

# **Operation & Maintenance Report- FY2027**

**Four Laning of Chikhali – Tarsod (Package-IIA) Section of NH-6 from Km 360.000 to Km 422.700 in the State of Maharashtra to be executed on Hybrid Annuity pattern under NHDP Phase IV : CTHPL**

**SAMARTH INFRAENGG Technocrats  
Private Limited**



**May 2026**

# TABLE OF CONTENTS

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## **Operation & Maintenance Report, FY2027 - CTHPL..... 1**

|       |                                                       |    |
|-------|-------------------------------------------------------|----|
| 1.1   | INTRODUCTION.....                                     | 1  |
| 1.2   | PROJECT AT GLANCE.....                                | 2  |
| 1.3   | SCOPE OF SERVICES .....                               | 3  |
| 1.4   | REVIEW OF CONCESSION AGREEMENT .....                  | 4  |
| 1.5   | MAINTENANCE REQUIREMENTS:.....                        | 7  |
| 1.6   | ROAD INVENTORY .....                                  | 8  |
| 1.7   | ROAD WORKS .....                                      | 13 |
| 1.8   | STRUCTURES.....                                       | 14 |
| 1.9   | COSTING.....                                          | 18 |
| 1.9.1 | RATE ANALYSIS .....                                   | 19 |
| 1.9.2 | IMMEDIATE REPAIRS COSTS .....                         | 21 |
| 1.9.3 | ROUTINE MAINTENANCE & INCIDENT MANAGEMENT COSTS ..... | 21 |
| 1.9.4 | OPERATIONS COSTS .....                                | 25 |
| 1.9.5 | PERIODIC MAINTENANCE COSTS .....                      | 26 |
| 1.9.6 | TOTAL OPERATION & MAINTENANCE COSTS .....             | 27 |

## LIST OF TABLES

---

|                                                                          |    |
|--------------------------------------------------------------------------|----|
| Table 1: Chronology of Project Milestones.....                           | 3  |
| Table 2: Detailed Inventory.....                                         | 13 |
| Table 3: Summary of Major Structures .....                               | 14 |
| Table 4: Summary of Culverts .....                                       | 14 |
| Table 5: Details of Major CD & Other Structures along Project Road ..... | 15 |
| Table 6: Summary of Unit Rates (excluding GST) .....                     | 19 |
| Table 7: Summary of Major material Rates (excluding GST) .....           | 20 |
| Table 8: Summary of O&M Costs .....                                      | 25 |
| Table 9: Summary of Periodic Maintenance Costs .....                     | 26 |
| Table 10: Summary of Total Cost .....                                    | 27 |

## LIST OF ABBREVIATIONS AND SYMBOLS

|      |                                            |
|------|--------------------------------------------|
| AADT | -Average Annual Daily Traffic              |
| AE   | -Authority Engineer                        |
| AMC  | -Annual Maintenance Contract               |
| ATMS | -Advanced Traffic Management System        |
| BC   | -Bituminous Concrete                       |
| BOQ  | -Bill of Quantities                        |
| BOT  | -Build, Operate & Transfer                 |
| CA   | -Concession Agreement                      |
| CBR  | -California Bearing Ratio                  |
| CCB  | -Concrete Crash Barrier                    |
| CCR  | -Cement Concrete Railing                   |
| COD  | -Commercial Operation Date                 |
| COS  | -Change of scope                           |
| CPI  | -Consumer Price Index                      |
| CUP  | -Cattle Underpass                          |
| CVC  | -Classified Volume Count                   |
| CVPD | -Commercial Vehicles per Day               |
| DBM  | -Dense Bituminous Concrete                 |
| DPR  | -Detailed Project Report                   |
| ECB  | -Emergency Call Box                        |
| EPC  | -Engineering, Procurement and Construction |
| ESI  | - Employees' State Insurance               |
| FDD  | -Filed Dry Density                         |
| FOB  | -Foot Over Bridge                          |
| FRL  | -Finished Road Level                       |
| FSI  | -Free Swell Index                          |
| FWD  | -Falling Weight Deflectometer              |
| FY   | -Financial Year                            |
| GOI  | - Government of India                      |
| GR   | -Growth Rates                              |
| GS   | -Grade Separated                           |
| GSB  | -Granular Sub Base                         |
| GST  | -Goods and Services Tax                    |
| HCPT | -Half-cell Potential Test                  |
| HPC  | -Hume Pipe Culvert                         |
| HR   | - Human Resources                          |
| HTMS | -Highway Traffic Management Systems        |

|         |                                              |
|---------|----------------------------------------------|
| IE      | -Independent Engineer                        |
| IRC     | - Indian Roads Congress                      |
| IRC SP  | - Indian Roads Congress Special Publications |
| IRI     | -International Roughness Index               |
| Km      | -kilometer                                   |
| LHS     | -Left Hand Side                              |
| LL      | -Liquid Limit                                |
| LS      | -Lumpsum                                     |
| m       | -Meter                                       |
| MBIU    | -Mobile Bridge Inspection Unit               |
| MCB     | -Metal Beam Crash Barrier                    |
| MCS     | -Micro Surfacing                             |
| MCW     | -Main Carriageway                            |
| MDD     | -Maximum Dry Density                         |
| MHR     | -Metallic Hand Rail                          |
| MJB     | -Major Bridge                                |
| mm      | -Millimeter                                  |
| MM      | -Major Maintenance                           |
| MNB     | -Minor Bridge                                |
| MoRTH   | - Ministry of Road Transport & Highways      |
| MPa     | -Mega Pascal                                 |
| MR      | -Resilient Modulus                           |
| MSA     | -Million Standard Axle                       |
| NDT     | -Non-Destructive Testing                     |
| NHAI    | - National Highways Authority of India       |
| NSV     | -Network survey Vehicle                      |
| O&M     | - Operation and Maintenance                  |
| OL      | -Overlay                                     |
| PF      | -Provident Fund                              |
| PGR     | -Pedestrian Guard Rail                       |
| PI      | -Plasticity Index                            |
| PL      | -Plastic Limit                               |
| PM      | -Periodic Maintenance                        |
| PUP     | -Pedestrian Underpass                        |
| R&R     | -Repair and Rehabilitation                   |
| RCC     | -Reinforced Cement Concrete                  |
| RE Wall | -Reinforced Earth Wall                       |
| RHS     | -Right Hand Side                             |
| RHT     | -Rebound Hammer Test                         |

|      |                                  |
|------|----------------------------------|
| RM   | -Routine Maintenance             |
| ROB  | -Road Over Bridge                |
| RPO  | -Route Patrol Officer            |
| RUB  | -Road Under Bridge               |
| SDBC | -Semi-Dense Bituminous Concrete  |
| SPV  | -Special Purpose Vehicle         |
| SR   | -Service Road                    |
| SWB  | -Static Weigh Bridge             |
| TCS  | -Typical cross Section           |
| TDRT | -Transient Dynamic Response test |
| TMS  | -Toll Management System          |
| UI   | -Unevenness Index                |
| UPVT | -Ultra Pulse Velocity test       |
| VDF  | -Vehicle Damage Factor           |
| VG   | -Viscosity Grade                 |
| VUP  | -Vehicular Underpass             |
| WBM  | -Water Bound Macadam             |
| WMM  | -Wet Mix Macadam                 |
| WPI  | -Wholesale Price Index           |

# Operation & Maintenance Report, FY2027 - CTHPL

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## 1.1.1 INTRODUCTION

The Government of India had entrusted to the Authority (National Highways Authority of India, NHAI) the development, maintenance and management of National Highway No.6 including the section from km 360.000 to km 422.700 (approx. 62.700 km). The Authority had resolved to augment the existing road from km 359.310 to km 423 .680 on the Chikhali - Tarsod section of National Highway No.6 (hereinafter called the "NH 6") in the State of Maharashtra by Four-Laning thereof (the "Project") on design, build, operate and transfer (the "DBOT Annuity" or "Hybrid Annuity") basis under NHDP Phase IV, which shall be partly financed by the Concessionaire who shall recover its investment and costs through payments to be made by the Authority, in accordance with the terms and conditions to be set forth in a concession agreement.

The Authority had accordingly invited the bid proposals and upon the evaluation of received bids, the Authority has awarded the Project to M/s **Vishvaraj Environment Pvt Ltd**, Nagpur. Consequent to this, M/s Vishvaraj Environment Pvt Ltd, formed a Special Purpose Vehicle (SPV) in the name of M/s **Chikhali Tarsod Highways Pvt. Ltd**, CTHPL (Concessionaire) for implementation/execution of the project.

