

**Pre-Feasibility Report**

**of**

**ELEVATED ROAD AND EXPANSION OF THANE- GHODBUNDER ROAD (GHODBUNDER TO GAIMUKH) IN THE  
STATE OF MAHARASHTRA UNDER DBFOT**

**By**

**M/s. Maharashtra State Road Development Corporation (MSRDC)**

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## 1. Introduction

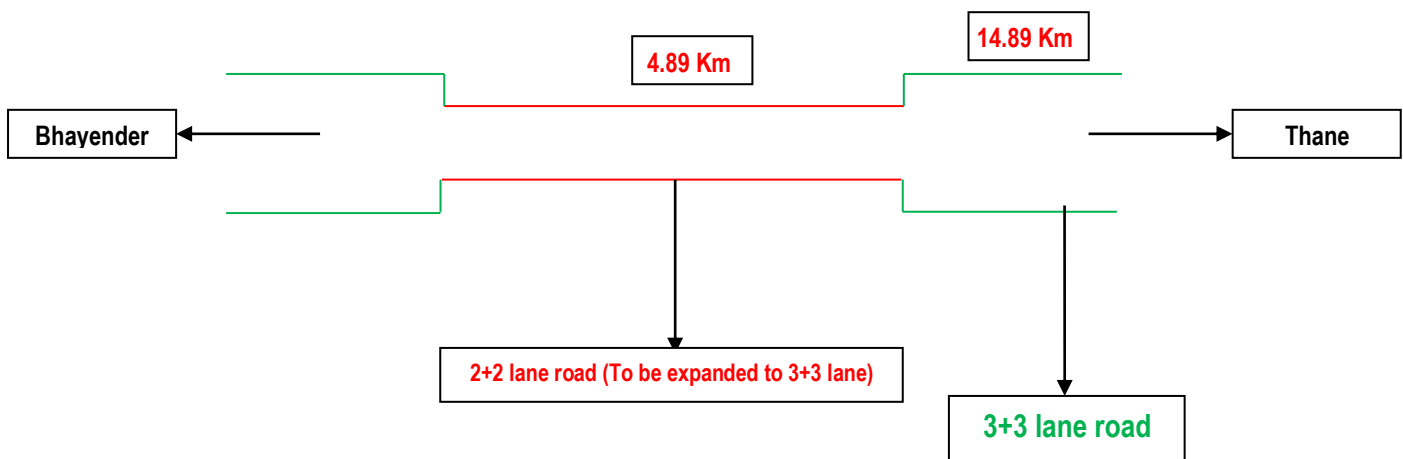
### General

State Highway 42, commonly referred to as Ghodbunder Road or G.B. Road, runs entirely through the district of Thane in Maharashtra State. It is one of the major roads leading out of Thane city and connects to the Eastern Express Highway (NH- 3) on one end and to the Western Express Highway (NH-8) on the other end. Ghodbunder Road carries a significant amount of JNPT bound traffic from Gujarat and in the reverse direction. Ghodbunder Road traverses through dense forests which form part of the Sanjay Gandhi National Park. It also skirts the Vasai Creek for most of its route and overlooks the forest from across the creek

### Background

The proposed project is essentially a highway up gradation project which involves diversion of 4.2877 ha forest land for grade improvement, horizontal expansion and construction of elevated portion over a distance of 4.89 Km on State Highway 42, namely Thane Ghodbunder Highway. This Highway ( with total Ch.- 0/000 to 14/900), passes through the Mira-Bhayender Municipal Corporation area (ch. 0/000 to 3/800) and the Thane Municipal Corporation area (ch. 3/800 to 14/900). **Entire road from chainage 0/000 to 0/405 and 4/500 to 14/900 has a width of minimum 3+3 lanes, except a part of it from Ghodbunder to Gaimukh (ch 0/405 to 4/400) which has limited width of only 2+2 lanes consisting of hilly portion, with higher gradient (Figure 1). Due to limited width in this portion of road, coupled with hilly terrain and gradient it is a bottleneck, hindering smooth movement of all time heavy traffic (Refer Annexure 1).** Being a major link between Eastern Express Highway (NH- 3) passing through Thane city and the Western Express Highway (NH-8) it is essential to upgrade this road to 3+3 lane with improvement of it's grade in the hilly portion and through construction of elevated road over some distance.

