market Equity Risk Premium	7.0%	
(3)	Times Levered / Re-levered Beta	0.86	
	Beta Adjusted Equity Risk Premium		6.0%
			12.7%
(4)	Add: Company Specific Risk Premium		2.0%
	Concluded Cost of Equity		14.7%

COST OF DEBT

(5)	Pre-tax cost of debt		9.5%
(6)	Tax Rate		17.5%
	Post tax Cost of Debt		7.8%

Notes:

- (1) Based on the India 10-Year Government Bond Rate. Source: Bloomberg
- (2) The market equity risk premium is estimated based on consideration of historical realized returns on equity investments over a risk-free rate as represented by 10-year government bonds and forward-looking equity risk premium estimates. Data sources reviewed generated a range of equity risk premium indications. However, a 7.0% equity risk premium was considered to reasonably represent a consensus viewpoint of the market equity risk premium.
- (3) The concluded beta is based on the median of the unlevered betas of the selected guideline companies, which was then re-levered based on the concluded capital structure for the Project.
- (4) Additional risk based on the fundamentals of the Project.
- (5) We understand that Cost of Debt for operational Road BOT Projects is in the range of 9.25% to 9.60%. Hence, we have considered 9.5% as the pre-tax cost of debt.
- (6) Based on the tax rate applicable for the project for the remaining concession period.
- (7) Based on the average debt:equity ratio of Road BOT projects over its life of concession.

Private & Confidential

IRE IMIT Fund

Valuation of IMIT Assets

Valuation as of September 30, 2018

Present Value of IM & other fee payable by the Trust

INR millions

Exhibit 8

IM Fees payable by the Trust												
Assumptions												
(1) Discount Rate	11.4%											
	Proposed	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	Fiscal year ended 31 March											
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
USA	1,422.3	2,811.5	3,857.8	-	-	-	-	-	-	-	-	-
IRE SD	2,151.1	4,340.0	4,771.8	4,008.8	-	-	-	-	-	-	-	-
IRE Telecom	417.4	862.4	895.1	1,071.8	1,212.8	1,354.0	1,512.2	1,680.5	1,878.2	2,089.6	2,328.2	
IRE JD	582.5	1,294.7	1,403.2	1,588.1	1,782.7	1,981.1	2,183.9	2,436.4	2,730.4	3,077.3	3,477.5	
Tunisia	1,265.4	2,887.6	3,215.5	3,603.8	4,035.8	4,499.5	5,085.1	5,748.7	6,450.8	7,190.8	8,002.9	
MVR	451.8	832.7	1,045.8	1,188.7	1,313.7	1,458.1	1,628.6	1,817.8	2,024.4	2,248.1	2,489.1	
Pathways	747.2	1,526.1	1,708.8	1,892.8	2,108.8	2,330.3	2,574.1	2,874.4	3,180.2	3,468.1	3,817.7	
Total	7,187.9	14,765.9	16,786.5	17,349.8	19,431.8	11,602.9	12,911.8	13,411.0	13,899.9	16,437.8	17,166.8	
(2) IM Fee & other fees	1%	71.7	147.1	167.7	133.4	104.3	116.0	129.1	134.1	139.1	154.4	171.6
(3) Other expenses		12.0	15.2	26.5	27.8	29.2	30.8	32.2	33.8	35.0	37.2	39.1
CASH FLOW		83.7	172.3	194.1	161.2	133.5	146.7	161.2	167.9	174.8	191.6	210.7
Partial Period		0.55	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Discount Period		0.25	1.00	3.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
Present Value Factor		0.97	0.90	0.81	0.72	0.65	0.58	0.52	0.47	0.42	0.38	0.34
PRESENT VALUE		81.4	154.8	148.2	116.8	86.7	85.6	84.4	78.8	73.6	72.5	71.6
Sum of Present Value (Rounded)		1,872.8										

Notes:

- (1) Weighted average discount rate of the IMIT Assets;
- (2) As informed by the Management, pursuant to the Investment Management Agreement, the Investment Manager is entitled to an Investment Management fees to be calculated @ 1% per annum exclusive of GST, of the consolidated bill revenue (net of premium paid / revenue shared with NISAC) of the IMIT Assets at the end of the reporting period subject to a floor of INR 100 million and a cap of INR 15M million;
- (3) Provided by Management

Private & Confidential

IRE InvT Fund

Valuation of InvT Assets

Valuation as of September 30, 2010

Present value of IM & other fee payable by the Trust

INR millions

Exhibit 9

IM Fees payable by the Trust

Assumptions

(1) Discount Rate 11.4%

	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Final year ended 31 March												
ICAA	-	-	-	-	-	-	-	-	-	-	-	-
IRB SD	-	-	-	-	-	-	-	-	-	-	-	-
IRB Telecom	2,595.6	2,580.1	3,185.3	3,547.4	3,941.2	4,375.3	4,904.5	-	-	-	-	-
IRB JD	2,750.2	4,164.8	4,807.5	5,118.8	5,584.8	6,308.1	6,958.8	7,701.2	8,524.5	9,460.2	2,792.2	-
Turnkur	8,494.0	9,371.3	10,360.4	11,473.2	12,730.4	14,085.7	15,488.8	4,114.1	-	-	-	-
NVS	-	-	-	-	-	-	-	-	-	-	-	-
Pathanot	4,198.2	4,836.0	5,040.1	5,493.5	4,887.4	-	-	-	-	-	-	-
Total	16,997.1	21,661.0	23,203.3	25,629.0	27,243.7	24,790.1	26,762.2	11,815.3	8,524.5	9,460.2	2,763.2	-
(2) IM Fee & other fees	1%	190.0	210.5	232.0	250.0	250.0	247.8	250.0	118.2	100.0	100.0	100.0
(3) Other expenses		41.0	43.1	46.3	47.5	49.9	62.4	55.0	57.8	60.6	63.7	66.9
CASH FLOW		231.0	253.6	277.3	297.5	299.9	299.9	305.0	176.0	160.6	163.7	166.9
Partial Period		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.27
Discount Periods		11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	20.63
Present Value Factor		0.90	0.77	0.65	0.52	0.39	0.18	0.16	0.14	0.13	0.12	0.11
PRESENT VALUE		70.6	89.4	86.1	85.6	59.4	63.3	46.7	25.2	26.7	16.9	16.0

Sum of Present Value (Rounded) 1,872.0

Notes:

- (1) Weighted average discount rate of the InvT Assets.
- (2) As informed by the Management, pursuant to the Investment Management Agreement, the Investment Manager is entitled to an Investment Management fee to be calculated @ 1% per annum, exclusive of GST, of the consolidated total revenue (net of premium paid / revenue shared with NHA) of the InvT Assets at the end of the reporting period, subject to a floor of INR 100 million and a cap of INR 250 million.
- (3) Provided by Management.

PATHANKOT TO AMRITSAR SECTION OF NH-15
(KM 6.082 TO 108.502)
IN THE STATE OF PUNJAB



**TOLL REVENUE AND O&M COST
PROJECTION REPORT**

October 2019



GMD Consultants

503, Mayuresh Chambers, Plot No. 60, Sector -11,
CBD Belapur, Navi Mumbai. 400 614. Maharashtra.

Phone : +91-22-2756 4586 / 2756 5313

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



PATHANKOT TO AMRITSAR SECTION OF NH-15
(KM 6.082 TO 108.502) IN THE STATE OF PUNJAB

**TOLL REVENUE AND O&M COST
PROJECTION REPORT**



October 2019

CONTENTS

Chapter 1	7
INTRODUCTION	7
1.1 Background	7
1.2 Objective of the Study	7
1.2.1 Scope of Services	8
Chapter 2	9
TRAFFIC SURVEYS AND ANALYSIS	9
2.1 Traffic Survey	9
2.2 Classified Traffic Volume Count	11
2.3 Traffic Characteristic	13
2.3.1 Traffic Data	13
2.4 Data Analysis	15
2.4.1 Analysis of Traffic Volume Count	15
2.4.2 Components of Traffic	16
Chapter 3	19
GROWTH OF TRAFFIC ON PROJECT HIGHWAY	19
3.1 Introduction	19
3.2 Trend Analysis	19
3.3 Estimation of Traffic Demand Elasticity	20
3.4 Analysis of Historic Traffic Data	25
3.5 Other Factors Influencing Growth	25
3.6 Recommended Growth Rates of Traffic	26
Chapter 4	29
TRAFFIC FORECAST	29
4.1 Traffic Projections	29

4.2	Modification in Concession Period	32
	Chapter 5.....	34
	FORECAST OF TOLL REVENUE	34
5.1	General.....	34
5.2	Discount Categories	34
5.3	Estimation of Toll Rates	35
5.4	Toll Revenue.....	41
5.5	Toll Revenue at all toll plazas under Scenarios	41
	Chapter 6.....	45
	OPERATION & MAINTENANCE COST	45
6.1	General.....	45
	Chapter 7.....	48
	CONCLUSION & RECOMMENDATIONS.....	48
7.1	Conclusion & Recommendations.....	48
	Chapter 8.....	49
	PROJECT ILLUSTRATIONS.....	49
8.1	General.....	49



LIST OF TABLES

<i>Table 2-1 : Traffic DataDetails</i>	10
<i>Table 2-2 : Vehicle Classification System.....</i>	12
<i>Table 2-3 : Traffic Data at Toll Plaza @ Km 16.00</i>	13
<i>Table 2-4 : Traffic Data at Toll Plaza @ Km 88.50</i>	14
<i>Table 2-5 : PCU Factors Adopted for Study</i>	15
<i>Table 2-6 : Traffic in PCU at both sections</i>	16
<i>Table 2-7 : Journey Type Bifurcation of Traffic at KM 16.00</i>	17
<i>Table 2-8 : Journey Type Bifurcation of Traffic at KM 88.50</i>	17
<i>Table 3-1: Per Capita Income Vs Car</i>	21
<i>Table 3-2 : Population Vs Bus.....</i>	22
<i>Table 3-3 : Goods Traffic Vs NSDP</i>	23
<i>Table 3-4 : Summary Regression Analysis</i>	24
<i>Table 3-5 : Recommended Growth Rates Optimistic</i>	27
<i>Table 3-6 : Recommended Growth Rates Pessimistic.....</i>	28
<i>Table 3-7 : Recommended Growth Rates Most Likely.....</i>	28
<i>Table 4-1 : Total TollableTraffic @ Toll Plaza 1- Chainage 16.000 KM</i>	29
<i>Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 88.50 KM</i>	30
<i>Table 4-3 : Total TollableTraffic @ Toll Plaza 1- Chainage 16.000 KM</i>	30
<i>Table 4-4 : Total TollableTraffic @ Toll Plaza 2- Chainage 88.50 KM</i>	31
<i>Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 16.000 KM</i>	31
<i>Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 88.500 KM</i>	32
<i>Table 5-1 : Base Toll Rates 2007 - 08</i>	36
<i>Table 5-2 : Toll Rates for Single Journey @Km 16.00.....</i>	37
<i>Table 5-3 : Toll Rates for Return Journey@ Km 16.000.....</i>	38
<i>Table 5-4 : Toll Rates for Local Monthly Ticket @ Km 16.000</i>	38
<i>Table 5-5 : Toll Rates for Monthly Pass Local (50 Trips) @Km 16.000</i>	39



<i>Table 5-6 : Toll Rates for Single Journey @ Km 88.500.....</i>	<i>39</i>
<i>Table 5-7 : Toll Rates for Return Journey @ Km 88.500.....</i>	<i>40</i>
<i>Table 5-8 : Toll Rates for Local Monthly Ticket @ Km 88.500.....</i>	<i>40</i>
<i>Table 5-9 : Toll Rates for Monthly Pass Local (50 Trips) @ Km 88.50.....</i>	<i>41</i>
<i>Table 5-10 : Toll Revenue Pessimistic Scenario (Crores).....</i>	<i>42</i>
<i>Table 5-11 : Toll Revenue Optimistic Scenario.....</i>	<i>43</i>
<i>Table 5-12 : Toll Revenue Most Likely Scenario.....</i>	<i>44</i>
<i>Table 6-1 : Yearwise Details of Operation & Maintenance Cost.....</i>	<i>46</i>



LIST OF FIGURES

<i>Figure 2-1: Toll Plaza Locations.....</i>	<i>11</i>
<i>Figure 3-1: Regression and Elasticity PCI vs. Car-Extrapolation</i>	<i>22</i>
<i>Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation.....</i>	<i>23</i>
<i>Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation</i>	<i>24</i>
<i>Figure 3-4 : Growth of GDP in India.....</i>	<i>26</i>
<i>Figure 5-1 : Historical Rate of WPI Inflation in India.....</i>	<i>35</i>
<i>Figure 8-1 : General Condition</i>	<i>49</i>
<i>Figure 8-2 : General Condition</i>	<i>50</i>
<i>Figure 8-3 : General Condition</i>	<i>50</i>



ABBREVIATIONS

AADT	- Annual Average Daily Traffic	NHAI	- National Highways Authority of India
BOT	- Build Operate Transfer	NHDP	- National Highways Development Project
CAGR	- Compound Annual Growth Rate	NSDP	- Net State Domestic Product
CTV	- Classified traffic volume	O&M	- Operation & Maintenance
DBFOT	- Design, Build, Finance, Operate & Transfer	PCDP	- Per Capita Domestic Product
EME	- Earth Moving Equipment	PCI	- Per Capita Income
GDP	- Gross Domestic Product	PCU	- Passenger Car Unit
GSDP	- Gross State Domestic Product	PSC	- Pre-stressed Concrete
HCM	- Heavy Construction Machinery	RCC	- Reinforced cement concrete
HCV	- Heavy Commercial Vehicle	RHS	- Right Hand Side
HTMS	- Highway Traffic Management System	SH	- State Highway
IRC	- Indian Road Congress	TP	- Toll Plaza
IRR	- Internal Rate of Return	WPI	- Wholesale Price Index
LCV	- Light Commercial Vehicle	NH	- National Highway
LHS	- Left Hand Side		
LGV	- Light Goods Vehicle		
MAV	- Multi Axle Vehicle		
MORTH	- Ministry of Road Transport and Highways		



CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase III.

The project under consideration, **Pathankot- Amritsar** section of NH 15 from km 6.082 to km 108.502 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s IPATRL* (Concessionaire) has been awarded the Project for concession period of 20 years starting from December 31, 2010. The Project has been commissioned and is currently in the operation / maintenance phase

The Pathankot - Amritsar NH 15 Project comprises the section of NH 15 from km 6.082 to km 108.502. IPATRL was entrusted to expand a 102.42 Km section of NH 15 between Pathankot and Amritsar in Punjab from two lanes to four lanes on a DBFOT basis. The project received a completion certificate on November 27, 2014 and IPATRL commenced tolling for a project length of 102.42 Km on that date. Subsequently, the project has received a final completion certificate on August 17, 2017.

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged *GMD Consultants* to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as "***Toll Revenue and O&M Cost Projection Report***" mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections

The Concessionaire has provided basic traffic data and other project details on the basis of which the above analysis has been carried out.

“Toll Revenue and O&M Cost Projection Report” was submitted in August 2017. In this report traffic data of year 2016-17 was used as base traffic. The report was updated with traffic data of 2017-18 and same was submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2019 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. Now as six-monthly traffic data from April 2019 to September 2019 is also available, this report is updated taking this latest traffic data into consideration..

Chapters on Project Details, Influence Zone Traffic Analysis have not been included in this update as there has been no significant event or change in the last 1 year which will have an impact on these chapters in our report dated April 2019.



CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Survey

In the course of our work we have collected required information for project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project.

- Classified traffic volume counts at the two toll plaza locations on Pathankot Amritsar section of NH-15 for base year 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

The project can be divided into two homogenous sections from traffic point of view.

These sections can be

1. Pathankot to Gurdaspur
2. Gurdaspur to Amritsar



Traffic of both sections is represented by toll plaza in each section. Table below lists provides details of locations from where traffic details have been collected.

Table 2-1 : Traffic Data Details

SR. NO	LOCATION	CTV	Single Journey Traffic	Return Pass Traffic	Monthly Pass Traffic	Local Traffic
1	Km 16.00 Toll Plaza	AADT for Year 2016-2017	For Year 2016- 2017	For Year 2016- 2017	For Year 2016-2017	For Year 2016-2017
		AADT for Year 2017-2018	For Year 2017- 2018	For Year 2017- 2018	For Year 2017-2018	For Year 2017-2018
		AADT for Year 2018-2019	For Year 2018- 2019	For Year 2018- 2019	For Year 2018-2019	For Year 2018-2019
		AADT April 2019 to September 2019	For April 2019 to September 2019	For April 2019 to September 2019	For April 2019 to September 2019	For April 2019 to September 2019
2	Km 88.50 Toll Plaza	AADT for Year 2016-2017	For Year 2016- 2017	For Year 2016- 2017	For Year 2016-2017	For Year 2016-2017
		AADT for Year 2017-2018	For Year 2017- 2018	For Year 2017- 2018	For Year 2017-2018	For Year 2017-2018
		AADT for period Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19	AADT for Year 2018-19



				2018-19	2018-19	
		AADT April 2019 to September 2019	For April 2019 to September 2019	For April 2019 to September 2019	For April 2019 to September 2019	For April 2019 to September 2019

The locations of each of the traffic survey are illustrated in Figure below.

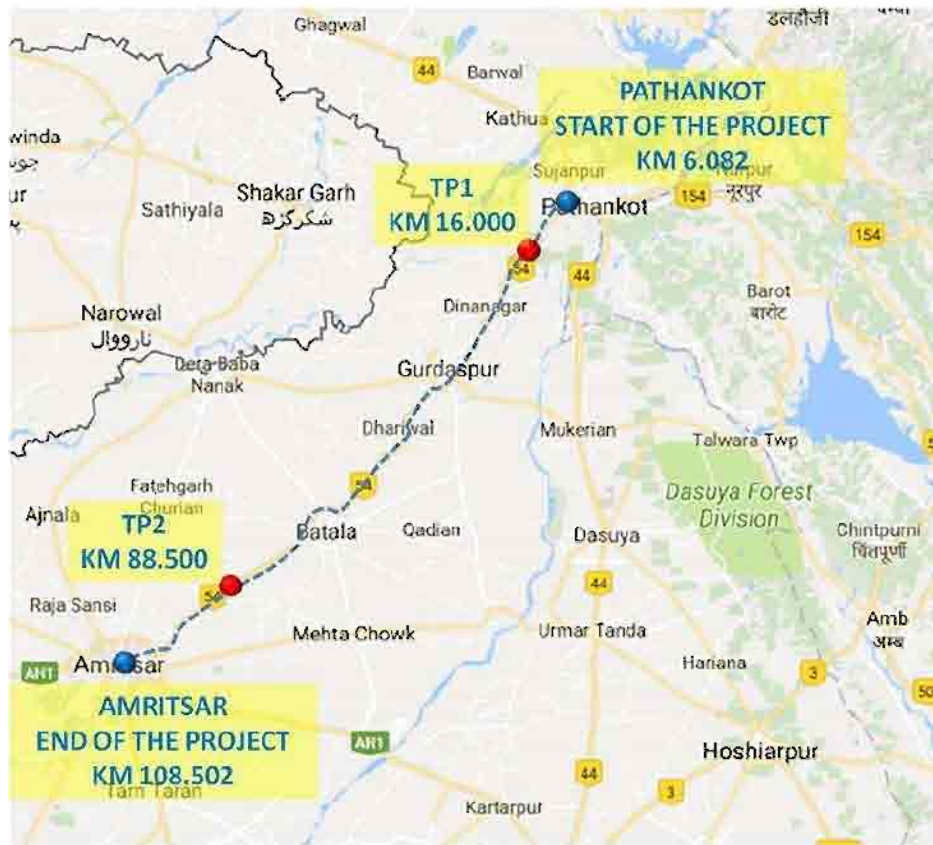


Figure 2-1: Toll Plaza Locations



2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume

Count survey has been provided by concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI. These locations are indicated in figure and table given above

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the toll able vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in below.

Table 2-2 : Vehicle Classification System

Vehicle Type	
Auto Rickshaw	
Passenger Car	Car, Jeep, Taxi & Van (Old / new technology)
Bus	Mini Bus
	Standard Bus
Truck	Light Goods Vehicle (LCV)
	2 – Axle Truck
	3 Axle Truck (HCV)
	Multi Axle Truck (4-6 Axle)
	Oversized Vehicles (7 or more axles)
Other Vehicles	Agriculture Tractor, Tractor & Trailer

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected is corresponding to category of toll able vehicles. Following are the type of vehicles as per concession agreement.

- Car / Jeep / van
- Mini Bus /LCV

- Truck / Bus
- Multi Axle
- Oversize Vehicle

2.3 Traffic Characteristic

Toll revenue of the project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have significant potential to affect toll revenue. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, portion of monthly pass traffic are some such characteristics of traffic. These will be discussed in subsequent sections of this report

2.3.1 Traffic Data

Project concessionaire has provided Traffic data for base year 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019 as under for toll plazas

Table 2-3 : Traffic Data at Toll Plaza @ Km 16.00

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) 2016-17	Annual Average Daily Traffic (Nos.) 2017-18	Annual Average Daily Traffic (Nos.) 2018-19	Annual Average Daily Traffic (Nos.) April 2019 to Sept-2019
1	Car	8094	8916	9220	10677
2	Mini Bus / LCV	999	992	881	963
3	Truck / Bus	1470	1343	1109	1181
4	Multi Axle	2940	2979	2450	2433
5	Oversized Vehicles	604	22	17	24
	Total	14107	14252	13677	15278

Similar traffic data for toll plaza at km 88.50 is given as under

Table 2-4 : Traffic Data at Toll Plaza @ Km 88.50

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) 2016-17	Annual Average Daily Traffic (Nos.) 2017-18	Annual Average Daily Traffic (Nos.) 2018-19	Annual Average Daily Traffic (Nos.) April 2019 to Sept-2019
1	CAR	10428	11238	11271	12739
2	Mini Bus/ LCV	578	598	574	663
3	Truck/Bus	840	849	841	928
4	Multi Axle	688	939	1177	1313
5	Oversized Vehicles	479	26	8	9
	Total	13013	13649	13870	15652

Pathankot -Amritsar stretch is gateway of Jammu and Kashmir to rest of India. Traffic from Jammu & Kashmir is quite affected due to current (post article 370) situation in Valley. It is expected that traffic will pick in second half of year.

Further, this year there have been extended high intensity rains on pan in India. States of Maharashtra, Gujarat, Rajasthan, Bihar, UP, MP, Karnataka, Himachal Pradesh have been quite affected due to heavy rains this year. This has negative impact on passenger and commercial traffic during first of half of this year. It is expected that traffic in second half of year from October to March shall be substantially this year. Taking this into account a seasonality factor is taken to arrive and AADT value of traffic from six monthly average volume of first half of year

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of futuristic traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in table given below.

Table 2-5 : PCU Factors Adopted for Study

Vehicle Type	PCUs
Car	1.0
Mini Bus	1.5
Standard Bus	3.0
LCV/LGV	1.5
2 Axle Truck	3.0
3 – 6 Axle Truck	4.5
MAV	4.5
Auto Rickshaw	1.0
Van/Tempo	1.0
Agriculture Tractor with Trailer	4.5
Agriculture Tractor without Trailer	1.5

Source: IRC: 64-1990



Traffic volume at each toll plaza was converted to PCU and same is presented as under

Table 2-6 : Traffic in PCU at both sections

Year	Toll Plaza Location (Km)	Traffic No	PCU	PCU Index
FY2016-17	16.00	14107	29951	2.12
	88.50	13013	19067	1.47
FY2017-18	16.00	14249	27926	1.96
	88.50	13642	18999	1.39
FY 2018-19	16.00	13677	24969	1.83
	88.50	13870	19986	1.44
April 2019 to Sept 2019	16.00	15278	26723	1.75
	88.50	15652	22466	1.44

There was ban on mining in Punjab in year 2017-18 due which growth of large size vehicles (multi-axle) slowed down. The same is reflecting in reduction of PCU Index. It can be observed from above that project traffic has a PCU index ranging between 1.4 to 1.8 which indicates good mix of passenger and commercial traffic on project corridor.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

It is observed that car traffic forms 70% of total traffic at toll plaza location Km 16.00 while multi axle vehicles are 16% of total traffic. 8% of traffic is Truck /Bus while LCV traffic forms the balance 6%. Over all about 25% of traffic is commercial in nature.

At toll plaza location Km 88.50 car traffic forms 82% of total traffic at toll plaza while multi axle and truck / bus are 8% and 6%. LCV volume is 4% of the total traffic. Over all about 15% of traffic is commercial in nature which is lower as compared to toll plaza location Km 16.00.



Another important bifurcation of traffic is components of traffic with respect various type of toll ticketing like

1. Single Journey
2. Return Journey
3. Overweight Vehicles (Concessionaire provided special tariff for this category)
4. Monthly Pass (Local and General)

Following table provides numbers of vehicle falling in each of above category in various years.

Table 2-7 : Journey Type Bifurcation of Traffic at KM 16.00

Sr. No	Type	Traffic Volume (Nos.) 2016-17	Traffic Volume (Nos.) 2017-18	Traffic Volume (Nos.) 2018-19	Traffic Volume (Nos.) April 2019 – Sept 2019
1	Single Journey	4255	4785	4574	4846
2	Return Journey	5364	4648	4322	4776
3	Monthly Pass	4488	4820	4781	5656

A significant part of the traffic at KM 16.00 is monthly and return journey which is 37% and 31% respectively. Single journey component is 32%. This indicated presence of dedicated urban traffic on corridor.



Similarly, traffic numbers for type of journey at KM 88.50 is monthly and return journey 37% and 40% respectively. Single journey component is 23%.

Table 2-8 : Journey Type Bifurcation of Traffic at KM 88.50

Sr. No	Type	Traffic Volume (Nos.) 2016-17	Traffic Volume (Nos.) 2017-18	Traffic Volume (Nos.) 2018-19	Traffic Volume (Nos.) April 2019 – Sept 2019
1	Single Journey	2656	2858	3177	3586
2	Return Journey	5352	5434	5620	6224
3	Monthly Pass	5005	5360	5073	5842

Here Return journey form highest portion of traffic followed by monthly pass and single journey.

Secondary Data Collection.

There are several other factors which have substantial impact on traffic pattern and growth on any project corridor. Following are some of such important factors

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or Industrial projects
- Special Industry in project corridor
- Overall trends of economic growth local as well as national / regional

Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP
 - b) NSDP
 - c) Population Growth
 - d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data
3. Competing road network.

We have collected and utilized such underlying data in the study to estimate the growth and risk factors for traffic along the project corridor.



CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the forecasts of factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor Pathankot- Amritsar section of NH-15 has been done taking above factors in to consideration. Established best practices and standard guidelines such as “**IRC: 108-2015-Guidelines for Traffic Forecast on Highways**” have been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Thus, we have considered the Elasticity model of growth projection which is one of the most widely acceptable methods for traffic forecast and is recommended in **IRC: 108-2015-Guidelines for Traffic Forecast on Highways**. Since entire project alignment falls in Punjab State and has very little contribution from other states in terms of traffic, hence all developmental parameter pertaining traffic growth are considered for Punjab State only.

In this method, past trends of any vehicular data are paired with an economic



indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicle traffic varies for different type of vehicle. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most important and direct parameters are given as under

- Per Capita Income
- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP

Time series data of vehicle (both passenger and goods) Registered in state of Punjab is used as the base data for analysis of growth.

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given categories of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth.

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log } (P) = k \times \text{Log } (EI) + A$$

Where,

P = Number of Vehicles (Mode wise)

EI = Economic Indicator



A = Regression constant

k = Elasticity coefficient (Regression coefficient)

The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

Following tables and graphs depict regression and elasticity of growth model.

Table 3-1: Per Capita Income Vs Car

Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2004-05	33103	337345	4.52	5.53		
2005-06	34096	376954	4.53	5.58	3%	
2006-07	37087	414612	4.57	5.62	9%	
2007-08	39567	456521	4.60	5.66	7%	
2008-09	41003	496658	4.61	5.70	4%	
2009-10	42831	538862	4.63	5.73	4%	
2010-11	44783	609469	4.65	5.78	5%	
2011-12	46422	680076	4.67	5.83	4%	
2012-13	48496	774611	4.69	5.89	4%	
2013-14	49411	869565	4.69	5.94	2%	
2014-15	51517	960734	4.71	5.98	4%	4.5%

Regression analysis of same is given in figure below



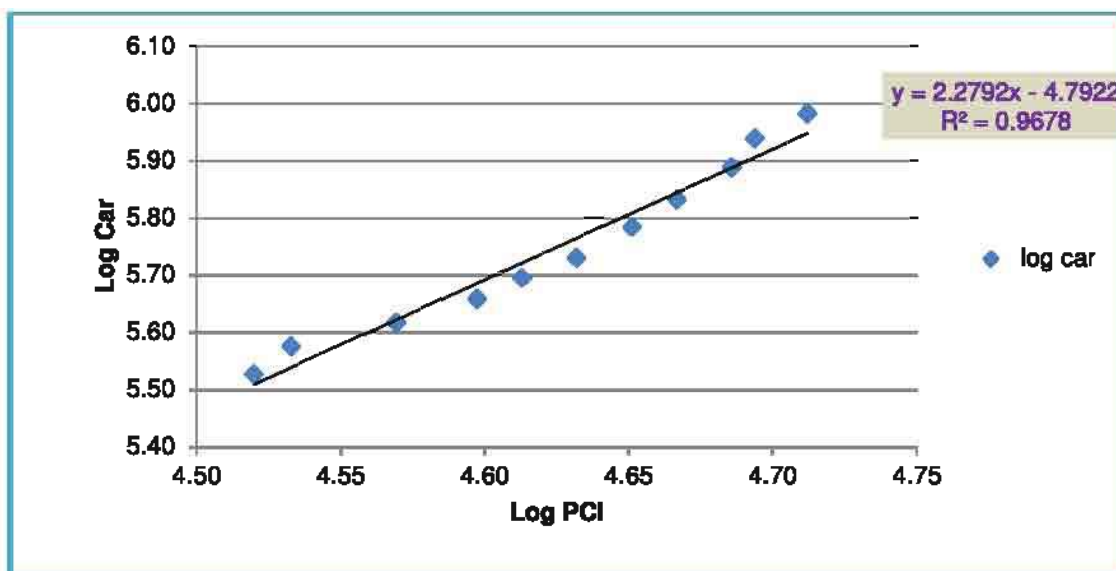


Figure 3-1: Regression and Elasticity PCI vs. Car-Extrapolation

Table 3-2 : Population Vs Bus

Year	Population	Buses	Log Pop	Log Bus	Pop Growth	Average Growth
2004-05	26012183	19855	7.42	4.30		
2005-06	26492788	21136	7.42	4.33	2%	
2006-07	26982983	22373	7.43	4.35	2%	
2007-08	27482038	24457	7.44	4.39	2%	
2008-09	27989725	25682	7.45	4.41	2%	
2009-10	28506747	27146	7.45	4.43	2%	
2010-11	29034180	28653	7.46	4.46	2%	
2011-12	29571111	30160	7.47	4.48	2%	
2012-13	29795907	33475	7.47	4.52	1%	
2013-14	35222450	35864	7.55	4.55	18%	
2014-15	35579780	40545	7.55	4.61	1%	3.29%

Regression analysis of same is given in figure below



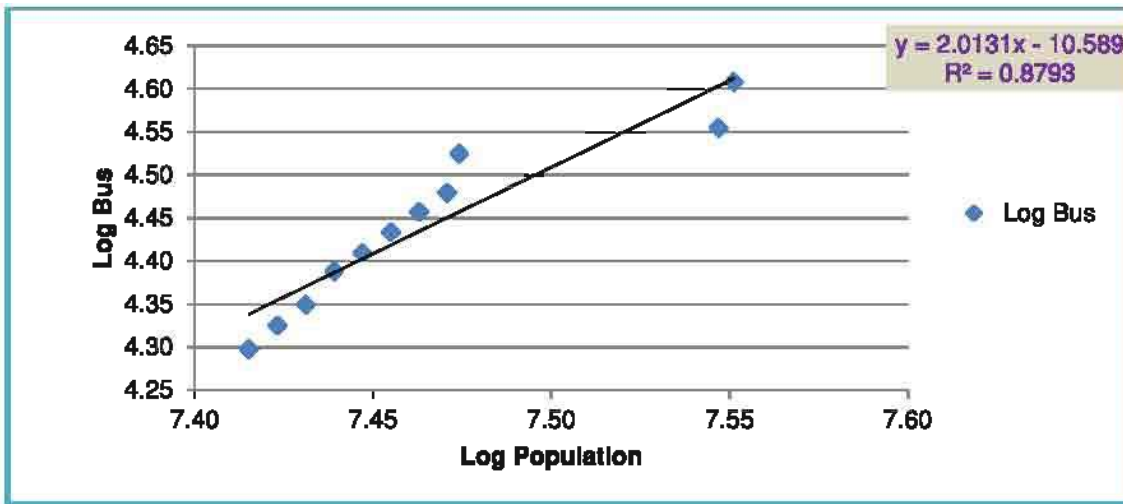


Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation

Elasticity of goods traffic has been worked out by regression analysis with NSDP.

Following table represents the data and details.

Table 3-3 : Goods Traffic Vs NSDP

Year	NSDP	Trucks	Log NDSP	Log Truck	NSDP Growth	Average Growth (5 Year)
2004-05	8610813	119183	6.94	5.08		
2005-06	9032981	128201	6.96	5.11	5%	
2006-07	10007179	140380	7.00	5.15	11%	
2007-08	10873818	150720	7.04	5.18	9%	
2008-09	11476627	160113	7.06	5.20	6%	
2009-10	12209725	170519	7.09	5.23	6%	
2010-11	13002377	186725	7.11	5.27	6%	
2011-12	13727501	202930	7.14	5.31	6%	
2012-13	14449823	216238	7.16	5.33	5%	
2013-14	17403765	233211	7.24	5.37	20%	
2014-15	18329810	251035	7.26	5.40	5%	7.96%

Following figure depict regression analysis and extrapolation.

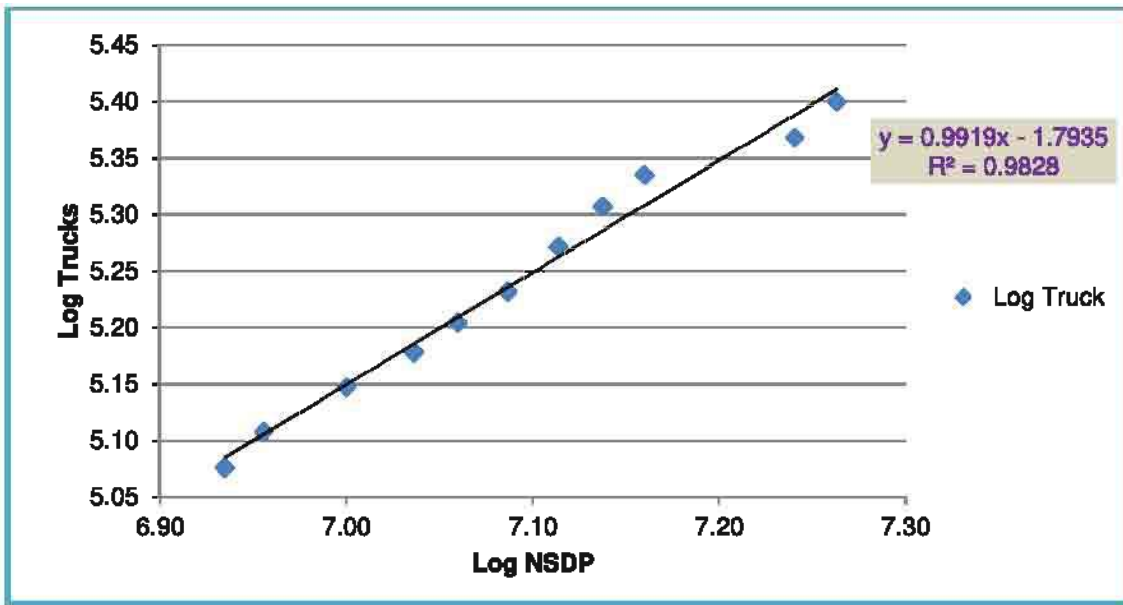


Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth.

The results of these analyses for the good fit as reflected by R^2 values are presented in the Table below.

Table 3-4 : Summary Regression Analysis

State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average IV Growth (5yrs)	Growth Elastic Model	Remarks
Punjab	Car/Jeep	PCI	$y = 2.2792x - 4.7922$	$R^2 = 0.9678$	2.2792	4.54%	10.34%	Good Regression
	Bus	Population	$y = 2.0131x - 10.5894$	$R^2 = 0.8793$	2.0131	3.29%	6.63%	Good Regression
	Truck	NSDP	$y = 0.9919x - 1.7935$	$R^2 = 0.9828$	0.9919	7.96%	7.90%	Good Regression



Economical model for predicting growth is good tool, however other local, regional, national factors should also be considered before finalizing growth factors. Considering factors such as Existing developments and other influencing economic factors, moderated growth should be considered. These factors are discussed in subsequent sections.

3.4 Analysis of Historic Traffic Data

Historic traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Pathankot to Amritsar has recently been commissioned and tolling commenced in 2014. Only few years traffic data is available which is not sufficient to establish any credible trend. Moreover, due to ban on mining in area commercial traffic is temporarily affected. Hence traffic growth on project corridor has been taken from economic model.

3.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

ECONOMY

After witnessing a slowdown during 2008-09, the economy recovered in 2009-10, and a very high growth rate of GDP was recorded in 2010. Following figure depicts growth of GDP in India during the period.



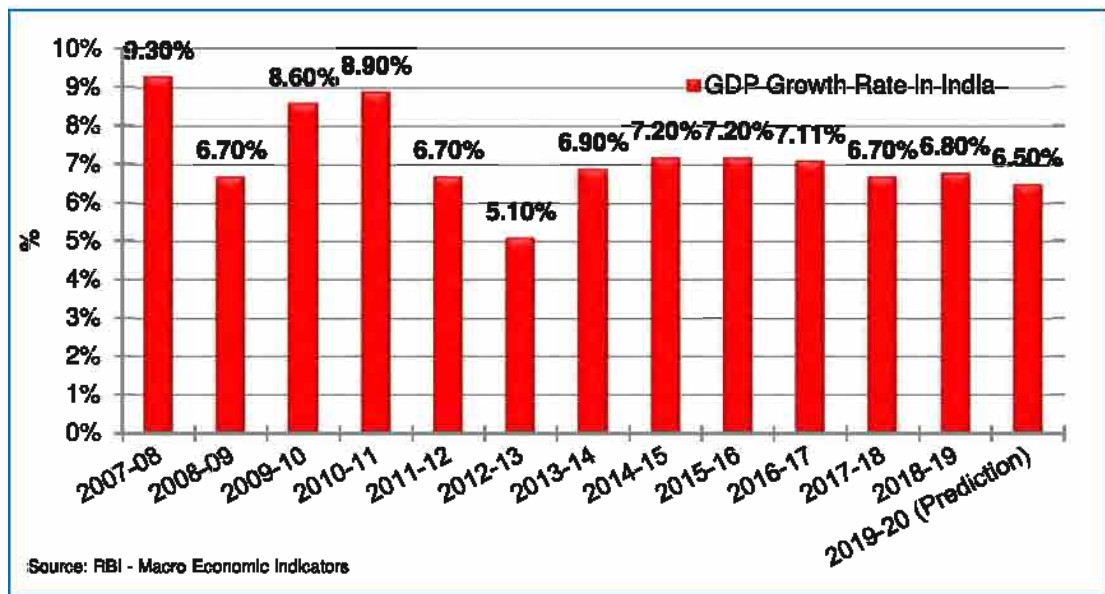


Figure 3-4 : Growth of GDP in India

After recording an all impressive growth of 8.9% in 2011, GDP declined between FY11 and FY14. GDP growth in 2014-15, 2015-16 and 2016-17 was pegged around 7.2%. FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Institutions like World Bank and ADB have predicted growth of GDP in Indian Economy in range of 6.5% in coming year.

Honorable Prime Minister and Government has set up a target for Indian Economy to become 5 Trillion USD economy. This would require a continuous robust growth for next 5 year. Government plans several initiatives to boost economy to achieve this target. In such case it is expected that project corridor will also witness good growth of traffic on project corridor.

3.6 Recommended Growth Rates of Traffic

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under. Growth rates are recommended for three scenarios for sensitivity analysis namely Optimistic, Pessimistic and Most Likely with a positive and negative variation 0.5% and -1.0% from Most Likely case respectively. While working out future growth projections both historical and economical model growths are considered.



Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as the trend of technological advances in the logistics industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is an established practice to stepdown future growth rates at interval of 5 years.

Since mining ban has been finally lifted in Punjab it is expected that project corridor would return to normal growth of traffic. Hence growth projections for future have been kept similar to April 2019 Report and same would be reviewed when full year traffic data is available in April 2020.

Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as the trend of technological advances in the logistics industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is an established practice to stepdown future growth rates at interval of 5 years

Table 3-5 : Recommended Growth Rates Optimistic

Year/ Vehicle Type	2020-22	2022-27	2027-32	2032-37
Car/Jeep/Van	8.84%	7.84%	6.84%	5.84%
LCV	7.40%	6.40%	5.40%	4.40%
Truck/Bus	6.13%	5.13%	4.13%	3.13%
Multi Axle (> 2 axle)	8.40%	7.40%	6.40%	5.40%



Table 3-6 : Recommended Growth Rates Pessimistic

Year/ Vehicle Type	2020-22	2022-27	2027-32	2032-37
Car/Jeep/Van	7.34%	6.34%	5.34%	4.34%
LCV	5.90%	4.90%	3.90%	2.90%
Truck/Bus	4.63%	3.63%	2.63%	1.63%
Multi Axle (> 2 axle)	6.90%	5.90%	4.90%	3.90%

Table 3-7 : Recommended Growth Rates Most Likely

Year/ Vehicle Type	2020-22	2022-27	2027-32	2032-37
Car/Jeep/Van	8.34%	7.34%	6.34%	5.34%
LCV	6.90%	5.90%	4.90%	3.90%
Truck/Bus	5.63%	4.63%	3.63%	2.63%
Multi Axle (> 2 axle)	7.90%	6.90%	5.90%	4.90%

With return of normalcy in J& K valley it is expected that transportation of famous Kashmiri apple would also pickup from next year. This is expected to contribute in enhanced traffic growth on project corridor.

Traffic and revenue has been worked out on the basis of above growths and same is presented in subsequent chapter of report.

CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in previous section of report are used to arrive at traffic projections for future years. Toll plaza wise futuristic traffic projection is given in tables below.

These projections have been done for following three cases of growth

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario

**Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 16.000 KM
(Optimistic Growth Scenario)**

Year	CAR	Minibus/LCV	Truck/Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	10677	963	1181	2433	24	15278	26723
2020-21	11621	1034	1253	2637	26	16573	28924
2021-22	12649	1109	1328	2857	31	17974	31293
2022-23	13641	1180	1395	3068	34	19318	33555
2023-24	14711	1255	1466	3295	37	20764	35986
2024-25	15864	1335	1541	3539	40	22319	38595
2025-26	17108	1419	1620	3800	43	23990	41390
2026-27	18450	1509	1703	4082	47	25791	44403
2027-28	19713	1590	1773	4342	50	27468	47181
2028-29	21062	1675	1846	4620	53	29256	50141
2029-30	22504	1765	1921	4915	57	31162	53289
2030-31	24045	1860	2000	5229	61	33195	56640
2031-32	25690	1960	2082	5564	65	35361	60207
2032-33	27191	2045	2147	5864	69	37316	63398
2033-34	28781	2135	2214	6180	73	39383	66764
2034-35	30462	2228	2283	6514	77	41564	70313
2035-36	32241	2326	2354	6865	81	43867	74049
2036-37	34125	2427	2427	7236	85	46300	77991

**Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 88.50 KM
(Optimistic Growth Scenario)**

Year	CAR	Minibus	Truck/Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	12739	663	928	1313	9	15652	22466
2020-21	13866	713	984	1423	14	17000	24354
2021-22	15092	766	1044	1543	16	18461	26389
2022-23	16276	816	1098	1658	18	19866	28336
2023-24	17552	869	1154	1781	20	21376	30422
2024-25	18929	925	1214	1913	22	23003	32666
2025-26	20413	984	1275	2055	24	24751	35070
2026-27	22015	1047	1339	2207	26	26634	37651
2027-28	23522	1104	1394	2349	28	28397	40057
2028-29	25131	1164	1451	2499	30	30275	42611
2029-30	26850	1227	1511	2658	32	32278	45329
2030-31	28687	1293	1573	2827	34	34414	48220
2031-32	30650	1362	1637	3008	36	36693	51302
2032-33	32441	1422	1688	3170	38	38759	54074
2033-34	34336	1484	1741	3341	40	40942	57000
2034-35	36342	1549	1796	3521	42	43250	60087
2035-36	38466	1617	1852	3711	44	45690	63345
2036-37	40713	1687	1909	3911	46	48266	66777

Similarly, traffic projections for Pessimistic scenario are given as under.

**Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 16.000 KM
(Pessimistic Growth Scenario)**

Year	CAR	Minibus/LCV	Truck/Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	10677	963	1181	2433	24	15278	26723
2020-21	11460	1019	1234	2600	26	16339	28508
2021-22	12302	1078	1290	2780	28	17478	30425
2022-23	13082	1131	1337	2945	30	18525	32177
2023-24	13912	1186	1385	3119	32	19634	34026
2024-25	14794	1243	1435	3302	34	20808	35976
2025-26	15732	1303	1486	3496	36	22053	38039
2026-27	16730	1366	1539	3703	38	23376	40231
2027-28	17623	1419	1579	3885	40	24546	42151
2028-29	18564	1474	1620	4075	42	25775	44162
2029-30	19556	1531	1662	4274	44	27067	46270



2030-31	20601	1590	1706	4483	46	28426	48485
2031-32	21702	1652	1752	4702	48	29856	50811
2032-33	22645	1699	1781	4885	50	31060	52744
2033-34	23628	1747	1810	5075	52	32312	54750
2034-35	24654	1798	1841	5273	54	33620	56846
2035-36	25724	1850	1872	5477	56	34979	59014
2036-37	26841	1904	1903	5690	58	36396	61272

**Table 4-4 : Total Tollable Traffic @ Toll Plaza 2- Chainage 88.50 KM
(Pessimistic Growth Scenario)**

Year	CAR	Minibus	Truck/Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	12739	663	928	1313	9	15652	22466
2020-21	13675	701	970	1404	9	16759	23995
2021-22	14679	743	1015	1502	9	17948	25638
2022-23	15610	780	1050	1590	9	19039	27126
2023-24	16600	819	1088	1684	9	20200	28711
2024-25	17653	859	1127	1784	17	21440	30427
2025-26	18772	901	1167	1889	18	22747	32206
2026-27	19963	945	1209	2000	19	24136	34093
2027-28	21030	982	1240	2098	20	25370	35754
2028-29	22154	1021	1272	2201	21	26669	37501
2029-30	23338	1061	1305	2309	22	28035	39334
2030-31	24585	1103	1339	2422	23	29472	41259
2031-32	25899	1146	1373	2540	24	30982	43275
2032-33	27024	1180	1394	2639	25	32262	44964
2033-34	28198	1214	1416	2742	26	33596	46723
2034-35	29423	1250	1440	2850	27	34990	48565
2035-36	30701	1286	1464	2960	28	36439	50468
2036-37	32034	1323	1488	3075	29	37949	52451

Similarly, traffic projections for Most Likely are given as under.

**Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 16.000 KM
(Most Likely Growth Scenario)**

Year	CAR	Minibus/LCV	Truck/Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	10677	963	1181	2433	24	15278	26723
2020-21	11567	1028	1247	2625	26	16493	28780
2021-22	12532	1099	1317	2832	28	17808	31002
2022-23	13452	1163	1379	3028	30	19052	33095
2023-24	14440	1231	1443	3236	32	20382	35322
2024-25	15501	1303	1509	3459	34	21806	37701
2025-26	16640	1380	1578	3697	36	23331	40243



2026-27	17862	1460	1651	3951	38	24962	42956
2027-28	18995	1531	1711	4184	40	26461	45433
2028-29	20200	1606	1773	4430	42	28051	48052
2029-30	21481	1684	1837	4690	44	29736	50821
2030-31	22844	1766	1903	4967	46	31526	53761
2031-32	24293	1852	1972	5261	49	33427	56882
2032-33	25591	1924	2023	5518	51	35107	59607
2033-34	26958	1999	2076	5788	53	36874	62469
2034-35	28399	2076	2130	6071	55	38731	65470
2035-36	29917	2156	2185	6369	58	40685	68628
2036-37	31516	2239	2243	6682	61	42741	71947

**Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 88.500 KM
(Most Likely Growth Scenario)**

Year	CAR	Minibus	Truck/Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	12739	663	928	1313	9	15652	22466
2020-21	13802	709	979	1417	10	16917	24224
2021-22	14953	759	1034	1530	11	18287	26128
2022-23	16051	805	1081	1635	12	19584	27913
2023-24	17229	853	1131	1748	13	20974	29826
2024-25	18494	904	1182	1868	14	22462	31865
2025-26	19852	957	1237	1998	15	24059	34057
2026-27	21310	1013	1293	2135	16	25767	36388
2027-28	22661	1063	1340	2260	17	27341	38522
2028-29	24099	1116	1389	2393	18	29015	40790
2029-30	25627	1170	1439	2535	19	30790	43192
2030-31	27252	1227	1490	2685	20	32674	45735
2031-32	28981	1287	1544	2843	21	34676	48432
2032-33	30530	1337	1584	2983	22	36456	50810
2033-34	32160	1390	1624	3130	23	38327	53306
2034-35	33878	1444	1667	3283	24	40296	55927
2035-36	35688	1500	1712	3444	25	42369	58685
2036-37	37595	1559	1758	3613	26	44551	61583

4.2 Modification in Concession Period

As per Article 29 of the concession agreement, if actual traffic on the project falls short or exceeds Target Traffic on project highway on defined date, concession period shall be modified subject to calculation stipulated therein. For Pathankot-Amritsar project, the Target Date and Target Traffic are defined as under.

Target Date - 1st January 2019



Target Traffic - 34498 in PCU.

It was observed that as per traffic projections, traffic volume falls short of target traffic in all scenarios. This warrants for extension of concession period. Extension of concession period is worked out as per provisions of concession agreement. Following table provides details of modification in concession agreement.

Scenario	Average Traffic in PCUs of Month Dec-2019 Jan-2019	Expected reduction/shortening in Concession Period
Actual	23110	4 years

Hence traffic and toll revenue have been considered for an additional 4 years.

Further, due to the suspension in toll in the year FY17 for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days



CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

As per the Toll Notification (Schedule R) the following discounts have been considered:

1. **Monthly Pass:** For frequent users monthly pass is issued for 50 trips per month. Applicable discounted rate is 2/3 times the normal rate. Concessionaire has also issued additional monthly pass for 60 trips at 2/3 times the normal rate.
2. **Daily Pass (for Return Trip):** A 75% discount will be offered on the return trip.
3. **Single Journey:** Full single journey toll would be charged to this category of vehicles who are infrequent travelers or whose frequency does not yield any discount from the above categories.
4. Local Car / Jeep / Van to be charged at Rs 150 per month (2007)

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule R) as given under

The formula for determining the applicable rate of fee shall be as follows:-

$$\text{Applicable rate of fee} = \text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI A} - \text{WPI B}}{\text{WPI B}} \right\} \times 0.4$$



Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site (www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.

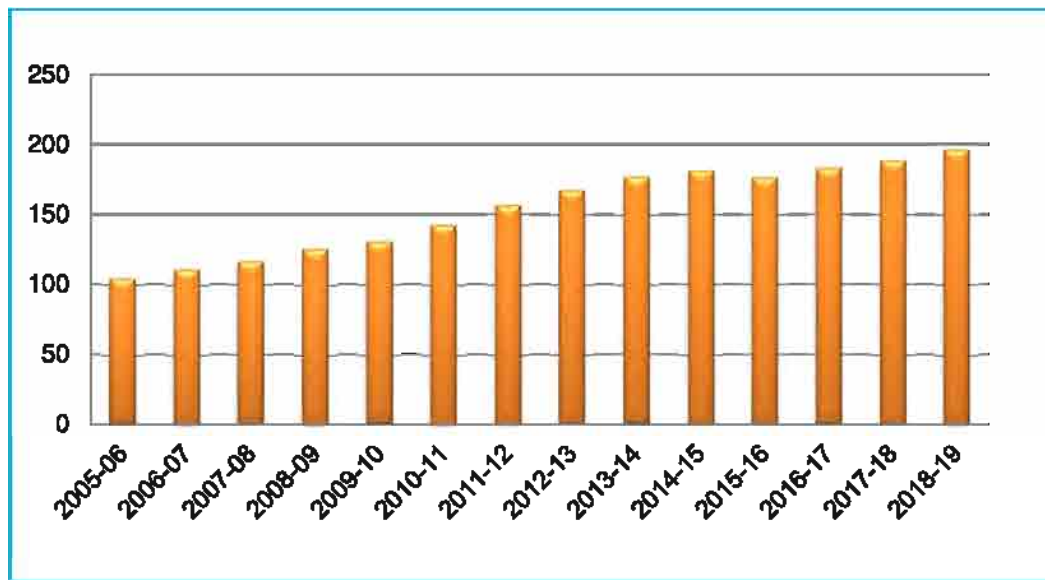


Figure 5-1 : Historical Rate of WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2018 is 5%. Same is considered for projection of WPI in future years.

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules, 2008.



Table 5-1 : Base Toll Rates 2007 - 08

Type of Vehicle	Base Rate of Fee / Km (in Rs.)
Car, Jeep, Van or Light Motor Vehicle	0.65
Light Commercial Vehicle, Light Goods Vehicle or Mini Bus	1.05
Bus or Truck (2 Axle)	2.2
Three Axle commercial vehicles	2.4
Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4-6 axles)	3.45
Oversized Vehicle (seven or more axles)	4.2

There are number of bypasses and structures in each package. Equivalent length for structures is added to tollable length at each toll plaza. Bypasses having cost more than Rs. 50 Cr. are to be charged as per fee notification which provide incremental rate over basic rate for Rs. 15 Cr cost of bypass. Following table provides details of Bypasses having cost more than Rs. 50 Cr.

Additional rates for bypass having cost more than Rs. 50 Cr has been added as per schedule -R in toll rates for both toll plazas. Lengths of bypasses is deducted to arrive at effective length of road for each toll plaza for normal toll rates. Effective length excluding length of bypasses thus works out to Km 31.310 and Km 36.97 for Toll Plaza at Km 16.00 and Km 88.50 respectively.

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below. Since applicable length of highway length is equal for both plazas, applicable toll rates are also same

Thus, worked out rates for various categories of vehicle and discounts are given as under.

