

Operation & Maintenance Report- FY2027

**8-Laning of NH-1 (New NH-44) from
Mukarba Chowk at km 15.500 to
Panipat at km 86.000 on BOT (Toll)
basis in the State of Haryana : MCP**

**SAMARTH INFRAENGG Technocrats
Private Limited**



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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	-Californian 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
MPRDCL	-Madhya Pradesh Road Development Corporation Ltd.
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, FY-2027 -MCP

1.1 INTRODUCTION

The National Highways Authority of India (the “**Authority**”) is engaged in the development of highways and as part of this endeavor, the Authority has decided to undertake development and operation/ maintenance of 8 Laning of NH-1 (New NH-44) from Mukarba Chowk at km 15.500 to km 86.000 (the “**Project**”) in the State of Haryana under Design, Build, Finance, Operate and Transfer (“**DBFOT**”) Basis. The Authority had accordingly invited the bid proposals and upon the evaluation of received bids, the Authority has awarded the Project to **M/s Essel Infraprojects Ltd.**

Consequent to this, **M/s Essel Infraprojects Ltd**, formed a Special Purpose Vehicle (SPV) in the name of **M/s Mukarba Chowk - Panipat Toll Roads Limited (MCPTRL, Concessionaire)** for implementation/execution of the project.

Due to default of Concessionaire, NHAI issued cure period notice vide letter Dt 16.04.2019. Intention to terminate notice was issued by NHAI on 16.10.2019 under clause 37.2.2 of the Concession Agreement.

The Lead banker, **India Infrastructure Finance Company Ltd**, vide his letter dated 16.10.2019 issued notice of financial default to the Concessionaire and vide letter dated 23.10.2019 requested NHAI to exercise its right of substitution in accordance with Substitution Agreement.

The Lead banker has requested NHAI to approve the substitution of **MCPTRL** with **M/s Welspun Infra Facility Pvt Ltd**. which is wholly owned subsidiary of **M/s Welspun Enterprises Ltd**.

Accordingly, a Settlement Agreement was signed between NHAI and **MCPTRL** on 20.03.2020, wherein a payment of Rs. 9.60 Cr is to be made by the existing concessionaire to the NHAI before signing of the substitution agreement in full and final settlement in respect of all claims, counter claims and all the various disputes under the Concession Agreement. Extension time of 15 months for the New Concessionaire from the date of implementation of the substitution for commencement of commercial operations without extension of Concession Period any no Claim w.r.t to Clause 35.2 & 35.3 shall be raised by New Entity in this regard. The Net amount payable by NHAI to MCPTRL is Nil.

M/s Welspun Infra Facility Pvt. Limited the prospective substituted party in place of the existing Concessionaire has also signed the Settlement Agreement as a witness upon being satisfied that all the pre-existing disputes are fully and finally settled and no residual.

A substitution agreement was signed by NHAI, the Substituted Concessionaire, **M/s Welspun Infracapacity Pvt Ltd** and the lead banker, **India Infrastructure Finance Company Ltd** on **08.06.2020**.

The new concessionaire has achieved PCOD for full length different timelines. PCOD-I: on 31.03.2022 for 53.763 km, PCOD-II: on 28.03.2023 for cumulative length 66.91 km and PCOD-III: 01.02.2024 for cumulative length 70.5 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 Infraengg Technocrats 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 is the updated Due diligence report incorporating the improvements and developments and then to evaluate 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.

1.2 PROJECT AT A GLANCE

National Highway-44 (old NH-1) forms a part of the proposed widening of 8 lanes of existing National Highway from Mukarba Chowk to Panipat in the state of Haryana. The total length of the Project Highway is 70.500 Km. The major portion of the project highway runs through Sonipat & Panipat Districts. It mainly passes through Narela, Sonipat, Ganaur, Samalkha, and Panipat Districts etc. Project stretch is proposed to be explored for rehabilitation and widening of existing carriageway.

Table 1: Project Corridor Chainage System

Referencing system	Project Corridor Start Point (km)	Project Corridor End Point (km)	Length (km)
Old Chainage	15.500	86.000	70.50
CA Design Chainage	15.500	86.000	70.50

Eight-Laning of NH-44 (old NH-1) from Mukarba Chowk at km 15.500 to Panipat at km 86.000 in the State of Delhi & Haryana on BOT(Toll) basis-MCP



Photographs showing the start and end point of the project road are presented below:



Start Point at km.15.000



End Point at km.86.100

Following Table highlights the total project at a glance:

Table 2: Chronology of Project Milestones

S No.	Description	Date
1.	Date of Signing the Concession Agreement	28 th Aug 2015
2.	Appointment Date	27 th Oct 2016
3.	Scheduled Project completion (910 days)	25 th April 2019
4.	Signing of Substitution Agreement with New Entity	08 th June 2020
5.	Revised date for Project completion (456 days)	07 th Sep 2021
	EOT on Date of Completion (104 days)	20 th Dec 2021
6.	Scheduled End of Concession	17 years from Appointed date EOT 104 Days of Covid-19.
	Revised Concession Period (as shared by SPV)	03.12.2037
7.	Date of issue of Provisional Completion Certificate	PCOD-I: 31.03.2022 for 53.763 km PCOD-II: 28.03.2023 for cum. length 66.91 km PCOD-III: 01.02.2024 for cum. length 70.5 km
9.	Date of Issue of Final Completion Certificate	-

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.

1.4 REVIEW OF CONCESSION AGREEMENT

- 1) Concession Parties and date of execution of Agreement: NHAI and MCPTRL entered into the Concession Agreement on 28th Aug, 2015.
- 2) Appointed Date, Commercial Operation Date (Article 4, Article 15 & Article 3): As the Concession Agreement was signed on 28th Aug, 2015, the Appointed Date as per the definition in the Concession Agreement would be required to be achieved by 24th Feb 2016.

The same has been declared as 27th Oct 2016 with the approval of the competent authority vide letter no NHAI/11012/NH-1/BOT/2014/HR/464 date 07/08th Nov 2016. The Financial Closure occurred on 06rd May 2016.

