



**BIHAR STATE ROAD DEVELOPMENT CORPORATION LIMITED
(A GOVT. OF BIHAR UNDERTAKING)**

PROJECT FEASIBILITY REPORT

for

“Construction of 4-Lane Elevated Road as a part of JP Ganga Path (Digha to Deedarganj from Nurrudin Ghat (Ch:16+975.79 Km) to Dharamshala Ghat (Ch:19+890 Km) (Length: 2.914 Km) with allied facilities and Widening & Strengthening of Existing Road to 4-Lane from the Junction of JP Ganga Path at Deedarganj (Ch:20+500 Km) to ROB approach on SH-106 (Old NH-30) (Length-750 m) & Development of 4-lane road from Patna Sahib Railway station (Ch. 0+000) to Patna Ghat (Ch. 1+550) in replacement of Existing Old Railway Line of Patna Sahib-Patna Ghat at Patna in the State of Bihar on EPC Mode”

BID DOCUMENT

(Contract No.- BSRDCL/EPC/01/2021-2022)

Volume – III

BIHAR STATE ROAD DEVELOPMENT CORPORATION LIMITED

RCD Mech. Workshop Campus, Sheikhpura,

Patna - 800 014, BIHAR

January 2022

The Govt. of Bihar envisioned the plan for construction of J.P Ganga Ganga Path (Digha to Deedarganj) Project accordingly the Road Construction Department, Bihar accorded the Administrative Approval (AA) for 3160 Crore vide its letter no. 2565 (s) dtd. 30.03.2013 and entrusted Bihar State Road Development Corporation Limited (BSRDCL) for the construction of J.P Ganga Path (Digha to Deedarganj) Project.

Initially the Contract from km 0 to 21.5 was awarded to M/s Navayuga Engineering Company Limited (NECL) vide LOA No. 2080 dtd. 03.08.2013. In due course of time Change of Scope (COS) has initiated due to shifting of river Ganges towards City side and in light of IIT Roorkee recommendation, the construction of stretch from km 13.5 to 17 and km 19 to 20.5 was changed from embankment to elevated type structure. Presently M/s NECL is working in the stretch of km 0 to 13.5.

Accordingly, Road Construction Department, Bihar accorded the Revised Administrative Approval of 3390.00 Crore vide its letter no.2641 (S) dated 03.04.2018 with the provision of HUDCO loan of 2000.00 Crore and the rest from State Govt. Share.

In this project the stretch from km 13.5 to 17 and km 19 to 20.5 was awarded to M/s GR Intra Projects Ltd. Vide LOA No. 4102 dtd. 24.09.2020 and the exclusive connectivity of JP Ganga Path to Patna Medical College Hospital (PMCH) has awarded to M/s Gawar Construction Limited vide LOA No. 4284 dtd. 13.10.2020. The work has been in progress with full swing by both the Contractor.

HUDCO loan agreement has been executed on 01.11.2021 and amount has been disbursed by the HUDCO as & when requested by the BSRDCL as per the progress of work.

The under constructed JP Ganga Path from Digha to Deedarganj is being developed by utilizing the river Ganga 'Khadir' land along the southern bank in the Patna City.

The Alignment of JP Ganga Path is on the Southern Bank of River Ganga. The preliminary alignment is presently traversing on river Khadir which may be of minimal disturbance / impact to river Ganga. However, alignment designation is dependent result of hydraulic effects and recommendations of hydraulic model study. The Key Plan/ Location Map are presented in Figure I, II & III.

The JP Ganga Path alignment takes off from Digha Ghat (near Rail cum Road Bridge JP Setu) traverse eastwards along southern bank of river Ganga and crosses the Mahatma Gandhi Setu (at Gai ghat) at RL 56.478 and terminates near Deedarganj on old NH-30. The JP Ganga Path continues upto 20.5 Km in a single stretch at Deedarganj where it connects Bihar New Ganga Bridge connecting Deedarganj, Patna to Bidupur, Vaishali in North Bihar is under construction on EPC mode by BSRDCL.

