

# CHAPTER 10

## MAINTENANCE DEPOT



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## MAINTENANCE DEPOT

### 10 MAINTENANCE DEPOT

**10.1 NAGPUR METRO PROJECT CORRIDORS :** The Nagpur Metro Project comprises of following corridors:

S. No.	Corridor	Gauge (mm)	Route Length (KMs)
1.	North-South Corridor	1435	19.658
2.	East-West Corridor	1435	18.266

### 10.2 DEPOT- CUM- WORKSHOP

**10.2.1** (A) It is proposed to establish one depot- cum- workshop near Khapri Station for North South Corridor and one depot- cum- workshop in SRP Land near Lokmanya Nagar Station for East West Corridor with following functions:

**a) Depot- cum- workshop near Khapri Station for North South Corridor (Line 1)**

- (i) Major overhauls of all the trains of Line 1.
- (ii) All minor schedules and repairs of Line 1.
- (iii) Lifting for replacement of heavy equipment and testing thereafter of Line 1.
- (iv) Repair of heavy equipments of Line 1.

**b) Depot- cum- workshop in SRP Land near Lokmanya Nagar Station for East West Corridor (Line 2)**

- (i) Major overhauls of all the trains of Line 2.
- (ii) All minor schedules and repairs of Line 2.
- (iii) Lifting for replacement of heavy equipment and testing thereafter of Line 2.



(iv) Repair of heavy equipments of Line 2.

**10.2.2** The Depot planning near Khapri Station for North South Corridor and in SRP Land near Lokmanya Nagar Station for East West Corridor is based on following assumptions:

- (i) Enough space should be available near Khapri Station for North South Corridor and in SRP Land near Lokmanya Nagar Station for East West Corridor for establishment of a Depot- Cum- workshop
- (ii) All inspection, workshop lines and stabling lines are designed to accommodate two trainsets of 3- car each.
- (iii) All stabling lines are planned in the proposed depot-cum-workshop assuming adequate space availability. In case of space constraints, if any, stabling facilities may need to be created at terminal stations or elsewhere to cater to the required stability facilities.
- (iv) Provision of transfer line from one corridor to another corridor.

In broad terms, based on the planned Rolling Stock requirements, this chapter covers conceptual design on following aspects and will work as a guide for detailed design later:

- Layout of Stabling-shed, Inspection-shed, minor repairs and heavy repair overhauling workshop and cleaning of Rolling Stock.
- Operational and functional safety requirements.
- Ancillary buildings for other maintenance facilities.
- Electrical & Mechanical Services, power supply and distribution system.
- Water Supplies, Drainage & Sewerage.

### **10.3 MAINTENANCE PHILOSOPHY**

- Monitoring of the performance of equipment by condition monitoring of key parameters. The concept is to evolve the need based maintenance regime, which can be suitably configured in the form of schedules like daily check, “A” checks, “B” type checks, “IOH” and “POH”.
- Labour intensive procedures are kept to the minimum. Automation with state of the art machinery to ensure quality with reliability.
- Multi skilling of the Maintenance staff to ensure quality and productivity in their performance.
- Energy conservation is given due attention.

### **10.4 ROLLING STOCK MAINTENANCE NEEDS**

**10.4.1 Maintenance Schedule** :The following maintenance schedule has been envisaged for conceptual design of depots assuming approx. 300 kms running



per train per day, taking in consideration the passenger load of 2016, 2021, 2026, 2031, 2036 and 2041 respectively.

**Table 10.1 : Maintenance Schedule**

Type of Schedule	Interval	Work Content	Locations
Daily	Daily	Check on the train condition and function at every daily service completion. Interval cleaning/mopping of floor and walls with vacuum cleaner.	Stabling Lines
“A” Service Check	5,000 Km (approx. 15 days)	Detailed inspection and testing of sub - systems, under frame, replacement/ topping up of oils & lubricants.	Inspection Bays
“B” Service Check	15,000 Km (approx. 45 days)	Detailed Inspection of ‘A’ type tasks plus items at multiples of 15,000 Km (‘B’ type tasks)	Inspection Bays
Intermediate Overhaul (IOH)	420,000 Km, (3 and half Years approx.)	Check and testing of all sub-assemblies (Electrical + Mechanical). Overhaul of pneumatic valves, Compressor. Condition based maintenance of sub-systems to bring them to original condition. Replacement of parts and rectification, trial run.	Workshop
Periodical Overhaul (POH)	840,000 Km, (7 Years approx.)	Dismantling of all sub-assemblies, bogies suspension system, traction motor, gear, control equipment, air-conditioning units etc. Overhauling to bring them to original condition. Checking repair and replacement as necessary. Inspection and trial.	Workshop
Heavy Repairs	-	Changing of heavy item such as bogies, traction motor, axles, gear cases & axle boxes etc.	Workshop

The above Schedule may need slight revision based on the actual earned kilometers per train and the specific maintenance requirements of Rolling Stock finally procured.

