# PROJECT NOTES

## 0.1 INTRODUCTION

The National Highway Authority of India (NHAI) has been entrusted with the assignment of Development of Economic Corridors, Inter-Corridors, Feeder Routes and Coastal Roads primarily to improve freight movement in Country. With a view to this, it has been proposed to conduct a "Consultancy Services for Preparation of Detailed Project Report for up-gradation to at least 4 lane Carriageway of **Economic Corridor** from Sagar to Kabrai comprising of section Sagar – Banda – Bada Malhera- Chhatarpur – Mahoba and Kabrai section of NH-934 (Old NH-86) and **Feeder Route** from Jamira to Kalwari comprising section from Jamira – Bhadarinmoojra - Sirmaur – Kalwari section of SH-9 in the States of Madhya Pradesh and Uttar Pradesh

## 0.2 PROJECT DESCRIPTION

The **ECONOMIC CORRIDOR** project road NH-934 (Old NH-86), starts at km 49.783 (design chainage 50.300) near Mohari town and ends at Satai Ghat at km 90.259 (design chainage 89.875). The existing project road is predominantly a 2 -Lane road without paved shoulder. The existing ROW is encroached and squatted at various locations specifically in existing Villages/market places. It traverses through Shahgarh, Amarmau, Hirapur Villages/ towns of Sagar District, in the state of Madhya Pradesh. Total length of the project road is about 40.476 km. (Design Length = 39.575 km)

| State | Name of Districts | Existing Road Chainages | | Length (km) | Remarks |
|---|---|---|---|---|---|
| | | From | To | | |
| **ECONOMIC CORRIDOR ( Package II, Ex. length = 40.476 km)** | | | | | |
| **MADHYA PRADESH** | Sagar | 49.783 | 88.000 | 38.217 | Old NH-86/ New NH-934 |
| | Chhatarpur | 88.000 | 90.259 | 2.259 | |

| Sl.no | Project Road | Existing Length (km) | Design Length (km) |
|---|---|---|---|
| 1 | Economic Corridor Package 2 | 40.476 (km 49.783 – km 90.259) | 39.575 (km 50.300 – km 89.875) |

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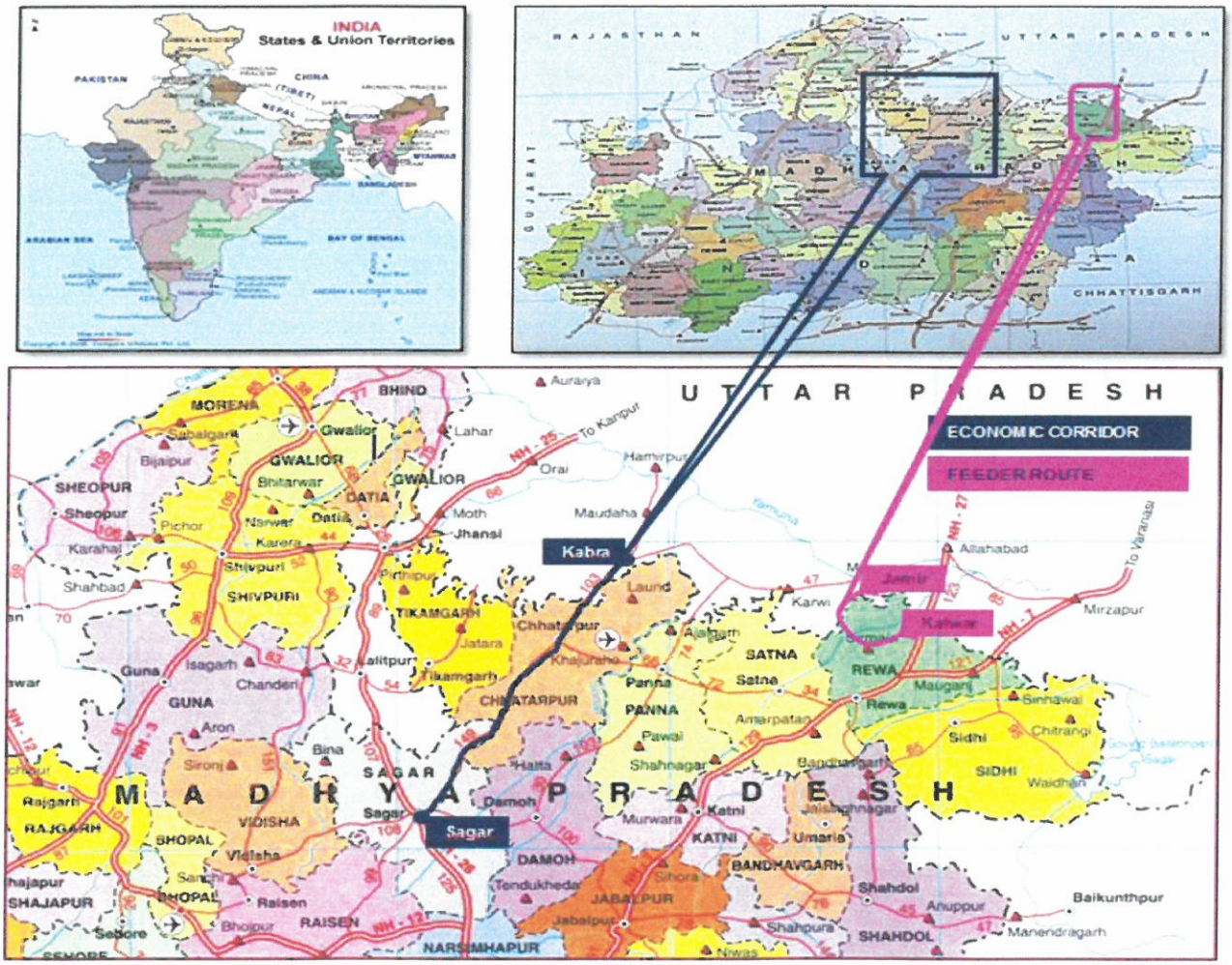


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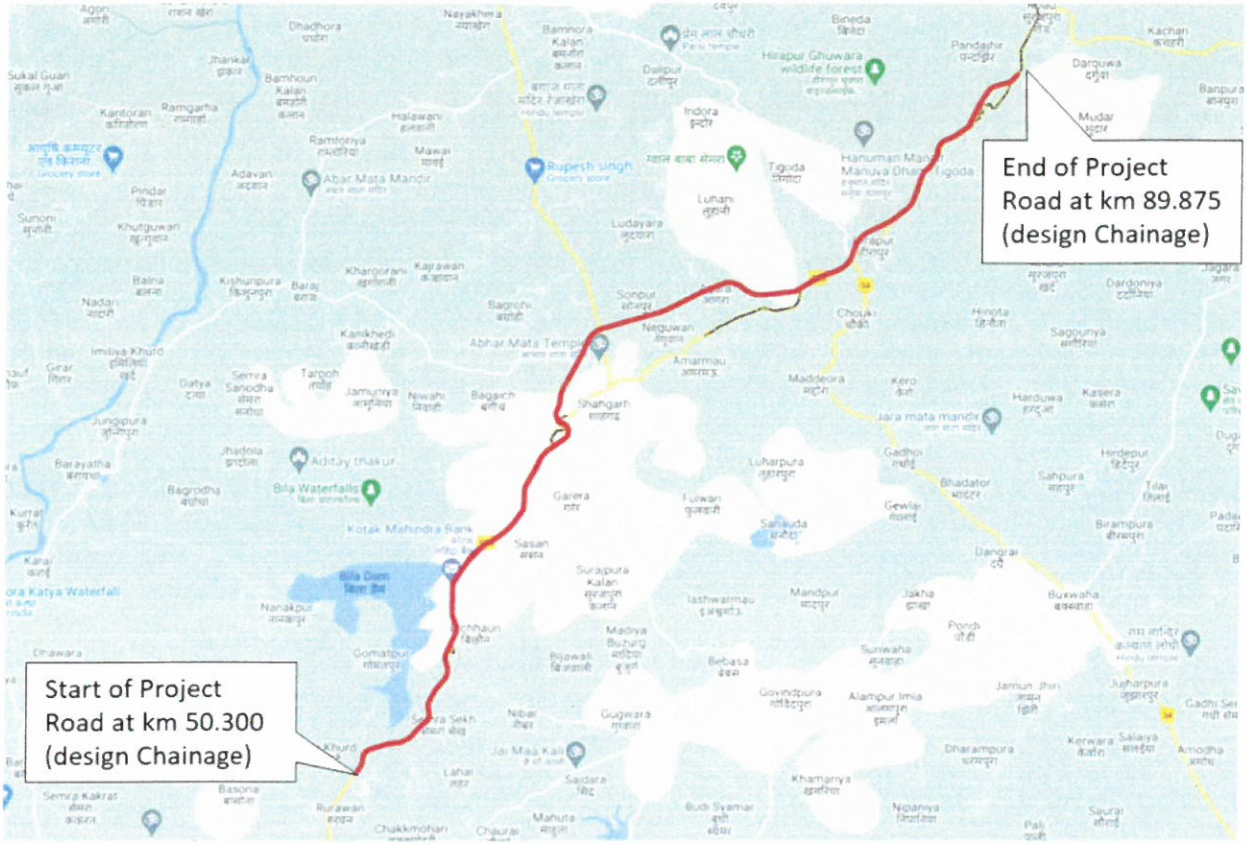