- 3) Based on the aforesaid, it appears that there has been a delay of about 8 months for the declared Appointed Date. The Authority and the Concessionaire mutually agreed for waiving off all the damages/penalties to be levied from Concessionaire as well as from NHAI. The delay damages/penalties on account of 72 days in achieving the Financial Close is considered in the Settlement Agreement between NHAI and M/s MCPRTL.
- 4) Concession Period (Article 3): The Appointed Date is declared on 27.10.2016, accordingly the expiry date of the Concession Period would be 23.10.2033. The Authority vide its letter NHAI/RO/CH/11011/PD-SNP/Mukarba chowk-Panipat/NH-1/337-4383 dt: 01.11.2021 has granted extension of Concession period by 104 days on account of Force Majeure Event (Pandemic COVID-19) in terms of Article 34 of Concession Agreement to the condition that in case the Concessionaire achieve the Provisional completion/Completion of the project on or before the extended date due to the Covid-19 pandemic, then number of extended days shall be deemed reduced to the extent date of Provisional/Completion, as the case may be) proceeds revised schedule date of completion. The Authority vide its letters No NHAI/PIU/NH-44/M-115/2021/D-5551 Dt: 02.09.2021 Dt: 01.11.2021 has granted approval for extension of Time for 104 days. The Scheduled Completion date would be 19.12.2021.
- 5) Condition Precedent (Article 4): The Condition Precedent required to be satisfied both by the Authority and Concessionaire are presumed to be fulfilled by the either party as the settlement Agreement has been signed by the Authority and the MCPRTL. However, the New Concessionaire vide his letter no WIPL/IE/Site/2021/731 conveyed the Authority about the Non-Availability of land
- 6) Obligations of Concessionaire (Article 5): The Concessionaire has fulfilled most of the obligations.
- 7) Change in Ownership (Clause 5.3 read with Clause 7.1(k)): The Concessionaire shall it shall at no time undertake or permit any Change in Ownership except in accordance with the provisions of Clause 5.3 and that the selected bidder, together with its Associates, hold not less than 51 % (fifty-one percent) of its issued and paid up Equity as on the date of this Agreement; and that each member of the Consortium whose technical and financial capacity was evaluated for the purposes of prequalification and short-listing in response to the Request for Qualification shall hold at least 26% (twenty six per cent) of Equity during the Construction Period and two years thereafter along with its Associates
- 8) Obligations of Authority (Article 6): The Authority has fulfilled most of its obligations. However, the Land was not provided to the Concessionaire as per CA.
- 9) Performance Security (Article 9): The performance security is Rs 106.44 Cr. The Concessionaire has fulfilled this condition.
- 10) Scheduled Completion Date (Schedule-G, Article 12 & Article 37): Construction period is 910 days from the Appointed Date 27.10.2016. The Schedule Completion date is 25.04.2019. The Concessionaire MCTRPL, achieved the Project Milestone 1 & II and could not achieve the Project Milestone III & Scheduled completion date as per the provisions of CA. After terminating the Concessionaire on his default in successful implementation of the Project, the Authority has entered into a settlement agreement with MCTRPL. Subsequently the Authority has entered into a substitution agreement with a new entity M/s Welspun Infrafacility Pvt Ltd. The Construction period is 15 months effective from the Substitution agreement date i.e., 8th June 2020 without extension of Concession Period. The Scheduled completion date is 7th Sept 2021.

- 11) Construction of Service Roads by Authority (Article 12.7): The Authority at any time after the 6th (Sixth) anniversary of the Appointed Date, can undertake at its cost, construction of service roads on the Project Highway. The Concessionaire shall have the obligation to maintain the service roads in accordance with Good Industry Practice
- 12) Provisional Completion Certificates, Final Completion Certificate and Punch List Items (Article 14 & Article 37): The new concessionaire has submitted different proposals for PCOD to NHAI in various lengths. PCOD-III achieved for full length of 70.5 Km.
- 13) Change of Scope (Article 16): The Concessionaire has executed certain works under change of scope and details were given in the COS page.
- 14) O& M Obligations of the Concessionaire: The Concessionaire has been fulfilling this obligation
- 15) Grant (Article 25): The authority agrees to provide the Concessionaire cash support by way of an outright grant of 189 Cr disbursed by the way of Equity Support.
- 16) Premium (Article 26): Concessionaire shall pay a sum of Rupee One to the Authority in consideration towards the grant of Concession.
- 17) Fees and Fee Notification (Article 27): The Authority and the Concessionaire acknowledge that a notification for levy and collection of Fee shall be issued by the Government under section 8A of the Act with Rule 3 of National Highways Fee Amendment Rules, 2008 (the **Fee Notification**) within 90 days hereof substantially in the form set forth in Schedule R. Revision of Fee shall annually on 1st April.
- 18) Revenue Shortfall Loan (Article 28): If the Realizable fee in any Accounting Year shall fall short of the Subsistence Revenue as a result of an Indirect Political Event, a Political event or an Authority default as the case may be, the Authority shall upon request of Concessionaire, provide a loan for meting such short fall “**Revenue Shortfall Loan**” at an interest rate equal to 2% above the Bank rate.
- 19) Effect of Variation in Traffic Growth (Article 29): As per the clause the traffic sampling shall be carried out as below (i) On the date falls one year prior to the Target Date (ii) On the Target Date (iii) On the first anniversary of the Target Date. Target date is 01.04.2025 and the Target Traffic is 1,32,197 PCU. Design capacity for Six Lane project highway is 2,10,000 PCU.

In the event that the actual Average Traffic shall have fallen short of the Target Traffic by more than 2.5% thereof or exceeded the Target Traffic by more than 2.5% thereof, the Concession Period shall be deemed to be modified in accordance with Clause 29.2.

As per Clause 29.2.1, if the Actual Average traffic has fallen short of the Target Traffic, then for every 1% shortfall as compared to the Target Traffic, the Concession Period shall subject to payment of Concession Fee be increased by 1.5% thereof; provided that such increase shall not exceed 20% of the Concession Period.

As per Clause 29.2.2, if the Actual Average traffic has exceeded the Target Traffic, then for every 1% excess as compared to the Target Traffic, the Concession Period shall be reduced by 0.75% thereof; provided that such reduction shall not exceed 10% of the Concession Period.
- 20) Competing Road (Clause 6.3) & Additional Toll way (Article 30) and Compensation for Competing Roads (Clause 35.4): As per Clause the 6.3, no competing road should be constructed before the 10th anniversary of the Appointed Date. As per Article 30, no additional tollway should be constructed before the 9th anniversary of the Appointed Date. As per Clause 35.4, in the event that an additional Tollway or a Competing Road as

the case may be, is opened for traffic, the Authority shall pay the compensation to the Concessionaire.