Concessionaire could not achieve the Financial Close within the stipulated time and has submitted a proposal for induction of **Welspun Enterprise Ltd** (Welspun") as a "Sponsor" of the project and subsequent to detailed deliberations, Authority approved for acquisition of 49% equity in the project company by Welspun.

The Concessionaire has achieved PCOD on 25th August 2021 for an average length of 59.885 km. (LHS: 58.735km, RHS: 61.035) out of 62.700 km after delinking existing Fekri ROB toll-section from Km.396+140 to 398+840, ROB at Km 405+545 and its approaches on LHS, ROB at Km 414+842 and its approaches (COS) on LHS. Further, COD obtained on 30<sup>th</sup> Oct 2022 for an average length of 62.225 km (LHS: 61.750km, RHS: 62.700) out of 62.700 km.

This project road is acquired by M/s Actis GP LLP and is presently under Operation and Maintenance phase.

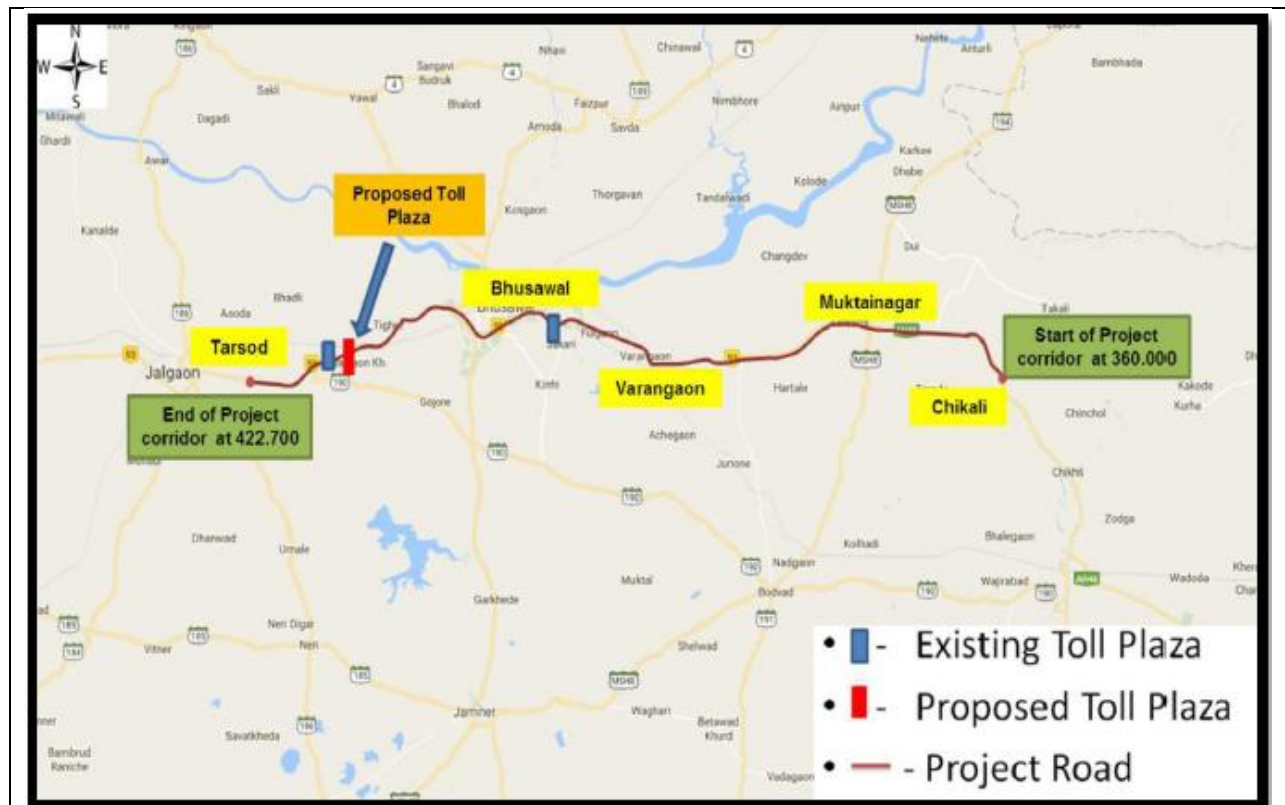
Nxt Infra Trust is a registered Indian infrastructure investment trust which has invested in road infrastructure assets in India with an initial portfolio for six Project SPVs. The Trust is sponsored by Actis Highway Infra - Limited (the "Sponsor"), part of the Actis Group, which is a global investor in sustainable infrastructure.

Actis GP LLP Ltd has engaged M/s Samarth Infra-engg Technocrats Pvt Ltd to undertake due-diligence study for self-assessment and/or for its Concessioning Authority and/ or for InvIT purpose and/ or for its present/ future investors/ lenders whom this Report will be presented as Vendors Technical Due Diligence Report.

This report presents the updated due diligence assessment for InVIT purposes, incorporating the recent improvements and developments, and includes an evaluation of the asset condition and work out O&M Cost, Major Maintenance cost and additional facilities cost/improvement works of the project during the Concession period.

### 1.1.2 PROJECT AT GLANCE

The project road is 4lane divided corridor passing through Pimprikaraut, Muktainagar, Varungaon, Bhusawal and Jalgaon khurd villages. Varungaon Ordinance Factory and Bhusawal Thermal Power Station exists at km 386 and km 397. Most length of project road runs through plain terrain and with intermittent locations in rolling terrain. The existing NH-16 numbering has been changed with new NH-53.



Photographs showing the various corridors of the project road are presented below:



Following Table highlights the total project at a glance:

**Table 1: Chronology of Project Milestones**

| S No. | Description                                              | Date                       |
|-------|----------------------------------------------------------|----------------------------|
| 1.    | Date of Signing the Concession Agreement                 | 3 <sup>rd</sup> Apr 2017   |
| 2.    | Appointment Date                                         | 16 <sup>th</sup> Jan 2019  |
| 3.    | Scheduled Project completion                             | 13 <sup>th</sup> July 2021 |
| 4.    | Scheduled End of Concession                              | 15 years from COD          |
| 5.    | Date of issue of Provisional Completion Certificate, COD | 25 <sup>th</sup> Aug 2021  |
| 7.    | Date of Issue of Final Completion Certificate            | 30 <sup>th</sup> Oct 2022  |
| 8.    | End of Concession Period                                 | 25 <sup>th</sup> Aug 2036  |

### 1.1.3 SCOPE OF SERVICES

The main objective of the study is to review the current status of project corridor including details pertaining to its construction and maintenance and to provide requisite technical due diligence for said project.

The scope of services as defined in the “terms of reference” for consultants is as below:

- Updating the inventory of Highway & Structures based on latest improvements in the project based on the discussions and data provided by project managers.
- Reviewing and updating the immediate repair works cost based on discussion with site team

- Revising the MMR based on any latest field investigation reports provided by client
- Preparation of detailed O&M & MMR cost estimate as per latest labour wages and material rates
- Preparation of detailed project report for each project
- Scope includes submission of project wise Annual Valuation Report including the revision of such reports based on discussion with your team.

#### **1.1.4 REVIEW OF CONCESSION AGREEMENT**

1. Concession Parties and date of execution of Agreement: NHAI referred as “Authority” entered in to Agreement with M/s Chikhali-Tarsod Highways Pvt. Ltd (CTHPL) referred as “Concessionaire” on 03.04.2017
2. Appointed Date, Commercial Operation Date (Article 3 & 4, Article 12): As the Concession Agreement was signed on 03 Apr, 2017, with the settlement agreement made on 08<sup>th</sup> Jan 2019. With no penalties on either party, appointed date issued by Authority on 16 Jan 2019. Accordingly, construction period is 910 days from Appointed date, and Concession period is 15 years from COD.
3. Concession Period (Clause 3): This includes Construction Period of 910 days and Operation Period of 15 years commencing from COD. As the Appointed Date is declared on 16.01.2019, considering 910days as Construction period, the scheduled construction completion date is 13.07.2021. as EOT received for 90days, it has extended to 11.10.2021. However, PCOD achieved prior to this date, i.e., on 25.08.2021. Accordingly, 15yrs from COD, end of concession period is 24.08.2036 (scheduled date 12.07.2036).
4. Obligations of Concessionaire & Authority (Article 5 & 6): The Concessionaire and Authority have fulfilled most of the obligations.
5. Representation and warranties (Article 7): The Concessionaire shall at no time undertake any change of ownership except in accordance with Clause 5.3. Concessionaire has submitted a proposal for induction of Welspun Enterprise Ltd (Welspun”) as a sponsor of the project and subsequent to detailed deliberations, Authority approved for acquisition of 49% equity in the project company by Welspun.
6. Release of Performance Security (Article-9.3): The performance security bank guarantee (PSBG) is Rs 52.41 Cr. However, Authority released back the Performance guarantee to the Concessionaire on 10<sup>th</sup> Dec 2019.
7. Right of Way (Article 10): If the Authority is unable to provide the remaining site within 180 days from the Appointed Date, the remaining Site of the Project Highway shall be removed from the scope of the work under the provision of Change of Scope. Right of Way is granted within 180 (one hundred and eighty) days of the Appointed Date shall be completed on or before the Scheduled Completion Date.
8. Construction of the Project (Schedule-G, Article12): Construction period 910 days from the appointed date i.e., schedule date of completion is on 13th July 2021. As EOT granted for 90days due to COVID outbreak, the revised schedule date of completion is on 11th OCT’2021. But, PCOD achieved prior to this date, i.e., on 25th Aug 2021.

