

MUMBAI RAILWAY VIKAS CORPORATION LIMITED

**DETAILED PROJECT REPORT
FOR
PROPOSED 3RD & 4TH RAILWAY LINES
BETWEEN
PUNE – LONAVALA**

JUNE 2016

1. EXECUTIVE SUMMARY

Brief History:

PECT Survey for 3rd & 4th Line between Pune-Lonavala was sanctioned in 1997 – 98 and report was submitted to Railway Board in 2001 at a total cost of Rs.322.44 cr. Further, RECT survey for only 3rd line was sanctioned by Railway Board in 2011-12 and the Survey Report was under scrutiny at HQ.

The work for Third B. G. Line between Pune -Lonavala was sanctioned by Railway Board vide Pink Book Item no. 22 of Demand No. 16 under Doubling for the year 2015-16 at the cost of Rs. 800 crores. Detailed Project Report with feasibility study and detailed construction estimate for proposed third B.G. line was prepared by Central Railway at a total cost of Rs. 943.60 Crore. It was sanctioned by Railway Board vide letter No. 2015/W1/NER/DL/BSB-MBS-ALD dated 31.03.2016 under Gross Budgetary support. The work has been assigned to Mumbai Railway Vikas Corporation Ltd (MRVC) vide Railway Board's letter No. 2015/W-1/Genl/Presentation/Pt dated 11.12.2015.

Hon'ble Chief Minister of Government of Maharashtra vide his D.O. letter No. MRD-3315/CR44/UD-7 dated 23.02.2016 addressed to Hon'ble Minister of Railways had requested for sanction of 3rd and 4th line between Pune – Lonavala to run suburban and main line train services.

Govt. Of Maharashtra has also agreed to share the cost of the project on 50:50 basis by extending MUTP model followed for Mumbai Suburban Railway System.

Railway Board has advised to prepare Detailed Project Report for 3rd and 4th lines between Pune –Lonavala to take final decision on the project. Accordingly, this Detailed Project Report for Proposed 3rd and 4th Lines has been prepared for approval of Railway Board.

Since sufficient Land with minimum obstructions exist on UP Side of existing Double Line, third and fourth B. G. Lines are proposed on the UP Side of the existing Lonavala to Pune Double Line.

1.1 **Brief about present PUNE-LONAVALA double line section**

Pune - Lonavala is double line electrified section of 63.84 kms. This is suburban section of PUNE division contributing a major portion of coaching earnings. The average trains dealt per day is 58 pairs. Average Goods train dealt per day is 10 nos in each direction.

Section capacity without maintenance block is 100.19% and with maintenance block is 119.84%

1.2 **Object of this Report and Scope of Work**

The primary aim of this report is preparation of cost estimate of 3rd and 4th lines between Pune – Lonavala in addition to examine feasibility for the proposed corridor, and project appraisal.

1.3 **Assessment of Traffic**

In the 3rd line DPR, assessment of Traffic has been done considering the existing pattern of traffic over the section, anticipated cross traffic potential being generated from the adjoining sections and line capacity constraints. Necessary data thus collected were used to study the trends and pattern of existing traffic and the prospects of traffic generation. Same assessment is considered for this report.

1.4 **Alignment Planning**

The proposed alignment for third B. G. Line from Pune to Lonavala passes partially through plain plateau and partially through undulating area near hill ranges of Sahyadri Mountain.

The elevation difference between Lonavala & Pune Station is about 62 m which is negotiated with ruling gradient.

Since land is available on the UP side of Pune-Lonavala Double line, it is proposed to run the 3rd and 4th lines on the UP side of Pune-Lonavala line to reduce land acquisition. This will also facilitate integration of future lines Pune-Nasik line one of which will also come on the UP side of the present Pune-Lonavala double line (Ref. fig.4.1 of Chapter.4).

As per policy on Planning for 3rd / 4th line vide Railway Board's Lr.No.98.W-I/Genl/0/30-Pt.I of 17.12.2013, integration of 3rd & 4th line should be at a distance of 30 KMs or so or 3-4 stations. In view of above, the proposed 3rd and 4th lines will not be integrated with the existing double line at all stations and planned for integration only at Chinchwad, Talegaon and Shivajinagar stations.