- 21) Insurance (Article 32): The Concessionaire has been fulfilling this obligation.
- 22) Force Majeure (Article 34): **The effect of Force Majeure Event on the Concession period** in accordance with Clause 34.6.2, at any time after the Appointed Date, if any Force Majeure Event occurs a) 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, whereupon the Concessionaire is unable to collect Fee despite making best efforts or it is directed by the Authority to suspend the collection thereof during the subsistence of such Force Majeure Event, the Concession Period shall be extended by a period, equal in length to the period during which the Concessionaire was prevented from collection of Fee on account thereof; provided that in the event of partial collection of Fee where the daily collection is less than 90% (ninety per cent) of the Average Daily Fee, the Authority shall extend the Concession Period in proportion to the loss of Fee on a daily basis. For the avoidance of doubt, loss of 25% (twenty-five per cent) in collection of Fee as compared to the Average Daily Fee for four days shall entitle the Concessionaire to extension of one day in the Concession Period.

Allocation of Costs arising out of Force Majeure Event after the Appointed Date shall follow clause 34.7.2 (a) i.e., upon the occurrence of any **Non-Political Event** after the Appointed date, the parties shall bear their respective Force Majeure Cost and neither party shall be required to pay the other any costs. As per Clause 34.7.2 (c) upon the occurrence of any **Political Event** after the Appointed date all FM Costs attributable to such Political Event shall be reimbursed by the Authority to the Concessionaire.

For the avoidance of doubt, the Clause 34.7.2 also specifies that the Force Majeure Costs shall not include loss of Fee revenues or debt repayment obligations and for determining such cost, information contained in the Financial Package may be relied upon to the extent that such information is relevant.

The Authority vide its letter NHAI/RO/CH/11011/PD-SNP/Mukarba chowk-Panipat/NH-1/337-4383 dt: 01.11.2021 has granted extension of Concession period by 104 days on account of Force Majeure Event.

- 23) Suspension of Concessionaire's Rights (Article 36): The NHAI has invoked this clause on M/s MCPTRL.
- 24) Termination (Article 37): The NHAI has invoked this clause on M/s MCPTRL.
- 25) Change in Law (Article 41): Change in law occurred due to eruption of COVID-19 and its impact by way of change in legislations by both the Central Government and respective State Governments.
- 26) Governing Law (Article 47) and Dispute resolution (Article 44): Governed by Laws of India and the Court at Delhi shall have the exclusive jurisdiction. There are no disputes referred so far under the article 44.

1.5 REVIEW OF PAVEMENT DESIGN

✓ Manual of Specification and Standards for Eight Laning

The Schedule-D states that “Subject to the provisions of Paragraph 2 of this Annex-I, Eight-Laning of the Project Highway shall conform to the Manual of Specifications and Standards for Six-Laning of Highway through Public Private Partnership Published by Indian Road Congress IRC: SP:87-2013”

✓ Review of CA stipulations for Pavement Design

Clause 5.3.1 of IRC SP: 87-2013 stipulate that the new pavement shall be designed in accordance with the IRC: 37.

Clause 5.4.1 (i) of IRC SP: 87-2013 stipulates that the flexible pavement shall be designed for a minimum design period of 15 years or operation period, whichever is more. **Stage Construction will be permissible subject to the requirements specified in para (ii) below.**

Clause 5.4.1 (ii) of IRC SP: 87-2013 specifies that “Alternative strategies or combination of initial design, strengthening and maintenance can be developed by the Concessionaire to provide the specified level of pavement performance over the operation period subject to satisfying the following minimum design requirements”.

Clause 5.4.1 (ii) (a) indicates that, the thickness of sub-base and base of pavement section is designed for a minimum design period of 15 years and the **initial bituminous surfacing for a minimum design period of 10 years.**

Clause 5.4.1 (ii-(b)) indicates that, the pavement shall be strengthened by bituminous overlay as and when required to extend the pavement life to full operation period. The thickness of bituminous overlay shall be determined on the basis of relevant IRC codes.

Clause 5.5.5 indicates that, the design traffic in case of Service Road shall be minimum ten million standard axles. The crust composition shall be provided accordingly.

Clause 5.9.6 (i) of IRC SP: 87-2013 stipulate the thickness of the bituminous overlay shall be determined on the basis of FWD method and the design traffic as per the procedure outlined in IRC: 81 as also from structural numbers of existing pavement layers.

Clause 5.9.6 (ii) of the same manual also stipulates that the initial **strengthening shall be done for a minimum design period of 10 years.** Subsequent strengthening to extend the pavement to full operation period shall be implemented at the end of initial design period or earlier, in case of any structural distress in the pavement or if the surface roughness exceeds the value specified in Schedule-K of the CA.

Clause 5.9.6 (iv) of the same Section stipulate that the thickness of Bituminous Overlay for pavement strengthening shall not be less than 50 mm Bituminous concrete, after attending to the requirements of profile corrective course”

✓ **Concession Period**

As per the Concession Agreement the Concession Period is 17 years.

✓ **Design Period**

As per the submitted Pavement design report, the thickness of base and sub-base is designed for 15 years and bituminous layers are designed for 10 years. **Stage construction has been adopted.**

✓ **Design CBR**

As per the submitted pavement design report, the effective CBR value for the design of Pavement is considered as 8%.

✓ **Design MSA**

The Design traffic for the project road in term of cumulative number of standard axles has been computed for a design life of 10 years and for 15 years design period of main carriageway as given below:

Sl. No	Location	MSA for 10 years	MSA for 15 years
1	Km 28+700	53	92
2	Km 52+000		

✓ **Pavement Crust Main carriageway**

Design of new construction and at widening portion is carried out in accordance with IRC 37. The pavement layer for new construction / Widening portion has been designed for 10-year design traffic load for the Bituminous layers.

The Pavement layer thickness for various design loading as given below:

S. No	Design MSA	New construction at Widening portion	New construction at Approach of Underpasses
1	Adopted MSA - 10 years	53	
2	BC in mm	50	50
3	DBM in mm	120	80
4	WMM in mm	250	150
5	GSB in mm	200	-
6	CTSB in mm	-	200

✓ Overlay Design

The Overlay thickness proposed for 10-year design traffic for the project corridor. Based on the deflection values overlay has been proposed for 10-year design traffic. The Overlay sections as given below:

- Entire project corridor in both the direction the remaining life more than the design MSA, hence no overlay required. However, a 50mm thick functional overlay has been proposed for complete length of the project road in both the direction.

✓ Service Road Design

The Service Road has to be designed for design traffic of 10 MSA as per Cl. 5.5.5 of IRC SP 87-2013.