**Package – II: Starts from km 50+300 to km 89+875 (Design Length = 39.575km):** Package 2 starts Village of Mohari at km 50+300 of NH-934 (OldNH-86) and ends of Village Satia Ghat at km 89+875 of NH-934 (Old NH-86).

| Pkg. No. | Related Stretch | Design Chainage | | Length (Km) |
|---|---|---|---|---|
| | | From (Km.) | To (Km.) | |
| II | From Mohari to Satia Ghat | 50+300 | 89+875 | 39.575 |
| | | **Total design length of Package 2 =** | | **39.575** |

## 0.3 DESIGN STANDARDS

The design standards have been followed from

- "Manual of specifications & standards for Four Laning of Highways through Public Private Partnership" **IRC: SP 84-2019** for Economic Corridor.
- Design standards have been extracted from IRC standards conform to the design speed of 100kmph.
- Pavement design has been carried out as per the **IRC 37-2018** "Guidelines for the design of Flexible Pavement".
- The specifications for road and Bridge works of Ministry of road Transport & Highways published by Indian Road Congress shall be used for materials to be used for construction of bridges.

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## 0.4 ENGINEERING SURVEY & INVESTIGATIONS

The following Engineering Surveys and Investigations have been carried out.

- Reconnaissance Survey
- Alignment option study and approval of alignment
- Topographic surveys (LIDAR)
- Road Inventory
- Pavement Condition Survey
- Inventory and condition survey of bridges and culverts
- Falling Weight Deflectometer, FWD Survey
- Roughness Survey
- Sub grade Test pit Investigations
- Quarry Sites Investigation
- Traffic Surveys (ATCC & Videography)
- Axle Load and
- Origin & Destination Survey
- Underground Utility details (using GPR- Ground Penetration Radar)

## 0.5 SALIENT FEATURES

The following are the Salient Features of project

| DESCRIPTION | Economic corridor (NH 934) |
|---|---|
| Design Length | 39.575 km |
| START POINT | At km 50+300 near Mohari |
| END POINT | At Satai Ghat, km 89+875 |
| DISTRICTS | Sagar & Chhatarpur |
| IMPORTANT LOCATIONS | Shehgarh, Amarmau, Hirapur, |
| ROAD CONFIGURATION | SL- Nil |
| | IL -Nil |
| | Two Lane – 37.217 KM (92%) |
| | Two Lane + PS – 3.259 KM (8%) |
| LANDUSE | Built-Up/Semi Built-Up/ Market Area – 6.2 KM (15%) |
| | Agricultural & Barren – 14.94 KM (37%) |
| | Forest – 19.33 KM (48%) |

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| DESCRIPTION | Economic corridor (NH 934) |
|---|---|
| STRUCTURES | Major Bridges – 1 Nos. |
| | Minor Bridges – 10 Nos. |
| | ROB's (ext. level crossing) – Nil.<br>RUB's (EXT.) – Nil. |

## 0.6 TRAFFIC SURVEYS

Under the present study, ATCC and Video graphic traffic volume count survey for 7 days were carried out at one location as 50% length is passing through forest reach hence no variation in traffic. Survey was done round-the-clock 24X7. The survey stations have been located away from urban agglomerations and villages to minimize interference of local traffic. Classified traffic count in Annual Average Daily Traffic at both the surveyed locations is presented below.

| Vehicle Type | PCU factor | Km 40+200 | Km 77+000 |
|---|---|---|---|
| Car/Jeep/Van | 1 | 765 | 469 |
| Mini Bus | 1.5 | 5 | 6 |
| Standard Bus | 3 | 139 | 76 |
| LCV | 1.5 | 205 | 167 |
| 2-Axle | 3 | 117 | 99 |
| 3-Axle | 3 | 240 | 248 |
| MAV | 4.5 | 338 | 402 |
| >=7Axle | 4.5 | - | - |
| **Total Tollable Vehicles** | | **1809** | **1467** |
| 2 Wheeler | 0.5 | 1499 | 953 |
| 3 Wheeler | 1 | 25 | 41 |
| Tractor with Trailers | 4.5 | 3 | 43 |
| Tractor without Trailers | 1.5 | 20 | 5 |
| Cycle | 0.5 | 70 | 472 |
| Cycle Rick. | 2 | - | 1 |
| Animal/Hand Carts | 4 | - | - |
| Car/Jeep | 1 | 2 | 3 |
| Mini Bus | 1.5 | 7 | 3 |
| Bus | 3 | - | - |
| LCV | 1.5 | 1 | - |
| Trucks | 3 | - | - |
| **Total Vehicles** | | **3436** | **3086** |
| **Total PCU** | | **4956** | **4866** |
| **Total PCU projected at 5% per annum for till 2022** | | **6173** | **6061** |

The total PCU (Passenger Car Unit) on the project road is in the range of 6000 PCUs.

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## 0.7 HORIZONTAL ALIGNMENT

Efforts have been made, during design of Horizontal alignment, to accommodate the 4-lane highway with optimum use of the existing ROW, without making any compromise in standards. A minimum radius of 400m has been kept achieving a good balance among additional land acquisition and highway geometrics.

## 0.8 VERTICAL ALIGNMENT/GRADIENT

The Vertical Alignment was designed for minimum criterion of ISD, Intermediate Sight Distance, applicable for 4-lane highway.