| Milestone | Completion days | Schedule date                           | Actual achieved | Delay/(early) days | % Total Capital Cost (TCC) / Physical progress in % |
|-----------|-----------------|-----------------------------------------|-----------------|--------------------|-----------------------------------------------------|
| MS-I      | 290             | 01/11/2019                              | 24/06/2019      | (129)              | 20% of TCC / 20% Physical Progress                  |
| MS-II     | 430             | 20/03/2020                              | 31/10/2019      | (140)              | 35% of TCC / 35% Physical Progress                  |
| MS-III    | 690             | 06/12/2020<br>EOT-90days,<br>16/03/2021 | 29/01/2021      | 54 days            | 75% of TCC / 75% Physical Progress                  |
| MS-IV     | 910             | 13/07/2021<br>EOT-90days,<br>11/10/2021 | 25/08/2021      | -                  | 100% of TCC / 100% Physical Progress                |

9. Monitoring of Construction (Article 13): The Concessionaire shall, perform all the tests as per Schedule-I, with the instructions of the Independent Engineer. Half of the costs incurred on such tests, and to the extent certified by the Independent Engineer as reasonable, shall be reimbursed by Authority the to the Concessionaire.
10. Completion Certificate/ Provisional Certificate (Article-14): Independent Engineer may, upon request of Concessionaire, issue a provisional certificate for completion of 100% construction site, which made available to the Concessionaire up to 182days from Appointed Date. Provisional certificate should have list of outstanding items in the punch list. These shall be completed within 90 days from issue of Provisional certificate. Authority shall recover damages for any delay in completion as per clause 14.4.1.

| Side | Scope, Km | Offered length for PCOD (Km) | Exclusion for PCOD                                                                                                                                                                                            |
|------|-----------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LHS  | 62.700    | 58.735                       | 1. km 396.250-km 397.540 (1.29 km)- Punch list-A<br>2. km 398.250-km 398.625(0.375 km) - Punch list-B<br>3. km 405.000-km 406.090(1.09 km) - Punch list-A<br>4. km 414.200-km 415.410(1.21 km) - Punch list-B |
| RHS  | 62.700    | 61.035                       | 1. km 396.250-km 397.540(1.29 km) - Punch list-A<br>2. km 398.250-km 398.625(0.375 km) - Punch list-B                                                                                                         |

Note: Exclusion for PCOD: S.no 1 & 2: MoRTH has undertaken ROB@396/827 construction works with M/s Fekri Infrastructure Ltd including its O&M with ROB approaches of 2lane configuration on BOT basis i.e., from Km396.140 to km398.840, length of 2.700km. Concession period for this expires on 03.10.2022. Presently, M/S Fekri is collecting Toll in this stretch. As NHAI's buy-back proposal was not materialized, NHAI decided to de-scope until the end of its concession period. Later, this proposal also not finalized with view that both (existing & newly proposed) toll plazas would be operational simultaneously. Hence, Concessionaire advised to complete the works within Scheduled Completion date, accordingly, S. No 1 works were progressed and in advance stage which are kept in Punch list-A, while S.no2 is the existing operational toll plaza location, kept in Punch list-B and shall be completed within reasonable time after handover of the same.

S.No.3: LHS: km 405.000-km 406.090(1.09 km) - Punch list-A, delayed launching scheme approval from railways for ROB at Km 405+545. However, at site RE-wall approaches are completed on either side, in structure portion, Concrete Barrier construction and installation of Expansion Joint works are in progress.

S.No.4: LHS: km 414.200-km 415.410(1.09 km) - Punch list-B, ROB@ Km414+842, is to be retained (1x37.5m span) as Schedule-B. But COS has been approved to re-construct with span arrangement of (1x10m+1x25m+1x37.5m+1x10m). Methodology and GAD approval pending

from Railway. Present status is to be ascertained from Concessionaire. However, at site approach construction with RE wall are under progress.

11. The Company has applied the Provisional Completion Certificate vide their letter no.2117 dated 06.03.2021. (Delink for PCOD Fekri from Km.396+140 to 398+840, ROB at Km 405+545 and its approaches on LHS, ROB at Km 414+842 and its approaches (COS) On LHS.

IE has issued the Provisional Certificate for an average length of 59.885 Km. out of 62.700 Km. on 25th August 2021.

Further Completion certificate also received on 30<sup>th</sup> Oct 2022.

12. Change of Scope (Article 16): Any additional works and services which are not included in scope of project shall be addressed in Change of Scope Notice. The costs thereof shall be expended by concessionaire and reimbursed by Authority with an advance payment of 20% of agreed COS cost.
13. Reduction of Scope (Article 16.6): if Concessionaire fails to complete the construction works on Force Majeure or for reasons attributable to Authority or under right-of-way clause 10.3.1. On direction of Authority, IE shall assess the civil cost for reduced scope as per Clause 16.6.1. Thus, revised Bid Project Cost shall be calculated. Accordingly, O&M cost shall be reduced or increase in proportion to reduction or increase in the length of the Project Highway.
14. Operation & Maintenance (Article 17): Concessionaire to maintain project road as per Schedule-K requirements. The roughness value exceeding 2750mm/km in a stretch of 1km should be rectified with 180days.
15. Safety requirements (Article 18): All costs and expenses arising related to safety requirement shall be borne by Concessionaire as per scope of the project. If any not forming the scope shall be as per Article 16, change of scope.
16. Remuneration to Independent Engineer (Article 21.3): As per Schedule-M, one- half of remuneration towards the cost and expenses of the Independent Engineer during the development and construction period shall be borne by Concessionaire by do not exceeding 3% of the BPC. Payment in excess of 3% shall borne entirely by Authority. All the payments made to independent Engineer during O&M period shall be borne equally by Authority and Concessionaire.
17. Financial Close (Article 22.1): Concessionaire to achieve Financial close within 150 days from date of the agreement. In the event of delay, further extension not exceeding 120days, subject to payment of damages to the Authority in the sum calculated at a rate of 0.05% of Performance security for each day of delay. Beyond this further 95 days shall be allowed with 0.1% of Performance security for each day of delay.

Financial Close in this project happened on 27.03.2018, i.e., 7 days before first anniversary, without imposing any penalties, and declared appointed date on 16.01.2019 by Authority with signing the settlement agreement.

18. Bid Project Cost (Article-23): The cost of construction of the project (BPC) is Rs.1048.1 Cr. and will be adjusted for the price index multiple. 40% of this Cost shall be payable to Concessionaire during Construction period in 5 installments of 8% each with adjusted price index multiple. Clarification sought from the Concessionaire about the total amount received against the receivable amount in the consolidated format.

The remaining 60% of Bid Project Cost, adjusted for Price Index multiple, shall be payable in 30 biannual installments commencing from 180<sup>th</sup> day of COD with the percentage payments as suggested in the table 23.6.3 along with the interest as per 23.6.4.

Expenses in excess of O&M payments shall be borne by Concessionaire. O&M payments due payable to the Concessionaire shall be paid in 2 equal biannual installments and disbursed by the Authority together with corresponding installments of Annuity payments.

19. Mobilization Advance (Article 23.8): Upon request from Concessionaire, 10% of Bid Project Cost shall be paid by Authority. This shall be repaid by Concessionaire with Bank interest compounded annually in 4 equal installments from each payment made by Authority to Concessionaire.
20. Insurance (Article 26): The Concessionaire has been fulfilling this obligation.
21. Force Majeure (Article 28): As per Clause 28.6.2, at any time after the Appointed Date, if any Force Majeure Event occurs) before COD, the Concession Period and the dates set forth in the Project Completion Schedule shall be extended by a period equal in length to the duration for which such Force Majeure Event subsists; or (b) after COD, the Concessionaire shall be entitled to receive Annuity payments plus interest due and payable under this Agreement.
22. Compensation for Breach of Agreement (Article 29): The Concessionaire has made no correspondence on this.
23. Change in Law (Article 35): As a result of Change in Law, if Concessionaire suffers an increase in cost or reduction in the net after-tax return subject to higher of 1.82 Cr or 2% of Total Annuity payments in any accounting year, Concessionaire may notify Authority to amend the agreement so as to place Concessionaire in same financial position as before the Change in Law.
24. Dispute resolution (Article 38): Any dispute not resolved amicably by conciliation, arbitration shall be held in accordance with rules of Society for Affordable Redressal of Disputes (SAROD), New Delhi or such other rules in-line with Arbitration and Conciliation Act, 1996. Place of such arbitration shall be the Delhi and the language of arbitration proceedings shall be English. There are no disputes referred so far under the article 38.