1.5 **Stations and their chainages with Proposed Integration:**

Sr. No.	Stations	Chainage From MUMBAI CST (Kms)	Remarks
1	Lonavala	127.26	
2	Malavali	135.73	
3	Kamshet	143.7	
4	Kanhe	148.09	
5	Vadgaon	153.38	

Sr. No.	Stations	Chainage From MUMBAI CST (Kms)	Remarks
6	Talegaon	157.33	This yard will be connected with 3 rd and 4 th lines.
7	Ghorawadi	160.34	
8	Begdewadi	163.41	
9	Dehu Road	167.08	
10	Akurdi	171.93	
11	Chinchwad	175.17	This yard will be connected with 3 rd and 4 th lines
12	Pimpri	177.30	
13	Kasarwadi	180.00	
14	Dapodi	183.37	
15	Khadki	185.35	
16	Shivajinagar	189.19	This yard will be connected with 3 rd and 4 th lines
17	Pune Junction	191.59	Yard remodelling is already considered under 3 rd line.

1.6 **Bridges**

a. **Water way Bridges**

Total number of waterway bridges required to be constructed for the project are as under :

(1) **Important Bridges**

- i) For Railway Tracks - 02 Nos.
- ii) For Road - 01 No

(2) **Minor Bridges** - 112 Nos.

Total - 115 Nos.

List of Bridges is as mentioned in Table 4.1 in Chapter 4

b. **Road Over Bridges/ Road under Bridges :**

There are existing 10 Nos. of Road Over Bridges and 8 Nos. of Road

Under Bridges.

List of ROBs is as mentioned in Table 4.2 in Chapter 4 and List of RUBs is as mentioned in Table 4.3Chapter 4.

1.7 **Road Crossings/ Level Crossings**

There are 16 Nos. of level crossings. *List of Level crossings and their present status is as shown in Table 4.4 of chapter 4*

Out of 16 No. of Level Crossings, 09 nos. have already been proposed for ROBs and proposal has been sent to State Govt. for constructing ROBs on cost sharing basis under Road Safety works. In the 3rd line estimate, it was planned to maintain remaining 07 level crossing. The proposed 3rd and 4th line is being planned mainly for running of suburban services and as per Railway Board’s policy directive, no level crossing is permitted in suburban section; it is now proposed to close these level crossings by constructing ROBs in this report.

1.8 **Curvature**

As far as possible, third and fourth lines will follow the existing alignment including curves. However new curves will be introduced at either ends of important bridges. *List of curves in existing Double Line section is given in Table 4.5 of Chapter 4.*

1.9 **Land**

The land acquisition is proposed for 3rd and 4th line as per Para 821 to 828 appendix-3rd of the Engineering Code. More Land is available on LEFT Hand Side of existing Pune-Lonavala Double B.G. Line compared to right hand side. Forest area is not involved in the proposed third and fourth B.G. line between Pune Junction & Lonavala. Additional land for stabling sidings for 10 EMU rakes is also considered. Provision for carshed is also made in the project on the existing suitable Railway land.

Project	Total land required	Land available	Land to be acquired
3rd Line	67.28Hectare	48.23 Hectare	18.17 Hectare
4 th Line	70.00 Hectare	19.24 Hectare	50.74 Hectare
Total	137.28 Hectare	67.47 Hectare	68.91 Hectare

Formation width for 3rd & 4th Line BG lines

Minimum top width for embankment	14.05 m [7.80 m + 5.30m + 3.95 m – 3.00 m(existing Shoulder)]
Minimum top width in cutting	14.05 m
Extra width on outside of curves	500mm

Track centre from existing BG line	7.80m Minimum (15m at Important bridges)
Track centre between 3 rd and 4 th lines	5.30 m

Considering the above stipulations, minimum width of land required has been worked out. Wherever land width is available upto toe of bank / cutting or upto 3m less, RCC retaining wall has been proposed to avoid land acquisition and to continue with the earthwork at these locations. Length wise about 7 km. length of retaining wall is required. This will avoid land acquisition of about 3 Hect.

The details of land to be acquired are as follows

Sr. No.	Particulars	Unit	Quantity in (Ha.)
1	Lonavala-Talegaon Section (Dist.-Pune)	Ha.	41.87
2	Talegaon-Chinchwad Section (Dist.-Pune)	Ha.	11.91
3	Chinchwad-Khadaki Section (Dist.-Pune)	Ha.	11.46
4	Khadki-Pune Section (Dist.-Pune)	Ha.	3.67
	Total :		68.91

1.10 Formation

Formation width of 7.85m top width in embankment and 7.85 m in Cutting (including side drains has been proposed. Width in embankment and cutting will be increased on curves based on extra clearance required on curves. Earthwork with Contractors own good quality earth shall be done. Blanketing up to 300 mm thick has been proposed.