## 0.9 IMPROVEMENT PROPOSALS

To enable smooth traffic, improvements have been proposed through correction of geometrics, realignments and proposing Bypasses in congested areas. Only one bypass is proposed due to limited ROW & poor geometrics issues. Bypasses and realignment proposed in the project highway are as under:

**(a) Bypasses: Economic Corridor**

| Sr. No. | Ex. Chainage (Km) | | Design Chainage | | Length (km) | Remarks |
|---|---|---|---|---|---|---|
| | From | To | From | To | | |
| 1 | 65+445 | 82+409 | 65+300 | 82+700 | 17.40 | SHAHGARH & HIRAPUR on LHS |
| | Total Length (Km) | | | | 17.400 | |

**(b) Realignment Economic Corridor Package 2 Mohari to Sataighat.**

| Sr. No. | Existing Chainage (Km) | | Design Chainage | | Length (Km) | Remarks |
|---|---|---|---|---|---|---|
| | From | To | From | To | | |
| 1 | 49+983 | 50+735 | 50+500 | 51+200 | 0.70 | Geometric Improvements |
| 2 | 51+734 | 52+163 | 52+200 | 52+600 | 0.40 | Geometric Improvements |
| 3 | 53+065 | 54+117 | 53+500 | 54+400 | 0.90 | Geometric Improvements |
| 4 | 55+221 | 56+828 | 55+500 | 56+800 | 1.30 | Geometric Improvements |
| 5 | 57+325 | 57+614 | 57+300 | 57+600 | 0.30 | Geometric Improvements |
| 6 | 58+718 | 59+880 | 58+700 | 59+800 | 1.10 | Geometric Improvements |
| 7 | 59+880 | 61+029 | 59+800 | 60+900 | 1.10 | Realignment (Chandola) |
| 8 | 83+109 | 83+453 | 83+400 | 83+700 | 0.30 | Geometric Improvements |

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| Sr. No. | Existing Chainage (Km) | | Design Chainage | | Length (Km) | Remarks |
|---|---|---|---|---|---|---|
| | From | To | From | To | | |
| 9 | 84+676 | 84+895 | 84+900 | 85+140 | 0.24 | Geometric Improvements |
| 10 | 85+175 | 85+628 | 85+400 | 85+800 | 0.40 | Geometric Improvements |
| 11 | 86+966 | 89+986 | 87+000 | 89+600 | 2.60 | Realignment |
| | Total length (Km) | | | | 9.34 km | |

## 0.10 SERVICE ROAD

Service road: Most of the towns are provided with bypasses, however at few locations' alignment is traversing through the villages/habitation. At all these locations service road is provided. Slip roads are provided at all Grade separated structures. Slip/service road has been extended if the distance between end and start of slip road is having a gap of 0.5km to 1km.

| Sl. No. | Design Chainage (Km) | | Length (m) | Carriage way width (m) | Side |
|---|---|---|---|---|---|
| | From | To | | | |
| 1 | 50+300 | 50+750 | 450 | 7 | Both |
| 2 | 54+900 | 55+500 | 600 | 7 | Both |
| 3 | 57+950 | 63+350 | 5400 | 7 | Both |
| 4 | 66+300 | 66+812 | 512 | 7 | Both |
| 5 | 68+375 | 69+300 | 925 | 7 | Both |
| 6 | 70+573 | 71+070 | 497 | 7 | Both |
| 7 | 76+100 | 80+400 | 4300 | 7 | Both |
| 8 | 82+700 | 83+000 | 300 | 7 | Both |
| | Total Length | | 2x12984= 25968 | | |

## 0.11 STRUCTURES PROPOSED

a) **VUP: VUP shall be provided at following locations:**

| Sr. No. | Existing Chainage (Km) | Design Chainage | Span arrangement No. x L x H (m) | Proposed Total Width (m) | Remarks |
|---|---|---|---|---|---|
| 1 | 50+126 | 50+343 | 1 x 20 x 5.5 | 2 x 11.0 | Approaches in package 1 |
| 2 | 59+683 | 59+901 | 1 x 20 x 5.5 | 2 x 11.0 | |
| 3 | SHAHGARH & HIRAPUR Bypass | 66+812 | 1 x 20 x 5.5 | 2 x 11.0 | |
| 4 | | 68+812 | 1 x 20 x 5.5 | 2 x 11.0 | |
| 5 | | 70+573 | 1 x 20 x 5.5 | 2 x 11.0 | |
| 6 | | 78+375 | 1 x 20 x 5.5 | 2 x 11.0 | |
| 7 | | 80+400 | 1 x 20 x 5.5 | 2 x 11.0 | |
| 8 | | 82+700 | 1 x 20 x 5.5 | 2 x 11.0 | |

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**b) LVUP: LVUP shall be provided at following locations:**

| Sr. No. | Existing Chainage (Km) | Design Chainage | Span arrangement No. x L x H (m) | Proposed Total Width (m) | Remarks |
|---|---|---|---|---|---|
| 1 | 61+964 | 62+080 | 1 x 12.0 x 4.0 | 2 x 11.0 | |
| 2 | SHAHGARH & HIRAPUR Bypass | 73+496 | 1 x 12.0 x 4.0 | 2 x 11.0 | |
| 3 | | 74+760 | 1 x 20.0 x 4.0 | 2 x 11.0 | |
| 4 | | 77+014 | 1 x 12.0 x 4.0 | 2 x 11.0 | |

**c) Pedestrian / Cattle Underpass:**

Nil

**d) VOP: Vehicle Overpass shall be provided at following locations:**

| Sr. No. | Existing Chainage (Km) | Design Chainage | Span arrangement No. x L x H (m) | Proposed Total Width (m) | Remarks |
|---|---|---|---|---|---|
| 1 | 55+000 | 55+280 | 2 x 20 x 5.5 | 1 x 16.0 | With slip road |

***Notes***

*i) The locations, orientation of the above-mentioned structures under paragraph b, c & e are tentative and shall vary as per the actual site condition. For crossroad in skew the proposed structure shall be provided in skew only.*

*ii)* In the case of grade separated structures (Flyover/ VUP/LVUP etc.) crossroads finished top level shall be at least existing level or raised, lower shall not be permitted.

*iii) Junctions of intersecting roads with service/slip roads shall be developed as per Manual.*

**0.12** At-grade junctions

**A. Major Junctions (at the start and end of bypass)**

| Sr. No | Existing Chainage (Km) | Design Chainage (km) | Side | Junction Type (Cross (+ / T or Y) | LHS | RHS | Proposal |
|---|---|---|---|---|---|---|---|
| | | | | | Leads to | | |
| 1. | 50+126 | 50+343 | LHS | T | Khatora khurd | - | VUP |
| 2. | 55+000 | 55+280 | RHS | T | - | Nibar | VOP |
| 3. | 59+683 | 59+901 | LHS | T | Bilagram | - | VUP |
| 4. | - | 66+812 | RHS | T | - | Shahgarh | VUP |
| 5. | - | 68+812 | BHS | + | Bagrahi | Shahgarh | VUP |
| 6. | - | 70+573 | BHS | + | Tikamgarh | Shahgarh | VUP |
| 7. | | 78+375 | | T | - | Shahgarh | VUP |
| 8. | - | 80+400 | BHS | + | Village | Hirapur | VUP |
| 9. | - | 82+700 | BHS | + | Crusher | Hirapur | VUP |

*Note: i) Additional pipe culverts of 1X1.00 m dia. in minimum 10m length or more as per site conditions to facilitate roadside drainage shall be provided at intersection of crossroads with the project highway.*

*ii) High mast shall be provided at all these locations.*

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**B. Minor Junctions (Connecting VR/ODR/MDR to Service/Slip road)**

| Sr. No. | Existing Chainage (Km) | Design Chainage | Side | Junction Type (Cross (+/T or Y) | LHS | RHS | Proposal |
|---|---|---|---|---|---|---|---|
| | | | | | Leads to | | |
| 1 | 50+070 | 50+580 | RHS | T | - | Mohari | Jn. imp |
| 2 | 50+200 | 50+700 | RHS | T | - | Village Road | Jn. imp |
| 3 | 50+530 | 51+000 | LHS | T | Dulchipur | - | Jn. imp |
| 4 | 51+980 | 52+410 | RHS | T | - | Ganeshpur | Jn. imp |
| 5 | 53+350 | 53+450 | RHS | T | - | Village Road | Jn. imp |
| 6 | 55+000 | 55+300 | RHS | T | - | Nibar | VOP |
| 7 | 58+000 | 57+980 | LHS | T | Bilguwan | - | Jn. imp |
| 8 | 59+000 | 58+930 | LHS | T/Y | Bilagram | - | Jn. imp |
| 9 | 60+500 | 59+580 | LHS | T | Narsinggarh | - | Jn. imp |
| 10 | 61+964 | 62+080 | BHS | + | - | Nimchas | LVUP |
| 11 | SHAHGARH & HIRAPUR Bypass | 73+496 | BHS | + | Bodangunj | Negwun | LVUP |
| 12 | | 74+760 | BHS | + | town | town | LVUP |
| 13 | | 77+014 | BHS | + | Tigoda | Hirapur | LVUP |