Figure 1: Schematic presentation of Project (2+2 lane - Not to scale)



It needs to be taken in to account that due to inadequate ROW in this particular stretch of road the heavy traffic causes frequent traffic jams, ranging many a times for 2-3 hours, It is important to mention here that this portion of road caters to major part of JNPT bound traffic from Gujarat and also in the reverse direction. Thus, it is commercially very important road link for trade and commerce. In addition, the disruption in traffic causes tremendous loss in terms of fuel, a scarce non-renewable natural resource, valuable time, delay in handling of goods and services, loss of value to the goods, particularly perishable essential commodities as also heavy emission in the environment, which is hazardous also to invaluable local flora and fauna of adjoining portion of the Sanjay Gandhi National Park. In addition, it also results in to health hazard to human life and other living being. Many a times inordinate delay in transfer of critical emergency patients to hospitals located in Thane and Mumbai causes loss of human life. Besides, the office commuters and workers are held up in traffic causing heavy loss of man hours and resultant loss of productivity. Hence it is essential to convert this stretch of road in to dual 3+3 lane configuration, with improvement in grade and through construction of elevated road over part of it.

As Ghodbunder Road traverses through forest area coming under Sanjay Gandhi National Park the proposed up gradation of part of this road mentioned above will need diversion of 4.2877 ha under Forest (Conservation) Act, 1980 Therefore, the separate application is submitted under Forest (Conservation) Act, 1980 and Rules made there under.

Besides, this project will also invites clearance under provisions Wild Life Act, 1972, for which separate application submitted, in accordance with the relevant Act and Rules.

Apparently implementation of this project will reduce travel time, fuel consumption, operation and maintenance cost of vehicles in addition to many advantages like ambient air quality, increase in productivity and prevention of losses due to delayed transit and safely to human life by avoiding likely accidents and quick transfer of serious patients. While meeting these essential services the project activity will generate temporary as well as permanent employment to the skilled and unskilled workers at a large scale. This will improve the economy of the local population of this region.

**Figure 2: Location Plan**



## 2. Salient Features of Project

The proposed project is essentially a highway upgradation project and involves widening of the existing Thane – Ghodbunder Road and construction of elevated road.

**Name of Project:** Elevated Road and expansion of Thane- Ghodbunder- Road (Ghodbunder to Gaimukh) in the state of Maharashtra under DBFOT

**User Agency:** “Maharashtra State Road Development Corporation Limited” a Government of Maharashtra Undertaking

**Forest area diversion to be sought:** Approximately 4.2877 ha. (Including 0.8721 hectare of Mangrove)

**Cost of the project:** Approximately 510 Crore INR

**Aerial distance of project area from nearest Protected Areas:** Project Activity is expansion of existing Thane- Ghodbunder Road which is passing through Protected Area i.e. Sanjay Gandhi National Park (**See Figure 3**)

**Alignment Plan:** At Grade 6 lane with Geometric Improvement + Elevated 4 lane

**Table 1: Project Details**

Project Alignment	Description
<b>Filling Length</b>	1.25 Km
<b>Cutting Length</b>	1.68 Km
<b>Gradient</b>	3.85%
<b>Design Speed</b>	Maximum 60 kmph, Minimum 40 kmph
<b>Absolute min Radius</b>	75 m
<b>Maximum Shift of proposed 6 lane C/L from Existing road</b>	9.00 m
<b>Existing Road</b>	i) Length - 4.89 Km ii) Chainage - 0+000 to 4+890 iii) Lane – 2+2 lane (4 lane) iv) Traffic Volume (PCU/day) - 1,00,000 (Approximate)
<b>At Grade Road (expansion of Thane-Ghodbunder Road)</b>	i) Area of At Grade road - 90090.48 sq.m. ii) Length - 4.89 Km iii) Chainage – 0+000 to 4+890