### 1.1.5 MAINTENANCE REQUIREMENTS:

Concessionaire shall undertake maintenance requirements as per Schedule-K of CA, below is the requirement

| S. No | Description | Length (Km) | Lanes | Applicable Schedule for O&M | Maximum Roughness Allowed |
|-------|-------------|-------------|-------|-----------------------------|---------------------------|
| 1     | CTHPL       | 62.7        | 4LPS  | Schedule-K                  | 2750 mm/Km                |

As per Manual, IRC SP:84-2014:

| S. No | Description | Length (Km) | Lanes | Maximum allowable deflection | Frequency of Roughness Test | Frequency of FWD Test |
|-------|-------------|-------------|-------|------------------------------|-----------------------------|-----------------------|
| 1     | CTHPL       | 62.7        | 4LPS  | 1.2mm                        | Twice a Year                | In every 5 Years      |

- No specific Handing Over (Divestment) requirements are mentioned under CA. It shall be same as Schedule-K

### 1.1.6 ROAD INVENTORY

The Project Road has flexible pavement over the entire length (except at Toll Plaza) with paved carriageway of 13.5m/9.0m wide including paved shoulder. The project corridor generally runs in Plain terrain. The land use along the project road is mostly built-up areas. It passes through villages like Chikhali, Varungaon, Bhusawal, and Nasirabad etc. In general, road embankments are in the range of 0.5m-2.0m height. Embankments higher than 2.0m are observed mainly in the approaches of CD structures and Underpass locations.

The view of project road at different locations is shown in the following photographs:



A view of the Project Road with 6-Lane Approach having Lighting, MCB & CCB at Km 381.000-RHS



A view of the Project Road with Median Drain at Km 397.200



A view of the Project Road with Median 1.5m wide & MCB at Km 408.000



A view of the Project Road with median 4m wide at km 412.000

Four Laning of Chikhali - Tarsod (Package-IIA) Section of NH-53 (old NH-6) from Km 360.000 to Km 422.700 in the State of Maharashtra to be executed on Hybrid Annuity (HAM) pattern under NHDP Phase IV (CTHPL)



A view of the Project Road on Structure approach with Highway Lighting, CCB & MCB at Km 419.000



A view of the Project Road with PGR in SR Separator & MCB on Median at Km 420.000-RHS

The Project Road has 06 Major junctions and 68 Minor junctions. Photographs showing junctions locations are presented below:



Minor Junction @ km 368.157 RHS



Major Junction @ km 372.420 RHS



Major Junction @ km 387.240 LHS



Minor Junction @ km 418.900 LHS

About 12 numbers of High mast lighting is observed along the project road. Mostly they are located at Junctions and Toll Plaza locations. Few photos showing High mast lighting are presented below:



A view of High mast lighting @ km 404.010 LHS



A view of High mast lighting @ km 415.950

All together the Project Road has about 06 Bus Bay with Bus Shelters and 19 Bus shelters on MCW and Service Road. Few photos taken at the Bus Bays and Bus Shelter are presented below:



Bus Shelter near km 360.050 LHS



Bus Shelter near km 372.250 RHS

The Project Road has one Truck lay-by along the Project Highway.



Truck Lay Bye @ Km 417.420 LHS



Truck Lay Bye Toilet Block @ Km 417.420 LHS

The Project Road has one New Toll Plaza at km 416+050-LHS & km 415+800-RHS. Rigid pavement exists at the toll plaza and in tapering portions both toll plazas. It has Ten (5+5) ETC lanes at Toll Plaza. Five high mast lights on either ends of the toll plaza are provided.



A view of the Toll Plaza near km 416+050-LHS



A view of the Toll Plaza near km 415+800-RHS



Service road/slip roads of varying carriageway width of 7m to 12m have been observed along the Project Corridor. Service road/slip roads have been constructed for most of the length of the project corridor except at few locations. Photos depicting the service road pavement surface type, Condition and the other associated features like drain, pedestrian guard rails and metal Beam crash barriers on the separator are presented below. Few photographs taken at service road locations are presented below:



### 1.1.7 ROAD WORKS

The Road inventory and structure inventory data for the Project stretch are highlighted in following table.

**Table 2: Detailed Inventory**

| S. No. | Particulars                    | Length/ Nos. | As per Site |
|--------|--------------------------------|--------------|-------------|
| 1      | Start Chainage (Km)            | Km.          | 360.000     |
| 2      | End chainage (Km)              | Km.          | 422.700     |
| 3      | Length of the Project Corridor | Kms          | 62.700      |
| 4      | Service Road / Slip Road       | Kms          | 70.725      |
| 5      | Bypass Length                  | Kms          | 3.600       |
| 6      | Toll Plaza                     | No.          | 1           |
| 7      | No. of Lanes (Both side)       | No.          | 10          |
| 8      | ROBs                           | No.          | 4           |
| 9      | VUPs                           | No.          | 9           |
| 10     | LVUP's                         | No.          | 1           |
| 11     | PUP's/CUP's                    | No.          | 16          |
| 12     | Major Bridges                  | No.          | 3           |
| 13     | Minor Bridges                  | No.          | 22          |
| 14     | Culverts (Pipe)                | No.          | 68          |
| 15     | Culvert (Slab/Box)             | No.          | 46          |
| 16     | Major Junctions                | No.          | 6           |
| 17     | Minor junctions                | No.          | 68          |
| 18     | Stone Pitching                 | Sqm          | 5175        |
| 19     | Grouting                       | Sqm          | 1910        |
| 20     | RE Blocks/PANELS               | Kms          | 30.245      |
| 21     | Bus Bays with Shelter          | No.          | 6           |
| 22     | Bus Shelters                   | No.          | 19          |
| 23     | Truck Lay bye                  | No.          | 1           |
| 24     | High Mast Lights               | No.          | 12          |
| 25     | Single Arm Lightings           | No.          | 309         |
| 26     | Double Arm Lightings           | No.          | 1102        |
| 27     | Lightings at Underpass         | No.          | 117         |
| 28     | Solar Blinkers                 | No.          | 35          |
| 29     | RCC Cover Drain                | Kms          | 60.76       |
| 30     | Median drain                   | Kms          | 10.127      |
| 31     | Median Cuts                    | No.          | 710         |
| 32     | Median Opening                 | No.          | 14          |

| S. No. | Particulars                       | Length/ Nos. | As per Site |
|--------|-----------------------------------|--------------|-------------|
| 33     | Median Kerb Damages               | m            | 18          |
| 34     | Median Plantation Functional      | Kms          | 43.245      |
| 35     | Median Plantation_ Non-Functional | Kms          | 8.195       |
| 36     | Road Markings                     | Sqm          | 55260       |
| 37     | W-Beam Safety Barriers            | Kms          | 31.000      |
| 38     | Anti-Glare                        | km           | 4.230       |
| 39     | Rigid Concrete Barriers           | Kms          | 35.930      |
| 40     | Concrete Railing                  | Kms          | 1.050       |
| 41     | Pedestrian Guard Rails            | Kms          | 7.268       |
| 42     | Delineators                       | No.          | 152         |
| 43     | Kilometer Stones                  | No.          | 118         |
| 44     | Hectometer Stones                 | No.          | 307         |
| 45     | Road Signs                        | No.          | 1129        |
| 46     | Gantry Sign Boards                | No.          | 18          |
| 47     | V-Notch Drain                     | Kms          | 10.090      |

### 1.1.8 STRUCTURES

List of structures found during the inventory surveys along the corridor are as follows:

**Table 3: Summary of Major Structures**

| S No | Type of Structure                  | Schedule-B | As per Site |
|------|------------------------------------|------------|-------------|
| (a)  | No. of Major Bridges               | 3          | 3           |
| (b)  | No. of Minor Bridges               | 19+3(COS)  | 22          |
| (c)  | No. of ROB                         | 04         | 04          |
| (d)  | No. of Vehicular Underpasses       | 09         | 09          |
| (e)  | No. of Light Vehicular Underpasses | 01         | 01          |
| (f)  | No. of Pedestrian Under passes     | 13+3 (COS) | 16          |