	Total	3 rd Line	4 th Line
Total length of railway line	63.840 Km		
Length of railway line in cutting	23.700 Km		
Length of railway line in embankment in km	35.654 Km		
Total Earth work in embankment	2,31,938 Cum	96,161 Cum	1,35,777 cum
Earth work in cutting	9,18,716 Cum	4,37,484 cum	4,81,232 cum
Quantity of Blanketing	1,89,783 Cum	90,373 cum	99,410 cum

1.11 **Grade**

Since the proposed third and fourth line is running parallel to the existing double line, gradients will be kept same as that of existing line. Ruling gradient 1 in 150 (same as of existing double line). Gradient in yards are also proposed same as that of existing yards. *List of gradients in existing section is given in Table 4.6 of Chapter 4.*

1.12 **Foot Over Bridges :**

There are 17 No. of FOBs which are at various stations (excluding Pune and Lonavala). In addition there are 3 no. of Foot Over Bridges in mid section which are as follows :

Sr No.	Chainage	section
1	173/5-6	Akurdi-Chinchwad
2	174/5-6	Akurdi-Chinchwad
3	180/7-8	Kasarwadi-Dapodi

Many of these FOBs will require modification/extension for accommodating proposed 3rd and 4th lines. As proposed lines are being planned as suburban corridor to enable running of required suburban services, one additional 6 m wide FOB at each station is also considered in the report.

List of FOBs is as shown in Table 4.7 of chapter 4.

1.13 **System Parameters:**

The Broad parameters of study has been decided after considering latest Railway Board Guidelines

Category of line	Group "B" / Group C
Track Gauge	Broad Gauge
Track Centre	7800 mm for 3 rd line and 5300 mm for 4 th line
Loading standard of Bridges	25 T
Signalling & Train Control	Automatic Multi Aspect Colour Light signalling.
Traction	25 KV AC OHE
Rolling Stock	12 Car EMU rakes Conventional similar to rakes operated on Mumbai Suburban Section
Speed potential of the section	110 kmph
Length of stabling sidings	330 m for EMUs

Track structure	(i) 60 KG. 1st class Rails on 60 KG 1stclass PSC sleepers to a sleeper density of 1660 nos. per Km. over 65 mm size Ballast with cushion of 350 mm. (ii) Loop line and siding -60 kg/52 kg Ist class rails on PSC sleeper with density of 1540 nos. per Km. (iii) Points and crossing -60 kg. 1 in 12 curved switches on PSC layout negotiated by passenger trains & 60 kg. 1 in 8 ½ curved switches on PSC layout negotiated by goods trains at crossing Stations.
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1.14 Stations and Yard Layouts:

Pune Station	At Pune station, the 3 rd and 4 th lines will start from R& D line number 2 & 3. These R&D lines will be converted in to Main line.
Shivajinagar	Proposed 3 rd and 4 th lines are planned behind PF No.1 . FOB is being extended to circulating area. R&R of residential houses including slums/encroachment is involved and considered in the estimate.
Khadki	Proposed 3 rd and 4 th lines are planned behind the Up PF.
Dapodi	Proposed 3 rd and 4 th lines are planned behind the Up PF, duly relocating the station building.
Pimpri	Proposed 3 rd and 4 th lines are planned behind the Up PF.
Kasarwadi	Proposed 3 rd and 4 th lines are planned behind the Up PF.
Chinchwad	A&D siding will be converted to 3 rd line by extending on either ends and 4 th line is planned on up side of this line. Up loop line kept as it is.
Akurdi	Proposed 3 rd and 4 th lines are planned behind the Up PF.
Dehu Road	Proposed 3 rd and 4 th lines are planned behind the Up loop line. Up loop line kept as it is.
Begdewadi	Proposed 3 rd and 4 th lines are planned behind the Up PF.
Ghorwadi	At this station, there is a level difference between Up M/L and Dn M/L. Proposed 3 rd and 4 th lines are planned behind the Up PF.
Talegaon	Up loop line is kept as it is. One additional Up loop provided at Up PF & Proposed 3 rd and 4 th lines are planned adjacent to additional loop line.
Vadgaon	Proposed 3 rd and 4 th lines are planned behind the Up PF, station building requires relocation.
Kanhephata	Proposed 3 rd and 4 th lines are planned behind the Up PF, station building requires relocation