Table 5-2 : Toll Rates for Single Journey @Km 16.00

Year	CAR	Minibus	LCV	Truck	Bus	Multi axle	Oversized Vehicles
2019-20	105	160	160	330	330	500	650
2020-21	110	170	170	345	345	525	680
2021-22	115	180	180	365	365	550	715
2022-23	120	190	190	380	380	580	750
2023-24	130	195	195	400	400	610	790
2024-25	135	205	205	420	420	640	830
2025-26	140	215	215	440	440	670	870
2026-27	150	230	230	465	465	705	915
2027-28	155	240	240	490	490	740	960
2028-29	165	250	250	515	515	780	1010
2029-30	170	265	265	540	540	820	1060
2030-31	180	280	280	565	565	860	1115
2031-32	190	295	295	595	595	905	1175
2032-33	200	310	310	630	630	950	1235
2033-34	210	325	325	660	660	1000	1300
2034-35	220	340	340	695	695	1055	1365
2035-36	235	360	360	730	730	1110	1440
2036-37	245	380	380	770	770	1170	1515



Table 5-3 : Toll Rates for Return Journey@ Km 16.000

Year	CAR	Minibus	LCV	Truck	Bus	Multi axle	Oversized Vehicles
2019-20	160	245	245	495	495	750	975
2020-21	165	255	255	520	520	790	1020
2021-22	175	270	270	545	545	825	1070
2022-23	185	280	280	575	575	870	1125
2023-24	190	295	295	600	600	910	1180
2024-25	200	310	310	630	630	960	1240
2025-26	210	325	325	665	665	1005	1305
2026-27	225	345	345	695	695	1055	1370
2027-28	235	360	360	730	730	1110	1440
2028-29	245	380	380	770	770	1170	1515
2029-30	260	400	400	810	810	1230	1590
2030-31	270	420	420	850	850	1290	1675
2031-32	285	440	440	895	895	1360	1760
2032-33	300	465	465	940	940	1430	1850
2033-34	315	485	485	990	990	1505	1950
2034-35	335	515	515	1045	1045	1580	2050
2035-36	350	540	540	1100	1100	1665	2180
2036-37	370	570	570	1155	1155	1755	2270

Table 5-4 : Toll Rates for Local Monthly Ticket @ Km 16.000

Year	CAR
2019-20	265
2020-21	280
2021-22	295
2022-23	310
2023-24	325
2024-25	340
2025-26	355
2026-27	375
2027-28	395
2028-29	415
2029-30	435
2030-31	460
2031-32	480
2032-33	505
2033-34	535
2034-35	560
2035-36	590
2036-37	620



Table 5-5 : Toll Rates for Monthly Pass Local (50 Trips) @Km 16.000

Year	Car/Jeep/Van	LCV	Truck	Bus	3 - Axle	Multi Axle
2019-20	3510	5410	11010	11010	16705	21650
2020-21	3685	5675	11545	11545	17515	22700
2021-22	3870	5955	12120	12120	18385	23830
2022-23	4065	6255	12725	12725	19305	25020
2023-24	4265	6570	13360	13360	20275	26275
2024-25	4480	6900	14035	14035	21290	27595
2025-26	4705	7245	14740	14740	22365	28985
2026-27	4945	7615	15490	15490	23500	30455
2027-28	5195	8000	16275	16275	24695	32005
2028-29	5460	8410	17110	17110	25955	33640
2029-30	5745	8840	17985	17985	27285	35365
2030-31	6040	9295	18910	18910	28695	37185
2031-32	6350	9775	19890	19890	30175	39110
2032-33	6680	10285	20925	20925	31745	41140
2033-34	7030	10820	22015	22015	33400	43290
2034-35	7400	11390	23170	23170	35150	45560
2035-36	7785	11990	24390	24390	37005	47955
2036-37	8200	12625	25680	25680	38960	50490

Table 5-6 : Toll Rates for Single Journey @ Km 88.500

Year	CAR	Minibus	LCV	Truck	Bus	Multi axle	Oversized Vehicles
2019-20	90	140	140	290	290	440	565
2020-21	95	150	150	300	300	460	590
2021-22	100	155	155	320	320	485	620
2022-23	105	165	165	335	335	510	650
2023-24	110	170	170	350	350	535	685
2024-25	115	180	180	370	370	560	720
2025-26	120	190	190	385	385	590	755
2026-27	130	200	200	405	405	620	795
2027-28	135	210	210	425	425	650	835
2028-29	140	220	220	450	450	685	875
2029-30	150	230	230	470	470	720	920
2030-31	155	240	240	495	495	755	970
2031-32	165	255	255	520	520	795	1020
2032-33	170	270	270	550	550	840	1070
2033-34	180	280	280	575	575	880	1125
2034-35	190	295	295	605	605	930	1185
2035-36	200	310	310	640	640	975	1250
2036-37	210	330	330	675	675	1030	1315

Table 5-7 : Toll Rates for Return Journey @ Km 88.500

Year	CAR	Minibus	LCV	Truck	Bus	Multi axle	Oversized Vehicles
2019-20	135	210	210	435	435	660	845
2020-21	145	220	220	455	455	695	885
2021-22	150	235	235	475	475	730	930
2022-23	155	245	245	500	500	765	975
2023-24	165	255	255	525	525	800	1025
2024-25	175	270	270	550	550	845	1080
2025-26	180	285	285	580	580	885	1130
2026-27	190	295	295	610	610	930	1190
2027-28	200	315	315	640	640	975	1250
2028-29	210	330	330	670	670	1025	1315
2029-30	220	345	345	705	705	1080	1380
2030-31	235	365	365	745	745	1135	1455
2031-32	245	380	380	780	780	1195	1530
2032-33	260	400	400	820	820	1255	1605
2033-34	270	425	425	865	865	1320	1690
2034-35	285	445	445	910	910	1390	1780
2035-36	300	470	470	960	960	1465	1875
2036-37	315	495	495	1010	1010	1540	1970

Table 5-8 : Toll Rates for Local Monthly Ticket @ Km 88.500

Year	CAR
2019-20	265
2020-21	280
2021-22	295
2022-23	310
2023-24	325
2024-25	340
2025-26	355
2026-27	375
2027-28	395
2028-29	415
2029-30	435
2030-31	460
2031-32	480
2032-33	505
2033-34	535
2034-35	560
2035-36	590
2036-37	620



Table 5-9 : Toll Rates for Monthly Pass Local (50 Trips) @ Km 88.50

Year	Car/Jeep/Van	LCV	Truck	Bus	3 - Axle	Multi Axle
2019-20	3020	4695	9615	9615	14690	18790
2020-21	3170	4925	10080	10080	15405	19705
2021-22	3325	5170	10585	10585	16170	20685
2022-23	3495	5430	11115	11115	16980	21720
2023-24	3670	5700	11670	11670	17830	22805
2024-25	3855	5990	12255	12255	18725	23955
2025-26	4045	6290	12875	12875	19670	25165
2026-27	4250	6610	13525	13525	20670	26435
2027-28	4470	6945	14215	14215	21720	27780
2028-29	4695	7300	14940	14940	22830	29200
2029-30	4940	7675	15705	15705	24000	30700
2030-31	5190	8070	16515	16515	25235	32280
2031-32	5460	8485	17370	17370	26540	33950
2032-33	5745	8930	18275	18275	27920	35715
2033-34	6045	9395	19225	19225	29380	37580
2034-35	6360	9885	20235	20235	30920	39545
2035-36	6695	10405	21300	21300	32545	41630
2036-37	7050	10955	22425	22425	34265	43830

5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza up to 2037-38 starting from the year 2019-20 are shown in tables below.



Table 5-10 : Toll Revenue Pessimistic Scenario (Crores)

Year	Toll at Plaza 16.00	Toll at Plaza 88.50	Total
2019-20	82.89	53.90	136.79
2020-21	92.35	60.26	152.61
2021-22	103.29	67.36	170.66
2022-23	114.81	74.54	189.35
2023-24	127.70	82.98	210.68
2024-25	141.11	91.91	233.03
2025-26	155.83	101.58	257.41
2026-27	174.09	113.35	287.44
2027-28	191.33	124.69	316.02
2028-29	210.15	136.66	346.81
2029-30	231.13	150.64	381.77
2030-31	253.59	166.02	419.62
2031-32	280.33	183.17	463.50
2032-33	304.51	199.50	504.01
2033-34	331.88	217.07	548.95
2034-35	363.13	237.51	600.64
2035-36	397.37	259.98	657.34
2036-37	432.85	283.41	716.26



Table 5-11 : Toll Revenue Optimistic Scenario
(Rs. Crores)

Year	Toll at Plaza 16.00	Toll at Plaza 88.50	Total
2019-20	82.89	53.90	136.79
2020-21	93.66	61.14	154.80
2021-22	106.18	69.32	175.51
2022-23	119.64	77.89	197.53
2023-24	134.92	87.94	222.86
2024-25	151.22	98.80	250.02
2025-26	169.37	110.75	280.13
2026-27	191.94	125.39	317.34
2027-28	213.88	139.99	353.86
2028-29	238.24	155.66	393.90
2029-30	265.80	174.02	439.82
2030-31	295.75	194.55	490.30
2031-32	331.57	217.77	549.35
2032-33	365.38	240.59	605.97
2033-34	404.03	265.62	669.65
2034-35	448.39	294.77	743.17
2035-36	497.76	327.38	825.14
2036-37	550.10	361.93	912.04



Table 5-12 : Toll Revenue Most Likely Scenario
(Rs. Crores)

Year	Toll at Plaza 16.00	Toll at Plaza 88.50	Total
2019-20	82.89	53.90	136.79
2020-21	93.22	60.88	154.11
2021-22	105.21	68.73	173.94
2022-23	118.04	76.81	194.84
2023-24	132.53	86.30	218.83
2024-25	147.85	96.47	244.32
2025-26	164.78	107.66	272.44
2026-27	185.80	121.33	307.13
2027-28	206.17	134.75	340.92
2028-29	228.61	149.13	377.74
2029-30	253.79	165.98	419.76
2030-31	281.00	184.74	465.74
2031-32	313.55	205.83	519.38
2032-33	343.82	226.34	570.16
2033-34	378.25	248.69	626.95
2034-35	417.68	274.65	692.32
2035-36	461.48	303.56	765.03
2036-37	507.51	334.06	841.57



CHAPTER 6

OPERATION & MAINTENANCE COST

6.1 General

Following are project parameters which would contribute towards cost of operation and maintenance.

Future cost of operation and maintenance is estimate on guess basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Pathankot to Amritsar on NH-15 in state of Punjab.

- a) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- b) **Periodic Maintenance** – This will be done on periodic basis say every 5 years. It will consist of overlaying of wearing course and painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost is spread over more than one years.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year 2019-20 is given in table below.



Table 6-1 : Year wise Details of Operation & Maintenance Cost

Year	Annual maintenance (Rs. Cr)	Thermoplastic painting (Rs. Cr)	Renewal Coat with BC (Rs. Cr.)	Special Repair of pavement	Structure maintenance (Rs. Cr)	Electric System		Total Expenditure (Rs. Crores)	Remarks
						Annual	Annual		
2019-20	19.12	1.18	16.64	12.97	0.06	0.94	0.94	53.45	Periodic Repair
2020-21	19.12	1.01	14.26	10.81	0.06	0.94	0.94	50.94	Periodic Repair
2021-22	19.12	0.84	12.56	7.93	0.06	0.94	0.94	47.99	Periodic Repair
2022-23	19.12				0.06	0.94	0.94	24.45	Regular O & M
2023-24	19.12				0.06	0.94	0.94	25.68	Regular O & M
2024-25	19.12	1.18	16.64	7.21	0.06	0.94	0.94	60.50	Periodic Repair
2025-26	19.12	1.18	16.64	5.04	0.06	0.94	0.94	60.48	Periodic Repair
2026-27	19.12			5.76	0.06	0.94	0.94	38.24	Periodic Repair
2027-28	19.12				0.06	0.94	0.94	31.21	Regular O & M
2028-29	19.12			10.09	0.06	0.94	0.94	49.20	Periodic Repair
2029-30	19.12	2.03	28.52		0.06	0.94	0.94	86.65	Periodic Repair
2030-31	16.25				0.06	0.94	0.94	30.39	Regular O & M
2031-32	16.25				0.06	0.94	0.94	31.30	Regular O & M

										Regular O & M
2032-33	16.25					0.06	0.94	32.24	Regular O & M	
2033-34	16.25					0.06	0.94	33.21	Regular O & M	
2034-35	16.25					0.06	0.94	34.20	Regular O & M	



CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Pathankot to Amritsar section of NH-15 in state of Punjab from km 6.082 to km 108.502 is currently a four-lane road. The road is in sound condition and serves to reasonably good levels of traffic volume. The project corridor falls in the influence zone of fast upcoming metro city Amritsar. There are many upcoming projects in the area which have the potential to boost economic growth of area and add value to development of region. All these developments have potential to give positive impact to traffic flow on project. As estimated in this study report project traffic is expected to grow at rate of 6-8% per annum.

Following can be considered as major outcome of study

- a) There is good amount of toll able traffic running on project
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in near future due to various development in area and overall growth of the economy
- c) Project corridor does not have risk of traffic leakage due to lack of competing roads of comparable quality
- d) Project infrastructure is in good condition and its maintenance cost is also reasonable

Based on above it can be considered a stable healthy project from traffic and revenue point of view.



CHAPTER 8

PROJECT ILLUSTRATIONS

8.1 General

Project current condition has been depicted in the following photographs



Figure 8-1 : General Condition





Figure 8-2 : General Condition



Figure 8-3 : General Condition





GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



**BHARUCH TO SURAT (KM 198.00 TO KM 263.00)
SECTION OF NH-8
IN THE STATE OF GUJARAT**



**TOLL REVENUE AND O&M
COST PROJECTION REPORT**



October 2019



GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



BHARUCH TO SURAT (KM 198.00 TO KM 263.000)

SECTION OF NH-8

IN THE STATE OF GUJARAT.

**TOLL REVENUE AND O&M
COST PROJECTION REPORT**

October 2019



CONTENTS

Chapter 1	6
INTRODUCTION	6
1.1 Background.....	6
1.2 Objective of the Study.....	6
1.2.1 Scope of Services	6
Chapter 2	8
TRAFFIC SURVEYS AND ANALYSIS	8
2.1 Traffic Surveys.....	8
2.2 Classified Traffic Volume Count	10
2.3 Traffic Characteristic	11
2.3.1 Traffic Data	12
2.4 Data Analysis.....	12
2.4.1 Analysis of Traffic Volume Count	12
2.4.2 Components of Traffic.....	14
2.5 Secondary Data Collection	15
Chapter 3	16
GROWTH OF TRAFFIC ON PROJECT HIGHWAY	16
3.1 Introduction.....	16
3.2 Trend Analysis.....	16
3.3 Estimation of Traffic Demand Elasticity	17
3.4 Analysis of Historic Traffic Data	21
3.5 Other Factors Influencing Growth.....	22
3.6 Recommended Growth Rates of Traffic	23
Chapter 4	25
TRAFFIC FORECAST	25
4.1 Traffic Projections	25
4.2 Extension in Concession Period	26
Chapter 5	27
FORECAST OF TOLL REVENUE	27
5.1 General.....	27
5.2 Discount Categories	27
5.3 Estimation of Toll Rates	28
5.4 Toll Revenue.....	32
5.5 Toll Revenue at all toll plazas under Scenarios	32
Chapter 6	34

OPERATION AND MAINTENANCE..... 34
6.1 Operation and Maintenance..... 34
Chapter 7..... 36
CONCLUSION & RECOMMENDATIONS..... 36
7.1 Conclusion & Recommendations..... 36
Chapter 8..... 37
PROJECT ILLUSTRATIONS..... 37
8.1 General..... 37



LIST OF TABLES

Table 2-1 : Traffic Data Details.....	9
Table 2-2 : Vehicle Classification System.....	11
Table 2-3 : Traffic Data at Toll Plaza at Km 246.075	12
Table 2-4 : PCU Factors Adopted for Study	13
Table 2-5 : Traffic in PCU at Project Stretch.....	13
Table 2-6 : Journey Type Bifurcation of Traffic at KM 246.075	14
Table 3-1 : Per Capita Income Vs Car	18
Table 3-2 : Population Vs Bus.....	19
Table 3-3 : Goods Traffic Vs NSDP	20
Table 3-4 : Summary Regression Analysis.....	21
Table 3-5 : Past Traffic at Project Stretch -	21
Table 3-6 : Recommended Growth Rates Optimistic	24
Table 3-7 : Recommended Growth Rates Pessimistic.....	24
Table 3-8 : Recommended Growth Rates Most Likely.....	24
Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage Km 246.075	25
Table 4-2 : Total Tollable Traffic @ Toll Plaza 1- Chainage Km 246.075	26
Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage Km 246.075	26
Table 5-1 : Base Toll Rates June 1997	28
Table 5-2 : Toll Rates for Car / Jeep / Van @Km 246.075	29
Table 5-3 : Toll Rates for LCV / Mini Bus @Km 246.075	30
Table 5-4 : Toll Rates for Truck / Bus @Km 246.075.....	30
Table 5-5 : Toll Rates for Multi Axle @Km 246.075.....	30
Table 5-6 : Toll Rates for Monthly Passes @Km 246.075	31
Table 5-7 : Toll Revenue Optimistic Scenario.....	32
Table 5-8 : Toll Revenue Pessimistic Scenario	32
Table 5-9 : Toll Revenue Most Likely Scenario	33



LIST OF FIGURES

<i>Figure 2-1: Toll Plaza Location</i>	<i>10</i>
<i>Figure 3-1: Regression and Elasticity PCI vs. Car-Extrapolation</i>	<i>18</i>
<i>Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation</i>	<i>19</i>
<i>Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation</i>	<i>20</i>
<i>Figure 3-4 : Growth of GDP in India.....</i>	<i>22</i>
<i>Figure 5-1 : Historical Rate WPI Inflation in India.....</i>	<i>29</i>
<i>Figure 8-1 : Tapi Bridge Condition</i>	<i>37</i>
<i>Figure 8-2 : General Condition of project road.....</i>	<i>37</i>
<i>Figure 8-3 : General Condition of Project Road</i>	<i>38</i>
<i>Figure 8-4 : View of Project Road</i>	<i>38</i>



ABBREVIATIONS

AADT	- Annual Average Daily Traffic	NHAI	- National Highway Authority of India
BOT	- Build Operate Transfer	NHDP	- National Highways Development Project
CAGR	- Compound Annual Growth Rate	NSDP	- Net State Domestic Product
CTV	- Classified traffic volume	O&M	- Operation & Maintenance
DBFOT	- Design, Build, Finance, Operate & Transfer	PCDP	- Per Capita Domestic Product
EME	- Earth Moving Equipment	PCI	- Per Capita Income
GDP	- Gross Domestic Product	PCU	- Passenger Car Unit
GSDP	- Gross State Domestic Product	PSC	- Pre-stressed Concrete
HCM	- Heavy Construction Machinery	RCC	- Reinforced cement concrete
HCV	- Heavy Commercial Vehicle	RHS	- Right Hand Side
HTMS	- Highway Traffic Management System	SH	- State Highway
IRC	- Indian Road Congress	TP	- Toll Plaza
IRR	- Internal Rate of Return	WPI	- Wholesale Price Index
LCV	- Light Commercial Vehicle	SIR	- Special Investment Region
LHS	- Left Hand Side	c.	- Circa
LGV	- Light Goods Vehicle	ROB	- Railway Over Bridge
MAV	- Multi Axle Vehicle	MDR	- Major District Road
MORTH	- Ministry of Road Transport and Highways	ODR	- Other District Road
NH	- National Highway	CA	- Concession Agreement
PCC	- Plain Cement Concrete	RMT	- Running Meter
CR	- Coarse Rubble		



CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 km of existing 4-lane National Highways into 6-lane National Highway. Sections envisaged under 6-laning comprise the Golden Quadrilateral section (5,700 km) and some other sections which are 800 km in length.

The project under consideration, **Bharuch and Surat** section of NH-8 from km 198.000 to km 263.000 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s IDAA Infrastructure Ltd.* (Concessionaire) has been awarded the Project for concession period of 15 years starting from 2nd January 2007 to 1st January 2022. The Project has been commissioned and is currently in the operation / maintenance phase.

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged *GMD Consultants* to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as "*Toll Revenue and O&M Cost Projection Report*" mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections



The Concessionaire has provided basic historical traffic data and other project details on the basis of which the above analysis has been carried out, after applying our judgement on the traffic estimates.

“Toll Revenue and O&M Cost Projection Report” was submitted in March 2017. In this report traffic data of year 2015-16 was used as base traffic. The report was updated with traffic data of year 2016-17 and report was submitted in October 2017. Report was further updated with traffic data of 2017-18 and same was submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2018 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. Now as six-monthly traffic data from April 2019 to September 2019 is also available, this report is updated taking this latest traffic data into consideration.

Chapters on Project Details, Influence Zone Traffic Analysis have not been included in this update as there has been no significant event or change in the last six months which will have an impact on these chapters in our report dated April 2019



CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

The Consultants have collected required information in connection with the project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project

- Classified traffic volume counts at toll plaza locations on Surat- Bharuch section of NH-8 for base year 2015-16, 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

Project can be divided into three homogenous sections from traffic point of view.

These sections can be

- Bharuch to Ankleshwar
- Ankleshwar to Palod
- Palod to Surat

Table 2-1 below lists provides details of locations from where traffic details have been collected.



Table 2-1 : Traffic Data Details

SR. NO	LOCATION	CTV	Single Journey Traffic	Return Journey	Monthly Pass	Local Journey
1	Km 246.075 Toll Plaza	AADT for year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AADT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AADT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AADT for year 2018-2019	For Year 2018-2019	For Year 2018-2019	For Year 2018-2019	For Year 2018-2019
		AADT for period April 2019 to September 2019	For period April 2019 to September 2019	For period April 2019 to September 2019	For period April 2019 to September 2019	For period April 2019 to September 2019



The locations of each of the traffic survey are illustrated in Figure given below

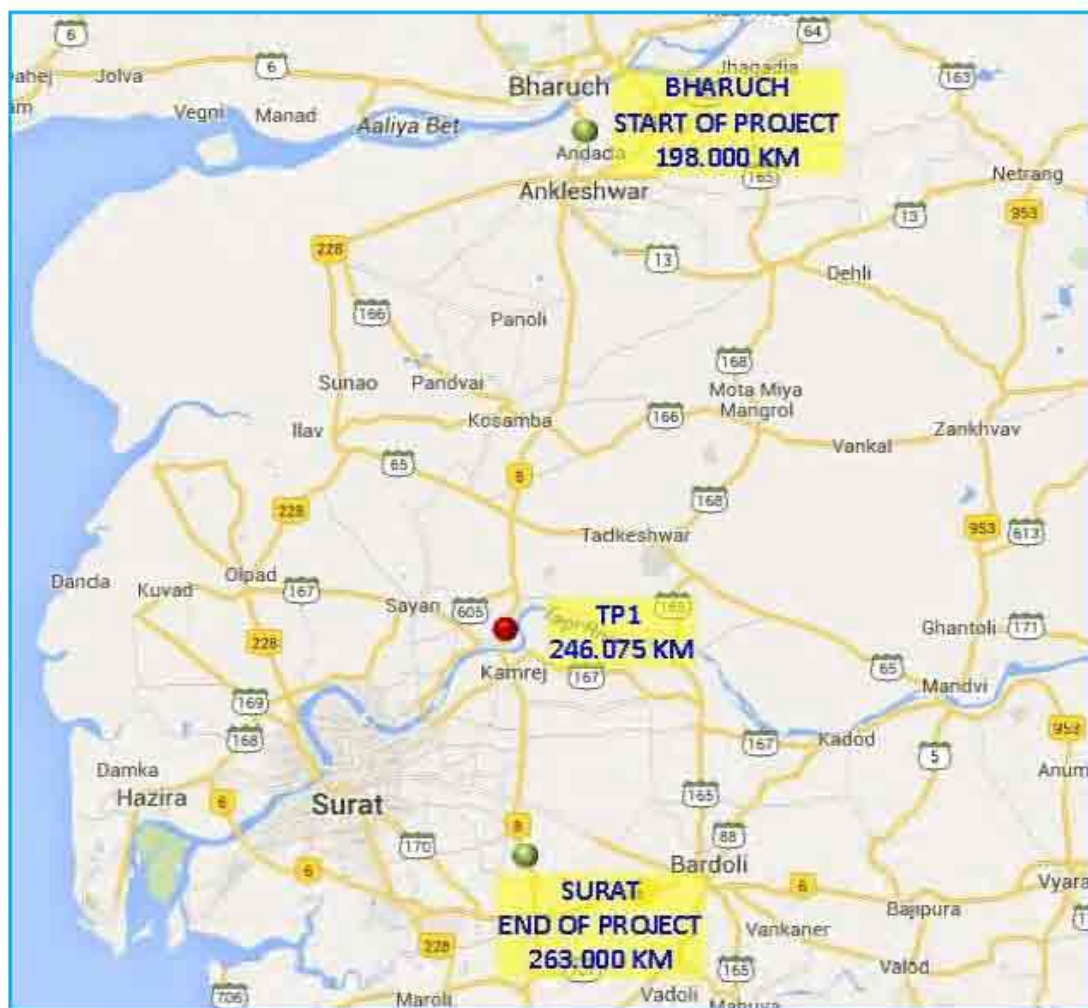


Figure 2-1: Toll Plaza Location



2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume Count survey has been provided by concessionaire of the project highway from actual traffic data gathered at toll plaza based on monthly data shared with NHAI. These locations are indicated in **Figure 2-1** and listed in **Table 2-1**.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in table given below

Table 2-2 : Vehicle Classification System

Vehicle Type	
Auto Rickshaw	
Passenger Car	Car, Jeep, Taxi & Van (Old / new technology)
Bus	Mini Bus
	Standard Bus
Truck	Light Goods Vehicle (LCV)
	2 – Axle Truck
	3 Axle Truck (HCV)
	Multi Axle Truck (4-6 Axle)
	Oversized Vehicles (7 or more axles)
Other Vehicles	Agriculture Tractor, Tractor & Trailer

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected is corresponding to a category of tollable vehicles. Following are the type of vehicles as per concession agreement.

- Car / Jeep / van
- LCV
- Truck / Bus
- Multi Axle



2.3 Traffic Characteristic

Toll revenue of project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have substantial potential to affect toll collection. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, % of monthly pass traffic are some of such characteristics of traffic. These will be discussed in subsequent sections of report.

2.3.1 Traffic Data

Project concessionaire has provided Traffic data for base year 2015-16, 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019 as under for toll plaza at Km 246.075

Table 2-3 : Traffic Data at Toll Plaza at Km 246.075

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) - FY 2018-19	Annual Average Daily Traffic (Nos.) – April 2019 – Sept 2019
1	CAR	6517	6337	6418	6878	8414
2	LCV	4608	4782	4950	5084	4851
3	Truck/Bus	5042	5089	5355	5578	7298
4	Multi Axle	9598	9836	10428	10660	11407
	Total	25766	26044	27151	28201	31970

This year there have been extended high intensity rains on pan in India. States of Maharashtra, Gujarat, Rajasthan, Bihar, UP, MP, Karnataka, Himachal Pradesh have been quite affected due to heavy rains this year. This has negative impact on passenger and commercial traffic during first of half of this year. It is expected that traffic in second half of year from October to March shall be substantially higher this year. Taking this into account a seasonality factor is taken to arrive and AADT value of traffic from six monthly average volume of first half of year

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed



in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in *Table 3-4*

Table 2-4 : PCU Factors Adopted for Study

Vehicle Type	PCUs
Car	1.0
Mini Bus	1.5
Standard Bus	3.0
LCV/LGV	1.5
2 Axle Truck	3.0
3 – 6 Axle Truck	4.5
MAV	4.5
Auto Rickshaw	1.0
Van/Tempo	1.0
Agriculture Tractor with Trailer	4.5
Agriculture Tractor without Trailer	1.5

Source: IRC: 64-1990

Traffic volume at each toll plaza was converted to PCU and same is presented as under:

Table 2-5 : Traffic in PCU at Project Stretch

Period	Toll Plaza Location	Traffic No	PCU	PCU Index
FY 2015-16	246.075	25766	71747	2.78
FY 2016-17	246.075	26044	73039	2.80
FY 2017-18	246.075	27151	76833	2.83
FY 2018-19	246.075	28201	79211	2.81
April 2019 – September 2019	246.075	31970	88915	2.78



It can be observed from above that project traffic has a PCU index close to 3 which indicates a higher component of commercial and goods traffic as compared to passenger traffic.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

For the purpose of analysis, the latest traffic numbers of period from April 2019 to September 2019 have been considered as the base numbers.

It is observed that car traffic forms only 26% of total traffic at toll plaza location 246.075 while as multi axle commercial vehicles comprise 36% of total traffic. Truck/ bus and LCV share 23% and 15% of total traffic respectively. Over all about 70% of traffic is commercial in nature.

Another important bifurcation of traffic is components of traffic with respect various type of toll ticketing like

1. Single Journey
2. Multi Journey
3. Monthly Pass (Local and General)

Following table provides numbers of vehicle falling in each of above category in year 2015-16, 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019

Table 2-6 : Journey Type Bifurcation of Traffic at KM 246.075

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) for FY 2018-19	Traffic Volume (Nos.) for April 2019-Sept 2019
1	Single Journey	18012	18736	19068	19599	21371
2	Return Journey	7306	7296	7864	8210	9996
3	Monthly Pass	448	372	219	392	603

Single journey component in total traffic numbers is as high as 67%. Return journey component is 31%. Monthly pass is as low as 2%. The project corridor serves as a spinal link for long distance traffic between Mumbai and Delhi. Thus, it has a higher component of single journey tickets.

2.5 Secondary Data Collection

There are several other factors which have a substantial impact on traffic pattern and growth on any project corridor. Following are some of such important factors

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or Industrial projects
- Special Industry in project corridor
- Overall trends of economic growth local as well as national / regional

Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP
 - b) NSDP
 - c) Population Growth
 - d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data
3. Competing road network.



We have collected and utilized such underlying data in the study to estimate the growth and risk factors for traffic along the project corridor.

CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the projections of other factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor Bharuch - Surat section of NH-8 has been done taking above factors in to consideration. “IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways” is established best practice and has been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Elasticity model of growth projection is one of the most widely acceptable methods for traffic forecast. The same is recommended in IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways.

In this method past trends of any vehicular data are paired with an economic indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicle traffic varies for different class of vehicles. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most important and direct parameters are given as under

- Per Capita Income
- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability. Hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Par Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP

Time series data of vehicle (both passenger and goods) Registered in state of Maharashtra is used as the base data for analysis of growth.

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given category of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth. Latest available data for vehicle registration, per capita income, NSDP and population is used in analysis.

As per IRC: 108-1996 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log } (P) = k \times \text{Log } (EI) + A$$

Where,

P = Number of Vehicles (Mode wise)

EI = Economic Indicator

A = Regression constant

k = Elasticity coefficient (Regression coefficient)



The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

Following tables and graphs depict regression and elasticity of growth model.

Table 3-1 : Per Capita Income Vs Car

Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2004	24143	749963	4.38	5.88		
2005	28067	826832	4.45	5.92	16%	
2006	30332	912933	4.48	5.96	8%	
2007	31754	1004822	4.50	6.00	5%	
2008	33901	1093965	4.53	6.04	7%	
2009	36202	1210368	4.56	6.08	7%	
2010	38048	1378830	4.58	6.14	5%	
2011	38856	1579889	4.59	6.20	2%	
2012	39904	1775502	4.60	6.25	3%	6.6%

Regression analysis of same is given in figure below

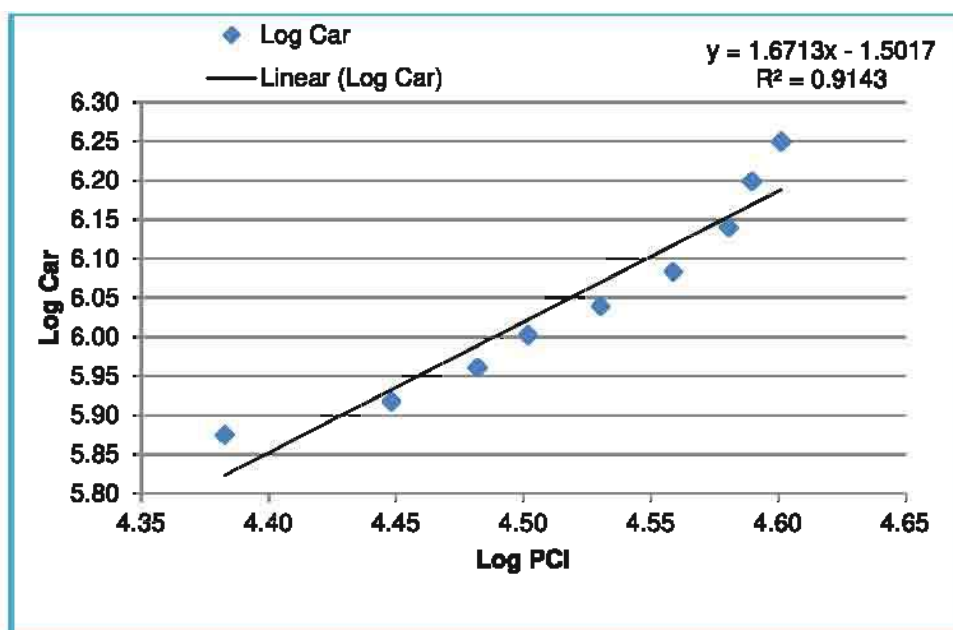
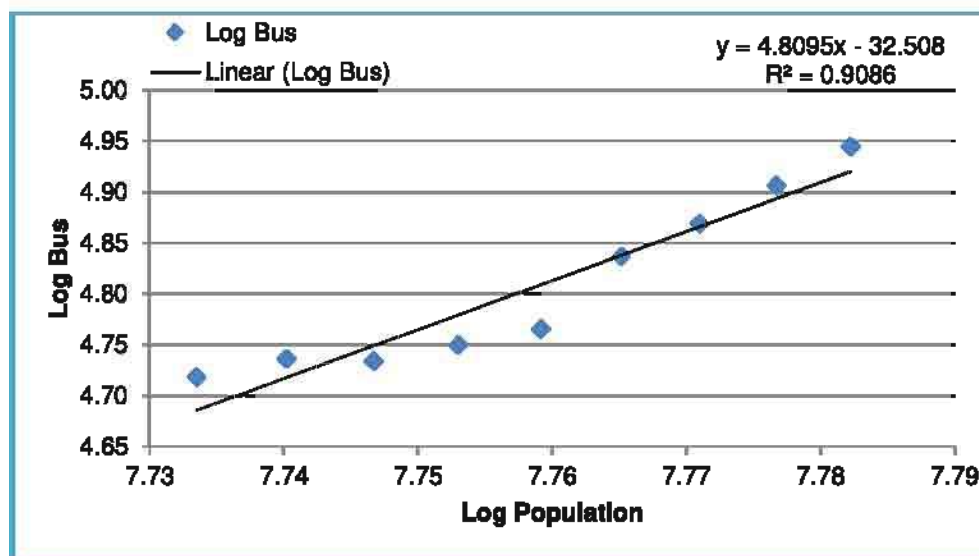
**Figure 3-1: Regression and Elasticity PCI vs. Car–Extrapolation**

Table 3-2 : Population Vs Bus

Year	Population	Buses	Log Pop	Log Bus	Pop Growth	Average Growth
2004	54140000	52286	7.73	4.72		
2005	54979000	54446	7.74	4.74	2%	
2006	55808000	54214	7.75	4.73	2%	
2007	56626000	56214	7.75	4.75	1%	
2008	57434000	58253	7.76	4.77	1%	
2009	58232000	68659	7.77	4.84	1%	
2010	59020000	73924	7.77	4.87	1%	
2011	59800000	80627	7.78	4.91	1%	
2012	60569000	87946	7.78	4.94	1%	
2013	61329000	93262	7.79	4.97	1%	
2014	62081000	96500	7.79	4.98	1%	1.38%

Regression analysis of same is given in figure below

**Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation**

Elasticity of goods traffic has been worked out by regression analysis with NSDP. Following table represents the data and details.

Table 3-3 : Goods Traffic Vs NSDP

Year	NSDP	Trucks	Log NSDP	Log Truck	NSDP Growth	Average Growth (5 Year)
2004	17226500	418811	7.24	5.62		
2005	19727000	457702	7.30	5.66	15%	
2006	21395400	508880	7.33	5.71	8%	
2007	23925300	553792	7.38	5.74	12%	
2008	24948000	586598	7.40	5.77	4%	
2009	28473200	626344	7.45	5.80	14%	
2010	31589200	678804	7.50	5.83	11%	
2011	33688600	750491	7.53	5.88	7%	
2012	35647700	818484	7.55	5.91	6%	
2013	38547200	875103	7.59	5.94	8%	9.42%

Following figure depict regression analysis and extrapolation.

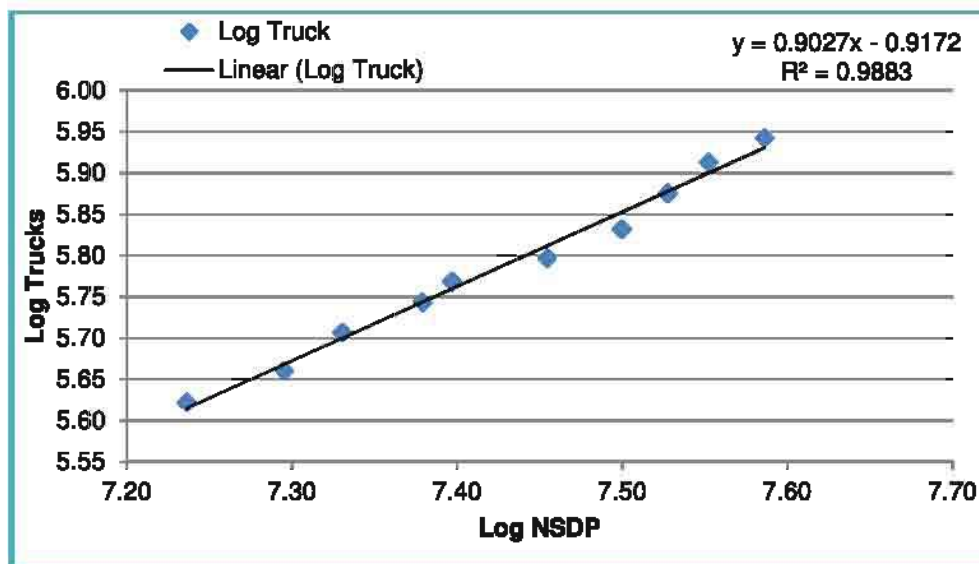


Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation



Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth. R^2 is statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R^2 more representative is the regression model of data.

The results of these analyses for the *good fit regression* as reflected by R^2 values are presented in the Table below

Table 3-4 : Summary Regression Analysis

State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth	Growth Elastic Model
Gujarat	Car/Jeep	PCI	$y = 1.6713x - 1.5017$	$R^2 = 0.9143$	1.6713	6.56%	10.96%
	Bus	Population	$y = 4.8095x - 32.5085$	$R^2 = 0.9086$	4.8095	1.38%	6.63%
	Truck	NSDP	$y = 0.9027x - 0.9172$	$R^2 = 0.9883$	0.9027	9.42%	8.50%

While the economic model for predicting growth is a good tool, other local, regional, national factors such as proposed developments etc. should also be considered before finalizing growth factors. These factors are discussed in subsequent sections.

3.4 Analysis of Historic Traffic Data

Historic traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Concessionaire has shared the traffic data of the project stretch from Surat to Bharuch on NH-8 since 2010. Following table provides historic traffic data at toll plaza location.

Table 3-5 : Past Traffic at Project Stretch -

Vehicle Type / Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20 (Apr to Sept)
Car/Jeep/Van	4950	5747	5864	5507	5948	6517	6337	6418	6878	8414
LCV	2855	3127	3479	3633	4226	4608	4782	4950	5084	4851
Truck/Bus	5226	4775	5442	5026	5025	5042	5089	5355	5578	7298
Mutli Axle (> 2 axle)	8202	8210	8696	8607	9138	9598	9836	10428	10660	11407
TOTAL (NO)	21233	21859	23481	22773	24337	25765	26044	27151	28201	31970



It is observed that except in year 2013-14 traffic on project corridor has registered positive growth. It has grown at in the range of 6% to 7% in year 2014-15 and 2015-16. Then in year 2016-17, a temporary slowdown in growth was expected due to impact of demonetization on the economy. It was observed that traffic volume dipped down considerably in months of November-2016 and December -2016. The traffic has registered good growth thereafter. Commercial traffic has grown @5-6% despite these disturbances which shows that impact of implementation of GST and demonetization is dissipated now. It is expected that the traffic growth shall gradually resume on these corridors which carry high proportions of commercial traffic.

3.5 Other Factors Influencing Growth

There are many factors which have an impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

ECONOMY

After witnessing a slowdown during 2008-09, the economy recovered in 2009-10, and a high growth rate of GDP was recorded in 2010. The following figure depicts growth of GDP in India during the period.

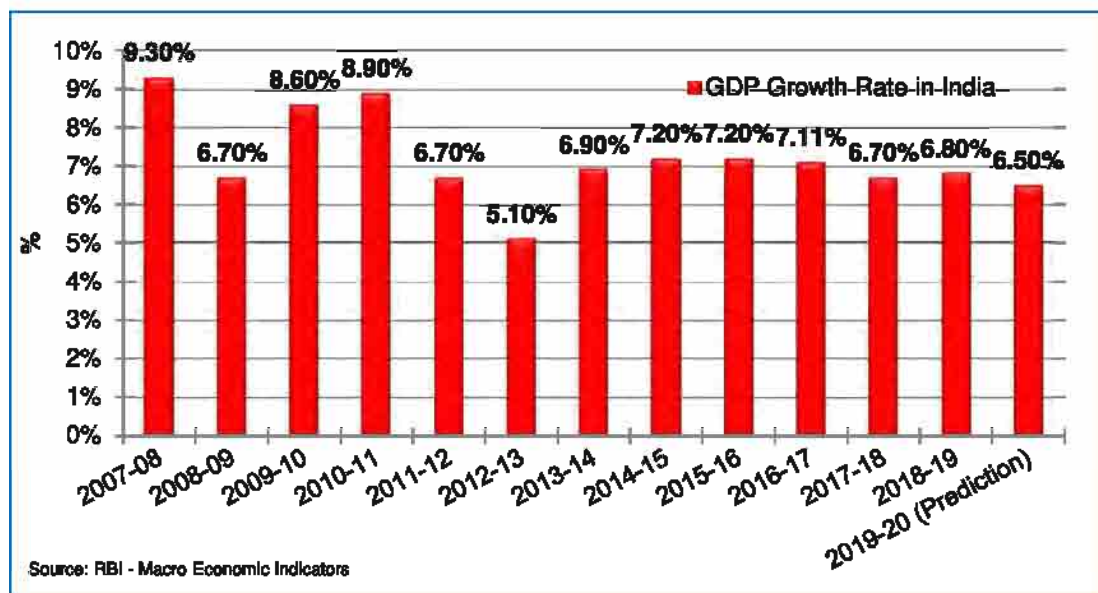


Figure 3-4 : Growth of GDP in India

After recording an all impressive growth of 8.9% in 2011, GDP declined between FY11 and FY14. GDP growth in 2014-15, 2015-16 and 2016-17 was pegged around 7.2%. FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and



demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Institutions like World Bank and ADB have predicted growth of GDP in Indian Economy in range of 6.5% in coming year.

Honorable Prime Minister and Government has set up a target for Indian Economy to become 5 Trillion USD economy. This would require a continuous robust growth for next 5 year. Government plans several initiatives to boost economy to achieve this target. In such case it is expected that project corridor will also witness good growth of traffic on project corridor.

3.6 Recommended Growth Rates of Traffic

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under. Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as trend of technological advances in logistic industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is established practice to stepdown future growth rates at interval of 5 years.

Temporary disruptions caused by the implementation of the Goods and Services Tax and demonetization have dissipated and the growth of the economy has improved significantly since then.

Growth rates are recommended for three scenarios for sensitivity analysis namely **Optimistic**, **Pessimistic** and **Most Likely** with a positive and negative variation 0.5% from Most Likely case.



Table 3-6 : Recommended Growth Rates Optimistic

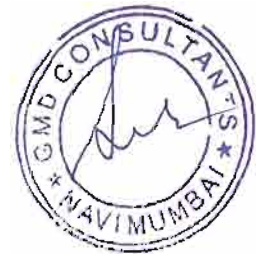
Year/ Vehicle Type	2020	2025	2035	2040	2045
CAR	8.00%	7.50%	7.00%	6.50%	6.00%
Mini Bus /LCV	7.50%	7.00%	6.50%	6.00%	5.50%
Truck / Bus	6.25%	5.75%	5.25%	4.75%	4.25%
Multi Axle	8.00%	7.50%	7.00%	6.50%	6.00%

Table 3-7 : Recommended Growth Rates Pessimistic

Year/ Vehicle Type	2020	2025	2035	2040	2045
CAR	7.00%	6.50%	6.00%	5.50%	5.00%
Mini Bus /LCV	6.50%	6.00%	5.50%	5.00%	4.50%
Truck / Bus	5.25%	4.75%	4.25%	3.75%	3.25%
Multi Axle	7.00%	6.50%	6.00%	5.50%	5.00%

Table 3-8 : Recommended Growth Rates Most Likely

Year/ Vehicle Type	2020	2025	2035	2040	2045
CAR	7.50%	7.00%	6.50%	6.00%	5.50%
Mini Bus /LCV	7.00%	6.50%	6.00%	5.50%	5.00%
Truck / Bus	5.75%	5.25%	4.75%	4.25%	3.75%
Multi Axle	7.50%	7.00%	6.50%	6.00%	5.50%



Traffic and revenue has been worked out on the basis of above growths and same is presented in subsequent chapter of report.

CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in previous section of report are used to arrive at traffic projections for future years. Toll plaza wise futuristic traffic projection is given in tables below.

These projections have been done for following three cases of growth up to concession period

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario

**Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage Km 246.075
(Optimistic Growth Scenario)**

Year	CAR	LCV	Truck/ Bus	Multi axle	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	8414	4851	7298	11407	31970	88915
2020-21	9087	5216	7755	12319	34377	95612
2021-22	9814	5607	8240	13305	36966	102817
2022-23	10599	6028	8757	14369	39753	110573



**Table 4-2 : Total Tollable Traffic @ Toll Plaza 1- Chainage Km 246.075
(Pessimistic Growth Scenario)**

Year	CAR	/LCV	Truck/ Bus	Multi axle	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	8414	4851	7298	11407	31970	88915
2020-21	9003	5166	7680	12204	34053	94710
2021-22	9633	5502	8083	13058	36276	100896
2022-23	10307	5860	8507	13972	38646	107492

**Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage Km 246.075
(Most Likely Growth Scenario)**

Year	CAR	LCV	Truck/ Bus	Multi axle	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	8414	4851	7298	11407	31970	88915
2020-21	9045	5191	7718	12263	34217	95169
2021-22	9723	5555	8163	13181	36622	101859
2022-23	10452	5944	8633	14169	39198	109028

4.2 Extension in Concession Period

Due to the suspension in toll in the year FY17 because of demonetization for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days.



CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

Fee schedule of agreement of Surat – Bharuch section of NH-8 is based on old toll policy. As per the Toll Notification (Schedule -G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. **Monthly Pass:** For frequent users, monthly pass would be issued at a fee 30 times the single journey fee. Additionally, concessionaire has announced special monthly passes for Truck/Bus and Multi Axle category of vehicle at Rs. 1175 and Rs. 1845 respectively which will be escalated every year per inflation in WPI.
2. **Multiple Journeys (for Return Trip):** Will be charged at 1.5 times single journey.
3. **Single Journey:** Full single journey toll would be charged to this category of vehicles who are infrequent travelers or whose frequency does not yield any discount from the above categories.
4. **Local Discounts:** There are several categories of local discounts.
 - a) **Local Personal Vehicle** - 25% of applicable fee for specific category of vehicle
 - b) **Local Commercial Vehicle** - 50% of applicable fee for specific category of vehicle

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

The aforesaid fee will be revised once in every year with effect from 1st July of the year. The revised fee shall be computed as follows:-

$$\text{Base Fee} \times \frac{\text{WPI-B}}{\text{WPI-A}}$$

Where

- WPI-A = is the Wholesale Price Index on March 31, 1997.
- WPI-B = is the Wholesale Price Index on March 31 preceding the fee-revision date.

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules applicable for contract.

Table 5-1 : Base Toll Rates June 1997

Type of Vehicle	Base Rate of Fee / Km (in Rs.)
Car, Jeep, Van or Jeep	0.40
Light Commercial Vehicle, (LCV) / Mini Bus	0.70
Bus or Truck (2 Axle)	1.40
MAV (> 2 axle)	2.25

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site (www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.



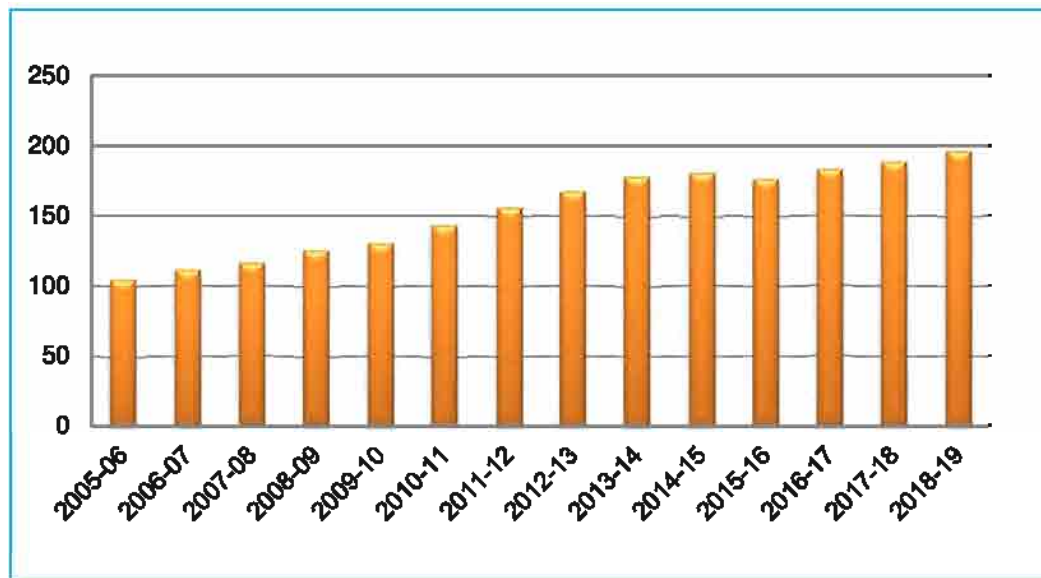


Figure 5-1 : Historical Rate WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2019 is 5%. Same is considered for projection of WPI in future years.

There is no bypass or structure to be added for in rates.

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below.

Table 5-2 : Toll Rates for Car / Jeep / Van @Km 246.075

Year	Single Journey	Single Journey LP	Single Journey LC	Daily Pass	Daily Pass LP	Daily Pass LC
2019-20	75	20	35	110	30	55
2020-21	80	20	40	115	30	60
2021-22	80	20	40	125	30	60
2022-23	85	20	45	130	30	65



Table 5-3 : Toll Rates for LCV / Mini Bus @Km 246.075

Year	Single Journey	Single Journey LC	Daily Pass	Daily Pass LC
2019-20	130	65	195	100
2020-21	135	70	205	105
2021-22	145	70	215	110
2022-23	150	75	225	115

Table 5-4 : Toll Rates for Truck / Bus @Km 246.075

Year	Single Journey	Single Journey LC	Daily Pass	Daily Pass LC
2019-20	260	130	390	195
2020-21	275	135	410	205
2021-22	285	145	430	215
2022-23	300	150	450	225

Table 5-5 : Toll Rates for Multi Axle @Km 246.075

Year	Single Journey	Single Journey LC	Daily Pass	Daily Pass LC
2019-20	420	210	630	315
2020-21	440	220	660	330
2021-22	460	230	690	345
2022-23	485	240	725	365



Table 5-6 : Toll Rates for Monthly Passes @Km 246.075

Year	CAR - Monthly Pass LP	CAR - Monthly Pass LC	CAR - Monthly Pass Regular	LCV - Monthly Pass	LCV - Monthly Pass LC	T/B - Monthly Pass	T/B - Monthly Pass LC	T/B - Monthly Pass - Special	Monthly Pass	Monthly Pass LC	Monthly Pass - Special	Monthly Pass - Sugarcane
2019-20	560	1115	2230	3905	1955	7810	3905	1370	12555	6275	2150	5000
2020-21	585	1170	2345	4100	2050	8200	4100	1450	13180	6590	2280	5000
2021-22	615	1230	2460	4305	2155	8610	4305	1535	13840	6920	2415	5000
2022-23	645	1290	2585	4520	2260	9040	4520	1625	14530	7265	2560	5000



5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios based on above rates and projected traffic. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza up to 2021-22 (End of Concession Period) starting from the year 2019-20 are shown in tables below.

Table 5-7 : Toll Revenue Optimistic Scenario

(Rs. Crores)

Year	Toll Plaza 246.075	Total
2019-20	260.25	260.25
2020-21	292.88	292.88
2021-22	329.52	329.52
2022-23	372.34	372.34

Table 5-8 : Toll Revenue Pessimistic Scenario

(Rs. Crores)

Year	Toll Plaza 246.075	Total
2019-20	260.25	260.25
2020-21	290.15	290.15
2021-22	323.38	323.38
2022-23	361.99	361.99



**Table 5-9 : Toll Revenue Most Likely Scenario
(Rs. Crores)**

Year	Toll Plaza 246.075	Total
2019-20	260.25	260.25
2020-21	291.51	291.51
2021-22	326.44	326.44
2022-23	367.14	367.14



CHAPTER 6

OPERATION AND MAINTENANCE

6.1 Operation and Maintenance

Following are project parameters which would contribute towards cost of operation and maintenance.

Future cost of operation and maintenance is estimated on engineering judgment and experience basis. Keeping all above factors in view, the following can be basis of working out cost of operation and maintenance for project corridor from Surat to Bharuch on NH-8 in state of Gujarat.

- a) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- b) **Periodic Maintenance** – This will be done on periodic basis, say every 5 years. It would consist of overlaying of wearing course, painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost are spread over three years. But since the project is commissioned and has seen stable traffic in the last few years, periodic maintenance shall be as per condition of pavement and other infrastructure. Inputs of concessionaire have been taken in this regard.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year 2019-20 is given in table below.



Year	Annual Maintenance (Rs. Cr)	Thermoplastic Painting (Rs. Cr)	Renewal Cost with BC (Rs. Cr.)	Special Repair of Pavement	Structure Maintenance (Rs. Cr)	Electric System		Total Expenditure (Rs. Crores)	Remarks
						Annual			
2019-20	16.81	1.43	20.63	23.41	0.05	0.80		66.29	Renewal of Wearing course + Pavement repair
2020-21	16.81			17.30	0.05	0.80		38.55	Regular O & M + Pavement Repair
2021-22	16.81	1.43	20.63	56.75	0.05	0.80		111.68	Renewal of Wearing course + Pavement repair



CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Surat to Bharuch section of NH-8 in state of Gujarat from km 198.000 to km 263.000 is currently a six-lane road. The road is in sound condition and serves to stable traffic volumes. The project corridor is a part of the busiest and most prominent national highway NH-8 which connects political and financial capitals of India. This is one of the most important trunk road which stretches across many states. There are large number of townships, industrial corridors and other business establishment coming up along the project corridor. As the Indian economy is poised to grow at over 7%, the project corridor is expected to pick up similar trends in terms of traffic flow. All these developments have potential to give positive impact to traffic flow on project. Following can considered as major outcome of study.

- a) There is a reasonable good amount of tollable traffic running on the project
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in near future due to various developments in the area and overall development of economy
- c) The project corridor has committed traffic as long route traffic and does not run the risk of traffic leakage due to quality competing road

The project infrastructure is in good condition and its maintenance cost is also reasonable.

Based on above it can be considered a stable healthy project from traffic and revenue point of view.



CHAPTER 8

PROJECT ILLUSTRATIONS

8.1 General

Project current condition has been depicted in the following photographs.