Project Alignment	Description
	iv) Lane – 3+3 lane (6 lane) v) PROW – 45 Meter vi) Capacity of Road (PCU) - 60000 PCU/Day
<b>Elevated Road</b>	i) Area of Elevated Road – 71380 sq.m., ii) Length - 4.15 Km iii) Chainage - 0+740 to 4+890 iv) Lane – 2+2 lane (4 lane) v) Width – 17.2 Meter vi) Capacity of Road (PCU) – 40000 PCU/Day
<b>Total Area of Project (At Grade + Elevated Road)</b>	161470.5 sq.m.
<b>Land required (hectare)</b>	i) Private – 2.4 ha. ii) Forest - 4.28 ha iii) Government – 2.32 ha. iv) Total – 9.0 ha.
<b>COST IN CRORES (INR)</b>	Approximate 510

Table 2: Forest Area Details

No	Type of Vegetation	Lane	Chainage Number	Length (m)	Area (sq.m.)
1	Affected Mangrove Area	Thane to Ghodbunder	0+200 to 0+600 2+000 to 2+450	400m+450m = 850m	3588.47+5133.039 = 8721.50 sq.m.
2	Reserved Forest	Ghodbunder to Thane	0+600 to 1+600 3+700 to 3+880 3+890 to 4+280 4+500 to 4+700	1000m+180m+390 m+200m = 1770m	11669.79+1584.08+3263.01 2+2736.611 = 19253.49 sq.m.
3	Open Scrub	Ghodbunder to Thane Thane to Ghodbunder	0+400 to 0+600 3+500 to 4+350	200m + 850m = 1050 m	1893.09+13009.60 = 14902.69 sq.m.
				<b>Total Forest Area</b>	<b>42877.68 Sq.m.</b> <b>4.2877 Hectare</b>

Figure 3: Location of Project Activity in Protected Area – Sanjay Gandhi National Park