As per submitted Pavement Design Report the service road has been designed for 10 MSA & 8%. The Pavement layer adopted for service road as given below:

- BC -40 mm
- DBM -50 mm
- WMM -200 mm
- GSB -200 mm

✓ Rigid Pavement Design

As per submitted Pavement Design Report, Rigid Pavement design at Toll Plaza location the proposed crust as given below:

- PQC -300 mm
- DLC -150 mm
- GSB -150 mm
- Subgrade -500 mm (8% effective CBR)

1.6 MAINTENANCE REQUIREMENTS:

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

S.No	Description	Length (Km)	Lanes	Applicable Manual	Applicable Schedule for O&M	Maximum Roughness Allowed	Maximum allowable deflection	Frequency of Roughness Test	Frequency of FWD Test
1	Mukarba Chowk to Panipat	71.40	8	IRC:SP:87-2013	Schedule-K and Manual	2500 mm/Km	Nil	2 Times in a Year	Once in a 5 Years

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

1.7 OVERVIEW OF PROJECT ROAD

The Project Road has flexible pavement over the entire length (except at Toll Plaza) with paved carriageway of 15.5m/12m 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 Alipur, Kundli, Rai, Murthal, Bari, Samalkha, Panipat, etc. In general, road embankments are in the range of 1.0m-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 median 1.2m wide at km 15.000



A view of the Project Road on Structure approach with Highway Lighting & CCB at Km 50.000-LHS



A view of the Project Road with 6-Lane Approach having Lighting, MCB & CCB at Km 62.000-RHS



A view of the Project Road with Median 1.2m wide & MCB at Km 71.000-BHS

Eight-Laning of NH-44 (old NH-1) from Mukarba Chowk at km 15.500 to Panipat at km 86.000 in the State of Delhi & Haryana on BOT(Toll) basis-MCP



A view of the Project Road with PGR in SR Separator at Km 76.000-RHS

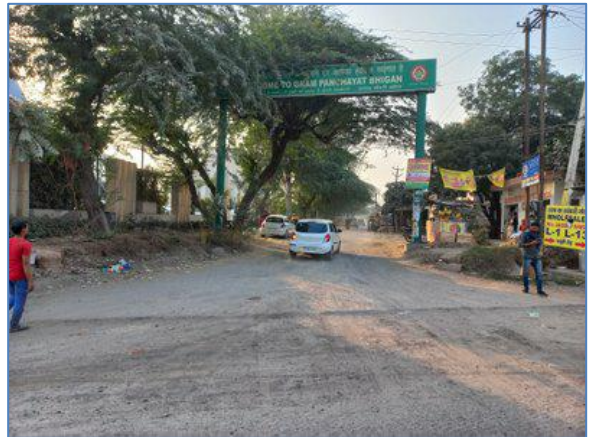


A view of the Project Road with MCB & PGR at Km 81.000-LHS

The Project Road has 13 Major junctions and 22 Minor junctions. Photographs showing junctions locations are presented below:



Major Junction Towards Sonipat @ km 50.170 LHS



Minor Junction Towards Bhighan @ km 53.400 LHS



Major Junction Towards Ganaur @ km 61.990 LHS



Minor Junction Towards Bhodwal Majri Station Road @ km 68.900 LHS

About 18 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 53.850



A view of High mast lighting @ km 84.500

All together the Project Road has about 53 Bus shelters on Service Road. Few photos taken at the Bus Bays and Bus Shelter are presented below:



Bus Shelter near km 43.480 LHS



Bus Shelter near km 50.900 LHS



Bus Shelter near km 64.900 LHS



Bus Shelter near km 66.900 RHS

The Project Road has one staggered Toll Plaza at km 54.230-LHS & km 53.770-RHS provided with Rigid pavement including its tapering portions. It has (13+13) ETC lanes at Toll Plaza. Eight high mast lights on either ends of the toll plaza are provided. Double arm lighting provided in the approaches of both the toll plazas.



A view of the Toll Plaza near km 54.230 (Baghan)



A view of the Toll Plaza near km 53.770 (Baghan)

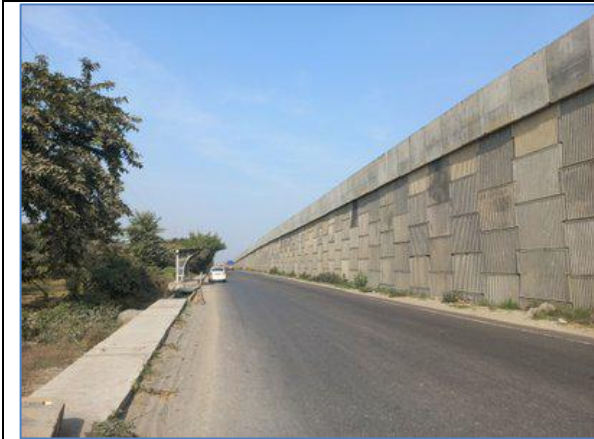


Admin Building at km.54.160 RHS



Temporary Toilets at km 54.300 LHS

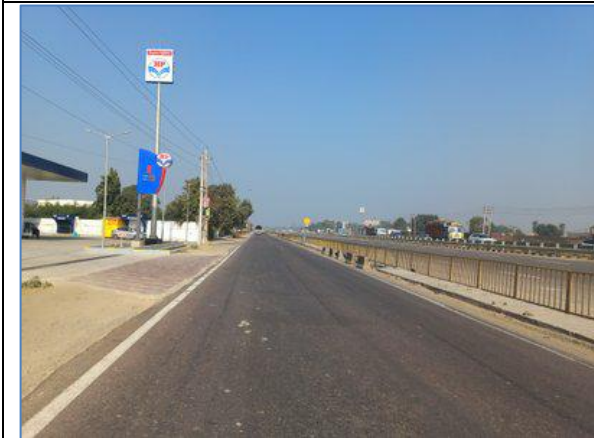
Service road/slip roads of varying carriageway width of 7m to 12m have been observed along the Project Corridor. Service road/slip roads have been constructed for most of the length of the project corridor except at few locations. Photos depicting the service road pavement surface type, Condition and 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:



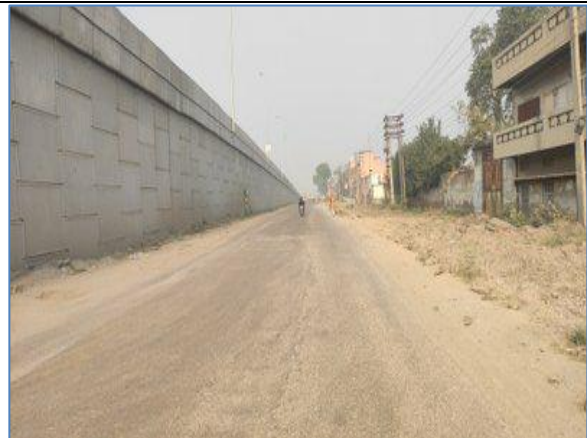
A view of the Service Road near VUP km 43.400 with covered drain & Bus shelter on LHS