Kamshet	There is land width constraint at existing Kamshet station due to Indrayani river on Dn side and hill on up side. Therefore, it is proposed to shift the station suitably towards Pune side and dismantled the entire existing station to accommodate all 4 lines with 2 loop lines. However, it is not proposed to connect 3 rd and 4 th lines with existing tracks at this station.
Malavali	Existing Up loop line kept as it is. Proposed 3 rd and 4 th lines are planned adjacent to Up loop line with connectivity to Up loop line on either ends. One additional common loop line with connectivity to 3 rd and 4 th lines on either ends is planned .
Lonavala	Shunting neck which is adjacent to Up Main line will be converted to 3 rd line and shunting neck will be provided in lieu of this on Mumbai end as shown in conceptual plan. 4 th line will be planned on Up side of Proposed 3 rd line

1.15 **Stabling Lines:**

As additional 10 EMU rakes of 12 car length has been included in the project. Provision for 10 stabling siding with required maintenance facility considered in the report.

1.16 **Other Highlights:**

1. **CONSTRUCTION OF IMPORTANT BRIDGE(SANGAM BRIDGE) – (2x19.3 35 + 9 x19.21)**

On the alignment, there is one important bridge called Sangam Bridge, just near Pune Station. Adjacent to this, there is Road Bridge (on Up line's side), running parallel to Railway Bridge. Since the third & fourth line bridge will be just adjacent to the existing double line bridge, Road bridge will have to be shifted further UP line side by 15 m (approx.) to create space for rail bridge.

Issue has been discussed with Pune Municipal Corporation; regarding closure of this Road which was not agreed.

Hence, Rebuilding at a distance of 15 m from existing Road bridge and dismantling of this road bridge is inevitable. Provision is made for the same in the report.

Fig.1(a) Image of Sangam Bridge & Road Bridge and Fig.1(b) Close up Images of Sangam Bridge & Road Bridge

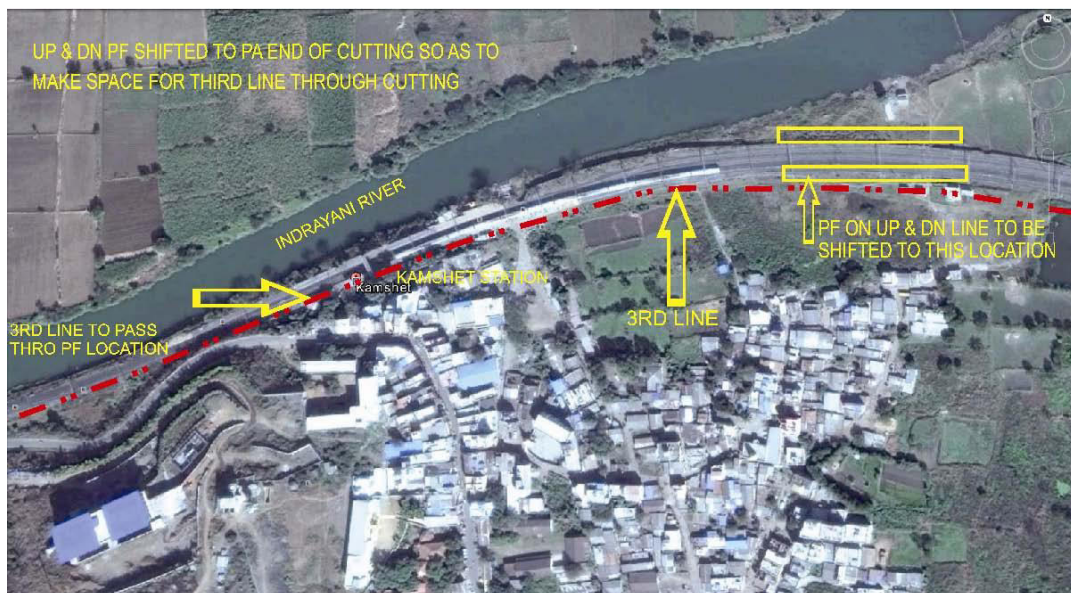


Fig. 1(b) – Road Bridge close to Railway track

2. Shifting of Platforms (both UP and Dn to Pune end) at KAMSHET to accommodate third line

Kamshet station is in Partial cutting i.e on up line side there is solid rock hillock, which is modestly inhabited, whereas on Dn line side there is river INDRAYANI. The up side PF is on the cutting side. Over the cutting is Road going to Market with private buildings on the edge of the cutting. In order to lay third and fourth line the entire Road has to be shifted away from station leading to acquisition of land and properties which seems to be time consuming.