#### 10.4.2 Washing Needs of Rolling Stock

Cleanliness of the trains is essential. Following schedules are recommended for Indian environment:

**Table 10.2 : Train Cleaning Schedule**

S.N.	Kind Inspection	Maint. Cycle	Time	Maintenance Place
1.	Outside cleaning (wet washing on automatic)	3 Days	10 mins.	Single Pass through Automatic washing



S.N.	Kind Inspection	Maint. Cycle	Time	Maintenance Place
	washing plant)			plant of Depot
2.	Outside heavy Cleaning (wet washing on automatic washing plant and Front Face, Vestibule/Buffer area. Floor, walls inside/outside of cars and roof. Manually)	30 days	2 – 3 hrs.	Automatic washing plant & cleaning & washing shed

### 10.5 YEAR-WISE PLANNING OF MAINTENANCE FACILITY :

Year-wise planning of maintenance facility setup at depot cum workshop based on planned Rolling Stock requirement in TOP is tabulated below:

(i) Planned rakes as per TOP:

a) Planned rakes as TOP for N- S Corridor:

Year	No. of Rakes	No. of coaches
2016	11	33
2021	12	36
2026	15	45
2031	16	48
2036	18	54
2041	20	60

b) Planned rakes as TOP for E- W Corridor:

Year	No. of Rakes	No. of coaches
2016	12	36
2021	13	39
2026	15	45
2031	17	51
2036	18	54
2041	20	60

(ii) Average earning/day/rake based on TOP:

a) Average earning/day/rake for N- S Corridor:

Year	Average earning/day/rake
2016	269
2021	261
2026	270
2031	278
2036	267



2041	287
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b) Average earning/day/rake for E- W Corridor:

Year	Average earning/day/rake
2016	218
2021	213
2026	239
2031	233
2036	236
2041	254

(iii) Requirement of Stabling Lines (SBL), Inspection Lines (IBL) and Workshop Lines (WSL) in the Depot

a) Requirement of Stabling Lines (SBL), Inspection Lines (IBL) and Workshop Lines (WSL) in the Depot -cum –Workshop near Khapri Station for North South Corridor.

**Table 10.3**  
**Requirement of Stabling Lines (SBL), Inspection Lines (IBL) and Workshop Lines (WSL)**  
**NS Corridor**

Year	No. of Trains	SBLs	IBLs	WSLs
2016	11	6 lines x two trains of 3-car	One bay of 3 lines each with two trains of 3-cars each on each line with space earmarked for future extension	One bay of 3 lines each with two trains of 3-cars each on each line with space earmarked for future extension
2021	12	7 lines x two trains of 3-car	-do-	-do-
2026	15	8 lines x two trains of 3-car	-do-	-do-
2031	16	8 lines x two trains of 3-car	-do-	-do-
2036	18	9 lines x two trains of 3-car	-do-	-do-
2041	20	10 lines x two trains of 3-car	-do-	-do-

All lines shall be suitable for placement of two trains of 3-car trains on each line.

b) Requirement of Stabling Lines (SBL), Inspection Lines (IBL) and Workshop Lines (WSL) in the Depot -cum –Workshop in SRP Land near Lokmanya Nagar Station for East West Corridor.