***Note:***

*i. Additional pipe culverts of 1X1.00 m dia. Or 2X0.600m dia. In minimum 10m length or more as per site conditions to facilitate roadside drainage shall be provided at intersection of crossroads with the project highway.*

*ii. Junctions of intersecting roads with slip roads shall be developed at the same level for minimum 20m.*

*iii. Each minor 3 leg junction shall be provided with Solar Blinker and solar light.*

*iv. Three set of transverse bar markings on the slip road near junctions and two road humps on crossroads shall be provided at all minor junction locations.*

**0.13 Major Bridges:**

**A. Construction of new Major Bridge on Main road**

| Sl. No. | Existing Chainage | Proposed Chainage | Existing Span Arrangement | Proposed Span Arrangement | Type of Proposed Structures | Remarks |
|---|---|---|---|---|---|---|
| 1 | Bypass | 71+862 | - | 4 x 22.5m | RCC Girder | New 4Lane |
| 2 | Bypass | 80+990 | - | 6 x 30.0m | RCC Girder | New 4Lane |

**B. The Existing major bridges at the following locations shall be reconstructed as new structures:**

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| Sr. No. | Existing Chainage (km) | Design Chainage | Span Arrangement (m) | Overall Width (m) | Type of Super-structure | Remarks |
|---|---|---|---|---|---|---|
| 1 | 90+190 | 89+805 | 4 x 20.0m | 4 x 20.0m | RCC Girder | LHS- reconstruction to 2-Lane and RHS-Retain |

## 0.14 Minor Bridges:

### A. Construction of New 4-lane Minor Bridges on Main road:

| Sl. No. | Existing Chainage | Proposed chainage | Type of proposed structure | Proposed Span Arrangement | Overall Width (m) | Remarks |
|---|---|---|---|---|---|---|
| 1 | Realignment | 52+437 | RCC Girder | 2 x 20.0m with 38 degree skew | 2x12.50 | New 4Lane |
| 2 | Realignment | 53+745 | RCC Girder | 1 x 16.0m | 2x12.50 | New 4Lane |
| 3 | Bypass | 72+692 | RCC Girder | 2 x 14.0m | 2x12.50 | New 4Lane |
| 4 | Bypass | 73+257 | RCC Box | 3 x 7.0m with 35 degree skew | 2x12.50 | New 4Lane |
| 5 | Bypass | 74+160 | RCC Box | 1 x 10.0m with 56 degree skew | 2x12.50 | New 4Lane |
| 6 | Bypass | 75+469 | RCC Girder | 1 x 7.0m | 2x12.50 | New 4Lane |
| 7 | Bypass | 75+657 | RCC Girder | 1 x 30.0m | 2x12.50 | New 4Lane |
| 8 | Bypass | 79+235 | RCC Girder | 1 x 25.0m | 2x11.00 | New 4Lane |
| 9 | Realignment | 88+360 | RCC Box | 3 x 7.0m | 2x12.50 | New 4Lane |
| 10 | Realignment | 89+365 | RCC Box | 1 x 10.0m | 2x12.50 | New 4Lane |

### A. Construction of New 2+2-lane Minor Bridges on Slip Roads:

| Sl. No. | Existing Chainage (km) | Design Chainage (km) | Proposed span arrangement (No. x L) | Proposed bridge type | Overall Width (m) | Remarks |
|---|---|---|---|---|---|---|
| 1 | Bypass | 79+235 | RCC Girder | 1 x 25.0m | 2x10.8 | New 4Lane |

## 0.15 PAVEMENT DESIGN

Flexible Pavement shall be provided in entire project length, including Bus bays, truck lay bye, junctions and Way side amenities as per IRC 37:2018 except at toll plaza where rigid pavement shall be designed as per IRC 58:2015. The minimum flexible pavement thickness shall be provided as below:

**Pavement Layer Thickness for Main Carriageway on Economic Corridor**

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| Economic Corridor Packages | Subgrade CBR (%) | Million Standard Axle | Pavement Composition (mm) | | | | Total (mm) |
|---|---|---|---|---|---|---|---|
| | | | BC | DBM | WMM | CTSB | |
| Package - II Mohari to Satia Ghat | 8 | 60 MSA | 40 | 80 | 150 | 200 | 470 |

Existing road shall be provided with flexible pavement with overlay. However, the overlay thickness shall not be less than 40mm BC and 50mm DBM.

The minimum pavement thickness for Service Road, Slip Road, Bus Bays, Truck Laybyes and way side amenities shall be provided as below:

| Subgrade CBR (%) | Million Standard Axle | Pavement Composition (mm) | | | | Total (mm) |
|---|---|---|---|---|---|---|
| | | BC | DBM | WMM | GSB | |
| 8 | 10 MSA | 30 | 60 | 250 | 200 | 540 |

The minimum pavement thickness for Toll Plaza shall be provided as below.

Design of Rigid pavement at toll plazas shall be carried out in accordance with Section 5 of the Manual. However, minimum crust having composition of 300 mm PQC, 150mm DLC and 150 mm GSB with a separation membrane of polythene sheet having a minimum thickness of 125 micron between DLC and PQC shall be provided.

## 0.16 WIDENING SCHEDULE

| Sl. No. | Existing Chainage (Km) | | Design Chainage (Km) | | Length (m) | TCS TYPE | TCS Descriptions |
|---|---|---|---|---|---|---|---|
| | From | To | From | To | | | |
| A | Part of Package 1 | | 49+870 | 50+300 | 430 | 5 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Rural |
| 1 | 49+783 | 50+233 | 50+300 | 50+750 | 450 | 5 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Rural |
| 2 | 50+233 | 50+735 | 50+750 | 51+200 | 450 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 3 | 50+735 | 51+734 | 51+200 | 52+200 | 1000 | 1A | 4Lane Eccentric Widening Without SR with Flushed Median |
| 4 | 51+734 | 52+163 | 52+200 | 52+600 | 400 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 5 | 52+163 | 52+413 | 52+600 | 52+850 | 250 | 2A | 4Lane Concentric Widening Without SR with Flushed Median |
| 6 | 52+413 | 53+065 | 52+850 | 53+500 | 650 | 1A | 4Lane Eccentric Widening Without SR with Flushed Median |
| 7 | 53+065 | 54+117 | 53+500 | 54+400 | 900 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 8 | 54+117 | 54+617 | 54+400 | 54+900 | 500 | 1A | 4Lane Eccentric Widening Without SR with Flushed Median |