The under constructed JP Ganga Path is of configuration of 4-Lane carriageway with allied facilities. Its alignment is mainly traversing through flat/plain river Khadir of

Ganga. Based on the detailed engineering surveys, the under constructed corridor has been divided into following sections:

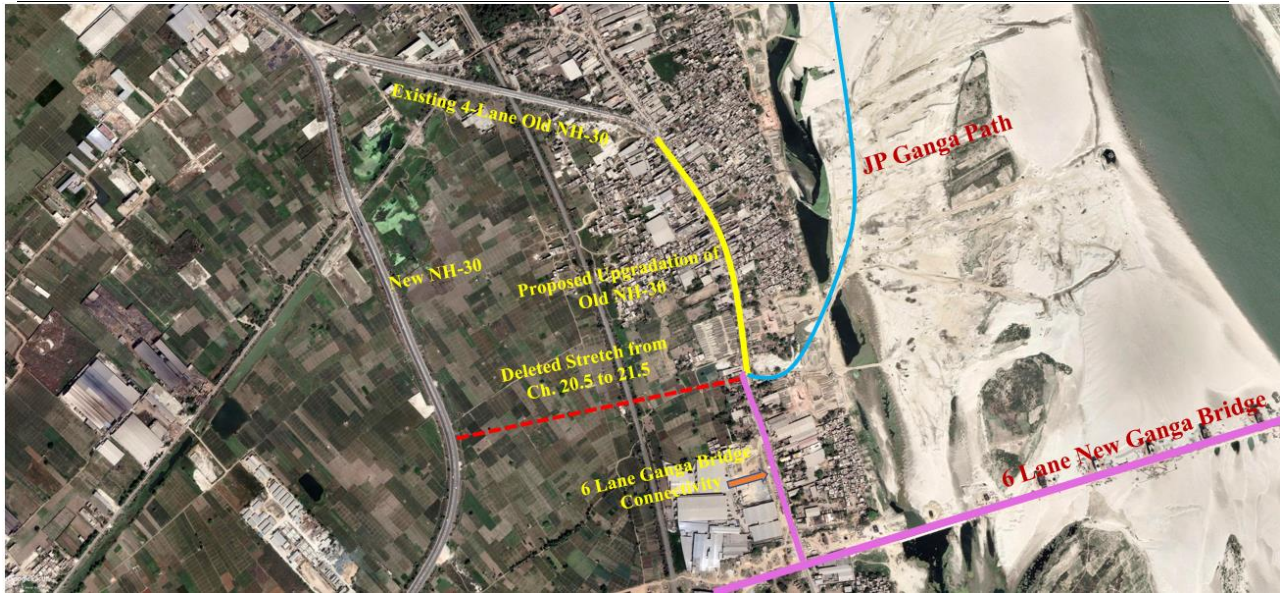
S. No.	Chainage	Structure Type	Contractor
1	Km 0 to 5.9 (Digha to A.N Sinha Institute)	Embankment	M/s Navayuga Engineering Company Limited
2	Km 5.9 to 13.5 (A.N Sinha Institute to Dulli Ghat)	Elevated	
3	Km 13.5 to 17	Elevated	
4	Km 19.9 to 20.5 (Deedarganj at Old NH-30)	Elevated	M/s GR Infraprojects Limited
5	PMCH exclusive connectivity	Elevated	M/s Gawar Construction Limited