**Table 10.4**  
**Requirement of Stabling Lines (SBL), Inspection Lines (IBL) and Workshop Lines (WSL)**  
**EW Corridor**

Year	No. of Trains	SBLs	IBLs	WSLs
2016	12	6 lines x two trains of 3-car	One bay of 3 lines each with two trains of 3-cars each on each line with space earmarked for future extension	One bay of 3 lines each with two trains of 3-cars each on each line with space earmarked for future extension
2021	13	7 lines x two trains of 3-car	-do-	-do-
2026	15	8 lines x two trains of 3-car	-do-	-do-
2031	17	9 lines x two trains of 3-car	-do-	-do-
2036	18	10 lines x two trains of 3-car	-do-	-do-
2041	20	11 lines x two trains of 3-car	-do-	-do-

All lines shall be suitable for placement of two trains of 3-car trains on each line

**10.6 REQUIREMENT OF MAINTENANCE / INSPECTION LINES FOR DEPOT-CUM-WORKSHOP**

- a) Requirement of maintenance / Inspection lines for depot-cum-workshop Depot -cum –Workshop near Khapri Station for North South Corridor (Line 1):

**Table 10.5**  
**Requirement of maintenance / Inspection lines (NS Corridor)**

Schedule	Maintenance Requirement (No. of Cars)	Lines Needed
<b>i) Year 2016 - Maximum no. of rake holding is 11TS x3 (= 33 Cars)</b>		
'A' Checks (5000 km) approx. 15 days	(11X3) Cars = 33 Cars	1 Line x two trains of 3- cars(with Sunken Floor)
'B' Checks (15000 km) approx. 45 days	(11X3) Cars = 33 Cars	1 Line x two trains of 3- cars(with Sunken Floor)



Schedule	Maintenance Requirement (No. of Cars)	Lines Needed
Unscheduled line & adjustment lines	For minor repairs, testing and after IOH/POH adjustments	1 Line x two trains of 3- cars(with sunken Floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future
<b>ii) Year 2021 - Maximum no. of rake holding is (12TS x3 = 36 Cars)</b>		
'A' Checks (5000 km) approx. 15 days	(12X3) Cars = 36 Cars	1 Lines X two trains of 3- cars(with sunken floor)
'B' Checks (15000 km) approx. 45 days	(12X3) Cars = 36 Cars	1 Lines X two trains of 3- cars(with sunken floor)
Unscheduled line & adjustment lines	For minor repairs, testing & adjustments post major repairs / IOH & POH	1 Line X two trains of 3- cars(with sunken floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future
<b>iii) Year 2026 -Maximum no. of rake holding is (15x3 = 45 Cars)</b>		
'A' Checks (5000 km) 15 days	(15X3) Cars = 45 Cars	1 Lines X two trains of 3- cars(with sunken floor)
'B' Checks (15000 km) 45 days	(15X3 ) Cars = 45 Cars	1 Lines X two trains of 3- cars(with sunken floor)
Unscheduled line & adjustment lines	For minor repairs, testing & adjustments post major repairs / IOH & POH	1 Line X two trains of 3- cars(with sunken floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future
<b>iv) Year 2031 -Maximum no. of rake holding is (16x3 = 48 Cars)</b>		
'A' Checks (5000 km) 15 days	(16X3) Cars = 48 Cars	1 Lines X two trains of 3- cars(with sunken floor)



Schedule	Maintenance Requirement (No. of Cars)	Lines Needed
'B' Checks (15000 km) 45 days	(16X3) Cars = 48 Cars	1 Lines X two trains of 3- cars(with sunken floor)
Unscheduled line & adjustment lines	For minor repairs, testing & adjustments post major repairs / IOH & POH	1 Line X two trains of 3- cars(with sunken floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future
<b>v) Year 2036 -Maximum no. of rake holding is (18x3 = 54 Cars)</b>		
'A' Checks (5000 km) 15 days	(18X3) Cars = 54 Cars	1 Lines X two trains of 3- cars(with sunken floor)
'B' Checks (15000 km) 45 days	(18X3) Cars = 54 Cars	1 Lines X two trains of 3- cars(with sunken floor)
Unscheduled line & adjustment lines	For minor repairs, testing & adjustments post major repairs / IOH & POH	1 Line X two trains of 3- cars(with sunken floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future
<b>vi) Year 2041 -Maximum no. of rake holding is (20x3 = 60 Cars)</b>		
'A' Checks (5000 km) 15 days	( 20 X 3 ) Cars = 60 Cars	2 Lines X two trains of 3- cars(with sunken floor)
'B' Checks (15000 km) 45 days & Unscheduled line & adjustment lines	( 20 X 3 ) Cars = 60 Cars For minor repairs, testing & adjustments post major repairs / IOH & POH	1 Lines X two trains of 3- cars(with sunken floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future

All lines shall be suitable for placement of two 3- car trains on same line.