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| Sl. No. | Existing Chainage (Km) | | Design Chainage (Km) | | Length (m) | TCS TYPE | TCS Descriptions |
|---|---|---|---|---|---|---|---|
| | From | To | From | To | | | |
| 9 | 54+617 | 55+221 | 54+900 | 55+500 | 600 | 8A | 4lane New construction in cutting with Both side SR in Bypass/ Realignment with Flushed Median with Retaining wall between MC and SR |
| 10 | 55+221 | Realignment | 55+500 | 55+850 | 350 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 11 | Realignment | Realignment | 55+850 | 56+500 | 650 | 4E | 4Lane new construction with Box cutting without SR in Bypass/ Realignment with Flushed Median |
| 12 | Realignment | 56+828 | 56+500 | 56+800 | 300 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 13 | 56+828 | 57+325 | 56+800 | 57+300 | 500 | 4E | 4Lane new construction with Box cutting without SR in Bypass/ Realignment with Flushed Median |
| 14 | 57+325 | 57+614 | 57+300 | 57+600 | 300 | 9B | 4lane New construction without SR in Bypass/ Realignment with Flushed Median in Forest section |
| 15 | 57+614 | 57+967 | 57+600 | 57+950 | 350 | 9A | 4lane Eccentric Widening without SR with Flushed Median in Forest section |
| 16 | 57+967 | 58+718 | 57+950 | 58+700 | 750 | 1D | 4Lane Eccentric Widening Both side SR with Flushed Median |
| 17 | 58+718 | Realignment | 58+700 | 59+500 | 800 | 4D | 4lane New construction with Both side SR in Bypass/ Realignment with Flushed Median |
| 18 | Realignment | Realignment | 59+500 | 60+650 | 1150 | 6 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Builtup |
| 19 | Realignment | 61+029 | 60+650 | 60+900 | 250 | 2D | 4Lane Concentric Widening Both side SR with Flushed Median |
| 20 | 61+029 | 61+623 | 60+900 | 61+500 | 600 | 1D | 4Lane Eccentric Widening Both side SR with Flushed Median |
| 21 | 61+623 | 62+374 | 61+500 | 62+250 | 750 | 6 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Builtup |
| 22 | 62+374 | 63471 | 62+250 | 63+350 | 1100 | 1D | 4Lane Eccentric Widening Both side SR with Flushed Median |
| 23 | 63+471 | 64+071 | 63+350 | 63+950 | 600 | 2A | 4Lane Concentric Widening Without SR with Flushed Median |
| 24 | 64+071 | 64+319 | 63+950 | 64+200 | 250 | 1A | 4Lane Eccentric Widening Without SR with Flushed Median |
| 25 | 64+319 | 64+663 | 64+200 | 64+500 | 300 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median in Forest section |
| 26 | 64+663 | 65+445 | 64+500 | 65+300 | 800 | 1A | 4Lane Eccentric Widening Without SR with Flushed Median |
| 27 | Bypass | Bypass | 65+300 | 66+300 | 1000 | 4E | 4Lane new construction with Box cutting without SR in Bypass/ Realignment with Flushed Median |

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| Sl. No. | Existing Chainage (Km) | | Design Chainage (Km) | | Length (m) | TCS TYPE | TCS Descriptions |
|---|---|---|---|---|---|---|---|
| | From | To | From | To | | | |
| 28 | Bypass | Bypass | 66+300 | 66+820 | 520 | 5 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Rural |
| 29 | Bypass | Bypass | 66+820 | 68+375 | 1555 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 30 | Bypass | Bypass | 68+375 | 69+300 | 925 | 5 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Rural |
| 31 | Bypass | Bypass | 69+300 | 70+565 | 1265 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 32 | Bypass | Bypass | 70+565 | 71+070 | 505 | 5 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Rural |
| 33 | Bypass | Bypass | 71+070 | 76+100 | 5030 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 34 | Bypass | Bypass | 76+100 | 77+400 | 1300 | 5 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Rural |
| 35 | Bypass | Bypass | 77+400 | 78+365 | 965 | 4G | 4Lane new construction with Box cutting with Both Side SR in Bypass/ Realignment with Flushed Median |
| 36 | Bypass | Bypass | 78+365 | 78+800 | 435 | 5 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Rural |
| 37 | Bypass | Bypass | 78+800 | 79+900 | 1100 | 1D | 4Lane Eccentric Widening Both side SR with Flushed Median |
| 38 | Bypass | Bypass | 79+900 | 80+400 | 500 | 5 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Rural |
| 39 | Bypass | 82+409 | 80+400 | 82+700 | 2300 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 40 | 82+409 | 82+712 | 82+700 | 83+000 | 300 | 5 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Rural |
| 41 | 82+712 | Realignment | 83+000 | 88+150 | 5150 | 4E | 4Lane new construction with Box cutting without SR in Bypass/ Realignment with Flushed Median |
| 42 | Realignment | Realignment | 88+150 | 88+500 | 350 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 43 | Realignment | Realignment | 88+500 | 89+200 | 700 | 4E | 4Lane new construction with Box cutting without SR in Bypass/ Realignment with Flushed Median |
| 44 | Realignment | 90+061 | 89+200 | 89+675 | 475 | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median |
| 45 | 90+061 | 90+259 | 89+675 | 89+875 | 200 | 1A | 4Lane Eccentric Widening Without SR with Flushed Median |



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Summary of the widening Schedule is as follows

| Sr. No. | TCS | TCS Decsrption | Median (m) | Length (m) |
|---|---|---|---|---|
| 1. | 1A | 4Lane Eccentric Widening Without SR with Flushed Median | 5 | 3,400 |
| 2. | 1D | 4Lane Eccentric Widening Bothside SR with Flushed Median | 5 | 3,550 |
| 3. | 2A | 4Lane Concentric Widening Without SR with Flushed Median | 5 | 850 |
| 4. | 2D | 4Lane Concentric Widening Bothside SR with Flushed Median | 5 | 250 |
| 5. | 4A | 4lane New construction without SR in Bypass/ Realignment with Flushed Median | 5 | 13,675 |
| 6. | 4D | 4lane New construction with Both side SR in Bypass/ Realignment with Flushed Median | 5 | 800 |
| 7. | 4E | 4Lane new construction with Box cutting without SR in Bypass/ Realignment with Flushed Median | 5 | 8,000 |
| 8. | 4G | 4Lane new construction with Box cutting with Bothside SR in Bypass/ Realignment with Flushed Median | 5 | 965 |
| 9. | 5 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Rural | 5 | 4,935 |
| 10. | 6 | 4Lane VUP Approach With RE wall and Both side SR with Flushed Median in Builtup | 5 | 1,900 |
| 11. | 8A | 4lane New construction in cutting with Both side SR in Bypass/ Realignment with Flushed Median with Retaining wall between MC and SR | 5 | 600 |
| 12. | 8B | 4lane New construction in filling with Both side SR in Bypass/ Realignment with Flushed Median with Retaining wall between MC and SR | 5 | 0 |
| 13. | 9A | 4lane Eccentric Widening without SR with Flushed Median in Forest section | 5 | 350 |
| 14. | 9B | 4lane New construction without SR in Bypass/ Realignment with Flushed Median in Forest section | 5 | 300 |

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## 0.17 LAND ACQUISITIONS, ENVIRONMENTAL & SOCIAL ISSUES

Preliminary Environmental Assessment, policy regulations, Environmental clearances and measures to mitigate the environmental impact due to project execution are being considered. The project road is passing through Forest Areas at different locations with cumulative length of 19.220km. Total land required for economic corridor & feeder route is 180.151 Hectare.