Proposed in this Tender

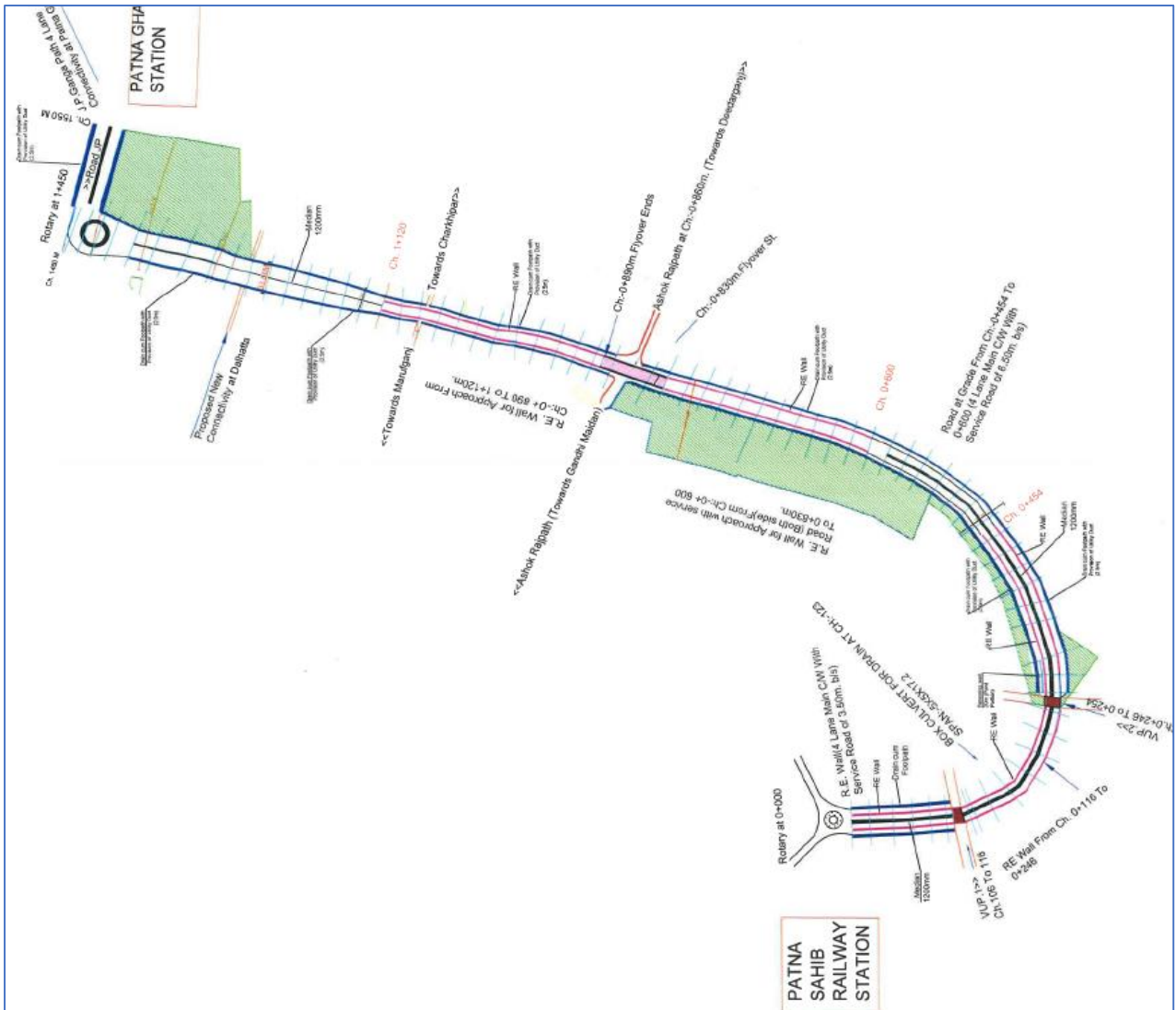
Stretch-A	Km 17 to 19.9	Elevated	Tender Invited
Stretch-B	Km 20.5 to 21.25 (Widening & Strengthening of Existing Old NH-30)	At-Grade	
Stretch-C	1.55 km Patna Sahib to Patna Ghat connectivity	At-Grade incl. Flyover at Ashok Raj Path	



(Figure- I) Stretch - A



(Figure- II) Stretch - B



(Figure- III) Stretch - C

Stretch – A

From (km)	To (km)	Length (km)	Right of Way (m)	Remark
16+975.79	19+890	2.914	45	Along the proposed alignment of the JP Ganga Path (From Digha to Deedarganj). The land for the project in Stretch A is mostly in the reclaimed land of river Ganga falling on the river side from the southern bank of the river Ganga

Carriageway

There is no existing carriageway along the alignment in Stretch- A as this is a proposed green field part of the JP Ganga Path project, presently there is only branch stream of river Ganga, barren, agricultural and reclaimed land.

The alignment of the Project Highway is enclosed in the alignment plan (Tender Drawings). Finished road level (FRL) indicated in the alignment plan shall be followed by the contractor as minimum FRL. In any case, the finished road level of the project highway shall not be less than those indicated in alignment plan.

The contractor shall plan for providing the traffic signages based on site/ design requirement as per latest relevant specification/ IRC Codes/ Manual for ensuring the safety of road users as well as pedestrians.

Stretch-(a)-Elevated Highway section of JP Ganga Path – (Km 16+975.79 to Km19+890)		
Cross Sectional Elements of Main Carriageway	Elevated Carriage Way	2X 7.50 m = 15.0 m
	Inspection/ Maintenance Path	2 X 1.750 = 3.50 m
	Median	1.00 m
	Crash Barrier (New Jersey RCC Type) Outer end	2 x0.5 m= 1.0 m
	RCC Railing	2X0.25 m= 0.50 m
	Total	21.0 m

Note: wherever Road cross section is changing, it shall be through smooth transition/tapering as per site conditions.