A view of Service Road with Double arm lighting near PUP km 53.400 RHS



A view of the Service Road near km 60.000 with Pedestrian Guardrail on LHS



A view of the Service Road near VUP km 73.700 RHS

1.8 ROAD WORKS

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

Table 3: Salient Feature of the Project Road

S. No	Description	Unit	As per Site
1	Start Chainage (Km)	Km.	15.000
2	End chainage (Km)	Km.	86.100
3	Length of the Project Corridor	Km's	71.100
4	Service / Slip	Km's	111.200
5	Toll Plaza	Nos	1
6	No. of Lanes	Nos	26
7	Flyovers	Nos	18 (3 existing, 6 COS, 1 extra found at site, 8 out of 10 as per Sch-B)
8	Uni Directional Flyovers	Nos	-
9	Overpass	Nos	-
10	VUPs	Nos	21 (3 existing, 14 COS, 4 out of 5 as per Sch-B)
11	LVUP's	Nos	-
12	PUP's	Nos	13 (3 existing, 4 COS, 6 as per Sch-B)
13	CUP's	Nos	1 (1 no deleted)
14	FOBs	Nos	6 (1 COS, 5 out of 11 as per Sch-B)
15	Major Bridges	Nos	1
16	Minor Bridges	Nos	18
17	Culverts (Pipe)	Nos	33
18	Culvert (Slab/Box)	Nos	Slab-4 /Box-42
19	Major Junctions	Nos	13
20	Minor junctions	Nos	22
21	RCC Wall	Kms	4.230
22	RE Wall (BHS)	Kms	28.040
23	Only Bus Shelter	Nos	53
24	No of Truck Lay bye	Nos	-
25	Rest Areas	Nos	-
26	High Mast Lights	Nos	18
27	Highway Lighting (length only)	Kms	54
28	Single Arm Lightnings	Nos	496
29	Double Arm Lightnings	Nos	827
30	Solar Blinkers	Nos.	24
31	Underpasses Lighting	Nos.	199
32	RCC Cover Drain	Kms	118.630
33	RCC Open Lined Drain	Kms	5.275
34	Earthen Drain	Kms	3.430
35	Median Kerb Damages	Kms	96.0
36	Road Markings	Sqm	78.600
37	W-Beam Safety Barriers (BHS)	Kms	83.575
38	Rigid Concrete Barrier	Kms	30.145

S. No	Description	Unit	As per Site
39	Hand Railing	Kms	5.150
40	Pedestrian Guard Rails	Kms	35.640
41	Kilometer Stones	Nos	75
42	Road Signs	Nos	244
43	Gantry Sign Boards	Nos	2
44	Cantilever Sign Boards	Nos	19
45	VMS	Nos	2
46	Approaches	Kms	32.270
47	Underpasses Lighting	Nos.	199

1.9 STRUCTURES

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

Table 4: Summary of Major Structures

	Type of Structure	Schedule-B	As per Site
(a)	No. of Major Bridges	-	1 (COS)
(b)	No. of Minor Bridges	18	23 (5 Existing)
(c)	No. of Flyovers	10	18 (3 existing, 6 COS, 1 extra found at site, 8 out of 10 as per Sch-B)
(d)	No. of Vehicular Underpasses	5	21 (3 existing, 14 COS, 4 out of 5 as per Sch-B)
(e)	No. of Pedestrian Under passes	6	13 (3 existing, 4 COS, 6 as per Sch-B)
(f)	No. of Cattle Under passes	2	1 (1 no deleted)
(g)	No. of Foot Over Bridges	11	6 (1 COS, 5 out of 11 as per Sch-B)

Table 5: Summary of Culverts

	Type of Structure	Schedule	As per Site
(a)	No. of Pipe Culverts	29	33
(b)	No. of Box / Slab Culverts	36/2	42/4

Table 6: List of Major Structures along Project Road

S No.	Design Chainage (km)	Type of Str.	Side	Str. on	Age of Structure	Span Arrangement (No x Length, m)	Deck Width (m)
1	17+065	VUP	LHS	MCW	Old	2 x 10 x 4.5	20
2	17+065	VUP	RHS	MCW	Old	2 x 10 x 4.5	20
3	17+650	FOB	BHS	MCW	Old	2 x 30	3.5
4	18+640	MNB	LHS	SR	Old	3.3 + 3.2 + 3.3	14
5	18+640	MNB	LHS	MCW	Old	3.6 + 3.4 + 3.6	16.9
6	18+640	MNB	RHS	MCW	Old	3.6 + 3.4 + 3.6	16.9
7	18+640	MNB	RHS	SR	Old	3.3 + 3.2 + 3.3	10
8	19+248	VUP	LHS	MCW	Old	2 x 10 x 4.5	21.4
9	19+248	VUP	RHS	MCW	Old	2 x 10 x 4.5	21.4
10	19+500	FOB	BHS	MCW	New	2 x 36.5	3.5
11	20+271	PUP	LHS	MCW	Old	1 x 6 x 3.5	19

Eight-Laning of NH-44 (old NH-1) from Mukarba Chowk at
km 15.500 to Panipat at km 86.000 in the State of Delhi &
Haryana on BOT(Toll) basis-MCP