Land Requirement of package 2

| Package No. | Length (m) | Area of Land Acquired (Ha.) | Tentative Cost of Land Acquired (Cr.) |
|---|---|---|---|
| P – 2 | 39575 | 180.151 | 57.03 |

| Sr. No. | Village of Name | Area in Ha (60mt.) | Land Cost /Rate | | Land cost | | |
|---|---|---|---|---|---|---|---|
| | | | Collector Rate as per revenue department (Y-2020-21) in lacs | Market Rate as per Chairman Central Board of Assessment and Inspector General (Y-2020-21) in lacs | Factor of 1 as per Govt. of Madhya Pradesh 23.01.2018 | Solatium 100% as per circular of MP Govt. | Total (Colum 16+17) in lacks |
| | District Sagar Tehsil Shahgarh | | | | | | |
| 1 | Chandola | 3.353 | 6.40 | 9.60 | 32.19 | 32.19 | 64.38 |
| 2 | Shahgarh | 25.416 | 17.60 | 26.40 | 670.98 | 670.98 | 1,341.96 |
| 3 | Amarmau | 21.290 | 11.40 | 17.10 | 364.06 | 364.06 | 728.12 |
| 4 | Heerapur NH Per | | 20.00 | 30.00 | 1,197.33 | 1,197.33 | 2,394.66 |
| 5 | Beela ( Beelagram) | 4.924 | 4.44 | 6.66 | 32.79 | 32.79 | 65.59 |
| 6 | Bilguwan | 1.418 | 3.20 | 4.80 | 6.81 | 6.81 | 13.61 |
| 7 | Shasan | 11.451 | 6.68 | 10.02 | 114.74 | 114.74 | 229.48 |
| 8 | Agra | 7.497 | 5.52 | 8.28 | 62.08 | 62.08 | 124.15 |
| | District Chhatarpur Tehsil Buxwaha | | | | | | |
| 9 | Maddevra | 20.209 | 5.12 | 7.68 | 155.21 | 155.21 | 310.41 |
| 10 | Lahar | 8.530 | 2.43 | 3.65 | 31.12 | 31.12 | 62.23 |
| 11 | Niwar | 0.252 | 3.52 | 5.28 | 1.33 | 1.33 | 2.66 |
| 12 | Bichaun | 2.783 | 2.32 | 3.48 | 9.68 | 9.68 | 19.37 |
| 13 | Palda | 4.004 | 2.10 | 3.14 | 12.59 | 12.59 | 25.18 |
| 14 | Darguwan | 29.113 | 3.68 | 5.52 | 160.70 | 160.70 | 321.41 |
| | Total Land Acquisition (Ha) | 180.151 | | | | Total Cost in lacs | 5,703.21 |

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**Package 2: Mohari to Satai Ghat**

| S.NO | Name of Forest | Chainage | | Length in Km |
|---|---|---|---|---|
| | | From | To | |
| 1 | PF-466 | 51.150 | 51.370 | 220.000 |
| 2 | RF-489 | 51.370 | 53.200 | 1830.000 |
| 3 | RF-206 | 53.200 | 53.800 | 600.000 |
| 4 | RF-199 | 53.800 | 55.300 | 1500.000 |
| 5 | RF-488 | 55.300 | 56.600 | 1300.000 |
| 6 | RF-487 | 56.600 | 58.470 | 1870.000 |
| 7 | RF-198 | 58.700 | 59.770 | 1070.000 |
| 8 | RF-483 | 59.770 | 61.600 | 1830.000 |
| 9 | PF-492 | 61.600 | 61.700 | 100.000 |
| 10 | RF-482 | 61.700 | 62.000 | 300.000 |
| 11 | PF-492 | 63.400 | 64.500 | 1100.000 |
| 12 | RF-480 | 64.500 | 66.800 | 2300.000 |
| 13 | PF-524 | 83.900 | 84.650 | 750.000 |
| 14 | PF-523 | 84.650 | 86.900 | 2250.000 |
| 15 | RF-40 | 86.900 | 89.100 | 2200.000 |
| | | | | **19220.000** |

There is no ASI protected monument within 300 m of the project road. Tree Felling Permission will be required from the State Forest Department.

Preliminary social assessment is carried out in terms of project influence Area, social impact, and project affected people including public consultation.

**Utility Summary of Project Road**

| Utility | Details | Total |
|---|---|---|
| Length (in Km.) | 33 KV line | 2 |
| | 11 KV Line | 13.5 |
| | LT Line | 10.2 |
| No. of poles effected | 33KV Poles | 27 |
| | 11KV Poles | 164 |
| | LT Poles | 187 |
| Crossing | Crossing 33 KV | 4 |
| | Crossing 11 KV | 41 |
| | Crossing LT | 32 |
| Transformers | 100 KVA | 1 |
| | 63 KVA | 3 |
| | 25 KVA | 15 |

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## 0.18 PROJECT FACILITIES PROPOSED IN THIS PACKAGE

The project facilities proposed in this package are as follows

1. Economic Corridor Package 2 Mohari to Satai Ghat

| Project Facilities | Package-II: Mohari to Satai Ghat |
|---|---|
| Toll Plaza | 1 No.<br>km 62 – km 63 |
| Way side Amenities | 1 No.<br>km 78+400 – km 78+650 |
| Truck Lay-bye | 1 No.<br>km 73+200 |
| Bus Shelter | 27 Nos |

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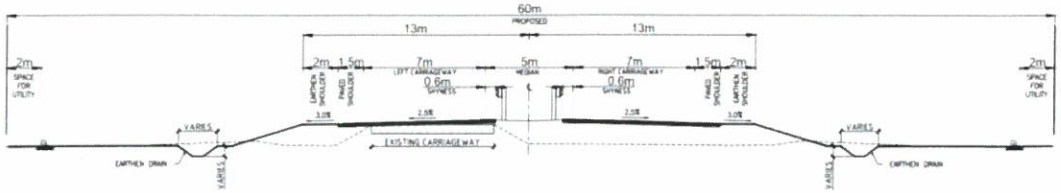
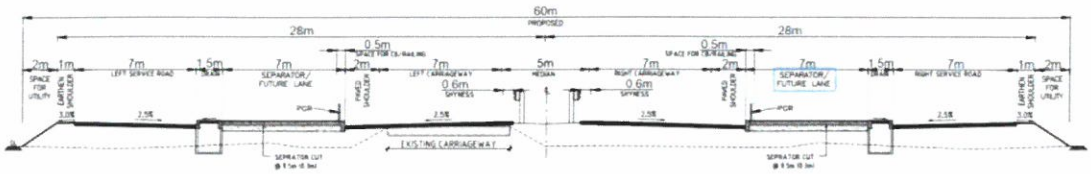
## 2. Typical Cross Section




TCS-1A

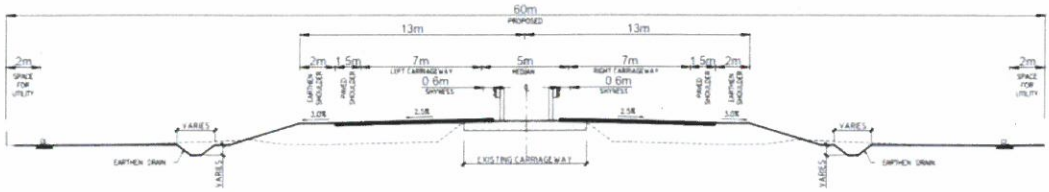
TYPICAL CROSS SECTION FOR 4-LANE ECCENTRIC WIDENING
WITHOUT SERVICE ROAD (FLUSHED MEDIAN)




TCS-1D

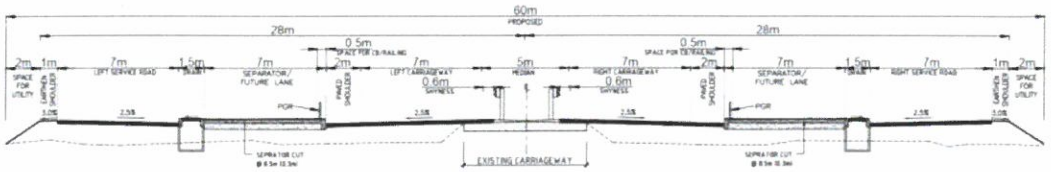
TYPICAL CROSS SECTION FOR 4-LANE ECCENTRIC WIDENING
WITH BOTH SIDE SERVICE ROAD (FLUSHED MEDIAN)

NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
2. FOR KERB AND DRAIN DETAILS REFER SEPARATE DRAWING (OR) RESPECTIVE IRC CODES
3. REFER IRC CODE FOR LANDSCAPING
4. OVERLAY / RAISING SHALL BE ADOPTED AS PER PROVISIONS OF VERTICAL PROFILE DESIGN
5. THE SUITABILITY OF EXISTING CARRIAGEWAY FOR OVERLAY / RECONSTRUCTION SHALL BE EXAMINED DURING EXECUTION BASED ON SITE CONDITIONS
6. USE OF GEOGRID/GEO TEXTILE OR ANY STABILIZING TECHNIQUE FOR STABILIZING AT THE SLOPE IN 1:1
7. TOE CUM RE WALL HEIGHT SHOULD BE "MINIMUM 2 m"