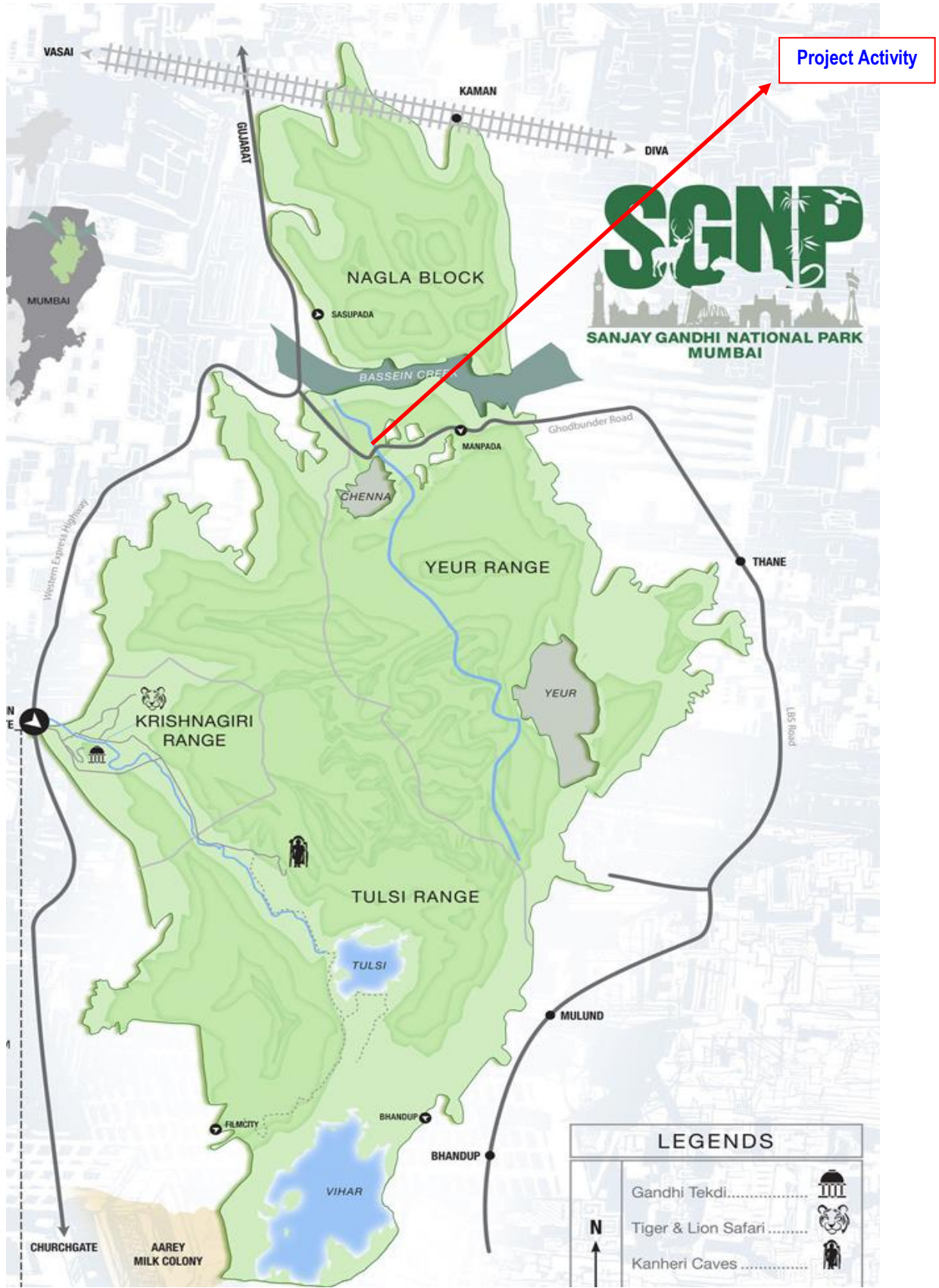
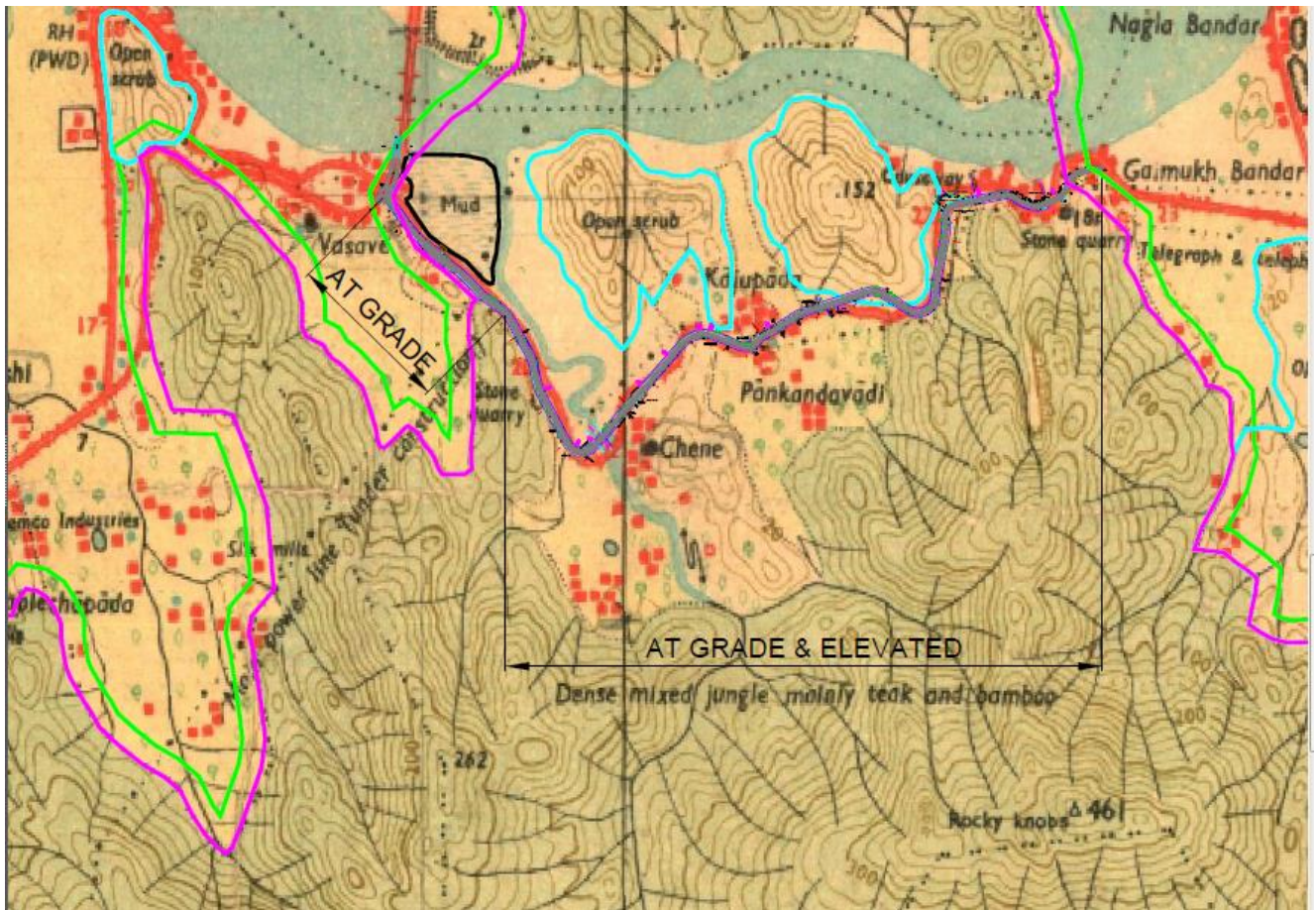