Figure 8-1 : Tapi Bridge Condition



Figure 8-2 : General Condition of project road





Figure 8-3 : General Condition of Project Road



Figure 8-4 : View of Project Road





GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



JAIPUR TO DEOLI SECTION OF NH-12

(KM 18.700 To 165.00)

IN THE STATE OF RAJASTHAN



TOLL REVENUE AND O&M COST PROJECTION REPORT

October 2019



GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



**JAIPUR TO DEOLI SECTION OF NH-12
(KM 18.700 To 165.00)
IN THE STATE OF RAJASTHAN**

**TOLL REVENUE AND O&M COST
PROJECTION REPORT**

October 2019



CONTENTS

Chapter 1.....	6
INTRODUCTION.....	6
1.1 Background.....	6
1.2 Objective of the Study.....	6
1.2.1 Scope of Services	6
Chapter 2.....	8
TRAFFIC SURVEYS AND ANALYSIS.....	8
2.1 Traffic Surveys.....	8
2.2 Classified Traffic Volume Count	10
2.3 Traffic Characteristic	11
2.3.1 Traffic Data	12
2.4 Data Analysis.....	13
2.4.1 Analysis of Traffic Volume Count	13
2.4.2 Components of Traffic.....	14
2.5 Secondary Data Collection	16
Chapter 3.....	18
GROWTH OF TRAFFIC ON PROJECT HIGHWAY	18
3.1 Introduction	18
3.2 Trend Analysis.....	18
3.3 Estimation of Traffic Demand Elasticity.....	19
3.4 Analysis of Historic Traffic Data	23
3.5 Other Factors Influencing Growth.....	24
3.6 Recommended Growth Rates of Traffic	25
Chapter 4.....	27
TRAFFIC FORECAST.....	27
4.1 Traffic Projections	27
4.2 Modification in Concession Period	34
Chapter 5.....	35
FORECAST OF TOLL REVENUE	35
5.1 General.....	35
5.2 Discount Categories	35
5.3 Estimation of Toll Rates	37
5.4 Toll Revenue.....	51

5.5 Toll Revenue at all toll plazas under Scenarios	51
Chapter 6.....	55
OPERATION AND MAINTENANCE.....	55
6.1 Operation & Maintenance.....	55
Chapter 7.....	58
CONCLUSION & RECOMMENDATIONS.....	58
7.1 Conclusion & Recommendations	58
Chapter 8.....	59
PROJECT ILLUSTRATIONS.....	59
8.1 Project Illustrations	59



LIST OF TABLES

Table 2-1 : Traffic DataDetails	9
Table 2-2 : Vehicle Classification System.....	11
Table 2-3 : Traffic Data at Toll Plaza @ Km 30.500	12
Table 2-4 : Traffic Data at Toll Plaza @ Km 105.000	12
Table 2-5 : PCU Factors Adopted for Study	13
Table 2-6 : Traffic in PCU at both sections	14
Table 2-7 : Journey Type Bifurcation of Traffic at KM 30.500	15
Table 2-8 : Journey Type Bifurcation of Traffic at KM 105.000	16
Table 3-1 : Per Capita Income Vs Car	20
Table 3-2 : Population Vs Bus.....	21
Table 3-3 : Goods Traffic Vs NSDP	22
Table 3-4 : Summary Regression Analysis.....	23
Table 3-5 : Recommended Growth RatesOptimistic	25
Table 3-6 : Recommended Growth Rates Pessimistic.....	26
Table 3-7 : Recommended Growth Rates Most Likely.....	26
Table 4-1 : Total TollableTraffic @ Toll Plaza 1- Chainage 30.500 KM	28
Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 105.000 KM	29
Table 4-3 : Total TollableTraffic @ Toll Plaza 1- Chainage 30.500 KM	30
Table 4-4 : Total TollableTraffic @ Toll Plaza 2- Chainage 105.000 KM	31
Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 30.500 KM	32
Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 105.000 KM	33
Table 5-1 : Overweight Traffic Rate	36
Table 5-2 : Special Overweight Return Pass	37
Table 5-3 : Base Toll Rates 2007 - 08	37
Table 5-4 : Tollable Length Jaipur – Deoli section of NH -12	38
Table 5-5 : Toll Rates for Single Journey @Km 30.500.....	39
Table 5-6 : Toll Rates for Return Journey@ Km 30.500.....	40
Table 5-7 : Toll Rates for Overweight Ticket @ Km 30.500.....	41
Table 5-8 : Toll Rates for Overweight Return Ticket (RPPU) @Km 30.500	42
Table 5-9 : Toll Rates for Monthly Pass Local @Km 30.500.....	43
Table 5-10 : Toll Rates for Monthly Pass @ Km 30.500	44
Table 5-11 : Toll Rates for Single Journey @ Km 105.000.....	45
Table 5-12 : Toll Rates for Return Journey @ Km 105.000.....	46
Table 5-13 : Toll Rates for Overweight Tickets @Km 105.000	47
Table 5-14 : Toll Rates for Overweight Return Pass (RPPU) @Km 105.00.....	48

Table 5-15 : Toll Rates for Local Monthly Pass @Km 105.000.....	49
Table 5-16 : Toll Rates for Monthly Pass @Km 105.000	50
Table 5-17 : Toll Revenue Optimistic Scenario	51
Table 5-18 : Toll Revenue Pessimistic Scenario	52
Table 5-19 : Toll Revenue Most Likely Scenario	53
Table 6-1 : O&M Cost	56

LIST OF FIGURES

Figure 2-1: Toll Plaza Locations.....	10
Figure 3-1: Regression and Elasticity PCI vs. Car-Extrapolation	20
Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation.....	21
Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation	22
Figure 3-4 : Growth of GDP in India.....	24
Figure 5-1 : Historical Rate of WPI Inflation in India.....	36
Figure 8-1 : Chaksu Junction	59
Figure 8-2 : General Condition	59
Figure 8-3 : General Condition	60
Figure 8-4 : Toll at Barkheda.....	60



ABBREVIATIONS

AADT	- Annual Average Daily Traffic	NHAI	- National Highways Authority of India
BOT	- Build Operate Transfer	NHDP	- National Highways Development Project
CAGR	- Compound Annual Growth Rate	NSDP	- Net State Domestic Product
CTV	- Classified traffic volume	O&M	- Operation & Maintenance
DBFOT	- Design, Build, Finance, Operate & Transfer	PCDP	- Per Capita Domestic Product
EME	- Earth Moving Equipment	PCI	- Per Capita Income
GDP	- Gross Domestic Product	PCU	- Passenger Car Unit
GSDP	- Gross State Domestic Product	PSC	- Pre-stressed Concrete
HCM	- Heavy Construction Machinery	RCC	- Reinforced cement concrete
HCV	- Heavy Commercial Vehicle	RHS	- Right Hand Side
HTMS	- Highway Traffic Management System	SH	- State Highway
IRC	- Indian Road Congress	TP	- Toll Plaza
IRR	- Internal Rate of Return	WPI	- Wholesale Price Index
LCV	- Light Commercial Vehicle	SIR	- Special Investment Region
LHS	- Left Hand Side	c.	- Circa
LGV	- Light Goods Vehicle	ROB	- Railway Over Bridge
MAV	- Multi Axle Vehicle	MDR	- Major District Road
MORTH	- Ministry of Road Transport and Highways	ODR	- Other District Road
NH	- National Highway	CA	- Concession Agreement
PCC	- Plain Cement Concrete	RMT	- Running Meter
CR	- Coarse Rubble		



CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 km of existing 4-lane National Highways into 6-lane National Highway. Sections envisaged under 6-laning comprise the Golden Quadrilateral section (5,700 km) and some other sections which are 800 km in length.

The project under consideration, Jaipur - Deoli section of NH-12 from Km 18.700 to km 165.000 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s IRB Jaipur Deoli Tollway Ltd.* (Concessionaire) has been awarded the Project for concession period of 25 years starting from 14th June 2010 to 13th June 2035. The Project has been commissioned and is currently in the operation / maintenance phase.

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged *GMD Consultants* to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as "*Toll Revenue and O&M Cost Projection Report*" mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections



The Concessionaire has provided basic historical traffic data and other project details on the basis of which the above analysis has been carried out, after applying our judgement on the traffic estimates.

“Toll Revenue and O&M Cost Projection Report” was submitted in March 2017. In this report traffic data of year 2015-16 was used as base traffic. The report was updated based on traffic data of year 2017-18 and submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2018 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. Now as six-monthly traffic data from April 2019 to September 2019 is also available, this report is updated taking this latest traffic data into consideration.

Chapters on Project Details, Influence Zone Traffic Analysis have not been included in this update as there has been no significant event or change in the last six months which will have an impact on these chapters in our report dated April 2019



CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

In the course of our work we have collected required information for project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project.

- Classified traffic volume counts at the two toll plaza locations on Jaipur Deoli section of NH-12 for base year 2015-16, 2016-17, 2017-18 2018-19 and for period from April 2019 to September 2019
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

The project can be divided into two homogenous sections from traffic point of view.

These sections can be

1. Jaipur to Tonk
2. Tonk to Deoli

Traffic of both sections is represented by toll plaza in each section. Table below lists provides details of locations from where traffic details have been collected.



Table 2-1 : Traffic Data Details

SR. NO	LOCATION	CTV	Single Journey Traffic	Return Pass Traffic	Monthly Pass Traffic	Local Traffic
1	Km 30.500 Toll Plaza	AADT for Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AADT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AADT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AADT for year 2018-19	For year 2018-19	For year 2018-19	For year 2018-19	For year 2018-19
		AADT for April-2019 to September 2019	For April-2019 to September 2019	For April-2019 to September 2019	For April-2019 to September 2019	For April-2019 to September 2019
2	Km 105.000 Toll Plaza	AADT for Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AADT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AADT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AADT for year 2018-19	For year 2018-19	For year 2018-19	For year 2018-19	For year 2018-19
		AADT for April-2019 to September 2019	For April-2019 to September 2019	For April-2019 to September 2019	For April-2019 to September 2019	For April-2019 to September 2019



The locations of each of the traffic survey are illustrated in Figure 2-1.

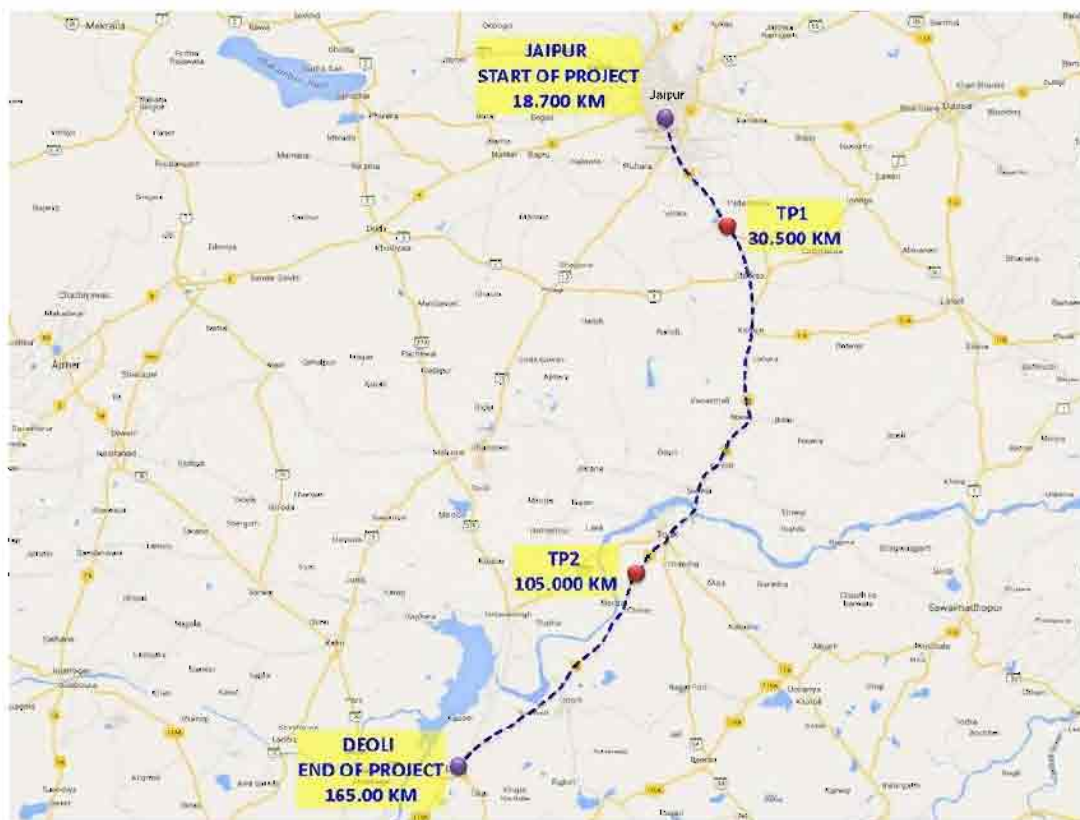


Figure 2-1: Toll Plaza Locations

2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume Count survey has been provided by concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI. These locations are indicated in *Figure 2-1* and listed in *Table 2-1*.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in table below



Table 2-2 : Vehicle Classification System

Vehicle Type	
Auto Rickshaw	
Passenger Car	Car, Jeep, Taxi & Van (Old / new technology)
Bus	Mini Bus
	Standard Bus
Truck	Light Goods Vehicle (LCV)
	2 – Axle Truck
	3 Axle Truck (HCV)
	Multi Axle Truck (4-6 Axle)
	Oversized Vehicles (7 or more axles)
Other Vehicles	Agriculture Tractor, Tractor & Trailer

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected is corresponding to category of tollable vehicles. Following are the type of vehicles as per concession agreement.

- Car / Jeep / van
- Mini Bus /LCV
- Truck / Bus
- Multi Axle
- Oversize Vehicle

2.3 Traffic Characteristic

Toll revenue of the project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have significant potential to affect toll revenue. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, portion of monthly pass traffic are some such characteristics of traffic. These will be discussed in subsequent sections of this report



2.3.1 Traffic Data

Project concessionaire has provided Traffic data for base year 2015-16, 2016-17 2017-18 and 2018-19 and for period from April 2019 to September 2019 as under for both toll plazas -

Table 2-3 : Traffic Data at Toll Plaza @ Km 30.500

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) – April 2019 – Sept 2019
1	Car	5672	7063	7360	8428	10233
2	Mini Bus / LCV	1462	1539	1529	1506	1532
3	Truck / Bus	3025	2869	2205	1109	1418
4	Multi Axle	2190	2365	2152	1453	1481
5	Oversized Vehicles	3	2	84	60	54
	Total	12352	13838	13330	12556	14718

Similar traffic data for toll plaza at km 105.000 is given as under

Table 2-4 : Traffic Data at Toll Plaza @ Km 105.000

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) – April 2019 – Sept 2019
1	CAR	3072	2810	2915	3276	4067
2	Mini Bus/ LCV	861	893	880	780	706
3	Truck/Bus	1407	819	906	691	818
4	Multi Axle	1637	1584	1746	1315	1268
5	Oversized Vehicles	3	3	25	25	18
	Total	6979	6108	6472	6087	6876

This year there have been extended high intensity rains on pan in India. States of Maharashtra, Gujarat, Rajasthan, Bihar, UP, MP, Karnataka, Himachal Pradesh have been quite affected due to heavy rains this year. This has negative impact on passenger and commercial traffic during first of half of this year. It is expected that traffic in second half of year from October to March shall be substantially higher this year. Taking this into account a seasonality factor is taken to arrive and AADT value of traffic from six monthly average volume of first half of year.

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued. Currently there is mining ban in area which has impacted traffic temporarily. It is expected that by end of this financial year mining ban would be lifted and traffic will be normalized.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in *Table 2-5*.

Table 2-5 : PCU Factors Adopted for Study

Vehicle Type	PCUs
Car	1.0
Mini Bus	1.5
Standard Bus	3.0
LCV/LGV	1.5
2 Axle Truck	3.0
3 – 6 Axle Truck	4.5
MAV	4.5
Auto Rickshaw	1.0
Van/Tempo	1.0
Agriculture Tractor with Trailer	4.5
Agriculture Tractor without Trailer	1.5

Source: IRC: 64-1990



Traffic volume at each toll plaza was converted to PCU and same is presented as under.

Table 2-6 : Traffic in PCU at both sections

Toll Plaza Location	Period	PCU	PCU Index
30.500	FY 2015-16	26809	2.17
	FY 2016-17	28629	2.07
	FY 2017-18	26323	1.98
	FY 2018-19	20823	1.66
	April 2019 – September 2019	23693	1.61
105.000	FY 2015-16	15963	2.29
	FY 2016-17	13747	2.25
	FY 2017-18	14917	2.30
	FY 2018-19	12549	2.06
	April 2019 – September 2019	13366	1.94

It can be observed from above that project traffic has a PCU index ranging 1.5 to 2. which indicates good mix of commercial and passenger traffic.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

For the purpose of analysis, the recent traffic numbers for period from April-2019 to September-2019 have been considered as the base numbers.

It is observed that car traffic forms 70% of total traffic at toll plaza location 30.5 while multi axle vehicles are 10% of total traffic. 10% of traffic is Truck /Bus while LCV traffic forms the balance 10%. Over all about 25% of traffic is commercial in nature.

At toll plaza location 105.0 car traffic forms 59% of total traffic at toll plaza while multi axle and LCV are 19% and 12%. Truck/ Bus volume is 10% of the total traffic. Over all about 40% of traffic is commercial in nature which is higher as compared to toll plaza location 30.5.



Another important bifurcation of traffic is components of traffic with respect various type of toll ticketing like

1. Single Journey
2. Return Journey
3. Overweight Vehicles (Concessionaire provided special tariff for this category)
4. Monthly Pass (Local and General)

Following table provides numbers of vehicle falling in each of above category on base year 2015-16, 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019

Table 2-7 : Journey Type Bifurcation of Traffic at KM 30.500

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) for FY 2018-19	Traffic Volume (Nos.) for April 2019-Sept 2019
1	Single Journey	4240	4703	4852	4395	4952
2	Return Journey	6166	6458	6174	5372	6450
3	Overweight vehicles	537	369	131	314	230
4	Monthly Pass	1409	2308	2173	2475	3086

A significant part of the traffic at KM 30.500 is return journey (44%) followed by single journey (34%) and monthly passes which share 21% of the total traffic volume. Oversize vehicle shares 1% of total traffic. High share of return journey indicates presence of larger volume of committed traffic.

Similarly, traffic numbers for type of journey at KM 105.000 are given in following table.



Table 2-8 : Journey Type Bifurcation of Traffic at KM 105.000

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) for FY 2018-19	Traffic Volume (Nos.) for April 2019-Sept 2019
1	Single Journey	3075	3314	3422	2999	3339
2	Return Journey	2200	1888	2248	2036	2412
3	Overweight vehicles	315	215	109	252	145
4	Monthly Pass	1389	691	693	800	980

Here single journey form highest portion of traffic followed by return journey and monthly pass journey

It can be observed as 105.000 is predominantly a rural part, monthly passes and return journey components have reduced as compared to location 30.500. Component of overweight vehicle remain same though.

2.5 Secondary Data Collection

There are several other factors which have substantial impact on traffic pattern and growth on any project corridor. Following are some of such important factors

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or Industrial projects
- Special Industry in project corridor
- Overall trends of economic growth local as well as national / regional



Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP

- b) NSDP
 - c) Population Growth
 - d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data
3. Competing road network.

We have collected and utilized such underlying data in the study to estimate the growth and risk factors for traffic along the project corridor. The same was presented in Report of April-2018 and there is no significant update on this.



CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the forecasts of factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor Jaipur – Deoli section of NH-12 has been done taking above factors in to consideration. “**IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**” is established best practice and has been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Thus, we have considered the Elasticity model of growth projection which is one of the most widely acceptable methods for traffic forecast and is recommended in **IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**.

In this method past trends of any vehicular data are paired with an economic indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicle traffic varies for different type of vehicle. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most



important and direct parameters are given as under

- Per Capita Income
- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Par Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP

Time series data of vehicle (both passenger and goods) Registered in state of Rajasthan is used as the base data for analysis of growth.

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given category of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth. Latest available data for vehicle registration, per capita income, NSDP and population is used in analysis

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log}(P) = k \times \text{Log}(EI) + A$$

Where,

- P = Number of Vehicles (Mode wise)
- EI = Economic Indicator
- A = Regression constant
- k = Elasticity coefficient (Regression coefficient)



The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

Following tables and graphs depict regression and elasticity of growth model.

Table 3-1 : Per Capita Income Vs Car

Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2004	18565	397290	4.27	5.60		
2005	19445	417701	4.29	5.62	5%	
2006	21342	467675	4.33	5.67	10%	
2007	21922	524723	4.34	5.72	3%	
2008	23356	585161	4.37	5.77	7%	
2009	24304	659616	4.39	5.82	4%	
2010	27502	748295	4.44	5.87	13%	
2011	29612	845909	4.47	5.93	8%	
2012	30839	947598	4.49	5.98	4%	
2013	31386	1053406	4.50	6.02	2%	
2014	33186	1171267	4.52	6.07	6%	6.0%

Regression analysis of same is given in figure below

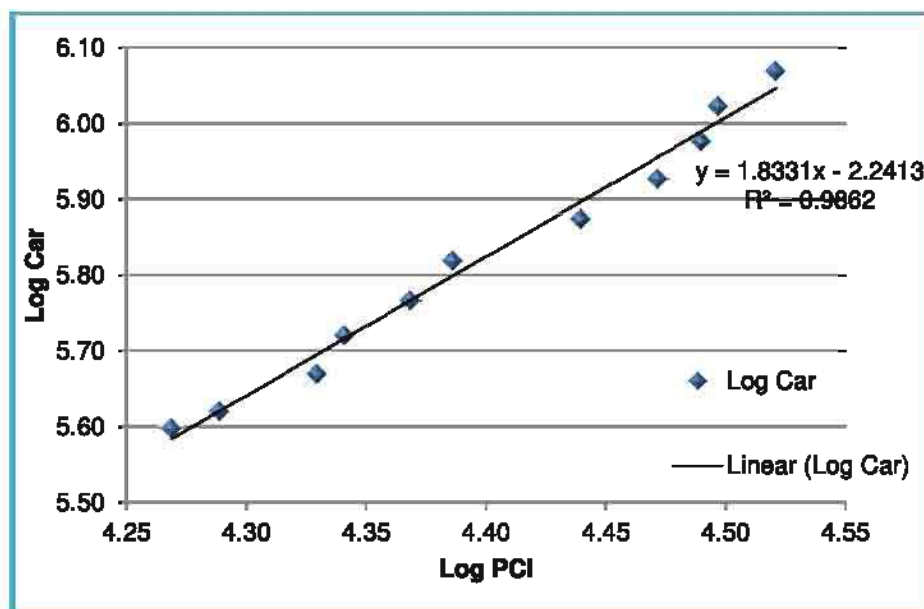
**Figure 3-1: Regression and Elasticity PCI vs. Car-Extrapolation**

Table 3-2 : Population Vs Bus

Year	Population	Buses	Log Pop	Log Bus	Pop Growth	Average Growth
2004	59984000	57542	7.78	4.76		
2005	61136000	60979	7.79	4.79	2%	
2006	62377000	63320	7.80	4.80	2%	
2007	63407000	65605	7.80	4.82	2%	
2008	64533000	69298	7.81	4.84	2%	
2009	65650000	73257	7.82	4.86	2%	
2010	66750000	77980	7.82	4.89	2%	
2011	68548437	83345	7.84	4.92	3%	
2012	70314000	88616	7.85	4.95	3%	
2013	71584000	93892	7.85	4.97	2%	
2014	72877000	97650	7.86	4.99	2%	1.97%

Regression analysis of same is given in figure below

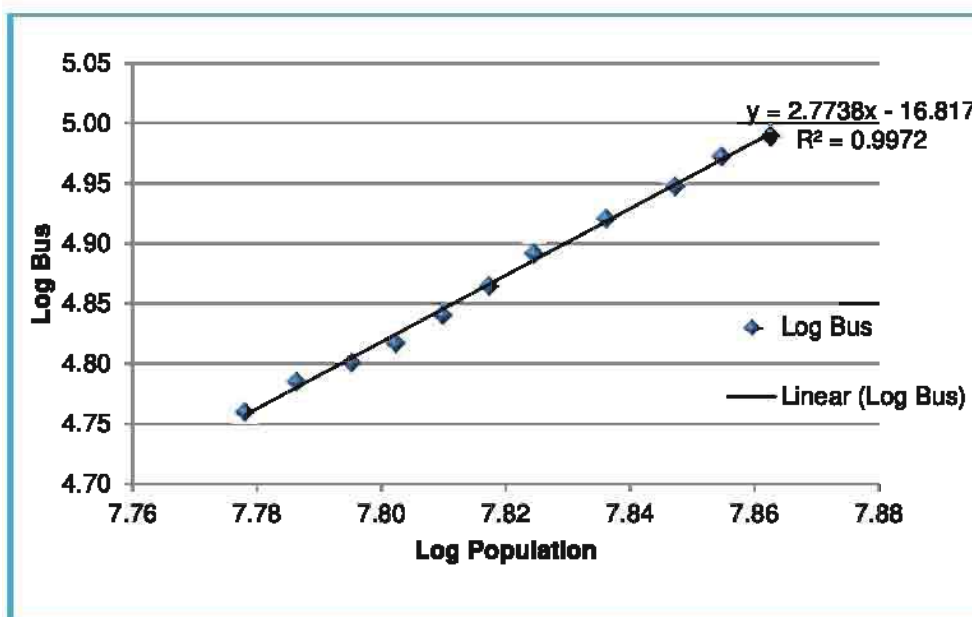


Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation



Elasticity of goods traffic has been worked out by regression analysis with NSDP.
Following table represents the data and details.

Table 3-3 : Goods Traffic Vs NSDP

Year	NSDP	Trucks	Log NSDP	Log Truck	NSDP Growth	Average Growth (5 Year)
2004	112636000	186431	8.05	5.27		
2005	120202000	206381	8.08	5.31	7%	
2006	134350000	232007	8.13	5.37	12%	
2007	140471000	252109	8.15	5.40	5%	
2008	152284000	266048	8.18	5.42	8%	
2009	161159000	289925	8.21	5.46	6%	
2010	185366000	323273	8.27	5.51	15%	
2011	202749000	362028	8.31	5.56	9%	
2012	214391000	401983	8.33	5.60	6%	
2013	224632000	434379	8.35	5.64	5%	
2014	237530000	472365	8.38	5.67	6%	7.43%

Following figure depict regression analysis and extrapolation.

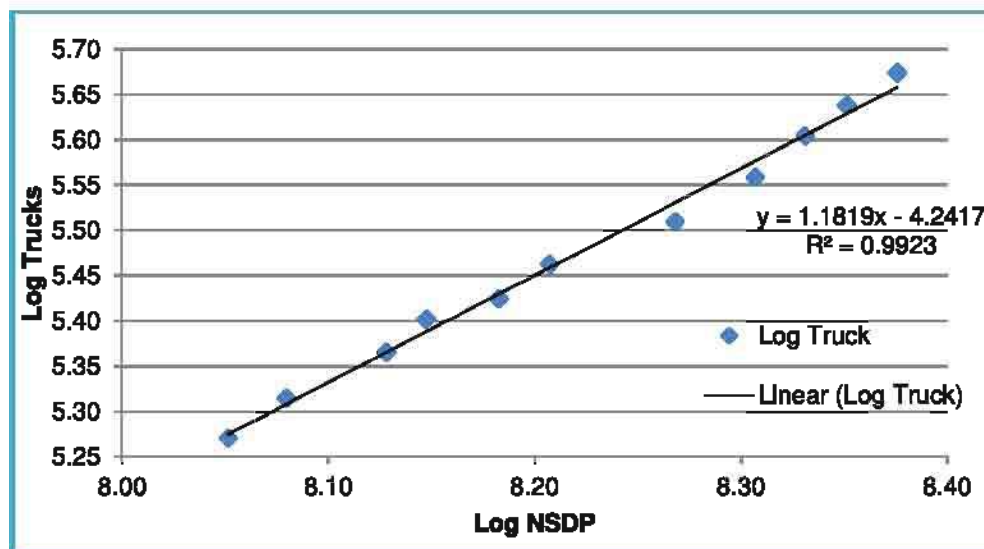


Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth. R^2 is statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R^2 more representative is the regression model of data.

The results of these analyses for the good fit as reflected by R^2 values are presented in the Table below

Table 3-4 : Summary Regression Analysis

State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth	Growth Elastic Model
Rajasthan	Car/Jeep	PCI	$y = 1.8331x - 2.2413$	$R^2 = 0.9862$	1.8331	6.03%	11.05%
	Bus	Population	$y = 2.7738x - 16.8173$	$R^2 = 0.9972$	2.7738	1.97%	5.46%
	Truck	NSDP	$y = 1.1819x - 4.2417$	$R^2 = 0.9923$	1.1819	7.43%	8.78%

Economic model for predicting growth is good tool, however other local, regional, national factors should also be considered before finalizing growth factors. Considering factors such as proposed developments and other influencing economic factors, moderated growth should be considered. These factors are discussed in subsequent sections.

3.4 Analysis of Historic Traffic Data

Historic traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Jaipur to Deoli has recently been commissioned and tolling only commenced in 2013. Only 3-4 years' traffic data is available with project concessionaire. Following factors also have added to inconsistency in traffic volume on project during previous years.

- Demonetization in November 2016
- Ban on mining in Rajasthan
- Incomplete project stretch (last 4 km was completed recently)

It is assumed that as project is now completed after adding the balance length, the impact of demonetization is diminishing but the mining ban has not been lifted in



area. This has impacted the traffic growth adversely temporarily. It is expected that impact of mining ban would continue for some more time before traffic is normalized on stretch. In such a case, growth projections are done on the basis of standard model of economical analysis till full year data is available in April 2019.

3.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

ECONOMY

After witnessing a slowdown during 2008-09, the economy recovered in 2009-10, and a very high growth rate of GDP was recorded in 2010. Following figure depicts growth of GDP in India during the period.

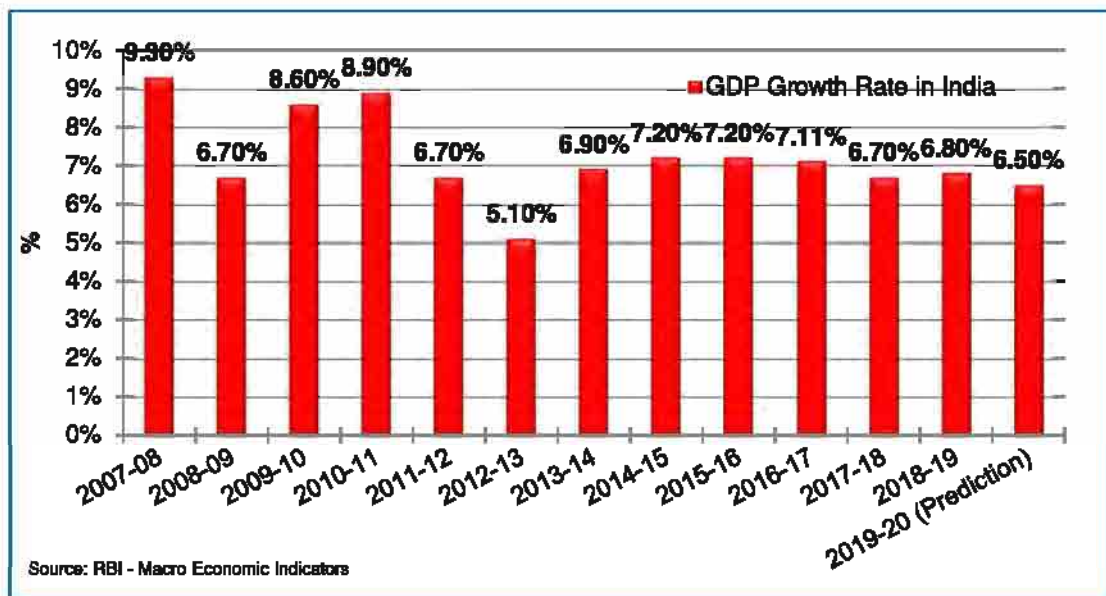


Figure 3-4 : Growth of GDP in India

After recording an all impressive growth of 8.9% in 2011, GDP declined between FY11 and FY14. GDP growth in 2014-15, 2015-16 and 2016-17 was pegged around 7.2%. FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Institutions like World Bank and ADB have predicted growth of GDP in Indian Economy in range of 6.5% in coming year.

Honorable Prime Minister and Government has set up a target for Indian Economy to become 5 Trillion USD economy. This would require a continuous robust growth for next 5 year. Government plans several initiatives to boost economy to achieve this



target. In such case it is expected that project corridor will also witness good growth of traffic on project corridor.

3.6 Recommended Growth Rates of Traffic

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under. Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as trend of technological advances in logistic industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long.

Temporary disruptions caused by implementation of Goods and Service Tax (GST) and demonetization have dissipated, and growth of economy has significantly improved since then. Curb on mining activity in area due to ban on quarrying has affected traffic on this project. It is expected that complete mining ban would be lifted soon and traffic would normalize. Since only six-monthly traffic data is available for current year hence growth projections of April 2019 report are kept same which would be reviewed in April 2019 when full year traffic data is available.

Growth rates are recommended for three scenarios for sensitivity analysis namely **Optimistic**, **Pessimistic** and **Most Likely** with a positive and negative variation 0.5% from Most Likely case.

Table 3-5 : Recommended Growth Rates Optimistic

Up to Year/ Vehicle Type	2020-25	2025- 30	2030- 2035	2035- 2040	2040- 2045
CAR	7.5%	7.0%	6.5%	6.0%	5.5%
Mini Bus /LCV	7.5%	7.0%	6.5%	6.0%	5.5%
Truck / Bus	6.5%	6.0%	5.5%	5.0%	4.5%
Multi Axle	8.0%	7.5%	7.0%	6.5%	6.0%
Oversized Vehicles	8.0%	7.5%	7.0%	6.5%	6.0%



Table 3-6 : Recommended Growth Rates Pessimistic

Year/ Vehicle Type	2020-25	2025-30	2030-2035	2035-2040	2040-2045
CAR	6.5%	6.0%	5.5%	5.0%	4.5%
Mini Bus /LCV	6.5%	6.0%	5.5%	5.0%	4.5%
Truck / Bus	5.5%	5.0%	4.5%	4.0%	3.5%
Multi Axle	7.0%	6.5%	6.0%	5.5%	5.0%
Oversized Vehicles	7.0%	6.5%	6.0%	5.5%	5.0%

Table 3-7 : Recommended Growth Rates Most Likely

Year/ Vehicle Type	2020-25	2025-30	2030-2035	2035-2040	2040-2045
CAR	7.0%	6.5%	6.0%	5.5%	5.0%
Mini Bus /LCV	7.0%	6.5%	6.0%	5.5%	5.0%
Truck / Bus	6.0%	5.5%	5.0%	4.5%	4.0%
Multi Axle	7.5%	7.0%	6.5%	6.0%	5.5%
Oversized Vehicles	7.5%	7.0%	6.5%	6.0%	5.5%

Currently there is ban on mining and quarrying in Rajasthan. Rajasthan government has started giving permission to mining in piecemeal basis. It is expected that soon mining permission would be given in Rajasthan for large mines also. It is then expected that project traffic would get a boost. Keeping this in view an additional growth of 5% has been taken in truck and multi axle category for year 2020-21.

Traffic and revenue has been worked out on the basis of above growths and same is presented in subsequent chapter of report.



CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in previous section of report are used to arrive at traffic projections for future years. Toll plaza wise futuristic traffic projection is given in tables below.

These projections have been done for following three cases of growth

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario



**Table 4-1 : Total TollableTraffic @ Toll Plaza 1- Chainage 30.500 KM
(Optimistic Growth Scenario)**

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	10233	1532	1418	1481	54	14718	23693
2020-21	11002	1646	1581	1674	58	15961	26008
2021-22	11828	1770	1763	1892	62	17315	28565
2022-23	12715	1903	1965	2138	67	18788	31387
2023-24	13668	2046	2191	2415	72	20392	34502
2024-25	14694	2200	2443	2730	78	22145	37959
2025-26	15723	2354	2712	3071	84	23944	41588
2026-27	16823	2518	3010	3455	90	25896	45583
2027-28	18003	2695	3341	3887	97	28023	49997
2028-29	19264	2883	3708	4373	104	30332	54859
2029-30	20613	3085	4115	4920	112	32845	60230
2030-31	21954	3286	4548	5511	120	35419	65867
2031-32	23381	3499	5026	6172	128	38206	72058
2032-33	24902	3726	5554	6912	137	41231	78874
2033-34	26522	3968	6137	7741	146	44514	86377
2034-35	28247	4224	6781	8670	156	48078	94643
2035-36	29943	4476	7459	9668	166	51712	103287
2036-37	31741	4743	8205	10780	177	55646	112777
2037-38	33646	5028	9025	12020	188	59907	123199
2038-39	35668	5329	9928	13403	200	64528	134659
2039-40	37812	5649	10921	14944	213	69539	147255
2040-41	39895	5960	11959	16588	226	74628	160375



**Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 105.000 KM
(Optimistic Growth Scenario)**

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	4067	706	818	1268	18	6876	13366
2020-21	4372	759	912	1432	19	7494	14776
2021-22	4701	816	1017	1618	20	8172	16347
2022-23	5053	877	1134	1828	21	8913	18091
2023-24	5432	942	1265	2066	23	9728	20041
2024-25	5839	1012	1410	2334	25	10620	22203
2025-26	6247	1082	1564	2626	27	11546	24501
2026-27	6684	1157	1736	2955	29	12561	27056
2027-28	7152	1237	1927	3325	31	13672	29891
2028-29	7652	1322	2139	3740	33	14886	33031
2029-30	8188	1416	2374	4207	35	16220	36523
2030-31	8719	1508	2622	4712	37	17598	40218
2031-32	9285	1607	2897	5277	39	19105	44309
2032-33	9888	1711	3200	5910	42	20751	48839
2033-34	10530	1822	3536	6620	45	22553	53864
2034-35	11215	1940	3906	7414	48	24523	59422
2035-36	11889	2056	4297	8266	51	26559	65291
2036-37	12602	2178	4727	9217	54	28778	71770
2037-38	13358	2308	5200	10277	57	31200	78923
2038-39	14160	2446	5719	11458	61	33844	86822
2039-40	15009	2592	6291	12774	65	36731	95546
2040-41	15835	2734	6888	14179	69	39705	104716

**Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 30.500 KM
(Pessimistic Growth Scenario)**

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	10233	1532	1418	1481	54	14718	23693
2020-21	10899	1631	1567	1659	58	15814	25773
2021-22	11608	1737	1654	1775	62	16836	27442
2022-23	12362	1850	1745	1899	66	17922	29215
2023-24	13165	1970	1841	2032	70	19078	31102
2024-25	14020	2098	1943	2175	75	20311	33121
2025-26	14860	2224	2040	2316	80	21520	35098
2026-27	15751	2357	2143	2467	85	22803	37200
2027-28	16696	2498	2250	2628	90	24162	39424
2028-29	17697	2648	2362	2799	96	25602	41783
2029-30	18758	2806	2481	2981	102	27128	44284
2030-31	19790	2960	2593	3160	108	28611	46715
2031-32	20878	3121	2710	3350	114	30173	49278
2032-33	22026	3292	2833	3551	121	31823	51987
2033-34	23237	3472	2961	3764	128	33562	54842
2034-35	24514	3662	3094	3990	136	35396	57856
2035-36	25739	3845	3218	4209	143	37154	60745
2036-37	27026	4037	3347	4440	151	39001	63782
2037-38	28377	4238	3480	4684	159	40938	66968
2038-39	29795	4449	3619	4941	168	42972	70316
2039-40	31284	4671	3764	5213	177	45109	73838
2040-41	32692	4880	3895	5474	186	47127	77167



**Table 4-4 : Total Tollable Traffic @ Toll Plaza 2- Chainage 105.000 KM
(Pessimistic Growth Scenario)**

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	4067	706	818	1268	18	6376	13366
2020-21	4331	753	904	1420	19	7427	14648
2021-22	4613	802	954	1519	20	7908	15604
2022-23	4913	854	1007	1625	21	8420	16622
2023-24	5232	908	1062	1739	22	8963	17705
2024-25	5572	966	1120	1860	23	9541	18855
2025-26	5906	1023	1176	1980	24	10109	19987
2026-27	6261	1085	1234	2109	25	10714	21194
2027-28	6637	1150	1295	2245	26	11353	22467
2028-29	7035	1219	1360	2391	28	12033	23829
2029-30	7456	1292	1428	2546	30	12752	25270
2030-31	7867	1362	1493	2699	32	13453	26679
2031-32	8299	1437	1560	2861	34	14191	28162
2032-33	8754	1515	1630	3032	36	14967	29723
2033-34	9235	1597	1703	3214	38	15787	31374
2034-35	9742	1684	1780	3407	40	16653	33120
2035-36	10229	1768	1851	3594	42	17484	34796
2036-37	10740	1855	1924	3791	44	18354	36552
2037-38	11276	1948	2002	4000	46	19272	38411
2038-39	11840	2046	2082	4221	48	20237	40366
2039-40	12432	2149	2166	4453	51	21251	42422
2040-41	12992	2245	2241	4676	53	22207	44363



**Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 30.500 KM
(Most Likely Growth Scenario)**

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	10233	1532	1418	1481	54	14718	23693
2020-21	10950	1638	1574	1666	58	15886	25887
2021-22	11716	1752	1668	1791	62	16989	27687
2022-23	12537	1873	1768	1925	67	18170	29615
2023-24	13414	2004	1874	2070	72	19434	31681
2024-25	14352	2143	1986	2226	77	20784	33888
2025-26	15285	2282	2096	2382	82	22127	36084
2026-27	16278	2429	2211	2549	88	23555	38421
2027-28	17335	2586	2333	2728	94	25076	40912
2028-29	18462	2753	2461	2919	100	26695	43560
2029-30	19662	2932	2596	3123	107	28420	46383
2030-31	20841	3108	2725	3326	114	30114	49158
2031-32	22091	3294	2862	3543	121	31911	52106
2032-33	23415	3492	3006	3773	129	33815	55230
2033-34	24819	3701	3156	4018	137	35831	58536
2034-35	26308	3923	3314	4280	146	37971	62052
2035-36	27756	4138	3463	4537	155	40049	65466
2036-37	29282	4365	3619	4810	164	42240	69070
2037-38	30892	4604	3782	5099	174	44551	72873
2038-39	32592	4856	3952	5405	184	46989	76883
2039-40	34384	5122	4130	5729	195	49560	81115
2040-41	36103	5377	4295	6044	206	52025	85179



**Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 105.000 KM
(Most Likely Growth Scenario)**

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU
2019-20	4067	706	818	1268	18	6876	13366
2020-21	4351	756	907	1426	19	7459	14709
2021-22	4656	808	961	1533	20	7978	15740
2022-23	4982	864	1018	1648	21	8533	16843
2023-24	5331	924	1078	1772	22	9127	18024
2024-25	5704	989	1143	1905	24	9765	19297
2025-26	6074	1053	1206	2038	26	10397	20560
2026-27	6469	1121	1273	2181	28	11072	21910
2027-28	6889	1193	1342	2334	30	11788	23343
2028-29	7336	1270	1415	2497	32	12550	24867
2029-30	7812	1352	1493	2671	34	13362	26492
2030-31	8280	1432	1568	2844	36	14160	28092
2031-32	8777	1517	1646	3029	38	15007	29792
2032-33	9303	1608	1728	3225	40	15904	31592
2033-34	9860	1705	1814	3435	42	16856	33506
2034-35	10451	1807	1905	3658	45	17866	35540
2035-36	11026	1907	1991	3878	48	18850	37527
2036-37	11632	2012	2080	4111	51	19886	39619
2037-38	12271	2123	2174	4358	54	20980	41832
2038-39	12946	2239	2272	4620	57	22134	44167
2039-40	13659	2361	2374	4897	60	23351	46629
2040-41	14342	2478	2469	5165	63	24517	48992



4.2 Modification in Concession Period

As per Article 29 of the concession agreement, if actual traffic on the project falls short or exceeds Target Traffic on project highway on defined date, concession period shall be modified subject to calculation stipulated therein. For Jaipur - Deoli project, the Target Date and Target Traffic are defined as under:

Target Date - 1st October 2018

Target Traffic - 30344 in PCU

It was observed that as per traffic projections, traffic volume fell short of target traffic and concession period is expected to extend by about 5 years.

Due to the suspension in toll in the year FY17 because of demonetization for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days.

Accordingly, traffic and revenue projections have been worked out up to year 2040-41.



CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

As per the Toll Notification (Schedule R) the following discounts have been considered:

1. **Monthly Pass:** For frequent users monthly pass is issued for 50 trips per month. The discount factor works out to 33.33% for 50 journeys. Similarly, there is a pass for 100 trips per month as well, with a discount factor of 33.33% for 100 journeys.
2. **Daily Pass (for Return Trip):** A 75% discount will be offered on the return trip.
3. **Single Journey:** Full single journey toll would be charged to this category of vehicles who are infrequent travelers or whose frequency does not yield any discount from the above categories.
4. Local Car / Jeep / Van to be charged at Rs 150 per month (2007)

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule R) as given under

The formula for determining the applicable rate of fee shall be as follows:-

$$\text{Applicable rate of fee} = \text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI A} - \text{WPI B}}{\text{WPI B}} \right\} \times 0.4$$



Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site

(www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.

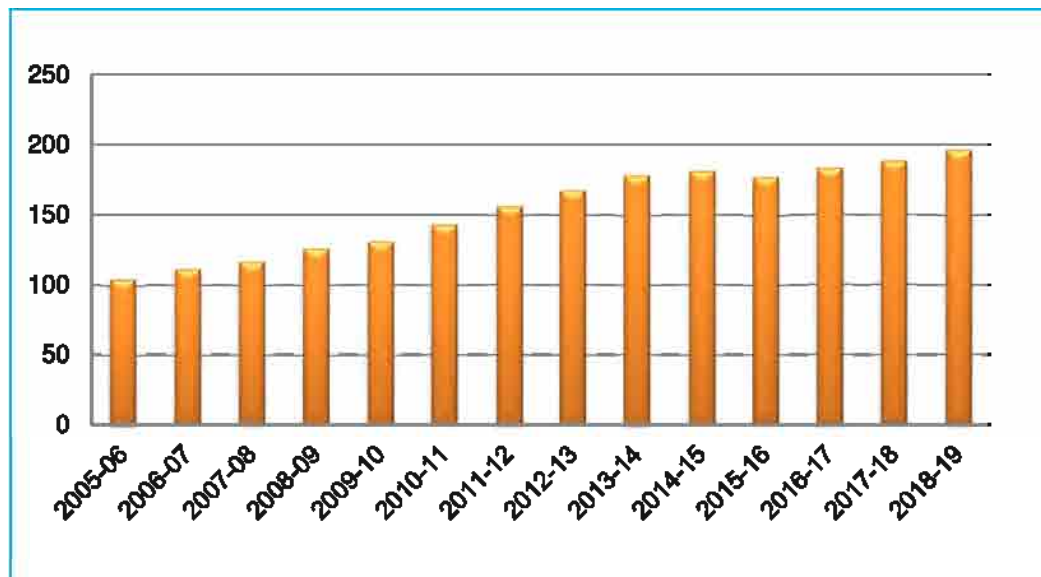


Figure 5-1 : Historical Rate of WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2019 is 5%. Same is considered for projection of WPI in future years.

It has been observed that project corridor witness's high percentage of overweight vehicles. In response to same, Concessionaire has further declared special rates for overweight vehicles which are applicable on project corridor.

These overweight categories and rate on base year (2015-16) are given as under

Table 5-1 : Overweight Traffic Rate

Category	Rate (Rs)
LCV (Single Journey of Ten Times)	1300
LCV(Single Journey of Two Times)	260
Truck/ Bus(Single Journey of Ten Times)	2700
Truck/ Bus(Single Journey of Two Times)	540



Multi Axle Vehicle (Single Journey of Ten Times)	4150
Multi Axle Vehicle (Single Journey of Two Times)	830

Normal escalation in the basis of WPI would be applicable to these rates as well.

In addition to above concessive has also declared special rates for overweight return journey as under

Table 5-2 : Special Overweight Return Pass

Category	Rate (Rs.)
Mini Bus /LCV	170
Truck/Bus	210
Multi Axle	205

These rates would be escalated at normal inflation rate.

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules, 2008.

Table 5-3 : Base Toll Rates 2007 - 08

Type of Vehicle	Base Rate of Fee / Km (in Rs.)
Car, Jeep, Van or Light Motor Vehicle	0.65
Light Commercial Vehicle, Light Goods Vehicle or Mini Bus	1.05
Bus or Truck (2 Axle)	2.2
Three Axle commercial vehicles	2.4
Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4-6 axles)	3.45



Oversized Vehicle (seven or more axles)	4.2
---	-----

There are number of bypasses and structures in each package. Equivalent length for structures is added to tollable length at each toll plaza. Bypasses having cost more than Rs. 10 Cr. are to be charged 1.5 times the normal fee. This has been incorporated in rates. Following table provides details of tollable lengths at each toll plaza

Table 5-4 : Tollable Length Jaipur – Deoli section of NH -12

Toll Plaza Chainage	Length (km)	Bypass Cost (Cr)	Equivalent Structure length (km)	Tollable highway + structure length (km)
30.500	59.164	64.5 (Chaksu Bypass)	-	59.194
105.000	66.500	-	-	66.50

Additional rate for bypass having cost more than 10 Cr has been added as per schedule -R in toll rates for toll plaza at 30.50 km

Other than this there is no structure or bypass which qualifies for additional toll rate at any toll plaza.