**Table 4: Summary of Culverts**

|     | Type of Structure          | Schedule | As per Site |
|-----|----------------------------|----------|-------------|
| (a) | No. of Pipe Culverts       | 65       | 68          |
| (b) | No. of Box / Slab Culverts | 46       | 46          |

**Table 5: Details of Major CD & Other Structures along Project Road**

| S No. | Design chainage | Type of Str | Side | Str on | Age of Str | Span Arrangement (No x Length) | Deck width |
|-------|-----------------|-------------|------|--------|------------|--------------------------------|------------|
| 1     | 360+649         | MJB         | LHS  | MCW    | OLD        | 7x9                            | 8.5        |
| 2     | 360+649         | MJB         | RHS  | MCW    | NEW        | 2x18+1x27                      | 12         |
| 3     | 361+017         | PUP         | LHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 4     | 361+017         | PUP         | RHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 5     | 361+970         | MNB         | LHS  | MCW    | NEW        | 2X7.0                          | 12         |
| 6     | 361+970         | MNB         | RHS  | MCW    | NEW        | 2X7.0                          | 12         |
| 7     | 363+300         | PUP         | LHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 8     | 363+300         | PUP         | RHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 9     | 364+772         | MNB         | LHS  | MCW    | OLD        | 2x8.5                          | 8.5        |
| 10    | 364+772         | MNB         | RHS  | MCW    | NEW        | 2x8.5                          | 12         |
| 11    | 365+767         | MNB         | LHS  | MCW    | NEW        | 2x6.9                          | 12         |
| 12    | 365+767         | MNB         | RHS  | MCW    | NEW        | 2x6.9                          | 12         |
| 13    | 367+377         | VUP         | LHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 14    | 367+377         | VUP         | RHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 15    | 367+700         | MNB         | LHS  | SR     | NEW        | 3x9.8                          | 12         |
| 16    | 367+700         | MNB         | LHS  | MCW    | NEW        | 3x9.8                          | 15         |
| 17    | 367+700         | MNB         | RHS  | MCW    | NEW        | 3x9.8                          | 15         |
| 18    | 367+700         | MNB         | RHS  | SR     | NEW        | 3x9.8                          | 12         |
| 19    | 370+750         | PUP         | LHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 20    | 370+750         | PUP         | RHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 21    | 371+197         | MNB         | LHS  | MCW    | NEW        | 1x9.2                          | 15         |
| 22    | 371+197         | MNB         | RHS  | MCW    | NEW        | 1x9.2                          | 15         |
| 23    | 371+257         | MNB         | LHS  | MCW    | NEW        | 1x10                           | 15         |
| 24    | 371+257         | MNB         | RHS  | MCW    | NEW        | 1x10                           | 15         |
| 25    | 372+325         | VUP         | LHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 26    | 372+325         | VUP         | RHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 27    | 372+912         | MNB         | LHS  | MCW    | NEW        | 1x9.0                          | 12         |
| 28    | 372+912         | MNB         | RHS  | MCW    | NEW        | 1x9.0                          | 12         |
| 29    | 373+599         | MNB         | LHS  | MCW    | NEW        | 1x6.2                          | 12         |
| 30    | 373+599         | MNB         | RHS  | MCW    | NEW        | 1x6.2                          | 12         |
| 31    | 374+253         | MNB         | LHS  | MCW    | OLD        | 3x8.8                          | 9          |
| 32    | 374+253         | MNB         | RHS  | MCW    | NEW        | 3x8.8                          | 12         |
| 33    | 375+165         | VUP         | LHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 34    | 375+165         | VUP         | RHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 35    | 376+833         | LVUP        | LHS  | MCW    | NEW        | 1x10.5x4.5                     | 14.5       |
| 36    | 376+833         | LVUP        | RHS  | MCW    | NEW        | 1x10.5x4.5                     | 14.5       |
| 37    | 382+337         | PUP         | LHS  | MCW    | NEW        | 1x10.5x4.5                     | 14.5       |
| 38    | 382+337         | PUP         | RHS  | MCW    | NEW        | 1x10.5x4.5                     | 14.5       |

| S No. | Design chainage | Type of Str | Side | Str on | Age of Str | Span Arrangement (No x Length) | Deck width |
|-------|-----------------|-------------|------|--------|------------|--------------------------------|------------|
| 39    | 383+347         | MNB         | LHS  | MCW    | NEW        | 2x12                           | 12         |
| 40    | 383+347         | MNB         | RHS  | MCW    | NEW        | 2x12                           | 12         |
| 41    | 385+891         | MNB         | LHS  | MCW    | NEW        | 2x9                            | 12         |
| 42    | 385+891         | MNB         | RHS  | MCW    | NEW        | 2x9                            | 12         |
| 43    | 386+979         | VUP         | LHS  | MCW    | NEW        | 1x15                           | 14.5       |
| 44    | 386+979         | VUP         | RHS  | MCW    | NEW        | 1x15                           | 14.5       |
| 45    | 387+729         | MNB         | LHS  | MCW    | NEW        | 1x12                           | 12         |
| 46    | 387+729         | MNB         | RHS  | MCW    | NEW        | 1x12                           | 12         |
| 47    | 389+000         | PUP         | LHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 48    | 389+000         | PUP         | RHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 49    | 389+368         | PUP         | LHS  | MCW    | NEW        | 1x10.5x4.5                     | 14.5       |
| 50    | 389+368         | PUP         | RHS  | MCW    | NEW        | 1x10.5x4.5                     | 14.5       |
| 51    | 390+366         | MJB         | LHS  | MCW    | NEW        | 5x20                           | 12         |
| 52    | 390+366         | MJB         | RHS  | MCW    | NEW        | 5x20                           | 12         |
| 53    | 390+745         | PUP         | LHS  | MCW    | NEW        | 1X7x4.0                        | 14.5       |
| 54    | 390+745         | PUP         | RHS  | MCW    | NEW        | 1X7x4.0                        | 14.5       |
| 55    | 391+206         | ROB         | LHS  | MCW    | NEW        | 11x32+2x26.15+3x31.45          | 16         |
| 56    | 391+206         | ROB         | RHS  | MCW    | NEW        | 11x32+2x26.15+3x31.45          | 16         |
| 57    | 392+019         | MNB         | LHS  | MCW    | NEW        | 1x11                           | 12         |
| 58    | 392+019         | MNB         | RHS  | MCW    | NEW        | 1x11                           | 12         |
| 59    | 393+592         | MNB         | LHS  | MCW    | NEW        | 5x8.8                          | 12         |
| 60    | 393+592         | MNB         | RHS  | MCW    | OLD        | 5x8.8                          | 8.5        |
| 61    | 395+798         | MNB         | LHS  | SR     | NEW        | 3x5.5                          | 11         |
| 62    | 395+798         | MNB         | LHS  | MCW    | NEW        | 3x5.5                          | 15         |
| 63    | 395+798         | MNB         | RHS  | MCW    | NEW        | 3x5.5                          | 15         |
| 64    | 395+798         | MNB         | RHS  | SR     | NEW        | 3x5.5                          | 11         |
| 65    | 396+502         | PUP         | LHS  | MCW    | OLD        | 1X5x3.5                        | 12         |
| 66    | 396+502         | PUP         | RHS  | MCW    | NEW        | 1X5x3.5                        | 16         |
| 67    | 396+752         | MNB         | LHS  | MCW    | NEW        | 1x8                            | 15         |
| 68    | 396+752         | MNB         | RHS  | MCW    | NEW        | 1x8                            | 15         |
| 69    | 396+825         | ROB         | LHS  | MCW    | OLD        | 1x36.7                         | 12         |
| 70    | 396+825         | ROB         | RHS  | MCW    | NEW        | 1x59.2                         | -          |
| 71    | 397+259         | PUP         | LHS  | MCW    | OLD        | 1X6x5.0                        | 14.5       |
| 72    | 397+259         | PUP         | RHS  | MCW    | NEW        | 1X6x5.0                        | 14.5       |
| 73    | 399+272         | PUP         | LHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 74    | 399+272         | PUP         | RHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 75    | 400+425         | VUP         | LHS  | MCW    | NEW        | 1x15                           | 14.5       |
| 76    | 400+425         | VUP         | RHS  | MCW    | NEW        | 1x15                           | 14.5       |
| 77    | 400+616         | MNB         | LHS  | SR     | NEW        | 3x8.8                          | 12         |