Figure 4: Project Detail Map



### 3. Objective

- ✚ Prepare various alignments and its comparative study for getting approval to the best feasible alignment from Competent Authority. The viability of the project shall be established taking into account the requirements with regard to rehabilitation and resettlement, upgrading and improvement based on elevated road and at grade road design, pavement design, provision of service roads wherever necessary, type of intersections, construction of bridges and structures, road safety features, quantities of various items of works and cost estimates and economic analysis.
- ✚ Study, analysis, economics of different land pooling/procurement project, hubs along the Thane-Ghodbunder Road & utility services along the elevated and at grade road independently.
- ✚ Obtain necessary clearances as per provisions of law

### 4. Need of Project

- ✚ The project activity is State Highway 42, commonly referred to as Ghodbunder Road or G.B. Road, runs entirely through the district of Thane in Maharashtra State
- ✚ It is one of the major roads leading out of Thane city and connects to the Eastern Express Highway (NH-3) on one end and to the Western Express Highway (NH-8)
- ✚ Ghodbunder Road carries a significant amount of JNPT bound traffic from Gujarat and in the reverse direction, existing 4-laned NH – 4B is proposed to be widened to 8-laned, similarly 4-laned existing SH – 54 is proposed to be widened to 6-laned by NHAI to cater the additional traffic to be generated from JNPT (from expansion of JNPT – additional cargo terminal) and in the reverse direction, hence expansion of existing Thane Ghodbunder Road is essential to cater the additional traffic load and avoid the possible congestion to be arised from expansion of NH-4B and SH-54
- ✚ The proposed At Grade (From existing 2+2 lane to 3+3 lane) and elevated road (2+2) will provide 6 more lanes to the existing Thane –Ghodbunder road, which means much less traffic congestion at Gaimukh and Ghodbunder Junction entrance to Mumbai
- ✚ The project is essential to improve the connectivity between Mumbai and Thane and to avoid possible congestion and reduce air emission