S No.	Design Chainage (km)	Type of Str.	Side	Str. on	Age of Structure	Span Arrangement (No x Length, m)	Deck Width (m)
12	20+271	PUP	RHS	MCW	Old	1 x 6 x 3.5	19
13	20+450	MNB	LHS	SR	Old	3 x 10.6	10.5
14	20+450	MNB	LHS	MCW	Old	3 x 10.6	15
15	20+450	MNB	RHS	MCW	Old	3 x 10.6	15
16	20+450	MNB	RHS	SR	Old	3 x 10.6	7.9
17	21+753	VUP	LHS	MCW	Old	2 x 10 x 4.5	19
18	21+753	VUP	RHS	MCW	Old	2 x 10 x 4.5	19
19	22+746	MNB	LHS	SR	New	7.71 + 7.7 + 7.71	10.2
20	22+746	MNB	LHS	MCW	New	7.71 + 7.7 + 7.71	16.9
21	22+746	MNB	RHS	MCW	New	7.71 + 7.7 + 7.71	16.9
22	22+746	MNB	RHS	SR	New	7.71 + 7.7 + 7.71	11.5
23	22+805	Flyover	LHS	MCW	New	1 x 30	16.9
24	22+805	Flyover	RHS	MCW	New	1 x 30	16.9
25	24+000	FOB	BHS	MCW	New	2 x 48	3.5
26	24+800	MNB	LHS	SR	New	7.31 + 7.2 + 7.31	10.2
27	24+800	MNB	LHS	MCW	Old	7.5 + 7.2 + 7.5	18.2
28	24+800	MNB	RHS	MCW	Old	7.85 + 7.5 + 7.85	15.5
29	24+800	MNB	RHS	SR	Old	7.85 + 7.5 + 7.85	18
30	26+450	Flyover	LHS	MCW	New	2 x 30	16.9
31	26+450	Flyover	RHS	MCW	New	2 x 30	16.9
32	27+405	Flyover	LHS	MCW	New	36.7+47.2+32.2	16.9
33	27+405	Flyover	RHS	MCW	New	36.7+47.2+32.2	16.9
34	28+520	MNB	LHS	SR	New	6.71 + 6.6 + 6.71	10.2
35	28+520	MNB	LHS	MCW	Old	6.9 + 6.6 + 6.9	16.9
36	28+520	MNB	RHS	MCW	Old	6.9 + 6.6 + 6.9	16.9
37	28+520	MNB	RHS	SR	New	6.71 + 6.6 + 6.71	10.2
38	28+530	FOB	BHS	MCW	New	2 x 34.4	3.5
39	29+160	Flyover	LHS	MCW	New	5 x 30	16.9
40	29+160	Flyover	RHS	MCW	New	5 x 30	16.9
41	30+667	Flyover	LHS	MCW	New	1 x 30	16.9
42	30+667	Flyover	RHS	MCW	New	1 x 30	16.9
43	30+925	MNB	LHS	SR	New	3 x 7	12.3
44	30+925	MNB	LHS	MCW	New	3 x 7	16.9
45	30+925	MNB	RHS	MCW	New	3 x 7	16.9
46	30+925	MNB	RHS	SR	New	3 x 7	12.3
47	31+329	Flyover	LHS	MCW	New	1 x 30	16.9
48	31+329	Flyover	RHS	MCW	New	1 x 30	16.9
49	31+900	PUP	LHS	MCW	New	1 x 12 x 3.5	16.9
50	31+900	PUP	RHS	MCW	New	1 x 12 x 3.5	16.9
51	32+275	MJB	LHS	SR	New	20 + 30 + 20	12
52	32+275	MJB	LHS	MCW	Old	7 x 10	10.22
53	32+275	MJB	LHS	MCW	Old	20 + 30 + 20	9.88
54	32+275	MJB	RHS	MCW	Old	20 + 30 + 20	9.66
55	32+275	MJB	RHS	MCW	Old	7 x 10	10.95
56	32+275	MJB	RHS	SR	New	20 + 30 + 20	12
57	33+596	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
58	33+596	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9

Eight-Laning of NH-44 (old NH-1) from Mukarba Chowk at
km 15.500 to Panipat at km 86.000 in the State of Delhi &
Haryana on BOT(Toll) basis-MCP

S No.	Design Chainage (km)	Type of Str.	Side	Str. on	Age of Structure	Span Arrangement (No x Length, m)	Deck Width (m)
59	34+240	MNB	LHS	SR	New	1 x 8.9	10.2
60	34+240	MNB	LHS	MCW	New	1 x 8.9	16.9
61	34+240	MNB	RHS	MCW	New	1 x 8.9	16.9
62	34+240	MNB	RHS	SR	New	1 x 8.9	10.2
63	35+025	Flyover	LHS	MCW	New	1 x 30	16.9
64	35+025	Flyover	RHS	MCW	New	1 x 30	16.9
65	35+812	MNB	LHS	SR	New	8.4 + 8 + 8.4	10.2
66	35+812	MNB	LHS	MCW	New	8.4 + 8 + 8.4	16.9
67	35+812	MNB	RHS	MCW	New	8.4 + 8 + 8.4	16.9
68	35+812	MNB	RHS	SR	New	8.4 + 8 + 8.4	10.2
69	36+900	Flyover	LHS	MCW	New	2 x 30	16.9
70	36+900	Flyover	RHS	MCW	New	2 x 30	16.9
71	37+780	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
72	37+780	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
73	37+900	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
74	37+900	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
75	37+915	VUP	LHS	MCW	New	1 x 15 x 5.5	16.9
76	37+915	VUP	RHS	MCW	New	1 x 15 x 5.5	16.9
77	38+825	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
78	38+825	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
79	41+215	Flyover	LHS	MCW	Old	3 x 45	16.9
80	41+215	Flyover	RHS	MCW	Old	3 x 45	16.9
81	42+331	MNB	LHS	SR	New	2 x 8.9	10.2
82	42+331	MNB	LHS	MCW	New	2 x 8.9	16.9
83	42+331	MNB	RHS	MCW	New	2 x 8.9	16.9
84	42+331	MNB	RHS	SR	New	2 x 8.9	10.2
85	43+395	Flyover	LHS	MCW	New	1 x 30	16.9
86	43+395	Flyover	RHS	MCW	New	1 x 30	16.9
87	43+734	MNB	LHS	SR	New	1 x 7.8	12.3
88	43+734	MNB	LHS	MCW	New	1 x 7.8	16.9
89	43+734	MNB	RHS	MCW	New	1 x 7.8	16.9
90	43+734	MNB	RHS	SR	New	1 x 7.8	12.3
91	44+043	MNB	LHS	SR	New	1 x 7.1	10.2
92	44+043	MNB	LHS	MCW	New	1 x 7.1	16.9
93	44+043	MNB	RHS	MCW	New	1 x 7.1	16.9
94	44+043	MNB	RHS	SR	New	1 x 7.1	10.2
95	45+606	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
96	45+606	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
97	45+619	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
98	45+619	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
99	47+290	PUP	LHS	MCW	New	1 x 12 x 4	16.9
100	47+290	PUP	RHS	MCW	New	1 x 12 x 4	16.9
101	47+415	MNB	LHS	SR	New	1 x 7.1	12.3
102	47+415	MNB	LHS	MCW	New	1 x 7.1	16.9
103	47+415	MNB	RHS	MCW	New	1 x 7.1	16.9
104	47+415	MNB	RHS	SR	New	1 x 7.1	12.3
105	48+600	Flyover	LHS	MCW	Old	22+41+22	16.9

Eight-Laning of NH-44 (old NH-1) from Mukarba Chowk at
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Haryana on BOT(Toll) basis-MCP