| S No. | Design chainage   | Type of Str | Side | Str on | Age of Str | Span Arrangement (No x Length) | Deck width |
|-------|-------------------|-------------|------|--------|------------|--------------------------------|------------|
| 78    | 400+616           | MNB         | LHS  | MCW    | NEW        | 3x8.8                          | 15         |
| 79    | 400+616           | MNB         | RHS  | MCW    | NEW        | 3x8.8                          | 15         |
| 80    | 400+616           | MNB         | RHS  | SR     | NEW        | 3x8.8                          | 12         |
| 81    | 402+052           | VUP         | LHS  | MCW    | NEW        | 1x15                           | 14.5       |
| 82    | 402+052           | VUP         | RHS  | MCW    | NEW        | 1x15                           | 14.5       |
| 83    | 402+940           | MNB         | LHS  | SR     | NEW        | 1x8                            | 11         |
| 84    | 402+940           | MNB         | LHS  | MCW    | NEW        | 1x8                            | 15         |
| 85    | 402+940           | MNB         | RHS  | MCW    | NEW        | 1x8                            | 15         |
| 86    | 402+940           | MNB         | RHS  | SR     | NEW        | 1x8                            | 11         |
| 87    | 403+280           | PUP         | LHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 88    | 403+280           | PUP         | RHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 89    | 404+012           | VUP         | LHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 90    | 404+012           | VUP         | RHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 91    | 405+545           | ROB         | LHS  | MCW    | NEW        | 2x19.6+1x37.6                  | 12         |
| 92    | 405+545           | ROB         | RHS  | MCW    | NEW        | 2x19.6+1x37.6                  | 12         |
| 93    | 406+542           | VUP         | LHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 94    | 406+542           | VUP         | RHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 95    | 408+860           | MNB         | LHS  | SR     | NEW        | 3x7.5                          | 11         |
| 96    | 408+860           | MNB         | LHS  | MCW    | NEW        | 3x7.5                          | 15         |
| 97    | 408+860           | MNB         | RHS  | MCW    | NEW        | 3x7.5                          | 15         |
| 98    | 408+860           | MNB         | RHS  | SR     | NEW        | 3x7.5                          | 11         |
| 99    | 409+261           | PUP         | LHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 100   | 409+261           | PUP         | RHS  | MCW    | NEW        | 1X7x3.5                        | 14.5       |
| 101   | 409+763           | MJB         | LHS  | MCW    | NEW        | 7x27.6                         | 12         |
| 102   | 409+763           | MJB         | LHS  | MCW    | NEW        | 7x27.6                         | 12         |
| 103   | 413+366           | PUP         | LHS  | MCW    | NEW        | 1x10.5x5.5                     | 14.5       |
| 104   | 413+366           | PUP         | RHS  | MCW    | NEW        | 1x10.5x5.5                     | 14.5       |
| 105   | 414+628           | PUP         | LHS  | MCW    | OLD        | 1X6x5.0                        | 12         |
| 106   | 414+628           | PUP         | RHS  | MCW    | NEW        | 1X6x5.0                        | 16         |
| 107   | 414+845           | ROB         | LHS  | MCW    | OLD        | 1x32.5                         | 12         |
| 108   | 414+845           | ROB         | RHS  | MCW    | NEW        | 2x10+1x37.2+1x25               | 12         |
| 109   | 414+905 (Descope) | PUP         | LHS  | MCW    | OLD        | 1X6x5.0                        | 20         |
| 110   | 416+640           | MNB         | LHS  | SR     | NEW        | 3x5.0                          | 11         |
| 111   | 416+640           | MNB         | LHS  | MCW    | NEW        | 3x5.0                          | 15         |
| 112   | 416+640           | MNB         | RHS  | MCW    | NEW        | 3x5.0                          | 15         |
| 113   | 416+640           | MNB         | RHS  | SR     | NEW        | 3x5.0                          | 11         |
| 114   | 418+434           | MNB         | LHS  | SR     | NEW        | 1x9.6                          | 11         |
| 115   | 418+434           | MNB         | LHS  | MCW    | NEW        | 1x9.6                          | 15         |
| 116   | 418+434           | MNB         | RHS  | MCW    | NEW        | 1x9.6                          | 15         |

| S No. | Design chainage | Type of Str | Side | Str on | Age of Str | Span Arrangement (No x Length) | Deck width |
|-------|-----------------|-------------|------|--------|------------|--------------------------------|------------|
| 117   | 418+434         | MNB         | RHS  | SR     | NEW        | 1x9.6                          | 11         |
| 118   | 418+920         | VUP         | LHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 119   | 418+920         | VUP         | RHS  | MCW    | NEW        | 1x25                           | 14.5       |
| 120   | 419+520         | PUP         | LHS  | MCW    | NEW        | 1X7x4.0                        | 14.5       |
| 121   | 419+520         | PUP         | RHS  | MCW    | NEW        | 1X7x4.0                        | 14.5       |
| 122   | 422+259         | MNB         | LHS  | SR     | NEW        | 3x8.9                          | 11         |
| 123   | 422+259         | MNB         | LHS  | MCW    | NEW        | 3x8.9                          | 15         |
| 124   | 422+259         | MNB         | RHS  | MCW    | NEW        | 3x8.9                          | 15         |
| 125   | 422+259         | MNB         | RHS  | SR     | NEW        | 3x8.9                          | 11         |

### 1.1.9 COSTING

Cost Component for various items and activities have been worked out by considering the Best Industry practice and most appropriate methods. Detailed quantities for work items have been estimated based on the details presented in previous chapters for various heads.

The gist of the cost components considered are presented below:

- Immediate Repair's Cost
- Routine Maintenance Cost
- Incident Management Cost
- Periodic Maintenance Cost
- Operations Cost
- Year by Year total O&M Costs

### 1.1.10 RATE ANALYSIS

Detailed rate analysis has been carried out based on MORTH guidelines to arrive at the unit rates of various items. Material rates and their leads from the project corridor are considered as per the material investigations done on the project road. Summary of unit rates arrived at are presented in table below:

**Table 6: Summary of Unit Rates (excluding GST)**

| S. No | Type of Material            | Units | Source      | Average Lead in Kms | Market Rates including Lead (Rs) |
|-------|-----------------------------|-------|-------------|---------------------|----------------------------------|
| 1     | <b>Aggregate</b>            |       |             |                     |                                  |
| a)    | 40 mm                       | Cum   | Crusher     | 11.21               | 663                              |
| b)    | 20 mm                       | Cum   | Crusher     | 11.21               | 916                              |
| c)    | 12 mm                       | Cum   | Crusher     | 11.21               | 781                              |
| d)    | 6 mm                        | Cum   | Crusher     | 11.21               | 676                              |
| e)    | Dust                        | Cum   | Crusher     | 11.21               | 696                              |
| 2     | <b>Gravel/Moorum</b>        |       |             |                     |                                  |
|       | Embankment                  | Cum   | Borrow Area | 8.90                | 33                               |
|       | Subgrade                    | Cum   | Borrow Area | 8.90                | 33                               |
| 3     | <b>Other Major Material</b> |       |             |                     |                                  |
|       | Bitumen 60/70               | MT    | Mumbai      | 440.00              | 46,946                           |
|       | Bitumen 80/100              | MT    | Mumbai      | 440.00              | 45,947                           |
|       | CRMB                        | MT    | Mumbai      | 440.00              | 42,452                           |
|       | Emulsion                    | MT    | Mumbai      | 440.00              | 53,080                           |
|       | Steel                       | MT    | Outlet      | 59.00               | 54,266                           |
|       | HTS Strands                 | MT    | Buldhana    | 59.00               | 75,266                           |
|       | Cement                      | MT    | Buldhana    | 59.00               | 7,766                            |
|       | Structural Steel            | MT    | Buldhana    | 59.00               | 76,166                           |
|       | <b>VG-40 (For FY2027)</b>   | MT    | Mumbai      | 440.00              | 88,953                           |
|       | <b>VG-40 (FY28 onwards)</b> | MT    | Mumbai      | 440.00              | 55,332                           |