### **Justification for Expansion of existing Thane-Ghodbunder Road**

Existing Thane-Ghodbunder Road (Chainage 0+000 to 4+890) passing through mountainous and hilly terrain is not as per IRC (Indian Road Congress) Standards:

1. The absolute min radius shall be 75 meters in hilly area where as, Thane-Ghodbunder road (Chainage 0+000 to 4+890) has much lesser radius of 25 meter, 38 meter and 42 meter at different locations. Lesser the radius, speed of the vehicle will be reduced (around 20 kmph) which in turn increase the travel time and consumption of fuel (IRC:SP-87-2013).
2. The permissible ruling gradient of road shall be 5% in mountainous and steep terrain; however the gradient of existing Thane-Ghodbunder road (Chainage 0+000 to 4+890) is 6.05%, 6.2% and 5.86% at different locations. More the gradient, speed of the vehicle will be reduced with increase in consumption of fuel and travel time (IRC:SP-87-2013).
3. The ROW (Right of Way) shall be 60 meter for four lane road, where as existing four lane Thane-Ghodbunder road (Chainage 0+000 to 4+890) ROW varies from 18 meter to 36 meter. More the ROW the capacity of handling traffic volume will be more (IRC:SP-84-2014).
4. The desirable Level of Service for urban road shall be "C" which is a stable traffic flow, whereas Level of Service of existing Thane-Ghodbunder Road (Chainage 0+000 to 4+890) is "F", which is breakdown of traffic flow and occurs when the amount of traffic approaching a point exceeds the amount which can pass it (IRC: 106-1990).

Hence it is essential for overall geometric improvement of existing Thane-Ghodbunder road (Chainage 0+000 to 4+890) to achieve minimum desirable speed of 40 kmph, reduce the vehicle fuel consumption and travel time IRC: 106-1990.

Following criteria's were considered while designing alignment namely horizontal alignment, vertical alignment and Traffic load.

The gradient is restricted to 3.85%, while designing expansion of thane-Ghodbunder road (Chainage 0+000 to 4+890) and elevated road to be constructed above it considering other existing operational elevated road which in turn will also reduce cutting of existing road.

#### **Right of Way (ROW)**

- ✚ Even though required ROW for four lane/six lane is 60 meter as per IRC, ROW is restricted to 45 meter while designing of expansion of Thane-Ghodbunder road (Chainage 0+000 to 4+890). Restricted ROW of 45 meter is proposed to minimise the acquisition of Protected Forest Area (Sanjay Gandhi National Park).

#### **Traffic Volume (or Flow) and Level of Service**

- ✚ Traffic Volume is the number of vehicles at a given point on the road during a designed time interval. Traffic volume is generally expressed in PCU's (Passenger car Unit)
- ✚ Level of Service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by drivers/passengers. (IRC: 106-1990)
- ✚ LOS "C" shall be adopted for design of urban roads. At this level volume of traffic will be 0.70 times the maximum capacity and this is taken as the "design services volume" for the purpose of adopting design values (IRC: 106-1990).

Length of Thane-Ghodbunder Road is 14.9 Km (Approximate). Thane Ghodbunder road is of 3+3 lane from chainage 0+000 to 0+300, 4+400 to 10+200 and of 5+5 lane from 10+200 to 14+900. In these stretches there is service road available with the scope of widening in future. Since width of existing Thane-Ghodbunder road is more than the width of road between 0+300 to 4+400 it is prone to traffic congestion.