S No.	Design Chainage (km)	Type of Str.	Side	Str. on	Age of Structure	Span Arrangement (No x Length, m)	Deck Width (m)
106	48+600	Flyover	RHS	MCW	Old	22+41+22	16.9
107	50+050	PUP	LHS	MCW	New	1 x 12 x 4	16.9
108	50+050	PUP	RHS	MCW	New	1 x 12 x 4	16.9
109	50+097	VUP	LHS	MCW	New	1 x 15 x 5.5	16.9
110	50+097	VUP	RHS	MCW	New	1 x 15 x 5.5	16.9
111	50+112	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
112	50+112	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
113	50+127	VUP	LHS	MCW	New	1 x 15 x 5.5	16.9
114	50+127	VUP	RHS	MCW	New	1 x 15 x 5.5	16.9
115	51+840	PUP	LHS	MCW	New	1 x 12 x 4	16.9
116	51+840	PUP	RHS	MCW	New	1 x 12 x 4	16.9
117	53+415	PUP	LHS	MCW	New	1 x 12 x 3	16.9
118	53+415	PUP	RHS	MCW	New	1 x 12 x 3	16.9
119	55+440	CUP	LHS	MCW	New	1 x 12 x 3.5	16.9
120	55+440	CUP	RHS	MCW	New	1 x 12 x 3.5	16.9
121	55+591	MNB	LHS	SR	New	1 x 7.6	12.3
122	55+591	MNB	LHS	MCW	New	1 x 7.6	16.9
123	55+591	MNB	RHS	MCW	New	1 x 7.6	16.9
124	55+591	MNB	RHS	SR	New	1 x 7.6	12.3
125	56+371	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
126	56+371	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
127	56+800	FOB	BHS	MCW	New	2 x 30	3.5
128	58+515	Flyover	LHS	MCW	New	1 x 30	16.9
129	58+515	Flyover	RHS	MCW	New	1 x 30	16.9
130	59+100	PUP	LHS	MCW	New	1 x 12 x 3.5	16.9
131	59+100	PUP	RHS	MCW	New	1 x 12 x 3.5	16.9
132	59+407	MNB	LHS	SR	New	2 x 10.3	10.2
133	59+407	MNB	LHS	MCW	New	2 x 10.3	16.9
134	59+407	MNB	RHS	MCW	New	2 x 10.3	16.9
135	59+407	MNB	RHS	SR	New	2 x 10.3	10.2
136	61+000	Flyover	LHS	MCW	New	2 x 30	16.9
137	61+000	Flyover	RHS	MCW	New	2 x 30	16.9
138	61+500	PUP	LHS	MCW	Old	1 x 8.25 x 3.5	12
139	61+500	PUP	RHS	MCW	Old	1 x 8.25 x 3.5	12
140	61+725	MNB	LHS	SR	New	1 x 7.42	10.2
141	61+725	MNB	LHS	MCW	Old	3 x 2	12.5
142	61+725	MNB	RHS	MCW	Old	3 x 2	12.5
143	61+725	MNB	RHS	SR	New	2.2+2.62+2.52	14.53
144	62+100	Flyover	LHS	MCW	Old	22+37+22	16.9
145	62+100	Flyover	RHS	MCW	Old	22+37+22	16.9
146	64+875	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
147	64+875	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
148	65+071	MNB	LHS	SR	New	1 x 7.7	12.3
149	65+071	MNB	LHS	MCW	New	1 x 7.7	16.9
150	65+071	MNB	RHS	MCW	New	1 x 7.7	16.9
151	65+071	MNB	RHS	SR	New	1 x 7.7	12.3
152	65+410	Flyover	LHS	MCW	New	1 x 30	16.9

Eight-Laning of NH-44 (old NH-1) from Mukarba Chowk at
km 15.500 to Panipat at km 86.000 in the State of Delhi &
Haryana on BOT(Toll) basis-MCP

S No.	Design Chainage (km)	Type of Str.	Side	Str. on	Age of Structure	Span Arrangement (No x Length, m)	Deck Width (m)
153	65+410	Flyover	RHS	MCW	New	1 x 30	16.9
154	65+872	MNB	LHS	SR	New	1 x 6.82	10.2
155	65+872	MNB	LHS	MCW	New	1 x 6.82	16.9
156	65+872	MNB	RHS	MCW	New	1 x 6.82	16.9
157	65+872	MNB	RHS	SR	New	1 x 6.82	10.2
158	65+920	FOB	BHS	MCW	New	2 x 29.3	3.5
159	66+872	PUP	LHS	MCW	New	1 x 12 x 4	16.9
160	66+872	PUP	RHS	MCW	New	1 x 12 x 4	16.9
161	68+955	VUP	LHS	MCW	New	1 x 15 x 5.5	16.9
162	68+955	VUP	RHS	MCW	New	1 x 15 x 5.5	16.9
163	69+105	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
164	69+105	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
165	69+231	MNB	LHS	SR	New	9.2+9.4+9.2	12.3
166	69+231	MNB	LHS	MCW	New	9.2+9.4+9.2	16.9
167	69+231	MNB	RHS	MCW	New	9.2+9.4+9.2	16.9
168	69+231	MNB	RHS	SR	New	9.2+9.4+9.2	12.3
169	69+850	VUP	LHS	MCW	New	1 x 12 x 4.5	16.9
170	69+850	VUP	RHS	MCW	New	1 x 12 x 4.5	16.9
171	72+400	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
172	72+400	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
173	73+100	Flyover	LHS	MCW	Old	6 x 36	16.9
174	73+100	Flyover	RHS	MCW	Old	6 x 36	16.9
175	73+700	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
176	73+700	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
177	75+300	PUP	LHS	MCW	New	1 x 12 x 4	16.9
178	75+300	PUP	RHS	MCW	New	1 x 12 x 4	16.9
179	77+416	PUP	LHS	MCW	New	1 x 12 x 4	16.9
180	77+416	PUP	RHS	MCW	New	1 x 12 x 4	16.9
181	78+735	PUP	LHS	MCW	New	1 x 12 x 4.5	16.9
182	78+735	PUP	RHS	MCW	New	1 x 12 x 4.5	16.9
183	81+934	VUP	LHS	MCW	New	1 x 12 x 5.5	16.9
184	81+934	VUP	RHS	MCW	New	1 x 12 x 5.5	16.9
185	83+830	PUP	LHS	MCW	Old	1 x 8.4 x 4.2	16
186	83+830	PUP	RHS	MCW	Old	1 x 8.4 x 4.2	16
187	84+600	Flyover	LHS	MCW	New	2 x 30	16.9
188	84+600	Flyover	RHS	MCW	New	2 x 30	16.9
189	85+744	Flyover	LHS	MCW	New	1 x 30	16.9
190	85+744	Flyover	RHS	MCW	New	1 x 30	16.9
191	86+333	FOB	BHS	MCW	New	2 x 26.5	3.5