**Table 7: Summary of Major material Rates (excluding GST)**

| S No | Activities          | Unit | Rate (Rs) per Unit - | Remarks |
|------|---------------------|------|----------------------|---------|
| 1    | BC (For FY27)       | Cum  | 16,427               | VG-40   |
|      | BC (FY28 onwards)   | Cum  | 11,347               | VG-40   |
| 2    | Tack Coat           | Sqm  | 15                   |         |
| 3    | DBM                 | Cum  | 10,260               | VG-40   |
| 4    | PC                  | Sqm  | 41                   |         |
| 5    | WMM                 | Cum  | 1,860                |         |
| 6    | GSB                 | Cum  | 1,468                |         |
| 7    | Embankment          | Cum  | 455                  |         |
| 8    | Subgrade            | Cum  | 500                  |         |
| 9    | Shoulder Filling    | Cum  | 500                  |         |
| 10   | Thermoplastic Paint | Sqm  | 452                  |         |
| 11   | Road Studs          | Nos  | 196                  |         |
| 12   | DLC                 | Cum  | 3,897                |         |
| 13   | PQC                 | Cum  | 8,772                |         |
| 14   | RE panel            | Sqm  | 3,884                |         |
| 15   | M-15                | Cum  | 7,116                |         |
| 16   | M-20                | Cum  | 7,457                |         |
| 17   | M-25                | Cum  | 8,060                |         |
| 18   | M-30                | Cum  | 8,079                |         |
| 19   | M-35                | Cum  | 8,958                |         |
| 20   | M-40                | Cum  | 10,220               |         |
| 21   | M-45                | Cum  | 10,529               |         |
| 22   | M-50                | Cum  | 12,126               |         |
| 23   | Reinforcement steel | MT   | 76,298               |         |
| 24   | 1.2m Dia pile       | Rm   | 13,108               |         |
| 25   | HT strands          | MT   | 1,31,784             |         |

**Note:**

- 1) For Major Maintenance in FY27, the prevailing market rate of bitumen has been considered. However, for the remaining concession period from FY28 onwards, FY25 rates have been adopted and escalated at 5% per annum for a period of 2 years, considering that the cost estimates are presented at FY27 base-year prices.
- 2) Labour: Central Minimum Wages as on April'2026 for "C Area" Category of construction workers Rates

### **1.1.11 IMMEDIATE REPAIRS COSTS**

Costs associated with immediate repairs shall be estimated based on the detailed asset inventory and condition assessment surveys, Pavement condition and structural condition assessment surveys. Following items required are mainly considered for immediate costs:

- Scope which is not executed
- Road work items
- Bridge Work Items
- Pavement Rehabilitation works
- Structural Rehabilitation works
- Drainage Works
- Slope Protection works
- Safety Works

Presently, there are no immediate requirement costs anticipated for FY2027.

### **1.1.12 ROUTINE MAINTENANCE & INCIDENT MANAGEMENT COSTS**

Routine maintenance costs include general maintenance costs of road elements, bridge elements and road furniture and appurtenances. This can be mainly divided into two parts as:

- ✓ General Maintenance of Works
- ✓ Repairs to Highway & Bridge Elements

### **1.1.13 General Routine Maintenance**

General Routine Maintenance of Roads generally include following items:

- Cleaning of Project facilities
- Structures cleaning,
- Cleaning of ROW
- Cleaning and Maintenance of Toll Plaza
- Unlined Drain Maintenance
- Lined Drain Maintenance
- Maintenance of Highway Lighting at Toll Plaza and other project locations
- Median Plantation maintenance & Avenue plantation maintenance:
- Maintenance of Road Furniture
- Maintenance of Road Safety Items

The above items are estimated by considering the detailed break-up of following items:

- Manpower including Managers/Labour etc
- Vehicles for Labour Transport/Water Tankers/Sweeping Machines Etc
- Resources/Equipment's such as grass cutters, tools, jet sprayers, hydraulic trimmers etc

### 1.1.14 Repairs to Highway & Bridge Works

Repairs to highway and bridge works have been estimated based on the assumed quantities (Percentage basis) of execution for every year.

These items include the following:

|    |                                                                                                                                   |
|----|-----------------------------------------------------------------------------------------------------------------------------------|
| 1  | Providing treatment for sealing of road surface / isolated cracks at scattered locations                                          |
|    | i) covered with 6.7 mm size stone chipping @ 0.1 cum/ 10 sqm.                                                                     |
|    | ii) covered with dry coarse sand passing through 2.36 mm sieve and retained on 180-micron sieve @ 0.03 cum/10 sqm heated to 600 C |
|    | iii) filling discrete cracks with slow curing bitumen emulsion as per Technical Specification Clause 3004.3.3                     |
| 2  | Providing treatment to bleeding bituminous surface at scattered locations                                                         |
| 3  | Providing localized repair to rutted portion and edge breaking of bituminous surface                                              |
| 4  | Providing treatment and repair to pot-holes and patch work                                                                        |
| 5  | Providing and laying dense bituminous macadam using bitumen grade VG 40 complete as per Technical Specification Clause 507        |
| 6  | Providing and laying bituminous concrete (asphaltic concrete)                                                                     |
|    | (a) Using bitumen (VG-40) as per IRC: SP: 53                                                                                      |
| 7  | Road Roughness survey                                                                                                             |
| 8  | Turfing on embankment slopes and at all other Project Facilities                                                                  |
| 9  | Providing repair to stone pitching/apron at scattered locations                                                                   |
| 10 | Rain Cuts Maintenance: Restoration of rain cuts soil, moorum, gravel or a mixture of these                                        |
| 11 | Providing and laying apron/ stone pitching on slopes of guide bunds/ road embankment / other location                             |
| 12 | Providing and laying stone aggregate filter material (150 mm compacted thickness) underneath pitching                             |
| 13 | Unlined drain                                                                                                                     |
| 14 | Filling in median island with approved materials with all leads and lifts complete as per TS Clause No. 407                       |
| 15 | Replacing damaged / broken railing with new pre-cast / cast-in-situ, concrete railing to match with existing design and pattern.  |
| 24 | Carrying out repair to road signs including strengthening resetting or otherwise repairing signs and delineators                  |
|    | a) Road sign board mounted on single post                                                                                         |
|    | b) Road sign board mounted on double post                                                                                         |
|    | c) Overhead/ Gantry Sign boards                                                                                                   |
|    | d) Delineator                                                                                                                     |
| 25 | Supplying and fixing at site retro-reflectorized type <b>sign boards/signs</b>                                                    |
|    | 90cm Equilateral triangle                                                                                                         |
|    | 60cm circular                                                                                                                     |
|    | 90 cm circular                                                                                                                    |
|    | 90cm high octagon                                                                                                                 |
|    | 80cm x 60cm rectangle                                                                                                             |
|    | Chevron signs 60cm x 45cm                                                                                                         |
|    | Place identification signs (Fig 15.7 of IRC 67)                                                                                   |
|    | Providing and fixing Object Markers                                                                                               |
|    | Providing and fixing of retro-reflectorized Route Marker signs (size 450mm x 600mm)                                               |
| 26 | <b>Hazard Marker Sign:</b>                                                                                                        |
|    | a) size 90 x 30 cm                                                                                                                |
|    | b) size 30cm triangular side cluster of red reflectors (screen printed)                                                           |
| 27 | Cats Eyes/Raised pavement marker (NMC Nails Less)                                                                                 |

|    |                                                                                                                                                                                                           |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 28 | Painting two coats on old surface after minor repairs to give an even and smooth surface and printing letters and figures with synthetic enamel paint                                                     |
|    | a) Hectometer stones                                                                                                                                                                                      |
|    | b) Kilometer Stone                                                                                                                                                                                        |
|    | c) 5 Kilometer stone                                                                                                                                                                                      |
|    | d) Boundary stone                                                                                                                                                                                         |
|    | e) Guard stone                                                                                                                                                                                            |
| 29 | Providing painting lettering and fixing of distance measurement stones including dismantling of old damaged/ broken ones, confirming to TS Clause 804                                                     |
|    | a) Hectometer stones                                                                                                                                                                                      |
|    | b) Kilometer Stone                                                                                                                                                                                        |
|    | c) 5 Kilometer stone                                                                                                                                                                                      |
|    | d) Boundary stone                                                                                                                                                                                         |
|    | e) Guard stone                                                                                                                                                                                            |
| 30 | Providing and fixing road delineators conforming to TS Clause No. 805 as directed by the Engineer.                                                                                                        |
| 31 | Repainting the kerb stones and separation barrier with first quality synthetic enamel paint of approved brand                                                                                             |
| 32 | Painting all types of pavement markings including lines, dashes, arrows etc. on roads as per relevant IRC/MOST standards after cleaning the surface complete in all respects as directed by the Engineer. |
|    | a) Hot applied Thermoplastic compound                                                                                                                                                                     |
|    | (i) Lane / Centre Line / Edge Line                                                                                                                                                                        |
|    | (ii) Direction Arrows                                                                                                                                                                                     |
|    | (iii) Diagonal Chevrons Markings                                                                                                                                                                          |
| 33 | Supplying and laying cast-in-situ cement concrete kerb without channel section                                                                                                                            |
|    | a) by Manual/machine including formwork                                                                                                                                                                   |
| 34 | Major repair / replacement of metal beam crash barrier (W profile guard rails)                                                                                                                            |
| 35 | Providing and fixing chain link/ welded mesh fencing / square bars fencing                                                                                                                                |
| 36 | Dismantling the old damaged chain link/welded mesh / square bars fencing and replacing it with new chain link/ welded mesh/square bars fencing                                                            |
| 37 | Provision of rumble strips                                                                                                                                                                                |
| 38 | Shoulder Maintenance:                                                                                                                                                                                     |
| 39 | synthetic enamel paint of approved brand on metal pedestrian guard rail                                                                                                                                   |
| 40 | Dismantling of wearing course                                                                                                                                                                             |