Hence it is imperative to widen the existing road with geometric improvement from chainage 0+000 to 4+890 and construction of elevated road above widened road from CH 0+740 to 4+890 for smooth movement of vehicle.

#### **5. Benefits of Project:**

Construction of elevated road and expansion of existing Thane- Ghodbunder road from chainage 0/000 to 4/890 (Ghodbunder to Gaimukh) will lead to the following benefits:

- Project will provide all weather connectivity to Mumbai and Thane
- Project operation will lead to reduction in travel time and traffic congestions
- Enhanced road safety for road users on account of improved sight distances, uniform road width and provision for cautionary and warning signs
- Fuel saving due to better quality of roads

- Due to up gradation of Thane-Ghodbunder Road at about 16 thousand liter/day fuel can be saved

## 6. Site Analysis

4 alignment options were studied before finalization of preferred alignment.

Option 1: At Grade 6 lane with Geometric Improvement with 4.15% gradient

Option 2: At Grade 6 lane with Geometric Improvement (Ruling gradient of 5% permitted for Hilly/Mountainous terrain)

Option 3: At Grade 6 lane with Geometric Improvement + Elevated 4 lane corridor (3.85% Gradient)

**Option 4: At grade 6 lane with Geometric Improvement + Elevated 4 lane (3.85% Gradient)**

**Table 3: Broad Features of Alignment Options**

Alignments	Maximum Gradient	Cost (Crore)	Absolute min Radius	Elevated Road Length (Km)	At Grade Road Length (Km)	Capacity of the road (in PCU)
Option 1	4.15%	<b>106</b>	75	-	4.89	For Six Lane: 60000 PCU/Day
Option 2	5.00%	<b>100</b>	75	-	4.89	For Six Lane: 60000 PCU/Day
Option 3	4.15%	<b>186</b>	75	1.35	4.89	For Six Lane: 60000 PCU/Day For Four Lane: 40000 PCU/Day
<b>Option 4</b>	<b>3.85%</b>	<b>510</b>	<b>75</b>	<b>4.15</b>	<b>4.89</b>	<b>For Six Lane: 60000 PCU/Day</b> <b>For Four Lane: 40000 PCU/Day</b>

Table 4: Comparative Analysis of Environment &amp; Social aspects of Alternative Alignments

Alignme nt	Elevated Road Length (Km)	Relative Marking	At Grade Road length (Km)	Relative Marking	Forest Land (ha)	Relative Marking	Private land (ha)	Relativ e Markin g	Governm ent Land (ha)	Relative Marking	Capacity (PCU/day)	Relativ e Markin g	Affecte d Reside ntial/Co mmerci al Buildin g	Relative Marking	Total Markin g
Option 1	-	0	4.89	100	4.2877	47	2.4	26.6	2.32	26.4	Six Lane: 60000 PCU/Day	60	5	90	350
Option 2	-	0	4.89	100	4.2877	47	2.4	26.6	2.32	26.4	Six Lane: 60000 PCU/Day	60	5	90	350
Option 3	1.35	30	4.89	100	4.2877	47	2.4	26.6	2.32	26.4	Six Lane: 60000 PCU/Day Four Lane: 40000 PCU/Day	100	5	90	420
Option 4	4.15	100	4.89	100	4.2877	47	2.4	26.6	2.32	26.4	Six Lane: 60000 PCU/Day Four Lane: 40000 PCU/Day	100	5	90	490

Note: Parameters considered for comparative analysis are selected based on their ability to:

1. Cater more traffic volume (PCU/day)
2. Reduce traffic congestion, maintain steady traffic flow (IRC:106-1990)
3. Displacement of structures

1. Elevated Road and At Grade Length – More the length, the capacity to handle traffic will be more

Table 5: Comparative Analysis of Based on engineering aspects of Alternative Alignments -