It is therefore desirable that both UP and DN PFs are shifted towards PUNE end by 600m approximately. Third and Fourth lines can be laid in the space created by shifting of the UP line platform with lesser Land acquisition involved. However, if it is not feasible to accommodate all 4 lines with 2 loop lines in the existing Railway land at existing Kamshet station area after shifting of station due to inadequate land width and no scope for acquisition of land adjacent to Railway land, in that case, this section will need to be re routed on other shore of Indrayani River by crossing Indrayani river and again joining back to existing corridor. However, this will be finalised only after detailed Final location survey.



1. A separate work for decongestion of Pune yard area is also included as per requirement of Railways. The present set up of Pune yard restricts the speed as well as the flexibility due to presence of diamond crossings. Removal of these will pave way for better utility of 3rd and 4th lines with increased speed as well as better mobility.
2. Encroachment between Shivajinagar to Khadki, Khadki to Dapodi, Dapodi to Kasarwadi, and at Chinchwad station in between Pimpri-Chinchwad will be critical for completion of the said project. As now project is proposed under MTP plan head and Govt. Of Maharashtra has agreed for sharing 50% cost of

the project including land cost and R&R cost, R&R of eligible encroachers as per approved MUTP Policy is considered in the estimate.

3. From Kasarwadi to Pimpri, Pimpri to Chinchwad, Chinchwad to Akurdi and Akurdi to Dehu road, land is available mostly in continuous stretches. Also, between Ghorawadi-Talegaon and Talegaon-Vadgaon, land is available in continuous stretches and Earthwork can be started in these locations immediately.

1.17 Integration with Existing Double Line :

As far as possible, 3rd & 4th lines are being taken separately behind the UP PF, minimizing disturbances to UP loop. However, where sharp curves are likely to be encountered, it will be routed through UP loop line.

1.18 Power Supply System :

The 3rd and 4th BG lines will also be 25 KV AC Traction (regulated OHE) electrified.

The existing double BG line is being powered from Thakurli Power House to Lonavala, Talegaon and Khadki TSS. For the 3rd and 4th BG lines, power supply will be augmented by tapping power from M.S.E.D.C.L. at Talegaon.

The details of TSS/SSP/SP available in Pune-Lonavala section are as follows :

Sr no.	Name	OHE Structure No.	TSS feeding Zone (Km.)
1	Pune (SSP)	190/10-12	
2	Khadki (TSS) 2*21.6 MVA	184/11-11	2 + 6+14 = 22
3	Chinchwad (SSP)	175/22-44	
4	Akurdi (SP)	170/16-17	
5	Talegaon (TSS) 2*21.6MVA	156/6-7	14 + 10 = 24
6	Kamshet (SP)	146/14-15	
7	Malawali (SSP)	135/3-4	
8	Lonavla (TSS) 2*21.6MVA	127/7-8	19

- Existing TSS at Khadki needs to be rebuild due to infringement with proposed lines.
- Existing SSP at Malavali is to be relocated on Dn side and the existing SSP at Chinchwad needs to be shifted on Up side where old sub-station was situated.
- Existing SP at Kamshet needs to be shifted by about 2 km. towards Kanhe station.

All Feeding posts sectioning post (SP) and sub sectioning post (SSP) will be equipped with isolator switches, circuit breakers etc.

Supervisory Control and Data Acquisition (SCADA) system : Now the existing system of power supply (traction & auxiliary supply) shall be monitored and controlled from a centralized control centre through SCADA system for proposed lines by duly modifying the existing system.

General Services for Electrical : As per latest guidelines issued by Railway Board, energy efficient LED fittings will be provided at Office Buildings, Stations, Quarters, OHE depots etc and provision of solar systems for minimum required lighting load at major stations.

1.19 **Signalling& Train Control System** :

The signalling system proposed for Proposed 3rd and 4th BG lines is Multiple Aspect Coloured Light System (MACLS). As per site survey carried out, erection of additional rakes for providing new relays at all 12 stations except Khadki station is required. Hence, at 11 Stations, construction of new relay room, panel room is required to provide new panel interlocking (route setting type).

It is proposed to have a separate board for train control system so as to have better control over train operations. 13 Relay huts are on the alignments of the proposed line, which are required to be relocated.

1.20 **Train Operation System**

As 3rd and 4th lines are being planned as a commuter corridor, there will be mainly one directional working, i.e. 3rd Line for Dn direction and 4th Line for Up direction, with Automatic signals (MACLS), with favourable integration at Shivajinagar, Talegaon & Chinchwad.