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below. Since applicable length of highway length is equal for both plazas, applicable toll rates are also same

Thus, worked out rates for various categories of vehicle and discounts are given as under;



Table 5-5 : Toll Rates for Single Journey @Km 30.500

Year	CAR	LCV	Truck / Bus	Multi Axle	Oversized Vehicles
2019-20	95	150	310	480	600
2020-21	100	160	325	505	630
2021-22	105	165	345	530	665
2022-23	110	175	360	555	695
2023-24	115	185	380	585	730
2024-25	120	190	395	615	770
2025-26	125	200	415	645	805
2026-27	135	210	440	680	845
2027-28	140	225	460	715	890
2028-29	150	235	485	750	935
2029-30	155	245	510	790	985
2030-31	165	260	535	830	1035
2031-32	170	270	565	870	1090
2032-33	180	285	590	915	1145
2033-34	190	300	625	965	1205
2034-35	200	315	655	1015	1265
2035-36	210	335	690	1070	1335
2036-37	220	350	725	1125	1405
2037-38	235	370	765	1185	1480
2038-39	245	390	805	1250	1560
2039-40	260	410	850	1315	1640
2040-41	275	430	895	1385	1730



Table 5-6 : Toll Rates for Return Journey@ Km 30.500

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV	Oversized Vehicles
2019-20	140	225	465	725	900
2020-21	150	235	490	760	945
2021-22	155	250	515	795	995
2022-23	165	260	540	835	1045
2023-24	175	275	565	880	1095
2024-25	180	290	595	920	1150
2025-26	190	300	625	970	1210
2026-27	200	320	660	1020	1270
2027-28	210	335	690	1070	1335
2028-29	220	350	725	1125	1405
2029-30	235	370	765	1180	1475
2030-31	245	390	805	1245	1550
2031-32	260	410	845	1305	1630
2032-33	270	430	890	1375	1715
2033-34	285	450	935	1445	1805
2034-35	300	475	985	1525	1900
2035-36	315	500	1035	1605	2000
2036-37	335	525	1090	1685	2105
2037-38	350	555	1150	1775	2220
2038-39	370	585	1210	1870	2335
2039-40	390	615	1275	1970	2460
2040-41	410	650	1340	2080	2595



Table 5-7 : Toll Rates for Overweight Ticket @ Km 30.500

Year	LCV (Single Journey of Ten Times)	LCV (Single Journey of Two Times)	Truck/ Bus (Single Journey of Ten Times)	Truck/ Bus (Single Journey of Two Times)	Multi Axle Vehicle (Single Journey of Ten Times)	Multi Axle Vehicle (Single Journey of Two Times)
2019-20	1500	300	3100	620	4800	960
2020-21	1600	320	3250	650	5050	1010
2021-22	1650	330	3450	690	5300	1060
2022-23	1750	350	3600	720	5550	1110
2023-24	1850	370	3800	760	5850	1170
2024-25	1900	380	3950	790	6150	1230
2025-26	2000	400	4150	830	6450	1290
2026-27	2100	420	4400	880	6800	1360
2027-28	2250	450	4600	920	7150	1430
2028-29	2350	470	4850	970	7500	1500
2029-30	2450	490	5100	1020	7900	1580
2030-31	2600	520	5350	1070	8300	1660
2031-32	2700	540	5650	1130	8700	1740
2032-33	2850	570	5900	1180	9150	1830
2033-34	3000	600	6250	1250	9650	1930
2034-35	3150	630	6550	1310	10150	2030
2035-36	3350	670	6900	1380	10700	2140
2036-37	3500	700	7250	1450	11250	2250
2037-38	3700	740	7650	1530	11850	2370
2038-39	3900	780	8050	1610	12500	2500
2039-40	4100	820	8500	1700	13150	2630
2040-41	4300	860	8950	1790	13850	2770



Table 5-8 : Toll Rates for Overweight Return Ticket (RPPU) @Km 30.500

Year	Mini Bus /LCV	Truck/ Bus	Multi Axle
2019-20	235	315	350
2020-21	245	330	370
2021-22	255	345	390
2022-23	270	360	410
2023-24	285	380	430
2024-25	300	400	450
2025-26	315	420	475
2026-27	330	440	500
2027-28	345	460	525
2028-29	360	485	550
2029-30	380	510	580
2030-31	400	535	610
2031-32	420	560	640
2032-33	440	590	670
2033-34	460	620	705
2034-35	485	650	740
2035-36	510	685	775
2036-37	535	720	815
2037-38	560	755	855
2038-39	590	795	900
2039-40	620	835	945
2040-41	650	875	990



Table 5-9 : Toll Rates for Monthly Pass Local @Km 30.500

Year	CAR (Non-Commercial Vehicles)	CAR SPL (10 to 20 Km)	LCV / Mini Bus SPL	LCV / Mini Bus (10 to 20 Km)
2019-20	265	1400	2360	3100
2020-21	280	1470	2480	3255
2021-22	295	1545	2605	3420
2022-23	310	1620	2735	3590
2023-24	325	1700	2870	3770
2024-25	340	1785	3015	3960
2025-26	355	1875	3165	4160
2026-27	375	1970	3325	4370
2027-28	395	2070	3490	4590
2028-29	415	2175	3665	4820
2029-30	435	2285	3850	5060
2030-31	460	2400	4045	5315
2031-32	480	2520	4245	5580
2032-33	505	2645	4455	5860
2033-34	535	2775	4680	6155
2034-35	560	2915	4915	6465
2035-36	590	3060	5160	6790
2036-37	620	3215	5420	7130
2037-38	655	3375	5690	7485
2038-39	690	3545	5975	7860
2039-40	725	3720	6275	8255
2040-41	765	3905	6590	8670



Table 5-10 : Toll Rates for Monthly Pass @ Km 30.500

Year	Car	Mini Bus /LCV	Truck/ Bus	Multi Axle	Oversized Vehicle	Truck/Bus - 100 Trips
2019-20	3165	5015	10375	16060	20050	20750
2020-21	3325	5260	10890	16860	21045	21785
2021-22	3490	5525	11435	17700	22095	22870
2022-23	3665	5800	12005	18580	23200	24010
2023-24	3845	6090	12605	19515	24360	25215
2024-25	4040	6395	13240	20495	25585	26480
2025-26	4245	6720	13910	21530	26875	27815
2026-27	4460	7060	14615	22620	28240	29225
2027-28	4685	7420	15355	23770	29675	30710
2028-29	4925	7800	16140	24985	31190	32280
2029-30	5180	8195	16970	26265	32790	33935
2030-31	5445	8620	17840	27615	34480	35685
2031-32	5725	9065	18765	29045	36265	37530
2032-33	6025	9535	19740	30555	38145	39480
2033-34	6340	10035	20770	32150	40140	41540
2034-35	6670	10560	21860	33835	42240	43720
2035-36	7020	11115	23010	35615	44465	46020
2036-37	7395	11705	24225	37500	46815	48455
2037-38	7785	12325	25515	39490	49300	51025
2038-39	8200	12980	26875	41595	51930	53745
2039-40	8640	13675	28310	43820	54710	56625
2040-41	9105	14410	29835	46175	57650	59665



Table 5-11 : Toll Rates for Single Journey @ Km 105.000

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles
2019-20	80	130	275	430	525
2020-21	85	135	290	450	550
2021-22	90	145	300	475	575
2022-23	95	150	315	495	605
2023-24	100	160	335	520	635
2024-25	105	165	350	550	670
2025-26	110	175	370	575	700
2026-27	115	185	385	605	735
2027-28	120	195	405	635	775
2028-29	125	205	425	670	815
2029-30	130	215	450	705	855
2030-31	140	225	470	740	900
2031-32	145	235	495	780	945
2032-33	155	250	520	820	995
2033-34	160	260	550	860	1050
2034-35	170	275	580	905	1105
2035-36	180	290	610	955	1160
2036-37	190	305	640	1005	1220
2037-38	200	320	675	1055	1285
2038-39	210	340	710	1115	1355
2039-40	220	355	750	1175	1430
2040-41	235	375	790	1235	1505



Table 5-12 : Toll Rates for Return Journey @ Km 105.000

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles
2019-20	120	195	410	645	785
2020-21	130	205	430	675	825
2021-22	135	215	455	710	865
2022-23	140	225	475	745	910
2023-24	150	240	500	785	955
2024-25	155	250	525	825	1000
2025-26	165	265	550	865	1050
2026-27	170	275	580	910	1105
2027-28	180	290	610	955	1160
2028-29	190	305	640	1005	1220
2029-30	200	320	675	1055	1285
2030-31	210	340	705	1110	1350
2031-32	220	355	745	1165	1420
2032-33	230	375	780	1225	1495
2033-34	245	395	825	1290	1570
2034-35	255	415	865	1360	1655
2035-36	270	435	910	1430	1740
2036-37	285	460	960	1505	1835
2037-38	300	485	1010	1585	1930
2038-39	315	510	1065	1670	2035
2039-40	330	535	1120	1760	2140
2040-41	350	565	1180	1855	2255



Table 5-13 : Toll Rates for Overweight Tickets @Km 105.000

Year	LCV (Single Journey of Ten Times)	LCV (Single Journey of Two Times)	Truck/ Bus (Single Journey of Ten Times)	Truck/ Bus (Single Journey of Two Times)	Multi Axle Vehicle (Single Journey of Ten Times)	Multi Axle Vehicle (Single Journey of Two Times)
2019-20	1300	260	2750	550	4300	860
2020-21	1350	270	2900	580	4500	900
2021-22	1450	290	3000	600	4750	950
2022-23	1500	300	3150	630	4950	990
2023-24	1600	320	3350	670	5200	1040
2024-25	1650	330	3500	700	5500	1100
2025-26	1750	350	3700	740	5750	1150
2026-27	1850	370	3850	770	6050	1210
2027-28	1950	390	4050	810	6350	1270
2028-29	2050	410	4250	850	6700	1340
2029-30	2150	430	4500	900	7050	1410
2030-31	2250	450	4700	940	7400	1480
2031-32	2350	470	4950	990	7800	1560
2032-33	2500	500	5200	1040	8200	1640
2033-34	2600	520	5500	1100	8600	1720
2034-35	2750	550	5800	1160	9050	1810
2035-36	2900	580	6100	1220	9550	1910
2036-37	3050	610	6400	1280	10050	2010
2037-38	3200	640	6750	1350	10550	2110
2038-39	3400	680	7100	1420	11150	2230
2039-40	3550	710	7500	1500	11750	2350
2040-41	3750	750	7900	1580	12350	2470



Table 5-14 : Toll Rates for Overweight Return Pass (RPPU) @Km 105.00

Year	Mini Bus /LCV	Truck/ Bus	Multi Axle
2019-20	210	295	310
2020-21	220	310	325
2021-22	230	325	340
2022-23	240	340	355
2023-24	250	355	375
2024-25	265	375	395
2025-26	280	395	415
2026-27	295	415	435
2027-28	310	435	455
2028-29	325	455	480
2029-30	340	480	505
2030-31	355	505	530
2031-32	375	530	555
2032-33	395	555	585
2033-34	415	585	615
2034-35	435	615	645
2035-36	455	645	675
2036-37	480	675	710
2037-38	505	710	745
2038-39	530	745	780
2039-40	555	780	820
2040-41	585	820	860



Table 5-15 : Toll Rates for Local Monthly Pass @Km 105.000

Year	CAR (Non-Commercial Vehicles)	CAR SPL (10 to 20 Km)	LCV / Mini Bus SPL	LCV / Mini Bus (10 to 20 Km)
2019-20	265	1420	2340	6300
2020-21	280	1490	2455	6615
2021-22	295	1565	2580	6945
2022-23	310	1645	2710	7290
2023-24	325	1725	2845	7655
2024-25	340	1810	2985	8040
2025-26	355	1900	3135	8440
2026-27	375	1995	3290	8860
2027-28	395	2095	3455	9305
2028-29	415	2200	3630	9770
2029-30	435	2310	3810	10260
2030-31	460	2425	4000	10775
2031-32	480	2545	4200	11315
2032-33	505	2670	4410	11880
2033-34	535	2805	4630	12475
2034-35	560	2945	4860	13100
2035-36	590	3090	5105	13755
2036-37	620	3245	5360	14445
2037-38	655	3405	5630	15165
2038-39	690	3575	5910	15925
2039-40	725	3755	6205	16720
2040-41	765	3945	6515	17555



Table 5-16 : Toll Rates for Monthly Pass @Km 105.000

Year	Car	Mini Bus /LCV	Truck/ Bus	Multi Axle	Oversized Vehicle	Truck/Bus - 100 Trips
2019-20	2700	4360	9140	14330	17445	18280
2020-21	2835	4580	9595	15045	18315	19185
2021-22	2975	4805	10070	15795	19225	20140
2022-23	3125	5045	10575	16580	20185	21145
2023-24	3280	5300	11105	17410	21195	22205
2024-25	3445	5565	11660	18285	22265	23325
2025-26	3620	5845	12250	19210	23385	24500
2026-27	3805	6145	12870	20185	24570	25740
2027-28	3995	6455	13525	21210	25820	27050
2028-29	4200	6785	14215	22295	27140	28430
2029-30	4415	7135	14945	23435	28530	29890
2030-31	4645	7500	15715	24645	30000	31430
2031-32	4885	7890	16530	25920	31555	33055
2032-33	5135	8300	17385	27265	33195	34775
2033-34	5405	8730	18295	28690	34925	36590
2034-35	5690	9190	19255	30190	36755	38505
2035-36	5990	9675	20265	31780	38690	40535
2036-37	6305	10185	21340	33460	40735	42675
2037-38	6640	10725	22470	35240	42900	44940
2038-39	6995	11295	23670	37115	45185	47335
2039-40	7365	11900	24935	39105	47605	49870
2040-41	7765	12540	26275	41205	50165	52550



5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza starting from the year 2018-19 are shown in tables below.

Table 5-17 : Toll Revenue Optimistic Scenario
(Rs. Crores)

Year	Toll at Plaza 30.500	Toll at Plaza 105.000	Total
2019-20	70.10	38.79	108.88
2020-21	81.38	45.21	126.59
2021-22	94.21	52.87	147.08
2022-23	109.23	61.38	170.61
2023-24	127.48	72.24	199.71
2024-25	147.03	84.29	231.32
2025-26	169.83	98.02	267.84
2026-27	197.95	113.96	311.91
2027-28	229.54	133.16	362.70
2028-29	265.57	155.11	420.69
2029-30	308.60	181.10	489.71
2030-31	356.76	210.49	567.26
2031-32	412.71	245.41	658.12
2032-33	475.53	284.98	760.50
2033-34	551.75	331.38	883.13
2034-35	639.06	386.15	1025.21
2035-36	740.11	450.20	1190.31
2036-37	852.24	521.27	1373.50
2037-38	986.21	604.51	1590.73



Year	Toll at Plaza 30.500	Toll at Plaza 105.000	Total
2038-39	1140.86	703.96	1844.81
2039-40	1323.78	820.67	2144.45
2040-41	1521.44	947.57	2469.01

Table 5-18 : Toll Revenue Pessimistic Scenario
(Rs. Crores)

Year	Toll at Plaza 30.500	Toll at Plaza 105.000	Total
2019-20	70.10	38.79	108.88
2020-21	80.66	44.81	125.47
2021-22	90.08	50.24	140.32
2022-23	100.68	55.93	156.61
2023-24	113.23	63.04	176.27
2024-25	125.70	70.41	196.11
2025-26	139.68	78.40	218.09
2026-27	156.73	87.15	243.88
2027-28	174.70	97.34	272.04
2028-29	194.32	108.41	302.73
2029-30	216.88	120.87	337.75
2030-31	240.68	134.34	375.02
2031-32	267.04	149.42	416.46
2032-33	295.05	165.70	460.75
2033-34	328.20	183.69	511.89
2034-35	364.34	204.14	568.48



Year	Toll at Plaza 30.500	Toll at Plaza 105.000	Total
2035-36	403.99	226.91	630.91
2036-37	445.45	250.42	695.88
2037-38	493.35	276.77	770.12
2038-39	545.62	306.83	852.45
2039-40	605.66	340.36	946.02
2040-41	665.25	374.52	1039.77

**Table 5-19 : Toll Revenue Most Likely Scenario
(Rs. Crores)**

Year	Toll at Plaza 30.500	Toll at Plaza 105.000	Total
2019-20	70.10	38.79	108.88
2020-21	81.03	45.00	126.03
2021-22	90.89	50.69	141.58
2022-23	102.08	56.67	158.75
2023-24	115.36	64.20	179.56
2024-25	128.66	72.08	200.74
2025-26	143.66	80.64	224.30
2026-27	161.90	90.08	251.98
2027-28	181.32	101.15	282.46
2028-29	202.58	113.11	315.69
2029-30	227.16	126.74	353.90
2030-31	253.33	141.51	394.83
2031-32	282.49	158.13	440.61
2032-33	313.61	176.14	489.75



Year	Toll at Plaza 30.500	Toll at Plaza 105.000	Total
2033-34	350.45	196.21	546.67
2034-35	390.93	219.14	610.07
2035-36	435.51	244.76	680.27
2036-37	482.55	271.45	754.00
2037-38	537.05	301.40	838.45
2038-39	596.77	335.74	932.51
2039-40	665.52	374.08	1039.59
2040-41	734.57	413.53	1148.10



CHAPTER 6

OPERATION AND MAINTENANCE

6.1 Operation & Maintenance

Following are project parameters which would contribute towards cost of operation and maintenance.

Future cost of operation and maintenance is estimate on guess basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Jaipur to Deoli on NH-12 in state of Rajasthan.

- a) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- b) **Periodic Maintenance** – This will be done on periodic basis say every 5 years. It will consist of overlaying of wearing course and painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost is spread over three years.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year 2019-2020 is given in table below.



Table 6-1 : O&M Cost

Year	Annual maintenance (Rs. Cr)	Thermoplastic painting (Rs. Cr)	Renewal Cost with BC (Rs. Cr.)	Special Repair of pavement	Structure maintenance (Rs. Cr)	Electric System		Total Expenditure (Rs. Crores)	Remarks
						Annual	Periodic		
2019-20	11.73	1.72	23.37	11.23	0.07	0.04		53.09	Renewal of Wearing course + Pavement repair
2020-21	11.96	1.47	20.03	16.05	0.07	0.04		57.44	Renewal of Wearing course + Pavement repair
2021-22	12.20	1.72	23.37	12.84	0.07	0.04		61.06	Renewal of Wearing course + Pavement repair
2022-23	12.20				0.07	0.04	0.00	15.71	Regular O & M
2023-24	12.45				0.07	0.04		16.82	Regular O & M
2024-25	12.70			0.80	0.07	0.04		19.14	Regular O & M
2025-26	12.95			0.80	0.07	0.04		20.47	Regular O & M
2026-27	13.21	1.72	23.37	27.28	0.07	0.04		101.89	Renewal of Wearing course + Pavement repair



2027-28	13.47	1.47	20.03	32.10	0.07	0.04		109.42	Renewal of Wearing course + Pavement repair
2028-29	13.74	1.72	23.37	43.33	0.07	0.04		140.70	Renewal of Wearing course + Pavement repair
2029-30	14.43			12.84	0.07	0.04		49.16	Regular O & M
2030-31	15.15			4.81	0.07	0.04		37.85	Regular O & M
2031-32	15.91			4.81	0.07	0.04		41.24	Regular O & M
2032-33	16.23	0.49		10.43	0.07	0.04		56.66	Renewal of Wearing course + Pavement repair
2033-34	16.55	1.47	20.03	40.12	0.07	0.04		170.87	Renewal of Wearing course + Pavement repair
2034-35	16.88	1.72	23.37	12.84	0.07	0.04		125.86	Renewal of Wearing course
2035-36	16.88			3.21	0.07	0.04		48.61	Regular O & M
2036-37	16.88			3.21	0.07	0.04		51.04	Regular O & M
2037-38	16.88			3.21	0.07	0.04		53.59	Regular O & M
2038-39	16.88			3.21	0.07	0.04		56.27	Regular O & M
2039-40	16.88	1.72		1.60	0.07	0.04		59.41	Regular O & M
2040-41	5.06			0.32	0.07	0.04		16.86	Regular O & M



TOLL, REVENUE AND O&M COST PROJECTION REPORT

Four - Laying of Jaipur - Deoli Section of NH-12 from Km 18.700 to Km 165.000

CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Jaipur to Deoli section of NH-12 in state of Rajasthan from km 18.700 to km 165.000 is currently a four-lane road. The road is in sound condition and serves to reasonably good levels of traffic volume. The project corridor falls in the influence zone of fast upcoming metro city Jaipur. There are many upcoming projects in the area which have the potential to boost economic growth of area and add value to development of region. All these developments have potential to give positive impact to traffic flow on project. As estimated in this study report project traffic revenue is expected to grow at rate of 6-8% per annum.

Following can be considered as major outcome of study

- a) There is good amount of tollable traffic running on project
- b) Project corridor has potential to witness traffic growth @ 7-8% annually in near future due to various development in area and overall growth of the economy
- c) Project corridor does not have risk of traffic leakage due to lack of competing roads of comparable quality

The project infrastructure is in good condition and its maintenance cost is also reasonable.

Based on above it can be considered a stable healthy project from traffic and revenue point of view



CHAPTER 8

PROJECT ILLUSTRATIONS

8.1 Project Illustrations

Current condition OF Project has been depicted in the following photographs.



Figure 8-1 : Chaksu Junction



Figure 8-2 : General Condition





Figure 8-3 : General Condition



Figure 8-4 : Toll at Barkheda





GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

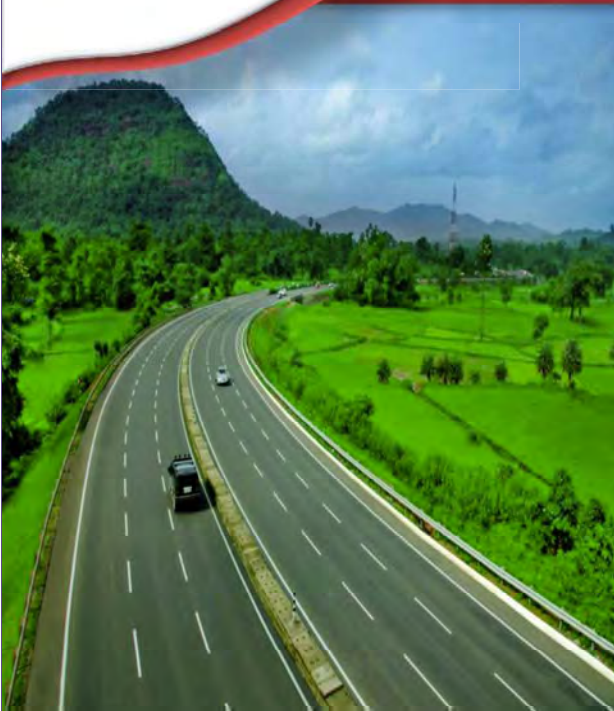
Email : info@gmdconsultants.in

Web : www.gmdconsultants.in





SURAT TO DAHISAR
(KM 263.000 TO KM 502.000)
SECTION OF NH-8 IN THE STATE OF
GUJARAT & MAHARASHTRA



TOLL REVENUE AND O&M
COST PROJECTION REPORT

October 2019

GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



**SURAT TO DAHISAR (KM 263.000 TO KM 502.000)
SECTION OF NH-8 IN THE STATE OF
GUJARAT & MAHARASHTRA**

**TOLL REVENUE AND O&M
COST PROJECTION REPORT**

October 2019



CONTENTS

Chapter 1	7
INTRODUCTION	7
1.1 Background.....	7
1.2 Objective of the Study.....	7
1.2.1 Scope of Services	8
Chapter 2	9
TRAFFIC SURVEYS AND ANALYSIS	9
2.1 Traffic Surveys.....	9
2.2 Classified Traffic Volume Count	11
2.3 Traffic Characteristic	12
2.3.1 Traffic Data	13
2.3.2 Analysis of Traffic Volume Count	15
2.3.3 Components of Traffic.....	17
2.4 Secondary Data Collection	19
Chapter 3	21
GROWTH OF TRAFFIC ON PROJECT HIGHWAY	21
3.1 Introduction.....	21
3.2 Trend Analysis.....	21
3.3 Estimation of Traffic Demand Elasticity.....	22
3.4 Analysis of Historic Traffic Data	30
3.5 Other Factors Influencing Growth.....	31
3.6 Recommended Growth Rates of Traffic	32
3.6.1 Recommended Growth Rates of Traffic for Maharashtra Part of Stretch.....	33
3.6.2 Recommended Growth Rates of Traffic for Gujarat Part of Stretch.....	33
Chapter 4	35
TRAFFIC FORECAST	35
4.1 Traffic Projections	35
4.2 Modification in Concession Period	40
Chapter 5	41
FORECAST OF TOLL REVENUE	41
5.1 General.....	41
5.2 Discount Categories	41
5.3 Estimation of Toll Rates	42
5.4 Toll Revenue	47
5.5 Toll Revenue at all toll plazas under Scenarios	48
Chapter 6	49

OPERATION & MAINTENANCE	49
6.1 Operation & Maintenance	49
Chapter 7	51
CONCLUSION & RECOMMENDATIONS	51
7.1 Conclusion & Recommendations	51
Chapter 8	52
PROJECT ILLUSTRATIONS	52
8.1 General	52



LIST OF TABLES

Table 2-1 : Traffic DataDetails	10
Table 2-2 : Vehicle Classification System.....	12
Table 2-3 : Traffic Data at Toll Plaza at Km 470.000	13
Table 2-4 : Traffic Data at Toll Plaza at Km 420.340	14
Table 2-5 : Traffic Data at Toll Plaza at Km 356.200	14
Table 2-6 : Traffic Data at Toll Plaza at Km 297.300	15
Table 2-7 : PCU Factors Adopted for Study	16
Table 2-8 : Traffic in PCU at Project Stretch.....	16
Table 2-9 : Journey Type Bifurcation of Traffic at KM 470.000	18
Table 2-10 : Journey Type Bifurcation of Traffic at KM 420.340	18
Table 2-11 : Journey Type Bifurcation of Traffic at KM 356.200	19
Table 2-12 : Journey Type Bifurcation of Traffic at KM 297.300	19
Table 3-1 : Per Capita Income Vs Car Maharashtra	23
Table 3-2 : Population Vs Bus Maharashtra	24
Table 3-3 : Goods Traffic Vs NSDP Maharashtra	25
Table 3-4 : Summary Regression Analysis Maharashtra.....	26
Table 3-5 : Per Capita Income Vs Car Gujarat	26
Table 3-6 : Population Vs Bus Gujarat	27
Table 3-7 : Goods Traffic Vs NSDP Gujarat.....	28
Table 3-8 : Summary Regression Analysis.....	29
Table 2-9 : Historical Traffic at KM 470.000.....	30
Table 2-10 : Historical Traffic at KM 420.340.....	30
Table 2-11 : Historical Traffic at KM 356.200.....	31
Table 2-12 : Historical Traffic at KM 297.300.....	31
Table 3-9 : Recommended Growth Rates Optimistic Maharashtra.....	33
Table 3-10 : Recommended Growth Rates Pessimistic Maharashtra	33
Table 3-11 : Recommended Growth Rates Most Likely Maharashtra.....	33
Table 3-12 : Recommended Growth Rates Optimistic Gujarat.....	33
Table 3-13 : Recommended Growth Rates Pessimistic Gujarat	33
Table 3-14 : Recommended Growth Rates Most Likely Gujarat	34
Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 470.000 KM	35
Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 420.340 KM	36
Table 4-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage 356.200 KM	36
Table 4-4 : Total Tollable Traffic @ Toll Plaza 4- Chainage 297.300 KM	36
Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 470.000 KM	37



Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 420.340 KM	37
Table 4-7 : Total Tollable Traffic @ Toll Plaza 3- Chainage 356.200 KM	38
Table 4-8 : Total Tollable Traffic @ Toll Plaza 4- Chainage 297.300 KM	38
Table 4-9 : Total Tollable Traffic @ Toll Plaza 1- Chainage 470.000 KM	38
Table 4-10 : Total Tollable Traffic @ Toll Plaza 2- Chainage 420.340 KM	39
Table 4-11 : Total Tollable Traffic @ Toll Plaza 3- Chainage 356.200 KM	39
Table 4-12 : Total Tollable Traffic @ Toll Plaza 4- Chainage 297.300 KM	40
Table 5-1: Base Toll Rates June 1997	42
Table 5-2 : Toll Rates for Single Journey @ Km 470.000	43
Table 5-3 : Toll Rates for Single Journey @ Km 420.340	44
Table 5-4 : Toll Rates for Single Journey @ Km 356.200	44
Table 5-5 : Toll Rates for Single Journey @ Km 297.300	44
Table 5-6 : Toll Rates for Daily Pass @ Km 470.000	45
Table 5-7 : Toll Rates for Daily Pass @ Km 420.340	45
Table 5-8 : Toll Rates for Daily Pass @ Km 356.200	45
Table 5-9 : Toll Rates for Daily Pass @ Km 297.300	46
Table 5-10 : Toll Rates for Local Ticket @ all Toll Plaza	46
Table 5-11 : Toll Rates for Monthly Pass @ Km 470.000	46
Table 5-12 : Toll Rates for Monthly Pass @ Km 420.340	47
Table 5-13 : Toll Rates for Monthly Pass @ Km 356.200	47
Table 5-14 : Toll Rates for Monthly Pass @ Km 297.300	47
Table 5-15 : Toll Revenue Optimistic Scenario (Rs. Crores)	48
Table 5-16 : Toll Revenue Pessimistic Scenario (Rs. Crores)	48
Table 5-17 : Toll Revenue Most Likely Scenario (Rs. Crores)	48
Table 6-1 : O&M COST	50



LIST OF FIGURES

<i>Figure 2-1: Toll Plaza Locations.....</i>	<i>11</i>
<i>Figure 3-1: Regression and Elasticity PCI vs. Car–Extrapolation Maharashtra.....</i>	<i>23</i>
<i>Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation Maharashtra</i>	<i>24</i>
<i>Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Maharashtra</i>	<i>25</i>
<i>Figure 3-4: Regression and Elasticity PCI vs. Car – Extrapolation Gujarat.....</i>	<i>27</i>
<i>Figure 3-5: Regression and Elasticity Population vs. Bus – Extrapolation Gujarat</i>	<i>28</i>
<i>Figure 3-6: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation Gujarat</i>	<i>29</i>
<i>Figure 3-7 : Growth of GDP in India.....</i>	<i>32</i>
<i>Figure 5-1 : Historical Rate of WPI Inflation in India.....</i>	<i>43</i>
<i>Figure 8-1 : General Condition of Project Road</i>	<i>52</i>
<i>Figure 8-2 : General Condition of Project Road</i>	<i>53</i>
<i>Figure 8-3 : General Condition of Project Road</i>	<i>53</i>



ABBREVIATIONS

AADT	- Annual Average Daily Traffic	NHAI	- National Highways Authority of India
BOT	- Build Operate Transfer	NHDP	- National Highways Development Project
CAGR	- Compound Annual Growth Rate	NSDP	- Net State Domestic Product
CTV	- Classified traffic volume	O&M	- Operation & Maintenance
DBFOT	- Design, Build, Finance, Operate & Transfer	PCDP	- Per Capita Domestic Product
EME	- Earth Moving Equipment	PCI	- Per Capita Income
GDP	- Gross Domestic Product	PCU	- Passenger Car Unit
GSDP	- Gross State Domestic Product	PSC	- Pre-stressed Concrete
HCM	- Heavy Construction Machinery	RCC	- Reinforced cement concrete
HCV	- Heavy Commercial Vehicle	RHS	- Right Hand Side
HTMS	- Highway Traffic Management System	SH	- State Highway
IRC	- Indian Road Congress	TP	- Toll Plaza
IRR	- Internal Rate of Return	WPI	- Wholesale Price Index
LCV	- Light Commercial Vehicle	SIR	- Special Investment Region
LHS	- Left Hand Side	c.	- Circa
LGV	- Light Goods Vehicle	ROB	- Railway Over Bridge
MAV	- Multi Axle Vehicle	MDR	- Major District Road
MORTH	- Ministry of Road Transport and Highways	ODR	- Other District Road
NH	- National Highway	CA	- Concession Agreement
PCC	- Plain Cement Concrete	RMT	- Running Meter
CR	- Coarse Rubble		



CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 km of existing 4-lane National Highways into 6-lane National Highway. Sections envisaged under 6-laning comprise the Golden Quadrilateral section (5,700 km) and some other sections which are 800 km in length.

The project under consideration, **Surat and Dahisar** section of NH-8 from km 263.000 to km 502.000 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s IRB Surat Dahisar Tollway Ltd.* (Concessionaire) has been awarded the Project for a concession period of 12 years starting from 20th February 2009 to 19th February 2021. The Project has been commissioned and is currently in the operation / maintenance phase.

The Project Highway passes through two states namely Gujarat and Maharashtra. It crosses several districts on the way of both states. About 120 km of stretch lies in the state of Gujarat and the balance c. 120 km in Maharashtra state. There are major urban centres, viz. Surat, Navsari, Pardi, Valsad and Vapi etc. and many semi-urban centres along the Project Highway. The Project Highway is joined and/or intersected by a number of State Highways (SH), Major District Roads (MDR), and Other District Roads (ODR).

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged *GMD Consultants* to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as “*Toll Revenue and O&M Cost Projection Report*” mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections

The Concessionaire has provided basic historical traffic data and other project details on the basis of which the above analysis has been carried out, after applying our judgement on the traffic estimates.

“Toll Revenue and O&M Cost Projection Report” was submitted in March 2017. In this report traffic data of year 2015-16 was used as base traffic. The report was updated with traffic data of year 2016-17 and report was submitted in October 2017. Report was further updated with traffic data of 2017-18 and same was submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2018 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. Now as six-monthly traffic data from April 2019 to September 2019 is also available, this report is updated taking this latest traffic data into consideration..

Chapters on Project Details, Influence Zone Traffic Analysis have not been included in this update as there has been no significant event or change in the last 1 year which will have an impact on these chapters in our report dated April 2019.



CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

The Consultants have collected the required information for project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project.

- Classified traffic volume counts at toll plaza locations on Surat- Dahisar section of NH-8 for base year 2015-16, 2016-17, 2017-18 2018-19 and for period from April 2019 to September 2019
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of the project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

Project can be divided into four homogenous sections from traffic point of view.

These sections can be

- Surat to Navsari
- Navsari to Valsad
- Valsad to Vapi
- Vapi to Dahisar (End)



Table 2-1 below lists provides details of locations from where traffic details have been collected.

Table 2-1 : Traffic Data Details

SR. NO	LOCATION	CTV	Single Journey Traffic	Daily Return Journey	Monthly Pass	Local Pass
1	Km 470.00 Toll Plaza at Khanivade	AADT for Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AADT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AADT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AADT for Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19
		AADT for April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019
2	Km 420.34 Toll Plaza at Charoti	AADT for Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AADT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AADT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AADT for Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19
		AADT for April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019
3	Km 356.20 Toll Plaza at Bhagwada	AADT for Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AADT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AADT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AADT for Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19
		AADT for April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019



		2019				
4	Km 297.30 Toll Plaza at Boriyach	AADT for Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AADT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AADT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AADT for Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19
		AADT for April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019

Toll plaza no. 1 & 2 are located in Maharashtra while Toll plaza no. 3 & 4 are located in Gujarat. The locations of each of the traffic survey are illustrated in *Figure 2-1*.

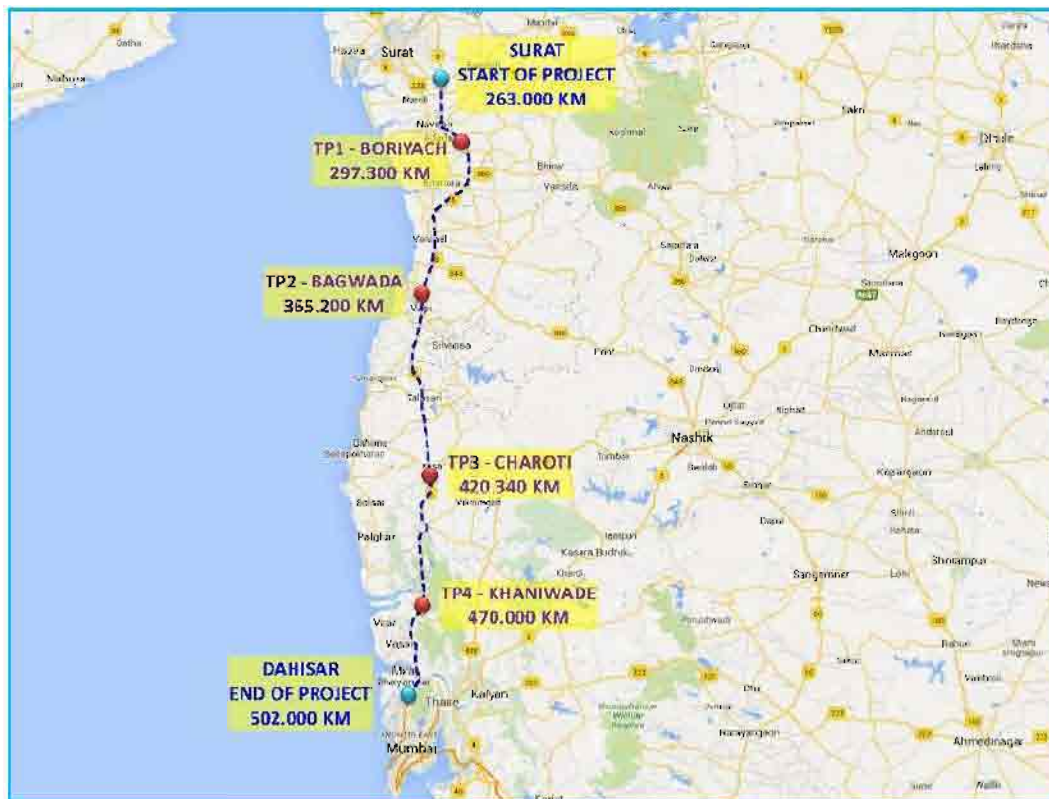


Figure 2-1: Toll Plaza Locations



2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume

Count survey has been provided by the concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI. These locations are indicated in *Figure 2-1* and listed in *Table 2-1*.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in table below

Table 2-2 : Vehicle Classification System

Vehicle Type	
Auto Rickshaw	
Passenger Car	Car, Jeep, Taxi & Van (Old / new technology)
Bus	Mini Bus
	Standard Bus
Truck	Light Goods Vehicle (LCV)
	2 – Axle Truck
	3 Axle Truck (HCV)
	Multi Axle Truck (4-6 Axle)
	Oversized Vehicles (7 or more axles)
Other Vehicles	Agriculture Tractor, Tractor & Trailer

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected is corresponding to category of tollable vehicles. Following are the type of vehicles as per concession agreement.

- Car / Jeep / van
- Min Bus /LCV
- Truck / Bus
- Multi Axle

2.3 Traffic Characteristic

Toll revenue of project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have substantial potential to affect toll



collection. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, % of monthly pass traffic are some of such characteristics of traffic. These will be discussed in subsequent sections of report.

2.3.1 Traffic Data

Project concessionaire has provided Traffic data for base year 2015-16 , 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019 as under for toll plazas

This year there have been extended high intensity rains on pan in India. States of Maharashtra, Gujarat, Rajasthan, Bihar, UP, MP, Karnataka, Himachal Pradesh have been quite affected due to heavy rains this year. This has negative impact on passenger and commercial traffic during first of half of this year. It is expected that traffic in second half of year from October to March shall be substantially higher this year. Taking this into account a seasonality factor is taken to arrive and AADT value of traffic from six monthly average volume of first half of year.

Table 2-3 : Traffic Data at Toll Plaza at Km 470.000

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	CAR	12540	9950	10709	11419	11913
2	LCV	6233	6125	6599	6926	5996
3	Truck/Bus	3486	3108	3563	3795	5612
4	Multi Axle	7953	7484	7868	7830	8288
	Total	30212	26667	28739	29970	31808



Table 2-4 : Traffic Data at Toll Plaza at Km 420.340

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	CAR	9720	9282	9461	10006	10315
2	LCV	4800	4830	4943	5190	4281
3	Truck/Bus	3704	3448	3857	4025	5705
4	Multi Axle	8043	7837	8218	8233	8533
	Total	26268	25396	26479	27454	28834

Table 2-5 : Traffic Data at Toll Plaza at Km 356.200

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	CAR	8494	7043	7360	7924	8221
2	LCV	5565	5148	5346	5784	4863
3	Truck/Bus	4525	4423	4839	4803	6599
4	Multi Axle	7839	7858	8216	8573	9095
	Total	26423	24473	25761	27083	28778



Table 2-6 : Traffic Data at Toll Plaza at Km 297.300

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	CAR	11330	10889	11703	12294	13557
2	LCV	5152	5121	5134	5639	4985
3	Truck/Bus	4569	4199	4308	5057	7217
4	Multi Axle	8135	8585	8892	9305	9950
	Total	26423	24473	25761	32296	35710

2.3.2 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of the traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in *Table 2-7*.



Table 2-7 : PCU Factors Adopted for Study

Vehicle Type	PCUs
Car	1.0
Mini Bus	1.5
Standard Bus	3.0
LCV/LGV	1.5
2 Axle Truck	3.0
3 – 6 Axle Truck	4.5
MAV	4.5
Auto Rickshaw	1.0
Van/Tempo	1.0
Agriculture Tractor with Trailer	4.5
Agriculture Tractor without Trailer	1.5

Source: IRC: 64-1990

Traffic volume at each toll plaza was converted to PCU and same is presented as under.

Table 2-8 : Traffic in PCU at Project Stretch

Toll Plaza Location (Km)	Period	Traffic No	PCU	PCU Index
470.000	FY 2015-16	30212	68142	2.26
	FY 2016-17	26667	62137	2.33
	FY 2017-18	28739	66703	2.32
	FY 2018-19	29970	68429	2.28
	April 2019 – Sept 2019	31808	75037	2.36
420.340	FY 2015-16	26268	64226	2.45
	FY 2016-17	25936	62136	2.45
	FY 2017-18	26479	65428	2.47
	FY 2018-19	27454	66914	2.44



	April 2019 – Sept 2019	28834	72251	2.51
356.200	FY 2015-16	26423	65697	2.49
	FY 2016-17	24473	63397	2.59
	FY 2017-18	25761	66869	2.60
	FY 2018-19	27083	69585	2.57
	April 2019 – Sept 2019	28778	76239	2.65
297.300	FY 2015-16	29186	69374	2.38
	FY 2016-17	28793	69799	2.42
	FY 2017-18	30037	72343	2.41
	FY 2018-19	32296	77799	2.41
	April 2019 – Sept 2019	35710	87463	2.45

It can be observed from above that project traffic has PCU index close to 2.5 which is an indicator of good mix of commercial and passenger traffic in project corridor.

It can be observed that PCU index is consistent at all four toll plaza locations.

2.3.3 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

For the purpose of analysis, the recent traffic numbers of for period April 2019 to September 2019 have been considered as the base numbers.

It is observed that car traffic forms about 30%- 40% of total traffic at toll plaza locations while multi axle commercial vehicles are about 25% -30% of total traffic. Truck / Bus and LCV share about 15-20% and 15- 20 % of traffic volume respectively.

Another important bifurcation of traffic is components of traffic with respect various type of toll ticketing like

1. Single Journey

2. Multi Journey
3. Monthly Pass (Local and General)

The following table provides numbers of vehicles falling in each of above category on base year 2015-16, 2016-17, 2018-18 and period from April 2019 to September 2019

Table 2-9 : Journey Type Bifurcation of Traffic at KM 470.000

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) FY 2018-19	Traffic Volume (Nos.) April 2019- Sept 2019
1	Single Journey	18041	17496	18082	18598	19717
2	Return Journey	9856	9082	9508	10370	11056
3	Monthly Pass	2315	89	1149	1002	1035

Most dominant part of the above is the single journey type followed by return journey at project stretch. Monthly pass commuters are a very low fraction of the total traffic on the project corridor.

The single journey component in total traffic numbers is a high as 62%. Return journey component is 35%. The number of monthly pass is 3% at toll plaza at Km 470.000.

Following tables give the detail of journey distribution at other toll plaza locations

Table 2-10 : Journey Type Bifurcation of Traffic at KM 420.340

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) FY 2018-19	Traffic Volume (Nos.) April 2019- Sept 2019
1	Single Journey	16892	16685	17208	17594	18415
2	Return Journey	8756	8688	8924	9514	9990
3	Monthly Pass	618	23	347	346	429



Table 2-11 : Journey Type Bifurcation of Traffic at KM 356.200

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) FY 2018-19	Traffic Volume (Nos.) April 2019- Sept 2019
1	Single Journey	18086	18120	18417	19044	20080
2	Return Journey	6170	6316	6738	7498	7978
3	Monthly Pass	2167	37	606	541	720

Table 2-12 : Journey Type Bifurcation of Traffic at KM 297.300

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) FY 2018-19	Traffic Volume (Nos.) April 2019- Sept 2019
1	Single Journey	18487	18688	18755	19985	21816
2	Return Journey	9720	10102	10990	11718	13166
3	Monthly Pass	978	23	292	593	728

It is observed that the project corridor demonstrates a similar pattern of single journey dominated mix of traffic across the entire stretch which is typical of major national highways.

2.4 Secondary Data Collection

There are several other factors which have a substantial impact on traffic pattern and growth on any project corridor. Following are some of such important factors

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or Industrial projects
- Special Industry in project corridor
- Overall trends of economic growth local as well as national / regional



Hence in addition to traffic details on project site, secondary data was also collected from various other sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP
 - b) NSDP
 - c) Population Growth
 - d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data
3. Competing road network

We have collected and utilized such underlying data in the study to estimate the growth and risk factors for traffic along the project corridor.



CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the projections of other factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor Surat- Dahisar section of NH-8 has been done taking the above factors into consideration. “**IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**” is established best practice and has been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of growth is to assume the same rate of growth as in the past. Although such a method is more suitable to projects of short durations say 5-10 years, however for long term projections it would-be erroneous to assume that the past rate of growth will continue to prevail for a long time in future. Economic conditions, which are major influencing factors, are bound to change over a long period of time. Thus, it would be necessary to modify the past trends of growth suitably.

Elasticity model of growth projection is one of the most widely acceptable methods for traffic forecast. The same is recommended in **IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**.

In this method the past trend of vehicular data is paired with an economic indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicle traffic varies for different type of vehicle. It is a proven fact that the growth pattern for passenger and goods vehicle is different. Traffic growth on any highway typically depends on number of economic parameters. Most important and direct parameters are given as under



- Per Capita Income
- Net State Domestic Product (NSDP)
- Population

It can be observed that the ownership of a car is more closely related to affordability; hence per capita is the index which closely fits the growth of car traffic among other criteria. In a similar fashion, the following can be pairs of vehicle type and independent variable for elasticity modeling of growth.

- Car / Jeep – Par Capita Income
- Bus / Minibus – Population
- Goods Vehicle – NSDP

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to a change in the corresponding indicator selected. Hence, In order to estimate the elasticity of traffic demand, it is necessary to establish relationship between the growth in number of given category of vehicles with the relevant economic variable considered, such as NSDP, per capita income and population growth. Latest available data for vehicle registration, per capita income, NSDP and population is used in analysis.

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is given as below:

$$\text{Log}(P) = k \times \text{Log}(EI) + A$$

Where,

P = Number of Vehicles (Mode wise)

EI = Economic Indicator

A = Regression constant

k = Elasticity coefficient (Regression coefficient)

The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

The project corridor spreads across two states. Toll plazas at km 470.000 and km 420.340 are in the state of Maharashtra and at Km 356.200 and km 297.300 are in Gujarat. For elasticity calculations, working data from both states has been analyzed.



Following tables and graphs depict regression and elasticity of growth model for stretch falling in Maharashtra State.

Table 3-1 : Per Capita Income Vs Car Maharashtra

Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2005	36077	1479877	4.56	6.17		
2006	40671	1648379	4.61	6.22	13%	
2007	45582	1822458	4.66	6.26	12%	
2008	50138	1979191	4.70	6.30	10%	
2009	50183	2182969	4.70	6.34	0%	
2010	54246	2440404	4.73	6.39	8%	
2011	59587	2750167	4.78	6.44	10%	
2012	61468	3162000	4.79	6.50	3%	
2013	64218	3439300	4.81	6.54	4%	7.6%

Regression analysis of same is given in figure below

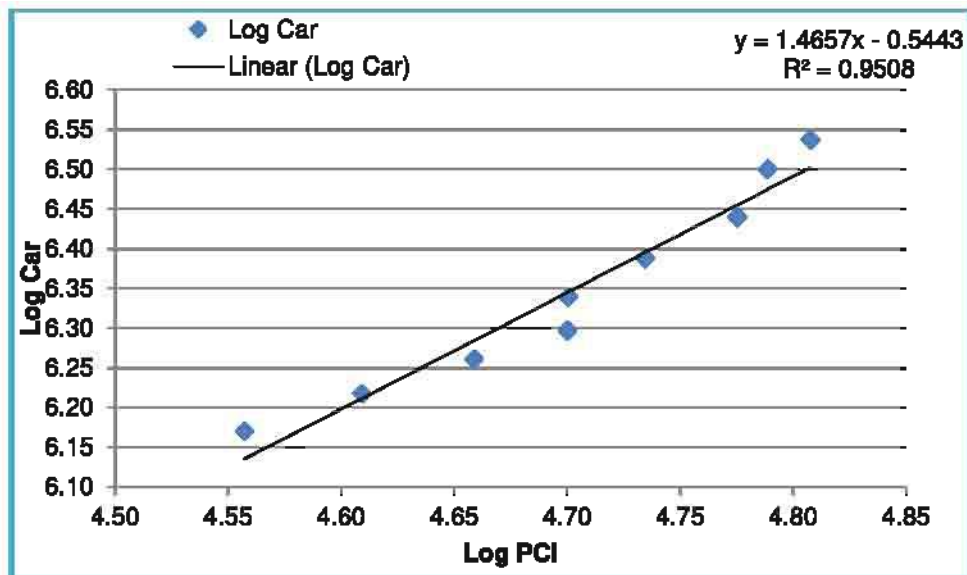


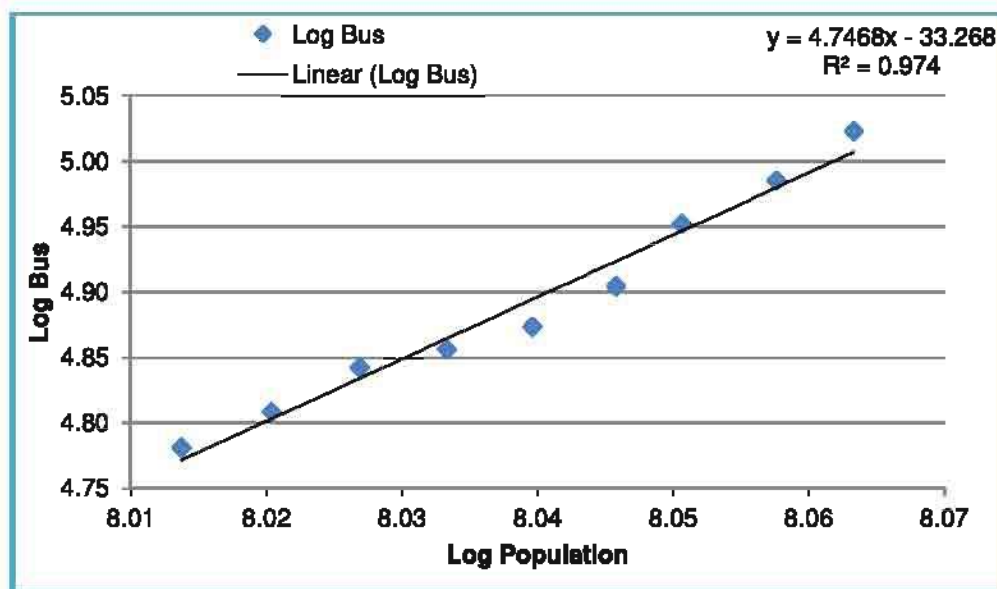
Figure 3-1: Regression and Elasticity PCI vs. Car–Extrapolation Maharashtra



Table 3-2 : Population Vs Bus Maharashtra

Year	Population	Buses	Log Pop	Log Bus	Pop Growth	Average Growth
2005	103218000	60426	8.01	4.78		
2006	104804000	64357	8.02	4.81	2%	
2007	106386000	69589	8.03	4.84	2%	
2008	107972000	71813	8.03	4.86	1%	
2009	109553000	74712	8.04	4.87	1%	
2010	111118000	80290	8.05	4.90	1%	
2011	112374333	89540	8.05	4.95	1%	
2012	114184000	96600	8.06	4.98	2%	
2013	115697000	105400	8.06	5.02	1%	1.44%

Regression analysis of same is given in figure below

**Figure 3-2: Regression and Elasticity Population vs. Bus – Extrapolation Maharashtra**

Elasticity of goods traffic has been worked out by regression analysis with NSDP.

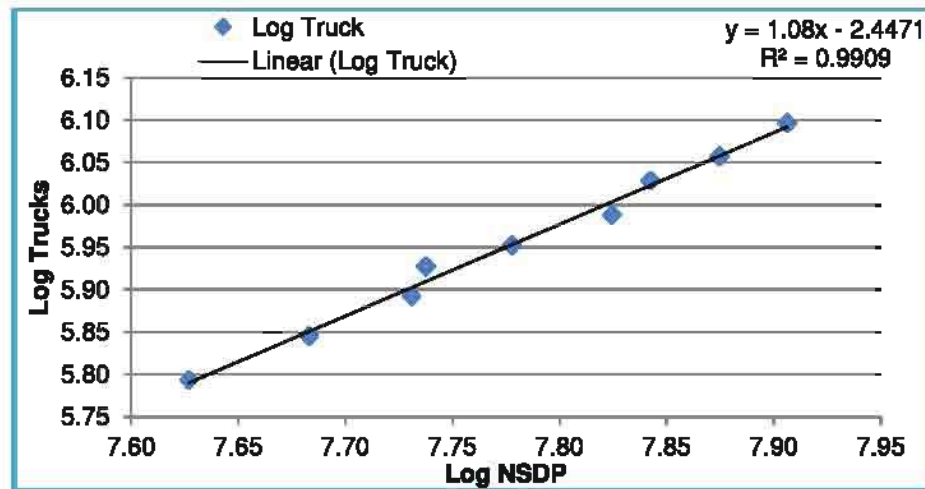
Following table represents the data and details.



Table 3-3 : Goods Traffic Vs NSDP Maharashtra

Year	NSDP	Trucks	Log NSDP	Log Truck	NSDP Growth	Average Growth (5 Year)
2005	42363200	621971	7.63	5.79		
2006	48198300	700356	7.68	5.85	14%	
2007	53808100	780992	7.73	5.89	12%	
2008	54653300	845617	7.74	5.93	2%	
2009	59933800	896397	7.78	5.95	10%	
2010	66762500	973788	7.82	5.99	11%	
2011	69590400	1067825	7.84	6.03	4%	
2012	74913700	1140900	7.87	6.06	8%	
2013	80559300	1249600	7.91	6.10	8%	7.01%

Following figure depict regression analysis and extrapolation.

**Figure 3-3: Regression and Elasticity NSDP vs. Goods Traffic - extrapolation Maharashtra**

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth. R2 statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R2 more representative is the regression model of data.



The results of these analyses for *the good fit* regression as reflected by R² values are presented in the Table below

Table 3-4 : Summary Regression Analysis Maharashtra

State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth	Growth Elastic Model
Maharashtra	Car/Jeep	PCI	$y = 1.4657x - 0.5443$	R ² = 0.9508	1.4657	7.56%	11.08%
	Bus	Population	$y = 4.7468x - 33.2683$	R ² = 0.974	4.7468	1.44%	6.82%
	Truck	NSDP	$y = 1.08x - 2.4471$	R ² = 0.9909	1.0800	7.01%	7.57%

Similar analysis has been done for the stretch of the Project Corridor in Gujarat and details of the same are presented as under.

Table 3-5 : Per Capita Income Vs Car Gujarat

Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2004	24143	749963	4.38	5.88		
2005	28067	826832	4.45	5.92	16%	
2006	30332	912933	4.48	5.96	8%	
2007	31754	1004822	4.50	6.00	5%	
2008	33901	1093965	4.53	6.04	7%	
2009	36202	1210368	4.56	6.08	7%	
2010	38048	1378830	4.58	6.14	5%	
2011	38856	1579889	4.59	6.20	2%	
2012	39904	1775502	4.60	6.25	3%	6.6%



Regression analysis of same is given in figure below

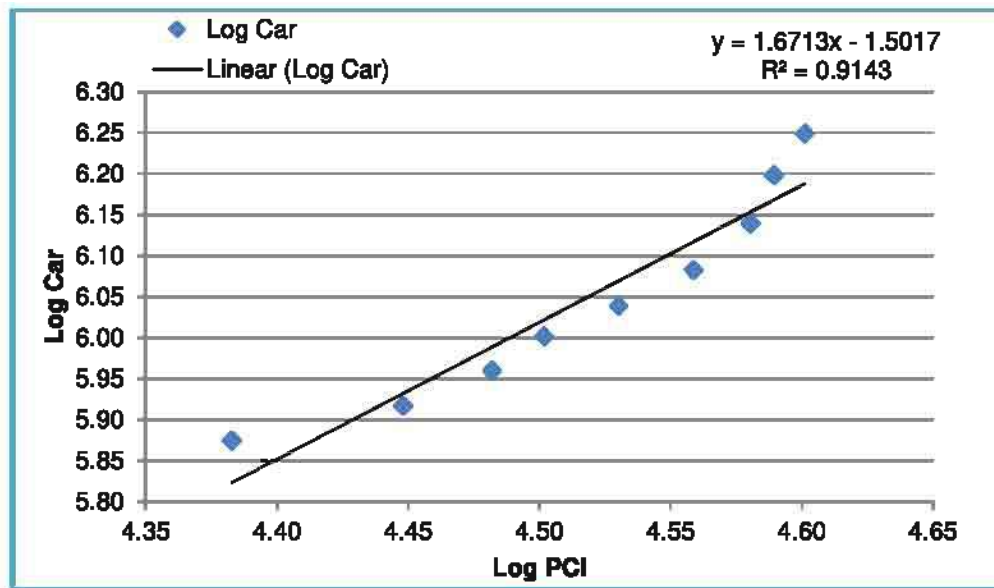


Figure 3-4: Regression and Elasticity PCI vs. Car – Extrapolation Gujarat

Table 3-6 : Population Vs Bus Gujarat

Year	Population	Buses	Log Pop	Log Bus	Pop Growth	Average Growth
2004	54140000	52286	7.73	4.72		
2005	54979000	54446	7.74	4.74	2%	
2006	55808000	54214	7.75	4.73	2%	
2007	56626000	56214	7.75	4.75	1%	
2008	57434000	58253	7.76	4.77	1%	
2009	58232000	68659	7.77	4.84	1%	
2010	59020000	73924	7.77	4.87	1%	
2011	59800000	80627	7.78	4.91	1%	
2012	60569000	87946	7.78	4.94	1%	
2013	61329000	93262	7.79	4.97	1%	
2014	62081000	96500	7.79	4.98	1%	1.38%



Regression analysis of same is given in figure below

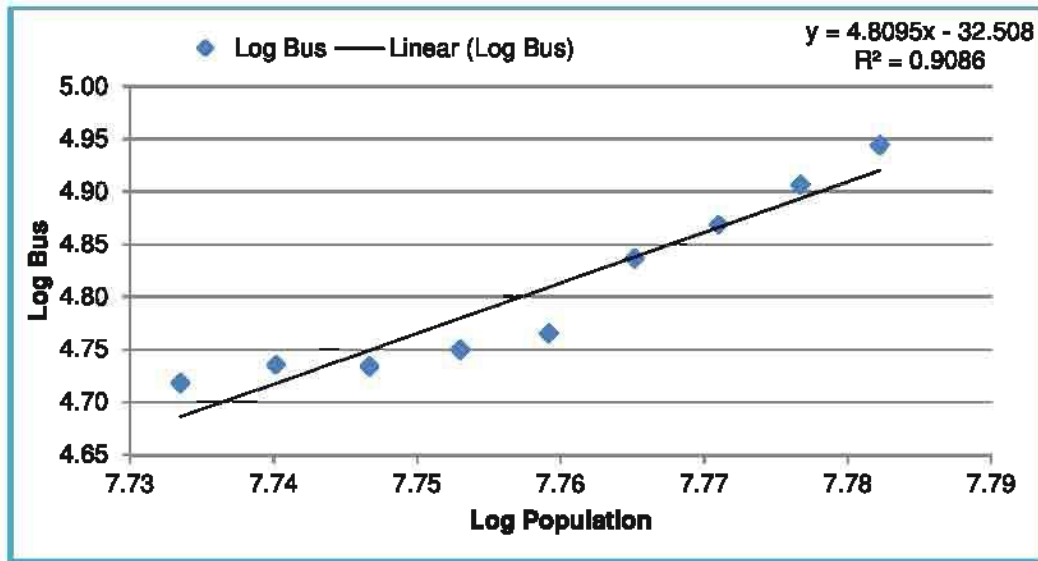


Figure 3-5: Regression and Elasticity Population vs. Bus – Extrapolation Gujarat

Elasticity of goods traffic has been worked out using regression analysis with NSDP as independent variable. The following table includes calculations for the same.

Table 3-7 : Goods Traffic Vs NSDP Gujarat

Year	NSDP	Trucks	Log NDSP	Log Truck	NSDP Growth	Average Growth (5 Year)
2004	17226500	418811	7.24	5.62		
2005	19727000	457702	7.30	5.66	15%	
2006	21395400	508880	7.33	5.71	8%	
2007	23925300	553792	7.38	5.74	12%	
2008	24948000	586598	7.40	5.77	4%	
2009	28473200	626344	7.45	5.80	14%	
2010	31589200	678804	7.50	5.83	11%	
2011	33688600	750491	7.53	5.88	7%	
2012	35647700	818484	7.55	5.91	6%	
2013	38547200	875103	7.59	5.94	8%	9.42%



Following figure depict regression analysis and extrapolation.