Geometric design and General features

Geometric design and general features of the Project Highway including connecting road shall be in accordance with the Alignment Plan provided by the Authority and in conformity with Section - 2 of the Manual IRC-SP: 84-2019 for 4-lane. Pavement design shall be carried out in accordance with Section-5 of the Manual.

Design Speed:

Design Speed of MCW	Ruling	100 Km/hr.
	Minimum	80 m/hr.

Improvement of the proposed road geometrics:

In the sections where improvement of the proposed road geometrics to the prescribed standards is not possible, the proposed road geometrics shall be improved to the extent possible within given right of way and proper road signs and safety measures shall be provided.

S. No.	Stretch (From km to km)	Fully paved Shoulders/ Footpaths	Reference to cross section.
1	Stretch-A Main Carriageway (16+975.79 to Ch. 19+890)	Paved Shoulder- Nil Footpath- 1.750m Inspection/ Maintenance Path on both sides	TCS-1

Design and specification of Paved shoulders and Footpath shall conform to the requirements specified in the relevant manual.

Lateral and vertical clearances at underpasses

Lateral and vertical clearances at underpasses and provision of guard rail/ crash barriers shall be as per provision of relevant manual for **Stretch- A**.

Typical cross-sections of the Project Highway

The typical cross-sections schedule of the Project Highway is as given below. The chainage wise applicable typical cross section is provided in table below.

Sl. No.	Design Chainage (Km)		Length (m)	Typical Cross Section Type	Type of Road
	From	to			
Stretch-A 4-lane elevated Road Main Carriageway (16+975.79 to Ch. 19+890)					
1.	16+975.790	18+225	2664.20	TCS-1	Main Carriage Way
2.	18+475	19+890			
3.	17+525	17+625	100	TCS 2	Rescue Lane LHS
4.	17+650	17+750	100	TCS-2	Rescue Lane RHS
5.	18+225	18+475	250	TCS-3	Toll plaza with all components & allied facilities

Median Opening:

Stretch- A There are **minimum 01no's** median opening to be provided as per site condition in consultation with Authority/Authority Engineer.

SPECIAL REQUIREMENTS FOR PROJECT**Stretch-A:**

The special conditions shall be as under:

- (a) A combination of RCC Crash Barrier and RCC Railings as per cross sectional details shall be provided in entire elevated structure portion except for locations near Toll Plaza where the same shall be provided as per standards & specifications/manual.
- (b) Fencing by proper mesh shall be provided at suitable (1.5m) heights on the elevated portion of main carriageway as per condition laid down by SEIAA for Environmental Clearances.
- (c) As this work is a part of under construction J P Ganga Path project and shall be in continuity of preceding and succeeding section of ongoing JP Ganga Path work, to maintain the aesthetic, homogeneity, and similarity in look, the outer/visible dimensions, shape & size of all items of the proposed elevated corridor shall be adhered to existing preceding & succeeding section type.

In view, the brief details of shape & size of existing preceding & succeeding elevated section are as follows:

Stretch- A- 4 lane elevated road (Ch.16+975.79 Km to Ch.19+890 Km)/ elevated structure

- (a) Min. Pile Dia. 1900mm, Group – min. 4 nos. of Pile, Minimum Length of Pile- 53.5m
- (b) Mean Scour Depth (d_{sm})- 21.70 m
- (c) Pile Cap Dimension: Minimum 8.1m x 8.1m x 2.85 m
- (d) Pile Cap Top level-46.350m
- (e) Pier Dia-. Minimum 2.5 m
- (f) Super Structure: Pre-stressed segmental construction; Depth of Segment- 3.15m
- (g) Superstructure and Substructure for the main Carriageway Elevated Structure will be designed for loading as per provision of IRC:6-2017 and other provisions for the design will be as per latest IRC codes for segmental construction.

Both side Additional widening at the location of Toll Plaza location (km 18+225 to km 18+475)

- (a) Pile Dia. Minimum 1900mm, 4no.Group, Minimum Length of Pile- 53.5m.
- (b) Mean Scour Depth (d_{sm}) - 21.70 m
- (c) Pile Cap top level-46.350m
- (d) Platform of additional widening shall be on separate composite structure (minimum 05 nos. Steel girder with deck slab to avoid any differential settlement w.r.t. main segmental structure) as per required dimension. All steel girders shall be painted with latest & highest quality silver colour.
- (e) The 250m long platform shall be attached with main segmental structure with longitudinal expansion joint. The additional platform shall be on separate foundation and substructure.
- (f) Toll plaza building platform (50m length) shall be on separate foundation, substructure and deck slab and attached with abutting additional platform with longitudinal expansion joint.