TCS-2A

TYPICAL CROSS SECTION FOR 4-LANE CONCENTRIC WIDENING
WITHOUT SERVICE ROAD (FLUSHED MEDIAN)




TCS-2D

TYPICAL CROSS SECTION FOR 4-LANE CONCENTRIC WIDENING
WITH BOTH SIDE SERVICE ROAD (FLUSHED MEDIAN)

NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
2. FOR KERB AND DRAIN DETAILS REFER SEPARATE DRAWING (OR) RESPECTIVE IRC CODES
3. REFER IRC CODE FOR LANDSCAPING
4. OVERLAY / RAISING SHALL BE ADOPTED AS PER PROVISIONS OF VERTICAL PROFILE DESIGN
5. THE SUITABILITY OF EXISTING CARRIAGEWAY FOR OVERLAY / RECONSTRUCTION SHALL BE EXAMINED DURING EXECUTION BASED ON SITE CONDITIONS
6. USE OF GEOGRID/GEO TEXTILE OR ANY STABILIZING TECHNIQUE FOR STABILIZING AT THE SLOPE IN 1:1
7. TOE CUM RE WALL HEIGHT SHOULD BE "MINIMUM 2 m"

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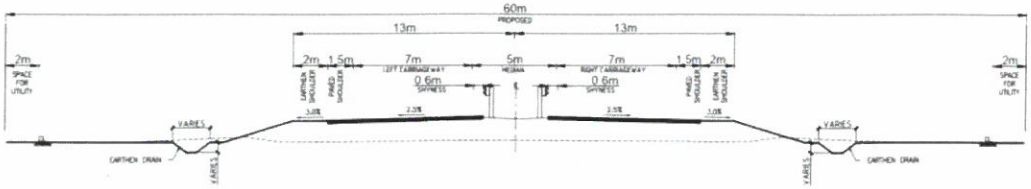
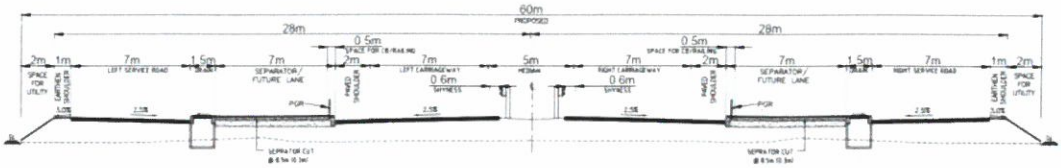



TCS-4A

TYPICAL CROSS SECTION FOR 4-LANE CONSTRUCTION
WITHOUT SERVICE ROAD IN BYPASS/REALIGNMENT WITH FLUSHED MEDIAN

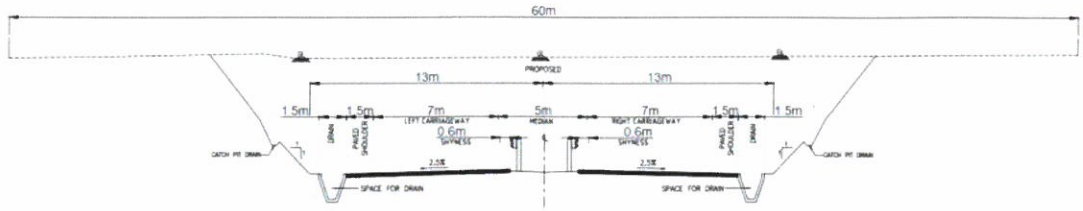



TCS-4D

TYPICAL CROSS SECTION FOR 4-LANE CONSTRUCTION
WITH BOTH SIDE SERVICE ROAD IN BYPASS/REALIGNMENT WITH FLUSHED MEDIAN

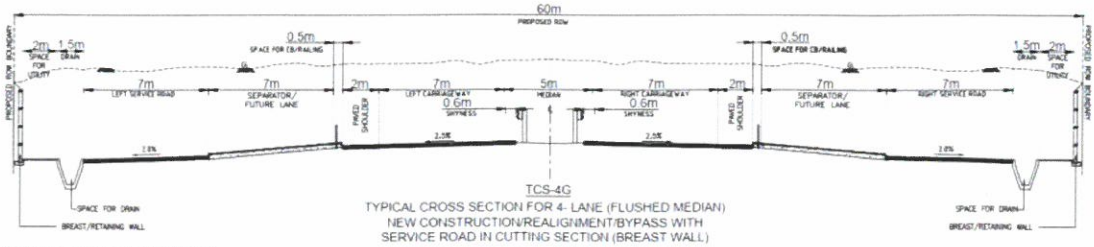
NOTES

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
2. FOR KERB AND DRAIN DETAILS REFER SEPARATE DRAWING (OR) RESPECTIVE IRC CODES
3. REFER IRC:CODE FOR LANDSCAPING
4. OVERLAY / RAISING SHALL BE ADOPTED AS PER PROVISIONS OF VERTICAL PROFILE DESIGN
5. THE SUITABILITY OF EXISTING CARRIAGE WAY FOR OVERLAY / RECONSTRUCTION SHALL BE EXAMINED DURING EXECUTION BASED ON SITE CONDITIONS
6. USE OF GEOGRID/GEO TEXTILE OR ANY STABILIZING TECHNIQUE FOR STABILIZING AT THE SLOPE IN 11
7. TOE CUM RE WALL HEIGHT SHOULD BE 'MINIMUM 2 m'




TCS-4E

TYPICAL CROSS SECTION FOR 4-LANE CONSTRUCTION
WITH BOX CUTTING WITHOUT SERVICE ROAD IN BYPASS WITH FLUSHED MEDIAN




TCS-4G

TYPICAL CROSS SECTION FOR 4- LANE (FLUSHED MEDIAN)
NEW CONSTRUCTION/REALIGNMENT/BYPASS WITH
SERVICE ROAD IN CUTTING SECTION (BREAST WALL)

NOTES

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
2. FOR KERB AND DRAIN DETAILS REFER SEPARATE DRAWING (OR) RESPECTIVE IRC CODES
3. REFER IRC:CODE FOR LANDSCAPING
4. OVERLAY / RAISING SHALL BE ADOPTED AS PER PROVISIONS OF VERTICAL PROFILE DESIGN
5. THE SUITABILITY OF EXISTING CARRIAGE WAY FOR OVERLAY / RECONSTRUCTION SHALL BE EXAMINED DURING EXECUTION BASED ON SITE CONDITIONS
6. USE OF GEOGRID/GEO TEXTILE OR ANY STABILIZING TECHNIQUE FOR STABILIZING AT THE SLOPE IN 11
7. TOE CUM RE WALL HEIGHT SHOULD BE 'MINIMUM 2 m'