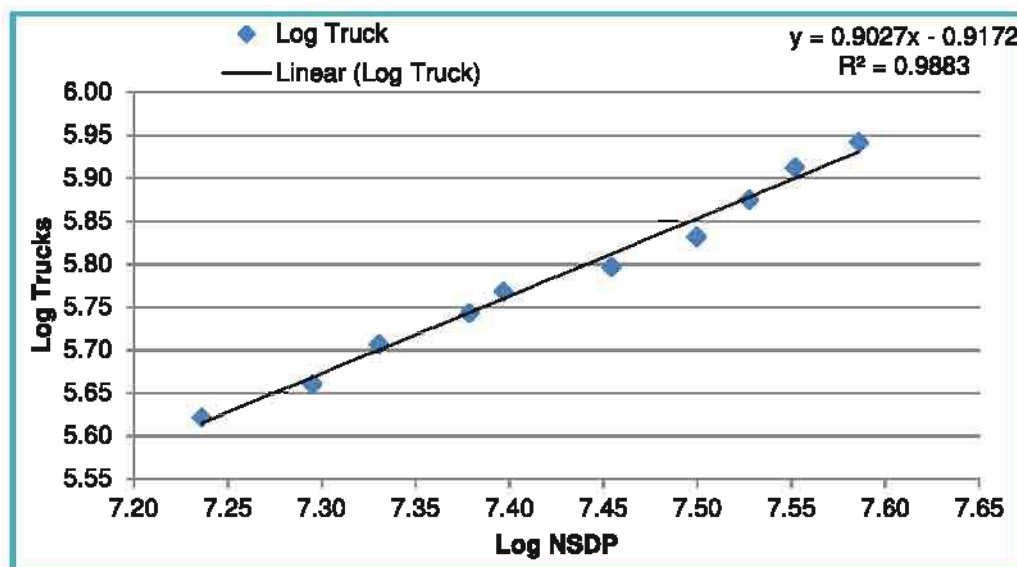


Figure 3-6: Regression and Elasticity NSDP vs. Goods Traffic – extrapolation Gujarat

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth.

The results of these analyses for the *good fit regressions* reflected by R^2 values are presented in the Table below

Table 3-8 : Summary Regression Analysis

State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth	Growth Elastic Model
Gujarat	Car/Jeep	PCI	$y = 1.6713x - 1.5017$	$R^2 = 0.9143$	1.6713	6.56%	10.96%
	Bus	Population	$y = 4.8095x - 32.5085$	$R^2 = 0.9086$	4.8095	1.38%	6.63%
	Truck	NSDP	$y = 0.9027x - 0.9172$	$R^2 = 0.9883$	0.9027	9.42%	8.50%

Economical model for predicting growth is good tool, however other local, regional, national factors should also be considered before finalizing growth factors. Considering factors such as proposed developments and other influencing economic



factors, moderated growth should be considered. These factors are discussed in subsequent sections.

3.4 Analysis of Historic Traffic Data

Historical traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Surat to Dahisar has recently been commissioned and is under tolling operation since 2013. Initial years of traffic operation in toll road project show varying volumes due to application Toll. In Surat Dahisar stretch stable project data is available since 2015-16 which again was hit due to demonetization and GST in year 2016-17. Hence the data pertaining to these does not represent normal traffic volume. Following table provides historical traffic volume on project road.

Table 3-9 : Historical Traffic at KM 470.000

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	CAR	12540	9950	10709	11419	11913
2	LCV	6233	6125	6599	6926	5996
3	Truck/Bus	3486	3108	3563	3795	5612
4	Multi Axle	7953	7484	7868	7830	8288
	Total	30212	26667	28739	29970	31808

Table 3-10 : Historical Traffic at KM 420.340

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	CAR	9720	9282	9461	10006	10315
2	LCV	4800	4830	4943	5190	4281
3	Truck/Bus	3704	3448	3857	4025	5705
4	Multi Axle	8043	7837	8218	8233	8533
	Total	26268	25396	26479	27454	28834



Table 3-11 : Historical Traffic at KM 356.200

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	CAR	8494	7043	7360	7924	8221
2	LCV	5565	5148	5346	5784	4863
3	Truck/Bus	4525	4423	4839	4803	6599
4	Multi Axle	7839	7858	8216	8573	9095
	Total	26423	24473	25761	27083	28778

Table 3-12 : Historical Traffic at KM 297.300

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	CAR	11330	10889	11703	12294	13557
2	LCV	5152	5121	5134	5639	4985
3	Truck/Bus	4569	4199	4308	5057	7217
4	Multi Axle	8135	8585	8892	9305	9950
	Total	26423	24473	25761	32296	35710

Above trend show an average growth of traffic in range of 5%-10% with car having car and bus/ trucks having maximum growth.

3.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economical, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

ECONOMY

After witnessing a slowdown during 2008-09, the economy recovered in 2009-10, and a very high growth rate of GDP was recorded in 2010. Following figure depicts growth of GDP in India during the period.



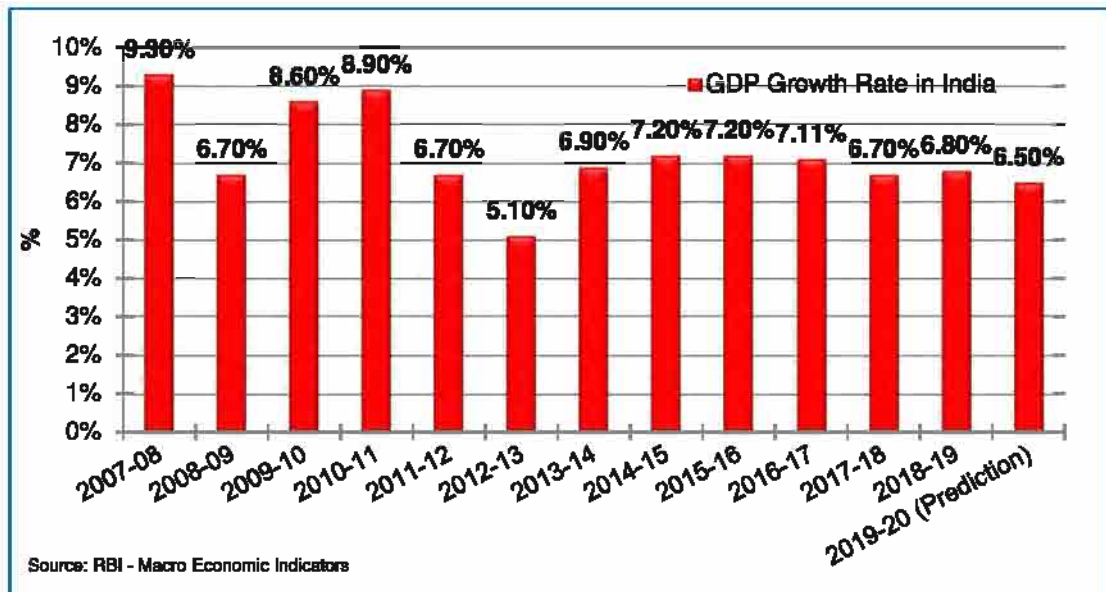


Figure 3-7 : Growth of GDP in India

After recording an all impressive growth of 8.9% in 2011, GDP declined between FY11 and FY14. GDP growth in 2014-15, 2015-16 and 2016-17 was pegged around 7.2%. FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Institutions like World Bank and ADB have predicted growth of GDP in Indian Economy in range of 6.5% in coming year.

Honorable Prime Minister and Government has set up a target for Indian Economy to become 5 Trillion USD economy. This would require a continuous robust growth for next 5 year. Government plans several initiatives to boost economy to achieve this target. In such case it is expected that project corridor will also witness good growth of traffic on project corridor.

3.6 Recommended Growth Rates of Traffic

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under. Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as trend of technological advances in logistic industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is established practice to stepdown future growth rates at interval of 5 years.

Temporary disruptions caused by implementation of Goods and Service Tax (GST) and demonetization have dissipated, and growth of economy has significantly improved since then. Hence corridor can expect to have expected growth.

Growth rates are recommended for three scenarios for sensitivity analysis namely **Optimistic, Pessimistic and Most Likely** with a positive and negative variation 0.5% from Most Likely case for corridor in both states.

3.6.1 Recommended Growth Rates of Traffic for Maharashtra Part of Stretch

Table 3-13 : Recommended Growth Rates Optimistic Maharashtra

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040
CAR	8.0%	7.5%	7.0%	6.5%
Mini Bus /LCV	6.5%	6.0%	5.5%	5.0%
Truck / Bus	7.0%	6.5%	6.0%	5.5%
Multi Axle	7.5%	7.0%	6.5%	6.0%

Table 3-14 : Recommended Growth Rates Pessimistic Maharashtra

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040
CAR	7.0%	6.5%	6.0%	5.5%
Mini Bus /LCV	5.5%	5.0%	4.5%	4.0%
Truck / Bus	6.0%	5.5%	5.0%	4.5%
Multi Axle	6.5%	6.0%	5.5%	5.0%

Table 3-15 : Recommended Growth Rates Most Likely Maharashtra

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040
CAR	7.5%	7.0%	6.5%	6.0%
Mini Bus /LCV	6.0%	5.5%	5.0%	4.5%
Truck / Bus	6.5%	6.0%	5.5%	5.0%
Multi Axle	7.0%	6.5%	6.0%	5.5%

3.6.2 Recommended Growth Rates of Traffic for Gujarat Part of Stretch

Table 3-16 : Recommended Growth Rates Optimistic Gujarat

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040
CAR	7.5%	7.0%	6.5%	6.0%
Mini Bus /LCV	7.5%	7.0%	6.5%	6.0%
Truck / Bus	7.0%	6.5%	6.0%	5.5%
Multi Axle	8.0%	7.5%	7.0%	6.5%

Table 3-17 : Recommended Growth Rates Pessimistic Gujarat

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040
CAR	6.5%	6.0%	5.5%	5.0%
Mini Bus /LCV	6.5%	6.0%	5.5%	5.0%
Truck / Bus	6.0%	5.5%	5.0%	4.5%
Multi Axle	7.0%	6.5%	6.0%	5.5%



Table 3-18 : Recommended Growth Rates Most Likely Gujarat

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040
CAR	7.0%	6.5%	6.0%	5.5%
Mini Bus /LCV	7.0%	6.5%	6.0%	5.5%
Truck / Bus	6.5%	6.0%	5.5%	5.0%
Multi Axle	7.5%	7.0%	6.5%	6.0%

Traffic and revenue have been worked out on the basis of above growths and same is presented in subsequent chapter of report



CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in previous section of report are used to arrive at traffic projections for future years. Toll plaza wise futuristic traffic projection is given in tables below.

These projections have been done for following three cases of growth up to concession period

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario

**Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 470.000 KM
(Optimistic Growth Scenario)**

Year	CAR	LCV	Truck/ Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	11913	5996	5612	8288	31808	75037
2020-21	12866	6386	6005	8909	34166	80551
2021-22	13896	6802	6426	9578	36702	86478
2022-23	15008	7244	6875	10297	39424	92836
2023-24	16208	7715	7356	11070	42349	99664



**Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 420.340 KM
(Optimistic Growth Scenario)**

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	10315	4281	5705	8533	28834	72251
2020-21	11141	4560	6104	9173	30978	77572
2021-22	12033	4857	6531	9861	33282	83286
2022-23	12996	5173	6987	10600	35756	89417
2023-24	14037	5510	7475	11395	38417	96005

**Table 4-3 : Total Tollable Traffic @ Toll Plaza 3- Chainage 356.200 KM
(Optimistic Growth Scenario)**

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	8221	4863	6599	9095	28778	76239
2020-21	8838	5228	7060	9823	30949	82064
2021-22	9500	5620	7554	10609	33283	88333
2022-23	10212	6041	8082	11458	35793	95081
2023-24	10978	6494	8647	12375	38494	102348

**Table 4-4 : Total Tollable Traffic @ Toll Plaza 4- Chainage 297.300 KM
(Optimistic Growth Scenario)**

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	13557	4985	7217	9950	35710	87463
2020-21	14574	5359	7723	10746	38402	94139
2021-22	15667	5761	8264	11606	41298	101328



2022-23	16843	6193	8843	12534	44413	109065
2023-24	18106	6657	9463	13537	47763	117397

**Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 470.000 KM
(Pessimistic Growth Scenario)**

s

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	11913	5996	5612	8288	31808	75037
2020-21	12747	6326	5949	8826	33848	79800
2021-22	13639	6675	6306	9399	36019	84865
2022-23	14595	7043	6684	10010	38332	90257
2023-24	15616	7430	7084	10660	40790	95983

**Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 420.340 KM
(Pessimistic Growth Scenario)**

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	10315	4281	5705	8533	28834	72251
2020-21	11038	4516	6047	9088	30689	76849
2021-22	11811	4764	6410	9679	32664	81743
2022-23	12637	5026	6794	10309	34766	86949
2023-24	13523	5302	7202	10979	37006	92488



**Table 4-7 : Total Tollable Traffic @ Toll Plaza 3- Chainage 356.200 KM
(Pessimistic Growth Scenario)**

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	8221	4863	6599	9095	28778	76239
2020-21	8755	5180	6995	9732	30662	81304
2021-22	9324	5517	7415	10413	32669	86703
2022-23	9930	5876	7859	11142	34807	92460
2023-24	10575	6258	8330	11922	37085	98601

**Table 4-8 : Total Tollable Traffic @ Toll Plaza 4- Chainage 297.300 KM
(Pessimistic Growth Scenario)**

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	13557	4985	7217	9950	35710	87463
2020-21	14439	5309	7650	10647	38045	93264
2021-22	15377	5654	8109	11392	40532	99449
2022-23	16376	6021	8595	12189	43181	106043
2023-24	17440	6413	9110	13042	46005	113079

**Table 4-9 : Total Tollable Traffic @ Toll Plaza 1- Chainage 470.000 KM
(Most Likely Growth Scenario)**

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	11913	5996	5612	8288	31808	75037
2020-21	12807	6356	5977	8867	34007	80174



2021-22	13768	6737	6366	9487	36358	85663
2022-23	14801	7140	6779	10151	38871	91528
2023-24	15911	7569	7219	10862	41561	97801

**Table 4-10 : Total Tollable Traffic @ Toll Plaza 2- Chainage 420.340 KM
(Most Likely Growth Scenario)**

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	10315	4281	5705	8533	28834	72251
2020-21	11089	4538	6076	9131	30834	77214
2021-22	11921	4811	6471	9770	32973	82516
2022-23	12815	5101	6890	10454	35260	88180
2023-24	13776	5408	7338	11186	37708	94239

**Table 4-11 : Total Tollable Traffic @ Toll Plaza 3- Chainage 356.200 KM
(Most Likely Growth Scenario)**

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	8221	4863	6599	9095	28778	76239
2020-21	8796	5204	7028	9777	30805	81683
2021-22	9413	5569	7485	10510	32977	87517
2022-23	10072	5959	7971	11298	35300	93765
2023-24	10778	6376	8489	12146	37789	100466



**Table 4-12 : Total Tollable Traffic @ Toll Plaza 4- Chainage 297.300 KM
(Most Likely Growth Scenario)**

Year	CAR	LCV	Truck/Bus	Multi axle (>2axle)	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	13557	4985	7217	9950	35710	87463
2020-21	14506	5333	7685	10697	38221	93697
2021-22	15522	5706	8184	11499	40911	100379
2022-23	16608	6106	8714	12361	43789	107534
2023-24	17770	6533	9279	13288	46870	115203

4.2 Modification in Concession Period

As per Article 29 of the concession agreement, if actual traffic on the project falls short or exceeds Target Traffic on project highway on defined date, concession period shall be modified subject to calculation stipulated therein. For Surat - Dahisar project, the Target Date and Target Traffic are defined as under:

Target Date - 1st January 2017

Target Traffic - 82043 in PCU

It was observed that as per traffic projections, average traffic volume falls short of target traffic. It is estimated that concession period would be extended by approximately 2.5 years.

Due to the suspension in toll in the year FY17 because of demonetization for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days.

Traffic forecast, and revenue projections are done for probable extended period accordingly up to year 2023-24.



CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

The fee schedule in the CA of Surat- Dahisar section of NH-8 is based on the old toll policy. As per the Toll Notification (Schedule -G) the discounts and special provisions have been considered. In addition to discounts as per Fee Notification concessionaire has declared special category rates also. Salient features of toll rate structure are given as under

1. **Monthly Pass:** For frequent users, monthly pass would be issued at fee 30 time the single journey fee. Additionally, concessionaire has announced special monthly passes for LCV and Bus / Truck at Rs. 450 and Rs. 750 respectively which will be escalated every year as per the inflation rate.
2. **Multiple Journeys (for Return Trip):** Will be charged at 1.5 times single journey.
3. **Single Journey:** Full single journey toll would be charged to this category of vehicles who are infrequent travelers or whose frequency does not yield any discount from the above categories.
4. **Local Discounts:** There are several categories of local discounts.
 - a) Local Car Jeep Van I - Rs. 150 per month (for locals residing within a radius of 10 kms from toll plaza)
 - b) Local Car Jeep Van II - Rs. 300 per month (for locals residing within a radius of between 10 kms - 20 kms from toll plaza)
 - c) Local LCV - Rs. 15 per trip
 - d) Local Truck Bus - Rs. 25 per Trip
 - e) School Bus - Rs. 1000 per month



Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule G) as given under as extract from concession agreement.

The aforesaid Fee will be revised once in every year. The revised Fee shall be computed ("Computed Fee") as follows:-

$$\text{Base Fee} \times \frac{\text{WPI-B}}{\text{WPI-A}} \times \dots \text{Km for one way journey}$$

Where

WPI-B = is the Average Wholesale Price Index available for the year ending March 31st preceding the Fee revision date.

WPI-A = is the Wholesale Price Index on June 1997 i.e (131.4%)

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules applicable for contract.

Table 5-1: Base Toll Rates June 1997

Type of Vehicle	Base Rate of Fee / Km (in Rs.)
Car, Jeep, Van or Jeep	0.40
Light Commercial Vehicle, (LCV) / Mini Bus	0.70
Bus or Truck (2 Axle)	1.40
MAV (> 2 axle)	2.25

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site (www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.



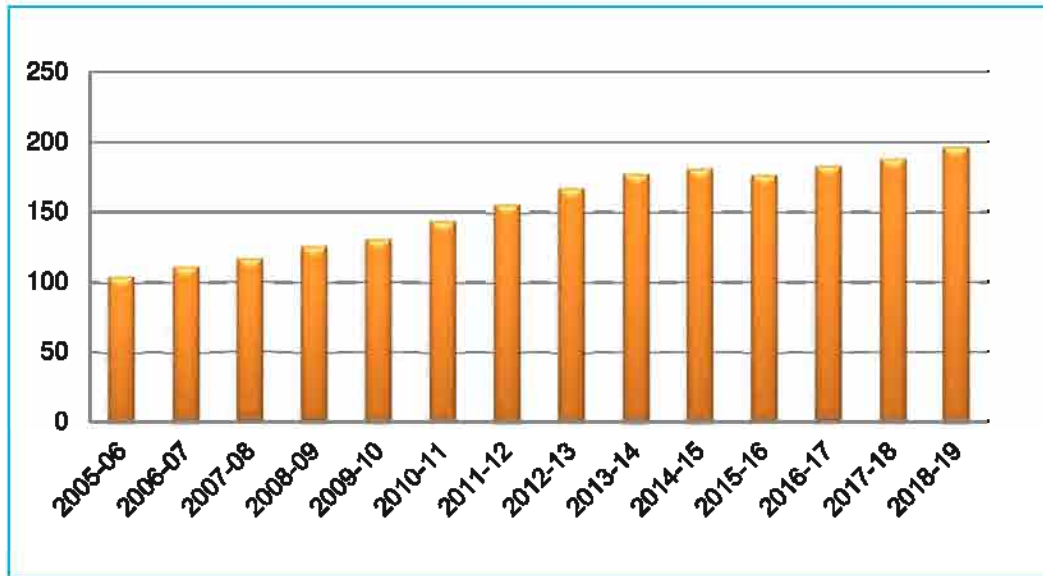


Figure 5-1 : Historical Rate of WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2019 is 5%. Same is considered for projection of WPI in future years.

There is no bypass or structure to be factored in for rates calculations.

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs.) for the concession period and are given below.

Thus worked out rates for various categories of vehicle and discounts are given as under

Table 5-2 : Toll Rates for Single Journey@ Km 470.000

Year	Car	Mini Bus /LCV	Truck/Bus	Heavy Truck
2019-20	70	125	245	395
2020-21	75	130	260	415
2021-22	80	135	270	440
2022-23	80	145	285	460
2023-24	85	150	300	485



Table 5-3 : Toll Rates for Single Journey @ Km 420.340

Year	Car	Mini Bus /LCV	Truck/Bus	Heavy Truck
2019-20	65	115	225	360
2020-21	70	120	235	380
2021-22	70	125	250	400
2022-23	75	130	260	420
2023-24	80	135	275	440

Table 5-4 : Toll Rates for Single Journey @ Km 356.200

Year	Car	Mini Bus /LCV	Truck/Bus	Heavy Truck
2019-20	70	125	245	395
2020-21	75	130	260	415
2021-22	80	135	270	440
2022-23	80	145	285	460
2023-24	85	150	300	485

Table 5-5 : Toll Rates for Single Journey @ Km 297.300

Year	Car	Mini Bus /LCV	Truck/Bus	Heavy Truck
2019-20	60	110	215	350
2020-21	65	115	225	365
2021-22	70	120	240	385
2022-23	70	125	250	405
2023-24	75	130	265	425



Table 5-6 : Toll Rates for Daily Pass @ Km 470.000

Year	Car	Mini Bus /LCV	Truck/Bus	Heavy Truck
2019-20	105	185	370	595
2020-21	110	195	390	625
2021-22	115	205	410	655
2022-23	125	215	430	690
2023-24	130	225	450	725

Table 5-7 : Toll Rates for Daily Pass @ Km 420.340

Year	Car	Mini Bus /LCV	Truck/Bus	Heavy Truck
2019-20	95	170	340	545
2020-21	100	175	355	570
2021-22	105	185	370	600
2022-23	110	195	390	630
2023-24	115	205	410	660

Table 5-8 : Toll Rates for Daily Pass @ Km 356.200

Year	Car	Mini Bus /LCV	Truck/Bus	Heavy Truck
2019-20	105	185	370	595
2020-21	110	195	390	625
2021-22	115	205	410	655
2022-23	125	215	430	690
2023-24	130	225	450	725



Table 5-9 : Toll Rates for Daily Pass @ Km 297.300

Year	Car	Mini Bus /LCV	Truck/Bus	Heavy Truck
2019-20	95	160	325	520
2020-21	95	170	340	550
2021-22	100	180	360	575
2022-23	105	190	375	605
2023-24	115	195	395	635

Table 5-10 : Toll Rates for Local Ticket @ all Toll Plaza

Year	Mini Bus /LCV	Truck/Bus
2019-20	15	25
2020-21	15	25
2021-22	15	25
2022-23	15	25
2023-24	15	25

Table 5-11 : Toll Rates for Monthly Pass @ Km 470.000

Year	CAR (local)	CAR (local2)	CAR (Reg.)	LCV (local)	LCV (Reg.)	Bus/ Truck (local)	Bus/ Truck (School Bus)	Bus/ Truck (Regular)	MAV
2019-20	150	300	2120	450	3705	750	1000	7415	11915
2020-21	150	300	2225	475	3895	790	1000	7785	12510
2021-22	150	300	2335	500	4085	830	1000	8175	13140
2022-23	150	300	2450	525	4290	870	1000	8585	13795
2023-24	150	300	2575	550	4505	915	1000	9015	14485



Table 5-12 : Toll Rates for Monthly Pass @ Km 420.340

Year	CAR (local)	CAR (local2)	CAR (Reg.)	LCV (local)	LCV (Reg.)	Bus/ Truck (local)	Bus/ Truck (School Bus)	Bus/ Truck (Regular)	MAV
2019-20	150	300	1930	450	3380	750	1000	6755	10855
2020-21	150	300	2025	475	3545	790	1000	7095	11400
2021-22	150	300	2130	500	3725	830	1000	7450	11970
2022-23	150	300	2235	525	3910	870	1000	7820	12570
2023-24	150	300	2345	550	4105	915	1000	8210	13195

Table 5-13 : Toll Rates for Monthly Pass @ Km 356.200

Year	CAR (local)	CAR (local2)	CAR (Reg.)	LCV (local)	LCV (Reg.)	Bus/ Truck (local)	Bus/ Truck (School Bus)	Bus/ Truck (Regular)	MAV
2019-20	150	300	2120	450	3705	750	1000	7415	11915
2020-21	150	300	2225	475	3895	790	1000	7785	12510
2021-22	150	300	2335	500	4085	830	1000	8175	13140
2022-23	150	300	2450	525	4290	870	1000	8585	13795
2023-24	150	300	2575	550	4505	915	1000	9015	14485

Table 5-14 : Toll Rates for Monthly Pass @ Km 297.300

Year	CAR (local)	CAR (local2)	CAR (Reg.)	LCV (local)	LCV (Reg.)	Bus/ Truck (local)	Bus/ Truck (School Bus)	Bus/ Truck (Regular)	MAV
2019-20	150	300	1855	450	3250	750	1000	6495	10440
2020-21	150	300	1950	475	3410	790	1000	6820	10965
2021-22	150	300	2045	500	3580	830	1000	7165	11510
2022-23	150	300	2150	525	3760	870	1000	7520	12085
2023-24	150	300	2255	550	3950	915	1000	7895	12690

5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated in all three scenarios based on above rates and projected traffic. The estimates of toll revenue



under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza up to 2022-23 (2 years from the end of original Concession Period) starting from the year 2019-20 are shown in tables below.

Table 5-15 : Toll Revenue Optimistic Scenario (Rs. Crores)

Year	Toll Plaza Km 470.000	Toll Plaza Km 420.340	Toll Plaza Km 356.200	Toll Plaza Km 297.300	Total
2019-20	191.94	180.15	191.56	202.05	765.69
2020-21	215.68	202.93	215.90	226.86	861.38
2021-22	243.86	228.92	244.89	257.01	974.68
2022-23	274.98	257.93	276.98	290.63	1100.53

Table 5-16 : Toll Revenue Pessimistic Scenario (Rs. Crores)

Year	Toll Plaza Km 470.000	Toll Plaza Km 420.340	Toll Plaza Km 356.200	Toll Plaza Km 297.300	Total
2019-20	191.94	180.15	191.56	202.05	765.69
2020-21	213.67	201.07	213.90	224.75	853.39
2021-22	239.34	224.70	240.37	252.25	956.66
2022-23	267.38	250.83	269.35	282.61	1070.17

Table 5-17 : Toll Revenue Most Likely Scenario (Rs. Crores)

Year	Toll Plaza Km 470.000	Toll Plaza Km 420.340	Toll Plaza Km 356.200	Toll Plaza Km 297.300	Total
2019-20	191.94	180.15	191.56	202.05	765.69
2020-21	214.66	201.98	214.90	225.81	857.36
2021-22	241.60	226.79	242.62	254.62	965.63
2022-23	271.16	254.36	273.12	286.59	1085.23



CHAPTER 6

OPERATION & MAINTENANCE

6.1 Operation & Maintenance

The following are project parameters which would contribute towards cost of operation and maintenance.

Future cost of operation and maintenance is the estimate made on engineering judgment and experience basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Surat to Dahisar on NH-8 in state of Gujarat & Maharashtra.

- a) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll collections, toll plaza maintenance, other services mile medical help and rescue operations etc.
- b) **Periodic Maintenance** This will be done on periodic basis say. It usually consists of overlaying of wearing course, painting and marking. Some pavement strengthening is also anticipated in few sections. As project stretch is long periodic maintenance items have also been spread on annual basis from execution point of view. Since the project is commissioned and traffic is running for 2 years, periodic maintenance shall be as per condition of pavement and other infrastructure

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year 2019-20 is given in table below.



Table 6-1 : O&M COST

Year	Annual maintenance (Rs. Cr)	Thermoplastic painting (Rs. Cr)	Special Repair of pavement	Structure maintenance (Rs. Cr)	Electric System		Total Expenditure (Rs. Crores)	Remarks
					Annual	Annual		
2019-20	51.07	1.05	15.88	0.88	2.42	2.42	82.53	Regular O & M + Pavement Repair
2020-21	25.53	1.05	7.94	0.88	2.42	2.42	45.98	Regular O & M + Pavement Repair
2021-22	25.53	1.05		0.88	2.42	2.42	38.14	Regular O & M + Pavement Repair
2022-23	20.43	1.05		0.88	2.42	2.42	33.21	Regular O & M + Pavement Repair



CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Surat to Dahisar section of NH-8 in state of Gujarat from km 263.000 to km 502.000 is currently a six-lane road. The road is in sound condition and serves healthy traffic volumes. Project corridor is a part of the most busy and prominent national highway NH-8 which connects political and financial capitals of India. This is one of the most important trunk roads which spreads across many states. There are large number of townships, industrial corridors and other business establishment coming up along project corridor. As discussed, dominant portion of traffic is long route traffic, which is more sensitive towards the growth of national economy. As Indian economy is poised to grow at 6% - 7%+, the project corridor is expected to pick up the same trend in terms of traffic flow. All these developments have potential to give positive impact to traffic flow on project. The following can be considered as major outcomes of the study

- a) There is good amount of tollable traffic running on project
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in near future due to various development in area and overall development of economy
- c) Project corridor has committed traffic as long route traffic and does not run a risk of traffic leakage due to quality competing road

The project infrastructure is in good condition and its maintenance cost is also reasonable.

Based on above it can be considered a stable healthy project from traffic and revenue point of view.



CHAPTER 8

PROJECT ILLUSTRATIONS

8.1 General

Project current condition has been depicted in the following photographs



Figure 8-1 : General Condition of Project Road





Figure 8-2 : General Condition of Project Road



Figure 8-3 : General Condition of Project Road





GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



**TALEGAON TO AMRAVATI SECTION OF NH-6
(KM 100.000 To KM 166.725)
IN THE STATE OF MAHARASHTRA**



**TOLL REVENUE AND O&M COST
PROJECTION REPORT**



GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



October 2019

**TALEGAON TO AMRAVATI SECTION OF NH-6
(KM 100.000 TO KM 166.725)
IN THE STATE OF MAHARASHTRA**

**TOLL REVENUE AND O&M
COST PROJECTION REPORT**

October 2019



CONTENTS

Contents.....	1
Chapter 1.....	6
INTRODUCTION	6
1.1 Background.....	6
1.2 Objective of the Study.....	6
1.2.1 Scope of Services	6
Chapter 2.....	8
TRAFFIC SURVEYS AND ANALYSIS	8
2.1 Traffic Surveys	8
2.2 Classified Traffic Volume Count	10
2.3 Traffic Characteristic	11
2.3.1 Traffic Data	12
2.4 Data Analysis	12
2.4.1 Analysis of Traffic Volume Count	12
2.4.2 Components of Traffic.....	14
2.5 Secondary Data Collection	15
Chapter 3.....	16
GROWTH OF TRAFFIC ON PROJECT HIGHWAY	16
3.1 Introduction	16
3.2 Trend Analysis.....	16
3.3 Estimation of Traffic Demand Elasticity.....	17
3.4 Analysis of Historic Traffic Data	21
3.5 Other Factors Influencing Growth.....	22
3.6 Recommended Growth Rates of Traffic	23
Chapter 4.....	25
TRAFFIC FORECAST.....	25
4.1 Traffic Projections	25
4.2 Modification in Concession Period	29
Chapter 5.....	30
FORECAST OF TOLL REVENUE	30
5.1 General.....	30
5.2 Discount Categories	30
5.3 Estimation of Toll Rates	31
5.4 Toll Revenue	36
5.5 Toll Revenue at all toll plazas under Scenarios	36
Chapter 6.....	40



OPERATION & MAINTENANCE..... 40
6.1 Operation & Maintenance..... 40
Chapter 7..... 43
CONCLUSION & RECOMMENDATIONS..... 43
7.1 Conclusion & Recommendations..... 43
PROJECT ILLUSTRATIONS..... 44
8.1 General..... 44



LIST OF TABLES

Table 2-1 : Traffic Data Details.....	9
Table 2-2 : Vehicle Classification System.....	11
Table 2-3 : Traffic Data at Toll Plaza at Km 142.800	12
Table 2-4 : PCU Factors Adopted for Study	13
Table 2-5 : Traffic in PCU at Project Stretch.....	13
Table 2-6 : Journey Type Bifurcation of Traffic at KM 142.800	14
Table 3-1 : Per Capita Income Vs Car	18
Table 3-2 : Population Vs Bus.....	19
Table 3-3 : Goods Traffic Vs NSDP	20
Table 3-4 : Summary Regression Analysis.....	21
Table 3-5 : Recommended Growth Rates Optimistic	23
Table 3-6 : Recommended Growth Rates Pessimistic.....	24
Table 3-7 : Recommended Growth Rates Most Likely.....	24
Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.800 KM	26
Table 4-2 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.800 KM	27
Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.800 KM	28
Table 5-1 : Base Toll Rates 2007 - 08	31
Table 5-2 : Additional Rate for Amravati Bypass	32
Table 5-3 : Toll Rates for Single Journey @ KM 142.800	33
Table 5-4 : Toll Rates for Return Journey @ KM 142.800.....	34
Table 5-5 : Toll Rates for Monthly Pass @ KM 142.800.....	35
Table 5-6 : Toll Revenue Optimistic Scenario.....	37
Table 5-7 : Toll Revenue Pessimistic Scenario	38
Table 5-8 : Toll Revenue Most Likely Scenario	39
Table 6-1 : O&M Cost.....	41



LIST OF FIGURES

Figure 2-1 : Toll Plaza Location	10
Figure 3-1 : Regression and Elasticity PCI vs. Car – Extrapolation	18
Figure 3-2 : Regression and Elasticity Population vs. Bus – Extrapolation.....	19
Figure 3-3 : Regression and Elasticity NSDP vs. Goods Traffic – extrapolation	20
Figure 3-4 : Growth of GDP in India.....	22
Figure 5-1 : Historical Rate of WPI Inflation in India.....	31
Figure 8-1 : General Condition	44
Figure 8-2 : Toll Plaza.....	44
Figure 8-3 : General Condition	45
Figure 8-4 : General Condition	45



ABBREVIATIONS

AADT	- Annual Average Daily Traffic	NHAI	- National Highways Authority of India
BOT	- Build Operate Transfer	NHDP	- National Highways Development Project
CAGR	- Compound Annual Growth Rate	NSDP	- Net State Domestic Product
CTV	- Classified traffic volume	O&M	- Operation & Maintenance
DBFOT	- Design, Build, Finance, Operate & Transfer	PCDP	- Per Capita Domestic Product
EME	- Earth Moving Equipment	PCI	- Per Capita Income
GDP	- Gross Domestic Product	PCU	- Passenger Car Unit
GSDP	- Gross State Domestic Product	PSC	- Pre-stressed Concrete
HCM	- Heavy Construction Machinery	RCC	- Reinforced cement concrete
HCV	- Heavy Commercial Vehicle	RHS	- Right Hand Side
HTMS	- Highway Traffic Management System	SH	- State Highway
IRC	- Indian Road Congress	TP	- Toll Plaza
IRR	- Internal Rate of Return	WPI	- Wholesale Price Index
LCV	- Light Commercial Vehicle	SIR	- Special Investment Region
LHS	- Left Hand Side	c.	- Circa
LGV	- Light Goods Vehicle	ROB	- Railway Over Bridge
MAV	- Multi Axle Vehicle	MDR	- Major District Road
MORTH	- Ministry of Road Transport and Highways	ODR	- Other District Road
NH	- National Highway	CA	- Concession Agreement
PCC	- Plain Cement Concrete	RMT	- Running Meter
CR	- Coarse Rubble		



CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 km of existing 4-lane National Highways into 6-lane National Highway. Sections envisaged under 6-laning comprise the Golden Quadrilateral section (5,700 km) and some other sections which are 800 km in length.

The project under consideration, Talegaon - Amravati section of NH-6 from Km 100.000 to km 166.725 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s IRB Talegaon - Amravati Tollway Ltd.* (Concessionaire) has been awarded the Project for concession period of 22 years starting from 3rd September 2010 to 2nd September 2032. The Project has been commissioned and is currently in the operation / maintenance phase.

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged GMD Consultants to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as "*Toll Revenue and O&M Cost Projection Report*" mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections



The Concessionaire has provided basic historical traffic data and other project details on the basis of which the above analysis has been carried out, after applying our judgement on the traffic estimates.

“Toll Revenue and O&M Cost Projection Report” was submitted in March 2017. In this report traffic data of year 2015-16 was used as base traffic. The report was updated with traffic data of year 2016-17 and report was submitted in October 2017. Report was further updated with traffic data of 2017-18 and same was submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2018 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. Now as six-monthly traffic data from April 2019 to September 2019 is also available, this report is updated taking this latest traffic data into consideration..

Chapters on Project Details, Influence Zone Traffic Analysis have not been included in this update as there has been no significant event or change in the last 1 year which will have an impact on these chapters in our report dated April 2019.



CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

In the course of our work we have collected required information for project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project.

- Classified traffic volume counts at toll plaza locations on Amravati Talegaon section of NH-6 for base year 2015-16, 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

Project can be divided into three homogenous sections from traffic point of view.

These sections can be

- Talegaon to Tivasa
- Talegaon to Mozri
- Talegaon to Amravati

Table 2-1 below lists provides details of locations from where traffic details have been collected.



Table 2-1 : Traffic Data Details

SR. NO	LOCATION	CTV	Single Journey Traffic	Return Journey Traffic	Monthly Pass Traffic	Local Traffic
1	Km 142.800 Toll Plaza	AA DT for Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AA DT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AA DT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AA DT for Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19
		AA DT April 2019 to September 2019	For April 2019 to September 2019	For April 2019 to September 2019	For April 2019 to September 2019	For April 2019 to September 2019



The locations of each of the traffic survey are illustrated in following Figure

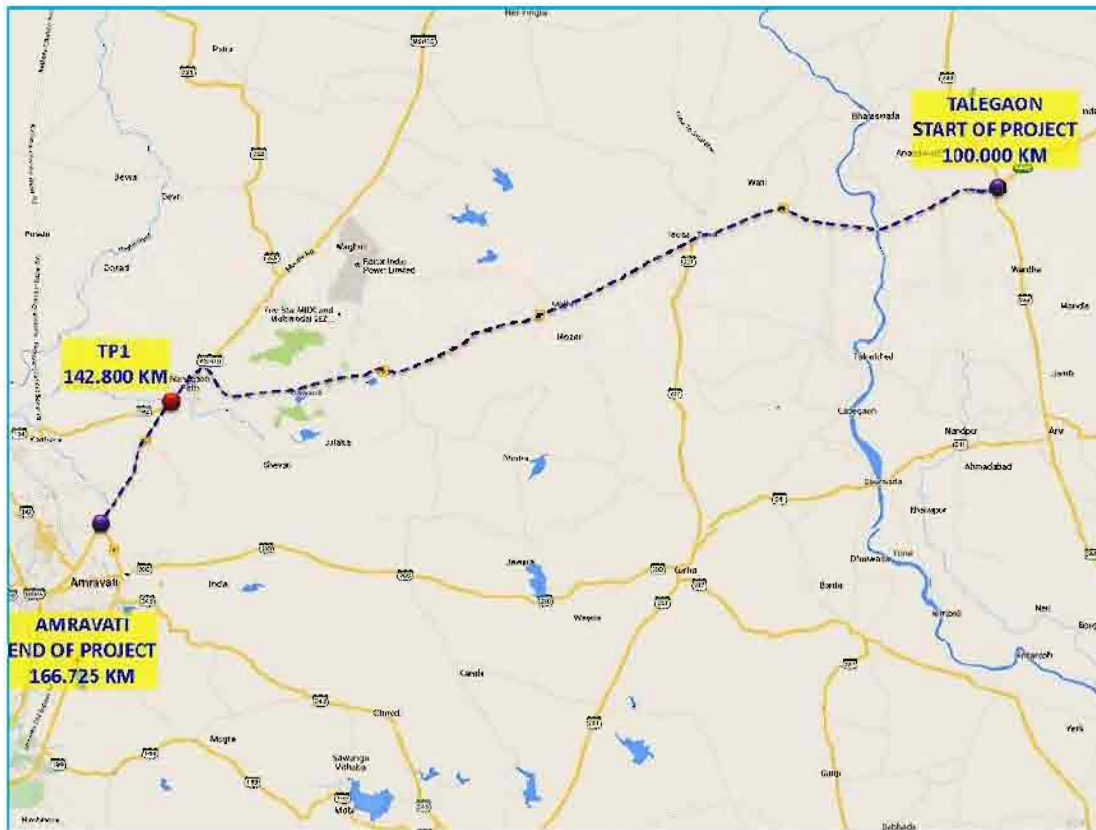


Figure 2-1 : Toll Plaza Location

2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume Count survey has been provided by concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI. These locations are indicated in **Figure 2-1** and listed in **Table 2-1**.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in **Table 2-2**.



Table 2-2 : Vehicle Classification System

Vehicle Type	
Auto Rickshaw	
Passenger Car	Car, Jeep, Taxi & Van (Old / new technology)
Bus	Mini Bus
	Standard Bus
Truck	Light Goods Vehicle (LCV)
	2 – Axle Truck
	3 Axle Truck (HCV)
	Multi Axle Truck (4-6 Axle)
	Oversized Vehicles (7 or more axles)
Other Vehicles	Agriculture Tractor, Tractor & Trailer

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected is corresponding to category of tollable vehicles. Following are the type of vehicles as per concession agreement.

- Car / Jeep / van
- Mini Bus /LCV
- Truck / Bus
- Multi Axle
- Oversize Vehicle



2.3 Traffic Characteristic

Toll revenue of the project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have significant potential to affect toll revenue. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, portion of monthly pass traffic are some such characteristics of traffic. These will be discussed in subsequent sections of this report

2.3.1 Traffic Data

The Concessionaire has provided Traffic data for base year 2015-16, 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019 as under for toll plaza -

Table 2-3 : Traffic Data at Toll Plaza at Km 142.800

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	Car	5105	5825	6275	6738	7981
2	Mini Bus/ LCV	1253	1374	1439	1511	1588
3	Truck/Bus	1238	1290	1362	1421	1704
4	Multi Axle	1742	1962	2233	2285	2325
5	Oversized Vehicles	2	1	4	2	2
	Total	9340	10452	11313	11957	13600

This year there have been extended high intensity rains on pan in India. States of Maharashtra, Gujarat, Rajasthan, Bihar, UP, MP, Karnataka, Himachal Pradesh have been quite affected due to heavy rains this year. This has negative impact on passenger and commercial traffic during first of half of this year. It is expected that traffic in second half of year from October to March shall be substantially higher this year. Taking this into account a seasonality factor is taken to arrive and AADT value of traffic from six monthly average volume of first half of year.

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of traffic forecast. The various vehicle types having different sizes and characteristics can be converted into



a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in *Table 2-4*.

Table 2-4 : PCU Factors Adopted for Study

Vehicle Type	PCUs
Car	1.0
Mini Bus	1.5
Standard Bus	3.0
LCV/LGV	1.5
2 Axle Truck	3.0
3 – 6 Axle Truck	4.5
MAV	4.5
Auto Rickshaw	1.0
Van/Tempo	1.0
Agriculture Tractor with Trailer	4.5
Agriculture Tractor without Trailer	1.5

Source: IRC: 64-1990

Traffic volume at each toll plaza was converted to PCU and same is presented as under

Table 2-5 : Traffic in PCU at Project Stretch

Period	Toll Plaza Location	Traffic No	PCU	PCU Index
FY 2015-16	142.800 (Nandgaon Peth)	9340	18547	1.99
FY 2016-17	142.800 (Nandgaon Peth)	10452	20590	1.97
FY 2017-18	142.800 (Nandgaon Peth)	11312	22582	2.00
FY 2018-19	142.800 (Nandgaon Peth)	11957	23558	1.97



April 2019 – September 2019	142.800 (Nandgaon Peth)	13600	25947	1.91
--------------------------------	----------------------------	-------	-------	------

It can be observed from above that project traffic has PCU index close to 2.0 which indicates balance mix of commercial, goods traffic and passenger traffic. It can be appreciated that character of traffic is consistent on stretch.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A Larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

For the purpose of analysis, the recent traffic numbers of for period April 2019 to September 2019 have been considered as the base numbers.

It is observed that car traffic forms 59% of total traffic at toll plaza location 142.800 where multi axle commercial vehicles comprise 17% of total traffic. Over all about 35-40% of traffic is commercial in nature.

Another important bifurcation of traffic is components of traffic with respect various type of toll ticketing like

1. Single Journey
2. Return Journey
3. Monthly Pass (Local and General)

Following table provides numbers of vehicle falling in each of above category.



Table 2-6 : Journey Type Bifurcation of Traffic at KM 142.800

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) FY 2018-19	Traffic Volume (Nos.) April 2019- Sept 2019
1	Single Journey	4160	4637	5160	5285	5647
2	Return Journey	2860	2988	3294	3514	4052
3	Monthly Pass	2320	2416	2859	3158	3901

A significant part of the traffic at KM 142.800 is single journey 41% followed by return journey 30% and monthly passes which share 29% of the total traffic volume.

2.5 Secondary Data Collection

There are several other factors which have substantial impact on traffic pattern and growth on any project corridor. Following are some of such important factors

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or Industrial projects
- Special Industry in project corridor
- Overall trends of economic growth local as well as national / regional

Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP
 - b) NSDP
 - c) Population Growth
 - d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data
3. Competing road network.

We have collected and utilized such underlying data in the study to estimate the growth and risk factors for traffic along the project corridor. The same was presented in Report of March-2017 and there is no significant update on this



CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the projections of other factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor Bharuch - Surat section of NH-8 has been done taking above factors in to consideration. “IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways” is established best practice and has been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Thus, we have considered the Elasticity model of growth projection which is one of the most widely acceptable methods for traffic forecast and is recommended in IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways.

In this method past trends of any vehicular data are paired with an economic indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicle traffic varies for different type of vehicle. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most important and direct parameters are given as under



- Per Capita Income
- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP

Time series data of vehicle (both passenger and goods) Registered in state of Maharashtra is used as the base data for analysis of growth.

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given category of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth. Latest available data for vehicle registration, per capita income, NSDP and population is used in analysis.

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log}(P) = k \times \text{Log}(EI) + A$$

Where,

- P = Number of Vehicles (Mode wise)
- EI = Economic Indicator
- A = Regression constant
- k = Elasticity coefficient (Regression coefficient)

The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).



Following tables and graphs depict regression and elasticity of growth model.

Table 3-1 : Per Capita Income Vs Car

Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2005	36077	1479877	4.56	6.17		
2006	40671	1648379	4.61	6.22	13%	
2007	45582	1822458	4.66	6.26	12%	
2008	50138	1979191	4.70	6.30	10%	
2009	50183	2182969	4.70	6.34	0%	
2010	54246	2440404	4.73	6.39	8%	
2011	59587	2750167	4.78	6.44	10%	
2012	61468	3162000	4.79	6.50	3%	
2013	64218	3439300	4.81	6.54	4%	7.6%

Regression analysis of same is given in figure below

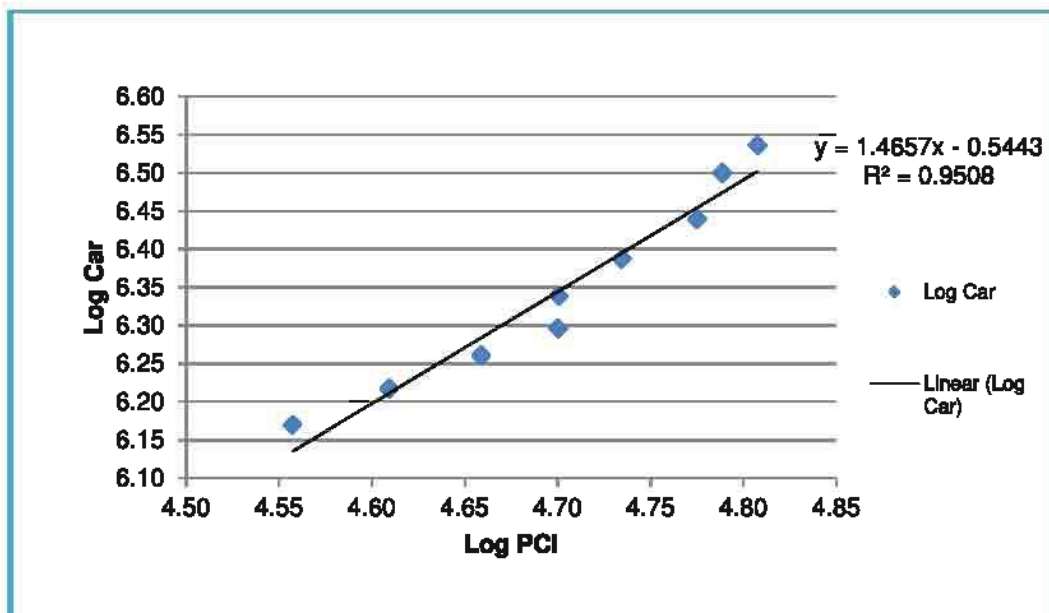


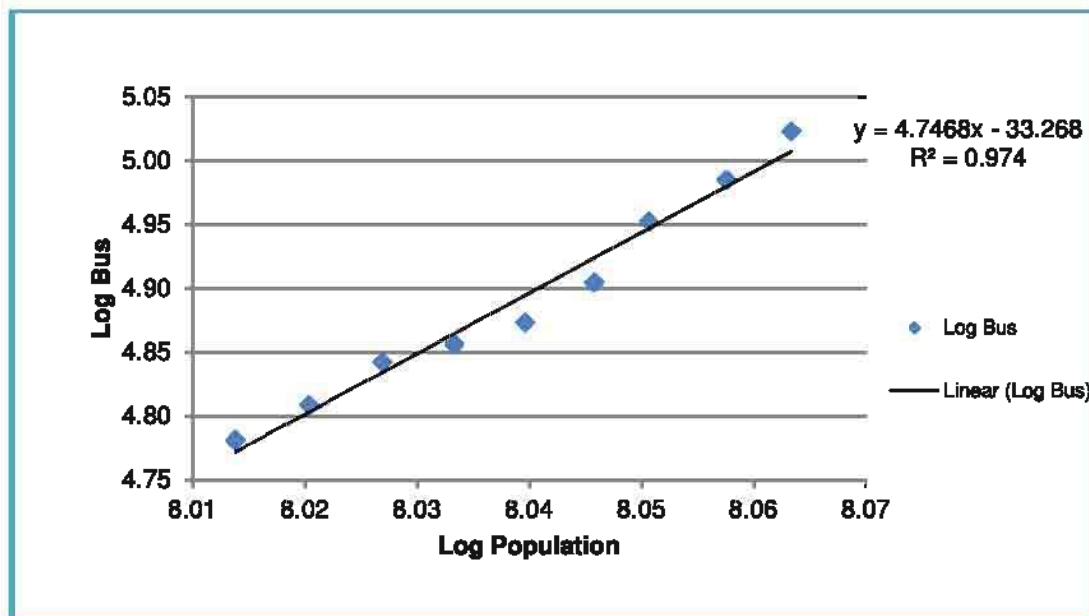
Figure 3-1 : Regression and Elasticity PCI vs. Car – Extrapolation



Table 3-2 : Population Vs Bus

Year	Population	Buses	Log Pop	Log Bus	Pop Growth	Average Growth
2005	103218000	60426	8.01	4.78		
2006	104804000	64357	8.02	4.81	2%	
2007	106386000	69589	8.03	4.84	2%	
2008	107972000	71813	8.03	4.86	1%	
2009	109553000	74712	8.04	4.87	1%	
2010	111118000	80290	8.05	4.90	1%	
2011	112374333	89540	8.05	4.95	1%	
2012	114184000	96600	8.06	4.98	2%	
2013	115697000	105400	8.06	5.02	1%	1.44%

Regression analysis of same is given in figure below

**Figure 3-2 : Regression and Elasticity Population vs. Bus – Extrapolation**

Elasticity of goods traffic has been worked out by regression analysis with NSDP. Following table represents the data and details.



Table 3-3 : Goods Traffic Vs NSDP

Year	NSDP	Trucks	Log NSDP	Log Truck	NSDP Growth	Average Growth
2005	42363200	621971	7.63	5.79		
2006	48198300	700356	7.68	5.85	14%	
2007	53808100	780992	7.73	5.89	12%	
2008	54653300	845617	7.74	5.93	2%	
2009	59933800	896397	7.78	5.95	10%	
2010	66762500	973788	7.82	5.99	11%	
2011	69590400	1067825	7.84	6.03	4%	
2012	74913700	1140900	7.87	6.06	8%	
2013	80559300	1249600	7.91	6.10	8%	7.01%

Following figure depict regression analysis and extrapolation.

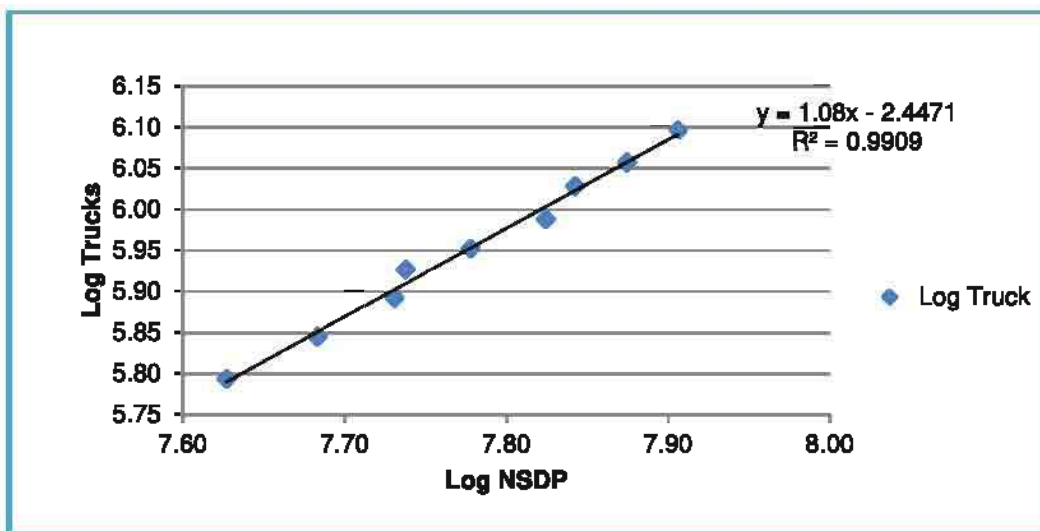


Figure 3-3 : Regression and Elasticity NSDP vs. Goods Traffic – extrapolation

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth. R^2 is statistical measure of how close the data



are to the fitted regression line. It varies from 0 to 1. Higher the value of R^2 more representative is the regression model of data.

The results of these analyses for the good fit as reflected by R^2 values are presented in the Table below

Table 3-4 : Summary Regression Analysis

State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth	Growth Elastic Model
Maharashtra	Car/Jeep	PCI	$y = 1.4657x - 0.5443$	$R^2 = 0.9508$	1.4657	7.56%	11.08%
	Bus	Population	$y = 4.7468x - 33.2683$	$R^2 = 0.974$	4.7468	1.44%	6.82%
	Truck	NSDP	$y = 1.08x - 2.4471$	$R^2 = 0.9909$	1.0800	7.01%	7.57%

While the economic model for predicting growth is a good tool, other local, regional, national factors such as proposed developments etc. should also be considered before finalizing growth factors. These factors are discussed in subsequent sections.

3.4 Analysis of Historic Traffic Data

Historic traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Talegaon to Amravati has recently been commissioned and tolling commenced in 2013. Stable traffic data from year 2015-16 is only available for stretch which is not enough to establish any growth pattern for future. Following table present details of historic traffic on project road.