Rescue Lane

- (a) Pile Dia. Minimum 1900mm, 4no.Group, Minimum Length of Pile- 53.5m.
- (b) Mean Scour Depth (d_{sm}) - 21.70 m
- (c) Pile Cap top level-46.350m
- (d) Platform of additional widening shall be on separate composite structure (minimum 05 nos. Steel girder with deck slab to avoid any differential settlement w.r.t. main segmental structure) as per required dimension. All steel girders shall be painted with latest & highest quality silver colour.
- (e) The 100m long platform shall be attached with main segmental structure with longitudinal expansion joint. The additional platform shall be on separate foundation and substructure.

DESIGN REQUIREMENTS**Type of Pavement**

Main carriageway along with Toll Plaza is an elevated structure/road, so concrete pavement will have bituminous wearing coat comprised of Bituminous Concrete 40 mm thick overlaid with 25 mm thick Mastic Asphalt

ROADSIDE DRAINAGE

Locations and type of drainage shall be as per TCS. Drainage System including surface and subsurface drains for the Project Highway shall be provided as per provision of relevant Manual. To avoid traffic hazard in monsoon season, flow of

surface flow water from one carriageway to another carriageway shall be avoided, accordingly drainage system shall be planned.

TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS

All required components of traffic control devices and road safety works in total length of project highway shall be provided in accordance with Section 9 of Manual of Specification and Standards for Four Laning of Highways (IRC: SP: 84- 2019).

Specification of the reflective sheeting in total length of project highway shall be provided in accordance with Manual of Specification and Standards for Four Laning of Highways (IRC: SP: 84- 2019).

ROADSIDE FURNITURE

All required components of roadside furniture in total length of project highway shall be provided in accordance with the provisions of Section 9 of the Manual of Specification and Standards for Four Laning of Highways (IRC: SP: 84- 2019)

Overhead traffic signs

Stretch – B

S. No.	From (km)	To (km)	Length (km)	Right of Way (m)	Remark
Stretch-B	Junction of JP Ganga Path at Deedarganj (Ch.20+500 Km)	ROB approach on SH-106 (Old NH-30) towards Patna	0.750	Minimum -25 Maximum-32	Along the existing alignment of SH-106 (old NH-30) towards Patna side. Stretch B is along the existing alignment of SH-106 (old NH-30)

The paved carriage way shall be 17.0m widened in accordance with typical cross sections drawings provided in the schedule. The minimum features in the cross section of the project shall be as under:

Junction of JP Ganga Path at Deedarganj (Ch.20+500 Km) to ROB approach on SH-106 (Old NH-30) towards Patna		
Cross Sectional Elements of Main Carriageway	Main Carriage Way	2X 7.00 m = 14.0 m
	Paved shoulder (same composition as of main c/way)	2 X 1.500 = 3.00 m
	Median	1.50 m
	Earthen shoulder (with paver block over 150 mm PCC)	Minimum-1.75 m where ROW is 25m In other section varied from 1.75m to 5.25m as per available ROW.
	Covered Drain (RCC Box type) at the extreme end of ROW	2X1.50m
	Total	Minimum -25m Maximum- 32m

Note: wherever Road cross section is changing, it shall be through smooth transition/tapering as per site conditions.

Geometric design and General features

Geometric design and general features of the Project Highway including connecting road shall be in accordance with the Alignment Plan provided by the Authority and in conformity with Section - 2 of the Manual IRC-SP: 84-2019 for 4-lane.

Design Speed:

Design Speed of MCW	Ruling	100 Km/hr.
	Minimum	80 m/hr.

Improvement of the proposed road geometrics:

In the sections where improvement of the proposed road geometrics to the prescribed standards is not possible, the proposed road geometrics shall be improved to the extent possible within given right of way and proper road signs and safety measures shall be provided.