1.10 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

1.10.1 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 7: Summary of Unit Rates (excluding GST)

S. No	Type of Material	Units	Source	Average Lead in Kms	Market Rates including lead
1	Aggregate				
a)	40 mm	Cum	Crusher	185.79	2378
b)	20 mm	Cum	Crusher	185.79	2388
c)	12 mm	Cum	Crusher	185.79	2321
d)	6 mm	Cum	Crusher	185.79	2369
e)	Dust	Cum	Crusher	185.79	2178
2	Gravel/Moorum				
	Embankment	Cum	Borrows Area	7.0	178
	Subgrade	Cum	Borrows Area	7.0	178
3	Other Major Material				
	Bitumen 60/70	MT	Panipat	64.00	40,539
	Bitumen 80/100	MT	Panipat	64.00	39,855
	CRMB	MT	Panipat	64.00	36,984
	Emulsion	MT	Panipat	64.00	50,448
	Steel	MT	Panipat	64.00	54,288
	HTS Strands	MT	Panipat	64.00	75,288
	Cement	MT	Panipat	64.00	7,688
	Structural Steel	MT	Panipat	64.00	76,188
	VG-40 (for FY27)	MT	Panipat	64.00	86,321
	VG-40 (for FY28 onwards)	MT	Panipat	64.00	50,291

Table 8: Major material Unit Rates (excluding GST)

S No	Activities	Unit	Rate (Rs) per Unit	Remarks
1	BC (for FY27)	Cum	18,739	VG-40
	BC (for FY28 onwards)	Cum	13,295	VG-40
2	Tack Coat	Sqm	15	
3	DBM	Cum	12,288	VG-40
4	PC	Sqm	40	
5	WMM	Cum	4,253	
6	GSB	Cum	3,740	
7	Embankment	Cum	449	
8	Subgrade	Cum	492	
9	Shoulder Filling	Cum	492	
10	Thermoplastic Paint	Sqm	457	
11	Road Studs	Nos	222	
12	DLC	Cum	5,105	
13	PQC	Cum	9,952	
14	RE panel	Sqm	4,409	
15	M-15	Cum	10,479	
16	M-20	Cum	8,994	
17	M-25	Cum	9,587	
18	M-30	Cum	9,602	
19	M-35	Cum	10,610	
20	M-40	Cum	12,064	
21	M-45	Cum	12,338	
22	M-50	Cum	14,141	
23	Reinforcement steel	MT	86,729	
24	1.2m Dia pile	Rm	15,178	
25	HT strands	MT	1,57,132	

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

1.10.2 IMMEDIATE REPAIRS COSTS

Costs associated with immediate repairs are estimated based on the detailed asset inventory and condition assessment surveys, Pavement condition and structural condition assessment surveys. Items which are not executed as part of scope or in damaged condition have been considered for immediate costs as a part of 1-year capex. Following items 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

There is no immediate cost associated with this project for FY27.

1.10.3 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

1.10.3.1 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

1.10.3.2 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 sign boards/signs
	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	Hazard Marker Sign:
	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

1.10.3.3 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.

1.10.4 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 Fee
- Administrative Cost
- Electricity Bill of lighting

Following table depicts the cost of operations for the project:

Table 9: Summary of 1st year O&M Cost

S No	Description	Amount in Lakhs.	Remarks
	SPV - Expenditure		
1	SPV staff	379.50	
2	Highway lighting	428.88	
3	Tolling and HTMS AMC/ Spare Parts	79.62	
4	Surveys & Investigations (BBD, Roughness)		
5	IE fees	144.00	
6	Insurance Charges	133.26	
7	Audit Charges	10.68	
8	Admin cost - Board Meeting Expenses, valuation etc.	210.00	
	Agency - Expenditure		
9	Toll Operation - Agency	1,159.68	
10	Route patrolling	480.06	
11	Routine maintenance	464.32	
12	Repair of Road - BOQ Items	859.79	
12	Repair of Structures	74.23	
	1st year O&M Costs in Cr.	4,424.02	

Note: The cost is inclusive of GST@18% without escalation and the amount is in lakhs considering FY27 rates.

1.10.5 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 10: Summary of Periodic Maintenance Costs

Year	Functional +Structural overlay MCW+ S/R	Replacement of ATMS	Replacement of TMS	Structure specified repairs
2026-2027	3,029.18	-	411.50	-
2027-2028	11,866.71	542.10	-	-
2028-2029	11,866.71	-	-	-
2029-2030	214.77	-	-	-
2030-2031	-	-	-	-
2031-2032	215.55	-	411.50	-
2032-2033	5,322.17	-	-	-
2033-2034	-	-	-	784.63
2034-2035	5,169.60	542.10	-	-
2035-2036	-	-	-	-
2036-2037	10,870.62	-	411.50	-
2037-2038	10,609.06	-	-	-
Total	59,164.37	1,084.21	1,234.49	784.63

Note: The cost is inclusive of GST @ 18% without escalation and the amount is in lakhs considering FY27 rates.

1.10.6 TOTAL OPERATION & MAINTENANCE COSTS

Year on year operation cost is summation of following:

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

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

Table 11: Summary of Total cost

Year	SUMMARY OF VARIOUS EXPENSES in Rs. Lakhs				
	Immediate Repair's Cost	Toll Operations Expenses	Routine Maintenance + Incident Management	Periodic Maintenance (Functional +Struc. Overlay+ Toll collection system)	Total Cost
2026-2027	-	1,159.68	3,297.90	3,440.68	7,898.26
2027-2028	-	1,159.68	3,297.90	12,408.81	16,866.39
2028-2029	-	1,159.68	3,297.90	11,866.71	16,324.29
2029-2030	-	1,159.68	3,297.90	214.77	4,672.35
2030-2031	-	1,159.68	3,385.15	-	4,544.83
2031-2032	-	1,159.68	3,297.90	627.05	5,084.63
2032-2033	-	1,159.68	3,297.90	5,322.17	9,779.75
2033-2034	-	1,159.68	3,297.90	784.63	5,242.21
2034-2035	-	1,159.68	3,297.90	5,711.70	10,169.28
2035-2036	-	1,159.68	3,318.03	-	4,477.72
2036-2037	-	1,159.68	3,297.90	11,282.12	15,739.70
2037-2038	-	784.77	2,313.92	10,609.06	13,707.75
Total Cost:	-	13,541.27	38,698.19	62,267.70	1,14,507.16

Note: The cost is inclusive of GST @ 18% without escalation and the amount is in lakhs considering FY27 rates.