## B. Structures

1. Wearing coat comprising of 50 mm thick BC.
2. Cleaning and adding rubber sealant near expansion joints.
3. Modular Expansion joints.
4. Replacement of Damaged Concrete Railing all complete as per technical specifications and as directed by the Engineer
5. Provision of an RCC crash barrier (0.35sqm cross sectional area) constructed with M-40 grade concrete including reinforcement
6. Cleaning of rocker & roller bearing using high pressure water jet, free from rust scales, re-setting & greasing the bearings using graphite grease including cost of materials, labour etc., complete.
7. POT PTF Bearings greasing and maintaining (sand plastering).
8. Elastomeric Bearings and maintaining.
9. Cutting of groove of 15 mm x 15 mm along crack and sealing the same with epoxy putty including cost of material, labour etc.
10. Carrying out 50 to 60 mm thick shortcreting using a mix proportion of 1:2:2 (cement: sand:6 mm down aggregate) added with Polypropylene fibers at a dosage rate of 125 gms/bag of cement including cost of labour, material, scaffolding, equipment etc. complete.
11. Repair of Floor Aprons, pitching and other protection works
12. Cleaning of Drainage Spouts
13. M-25 Concrete

### 1.1.15 Incident Management Cost

Incident Management & Safety items include the following:

- ✓ ATMS control room operations,
- ✓ Regular patrolling & reaching accident/incident site,
- ✓ providing relief to injured persons including taking them to nearest hospital and attending to the safety requirements at the location (putting cones, safely guide & manage the traffic using signs, safety barricades, etc.),
- ✓ removal of accident /breakdown vehicles, removing of dead animals/birds lying on the highway and loading, unloading, transportation & disposal of surplus material left over by accidental vehicle or otherwise lying on road (on carriageway) and
- ✓ Encroachment prevention & removal with all lead & lifts complete with proper communication equipment,
- ✓ consumables, materials, suitable Towing vehicles, Ambulance, patrolling vehicles and manpower like drivers, helpers, para-medical staff, labours including deployment of crane and all works shall be done as per requirement and as directed by Client representative and as per Relevant Specifications as applicable.

### 1.1.16 OPERATIONS COSTS

Cost towards Operations include the following:

- Toll Plaza Operation cost
- Operation and management costs of rest areas and lay byes
- SPV Costs
- Survey Costs
- Insurance
- Audit Charges
- IE for O&M period
- Administrative Cost
- Electricity Bill of lighting

Following table depicts the cost of operations for the project:

**Table 8: Summary of O&M Costs**

| S No | Description                                         | Amount in Lakhs<br>(including GST) |
|------|-----------------------------------------------------|------------------------------------|
|      | SPV - Expenditure                                   |                                    |
| 1    | SPV staff                                           | 83.40                              |
| 2    | Highway lighting - Power Charges                    | 286.10                             |
| 3    | Highway lighting - Maintenance charges              | 8.58                               |
| 4    | Tolling and HTMS AMC/ Spare Parts                   | 72.72                              |
| 5    | Surveys & Investigations (BBD, Roughness)           | 6.21                               |
| 6    | IE fees                                             | 54.00                              |
| 7    | Insurance Charges                                   | 45.52                              |
| 8    | Audit Charges                                       | 11.56                              |
| 9    | LIE Fee                                             | 17.00                              |
| 10   | Admin cost - Board Meeting Expenses, valuation etc. |                                    |
|      | Agency - Expenditure                                |                                    |
| 11   | Toll Operation - Agency                             | -                                  |
| 12   | Route patrolling                                    | 147.02                             |
| 13   | Cost towards Periodic Vehicle replacement           |                                    |
| 14   | TAP & MAP                                           | -                                  |
| 15   | Routine maintenance                                 | 336.10                             |
| 16   | Repair of Road - BoQ Items                          | 289.08                             |
| 17   | Repair of Structures                                | 25.86                              |
|      | 1 <sup>st</sup> year O&M Cost in Lakhs              | 1,383.14                           |

**Note:** The cost is in lakhs including GST@18% without escalation considering FY27 rates

### 1.1.17 PERIODIC MAINTENANCE COSTS

Cost towards major maintenance include following:

- ✓ Cost of Periodic maintenance of Pavement based on Finalized MM schedule
- ✓ Cost of Periodic Maintenance of Structures
- ✓ Cost of Periodic replacement of ATMS and TMS

Following table includes the cost of Major Maintenance works for the project:

**Table 9: Summary of Periodic Maintenance Costs**

| Year               | Functional +Structural overlay MCW+ S/R | Major Maintenance of Rigid Pavement | Replacement of TMS @ every 5 years | Structure specified repairs |
|--------------------|-----------------------------------------|-------------------------------------|------------------------------------|-----------------------------|
| 2026-2027          | -                                       | 31.82                               | 225.47                             | 16.37                       |
| 2027-2028          | 11,187.15                               | -                                   | -                                  | -                           |
| 2028-2029          | -                                       | -                                   | -                                  | -                           |
| 2029-2030          | -                                       | -                                   | -                                  | -                           |
| 2030-2031          | 76.42                                   | -                                   | -                                  | -                           |
| 2031-2032          | 74.71                                   | -                                   | 225.47                             | -                           |
| 2032-2033          | -                                       | 31.82                               | -                                  | -                           |
| 2033-2034          | -                                       | -                                   | -                                  | -                           |
| 2034-2035          | 4,346.45                                | -                                   | -                                  | -                           |
| 2035-2036          | 4,481.81                                | -                                   | -                                  | 642.92                      |
| 2036-2037          | -                                       | -                                   | 225.47                             | -                           |
| <b>Total Cost:</b> | <b>20,166.54</b>                        | <b>63.64</b>                        | <b>676.42</b>                      | <b>659.29</b>               |

**Note:** The cost is in Lakhs including GST@18% without escalation considering FY27 rates.

### 1.1.18 TOTAL OPERATION & MAINTENANCE COSTS

Year on year operation cost is summation of following:

- ✓ Immediate Costs
- ✓ Routine Maintenance & Incident Management
- ✓ Periodic Maintenance
- ✓ Operations Cost

Following table presents the summary of Operations & Maintenance cost for the project

**Table 10: Summary of Total Cost**

| Year               | SUMMARY OF VARIOUS EXPENSES in Rs. Lakhs |                         |                                           |                                                                          |                  |
|--------------------|------------------------------------------|-------------------------|-------------------------------------------|--------------------------------------------------------------------------|------------------|
|                    | Immediate Repair's Cost                  | Toll Operation expenses | Routine Maintenance + Incident Management | Periodic Maintenance (Functional +Struc Overlay+ Toll collection system) | Total Cost       |
| 2026-2027          | -                                        | -                       | 1,382.85                                  | 273.66                                                                   | 1,656.51         |
| 2027-2028          | -                                        | -                       | 1,397.01                                  | 11,187.15                                                                | 12,584.16        |
| 2028-2029          | -                                        | -                       | 1,382.85                                  | -                                                                        | 1,382.85         |
| 2029-2030          | -                                        | -                       | 1,426.51                                  | -                                                                        | 1,426.51         |
| 2030-2031          | -                                        | -                       | 1,391.73                                  | 76.42                                                                    | 1,468.15         |
| 2031-2032          | -                                        | -                       | 1,397.01                                  | 300.18                                                                   | 1,697.19         |
| 2032-2033          | -                                        | -                       | 1,382.85                                  | 31.82                                                                    | 1,414.67         |
| 2033-2034          | -                                        | -                       | 1,397.01                                  | -                                                                        | 1,397.01         |
| 2034-2035          | -                                        | -                       | 1,382.85                                  | 4,346.45                                                                 | 5,729.29         |
| 2035-2036          | -                                        | -                       | 1,405.89                                  | 5,124.73                                                                 | 6,530.62         |
| 2036-2037          | -                                        | -                       | 577.52                                    | 225.47                                                                   | 803.00           |
| <b>Total Cost:</b> | -                                        | -                       | <b>14,524.05</b>                          | <b>21,565.89</b>                                                         | <b>36,089.94</b> |

**Note:** The cost is in Lakhs including GST@18% without escalation considering FY27 rates