S. No.	Stretch (from km to km)	Fully paved Shoulders/ Footpaths	Reference to cross section.
1	Junction of JP Ganga Path at Deedarganj (ch.20+500 Km) to ROB approach on SH-106 (Old NH-30) towards Patna	Paved Shoulder -2 X 1.50m Footpath - 1.5m over covered RCC drain.	TCS-4

Flexible pavement – on existing road- minimum 50mm BC with profile correction (with BC) for camber & gradient.

Widening portion – the pavement composition shall be minimum **50mm BC** plus **125mm DBM** plus **250mm WMM** plus **250mm GSB** over **500mm compacted subgrade** (with minimum **effective CBR 10%**).

To avoid any doubt, **Top** of 250 mm GSB in **widened portion** shall match with **top of existing** GSB layer. The contractor for this section shall match the profile with start point at junction of JP Ganga Path end to provide smooth riding quality.

Top 50mm BC shall be overlaid in continuity over whole existing and widened portion to act as single structural layer maintaining required camber/gradient and to provide smooth riding quality.

DESIGN REQUIREMENTS**(a) Design Period and strategy**

Flexible pavement shall be designed for a minimum design period of 20 years. Stage construction shall not be permitted.

(b) Design Traffic

Stretch B up-gradation & widening of existing road to 4-lane configuration from Junction of JP Ganga Path at Deedarganj (ch.20+500 Km) to ROB approach on SH-106 (Old NH-30) towards Patna with design traffic of minimum 150 million standard axles (MSA).

ROADSIDE DRAINAGE

Locations of drainage shall be as indicated in the TCS. Drainage System including surface and subsurface drains for the Project Highway shall be provided as per provision of relevant Manual. The drainage system shall be designed such that all surface and subsurface water shall be disposed-off through both side RCC drain. The RCC drain section shall be designed considering total storm water capacity of surface & sub surface flow. The technically justified provisions for subsurface water flow into RCC drain mechanism shall be ensured during construction, even if, same is not

shown in the indicative TCS i.e., drainage from GSB layer to RCC drain shall be ensured during construction.

TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS

All required components of traffic control devices and road safety works in total length of project highway shall be provided in accordance with Section 9 of Manual of Specification and Standards for Four Laning of Highways (IRC: SP: 84- 2019).

Specification of the reflective sheeting in total length of project highway shall be provided in accordance with Manual of Specification and Standards for Four Laning of Highways (IRC: SP: 84- 2019).

ROADSIDE FURNITURE

All required components of roadside furniture in total length of project highway shall be provided in accordance with the provisions of Section 9 of the Manual of Specification and Standards for Four Laning of Highways (IRC: SP: 84- 2019)

Overhead traffic signs

Stretch – C

Construction of 4-lane Road in lieu of old railway track from Patna Sahib Railway Station to Patna Ghat has been envisaged by Government of Bihar and Bihar State Road Development Corporation Limited (BSRDCL) has been entrusted to conceptualize and execute the work.

Patna Sahib Railway Station to Patna Ghat Project Road starts from Patna Shahib Railway Station (km 0+000) and ends at Patna Ghat (km 1+550) connecting Patna Ghat connectivity of JP Ganga Path.

1.448 km long existing old Railway Line of Malsalami – Patna Ghat in the City of Patna is under transfer to Govt. of Bihar on which it is proposed to construct 4-Lane At-Grade / Elevated Road.

The Proposed Road will provide the connectivity with the under construction 4 Lane JP Ganga Path through Patna Ghat 4-Lane connectivity.

The Proposed Road will reduce the congestion on Ashok Raj Path, Marufganj Mandi area and also provides the connectivity of JP Ganga Path to New NH-30 through ROB at Patna Sahib Railway Station.

The Proposed Road also provide connectives from Dalhatta, Charkhipar area etc. which further reduce the congestion of traffic movement on Ashok Raj Path and its nearby area.

From (km)	To (km)	Length (km)	Right of Way (m)	Remark
Patna Sahib Railway Station (Ch.0+000)	Patna Ghat Railway Station (Ch. 1+550)	1.550	Ch. 0+000 – Ch. 0+116 -27 m Ch. 0+116 – Ch. 0+254 – 21 m Ch. 0+254 – Ch. 0+840 – varying between 41 m – 90 Ch. 0+840 – Ch. 1+280 – varying between 28 m – 89 m Ch. 1+280 – Ch. 1+550 – varying between 90 m – 139 m	In replacement of existing abandon old railway line.