Alignment	Filling Length (m)	Relative Marking	Cutting Length (m)	Relative Marking	Total marking
Option 1	1250	65	1680	68	133
Option 2	1530	75	1060	90	165
Option 3	<b>1540</b>	74	1650	68	142
<b>Option 4</b>	<b>1150</b>	<b>100</b>	<b>1680</b>	<b>64</b>	<b>164</b>

Three alignments were prepared and studied by considering following norms

- More the length of filling more will be filling material required and hence low relative marking and vice versa
- More the length of cutting more will be cutting material required and hence low relative marking and vice versa

Table 6: Comparative Analysis of Based on engineering and environment aspects combined

Parameter	Environment & Socioeconomic Aspect (Relative Marking)							Engineering Aspect (Relative Marking)		
	Elevated Road Length Relative Marking	At Grade Road length Relative Marking	Capacity (PCU/D ay) Relative Marking	Affected Building Relative Marking	Forest land Relative Marking	Private Land Relative Marking	Government Land (Relative Marking)	Filling Length Relative Marking	Cutting Length Relative Marking	Total Score
Option 1	0	100	<b>60</b>	90	47	26.6	26.4	65	68	483
Option 2	0	100	<b>60</b>	90	47	26.6	26.4	75	90	515
Option 3	30	100	100	90	47	26.6	26.4	74	68	562
Option 4	<b>100</b>	<b>100</b>	<b>100</b>	<b>90</b>	<b>47</b>	<b>26.6</b>	<b>26.4</b>	<b>100</b>	<b>64</b>	<b>654</b>

Based on the relative marking of Engineering aspects, Environment & Social aspects, Alignment Option no 4 has scored the highest marks and hence recommended. Based on above analysis it is evident that Option 4 is more conducive and impose less impact on environment and caters more traffic.

Table 7: Comparative Statement for various Options

Description	Option 1	Option 2	Option 3	Option 4
Maximum Gradient	4.15%	5.00%	4.15%	3.85%
Speed	Maximum 60 kmph Minimum 40 kmph	Maximum 60 kmph Minimum 40 kmph	Maximum 60 kmph Minimum 40 kmph	<b>Maximum 60 kmph Minimum 40 kmph</b>
Absolute min Radius	75m CH 2+800	75m CH 2+800	75m CH 2+800	<b>75m CH 2+800</b>
Maximum Shift of existing 6 lane C/L from Existing road	9.00 M CH 3+880	9.00 M CH 3+880	9.00 M CH 3+880	<b>9.00 M CH 3+880</b>
<b>Elevated Road</b>	-	-	<b>CH. 2+020 to 3+370</b>	<b>CH 0+740 to 4+890</b>
<b>PROW</b>	<b>45 M</b>	<b>40 M</b>	<b>45 M</b>	<b>45 M</b>
Capacity of the road	For Six Lane: 60000 PCU/Day	For Six Lane: 60000 PCU/Day	For Six Lane: 60000 PCU/Day For Four Lane: 40000 PCU/Day	<b>For Six Lane: 60000 PCU/Day For Four Lane: 40000 PCU/Day</b>
<b>COST IN CRORES (Approximate)</b>	<b>106</b>	<b>100</b>	<b>186</b>	<b>510</b>
<b>Radius of Curve Proposed in M</b>	<b>75</b>	<b>75</b>	<b>75</b>	<b>75</b>

- Option 1: At Grade 6 lane with Geometric Improvement with 3.3% to 4% gradient  
Option 2: At Grade 6 lane with Geometric Improvement (Ruling gradient of 5% permitted for Hilly/Mountainous terrain)  
Option 3: At Grade 6 lane + Elevated 4 lane corridor with Geometric Improvement (5% Gradient)  
**Option 4: At Grade 6 lane Geometric Improvement + Elevated 4 lane (3.85% Gradient)**

**Based on the assessment of above four options, it is evident that Option 4 meets the required traffic handling capacity (PCU/day) with least possible diversion of forest land (4.2877 ha.)**