Vehicle Type	2015-16	2016-17	2017-2018	2018-2019	April 2019- Sept 2019
Car	5105	5825	6275	6738	7981
LCV/Mini Bus	1253	1374	1439	1511	1588
BUS/Truck	1238	1290	1362	1421	1704
Mav	1742	1962	2233	2285	2325
OSV	2	1	4	2	2
Total	9340	10452	11313	11957	13600



It can be observed from above that passenger traffic has grown in range of 8-10% from 2015-16 to 2018-19. While as growth of multi axle commercial traffic is about 10%. The data indicates strong growth of traffic on project corridor but being for small period it is not taken into account for projecting future growth.

3.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

ECONOMY

After witnessing a slowdown during 2008-09, the economy recovered in 2009-10, and a very high growth rate of GDP was recorded in 2010. Following figure depicts growth of GDP in India during the period.

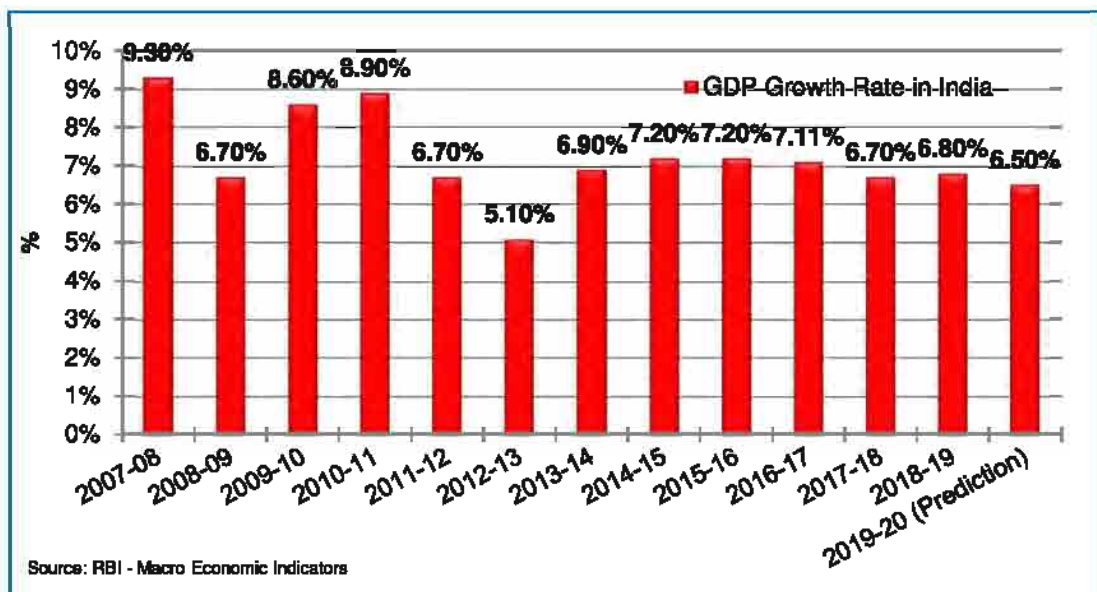


Figure 3-4 : Growth of GDP in India

After recording an all impressive growth of 8.9% in 2011, GDP declined between FY11 and FY14. GDP growth in 2014-15, 2015-16 and 2016-17 was pegged around 7.2%. FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Institutions like World Bank and ADB have predicted growth of GDP in Indian Economy in range of 6.5% in coming year.

Honorable Prime Minister and Government has set up a target for Indian Economy to become 5 Trillion USD economy. This would require a continuous robust growth for



next 5 year. Government plans several initiatives to boost economy to achieve this target. In such case it is expected that project corridor will also witness good growth of traffic on project corridor.

3.6 Recommended Growth Rates of Traffic

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under. Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as trend of technological advances in logistic industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is established practice to stepdown future growth rates at interval of 5 years.

Temporary disruptions caused by implementation of Goods and Service Tax (GST) and demonetization have dissipated, and growth of economy has significantly improved since then. Hence corridor can expect to have expected growth.

Growth rates are recommended for three scenarios for sensitivity analysis namely **Optimistic**, **Pessimistic** and **Most Likely** with a positive and negative variation 0.5% from Most Likely case.

Table 3-5 : Recommended Growth Rates Optimistic

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045
CAR	7.5%	7.0%	6.5%	6.0%	5.5%
Mini Bus /LCV	6.5%	6.0%	5.5%	5.0%	4.5%
Truck / Bus	7.0%	6.5%	6.0%	5.5%	5.0%
Multi Axle	8.0%	7.5%	7.0%	6.5%	6.0%
Oversized Vehicles	8.0%	7.5%	7.0%	6.5%	6.0%



Table 3-6 : Recommended Growth Rates Pessimistic

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045
CAR	6.5%	6.0%	5.5%	5.0%	4.5%
Mini Bus /LCV	5.5%	5.0%	4.5%	4.0%	3.5%
Truck / Bus	6.0%	5.5%	5.0%	4.5%	4.0%
Multi Axle	7.0%	6.5%	6.0%	5.5%	5.0%
Oversized Vehicles	7.0%	6.5%	6.0%	5.5%	5.0%

Table 3-7 : Recommended Growth Rates Most Likely

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045
CAR	7.0%	6.5%	6.0%	5.5%	5.0%
Mini Bus /LCV	6.0%	5.5%	5.0%	4.5%	4.0%
Truck / Bus	6.5%	6.0%	5.5%	5.0%	4.5%
Multi Axle	7.5%	7.0%	6.5%	6.0%	5.5%
Oversized Vehicles	7.5%	7.0%	6.5%	6.0%	5.5%



CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in previous section of report are used to arrive at traffic projections for future years. Toll plaza wise futuristic traffic projection is given in tables below.

These projections have been done for following three cases of growth

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario



**Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.800 KM
(Optimistic Growth Scenario)**

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	7981	1588	1704	2325	2	13600	25947
2020-21	8598	1692	1826	2512	2	14630	27927
2021-22	9262	1803	1956	2713	2	15736	30052
2022-23	9978	1920	2095	2930	2	16925	32337
2023-24	10749	2045	2244	3164	2	18204	34796
2024-25	11579	2178	2403	3417	2	19579	37441
2025-26	12415	2309	2561	3673	2	20960	40099
2026-27	13311	2447	2731	3949	2	22440	42954
2027-28	14272	2593	2912	4245	2	24024	46009
2028-29	15303	2748	3105	4563	2	25721	49283
2029-30	16408	2912	3309	4905	2	27536	52785
2030-31	17512	3071	3511	5248	2	29344	56277
2031-32	18690	3239	3725	5615	2	31271	60000
2032-33	19947	3417	3952	6009	2	33327	63978
2033-34	21289	3606	4194	6430	2	35521	68224
2034-35	22721	3804	4450	6880	2	37857	72746
2035-36	24136	3995	4700	7327	2	40160	77209
2036-37	25639	4195	4964	7803	2	42603	81946



**Table 4-2 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.800 KM
(Pessimistic Growth Scenario)**

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	7981	1588	1704	2325	2	13600	25947
2020-21	8517	1676	1808	2488	2	14491	27660
2021-22	9089	1768	1918	2663	2	15440	29488
2022-23	9700	1865	2035	2850	2	16452	31437
2023-24	10351	1967	2159	3050	2	17529	33513
2024-25	11046	2076	2290	3264	2	18678	35727
2025-26	11732	2180	2419	3476	2	19809	37910
2026-27	12462	2290	2555	3702	2	21011	40230
2027-28	13238	2405	2698	3943	2	22286	42692
2028-29	14062	2526	2848	4199	2	23637	45300
2029-30	14937	2652	3007	4472	2	25070	48069
2030-31	15792	2772	3160	4740	2	26466	50769
2031-32	16696	2896	3321	5024	2	27939	53620
2032-33	17652	3027	3491	5325	2	29497	56637
2033-34	18662	3163	3670	5644	2	31141	59824
2034-35	19730	3305	3858	5983	2	32878	63194
2035-36	20762	3438	4036	6312	2	34550	66440
2036-37	21847	3575	4223	6658	2	36305	69849



**Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 142.800 KM
(Most Likely Growth Scenario)**

Year	CAR	Minibus /LCV	Truck/ Bus	Multi axle	Oversized Vehicles	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	7981	1588	1704	2325	2	13600	25947
2020-21	8558	1683	1816	2500	2	14559	27790
2021-22	9176	1785	1935	2688	2	15586	29764
2022-23	9838	1893	2063	2890	2	16686	31881
2023-24	10550	2007	2198	3107	2	17864	34145
2024-25	11312	2128	2343	3340	2	19125	36572
2025-26	12073	2245	2486	3573	2	20379	38986
2026-27	12885	2369	2638	3823	2	21717	41565
2027-28	13751	2500	2799	4090	2	23142	44312
2028-29	14675	2637	2970	4376	2	24660	47242
2029-30	15662	2782	3152	4682	2	26280	50369
2030-31	16637	2921	3329	4986	2	27875	53452
2031-32	17673	3067	3516	5309	2	29567	56721
2032-33	18773	3220	3713	5654	2	31362	60194
2033-34	19943	3381	3921	6021	2	33268	63881
2034-35	21186	3550	4141	6413	2	35292	67802
2035-36	22400	3709	4352	6798	2	37261	71620
2036-37	23684	3876	4575	7206	2	39343	75659



4.2 Modification in Concession Period

As per Article 29 of the concession agreement, if actual traffic on the project falls short or exceeds Target Traffic on project highway on defined date, concession period shall be modified subject to calculation stipulated therein. For Talegaon - Amravati project, the Target Date and Target Traffic are defined as under:

Target Date - 1st April 2020

Target Traffic - 41052 in PCU

It was observed that as per traffic projections, traffic volume falls short of target traffic in all scenarios. This warrants for an extension of the envisaged concession period. Based on the above traffic estimate probable extension of concession period is worked out as per article 29 of concession agreement which is summarized as under –

Scenario	Projected Traffic in PCUs (average of traffic on target date, one year before target date and one year after target date)	Expected extension in Concession Period
Optimistic	27975	4.4 years
Pessimistic	27698	4.4 years
Most Likely	27833	4.4 years

Due to the suspension in toll in the year FY17 because of demonetization for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days

Hence, traffic and toll revenue projections have been worked out for additional 5 years beyond original concession period.



CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

As per the Toll Notification (Schedule R) the following discounts have been considered:

1. **Monthly Pass:** For frequent users, monthly pass is issued for 50 trips per month. The discount factor works out to 33.33% for 50 journeys.
2. **Daily Pass (for Return Trip):** A 75% discount will be offered on the return trip.
3. **Single Journey:** Full single journey toll would be charged to this category of vehicles who are infrequent travelers or whose frequency does not yield any discount from the above categories.
4. **Local Car / Jeep / Van to be charged at Rs 150 per month (2007)**
5. **Additionally, Concessionaire has introduced monthly rates for local commercial vehicles also.**

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule R) as given under

The formula for determining the applicable rate of fee shall be as follows:-

$$\text{Applicable rate of fee} = \text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI A} - \text{WPI B}}{\text{WPI B}} \right\} \times 0.4$$

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site

(www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.

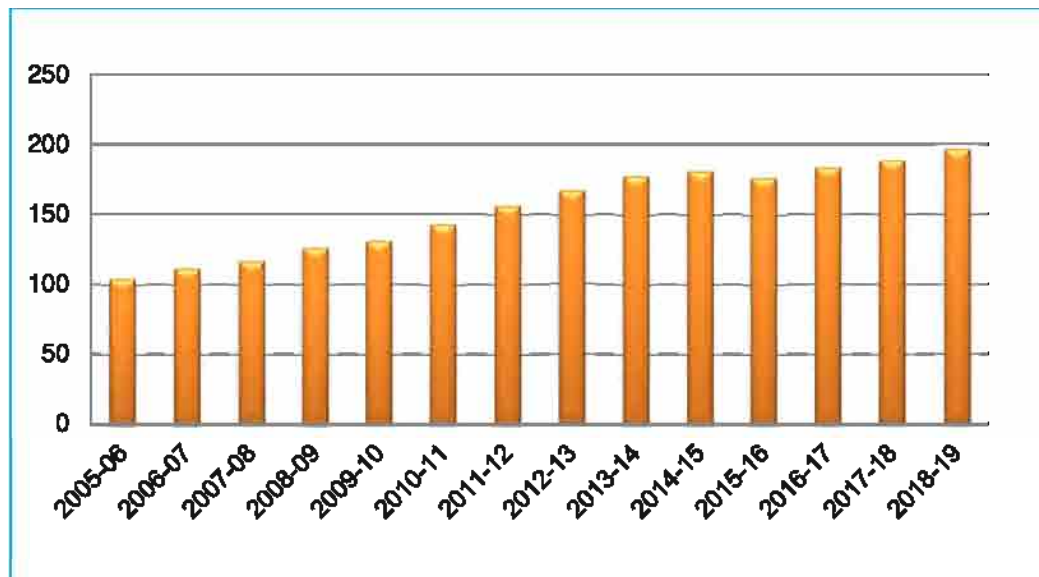


Figure 5-1 : Historical Rate of WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2019 is 5%. Same is considered for projection of WPI in future years.

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules, 2008.

Table 5-1 : Base Toll Rates 2007 - 08

Type of Vehicle	Base Rate of Fee / Km (in Rs.)
Car, Jeep, Van or Light Motor Vehicle	0.65
Light Commercial Vehicle, Light Goods Vehicle or Mini Bus	1.05
Bus or Truck (2 Axle)	2.2
Three Axle commercial vehicles	2.4
Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4-6 axles)	3.45

Oversized Vehicle (seven or more axles)	4.2
---	-----

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2018-19.

Amravati bypass qualifies for adding to toll rate since its cost is more than 10 Cr. There is not structure in project which qualifies for addition in toll rates.

Table 5-2 : Additional Rate for Amravati Bypass

Total Cost of Bypass	95.09 Cr	Length	17.43 km
Type of Vehicle	Base Rate for 15 Cr	Addition for every 5 Cr over 15 Cr	Rate 2007-8
Car/Jeep/Van	5.00	1.00	22
LCV	7.50	1.50	33
Bus	15.00	3.00	66
2-axle	15.00	3.00	66
3 - Axle	22.00	4.50	98.5
Multi Axle	30.00	6.00	132

Above table provides for rates applicable for accounting for bypass in toll rates. This has been incorporated in toll rates at Toll Plaza at Km 142.800 at Nandgaon Peth.

Other than this there is no structure or bypass which qualifies for additional toll rate at any toll plaza.

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below.

Thus, worked out rates for various categories of vehicle and discounts are given as under.



Table 5-3 : Toll Rates for Single Journey @ KM 142.800

Year	CAR	LCV	Truck / Bus	Multi Axle	Oversized Vehicles
2019-20	95	150	310	475	600
2020-21	100	160	325	500	630
2021-22	105	165	340	525	665
2022-23	110	175	360	550	695
2023-24	115	185	375	580	730
2024-25	120	190	395	610	770
2025-26	130	200	415	640	805
2026-27	135	210	435	670	850
2027-28	140	225	460	705	890
2028-29	150	235	480	740	935
2029-30	155	245	505	780	985
2030-31	165	260	530	820	1035
2031-32	175	270	560	860	1090
2032-33	185	285	590	905	1145
2033-34	190	300	620	955	1205
2034-35	200	315	650	1005	1270
2035-36	215	335	685	1055	1335
2036-37	225	350	725	1115	1405

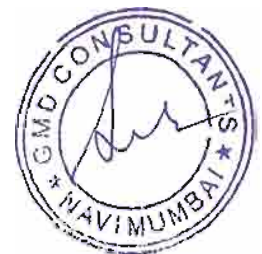


Table 5-4 : Toll Rates for Return Journey @ KM 142.800

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV	Oversized Vehicles
2019-20	145	225	465	715	905
2020-21	150	235	490	750	950
2021-22	160	250	510	790	995
2022-23	165	260	535	825	1045
2023-24	175	275	565	870	1095
2024-25	185	290	595	910	1150
2025-26	195	305	625	960	1210
2026-27	205	320	655	1005	1270
2027-28	215	335	685	1060	1335
2028-29	225	350	725	1110	1405
2029-30	235	370	760	1170	1475
2030-31	245	390	800	1230	1550
2031-32	260	410	840	1295	1635
2032-33	275	430	885	1360	1715
2033-34	290	450	930	1430	1805
2034-35	305	475	980	1505	1900
2035-36	320	500	1030	1585	2000
2036-37	335	525	1085	1670	2110



Table 5-5 : Toll Rates for Monthly Pass @ KM 142.800

Year	Car - LP	LCV - LC	Truck/Bus - LC	Car	Mini Bus /LCV	Truck/Bus	Multi Axle	Oversized Vehicle
2019-20	265	1650	3100	3200	5015	10320	15890	20060
2020-21	280	1735	3255	3355	5265	10835	16680	21055
2021-22	295	1820	3420	3525	5525	11375	17510	22105
2022-23	310	1910	3590	3700	5805	11945	18385	23210
2023-24	325	2005	3770	3885	6095	12540	19305	24375
2024-25	340	2105	3960	4080	6400	13170	20280	25600
2025-26	355	2210	4160	4285	6725	13835	21300	26890
2026-27	375	2320	4370	4505	7065	14535	22380	28250
2027-28	395	2435	4590	4730	7420	15275	23520	29690
2028-29	415	2555	4820	4975	7800	16055	24720	31205
2029-30	435	2685	5060	5230	8200	16880	25985	32805
2030-31	460	2820	5315	5500	8625	17750	27325	34495
2031-32	480	2960	5580	5785	9070	18670	28740	36280
2032-33	505	3110	5860	6085	9540	19640	30235	38165
2033-34	535	3265	6155	6400	10040	20665	31810	40155
2034-35	560	3430	6465	6735	10565	21745	33480	42260
2035-36	590	3600	6790	7090	11120	22890	35240	44485
2036-37	620	3780	7130	7465	11710	24100	37105	46840

* LP- Local Passenger, LC – Local Commercial



5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza up to 2036-37 (End of Concession Period+ 5 Years) starting from the year 2019-20 are shown in tables below.



Table 5-6 : Toll Revenue Optimistic Scenario**(Rs. Crores)**

Year	Toll at Plaza 142.800	Total
2019-20	77.22	77.22
2020-21	87.07	87.07
2021-22	98.34	98.34
2022-23	110.84	110.84
2023-24	125.89	125.89
2024-25	141.87	141.87
2025-26	160.02	160.02
2026-27	179.44	179.44
2027-28	202.58	202.58
2028-29	227.38	227.38
2029-30	255.71	255.71
2030-31	286.83	286.83
2031-32	322.34	322.34
2032-33	360.99	360.99
2033-34	404.54	404.54
2034-35	453.66	453.66
2035-36	508.43	508.43
2036-37	567.11	567.11



**Table 5-7 : Toll Revenue Pessimistic Scenario
(Rs. Crores)**

Year	Toll at Plaza 142.800	Total
2019-20	77.22	77.22
2020-21	86.24	86.24
2021-22	96.51	96.51
2022-23	107.78	107.78
2023-24	121.29	121.29
2024-25	135.40	135.40
2025-26	151.26	151.26
2026-27	168.05	168.05
2027-28	187.92	187.92
2028-29	208.96	208.96
2029-30	232.82	232.82
2030-31	258.68	258.68
2031-32	288.01	288.01
2032-33	319.53	319.53
2033-34	354.74	354.74
2034-35	394.12	394.12
2035-36	437.53	437.53
2036-37	483.43	483.43



**Table 5-8 : Toll Revenue Most Likely Scenario
(Rs. Crores)**

Year	Toll at Plaza 142.800	Total
2019-20	77.22	77.22
2020-21	86.66	86.66
2021-22	97.41	97.41
2022-23	109.31	109.31
2023-24	123.55	123.55
2024-25	138.59	138.59
2025-26	155.59	155.59
2026-27	173.64	173.64
2027-28	195.06	195.06
2028-29	217.90	217.90
2029-30	243.95	243.95
2030-31	272.33	272.33
2031-32	304.65	304.65
2032-33	339.59	339.59
2033-34	378.76	378.76
2034-35	422.77	422.77
2035-36	471.54	471.54
2036-37	523.54	523.54



CHAPTER 6

OPERATION & MAINTENANCE

6.1 Operation & Maintenance

Operation and maintenance cost of project depends number of factors like quality of construction, response of maintenance team to early damage, local climate (rain etc.).

Future cost of operation and maintenance is estimate on guess basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Talagaon to Amravati on NH-6 in state of Maharashtra.

- a) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- b) **Periodic Maintenance** – This will be done on periodic basis say every 5 years. It will consist of overlaying of wearing course and painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost are spread over three years.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year FY 2019-20 is given in table below.



Table 6-1 : O&M Cost

Year	Annual maintenance (Rs. Cr)	Thermoplastic painting (Rs. Cr)	Renewal Coat with BC (Rs. Cr.)	Special Repair of pavement	Structure maintenance (Rs. Cr)	Electric System		Total Expenditure (Rs. Crores)	Remarks
						Annual	Periodic		
2019-20	12.45			4.58	0.02	0.59		18.52	Pavement repair
2020-21	12.45				0.02	0.59		14.39	Regular O & M
2021-22	12.45	1.47	15.76	3.82	0.02	0.59	0.00	39.47	Renewal of Wearing course + Pavement repair
2022-23	12.45	1.47	15.76	3.82	0.02	0.59	0.00	41.45	Renewal of Wearing course + Pavement repair
2023-24	12.45				0.02	0.59		16.66	Regular O & M
2024-25	12.45				0.02	0.59		17.49	Regular O & M
2025-26	12.45				0.02	0.59		18.37	Regular O & M
2026-27	12.45				0.02	0.59		19.29	Regular O & M
2027-28	12.45	1.47	16.36	4.58	0.02	0.59		55.01	Renewal of Wearing course + Pavement repair
2028-29	12.45	1.47	16.36	7.64	0.02	0.59		62.74	Renewal of Wearing course + Pavement repair



Year	Annual maintenance (Rs. Cr)	Thermoplastic painting (Rs. Cr)	Renewal Coat with BC (Rs. Cr.)	Special Repair of pavement	Structure maintenance (Rs. Cr)	Electric System	Total Expenditure (Rs. Crores)	Remarks
2029-30	12.45			2.29	0.02	0.59	26.25	Regular O & M
2030-31	12.45			2.29	0.02	0.59	27.56	Regular O & M
2031-32	12.45			2.29	0.02	0.59	28.94	Regular O & M
2032-33	12.45			2.29	0.02	0.59	30.38	Regular O & M
2033-34	12.45	1.47	16.36	9.16	0.02	0.59	83.25	Renewal of Wearing course + Pavement repair
2034-35	12.45	1.47	16.36	12.22	0.02	0.59	94.08	Renewal of Wearing course + Pavement repair
2035-36	12.45			2.29	0.02	0.59	35.17	Regular O & M
2036-37	12.45			2.29	0.02	0.59	36.93	Regular O & M



TOLL REVENUE AND O&M COST PROJECTION REPORT

Four - Lining of Talegaon - Amravati Section of NH-6 from Km.100.000 to Km.166.725

CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Talegaon to Amravati section of NH-6 in state of Maharashtra from km 100.000 to km 166.725 is currently a four-lane road. The road is in sound condition and serves to stable traffic volumes. Project corridor is part of major east west connectivity national highway NH-6. There are many upcoming projects in area which will boost economic growth of area and add value to development of region. All these developments have potential to give positive impact to traffic flow on project. Following can considered as major outcome of study

- a) There is good amount of tollable traffic running on project
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in the near future, further moderated by 1-2% in the longer term due to various development in area and overall development of economy
- c) Project corridor does not have risk of traffic leakage due to lack of competing roads of comparable quality

The project infrastructure is in good condition and its maintenance cost is also reasonable.

Based on above it can be considered a stable healthy project from traffic and revenue point of view.



PROJECT ILLUSTRATIONS

8.1 General

Project current condition has been depicted in the following photographs.



Figure 0-1 : General Condition



Figure 0-2 : Toll Plaza





Figure 0-3 : General Condition



Figure 0-4 : General Condition





GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



TUMKUR TO CHITRADURGA (KM 75.000 TO KM 189.000)

SECTION OF NH-4 IN THE STATE OF KARNATAKA



TOLL REVENUE AND O&M COST PROJECTION REPORT



October 2019



GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



TUMKUR TO CHITRADURGA (KM 75.000 TO KM 189.000)
SECTION OF NH-4 IN THE STATE OF KARNATAKA

**TOLL REVENUE AND O&M
COST PROJECTION REPORT**

October 2019



CONTENTS

Chapter 1.....	6
INTRODUCTION.....	6
1.1 Background.....	6
1.2 Objective of the Study.....	6
1.2.1 Scope of Services	6
Chapter 2.....	8
TRAFFIC SURVEYS AND ANALYSIS.....	8
2.1 Traffic Surveys.....	8
2.2 Classified Traffic Volume Count	10
2.3 Traffic Characteristic	11
2.3.1 Traffic Data	12
2.4 Data Analysis.....	13
2.4.1 Analysis of Traffic Volume Count	13
2.4.2 Components of Traffic.....	14
2.5 Secondary Data Collection	16
Chapter 3.....	17
GROWTH OF TRAFFIC ON PROJECT HIGHWAY.....	17
3.1 Introduction.....	17
3.2 Trend Analysis.....	17
3.3 Estimation of Traffic Demand Elasticity.....	18
3.4 Analysis of Historic Traffic Data	22
3.5 Other Factors Influencing Growth.....	24
3.6 Recommended Growth Rates of Traffic	25
Chapter 4.....	27
TRAFFIC FORECAST.....	27
4.1 Traffic Projections	27
4.2 Modification of Concession Period	33
Chapter 5.....	35
FORECAST OF TOLL REVENUE.....	35
5.1 General.....	35
5.2 Discount Categories	35
5.3 Estimation of Toll Rates	37
5.4 Toll Revenue.....	44
5.5 Toll Revenue at all toll plazas under Scenarios	44
Chapter 6.....	47

OPERATION & MAINTENANCE	47
6.1 Operation & Maintenance	47
Chapter 7	50
CONCLUSION & RECOMMENDATIONS	50
7.1 Conclusion & Recommendations	50
Chapter 8	51
PROJECT ILLUSTRATIONS	51
8.1 General	51



LIST OF TABLES

Table 2-1 : Traffic Survey Locations.....	9
Table 2-2 : Vehicle Classification System.....	11
Table 2-3 : Traffic Data at Toll Plaza at Km 172.770	12
Table 2-4 : Traffic Data at Toll Plaza at Km 104.530	12
Table 2-5 : PCU Factors Adopted for Study	13
Table 2-6 : Traffic in PCU at both sections	14
Table 2-7 : Journey Type Bifurcation of Traffic at KM 172.770	15
Table 2-8 : Journey Type Bifurcation of Traffic at KM 104.530	15
Table 3-1 : Per Capita Income Vs Car	19
Table 3-2 : Population Vs Bus.....	20
Table 3-3 : Goods Traffic Vs NSDP	21
Table 3-4 : Summary Regression Analysis.....	22
Table 3-5 : Historical Traffic Volume at Sira	23
Table 3-6 : Historical Traffic Volume at Chitradurga.....	23
Table 3-7 : Recommended Growth Rates in an Optimistic Scenario	25
Table 3-8 : Recommended Growth Rates in a Pessimistic Scenario.....	26
Table 3-9 : Recommended Growth Rates in a Most Likely Scenario.....	26
Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 172.770 KM	28
Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 104.530 KM	29
Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 172.770 KM	30
Table 4-4 : Total Tollable Traffic @ Toll Plaza 2- Chainage 104.530 KM	31
Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 172.770 KM	32
Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 104.530 KM	33
Table 5-1 : Special Local Monthly Rate.....	36
Table 5-2 : Special Local Single Journey Rate	36
Table 5-3 : Base Toll Rates 2007 - 08	37
Table 5-4 : Tollable Length PKG-I.....	38
Table 5-5 : Toll Rates for Single Journey @ 172.770.....	39
Table 5-6 : Toll Rates for Return Journey @ 172.770	40
Table 5-7 : Toll Rates for Local Single Journey@ 172.770	41
Table 5-8 : Toll Rates for Monthly Pass @ 172.770	42
Table 5-9 : Toll Revenue Optimistic Scenario.....	44
Table 5-10 : Toll Revenue Pessimistic Scenario	45
Table 5-11 : Toll Revenue Most Likely Scenario	46
Table 6-1 : O&M COST.....	48



LIST OF FIGURES

<i>Figure 2-1 : Traffic Survey Locations</i>	10
<i>Figure 3-1 : Regression and Elasticity PCI vs. Car – Extrapolation</i>	19
<i>Figure 3-2 : Regression and Elasticity Population vs. Bus – Extrapolation</i>	20
<i>Figure 3-3 : Regression and Elasticity NSDP vs. Goods Traffic – extrapolation</i>	21
<i>Figure 3-6 : Growth of GDP in India</i>	24
<i>Figure 5-1 : Historical Rate of WPI Inflation in India</i>	37
<i>Figure 8-1 : General Condition of project road</i>	51
<i>Figure 8-2 : General Condition of project road</i>	51



ABBREVIATIONS

AADT	- Annual Average Daily Traffic	NHAI	- National Highways Authority of India
BOT	- Build Operate Transfer	NHDP	- National Highways Development Project
CAGR	- Compound Annual Growth Rate	NSDP	- Net State Domestic Product
CTV	- Classified traffic volume	O&M	- Operation & Maintenance
DBFOT	- Design, Build, Finance, Operate & Transfer	PCDP	- Per Capita Domestic Product
EME	- Earth Moving Equipment	PCI	- Per Capita Income
GDP	- Gross Domestic Product	PCU	- Passenger Car Unit
GSDP	- Gross State Domestic Product	PSC	- Pre-stressed Concrete
HCM	- Heavy Construction Machinery	RCC	- Reinforced cement concrete
HCV	- Heavy Commercial Vehicle	RHS	- Right Hand Side
HTMS	- Highway Traffic Management System	SH	- State Highway
IRC	- Indian Road Congress	TP	- Toll Plaza
IRR	- Internal Rate of Return	WPI	- Wholesale Price Index
LCV	- Light Commercial Vehicle	SIR	- Special Investment Region
LHS	- Left Hand Side	c.	- Circa
LGV	- Light Goods Vehicle	ROB	- Railway Over Bridge
MAV	- Multi Axle Vehicle	MDR	- Major District Road
MORTH	- Ministry of Road Transport and Highways	ODR	- Other District Road
NH	- National Highway	CA	- Concession Agreement
PCC	- Plain Cement Concrete	RMT	- Running Meter
CR	- Coarse Rubble		



CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 km of existing 4-lane National Highways into 6-lane National Highway. Sections envisaged under 6-laning comprise the Golden Quadrilateral section (5,700 km) and some other sections which are 800 km in length.

The project under consideration, Tumkur - Chitradurga Section of NH-4 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. *M/s IRB Tumkur Chitradurga Tollway Ltd.* (Concessionaire) has been awarded the Project for concession period of 26 years starting from June 4th, 2011 to June 3rd, 2037. The Project has been commissioned and is currently in the operation / maintenance phase.

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged GMD Consultants to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as "*Toll Revenue and O&M Cost Projection Report*" mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections



The Concessionaire has provided basic historical traffic data and other project details on the basis of which the above analysis has been carried out, after applying our judgement on the traffic estimates.

“Toll Revenue and O&M Cost Projection Report” was submitted in March 2017. In this report traffic data of year 2015-16 was used as base traffic. The report was updated with traffic data of year 2016-17 and report was submitted in October 2017. Report was further updated with traffic data of 2017-18 and same was submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2018 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. Now as six-monthly traffic data from April 2019 to September 2019 is also available, this report is updated taking this latest traffic data into consideration..

Chapters on Project Details, Influence Zone Traffic Analysis have not been included in this update as there has been no significant event or change in the last 1 year which will have an impact on these chapters in our report dated April 2019.



CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

In the course of our work we have collected required information for project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project.

- Classified traffic volume counts at the two toll plaza locations on Tumkur Chitradurga section of NH-4 for base year 2015-16, 2016-17, 2017-18 2018-19 and for period from April 2019 to September 2019
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

The project can be divided into two homogenous sections from traffic point of view.

These sections can be

1. Chitradurga to Sira
2. Sira to Tumkur

Traffic of both sections is represented by toll plaza in each section.

Table 2-1 below lists provides details of locations from where traffic details have been collected.



Table 2-1 : Traffic Survey Locations

Sr. No.	Location	CTV	Single Journey Traffic	Return Journey Traffic	Monthly Pass Traffic	Local Traffic
1	Km 172.770 Toll Plaza	AADT for Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AADT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AADT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AADT for year 2018-19	For year 2018-19	For year 2018-19	For year 2018-19	For year 2018-19
		AADT for April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019
2	Km 104.530 Toll Plaza	AADT for Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AADT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AADT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AADT for year 2018-19	For year 2018-19	For year 2018-19	For year 2018-19	For year 2018-19
		AADT for April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019	For April 2019 – Sept 2019



The locations of each of the traffic survey are illustrated in Figure 2-1.

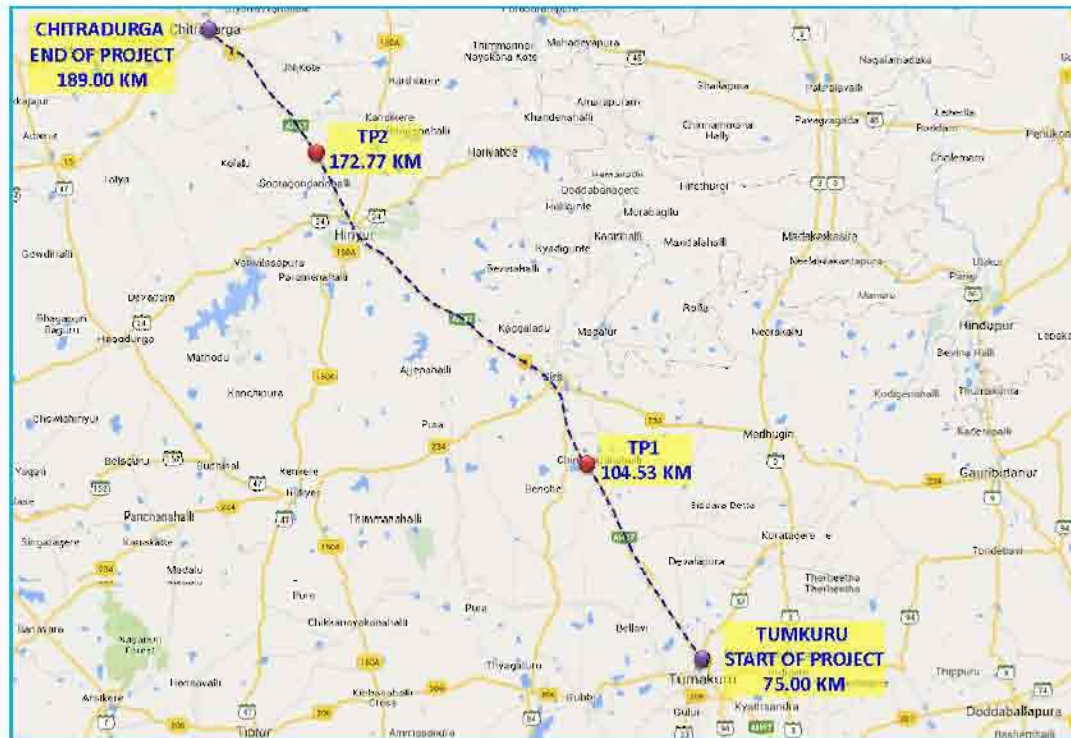


Figure 2-1 : Traffic Survey Locations

2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume Count survey has been provided by concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI. These locations were indicated in **Figure 2-1** and listed in **Table 2-1**.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in **Table 2-2**.



Table 2-2 : Vehicle Classification System

Vehicle Type	
Auto Rickshaw	
Passenger Car	Car, Jeep, Taxi & Van (Old / new technology)
Bus	Mini Bus
	Standard Bus
Truck	Light Goods Vehicle (LCV)
	2 – Axle Truck
	3 Axle Truck (HCV)
	Multi Axle Truck (4-6 Axle)
	Oversized Vehicles (7 or more axles)
Other Vehicles	Agriculture Tractor, Tractor & Trailer

Source - IRC: 64 – 1990

However, since the project highway is currently under toll operation, the data collected is corresponding to category of tollable vehicles. Following are the types of vehicles as per the Concession Agreement.

- Car / Jeep / Van
- LCV
- Truck / Bus
- HCM/ EME/ MAV

2.3 Traffic Characteristic

Toll revenue of the project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have significant potential to affect toll revenue. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, portion of monthly pass traffic are some such characteristics of traffic. These will be discussed in subsequent sections of this report.



2.3.1 Traffic Data

The Concessionaire has provided Traffic data for base year 2015-16 , 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019 as under for toll plazas

Table 2-3 : Traffic Data at Toll Plaza at Km 172.770

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	CAR	4395	4803	5261	5244	5646
2	LCV	2205	2237	2514	2918	2929
3	Truck/Bus	2898	2976	3066	3157	3429
4	HCM /EME/ MAV	5356	5365	5563	5748	5572
5	Oversized Vehicles	47	80	46	31	43
	Total	14901	15460	16451	17099	17618

Similar traffic data for toll plaza at Km 104.530 is given as under

Table 2-4 : Traffic Data at Toll Plaza at Km 104.530

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019 – Sept 2019
1	CAR	5340	6203	6577	6855	7885
2	LCV	2494	2581	2999	3401	3385
3	Truck/Bus	3577	3727	3743	3888	4246
4	HCM /EME/ MAV	6116	6140	6464	6656	6440
5	Oversized Vehicles	166	130	43	35	53
	Total	17693	18782	19826	20834	22008

This year there have been extended high intensity rains on pan in India. States of Maharashtra, Gujarat, Rajasthan, Bihar, UP, MP, Karnataka, Himachal Pradesh have been quite affected due to heavy rains this year. This has negative impact on passenger and commercial traffic during first of half of this year. It is expected that traffic in second half of year from October to March shall be substantially higher this year. Taking this into account a seasonality factor is taken to arrive and AADT value of traffic from six monthly average volume of first half of year.

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.

2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in *Table 2-5*.

Table 2-5 : PCU Factors Adopted for Study

Vehicle Type	PCUs
Car	1.0
Mini Bus	1.5
Standard Bus	3.0
LCV/LGV	1.5
2 Axle Truck	3.0
3 – 6 Axle Truck	4.5
MAV	4.5
Auto Rickshaw	1.0
Van/Tempo	1.0
Agriculture Tractor with Trailer	4.5
Agriculture Tractor without Trailer	1.5

Source: IRC: 64-1990



Traffic volume at each toll plaza was converted to PCU and same is presented as under.

Table 2-6 : Traffic in PCU at both sections

Toll Plaza Location	Period	Traffic No	PCU	PCU Index
172.770	FY 2015-16	14885	40661	2.70
	FY 2016-17	15460	41587	2.69
	FY 2017-18	17252	45852	2.66
	FY 2018-19	17099	45099	2.64
	April 2019 – Sept 2019	17618	45591	2.59
104.530	FY 2015-16	17678	48037	2.71
	FY 2016-17	18782	49471	2.56
	FY 2017-18	20892	54529	2.61
	FY 2018-19	20834	53728	2.58
	April 2019 – Sept 2019	22008	54917	2.50

It can be observed from above that project traffic has PCU index near 2.5 which indicates good mix of commercial and passenger traffic.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A Larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

For the purpose of analysis, the recent traffic numbers of for period April 2019 to September 2019 have been considered as the base numbers.

It is observed that Car traffic forms 32% of total traffic while as HCM / EME / MAV comprise 32% of total traffic. Over all about 65% of traffic is commercial in nature.

Another important bifurcation of traffic is components of traffic with respect various type of toll ticketing

1. Single Journey
2. Return Journey
3. Local Single Journey (Concessionaire provided special tariff for this category)
4. Monthly Pass Journey



Following table provides numbers of vehicle falling in each of above category

Table 2-7 : Journey Type Bifurcation of Traffic at KM 172.770

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) for FY 2018-19	Traffic Volume (Nos.) for April 2019 – Sept 2019
1	Single Journey	11733	12178	12808	13370	13614
2	Return Journey	2642	2764	3146	3332	3632
3	Local Single Journey	286	276	268	185	135
4	Monthly Pass	240	129	134	212	237

A significant part of the traffic at KM 172.770 is single journey (77%) followed by return journey (21%) with a very low component of local single journey and monthly pass traffic.

Similarly, traffic numbers for type of journey at KM 104.530 are given in following table.

Table 2-8 : Journey Type Bifurcation of Traffic at KM 104.530

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) for FY 2018-19	Traffic Volume (Nos.) for April 2019 – Sept 2019
1	Single Journey	13121	13721	14291	15053	15603
2	Return Journey	3700	4032	4580	4820	5276
3	Local Single Journey	378	419	392	387	421
4	Monthly Pass	494	501	481	574	708

Here too it was observed that single journey is the most dominant component of traffic consistent across entire length of the project highway



2.5 Secondary Data Collection

There are several other factors which have substantial impact on traffic pattern and growth on any project corridor. Following are some of such important factors

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or Industrial projects
- Special Industry in project corridor
- Overall trends of economic growth local as well as national / regional

Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP
 - b) NSDP
 - c) Population Growth
 - d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data
3. Competing road network.

We have collected and utilized such underlying data in the study to estimate the growth and risk factors for traffic along the project corridor.



CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the forecasts of factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor viz. Tumkur – Chitradurga section of NH-4 has been done after taking the above factors into consideration. “**IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**” is established best practice and has been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Elasticity model of growth projection is one of the most widely acceptable methods for traffic forecast. The same is recommended in **IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**.

In this method past trends of any vehicular data are paired with an economic indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicle traffic varies for different type of vehicle. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most important and direct parameters are given as under



- Per Capita Income
- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP

Time series data of vehicle (both passenger and goods) Registered in state of Karnataka is used as the base data for analysis of growth.

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given category of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth. Latest available data for vehicle registration, per capita income, NSDP and population is used in analysis.

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log } (P) = k \times \text{Log } (EI) + A$$

Where,

P = Number of Vehicles (Mode wise)

EI = Economic Indicator

A = Regression constant

k = Elasticity coefficient (Regression coefficient)

The elasticity for car and bus (passenger vehicles) is calculated based on the Population and Per Capita Domestic Product (PCDP) respectively and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).



Following tables and graphs depict regression and elasticity of growth model.

Table 3-1 : Per Capita Income Vs Car

Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2005	26804	583322	4.43	5.77		
2006	31166	677194	4.49	5.83	16%	
2007	35969	730991	4.56	5.86	15%	
2008	42345	829333	4.63	5.92	18%	
2009	47604	931829	4.68	5.97	12%	
2010	52097	1045516	4.72	6.02	9%	
2011	62251	1172430	4.79	6.07	19%	
2012	68053	1311609	4.83	6.12	9%	
2013	77168	1464030	4.89	6.17	13%	
2014	89545	1616812	4.95	6.21	16%	
2015	101594	1787088	5.01	6.25	13%	14.3%

Regression analysis PCI Vs Car data is presented in the figure below

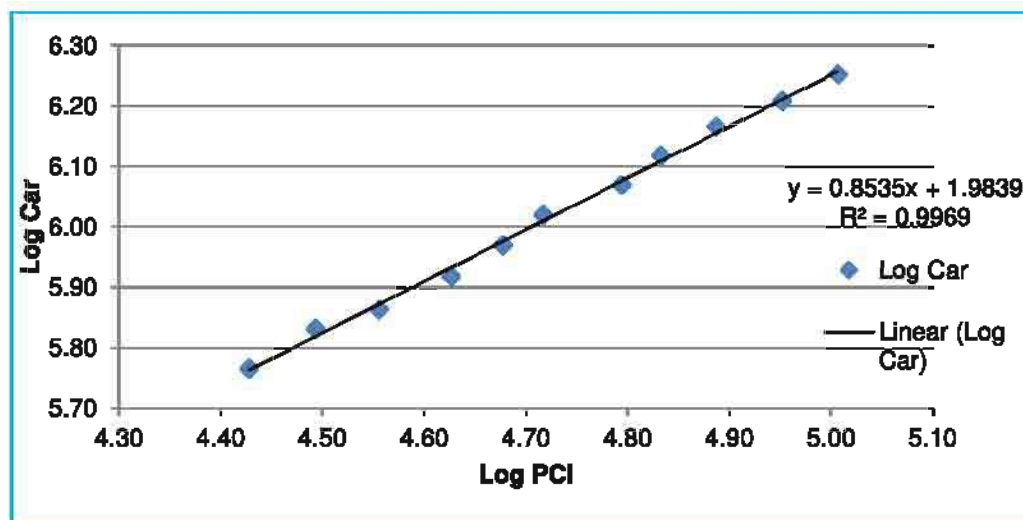


Figure 3-1 : Regression and Elasticity PCI vs. Car – Extrapolation



Table 3-2 : Population Vs Bus

Year	Population	Buses	Log Pop	Log Bus	Pop Growth	Average Growth
2005	55992	38052	4.75	4.58		
2006	56647	40819	4.75	4.61	1%	
2007	57292	45211	4.76	4.66	1%	
2008	57927	49586	4.76	4.70	1%	
2009	58552	44308	4.77	4.65	1%	
2010	59170	53874	4.77	4.73	1%	
2011	59780	58012	4.78	4.76	1%	
2012	60382	62501	4.78	4.80	1%	
2013	60975	69718	4.79	4.84	1%	
2014	61560	75529	4.79	4.88	1%	
2015	62140	80938	4.79	4.91	1%	1.05%

Regression analysis of population Vs. Bus Traffic is presented in figure below

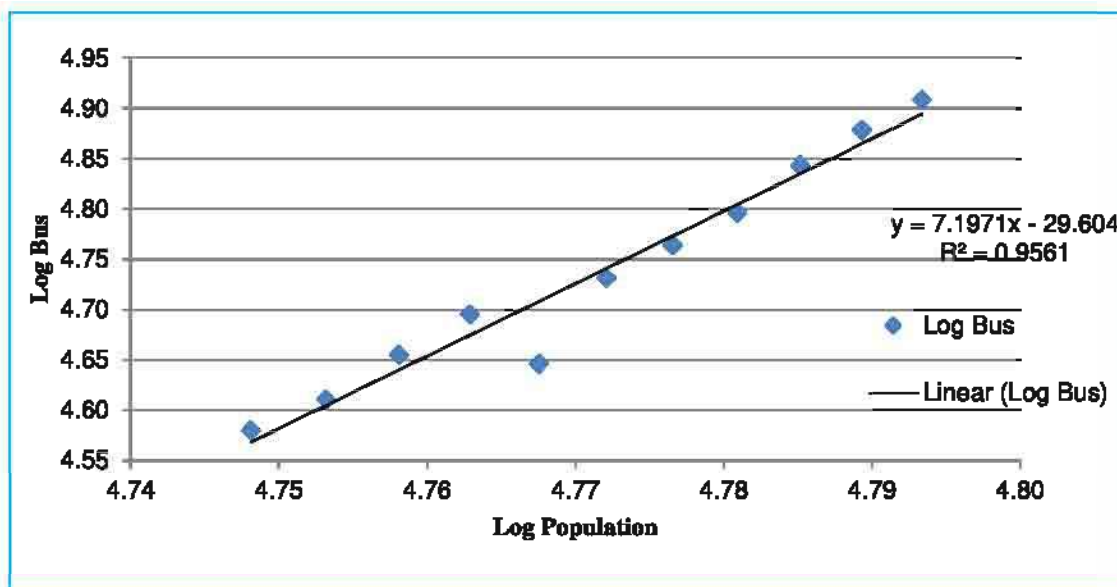


Figure 3-2 : Regression and Elasticity Population vs. Bus – Extrapolation

Elasticity of goods traffic demand has been worked out by regression analysis with NSDP. Following table represents the data and details.

Table 3-3 : Goods Traffic Vs NSDP

Year	NSDP	Trucks	Log NSDP	Log Truck	NSDP Growth	Average Growth
2005	16674700	276013	7.22	5.44		
2006	18427700	312272	7.27	5.49	11%	
2007	20266000	344764	7.31	5.54	10%	
2008	22820200	366597	7.36	5.56	13%	
2009	24442100	377495	7.39	5.58	7%	
2010	24759000	415491	7.39	5.62	1%	
2011	27272100	454582	7.44	5.66	10%	
2012	28278400	660959	7.45	5.82	4%	
2013	29824100	736023	7.47	5.87	5%	
2014	31435600	814354	7.50	5.91	5%	6.53%

The following figure depicts regression analysis and extrapolation of NSDP vs. goods traffic

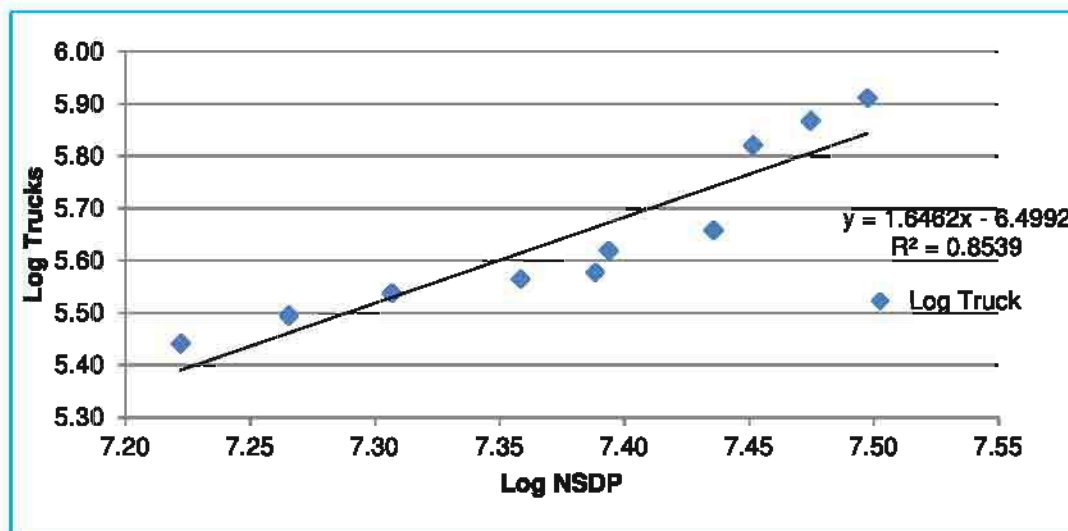


Figure 3-3 : Regression and Elasticity NSDP vs. Goods Traffic – extrapolation

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive at traffic growth. R^2 is statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R^2 more representative is the regression model of data.



The results of these analyses for the good fit as reflected by R² values are presented in the Table below

Table 3-4 : Summary Regression Analysis

State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient	Average Growth	Growth Elastic Model
Karnataka	Car/Jeep	PCI	$y = 1.1164x - 2.7365$	R ² = 0.9969	0.8535	14.30%	12.20%
	Bus	Population	$y = 1.8755x - 10.293$	R ² = 0.956	7.197	1.05%	7.54%
	Truck	NSDP	$y = 1.1164x - 2.7365$	R ² = 0.8539	1.42	6.53%	9.27%

While the economic model for predicting growth is a good tool, other local, regional, national factors such as proposed developments etc. should also be considered before finalizing growth factors. These factors are discussed in subsequent sections

3.4 Analysis of Historic Traffic Data

Traffic growth on a particular section of the highway depends on a number of factors. Some of these are local and some have regional or national context. Regional or national economy development has a marked impact on traffic growth. Still, historical traffic volume data at the project highway provides a meaningful insight into traffic development on corridor.

Recently there has been tremendous up-gradation in the logistics industry in terms of processes, technology and mode of transportation. Improvement in road networks has opened way for larger freight vehicles to be used for transportation of goods. This has added substantial value to logistical operations all across the country. It has been observed that volume of the typical 2 Axle truck has reduced and multi axle trucks or larger size have come in their place. This phenomenon is observed at project highway under study as well.

Following historical traffic data have been used for our analysis.

- Traffic Numbers provided in Contract document pertaining to year 2008
- Traffic Numbers provided in Report of Lea Associates pertaining to year 2010
- Traffic Numbers provided in by concessionaire pertaining to year 2016, 2027 and 2018



Traffic numbers pertaining to tollable category of contract have been compared.

The following tables provide historical traffic numbers at both toll plaza locations i.e. at Km 104.530 (Near Sira) and Km 172.770 (Near Chitradurga)

Table 3-5 : Historical Traffic Volume at Sira

Location	Year					
	2007-8	2009-10	2016-17	2017-18	2018-19	2019-20
At Sira						
CAR	2571	3061	6203	6577	6855	7885
LCV	493	1462	2581	2999	3401	3385
Truck/Bus	9211	4386	3727	3743	3888	4246
HCM /EME/ MAV	524	5498	6140	6464	6656	6440
Oversized Vehicles	0	0	130	43	35	53
Total	12799	14407	18782	19826	20834	22008

Table 3-6 : Historical Traffic Volume at Chitradurga

Location	Year					
	2007-8	2009-10	2016-17	2017-18	2018-19	2019-20
At Chitradurga						
CAR	1664	2356	4803	5261	5244	5646
LCV	385	1475	2237	2514	2918	2929
Truck/Bus	7907	9628	2976	3066	3157	3429
HCM /EME/ MAV	524	564	5365	5563	5748	5572
Oversized Vehicles	0	0	80	46	31	43
Total	10480	14023	15460	16451	17099	17618

From the above, it appears that though all categories of vehicles have grown in number over period of time. There is substantial increase in HCM/EME category of vehicles which are large vehicles with improved multi axle configuration. Overall traffic volume per annum has grown at CAGR of 5 to 5.5% between 2009 and 2018-19. There is a slight reduction in current year on account of completion of construction activities of major development projects in area. This updated traffic volume is taken as base for current year. It is expected that growth of traffic would be normal on project corridor.



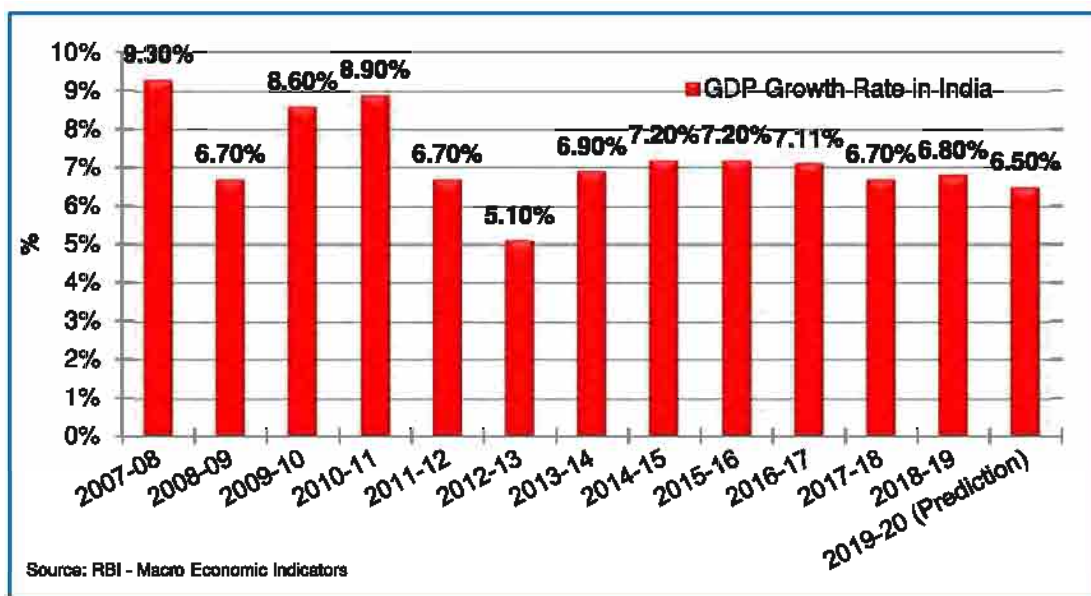
3.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.

Potentiality of such factors for project highway is discussed as under.

Economy

After witnessing a slowdown during 2008-09, the economy recovered in 2009-10, and a very high growth rate of GDP was recorded in 2010. Following figure depicts growth of GDP in India during the period.