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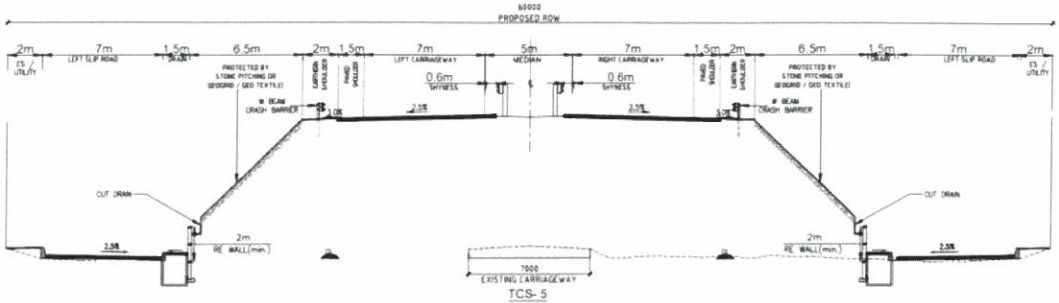
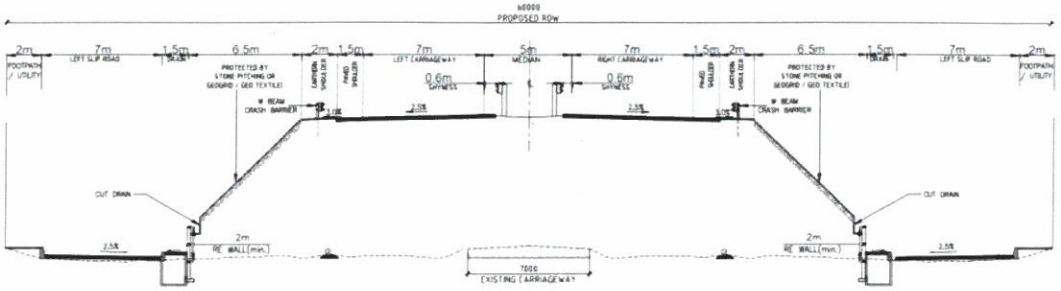


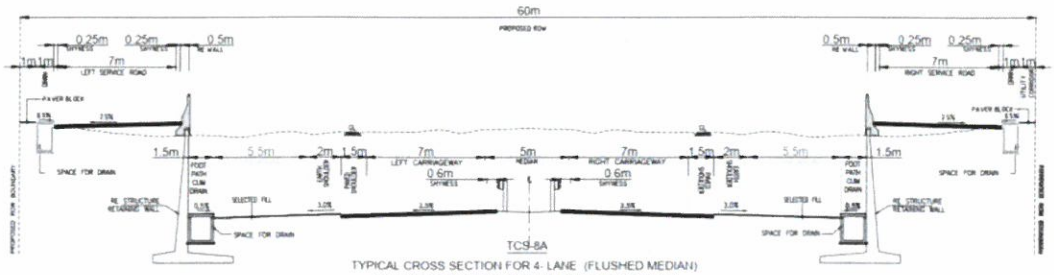

TCS- 5

TYPICAL CROSS SECTION FOR 4-LANE VUP APPROACH AT RURAL LOCATIONS
WITH FOOTPATH/DRAIN AND SERVICE ROAD 7.0m (RE WALL 2m) WITH FLUSHED MEDIAN



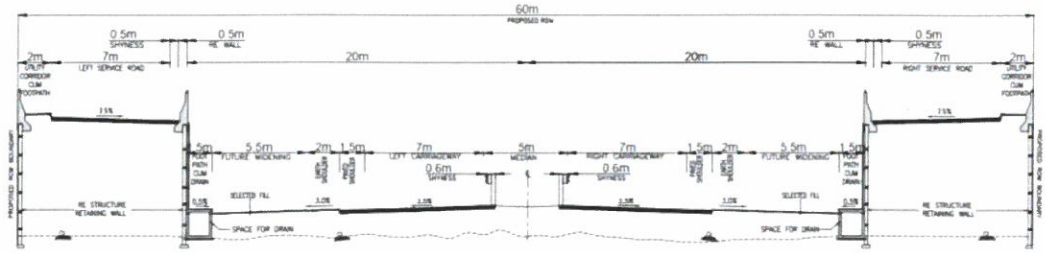

TCS- 6

TYPICAL CROSS SECTION FOR 4-LANE VUP APPROACH AT URBAN LOCATIONS
WITH FOOTPATH/DRAIN AND SERVICE ROAD 7.0m (RE WALL 2m) WITH FLUSHED MEDIAN




TCS-8A

TYPICAL CROSS SECTION FOR 4- LANE (FLUSHED MEDIAN)
NEW CONSTRUCTION/REALIGNMENT/BYPASS WITH
SERVICE ROAD IN CUTTING SECTION (RETAINING WALL)




TCS-8B

TYPICAL CROSS SECTION FOR 4- LANE (FLUSHED MEDIAN)
NEW CONSTRUCTION/REALIGNMENT/BYPASS
WITH SERVICE ROAD IN FILLING SECTION (RE-WALL)

NOTES:
1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
2. FOR KERB AND DRAIN DETAILS REFER SEPARATE DRAWING,IORI RESPECTIVE IRC CODES
3. REFER IRC:SP:06 FOR LANDSCAPING
4. OVERLAY / RAISING SHALL BE ADOPTED AS PER PROVISIONS OF VERTICAL PROFILE DESIGN
5. THE SUITABILITY OF EXISTING CARRIAGEWAY FOR OVERLAY / RECONSTRUCTION SHALL BE EXAMINED DURING EXECUTION BASED ON SITE CONDITIONS
6. USE OF GEOGRID/GEO TEXTILE OR ANY STABILIZING TECHNIQUE FOR STABILIZING AT THE SLOPE IN 11
7. TOE CUM RE WALL HEIGHT SHOULD BE MINIMUM 2 m

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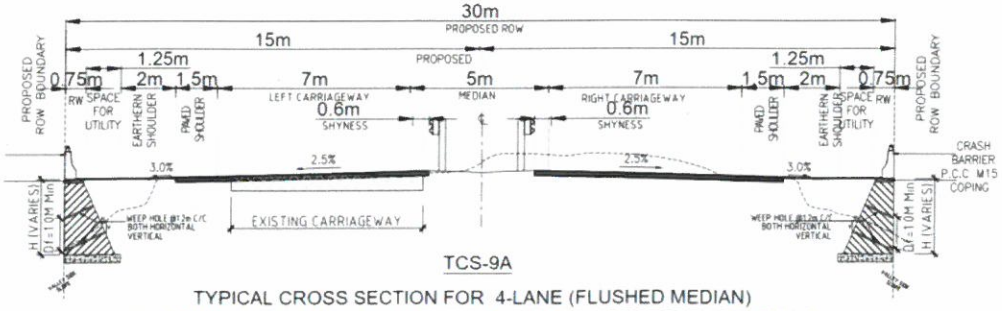
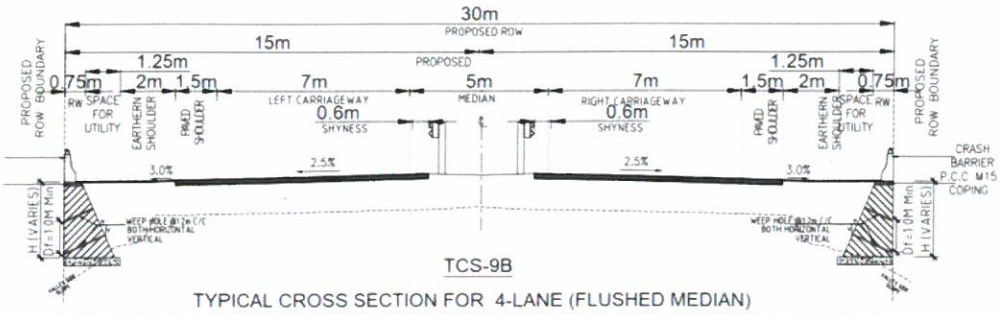
PROJECT DIRECTOR
NHAI PIU SAGAR

URS Scott Wilson




TCS-9A

TYPICAL CROSS SECTION FOR 4-LANE (FLUSHED MEDIAN)
ECCENTRIC WIDENING WITHOUT SERVICE ROAD AT FOREST LOCATIONS.




TCS-9B

TYPICAL CROSS SECTION FOR 4-LANE (FLUSHED MEDIAN)
NEW CONSTRUCTION/REALIGNMENT WITHOUT SERVICE ROAD AT FOREST LOCATIONS.

NOTES:
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