Width of Carriageway

Cross Sectional Elements of Main Carriageway	Main Carriage Way	(a) Ch. 0+000 to 0+600 - 2 X 7.50 m = 15.0 m (b) Ch. 0+600 to 0+830 - 2 X 5.50 m = 11.0 m (with Flush median) Flyover approaches. (c) Ch. 0+830 to 0+890 - 2X 5.50 m = 11.000m (with Flush median) Flyover section. (d) Ch. 0+890 to 1+120X 5.50 m = 11.000m (with Flush median) Flyover approaches. (e) (Ch. 1+120 to 1+550 - 2X 10.50 m = 21.000m
	Median	(a) Ch. 0+000 to 0+600 -Raised Median = 1.2 m

		(b) Ch. 0+600 to 1+120 - Flush Median (c) Ch. 1+120 to 1+550 Raised Median = 1.2 m
	Covered Drain with provision of Utility Duct (Load Bearing RCC Box type) at the extreme end of ROW	As per site condition as depicted in respective TCS.
Note: wherever Road cross section is changing, it shall be through smooth transition/tapering as per site conditions.		

Design Speed:

Design Speed of MCW	Ruling	100 Km/hr.
	Minimum	80 m/hr.

Service roads / Slip Road

The service roads/ slip roads shall be constructed at the locations and for the lengths indicated below:

Sl. No.	(MCW) Design		Length (m)	Width (m)	Location	Remarks
	Chainage From	To				
1	0+000	0+116	116	3.50m	Near Patna Sahib Rly Stn.	Rigid pavement as per TCS-5 Both sides
2	0+254	0+830	576	6.50m		Both Sides
3	0+890	1+120	230	5.00m		Both sides

Flyover

Flyover at ch.0+830 to 0+890 over Ashok Rajpath as Per TCS.

Rotary

Rotary (02 nos.) – (a) Ch.0+000 (b) Ch. 1+450	At grade intersection with 03 leg rotary
Connecting Road (a) Ch. 1+080 (Maruf Ganj) (b) Ch. 1+260 (Dalhatta)	(X type) with 04 leg

Flyover / VUP

Ch. 0+110	VUP (10mX 5.50m)	10m	
Ch. 0+250	VUP (8mX 5.50m)	8m	
Ch. 0+860	Flyover (03 span – 17m+26m+17m) – Total length=60m	60m	Ashok Rajpath

Pavement Design Requirements**Stretch-C – Flexible pavement –**

new Construction of 4-lane configuration highway. -The pavement composition shall be minimum **50mm BC** plus **125mm DBM** plus **250mm WMM** plus **200mm GSB** over **500mm compacted subgrade** (with minimum **effective CBR 10%**).

Rigid Pavement -on service road (TCS-5) **250mm PQC M40** over **150mm DLC** over **200mm GSB (Grade-V)** over **500mm compacted subgrade** as per specification & standards and at level as per site requirement.

DESIGN REQUIREMENTS**(c) Design Period and strategy**

Flexible pavement shall be designed for a minimum design period of 20 years. Stage construction shall not be permitted.

(d) Design Traffic

Stretch B up-gradation & widening of existing road to 4-lane configuration from Junction of JP Ganga Path at Deedarganj (ch.20+500 Km) to ROB approach on SH-106 (Old NH-30) towards Patna with design traffic of minimum 150 million standard axles (MSA).

Roadside Drainage

Locations & Type of drainage shall be as per TCS. Size shall be designed as per site conditions as decided by Authority Engineer/Authority. Drainage System including surface and subsurface drains for the Project Highway shall be provided as per provision of relevant Manual. To avoid traffic hazard in monsoon season, flow of surface flow water from one carriageway to another carriageway shall be avoided,

accordingly drainage system shall be planned. The drainage system shall be designed such that all surface and subsurface water shall be disposed-off through both side RCC drain. The RCC drain section shall be designed considering total storm water capacity of surface & sub surface flow.

TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS

All required components of traffic control devices and road safety works in total length of project highway shall be provided in accordance with Section 9 of Manual of Specification and Standards for Four Laning of Highways (IRC: SP: 84- 2019).

Specification of the reflective sheeting in total length of project highway shall be provided in accordance with Manual of Specification and Standards for Four Laning of Highways (IRC: SP: 84- 2019).

ROADSIDE FURNITURE

All required components of roadside furniture in total length of project highway shall be provided in accordance with the provisions of Section 9 of the Manual of Specification and Standards for Four Laning of Highways (IRC: SP: 84- 2019)

Overhead traffic signs