Source: RBI Macro Economic Indicators

Figure 3-4 : Growth of GDP in India

After recording an all impressive growth of 8.9% in 2011, GDP declined between FY11 and FY14. GDP growth in 2014-15, 2015-16 and 2016-17 was pegged around 7.2%. FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Institutions like World Bank and ADB have predicted growth of GDP in Indian Economy in range of 6.5% in coming year.

Honorable Prime Minister and Government has set up a target for Indian Economy to become 5 Trillion USD economy. This would require a continuous robust growth for next 5 year. Government plans several initiatives to boost economy to achieve this target. In such case it is expected that project corridor will also witness good growth of traffic on project corridor.

3.6 Recommended Growth Rates of Traffic

Rate of growth is moderated in light of overall regional trend. Growth of Multi-Axle is kept slightly higher as trend of technological advances in logistic industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is established practice to stepdown future growth rates at interval of 5 years.

Temporary disruptions caused by implementation of Goods and Service Tax (GST) and demonetization have dissipated, and growth of economy has significantly improved since then. Hence corridor can expect to have expected growth.

Growth rates are recommended for three scenarios for sensitivity analysis namely **Optimistic, Pessimistic and Most Likely** with a positive and negative variation 0.5% from Most Likely case.

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under.

Table 3-7 : Recommended Growth Rates in an Optimistic Scenario

Year/ Vehicle Type	2020-25	2025-30	2030-35	2035-40	2040-45
CAR	8.0%	7.5%	7.0%	6.5%	6.0%
LCV	8.0%	7.5%	7.0%	6.5%	6.0%
Truck / Bus	7.0%	6.5%	6.0%	5.5%	5.0%
HCM /EME/ MAV	8.0%	7.5%	7.0%	6.5%	6.0%
Oversized Vehicles	8.0%	7.5%	7.0%	6.5%	6.0%



Table 3-8 : Recommended Growth Rates in a Pessimistic Scenario

Year/ Vehicle Type	2020-25	2025-30	2030-35	2035-40	2040-45
CAR	6.5%	6.0%	5.5%	5.0%	4.5%
LCV	6.5%	6.0%	5.5%	5.0%	4.5%
Truck / Bus	5.5%	5.0%	4.5%	4.0%	3.5%
HCM /EME/ MAV	6.5%	6.0%	5.5%	5.0%	4.5%
Oversized Vehicles	6.5%	6.0%	5.5%	5.0%	4.5%

Table 3-9 : Recommended Growth Rates in a Most Likely Scenario

Year/ Vehicle Type	2020-25	2025-30	2030-35	2035-40	2040-45
CAR	7.5%	7.0%	6.5%	6.0%	5.5%
LCV	7.5%	7.0%	6.5%	6.0%	5.5%
Truck / Bus	6.5%	6.0%	5.5%	5.0%	4.5%
HCM /EME/ MAV	7.5%	7.0%	6.5%	6.0%	5.5%
Oversized Vehicles	7.5%	7.0%	6.5%	6.0%	5.5%



CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in the previous section of the Report are used to arrive at traffic projections for future years. Traffic projections at the respective toll plazas are presented in the tables below.

These projections have been done for following three growth scenarios:

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario



**Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 172.770 KM
(Optimistic Growth Scenario)**

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV	Oversized Vehicles	Total No.	Total PCU
2019-20	5646	2929	3429	5572	43	17618	45591
2020-21	6098	3164	3668	6017	46	18993	49132
2021-22	6586	3417	3925	6499	50	20477	52957
2022-23	7112	3691	4199	7019	54	22075	57074
2023-24	7680	3986	4494	7581	58	23799	61517
2024-25	8295	4305	4808	8188	62	25658	66302
2025-26	8918	4628	5120	8802	67	27535	71131
2026-27	9586	4975	5453	9462	72	29548	76311
2027-28	10305	5349	5808	10171	77	31710	81869
2028-29	11077	5750	6185	10934	83	34029	87834
2029-30	11907	6180	6586	11753	89	36515	94224
2030-31	12740	6612	6981	12576	95	39004	100621
2031-32	13632	7074	7400	13456	102	41664	107454
2032-33	14586	7569	7844	14398	109	44506	114753
2033-34	15607	8099	8314	15405	116	47541	122542
2034-35	16700	8666	8812	16483	124	50785	130867
2035-36	17786	9229	9296	17554	132	53997	139105
2036-37	18943	9828	9806	18694	140	57411	147856
2037-38	20174	10466	10344	19908	149	61041	157162



**Table 4-2 : Total Tollable Traffic @ Toll Plaza 2- Chainage 104.530 KM
(Optimistic Growth Scenario)**

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV	Oversized Vehicles	Total No.	Total PCU
2019-20	7885	3385	4246	6440	53	22008	54917
2020-21	8515	3655	4544	6955	57	23726	59184
2021-22	9196	3947	4863	7512	61	25579	63784
2022-23	9931	4262	5204	8113	66	27576	68742
2023-24	10725	4603	5568	8762	71	29729	74082
2024-25	11583	4972	5958	9463	77	32053	79845
2025-26	12451	5346	6345	10172	83	34397	85653
2026-27	13385	5747	6757	10934	89	36912	91880
2027-28	14389	6178	7197	11754	96	39614	98572
2028-29	15469	6641	7666	12636	103	42515	105754
2029-30	16630	7139	8165	13584	111	45629	113461
2030-31	17794	7639	8656	14535	119	48743	121164
2031-32	19040	8174	9175	15552	127	52068	129382
2032-33	20373	8746	9726	16640	136	55621	138162
2033-34	21800	9357	10309	17804	145	59415	147533
2034-35	23325	10012	10927	19050	155	63469	157547
2035-36	24841	10662	11527	20287	165	67482	167449
2036-37	26455	11355	12162	21605	176	71753	177988
2037-38	28175	12092	12831	23009	187	76294	189188



Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 172.770 KM**(Pessimistic Growth Scenario)**

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV	Oversize d Vehicles	Total No.	Total PCU
2019-20	5646	2929	3429	5572	43	17618	45591
2020-21	6014	3119	3617	5934	46	18730	48454
2021-22	6405	3321	3816	6320	49	19911	51495
2022-23	6821	3536	4026	6730	52	21165	54722
2023-24	7265	3766	4247	7167	55	22500	58154
2024-25	7737	4011	4480	7632	58	23918	61799
2025-26	8202	4251	4704	8089	61	25307	65366
2026-27	8694	4506	4939	8574	65	26778	69146
2027-28	9215	4776	5186	9088	69	28334	73144
2028-29	9767	5062	5444	9633	73	29979	77369
2029-30	10352	5366	5717	10210	77	31722	81844
2030-31	10921	5660	5974	10771	81	33407	86167
2031-32	11521	5971	6243	11363	85	35183	90723
2032-33	12154	6299	6523	11988	90	37054	95523
2033-34	12822	6645	6816	12647	95	39025	100577
2034-35	13529	7009	7123	13342	100	41103	105901
2035-36	14205	7359	7408	14009	105	43086	110981
2036-37	14916	7727	7704	14709	110	45166	116304
2037-38	15662	8113	8012	15444	115	47346	121883



Table 4-4 : Total Tollable Traffic @ Toll Plaza 2- Chainage 104.530 KM**(Pessimistic Growth Scenario)**

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV	Oversize d Vehicles	Total No.	Total PCU
2019-20	7885	3385	4246	6440	53	22008	54917
2020-21	8398	3604	4480	6858	56	23396	58357
2021-22	8944	3838	4726	7304	60	24872	62017
2022-23	9526	4087	4986	7778	64	26441	65904
2023-24	10144	4353	5260	8283	68	28108	70033
2024-25	10804	4635	5550	8821	72	29882	74425
2025-26	11451	4913	5827	9350	76	31617	78719
2026-27	12138	5207	6118	9910	80	33453	83258
2027-28	12866	5519	6424	10504	85	35398	88067
2028-29	13638	5851	6746	11133	90	37458	93156
2029-30	14456	6201	7083	11800	95	39635	98534
2030-31	15252	6542	7402	12449	100	41745	103742
2031-32	16091	6901	7736	13133	105	43966	109222
2032-33	16976	7281	8085	13854	111	46307	114995
2033-34	17909	7682	8449	14615	117	48772	121073
2034-35	18894	8104	8830	15418	123	51369	127475
2035-36	19839	8509	9183	16188	129	53848	133578
2036-37	20830	8934	9550	16997	135	56446	139975
2037-38	21872	9381	9933	17847	142	59175	146693



**Table 4-5 : Total Tollable Traffic @ Toll Plaza 1- Chainage 172.770 KM
(Most Likely Growth Scenario)**

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV	Oversize d Vehicles	Total No.	Total PCU
2019-20	5646	2929	3429	5572	43	17618	45591
2020-21	6068	3148	3652	5989	46	18903	48904
2021-22	6523	3385	3889	6438	49	20284	52459
2022-23	7012	3639	4141	6921	53	21766	56277
2023-24	7537	3913	4411	7441	57	23359	60381
2024-25	8102	4207	4697	7999	61	25066	64774
2025-26	8669	4501	4979	8559	65	26773	69166
2026-27	9276	4816	5278	9158	69	28597	73856
2027-28	9926	5153	5594	9799	74	30546	78866
2028-29	10622	5513	5929	10485	79	32628	84217
2029-30	11365	5899	6284	11218	84	34850	89925
2030-31	12104	6283	6629	11947	89	37052	95578
2031-32	12890	6692	6993	12723	95	39393	101588
2032-33	13727	7126	7378	13550	101	41882	107980
2033-34	14620	7589	7784	14430	107	44530	114772
2034-35	15570	8082	8212	15368	114	47346	121998
2035-36	16505	8567	8623	16290	121	50106	129074
2036-37	17495	9081	9055	17267	128	53026	136559
2037-38	18545	9626	9508	18302	136	56117	144479



Table 4-6 : Total Tollable Traffic @ Toll Plaza 2- Chainage 104.530 KM**(Most Likely Growth Scenario)**

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV	Oversized Vehicles	Total No.	Total PCU
2019-20	7885	3385	4246	6440	53	22008	54917
2020-21	8475	3639	4521	6923	57	23615	58907
2021-22	9111	3912	4815	7442	61	25341	63188
2022-23	9794	4205	5128	8000	65	27192	67778
2023-24	10528	4520	5462	8600	70	29180	72709
2024-25	11317	4859	5817	9245	75	31313	77997
2025-26	12110	5199	6167	9893	80	33449	83288
2026-27	12957	5563	6537	10585	85	35727	88928
2027-28	13863	5952	6929	11326	91	38161	94955
2028-29	14832	6368	7344	12118	97	40759	101384
2029-30	15871	6814	7785	12966	104	43540	108262
2030-31	16904	7257	8214	13809	111	46295	115072
2031-32	18003	7729	8665	14707	118	49222	122304
2032-33	19174	8232	9142	15663	126	52337	129999
2033-34	20420	8767	9645	16681	134	55647	138173
2034-35	21747	9337	10176	17765	143	59168	146867
2035-36	23051	9897	10685	18830	151	62614	155366
2036-37	24435	10490	11220	19959	160	66264	164366
2037-38	25900	11119	11781	21156	169	70125	173884

4.2 Modification of Concession Period

As per Article 29 of the concession agreement, if actual traffic on the project falls short or exceeds Target Traffic on project highway on defined date, concession period shall be modified subject to calculation stipulated therein. For Tumkur - Chitradurga project, the Target Date and Target Traffic are defined as under:



Target Date - 1st April 2020

Target Traffic - 54558 in PCU

It was observed that as per traffic projections, traffic volume falls short of Target Traffic in all scenarios. This warrants for extension of the concession period as per provisions of concession agreement which is summarized as under -

Scenario	Projected Traffic in PCUs (average of traffic on target date, one year before target date and one year after target date)	Expected extension in Concession Period
Optimistic	54261	3.12
Pessimistic	53472	3.12
Most Likely	53994	3.12

As per above, traffic and toll revenue have been considered up to end of original concession period for this midyear traffic report. Same would be updated in yearly report of April 2020.

Due to the suspension in toll in the year FY17 because of demonetization for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days.



CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

As per the Toll Notification (Schedule R) the following discounts have been considered:

1. **Monthly Pass:** For frequent users monthly pass is issued for 50 trips per month. The discount factor works out to 33.33% for 50 journeys.
2. **Daily Pass (for Return Trip):** A 25% discount will be offered for a return pass.
3. **Single Journey:** Full single journey toll would be charged to this category of vehicles who are infrequent travelers.
4. Local Car / Jeep / Van to be charged at Rs 150 per month (2007)

The inflation and escalation of toll rate on the basis of WPI has been built up as per toll notification (Schedule R) as given under

The formula for determining the applicable rate of fee shall be as follows:-

$$\text{Applicable rate of fee} = \text{base rate} + \text{base rate} \times \left\{ \frac{\text{WPI A} - \text{WPI B}}{\text{WPI B}} \right\} \times 0.4$$

Concessionaire has further declared special discount rates which are applicable on project corridor.

These categories and rate on base year (2015-16) are given as under



Table 5-1 : Special Local Monthly Rate

Category	Monthly Rate
CAR (Local 2)	370.00
CAR (Local 3)	615.00
LCV (Local 1)	615.00
LCV (Local 2)	1,850.00
Truck/Bus (Local 1)	3085.00
Truck/Bus (Local 2)	5185.00

Normal escalation in the basis of WPI would be applicable to these rates as well.

In addition to above Concessionaire has also declared special rates for single local journey as under

Table 5-2 : Special Local Single Journey Rate

Category	Rate
CAR	30.00
LCV	40.00
Truck/Bus	70.00
HCM /EME/ MAV	95.00

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site (www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.



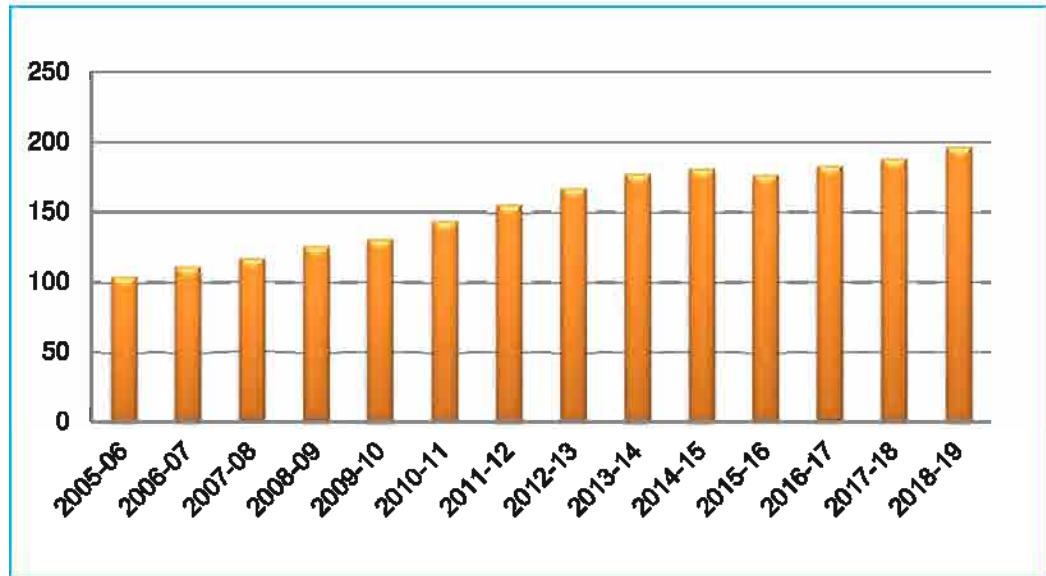


Figure 5-1 : Historical Rate of WPI Inflation in India

Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2019 is 5%. Same is considered for projection of WPI in future years.

5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules, 2008.

Table 5-3 : Base Toll Rates 2007 - 08

Type of Vehicle	Base Rate of Fee / Km (in Rs.)
Car, Jeep, Van or Light Motor Vehicle	0.65
Light Commercial Vehicle, Light Goods Vehicle or Mini Bus	1.05
Bus or Truck (2 Axle)	2.2
Three Axle commercial vehicles	2.4
Heavy Construction Machinery (HCM) or Earth Moving Equipment (EME) or Multi Axle Vehicle (MAV) (4-6 axles)	3.45
Oversized Vehicle (seven or more axles)	4.2



Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 108-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that as discussed above.

Table 5-4 : Tollable Length PKG-I

Toll Plaza Chainage	Length (Km)	Tollable Highway + Structure length (Km)
172.770	57.00	57.00
104.530	57.00	70.680

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below. Since applicable length of highway length is equal for both plazas, applicable toll rates are also same

Thus, worked out rates for various categories of vehicle and discounts are given as under



Table 5-5 : Toll Rates for Single Journey @ 172.770

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV	Oversized Vehicles
2019-20	65	105	225	350	425
2020-21	70	110	235	365	445
2021-22	70	115	245	385	470
2022-23	75	125	260	405	490
2023-24	80	130	270	425	515
2024-25	85	135	285	445	540
2025-26	90	140	300	470	570
2026-27	95	150	315	490	600
2027-28	95	155	330	515	630
2028-29	100	165	345	545	660
2029-30	110	175	365	570	695
2030-31	115	185	385	600	730
2031-32	120	190	405	630	770
2032-33	125	200	425	665	810
2033-34	130	215	445	700	850
2034-35	140	225	470	735	895
2035-36	145	235	495	775	940
2036-37	155	250	520	815	990
2037-38	160	260	545	860	1045



Table 5-6 : Toll Rates for Return Journey @ 172.770

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV	Oversized Vehicles
2019-20	100	160	335	525	635
2020-21	105	165	350	550	670
2021-22	110	175	370	575	700
2022-23	115	185	385	605	735
2023-24	120	195	405	635	775
2024-25	125	205	425	670	815
2025-26	130	215	450	700	855
2026-27	140	225	470	735	900
2027-28	145	235	495	775	945
2028-29	155	250	520	815	990
2029-30	160	260	545	855	1040
2030-31	170	275	575	900	1095
2031-32	180	290	605	945	1155
2032-33	190	305	635	995	1215
2033-34	195	320	670	1050	1275
2034-35	210	335	705	1105	1345
2035-36	220	355	740	1160	1415
2036-37	230	370	780	1220	1490
2037-38	245	390	820	1285	1565



Table 5-7 : Toll Rates for Local Single Journey@ 172.770

Year	CAR	LCV	Truck / Bus	HCM /EME/ MAV
2019-20	50	60	110	205
2020-21	55	65	115	215
2021-22	60	70	120	225
2022-23	65	75	125	235
2023-24	70	80	130	245
2024-25	75	85	135	255
2025-26	80	90	140	270
2026-27	85	95	145	285
2027-28	90	100	150	300
2028-29	95	105	160	315
2029-30	100	110	170	330
2030-31	105	115	180	345
2031-32	110	120	190	360
2032-33	115	125	200	380
2033-34	120	130	210	400
2034-35	125	135	220	420
2035-36	130	140	230	440
2036-37	135	145	240	460
2037-38	140	150	250	485



Table 5-8 : Toll Rates for Monthly Pass @ 172.770

Year	CAR (Regular)	CAR (Local 1)	CAR (Local 2)	CAR (Local 3)	LCV (Regular)	LCV (Local 1)	LCV (Local 2)	Truck/Bus (Regular)	Truck/Bus (Local 1)	Truck/Bus (Local 2)	HCM /EMIR/ MAV	Oversized Vehicles	Truck / Bus (60 Trips)	Truck / Bus (80 Trips)
2019-20	2190	265	495	790	3540	2950	2255	7420	3760	6180	11635	14165	8855	11870
2020-21	2300	280	520	830	3715	3100	2370	7790	3950	6490	12215	14870	9295	12460
2021-22	2415	295	545	870	3900	3250	2485	8175	4145	6815	12820	15610	9760	13080
2022-23	2535	310	575	915	4095	3415	2610	8585	4355	7155	13460	16390	10250	13735
2023-24	2665	325	600	960	4300	3585	2740	9015	4570	7510	14135	17210	10765	14425
2024-25	2795	340	630	1010	4520	3765	2880	9465	4800	7885	14845	18075	11310	15150
2025-26	2940	355	665	1060	4745	3955	3020	9945	5040	8280	15595	18985	11885	15910
2026-27	3085	375	695	1110	4985	4150	3175	10450	5290	8695	16385	19950	12490	16720
2027-28	3245	395	730	1165	5240	4360	3330	10980	5555	9130	17220	20965	13125	17570
2028-29	3410	415	770	1225	5510	4575	3500	11540	5835	9585	18100	22035	13800	18465
2029-30	3585	435	805	1285	5790	4805	3675	12135	6125	10065	19025	23165	14510	19415
2030-31	3770	460	845	1350	6090	5045	3855	12760	6430	10570	20005	24355	15260	20415
2031-32	3965	480	890	1420	6405	5300	4050	13420	6750	11100	21040	25615	16050	21470
2032-33	4170	505	935	1490	6735	5565	4250	14115	7090	11655	22135	26950	16890	22585
2033-34	4390	535	980	1565	7090	5840	4465	14850	7445	12235	23290	28355	17770	23765



TOLL REVENUE AND O&M COST PROJECTION REPORT

Six - Laning of Tunkur - Chitradurga Section of NH-4 from Km 75.000 to Km 189.000



2034-35	4620	560	1030	1640	7460	6135	4690	15630	7815	12850	24510	29840	18705	25010
2035-36	4860	590	1080	1725	7855	6440	4920	16455	8210	13490	25800	31410	19695	26325
2036-37	5120	620	1135	1810	8270	6760	5170	17325	8620	14165	27165	33070	20740	27715
2037-38	5390	655	1190	1900	8705	7100	5425	18245	9050	14875	28610	34825	21840	29190



UPDATE ON TOLL REVENUE AND O&M COST PROJECTION REPORT

Six - Laning of Tunkur - Chiradurga Section of NH-4 from Km 75.000 to Km 185.000

5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza up to 2037-38 (End of Concession Period) starting from the year 2020-21 are shown in tables below.

Table 5-9 : Toll Revenue Optimistic Scenario

(Rs. Crores)

Year	Toll at Plaza 177.2	Toll at Plaza 104.53	Total
2019-20	119.59	140.70	260.30
2020-21	134.52	158.35	292.87
2021-22	151.92	178.78	330.70
2022-23	172.98	203.52	376.50
2023-24	196.06	230.77	426.83
2024-25	221.16	260.38	481.54
2025-26	250.11	294.44	544.54
2026-27	281.16	331.07	612.23
2027-28	316.02	372.04	688.06
2028-29	357.11	420.40	777.51
2029-30	403.40	474.97	878.37
2030-31	453.70	534.17	987.87
2031-32	509.49	599.85	1109.34
2032-33	571.31	672.57	1243.88
2033-34	641.73	755.37	1397.09
2034-35	722.11	850.12	1572.23
2035-36	809.41	952.65	1762.06



Year	Toll at Plaza 177.2	Toll at Plaza 104.53	Total
2036-37	904.00	1064.08	1968.08
2037-38	1010.26	1189.02	2199.28

**Table 5-10 : Toll Revenue Pessimistic Scenario
(Rs. Crores)**

Year	Toll at Plaza 177.2	Toll at Plaza 104.53	Total
2019-20	119.59	140.70	260.30
2020-21	132.64	156.12	288.76
2021-22	147.71	173.84	321.55
2022-23	165.85	195.12	360.98
2023-24	185.38	218.19	403.58
2024-25	206.21	242.74	448.95
2025-26	229.92	270.65	500.57
2026-27	254.88	300.09	554.97
2027-28	282.48	332.53	615.00
2028-29	314.74	370.52	685.26
2029-30	350.57	412.76	763.33
2030-31	388.72	457.68	846.40
2031-32	430.36	506.77	937.13
2032-33	475.80	560.24	1036.04
2033-34	526.96	620.36	1147.32
2034-35	584.63	688.41	1273.04
2035-36	646.06	760.50	1406.57
2036-37	711.43	837.46	1548.89
2037-38	783.83	922.60	1706.43



**Table 5-11 : Toll Revenue Most Likely Scenario
(Rs. Crores)**

Year	Toll at Plaza 177.2	Toll at Plaza 104.53	Total
2019-20	119.59	140.70	260.30
2020-21	133.91	157.62	291.53
2021-22	150.50	177.14	327.64
2022-23	170.58	200.70	371.28
2023-24	192.46	226.55	419.01
2024-25	216.09	254.41	470.50
2025-26	243.23	286.35	529.58
2026-27	272.16	320.48	592.64
2027-28	304.49	358.43	662.92
2028-29	342.48	403.13	745.61
2029-30	385.06	453.33	838.39
2030-31	431.03	507.43	938.46
2031-32	481.78	567.19	1048.98
2032-33	537.72	633.01	1170.73
2033-34	601.16	707.63	1308.79
2034-35	673.31	792.69	1465.99
2035-36	751.18	884.07	1635.25
2036-37	835.10	982.83	1817.93
2037-38	928.89	1093.04	2021.93



CHAPTER 6

OPERATION & MAINTENANCE

6.1 Operation & Maintenance

Following are project parameters which would contribute towards cost of operation and maintenance.

Future cost of operation and maintenance is estimate on engineering judgment and experience basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Tumkur to Chitradurga on NH-4 in state of Karnataka.

- a) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- b) **Periodic Maintenance** – This will be done on periodic basis say every 5 years. It will consist of overlaying of wearing course and painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost are spread over three years. But since project is commissioned and running traffic for last many years, periodic maintenance shall be as per condition of pavement and other infrastructure. Inputs of concessionaire have been taken in this regard.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year 2019-20 is given in table below.



Table 6-1 : O&M COST

Year	Annual Maintenance (Rs. Cr)	Thermoplastic Painting (Rs. Cr)	Renewal Coat with BC (Rs. Cr.)	Special Repair of pavement	Structure maintenance (Rs. Cr)	Electric System		Total Expenditure (Rs. Crores)	Remarks
						Annual	Periodic		
2019-20	8.56	0.98	13.74	19.91	0.01	0.04	0.04	45.40	Renewal of Wearing course + Pavement repair
2020-21	8.56				0.01	0.04	0.04	9.48	Regular O & M
2021-22	8.56				0.01	0.04	0.04	9.95	Regular O & M
2022-23	8.56				0.01	0.04	0.00	10.45	Regular O & M
2023-24	8.56				0.01	0.04	0.04	10.97	Regular O & M
2024-25	8.56	0.98	13.74	19.91	0.01	0.04	0.04	57.94	Renewal of Wearing course + Pavement repair
2025-26	8.56				0.01	0.04	0.04	12.10	Regular O & M
2026-27	8.56				0.01	0.04	0.04	12.70	Regular O & M
2027-28	8.56				0.01	0.04	0.04	13.34	Regular O & M
2028-29	8.56				0.01	0.04	0.04	14.01	Regular O & M
2029-30	8.56	0.98	13.74	19.91	0.01	0.04	0.04	73.94	Renewal of Wearing course + Pavement repair
2030-31	8.56			1.81	0.01	0.04	0.04	18.69	Regular O & M
2031-32	8.56			1.81	0.01	0.04	0.04	19.63	Regular O & M
2032-33	8.56			1.81	0.01	0.04	0.04	20.61	Regular O & M



2033-34	8.56				1.81	0.01	0.04	21.64	Regular O & M
2034-35	8.56	1.72	13.74	28.96	0.01	0.01	0.04	115.74	Regular of Wearing course + Pavement repair
2035-36	8.56			1.81	0.01	0.01	0.04	23.86	Regular O & M
2036-37	8.56			2.17	0.01	0.01	0.04	25.92	Regular O & M
2037-38	2.57				0.01	0.01	0.04	6.60	Regular O & M



CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Tumkur to Chitradurga section of NH-4 in state of Karnataka from km 75.000 to km 189.000 is currently Six lane road. The road is in sound condition and serves to good traffic volume. As Indian economy is poised to grow at 8%+ project corridor is expected to pick up same trend in terms of traffic flow. All these developments have potential to give positive impact to traffic flow on project. Following can considered as major outcome of study

- a) There is good amount of tollable traffic running on project
- b) Project corridor has potential to witness traffic growth @ 6-8% annually in near future due to various development in area and overall development of economy
- c) Project corridor has committed traffic as long route traffic and does not have risk of traffic leakage due lack of competing road of comparable quality

The project infrastructure is in good condition and its maintenance cost is also reasonable.

Based on above it can be considered a stable healthy project from traffic and revenue point of view.



CHAPTER 8

PROJECT ILLUSTRATIONS

8.1 General

Project current condition has been depicted in the following photographs.



Figure 8-1 : General Condition of project road



Figure 8-2 : General Condition of project road





GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



OMALAU TO NAMAKKAL (KM 180.00 TO KM 248.625)

SECTION OF NH-7 IN THE STATE OF **TAMIL NADU**.

October 2019



TOLL REVENUE AND O&M COST PROJECTION REPORT



GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



**OMALAUUR TO NAMAKKAL (KM 180.00 TO KM 248.625)
SECTION OF NH-7 IN THE STATE OF
TAMIL NADU.**

**TOLL REVENUE AND O&M COST
PROJECTION REPORT**

October 2019



CONTENTS

Chapter 1	6
INTRODUCTION	6
1.1 Background.....	6
1.2 Objective of the Study.....	6
1.2.1 Scope of Services	6
Chapter 2	8
TRAFFIC SURVEYS AND ANALYSIS	8
2.1 Traffic Surveys.....	8
2.2 Classified Traffic Volume Count	10
2.3 Traffic Characteristic	11
2.3.1 Traffic Data	11
2.4 Data Analysis.....	12
2.4.1 Analysis of Traffic Volume Count	12
2.4.2 Components of Traffic.....	13
2.5 Secondary Data Collection	14
Chapter 3	15
GROWTH OF TRAFFIC ON PROJECT HIGHWAY	15
3.1 Introduction.....	15
3.2 Trend Analysis.....	15
3.3 Estimation of Traffic Demand Elasticity.....	16
3.4 Analysis of Historic Traffic Data	20
3.5 Other Factors Influencing Growth	20
3.6 Recommended Growth Rates of Traffic	21
Chapter 4	24
TRAFFIC FORECAST	24
4.1 Traffic Projections	24
4.2 Extension of Concession Period	25
Chapter 5	26
FORECAST OF TOLL REVENUE	26
5.1 General.....	26
5.2 Discount Categories	26
5.3 Estimation of Toll Rates	27
5.4 Toll Revenue	29



5.5 Toll Revenue at all toll plazas under Scenarios	29
Chapter 6	32
OPERATION & MAINTENANCE	32
6.1 Operation & Maintenance.....	32
Chapter 7	34
CONCLUSION & RECOMMENDATIONS	34
7.1 Conclusion & Recommendations	34
Chapter 8	35
PROJECT ILLUSTRATIONS	35
8.1 General.....	35



LIST OF TABLES

Table 2-1 : Traffic Data Details.....	9
Table 2-2 : Vehicle Classification System.....	10
Table 2-3 : Traffic Data at Toll Plaza at Km 191.800	11
Table 2-4 : PCU Factors Adopted for Study	12
Table 2-5 : Traffic in PCU at Project Stretch.....	12
Table 2-6 : Journey Type Bifurcation of Traffic at KM 191.800	13
Table 3-1 : Per Capita Income Vs Car	17
Table 3-2 : Population Vs Bus.....	18
Table 3-3 : Goods Traffic Vs NSDP	19
Table 3-4 : Summary Regression Analysis.....	20
Table 3-5 : Recommended Growth Rates Optimistic	22
Table 3-6 : Recommended Growth Rates Pessimistic.....	22
Table 3-7 : Recommended Growth Rates Most Likely.....	23
Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 191.800 KM	24
Table 4-2 : Total Tollable Traffic @ Toll Plaza 1- Chainage 191.800 KM	25
Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 191.800 KM	25
Table 5-1 : Base Toll Rates June 1997	27
Table 5-2 : Toll Rates for Single Journey @ 191.800.....	28
Table 5-3 : Toll Rates for Multiple Journeys @ 191.800	28
Table 5-4 : Toll Rates for Monthly Pass @ 191.800	29
Table 5-5 : Toll Revenue Optimistic Scenario	30
Table 5-6 : Toll Revenue Pessimistic Scenario	30
Table 5-7 : Toll Revenue Most Likely Scenario	31
Table 6-1 : O&M COST.....	33



LIST OF FIGURES

<i>Figure 2-1 : Toll Plaza Locations</i>	9
<i>Figure 3-1 : Regression and Elasticity PCI vs. Car – Extrapolation</i>	17
<i>Figure 3-2 : Regression and Elasticity Population vs. Bus – Extrapolation</i>	18
<i>Figure 3-3 : Regression and Elasticity NSDP vs. Goods Traffic – extrapolation</i>	19
<i>Figure 3-4 : Growth of GDP in India</i>	21
<i>Figure 5-1 : Historical Rate of WPI Inflation in India</i>	27
<i>Figure 8-1 : General Project Condition</i>	35
<i>Figure 8-2 : Toll Plaza</i>	35
<i>Figure 8-3 General Project Condition</i>	36
<i>Figure 8-4 General Project Condition</i>	36



ABBREVIATIONS

AADT	- Annual Average Daily Traffic	NHAI	- National Highways Authority of India
BOT	- Build Operate Transfer	NHDP	- National Highways Development Project
CAGR	- Compound Annual Growth Rate	NSDP	- Net State Domestic Product
CTV	- Classified traffic volume	O&M	- Operation & Maintenance
DBFOT	- Design, Build, Finance, Operate & Transfer	PCDP	- Per Capita Domestic Product
EME	- Earth Moving Equipment	PCI	- Per Capita Income
GDP	- Gross Domestic Product	PCU	- Passenger Car Unit
GSDP	- Gross State Domestic Product	PSC	- Pre-stressed Concrete
HCM	- Heavy Construction Machinery	RCC	- Reinforced cement concrete
HCV	- Heavy Commercial Vehicle	RHS	- Right Hand Side
HTMS	- Highway Traffic Management System	SH	- State Highway
IRC	- Indian Road Congress	TP	- Toll Plaza
IRR	- Internal Rate of Return	WPI	- Wholesale Price Index
LCV	- Light Commercial Vehicle	SIR	- Special Investment Region
LHS	- Left Hand Side	c.	- Circa
LGV	- Light Goods Vehicle	ROB	- Railway Over Bridge
MAV	- Multi Axle Vehicle	MDR	- Major District Road
MORTH	- Ministry of Road Transport and Highways	ODR	- Other District Road
NH	- National Highway	CA	- Concession Agreement
PCC	- Plain Cement Concrete	RMT	- Running Meter
CR	- Coarse Rubble		



CHAPTER 1

INTRODUCTION

1.1 Background

The Government of India through National Highway Authority of India (NHAI) embarked upon a program to enhance the traffic capacity and safety for efficient transportation of goods as well as passenger traffic on National Highway Sections under NHDP Phase V. Under Phase V NHAI has planned to convert 6,500 km of existing 4-lane National Highways into 6-lane National Highway. Sections envisaged under 6-laning comprise the Golden Quadrilateral section (5,700 km) and some other sections which are 800 km in length .

The project under consideration, Omalur - Namakkal section of NH-7 from Km 180.000 to km 248.625 is one such road project NHAI intended to implement on a BOT basis in the DBFOT format. Project has concession period of 20 years. Project achieved COD on 6th August-2009. The Project has been commissioned and is currently in the operation / maintenance phase. Project under consideration is a combination of construction and maintenance packages as given under

Maintenance package – From Km 180.000 to Km 207.500

Construction & Maintenance Package – From Km 207.500 to Km 248.625

1.2 Objective of the Study

M/s IRB INVIT FUND has engaged GMD Consultants to assess the future traffic and toll potential of project along with related operation & maintenance expenditure involved.

This report named as *“Toll Revenue and O&M Cost Projection Report”* mainly focuses on traffic and O&M aspects of the project. Other parameters like competing road, area developments etc. have been considered from a traffic development point of view.

1.2.1 Scope of Services

The broad scope of work covered in the assignment is as follows

- a) Analysis of Traffic Growth
- b) Toll Rate Growth
- c) Revenue Forecasting
- d) Operation and Maintenance Cost Projections

The Concessionaire has provided basic historical traffic data and other project details on the basis of which the above analysis has been carried out, after applying our judgement on the traffic estimates.



“Toll Revenue and O&M Cost Projection Report” was submitted in March 2017. In this report traffic data of year 2015-16 was used as base traffic. The report was updated with traffic data of year 2016-17 and report was submitted in October 2017. Report was further updated with traffic data of 2017-18 and same was submitted in April 2018. The report was further updated with traffic Data of period from April 2018 to September 2018 and was submitted in October 2018. A revised report was submitted with updated traffic of year 2018-19 in April 2019. Now as six-monthly traffic data from April 2019 to September 2019 is also available, this report is updated taking this latest traffic data into consideration..

Chapters on Project Details, Influence Zone Traffic Analysis have not been included in this update as there has been no significant event or change in the last 1 year which will have an impact on these chapters in our report dated April 2019.

There are no further updates to the O&M cost projections included in our previous report dated April 2019.



CHAPTER 2

TRAFFIC SURVEYS AND ANALYSIS

2.1 Traffic Surveys

In the course of our work we have collected required information for project corridor to understand the general traffic and travel characteristics on the corridor.

The following traffic data has been collected for project.

- Classified traffic volume counts at toll plaza location on Omalur - Namakkal section of NH-7 for base year 2015-16, 2016-17 , 2017-18 2018-19 and for period from April 2019 to September 2019
- Local Component of traffic
- Component of Return Journey
- Component of Monthly Pass Journey

The main objective of the traffic data analysis is to:

- Determine the existing traffic movement characteristics of project
- Establish base year traffic
- Identification of travel patterns and modal split of project traffic
- Deriving growth factors for traffic forecasting
- Estimation of corridor traffic including traffic diversion if any
- Preparation of revenue model and projection of revenue as per toll policy for various scenarios

Project can be divided into following homogenous sections from traffic point of view.

These sections can be

- Omalur to Salem
- Salem to Rasipuram
- Rasipuram to Namakkal

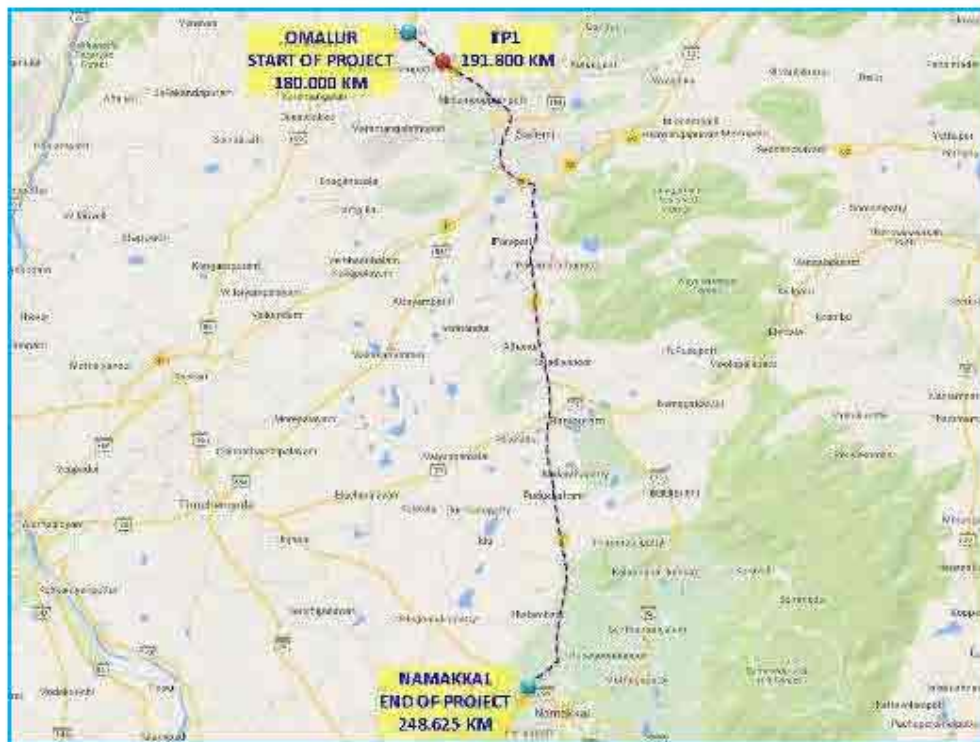
Table 2-1 below lists provides details of locations from where traffic details have been collected.



Table 2-1 : Traffic Data Details

SR. NO	LOCATION	CTV	Single Journey Traffic	Multiple Journey	Monthly Pass	Local Traffic
1	Km 191.800 Toll Plaza	AADT for Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016	For Year 2015-2016
		AADT for year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017	For Year 2016-2017
		AADT for year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018	For Year 2017-2018
		AADT for Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19	For Year 2018-19
		AADT for April 2019-Sept 2019	For April 2019-Sept 2019	For April 2019-Sept 2019	For April 2019-Sept 2019	For April 2019-Sept 2019

The locations of each of the traffic survey are illustrated in Figure 2-1.

**Figure 2-1 : Toll Plaza Locations**

2.2 Classified Traffic Volume Count

The objective of conducting a Classified Traffic Volume Count is to understand the traffic flow pattern including modal split on a roadway. The Classified Traffic Volume Count survey has been provided by concessionaire of project highway from actual traffic data gathered at toll plaza locations based on monthly data shared with NHAI. These locations are indicated in *Figure 2-1* and listed in *Table 2-1*.

The vehicles can broadly be classified into fast moving / motorized and slow moving / non-motorized vehicles, which can be further classified into specific categories of vehicles. The groupings of vehicles are further segregated to capture the tollable vehicle categories specifically and toll exempted vehicles are counted separately. The detailed vehicle classification system as per IRC: 64-1990 is given in *Table 2-2*.

Table 2-2 : Vehicle Classification System

Vehicle Type	
Auto Rickshaw	
Passenger Car	Car, Jeep, Taxi & Van (Old / new technology)
Bus	Mini Bus
	Standard Bus
Truck	Light Goods Vehicle (LCV)
	2 – Axle Truck
	3 Axle Truck (HCV)
	Multi Axle Truck (4-6 Axle)
	Oversized Vehicles (7 or more axles)
Other Vehicles	Agriculture Tractor, Tractor & Trailer

Source - IRC: 64 – 1990

However, since project highway is currently under toll operation, the data collected is corresponding to category of tollable vehicles. Following are the type of vehicles as per concession agreement.

- Car / Jeep / Van
- LCV
- Truck / Bus
- Multi Axle



2.3 Traffic Characteristic

Toll revenue of project highway does not solely depend on traffic volume. There are certain characteristics of traffic which have substantial potential to affect toll collection. Component of local traffic, component of passenger and commercial traffic, portion of return journey traffic, % of monthly pass traffic are some of such characteristics of traffic. These will be discussed in subsequent sections of report.

2.3.1 Traffic Data

Project concessionaire has provided Traffic data for base year 2015-16 , 2016-17, 2017-18, 2018-19 and for period from April 2019 to September 2019 as under for toll plaza.

Table 2-3 : Traffic Data at Toll Plaza at Km 191.800

Sr. No	Type of Vehicle	Annual Average Daily Traffic (Nos.) – FY 2015-16	Annual Average Daily Traffic (Nos.) – FY 2016-17	Annual Average Daily Traffic (Nos.) – FY 2017-18	Annual Average Daily Traffic (Nos.) FY 2018-19	Annual Average Daily Traffic (Nos.) April 2019-Sep 2019
1	CAR	10179	10765	12033	12645	14542
2	LCV	3694	3966	4307	4672	5078
3	Truck/Bus	3091	3148	3085	3199	3697
4	Multi Axle	2482	2710	2552	2952	3128
	Total	19447	20589	21977	23468	26446

This year there have been extended high intensity rains on pan in India. States of Maharashtra, Gujarat, Rajasthan, Bihar, UP, MP, Karnataka, Himachal Pradesh have been quite affected due to heavy rains this year. This has negative impact on passenger and commercial traffic during first of half of this year in entire country. It is expected that traffic in second half of year from October to March shall be substantially higher this year. Taking this into account a seasonality factor is taken to arrive and AADT value of traffic from six monthly average volume of first half of year.

The above data was arrived at by applying standard trip frequencies to monthly passes and return journey tickets issued.



2.4 Data Analysis

2.4.1 Analysis of Traffic Volume Count

Understanding the character of existing traffic forms the basis of traffic forecast. The various vehicle types having different sizes and characteristics can be converted into a single unit called Passenger Car Unit (PCU). Passenger Car equivalents for various vehicles are adopted based on recommendations of Indian Road Congress prescribed in “IRC-64-1990: Guidelines for Capacity of Roads in Rural areas”. The adopted passenger car unit values (PCU) are presented in Table 3-4

Table 2-4 : PCU Factors Adopted for Study

Vehicle Type	PCUs
Car	1.0
Mini Bus	1.5
Standard Bus	3.0
LCV/LGV	1.5
2 Axle Truck	3.0
3 – 6 Axle Truck	4.5
MAV	4.5
Auto Rickshaw	1.0
Van/Tempo	1.0
Agriculture Tractor with Trailer	4.5
Agriculture Tractor without Trailer	1.5

Source: IRC: 64-1990

Traffic volume at each toll plaza was converted to PCU and same is presented as under

Table 2-5 : Traffic in PCU at Project Stretch

Period	Toll Plaza Location	Traffic No	PCU	PCU Index
FY 2015-16	191.800	19447	36164	1.86
FY 2016-17	191.800	20589	38355	1.86
FY 2017-18	191.800	21977	39232	1.78



FY 2018-19	191.800	23468	42534	1.81
April 2019 - September 2019	191.800	26446	47330	1.79

It can be observed from above that project traffic has PCU index about 2 which is a fair indicator of good mix being split between commercial and urban traffic.

2.4.2 Components of Traffic

As discussed previously, components of traffic volume play an important role in determining project revenue. A larger component of commercial traffic with higher axle configuration adds to project revenue positively. Similarly, a larger component of local traffic affects the project revenue potential negatively.

For the purpose of analysis, the recent traffic numbers of for period from April 2019 to September 2019 have been considered as the base numbers.

It is observed that car traffic forms 55% of total traffic at toll plaza location Km 191.800 LCV and bus / truck share 19% and 14% respectively. Multi axle consists of 12% of total traffic. Over all about 40% of traffic is commercial in nature. Higher percentage of urban traffic is due to the project corridor passing through the city of Salem which is a fast-upcoming urban C category town.

Another important bifurcation of traffic is components of traffic with respect to various type of toll ticketing like

1. Single Journey
2. Multi Journey
3. Monthly Pass (Local and General)

Following table provides numbers of vehicle falling in each of above category on base year 2015-16, 2016-17, 2017-18, 2018-19 and April 2019 to September 2019

Table 2-6 : Journey Type Bifurcation of Traffic at KM 191.800

Sr. No	Type	Traffic Volume (Nos.) for FY 2015-16	Traffic Volume (Nos.) for FY 2016-17	Traffic Volume (Nos.) for FY 2017-18	Traffic Volume (Nos.) For FY 2018-19	Traffic Volume (Nos.) For April 2019-Sept 2019
1	Single Journey	13103	13942	15354	16311	18197
2	Return Journey	4146	4264	4462	5210	6010



3	Monthly Pass	2198	2383	2161	1947	2239
---	--------------	------	------	------	------	------

The single journey component in total traffic numbers is as high as 69% while the return journey component is 23%. Monthly pass share is as low as 8%. As the project corridor serves as primary link for traffic between Madurai and Bangalore the component of single journey ticket is much higher. Moreover, toll structure of project is based on old toll policy and there are special rates for local single journey traffic (Please refer table 7.2). This makes the option of a monthly pass less attractive.

2.5 Secondary Data Collection

There are several other factors which have substantial impact on traffic pattern and growth on any project corridor. Following are some of such important factors

- Industrial development around project corridor and its catchment
- Educational infrastructure along project corridor
- Demographic pattern
- Urban area development
- Tourism potential
- Upcoming major infrastructural or industrial projects
- Special industry in project corridor
- Overall trends of economic growth local as well as national / regional

Hence in addition to traffic details on project site, secondary data was also collected from the various sources. Typical secondary data includes the following:

1. Vehicle registration data of regional and national level.
2. Economic Data
 - a) GDP
 - b) NSDP
 - c) Population Growth
 - d) Per Capita Income growth
 - e) Industrial Growth
 - f) Special Industry Potential
 - g) Regional and National development vision / plan
 - h) Any other relevant data
3. Competing road network.

We have collected and utilized such underlying data in the study to estimate the growth and risk factors for traffic along the project corridor.



CHAPTER 3

GROWTH OF TRAFFIC ON PROJECT HIGHWAY

3.1 Introduction

Traffic growth is a function of the interplay of a number of contributory factors such as National economy, Government policy, socio-economic conditions of the people, and changes in land uses along the project corridor precincts etc. As these factors have a number of uncertainties associated with them, forecasts of traffic are dependent on the forecasts of factors such as population, gross domestic product (GDP), vehicle ownership, per capita income (PCI), agricultural output, fuel consumption etc. Future pattern of change in these factors can be estimated with only a reasonable degree of accuracy and hence the resultant traffic forecast levels may not be precise.

Traffic growth forecast for project corridor Omalur - Namakkal section of NH-7 has been carried out taking above factors in to consideration. “**IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**” is established best practice and has been used for traffic growth forecast.

3.2 Trend Analysis

One of the methods of estimation of future rate of traffic growth is to assume the same rate of growth as experienced in the past. However, it may be noted that major influencing factors which reflect Economic conditions such as GDP, agricultural output, industrial output, national policies etc. are susceptible to change over a longer period of time and necessary adjustments need to be made to past trends to account for these changes.

Thus, we have considered the Elasticity model of growth projection which is one of the most widely acceptable methods for traffic forecast and is recommended in **IRC: 108-2015-Guidelines for Traffic Prediction on Rural Highways**.

In this method past trends of any vehicular data are paired with an economic indicator and a regression analysis is done to yield the economic model of growth. Growth of vehicular traffic varies for different type of vehicle. It is a proven fact that growth patterns for passenger and goods vehicles are different. Traffic growth on any highway typically depends on a number of economic parameters. The most important and direct parameters are given as under

- Per Capita Income



- Net State Domestic Product (NSDP)
- Population

It is observed that the ownership of a car is more closely related to affordability hence per capita is the index which closely fits with growth of car traffic among other criteria. In similar fashion, following pairs of vehicle type and independent variable can be established for elasticity modeling of growth.

- Car / Jeep – Per Capita Income
- Bus / Minibus – Population
- Trucks / Heavy / Goods Vehicle – NSDP
- Time series data of vehicle (both passenger and goods) Registered in the state of Tamil Nadu is used as the base data for analysis of growth

3.3 Estimation of Traffic Demand Elasticity

Elasticity of traffic demand is defined as the rate at which traffic intensity varies due to change in the corresponding indicator selected. Hence, in order to estimate the elasticity of traffic demand, it is necessary to establish the relationship between the growth in number of given category of vehicle with one of the economic variables considered, such as NSDP, per capita income and population growth. Latest available data for vehicle registration, per capita income, NSDP and population is used in analysis.

As per IRC: 108-2015 the model for estimating elasticity index for the project corridor is of the following form and is as given below:

$$\text{Log } (P) = k \times \text{Log } (EI) + A$$

Where,

P = Number of Vehicles (Mode wise)

EI = Economic Indicator

A = Regression constant

k = Elasticity coefficient (Regression coefficient)

The elasticity for car and bus (passenger vehicles) is calculated based on Population and Per Capita Domestic Product (PCDP) and the elasticity for trucks is calculated based on the Net State Domestic Product (NSDP).

Following tables and graphs depict regression and elasticity of growth model.



Table 3-1 : Per Capita Income Vs Car

Year	PCI	Car	Log PCI	Log Car	PCI Growth	Average Growth
2004	30062	657339	4.48	5.82		
2005	34126	714978	4.53	5.85	14%	
2006	39166	787085	4.59	5.90	15%	
2007	41314	871917	4.62	5.94	5%	
2008	43193	967310	4.64	5.99	5%	
2009	47394	1080445	4.68	6.03	10%	
2010	53507	1230492	4.73	6.09	13%	
2011	57093	1385143	4.76	6.14	7%	
2012	58360	1549950	4.77	6.19	2%	
2013	62361	1709528	4.79	6.23	7%	8.5%

Regression analysis of same is given in figure below

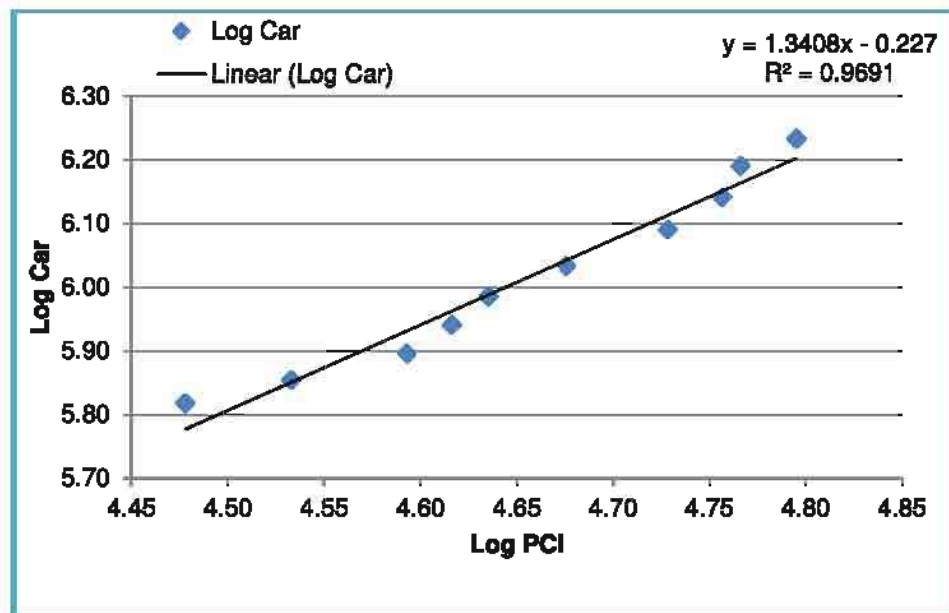
**Figure 3-1 : Regression and Elasticity PCI vs. Car – Extrapolation**

Table 3-2 : Population Vs Bus

Year	Population	Buses	Log Pop	Log Bus	Pop Growth	Average Growth
2004	64096000	37937	7.81	4.58		
2005	64623000	42109	7.81	4.62	1%	
2006	65135000	42999	7.81	4.63	1%	
2007	65629000	47765	7.82	4.68	1%	
2008	66106000	52617	7.82	4.72	1%	
2009	66566000	56338	7.82	4.75	1%	
2010	67012000	59240	7.83	4.77	1%	
2011	67444000	62725	7.83	4.80	1%	
2012	67862000	68096	7.83	4.83	1%	
2013	68265000	84488	7.83	4.93	1%	0.70%

Regression analysis of same is given in figure below

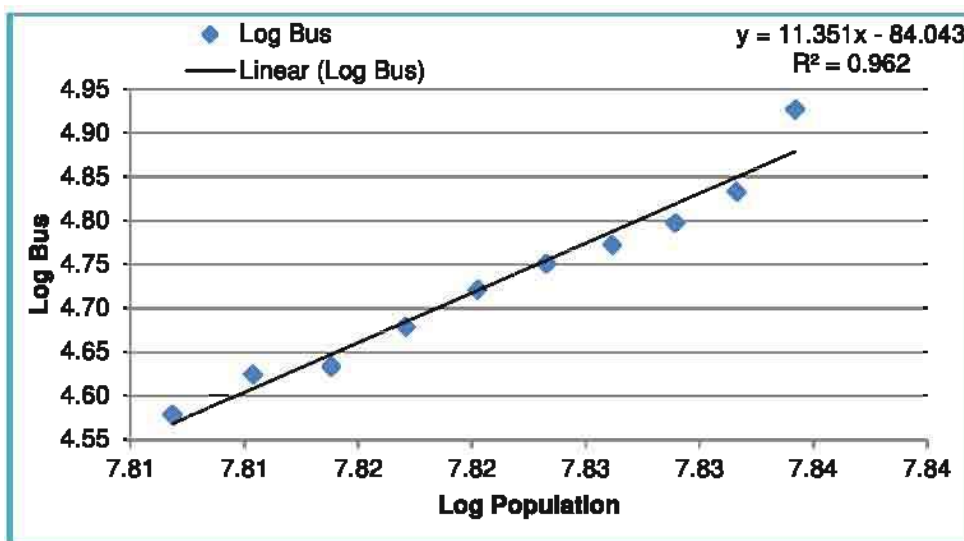


Figure 3-2 : Regression and Elasticity Population vs. Bus – Extrapolation

Elasticity of goods traffic has been worked out by regression analysis with NSDP. Following table represents the data and details.



Table 3-3 : Goods Traffic Vs NSDP

Year	NSDP	Trucks	Log NSDP	Log Truck	NSDP Growth	Average Growth (5 Year)
2004	19364500	220016	7.29	5.34		
2005	22158800	272756	7.35	5.44	14%	
2006	25628600	279984	7.41	5.45	16%	
2007	27234000	340542	7.44	5.53	6%	
2008	28674400	385948	7.46	5.59	5%	
2009	31676000	404326	7.50	5.61	10%	
2010	35996100	433814	7.56	5.64	14%	
2011	38650800	474226	7.59	5.68	7%	
2012	39747100	493564	7.60	5.69	3%	
2013	42718200	544201	7.63	5.74	7%	7.62%

Following figure depict regression analysis and extrapolation.

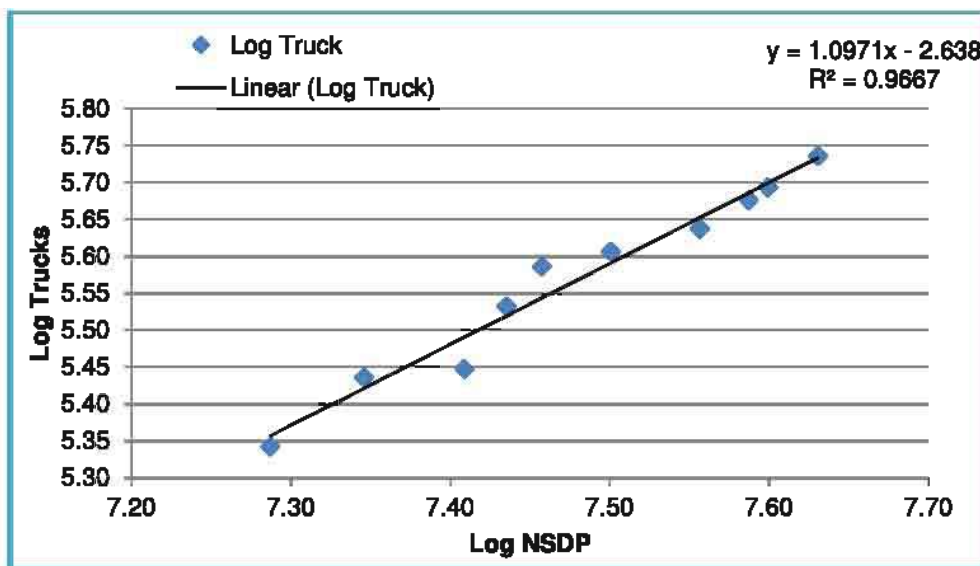


Figure 3-3 : Regression and Elasticity NSDP vs. Goods Traffic – extrapolation

Using the regression analysis above, we have arrived at the elasticity of traffic demand for each class of vehicle to a given change in relevant economic indicators. Average traffic growth of a vehicle class is multiplied by the corresponding elasticity coefficient to arrive

at traffic growth. R^2 is statistical measure of how close the data are to the fitted regression line. It varies from 0 to 1. Higher the value of R^2 more representative is the regression model of data.

The results of these analyses for the good fit as reflected by R^2 values are presented in the Table below

Table 3-4 : Summary Regression Analysis

State	Vehicle Category	Independent Variable	Regression Equation	R Square	Elasticity Coefficient (y)	Average Growth	Growth Elastic Model
Tamilnadu	Car/Jeep	PCI	$y = 1.3408x - 0.227$	$R^2 = 0.9691$	1.3408	8.52%	11.43%
	Bus	Population	$y = 11.3505x - 84.0434$	$R^2 = 0.962$	11.3505	0.70%	7.98%
	Truck	NSDP	$y = 1.0971x - 2.638$	$R^2 = 0.9667$	1.0971	7.62%	8.36%

While the economic model for predicting growth is a good tool, other local, regional, national factors such as proposed developments etc. should also be considered before finalizing growth factors. These factors are discussed in subsequent sections.

3.4 Analysis of Historic Traffic Data

Historic traffic data forms useful information for any highway project. It provides useful information for establishing past trend of growth. Project stretch of Omalur to Namakkal has been commissioned and it under tolled operation since 2009.

M/s MVR Infrastructure & Tollways Private Limited, the concessionaire of the project, was owned by erstwhile promoters up to 2013. Project ownership is now with M/s IRB Infrastructure Developers Limited. As a result of change in management, we have not been able to rely on data from the previous concessionaire and hence are unable to establish a reliable trend in the absence of sufficient data points. A minimum of 5-6 years stable traffic data is required for establishing a reliable past trend.

3.5 Other Factors Influencing Growth

There are many factors which have impact on traffic growth. As discussed previously these factors can be economic, social, educational, and industrial.



Potentiality of such factors for project highway is discussed as under.

ECONOMY

After witnessing a slowdown during 2008-09, the economy recovered in 2009-10, and a very high growth rate of GDP was recorded in 2010. Following figure depicts growth of GDP in India during the period.

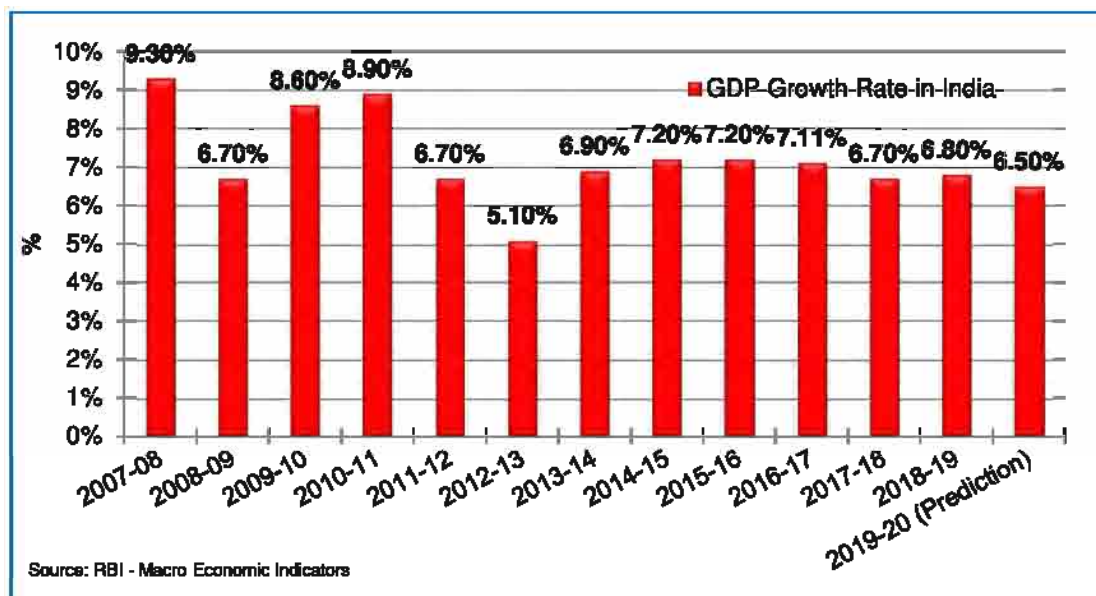


Figure 3-4 : Growth of GDP in India

After recording an all impressive growth of 8.9% in 2011, GDP declined between FY11 and FY14. GDP growth in 2014-15, 2015-16 and 2016-17 was pegged around 7.2%. FY 2017-18 recorded a growth of 6.7% which had slight impact of GST and demonetization. Indian economy appears on recovery path with estimated growth of 6.8% in FY 2018-19. Institutions like World Bank and ADB have predicted growth of GDP in Indian Economy in range of 6.5% in coming year.

Honorable Prime Minister and Government has set up a target for Indian Economy to become 5 Trillion USD economy. This would require a continuous robust growth for next 5 year. Government plans several initiatives to boost economy to achieve this target. In such case it is expected that project corridor will also witness good growth of traffic on project corridor.

3.6 Recommended Growth Rates of Traffic

Based on the above analysis and after giving due consideration to the entire listed factors, the following overall growth rates are recommended for each category of vehicle as under. Rate of growth is moderated in light of overall regional trend. Growth of Multi-



Axle is kept slightly higher as trend of technological advances in logistic industry favors multi-axle over 2/3 axle carriage. It is also expected that as the economy moves from developing to developed, rate of growth diminishes. Same growth rate is not sustainable for long. It is established practice to stepdown future growth rates at interval of 5 years.

Temporary disruptions caused by implementation of Goods and Service Tax (GST) and demonetization have dissipated, and growth of economy has significantly improved since then. Hence corridor can expect to have expected growth.

Growth rates are recommended for three scenarios for sensitivity analysis namely **Optimistic, Pessimistic** and **Most Likely** with a positive and negative variation 0.5% from Most Likely case.

Table 3-5 : Recommended Growth Rates Optimistic

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045
CAR	8.0%	7.5%	7.0%	6.5%	6.0%
Mini Bus /LCV	6.5%	6.0%	5.5%	5.0%	4.5%
Truck / Bus	7.5%	7.0%	6.5%	6.0%	5.5%
Multi Axle	8.0%	7.5%	7.0%	6.5%	6.0%

Table 3-6 : Recommended Growth Rates Pessimistic

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045
CAR	7.0%	6.5%	6.0%	5.5%	5.0%
Mini Bus /LCV	5.5%	5.0%	4.5%	4.0%	3.5%
Truck / Bus	6.5%	6.0%	5.5%	5.0%	4.5%
Multi Axle	7.0%	6.5%	6.0%	5.5%	5.0%



Table 3-7 : Recommended Growth Rates Most Likely

Year/ Vehicle Type	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045
CAR	7.5%	7.0%	6.5%	6.0%	5.5%
Mini Bus /LCV	6.0%	5.5%	5.0%	4.5%	4.0%
Truck / Bus	7.0%	6.5%	6.0%	5.5%	5.0%
Multi Axle	7.5%	7.0%	6.5%	6.0%	5.5%



CHAPTER 4

TRAFFIC FORECAST

4.1 Traffic Projections

Growth rates recommended in previous section of report are used to arrive at traffic projections for future years. Toll plaza wise futuristic traffic projection is given in tables below.

These projections have been done for following three cases of growth

1. Optimistic Scenario
2. Pessimistic Scenario
3. Most Likely Scenario

**Table 4-1 : Total Tollable Traffic @ Toll Plaza 1- Chainage 191.800 KM
(Optimistic Growth Scenario)**

Year	CAR	LCV	Truck/ Bus	Multi axle	Total No.	Total PCU (Including Non-Paid Traffic)
2019-20	14542	5078	3697	3128	26446	47330
2020-21	15706	5409	3979	3379	28473	50962
2021-22	16963	5761	4283	3649	30656	54874
2022-23	18320	6137	4609	3940	33006	59083
2023-24	19786	6536	4959	4255	35536	63615
2024-25	21368	6961	5336	4595	38260	68495
2025-26	22970	7379	5714	4940	41003	73411
2026-27	24692	7823	6120	5310	43945	78682

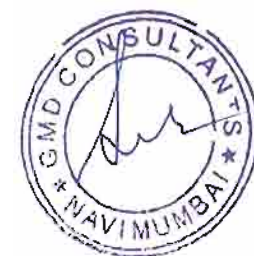


**Table 4-2 : Total Tollable Traffic @ Toll Plaza 1- Chainage 191.800 KM
(Pessimistic Growth Scenario)**

Year	CAR	LCV	Truck/ Bus	Multi axle	Total No.	Total PCU (Including Non- Paid Traffic)
2019-20	14542	5078	3697	3128	26446	47330
2020-21	15560	5358	3942	3348	28208	50489
2021-22	16648	5652	4202	3582	30084	53851
2022-23	17813	5963	4478	3833	32087	57440
2023-24	19060	6291	4772	4101	34224	61267
2024-25	20394	6637	5087	4388	36506	65357
2025-26	21720	6969	5397	4673	38759	69393
2026-27	23132	7316	5726	4976	41150	73676

**Table 4-3 : Total Tollable Traffic @ Toll Plaza 1- Chainage 191.800 KM
(Most Likely Growth Scenario)**

Year	CAR	LCV	Truck/ Bus	Multi axle	Total No.	Total PCU (Including Non- Paid Traffic)
2019-20	14542	5078	3697	3128	26446	47330
2020-21	15633	5383	3960	3363	28339	50721
2021-22	16806	5706	4241	3615	30368	54356
2022-23	18067	6049	4542	3886	32544	58254
2023-24	19423	6412	4864	4177	34876	62430
2024-25	20879	6796	5209	4490	37374	66905
2025-26	22340	7169	5553	4804	39866	71371
2026-27	23905	7564	5919	5140	42528	76138



4.2 Extension of Concession Period

Due to the suspension in toll in the year FY17 because of demonetization for a period of 24 days, the Concessionaire would be entitled to extension of additional 24 days

CHAPTER 5

FORECAST OF TOLL REVENUE

5.1 General

This chapter presents the tolling rate calculations, categories and toll revenue of the project.

5.2 Discount Categories

Fee schedule of agreement of Omalur – Namakkal section of NH-7 is based on old toll policy. As per the Toll Notification (Schedule R) the following discounts have been considered:

1. Monthly Pass: For frequent user's monthly pass would be issued at fee 30 time the single journey fee. There are other local monthly passes for car /Jeep/ Van category I and II and school bus @ Rs.150, Rs.300 and Rs.1000 respectively.
2. Multiple Journeys (for Return Trip): Will be charged at 1.5 time single journey.
3. Single Journey: Full single journey toll would be charged to this category of vehicles who are infrequent travelers or whose frequency does not yield any discount from the above categories.
4. There are several categories of local discounts.
 - a) Local Bus / truck and LCV (within 20 km) will be charged @ Rs. 25 and 15 respectively. Rate will be constant throughout concession period

Building of inflation and escalation of rate on the basis of WPI are done as per toll notification (Schedule R) as given under

$$\text{Base Fee} \times \frac{\text{WPI-B}}{\text{WPI-A}} \times \text{length of the said section.}$$

Where

- WPI-A = is the Wholesale Price Index of June, 1997 (131.4).
- WPI-B = is the Average Wholesale Price Index for the year ending March, 31st preceding the fee revision date.



5.3 Estimation of Toll Rates

As per the applicable MORTH notification and Schedule R of contract agreement, the following Base rate of fee for the categories mentioned in the table stands true in the National Highways Fee Rules applicable for contract.

Table 5-1 : Base Toll Rates June 1997

Type of Vehicle	Base Rate of Fee / Km (in Rs.)
Car, Jeep, Van or Jeep	0.40
Light Commercial Vehicle, (LCV)	0.70
Bus or Truck (2 Axle)	1.40
MAV (> 2 axle)	2.25

Factor of inflation / growth has been incorporated as per Schedule R. WPI are available up to 2018-19. A moderate growth in Wholesale Price Index (WPI) has been assumed after that. Following graph provides projection of rate of inflation (WPI) in India. Data has been taken from Office of Economic Advisor web site (www.eaindustry.nic.in). WPI for year 2017-18 and 2018-2019 is worked back by applying a correlation factor for 2004-05 series as 2017-18 and 2018-2019 data is available in 2011-12 series only. Ratio of WPI for year 2016-17 for both series is used for conversion of WPI in 2004-05 series.

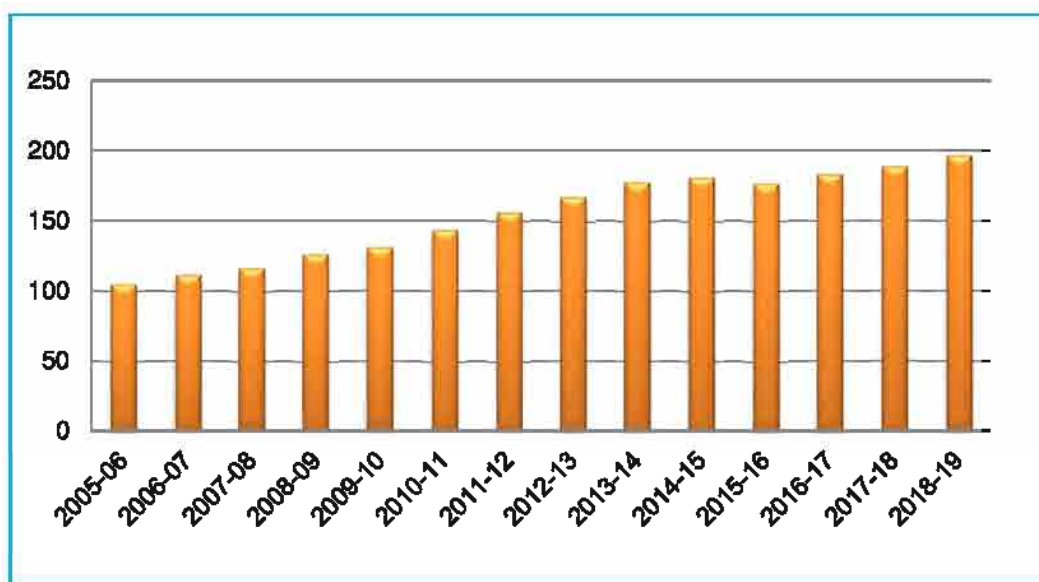


Figure 5-1 : Historical Rate of WPI Inflation in India



Except the negative growth of WPI in year 2015-16 average inflation in WPI from year 2005-2019 is 5%. Same is considered for projection of WPI in future years.

Toll rates are calculated as per guidelines provided in schedule R (rounded to nearest Rs. five) for the concession period and are given below.

Thus worked out rates for various categories of vehicle and discounts are given as under

Table 5-2 : Toll Rates for Single Journey @ 191.800

Year	Car/ Jeep/ Van	LCV	Truck/ Bus	Multi Axle (> 2 axle)	Car - LCO	LCV - LTO	Truck/ Bus - LTO
2019-20	75	135	270	435	15	15	25
2020-21	80	140	285	455	15	15	25
2021-22	85	150	295	475	15	15	25
2022-23	90	155	310	500	15	15	25
2023-24	95	165	330	525	15	15	25
2024-25	100	170	345	555	15	15	25
2025-26	105	180	360	580	15	15	25
2026-27	110	190	380	610	15	15	25

Table 5-3 : Toll Rates for Multiple Journeys @ 191.800

Year	Car	Mini Bus /LCV	Truck/ Bus	Multi Axle
2019-20	115	200	405	650
2020-21	120	210	425	680
2021-22	125	225	445	715
2022-23	135	235	470	750
2023-24	140	245	490	790
2024-25	145	260	515	830
2025-26	155	270	540	870
2026-27	160	285	570	915



Table 5-4 : Toll Rates for Monthly Pass @ 191,800

Year	Car/ Jeep/ Van	LCV	Truck/ Bus	Multi Axle (> 2 axle)	Car - LT1	Car - LT2	School Bus
2019-20	2310	4040	8085	12990	150	300	1000
2020-21	2425	4245	8490	13640	150	300	1000
2021-22	2545	4455	8910	14325	150	300	1000
2022-23	2675	4680	9360	15040	150	300	1000
2023-24	2805	4915	9825	15790	150	300	1000
2024-25	2950	5160	10315	16580	150	300	1000
2025-26	3095	5415	10835	17410	150	300	1000
2026-27	3250	5685	11375	18280	150	300	1000

5.4 Toll Revenue

As indicated earlier, toll revenue on the Project Road has been calculated under in all three scenarios. The estimates of toll revenue under *Optimistic*, *Pessimistic* and *Most Likely* growth scenarios are presented in the following section.

5.5 Toll Revenue at all toll plazas under Scenarios

Toll Revenue estimates under most likely scenario at each of the toll plaza up to 2026-27 (End of Concession Period) starting from the year 2020-21 are shown in tables below.



Table 5-5 : Toll Revenue Optimistic Scenario**(Rs. Crores)**

Year	Toll Plaza 191.800	Total
2019-20	108.69	108.69
2020-21	121.47	121.47
2021-22	137.45	137.45
2022-23	155.07	155.07
2023-24	175.95	175.95
2024-25	198.46	198.46
2025-26	223.58	223.58
2026-27	250.68	250.68

Table 5-6 : Toll Revenue Pessimistic Scenario**(Rs. Crores)**

Year	Toll Plaza 191.800	Total
2019-20	108.69	108.69
2020-21	120.35	120.35
2021-22	134.92	134.92
2022-23	150.80	150.80
2023-24	169.52	169.52
2024-25	189.44	189.44
2025-26	211.44	211.44
2026-27	234.85	234.85



**Table 5-7 : Toll Revenue Most Likely Scenario
(Rs. Crores)**

Year	Toll Plaza 191.800	Total
2019-20	108.69	108.69
2020-21	120.92	120.92
2021-22	136.19	136.19
2022-23	152.94	152.94
2023-24	172.74	172.74
2024-25	193.93	193.93
2025-26	217.45	217.45
2026-27	242.70	242.70



CHAPTER 6

OPERATION & MAINTENANCE

6.1 Operation & Maintenance

Following are project parameters which would contribute towards cost of operation and maintenance.

Future cost of operation and maintenance is estimate on engineering judgment and experience basis. Keeping all above factors in view, following can be basis of working out cost of operation and maintenance for project corridor from Talegaon to Amravati on NH-6 in state of Maharashtra.

- b) **Annual Regular Maintenance** – Covering pothole repair, shoulder and slope repair, drain cleaning, median maintenance, Crash barrier, toll plaza maintenance, Toll collection, other services like medical help and rescue operations etc.
- c) **Periodic Maintenance** – This will be done on periodic basis say every 5 years. It will consist of overlaying of wearing course and painting and marking. Some pavement strengthening is also anticipated in few sections. This operation and its cost are spread over three years.

Concessionaire has recently updated the program of maintenance of project road. Same has been reviewed and year-wise cost of O&M from year 2019-20 is given in table below.



Table 6-1 : O&M COST

Year	Annual maintenance (Rs. Cr)	Thermoplastic painting (Rs. Cr)	Renewal Coat with BC (Rs. Cr.)	Special Repair of pavement	Structure maintenance (Rs. Cr)	Electric System		Total Expenditure (Rs. Crores)	Remarks
						Annual			
2019-20	5.13	1.51	6.08	5.71	0.14	0.23	0.23	19.75	Renewal of Wearing course + Pavement repair
2020-21	5.13				0.14	0.23	0.23	6.07	Regular O & M
2021-22	5.13				0.14	0.23	0.23	6.37	Regular O & M
2022-23	5.13				0.14	0.23	0.23	6.69	Regular O & M
2023-24	5.13	1.51	6.08	6.23	0.14	0.23	0.23	24.66	Renewal of Wearing course + Pavement repair
2024-25	5.13	1.51	6.08	5.71	0.14	0.23	0.23	25.20	Renewal of Wearing course + Pavement repair
2025-26	5.13				0.14	0.23	0.23	7.75	Regular O & M
2026-27	5.13				0.14	0.23	0.23	8.13	Regular O & M



CHAPTER 7

CONCLUSION & RECOMMENDATIONS

7.1 Conclusion & Recommendations

Project stretch of Omalur to Namakkal section of NH-7 in state of Tamilnadu from km 180.000 to km 248.625 is presently a four lane road. The road is in sound condition and serves healthy traffic volumes. The project corridor is a part of critical North – South connectivity via national highway NH-7. Bangalore has already emerged as IT capital of country and the project stretch falls in its catchment. There are many upcoming projects in area which are proposed to boost economic growth of area and add value to development of the region. All the developments considered in the Report have the potential to have a positive impact to traffic flow on project. Following can considered as major outcome of study

- a) There is a healthy volume of tollable traffic running on project
- b) Project corridor has the potential to witness traffic growth @ 6-8% annually in near future due to various development in area and overall development of economy
- c) Project corridor does not have risk of traffic leakage due to lack of competing roads of comparable quality

The project infrastructure is in good condition and its maintenance cost is also reasonable.

Based on above it can be considered a stable healthy project from traffic and revenue point of view.



CHAPTER 8

PROJECT ILLUSTRATIONS

8.1 General

Project current condition has been depicted in the following photographs



Figure 8-1 : General Project Condition



Figure 8-2 : Toll Plaza





Figure 8-3 General Project Condition



Figure 8-4 General Project Condition





GMD Consultants

503, Mayuresh Chambers Premises, Sector 11,
Plot No 60, CBD Belapur, Navi Mumbai - 400614,
Maharashtra, India

T: +91-22-2756 5313 / +91-22-2756 4586.

Email : info@gmdconsultants.in

Web : www.gmdconsultants.in



Annexure G – Details of borrowings

Details of Borrowings or repayment of borrowings on standalone and consolidated are as follows:
 (Amt in lakhs)

Particulars	Opening Balance	Loan availed during the period	Loan repaid during the period	Closing Balance
Secured loan				
Loan from SBI	1,02,488.81	-	1,564.46	1,00,924.35
Loan from IDFC bank	48,810.00	-	750.00	48,060.00
	1,51,298.81	-	2,314.46	1,48,984.35

- CARE Ratings Limited has reaffirmed “CARE AAA; Stable” to long term bank facilities of Rs.153,636 Lakhs availed by the Trust.
- The last repayment date for the above borrowings from SBI as well as IDFC bank is March, 2033.



Annexure H – Details of operating expenses at consolidated level

(Amt in lakhs)

Sr. No.	Particulars	Half year ended September 30, 2019
1	Operational expenses	3,521.38
2	Valuation expenses	16.18
3	Annual Listing Fees	30.41
4	Trustee Fees	14.75
5	Audit fees	26.42
6	Insurance & security expenses	608.86
7	Employee benefits expenses	1,378.15
8	Project management fees*	5,800.05
9	Investment management fees	602.07
10	Depreciation on property, plant and equipment	1.40
11	Amortisation of intangible assets	33,772.76
12	Finance costs (Interest)	7,867.70
13	Finance costs (Others)	571.49
14	Repairs and maintenance	149.15
15	Legal and professional fees	56.22
16	Other expenses **	585.23
Total Expenses and losses		55,002.22

* Project management fees do not include major maintenance of Rs. 6,474.43 lakhs incurred during the six month ended September 2019 and for which the provision for major maintenance was made in earlier years.

** Other expenses include printing and stationery, rent, rates and taxes and other miscellaneous expenses.



Annexure I

MATERIAL LITIGATION AND REGULATORY ACTION

Except as stated in this report and annexures, there is no material litigation or regulatory action, pending against (i) the Trust, the Sponsor, the Investment Manager, the Project Manager, the Trustee, and (ii) the Associates of the Trust, the Sponsor, the Project Manager and the Investment Manager. As per confirmation provided by the Sponsor, the Project Manager or their Associates, except as stated in this report and annexures (i) There are no material update on litigations & regulatory actions against them disclosed earlier (ii) There are no additional material litigations or regulatory actions which may have bearing on their activities or revenues or cash flows.

Material Litigation against the Investment Manager and the Project SPVs

IRB Infrastructure Private Limited

Pending Civil Litigation against the IRB Infrastructure Private Limited

1. Anishaben (“**Appellant**”) preferred an appeal before the Additional District Judge of Nadiad against Special Land Acquisition Officer, the IRB Infrastructure Pvt. Ltd., NHAI and Collector, Kheda (“**Respondents**”) seeking that the order (“**Order**”) passed by the Additional Senior Civil Judge, Nadiad be dismissed on account of erroneous assessment of documental proofs and other proofs. Pursuant to the Order, the Appellant’s tentative stay order under Order 39 Rule 1 of the CPC was rejected by the Additional Senior Civil Judge, Nadiad on the grounds that the public interest would be hampered if the stay was imposed. The Appellant had originally filed a civil case bearing No. 168 of 2015 before the Principal Senior Civil Judge, Nadiad against the Respondents seeking that the Respondents be prohibited from constructing, farming, entering the Appellant’s land or constructing any illegal structure on the ground that the alleged construction by Respondents resulted in causing damage to the crops of the Appellant and was done without completing the procedure for land acquisition. The matter is currently pending.

Pending Regulatory Action against the IRB Infrastructure Private Limited

1. The Assistant Conservator of Forests, Forest Department, Pune, has issued notice to the Investment Manager directing to show cause as to why no legal proceedings should be initiated against the Investment Manager under the provisions of the Indian Wildlife Protection Act, 1972, for negligence on the part of the Investment Manager in the installation and repairing of the compound adjoining the Mumbai – Pune Expressway which is meant to prevent wild animals from entering the highway. Such negligence resulted in the death of 1 (one) male leopard. The notice demands the Investment Manager to record its statement personally in the offices of the Assistant Conservator of Forests, Forest Department, Pune. MIPL has replied to the said notice. No further communication has been received in this regard.





IRB Jaipur Deoli Tollway Ltd. (“IJDTPL”)

Pending Criminal Litigation against IJDTPL

1. Pradeep Sogani, Shankar Lal Sharma and certain others (collectively the “**Complainants**”) have lodged 10 first information reports against Virendra Mahiskar, Managing Director, IRB Infrastructure Developers Limited, Vivek Chouhan (the project manager and the authorised signatory of the Sponsor) and certain others (collectively the “**Accused**”) with the Chaksu Police Station. The aforesaid first information reports were lodged on the alleged ground that there was delay in the release of payments on the part of the Accused towards the purchase of various materials from the Complainants. The matter is currently pending.

Pending Civil Litigation against IJDTPL

1. Jagannath University (the “**Petitioner**”) had filed a writ petition before the Rajasthan High Court against the project manager of IJDTPL and certain others (the “**Respondent**”) seeking that the Respondents be directed to issue monthly pass to the buses/ vehicles of the Petitioner for the toll fee of Rs. 215 per month as per the notification dated April 8, 2013 and (b) any other appropriate relief in favour of the Petitioner which the court deems fit. The said relief has been sought on the alleged grounds that the Respondents had previously issued a monthly pass of a higher denomination without taking into consideration the non-commercial nature of the vehicles of the Petitioner, which was in violation of Clause 3 of the notification dated April 8, 2013. Further, the Petitioner has also filed a stay application before the Rajasthan High Court seeking that during the pendency of the writ petition, the Respondents be directed to permit the vehicles of the Petitioner on the toll fee of Rs. 215 per month. The project manager of IJDTPL has filed its reply denying the averments made by the Petitioner. The matter is currently pending.
2. Girdhari Lal Jat had filed writ petition against IRB Jaipur Deoli Tollway Pvt. Ltd. and others in Rajasthan High Court, Jaipur Bench, with respect to the National Highway 12 (Jaipur – Tonk - Deoli section), praying that directions to be given to respondents to take stern action in the matter of removal of illegal barricades in the villages Khajalpura, Dhar Mod, Barkheda and Bhadarwas, to do enquiry against the wrongdoers who have been involved in installing the said illegal barriers, etc. The matter is pending.

IRB Pathankot Amritsar Toll Road Limited (“IPATRPL”)

Other Proceedings involving IPATRPL

1. IPATRPL has initiated arbitration proceedings against National Highways Authority of India (“NHA”) before Arbitration Tribunal consisting of Justice (Retd) Ajit Prakash Shah, Presiding Arbitrator, Mr. S S. Agarwal, Arbitrator & Mr. Navin Kumar, IAS (Retd.) The claim is for sum of Rs. 252.25 crores and extension in concession period by 518 days. IPATRPL requested to NHA to extend the concession period by 518 days, as NHA has granted extension of time of 518 days for completion of construction due to the reasons not attributable to the IPATRPL.



IPATRPL invoked arbitration against NHAI. NHAI had rejected the claim of IPATRPL. IPATRPL had submitted its claim on account of losses and requested NHAI for appointment of other Arbitrator. NHAI had refused the request for appointment of arbitrator. As per the provisions of Concession Agreement, IPATRPL requested Indian road congress to appoint arbitrator on behalf of NHAI. Subsequently, on NHAI had appointed Mr Navin Kumar as the Arbitrator. Both the Arbitrators mutually appointed Justice (Retd) Ajit Prakash Shah as the Presiding Arbitrator. The matter is pending.

2. IPATRPL has initiated arbitration proceedings against National Highways Authority of India (“NHAI”) Arbitration Tribunal consists of Dr. Mr B N Singh, Presiding Arbitrator Mr. V K. Agarwal, Arbitrator & Mr. Navin Kumar, IAS (Retd.) Arbitrator for a sum of Rs. 127.5 Crores (Change of Scope) and Rs. 22.842 Crore towards Mining ban. . IPATRPL has submitted a claim of on account of Change of Scope work executed by it. Change of Scope of Rs. 14.5 Crs has been approved by NHAI and balance amount is under dispute. Both the Parties have submitted admission and denial with respect to statement of claims. The matter is pending.

Pending Regulatory Action involving IPATRPL

1. Employees’ State Insurance Corporation, sub-regional office Marol (“ESI”) issued a notice to IPATRPL demanding payment of Rs. 83,637/- towards pending employers contributions and employees’ contributions required to be paid by IPATRPL, in its capacity as the principal employer, under Section 40 read with Section 39 of the Employees’ State Insurance Act, 1948. Further, ESI has also directed IPATRPL to show cause as to why the assessment of an amount of ` 5.83 million towards contributions payable in respect of the employees should not be recovered from IPATRPL. IPATRPL has replied to the aforementioned notice. No further communication has been received in this regard.

IRB Surat Dahisar Tollway Ltd. (“ISDTL”)

Pending Civil Litigation against ISDTL

1. Mr. Vasantrai Harilal Gohil and Mr. Vijay Vasantrai Gohil (the “Plaintiffs”) have filed a special civil suit before the Court of the Civil Judge (Senior Division) at Vasai, against the Sponsor, certain directors of the Sponsor and IRB Surat Dahisar Tollway Pvt. Ltd. The Plaintiffs have alleged that on January 5, 2011, certain employees of the Sponsor acted violently and forcefully with them when they could not provide a money change at the toll plaza at Khanivade, Taluka Vasai. The Plaintiffs have alleged that they were chased, threatened and beaten by the employees of the Sponsor which resulted in serious injuries. The Plaintiffs have sought a direction that the Sponsor and its directors be directed to pay the medical expenses of Rs. 0.5 million incurred by the Plaintiffs along with damages of Rs. 50 million with interest. The Plaintiffs have also sought a direction from the court requiring the Sponsor and the directors to disclose on oath, their respective movable and immovable property and to record charge of Rs. 50.5 million over such property until the decretal amount is paid. The Plaintiffs have filed an application for adding ISDTL as a necessary party in the suit. The ISDTL, its directors and employees have filed their reply in the matter. The Civil Judge (Senior Division) at Vasai has vide its Judgement dated 9/7/2019 directed the respondents jointly and severally to pay Rs. 50





Lakhs with interest at the rate of 9% p.a. to the Plaintiffs. IRB Surat Dahisar Tollway Pvt. Ltd. has filed writ petition in Bombay High Court challenging the Judgement of the Vasai Court Dated 9/7/2019. The matter is pending.

2. Jimmy Gonsalves and another (the “**Petitioners**”) have filed a public interest litigation before the High Court of Bombay against the MoRTH, NHAI, ISDTL and Ideal Road Builders Private Limited and certain others (the “**Respondents**”). The Petitioners have inter alia alleged that commuters are facing hardship and inconvenience due to traffic at Varsova Creek bridge and that ISDTL has denied its duty to build a new bridge on Varsova Creek, and have sought inter alia, that MoRTH be directed to take steps for the construction of a third bridge on Varsova Creek and that all vehicles travelling from Khaniwade toll on NH-8 and Ghodbunder Road toll on the state highway be exempt from toll till the completion of said new bridge. ISDTL and Ideal Road Builders Private Limited are yet to file their respective replies in this matter. The matter is currently pending.
3. IRB Surat Dahisar Tollway Limited had initiated arbitration proceedings against National Highways Authority of India, in the Arbitration Tribunal consisting of Mr. S. S. Agarwal, Presiding Arbitrator, Mr. M. K. Agarwal, Arbitrator and Mr. A B Desai Arbitrator. The Concession Agreement allows Concessionaire (IRB Surat Dahisar Tollway Limited) to design optimally as per specifications. Accordingly, Concessionaire had designed the longitudinal drains to carry peak hours run-off. Hence, Indicative Typical cross section show covered drains. When Concessionaire had submitted his design to Independent Engineer, there were no comments. Hence, Concessionaire constructed the drains in accordance with the technical specifications. Subsequently, Independent Engineer / National Highway Authority of India (NHAI) claimed that provision of earthen drains in lieu of covered drains (RCC type as interpreted by Independent Engineer) amounted to negative Change Of Scope. This has been disputed and matter is before the Arbitral Tribunal. The arbitral tribunal has vide its majority award dated 18/08/2018, rejected the claim of Independent Engineer / NHAI. NHAI had filed the writ petition in Delhi High Court challenging the arbitration award. The matter is pending.
4. IRB Surat Dahisar Tollway Limited had initiated arbitration proceedings against National Highways Authority of India, in the Arbitration Tribunal consisting of Shri A B Desai. Based on audit observation of Central Govt, National Highways Authority of India (NHAI) demanded recovery of Rs 16.8 Crore on account of non-recovery of Premium during the period - August 2016 to October 2016 (subsequently NHAI has revised its claim to Rs 75.16 Cr plus applicable interest. ISDTL has submitted a counter claim of Rs 204.85 Cr). However, ISDTL responded to the demand of NHAI stating that no additional fee beyond ‘Realisable Fee’ i.e. include fees that the Concessionaire has not been able to realise after due diligence and best efforts. ISDTL invoked arbitration proceedings and appointed Shri A B Desai. The matter is pending.

Pending Regulatory Action involving ISDTL

1. ISDTL has received certain notices from NHAI alleging short recovery of revenue share (annual traffic count) for the period between the years 2009 and 2013 and as per the latest notice a payment of Rs. 328.91 million was demanded from ISDTL. Subsequently, an assessment was carried out by an independent engineer appointed by NHAI and the liability of ISDTL was





assessed to the extent of Rs. 8.38 million. While ISDTL has paid such amount under protest, it has invoked conciliation proceedings for an amicable settlement under the relevant provisions of the concession agreement entered into between ISDTL and NHAI. The matter is currently pending.

M.V.R. Infrastructure and Tollways Ltd. ("MITPL")

Pending Civil Litigation against MITPL

1. Certain colleges in Salem (the "**Petitioners**") have filed 25 writ petitions before the High Court of Madras, against MITPL and others (collectively the "**Respondents**") alleging the legality of act of collecting entry fee at increased rates from college buses. The Petitioners have sought the directions against Respondents to collect entry fee at toll plaza for educational institution vehicles at par with that of school buses. An order was passed by the High Court of Madras, which took into consideration various petitions filed against MITPL regarding the above mentioned issue and held that the discounted rates were only applicable to school buses carrying school students and not to college buses. However, the High Court of Madras passed an order granting an interim stay and ordered MITPL to collect entry fee from the college buses of the Petitioners at par with the rates applicable to school buses. The matter is currently pending.

Other Proceedings involving MITPL

1. MITPL had initiated arbitration proceedings against National Highways Authority of India ("NHAI") before the Arbitration Tribunal Consisting of Dr. Justice Arijit Pasayat (Retd.), Presiding Arbitrator Mr. S.S.Agarwal, (Retd.) Arbitrator and Mr. Navin Kumar, IAS (Retd.) Arbitrator, for its claim to the tune of Rs. 5.14 Crores (towards positive Change of scope for construction of additional arm of flyover) and Rs. 0.26 Crore (negative Change of Scope on account of deletion of 19 hume pipe culverts). The conciliation meeting between NHAI and MITPL meeting was concluded. As NHAI did not responded on the matter, MITPL invoked Arbitration proceedings against NHAI. MITPL had submitted its statement of claims against NHAI. NHAI had filed its counter claim. The matter is pending.

Taxation Proceedings involving MVRITPL

1. There are one direct tax proceedings pending against MVR, which involve an aggregate amount of Rs. 9.46 million.

IDAA Infrastructure Ltd. ("IDAAIPL")

1. There are one indirect tax proceedings pending against IDAA, which involve an aggregate amount of Rs. 9.37 million.





Material Litigations against Sponsor/Project Manager/Associates of the Sponsor

IRB Kolhapur Integrated Road Development Company Private Limited (“IKIRDCPL”)

Pending Civil Litigation against IKIRDCPL

1. IKIRDCPL and Dhananjay K. Joshi (collectively the “**Petitioners**”) have filed a writ petition before the High Court of Bombay against the State of Maharashtra, Maharashtra State Road Development Corporation Limited (“**MSRDC**”), Kolhapur Municipal Corporation and Public Works Department seeking *inter alia* that (a) a writ of mandamus or in the nature of mandamus or any other writ, order and/or direction be passed to quash or set aside the notification dated January 22, 2015 constituting the committee for suggesting alternative to toll and all actions taken by the said committee and (b) a writ of mandamus or in the nature of mandamus or any other writ, order and/or direction be passed to quash or set aside the notification dated February 9, 2015 constituting the committee for re-valuation of the IKIRDCPL project and all actions taken by the said committee. The said relief has been sought *inter alia* on the alleged ground that the notification dated January 22, 2015 and notification dated February 9, 2015 constitute an unlawful and illegal interference with the Petitioner’s statutory right to collect toll under the toll collection notification dated December 17, 2011 for the duration of 30 years. The parties have filed consent terms in this matter. Hence, vide the order dated 24/9/2019 of the Bombay High Court, the petition is disposed of.

Mhaiskar Infrastructure Private Limited (“MIPL”)

Other Proceedings involving MIPL

1. MIPL (the “**Petitioner**”) has filed a writ petition before the High Court of Bombay, against Maharashtra State Road Development Corporation (“**MSRDC**”). The Petitioner had entered into an agreement with MSRDC in the year 2004, wherein it was required to act as an agent of MSRDC for the purpose of expansion of roads and construction of bridges on NH No. 4. The Petitioner was required to pay MSRDC upfront amount of Rs. 9,180 million on or before August 15, 2008. The Collector of Stamps and other authorities called upon the Petitioner to pay the deficit stamp duty of Rs. 275.4 million along with the penalty of Rs. 49.57 million levied from the date of the execution of the agreement to the date of issuance of the notice by the Collector of Stamps, under the Bombay Stamp Act, 1958. An order was passed by the High Court of Bombay wherein it placed the petition to be heard along with similar petitions before the Chief Justice for further appropriate orders. The High Court of Bombay has vide its order dated 3/9/2019 dismissed the petition for non – prosecution. The Petitioner has filed application in this matter praying to set aside / recall its order dated 3/9/2019 and restore the writ petition.

Pending Regulatory Action involving MIPL

1. MIPL has received notice from Collector of Stamps Andheri, calling upon to pay deficit stamp duty of Rs. 15,00,000/- and Penalty thereon of Rs. 53,40,000/-, on the Contract agreement dated 4/8/2004. MIPL has replied to the notice of Collector of Stamps Andheri.



***Ideal Road Builders Private Limited (“IRBPL”)******Pending Regulatory Action involving IRBPL***

1. IRBPL has received notice from Collector of Stamps Andheri calling upon to pay deficit stamp duty of Rs. 7,25,000/- and Penalty thereon of Rs. 28,71,000/-, on the Contract agreement dated 27/11/2002. IRBPL has replied to the notice of Collector of Stamps Andheri.

IRB Ahmedabad Vadodara Super Express Tollway Private Limited (“IRBAV”)**Other Proceedings involving IRBAV**

1. IRBAV has received award from Hon’ble High court for continuation of relief from payment of Premium to NIIAI till the outcome of Section 17 proceedings under Arbitration.

Material Litigations against the Trustee***Pending Civil Litigations against the Trustee***

1. Hubtown Limited (the “Plaintiff”) had filed a case before the High Court of Bombay against the Trustee and its directors (the “Defendants”) for having informed the bankers of the Plaintiff regarding the defaults committed by the Plaintiff. The Trustee has stated that the Plaintiff is a guarantor for the debt for which the Trustee is acting as a debenture trustee and in case of defaults, the relevant documents authorize the Trustee to share information about such default to CIBIL/RBI and other creditors. The aggregate amount claimed is Rs. 3000 million. The matter is currently pending in the Court for settlement.
2. SBI Cap Trustee (the “Plaintiff”) had filed a suit before the City Civil Court, Bangalore against the Trustee and others (the “Defendants”) requiring sale of pledged shares for a particular price by SREI Fund/Investors, for whom the Trustee was acting as the share pledge trustee. The Plaintiff was acting for a consortium of lenders and has residual interest. The aggregate claim amount is Rs. 1,550.3 million. The matter is pending.
3. Balmer Lawrie and Company Limited and another (the “Plaintiffs”) had filed a petition before the Calcutta High Court against the Trustee and certain others (the “Defendants”) challenging the validity of the sale transaction of 1,48,20,000 shares in Transafe Services Limited by the Defendant to the Plaintiff. The Plaintiffs have inter alia sought (a) the recovery of consideration received by the Defendants for the allegedly void contract being Rs. 237.12 million and (b) interest at the rate of 18% per annum on the decretal amount. The matter is currently pending..
4. Reliance Project Ventures and Management Private Limited and another (the “Plaintiffs”) had filed a commercial suit before the Bombay High Court against the Trustee and ECL Finance Limited and others (the “Defendants”) declaring the sale and transfer of pledged shares by Defendants to be illegal, null and void and to restore and reconstitute the said pledged shares by making necessary purchases from the market. The aggregate claim amount is Rs. 27344.10 million is against the Edelweiss entities and not against the Trustee. The single bench of the Bombay High Court has rejected the ad-interim reliefs of the Plaintiffs, therefore the Plaintiffs have now approached the Division Bench of the Bombay High Court with their pleas. The Plaintiffs/Appellants has withdrawn the said appeal filed before the Division Bench of the Bombay High Court hence the said appeals stands dismissed as not pressed vide order dated July 9, 2019. The matter before the single bench of the Bombay High Court is currently pending.





Annexure J

RISK FACTORS

(In this section “We”, “Our”, “InvIT” means “the Trust and/or Project SPVs owned by the Trust”)

Risks Related to our Organization and the Structure of the Trust

1. The debt financing provided by the Trust to each of the Project SPVs comprises of certain unsecured, interest free and interest-bearing loans as well as loans that is secured by a subordinate charge on (i) the cash flows deposited in the escrow account and (ii) the escrow account of such Project SPV. The payment obligations of the respective Project SPVs in relation to such debt financing will be subordinated to all existing and future obligations of the Project SPVs towards any secured senior lenders.
2. Any payment by the Project SPVs, including in an event of termination of the relevant concession agreement, is subject to a mandatory escrow arrangement which restricts their flexibility to utilise the available funds.
3. The regulatory framework governing infrastructure investment trusts in India is untested and the interpretation and enforcement thereof involve uncertainties, which may have a material, adverse effect on the ability of certain categories of investors to invest in the Units, our business, financial condition and results of operations and our ability to make distributions to Unitholders.
4. We must maintain certain investment ratios, which may present additional risks to us.
5. The Valuation Report, and any underlying reports, are not opinions on the commercial merits of the Trust or the Project SPVs, nor are they opinions, expressed or implied, as to the future trading price of the Units and the valuation contained therein may not be indicative of the true value of the Project SPVs’ assets.
6. Certain of the Project SPVs have experienced losses in prior years and any losses in the future could adversely affect our business, financial condition and results of operations, our ability to make distributions to the Unitholders and the trading price of our Units.
7. We may not be able to make distributions to Unitholders or the level of distributions may fall.
8. We expect to derive a substantial amount of our revenues from the operation of the Surat–Dahisar NH 8 Project, the Tumkur–Chitradurga NH 4 Project and the Bharuch–Surat NH 8 Project. Any factors adversely affecting these projects could have a material, adverse effect on our business, financial condition and results of operations.

Risks Related to Our Business and Industry

9. Our failure to extend applicable concession agreements or our inability to identify and acquire new road assets that generate comparable or higher revenue, profits or cash flows than the Project SPVs may have a material adverse impact on our business, financial condition and results of operations and our ability to make distributions.
10. The Project SPVs’ toll-road concessions may be terminated prematurely under certain circumstances.
11. A decline in traffic volumes would materially and adversely affect our business prospects, financial condition and results of operations and our ability to make distributions to Unitholders.
12. Certain investigations are pending against the Related Parties of the Sponsor, the outcome of which may materially and adversely affect the Sponsor / our reputation, business and financial condition.
13. IRB Tumkur Chitradurga Tollway Limited (ITCTPL) and M.V.R. Infrastructure And Tollways Limited (MITPL) are required to pay annual premiums / negative grants in consideration for being





- granted the right to build and operate their respective projects. Failure to make such payments could result in the termination of the relevant concession agreement by the NHAI.
14. Changes in the policies adopted by governmental entities or in the relationships of any member of the Trust Group with the Government or State Governments could materially and adversely affect our business, financial performance and results of operations.
 15. Certain provisions of the standard form of concession agreement may be non-negotiable or untested, and the concession agreements may contain certain restrictive terms and conditions which may be subject to varying interpretations.
 16. We may be subject to increases in costs, including operation and maintenance costs, which we cannot recover by increasing toll fees under the concession agreements.
 17. Certain actions of the Project SPVs require the prior approval of the NHAI, and no assurance can be given that the NHAI will approve such actions in a timely manner or at all.
 18. Leakage of the toll fees on the Project SPVs' roads may materially and adversely affect our revenues and financial condition.
 19. We will depend on certain directors, executive officers and key employees of the Investment Manager, the Project Manager and the Project SPVs, and such entities may be unable to retain such personnel or to replace them with similarly qualified personnel, which could have a material, adverse effect on the business, financial condition, results of operations and prospects of the Trust Group.
 20. There can be no assurance that we will be able to successfully undertake future acquisitions of road assets or efficiently manage the infrastructure road assets we have acquired or may acquire in the future.
 21. The Project SPVs' concessions are illiquid in nature, which may make it difficult for us to realise, sell or dispose of our shareholdings in the Project SPVs.
 22. The Project SPVs may be required to undertake certain development of the Road Assets owned by the Trust, which may present additional risks to us.
 23. The Project SPVs may not be able to comply with their maintenance obligations under the concession agreements, which may result in the termination of the concession agreements, the suspension of the Project SPVs' rights to collect tolls or the requirement that the Project SPVs pay compensation or damages to the NHAI.
 24. Our insurance policies may not provide adequate protection against various risks associated with our operations.
 25. The Project SPVs, the Sponsor, the Investment Manager, the Project Manager and the Trustee are involved in certain legal and other proceedings, which may not be decided in their favour.
 26. ISDTPL has filed claims before the NHAI and governmental entities in relation to certain disputes arising out of the Surat-Dahisar NH 8 Project, which are still pending and may not be decided in IRB Surat Dahisar Tollway Limited's (ISDTPL) favour.
 27. We do not own the "IRB" trademark and logo. Our license to use the "IRB" trademark and logo may be terminated under certain circumstances and our ability to use the trademark and logo may be impaired.
 28. We will depend on various third parties to undertake certain activities in relation to the operation and maintenance of the Initial Road Assets. Any delay, default or unsatisfactory performance by these third parties could materially and adversely affect our ability to effectively operate or maintain the Initial Road Assets.
 29. The Project SPVs may be held liable for the payment of wages to the contract labourers engaged indirectly in our operations.
 30. Our contingent liabilities could adversely affect our results of operations, cash flows and financial condition.
 31. Our actual results may be materially different from the expectations expressed or implied in the Revenue, Profit and Cash Flow Projections and the assumptions are inherently uncertain and are subject to significant business, economic, financial, regulatory and competitive risks and uncertainties that could cause actual results to differ materially from those projected.





32. Our business will be subject to seasonal fluctuations that may affect our cash flows.
33. Certain Project SPVs' operations and revenue are, currently, geographically concentrated in Gujarat, Maharashtra and other Indian states and consequently we will be exposed to certain risks emanating therefrom.
34. The Initial Road Assets are concentrated in the infrastructure sector and toll-road industry in India, and our business could be adversely affected by an economic downturn in that sector or industry.
35. Political and other agitations against the collection of tolls may affect our ability to collect tolls over prolonged periods, which could have a material, adverse effect on our business, results of operation and financial condition.
36. The cost of implementing new technologies for collection of tolls and monitoring our projects could materially and adversely affect our business, financial condition and results of operations.
37. We may be unable to renew or maintain the statutory and regulatory permits and approvals required to operate the Initial Road Assets.
38. Compliance with, and changes in, safety, health and environmental laws and regulations in India may materially and adversely affect our business.
39. The Project SPVs' financing agreements entail interest at variable rates, and any increases in interest rates may adversely affect our results of operations, financial condition and cash flows.
40. The Project SPVs are subject to restrictive covenants under their financing agreements that could limit our flexibility in managing our business or to use cash or other assets.
41. We have obtained a credit rating of IND AAA for the senior debt of the Trust from India Ratings and Research, assuming the Trust's consolidated "external debt" (including debt availed by InvIT and the Project SPVs from banks and institutions but excluding debt infused by InvIT into the Project SPVs) as on March 31, 2017 would be up to Rs. 10 billion. We have also obtained a credit rating of CARE AAA from CARE Ratings, assuming that the debt exposure of the Trust Group does not exceed Rs. 10 billion after the Listing. Any downgrade of our credit rating may restrict our access to capital and materially and adversely affect our business, financial condition and results of operations. We will enter into related-party transactions. There can be no assurance that we could not have achieved more favourable terms if such transactions had been entered into with third parties.
42. We will enter into related-party transactions. There can be no assurance that we could not have achieved more favourable terms if such transactions had been entered into with third parties.

Risks Related to the Trust's Relationships with the Sponsor and the Investment Manager

43. The Sponsor, whose interests may be different from the other Unitholders, will be able to exercise significant influence over certain activities of the Trust.
44. The ROFO/ROFR Deed and the Future Assets Agreement will terminate in certain circumstances and shall be subject to the terms of the concession agreement and applicable law.
45. The Sponsor is a listed company and operates other road assets, and anything that impacts the business, results of operations and trading price of the Sponsor's equity shares may have a material, adverse effect on the Trust and the trading price of the Units.
46. The Investment Manager may not be able to implement its investment or corporate strategies and the fees payable to the Project Manager are dependent on various factors.
47. Parties to the Trust are required to maintain the eligibility conditions specified under Regulation 4 of the InvIT Regulations on an ongoing basis. The Trust may not be able to ensure such ongoing compliance by the Sponsor, the Investment Manager, the Project Manager and the Trustee, which could result in the cancellation of the registration of the Trust.
48. The Investment Manager is required to comply with certain ongoing reporting and management obligations in relation to the Trust. There can be no assurance that the Investment Manager will be able to comply with such requirements.





Risks Related to Tax

49. Changes in legislation or the rules relating to tax regimes could materially and adversely affect our business, prospects and results of operations.
50. Some of our roads assets enjoy certain benefits under Section 80-IA of the Income Tax Act and any change in these tax benefits applicable to us may materially and adversely affect our results of operations.
51. Tax laws are subject to changes and differing interpretations, which may materially and adversely affect our operations.
52. Entities operating in India are subject to a variety of Government and State Government tax regimes and surcharges and changes in legislation or the rules relating to such tax regimes and surcharges could materially and adversely affect our business.
53. Investors may be subject to Indian taxes arising out of capital gains on the sale of Units.