**b) Requirement of maintenance / Inspection lines for depot-cum-workshop In SRP Land near Lokmanya Nagar Station for East West Corridor (Line-2):**

**Table 10.6  
Requirement of maintenance / Inspection lines(EW Corridor)**

<b>Schedule</b>	<b>Maintenance Requirement (No. of Cars)</b>	<b>Lines Needed</b>
<b>i) Year 2016 - Maximum no. of rake holding is 12TS x3 (= 36 Cars)</b>		
'A' Checks (5000 km) approx. 15 days	(12X3) Cars = 36 Cars	1 Line x two trains of 3- cars(with Sunken Floor)
'B' Checks (15000 km) approx. 45 days	(12X3) Cars = 36 Cars	1 Line x two trains of 3- cars(with Sunken Floor)
Unscheduled line & adjustment lines	For minor repairs, testing and after IOH/POH adjustments	1 Line x two trains of 3- cars(with sunken Floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future
<b>ii) Year 2021 - Maximum no. of rake holding is (13TS x3 = 39 Cars)</b>		
'A' Checks (5000 km) approx. 15 days	(13X3) Cars = 39 Cars	1 Lines X two trains of 3- cars(with sunken floor)
'B' Checks (15000 km) approx. 45 days	(13X3) Cars = 39 Cars	1 Lines X two trains of 3- cars(with sunken floor)
Unscheduled line & adjustment lines	For minor repairs, testing & adjustments post major repairs / IOH & POH	1 Line X two trains of 3- cars(with sunken floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future
<b>iii) Year 2026 -Maximum no. of rake holding is (15x3 = 45 Cars)</b>		
'A' Checks (5000 km) 15 days	(15X3) Cars = 45 Cars	1 Lines X two trains of 3- cars(with sunken floor)
'B' Checks (15000 km) 45 days	(15X3) Cars = 45 Cars	1 Lines X two trains of 3- cars(with sunken floor)



Schedule	Maintenance Requirement (No. of Cars)	Lines Needed
Unscheduled line & adjustment lines	For minor repairs, testing & adjustments post major repairs / IOH & POH	1 Line X two trains of 3- cars(with sunken floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future
<b>iv) Year 2031 -Maximum no. of rake holding is (17x3 = 51 Cars)</b>		
'A' Checks (5000 km) 15 days	(17X 3) Cars = 51 Cars	1 Lines X two trains of 3- cars(with sunken floor)
'B' Checks (15000 km) 45 days	(17X3) Cars = 51 Cars	1 Lines X two trains of 3- cars(with sunken floor)
Unscheduled line & adjustment lines	For minor repairs, testing & adjustments post major repairs / IOH & POH	1 Lines X two trains of 3- cars(with sunken floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future
<b>v) Year 2036 -Maximum no. of rake holding is (18x3 = 54 Cars)</b>		
'A' Checks (5000 km) 15 days	(18X3) Cars = 54 Cars	2 Lines X two trains of 3- cars(with sunken floor)
'B' Checks (15000 km) 45 days & Unscheduled line & adjustment lines	(18X3) Cars = 54 Cars For minor repairs, testing & adjustments post major repairs / IOH & POH	1 Lines X two trains of 3- cars(with sunken floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future
<b>vi) Year 2041 -Maximum no. of rake holding is (20x3 = 60 Cars)</b>		
'A' Checks (5000 km) 15 days	(20X3) Cars = 60 Cars	2 Lines X two trains of 3- cars(with sunken floor)



Schedule	Maintenance Requirement (No. of Cars)	Lines Needed
'B' Checks (15000 km) 45 days & Unscheduled line & adjustment lines	(20X3) Cars = 60 Cars For minor repairs, testing & adjustments post major repairs / IOH & POH	1 Lines X two trains of 3- cars(with sunken floor)
Requirement		1 bay of 3 lines with provision of space for additional bay of 3 lines for work load in future

All lines shall be suitable for placement of two 3- car trains on same line

#### 10.7 INSPECTION REQUIREMENTS AT DEPOTS NEAR KHAPRI STATION FOR NORTH SOUTH CORRIDOR (LINE-1) AND IN SRP LAND NEAR LOKMANYA NAGAR STATION FOR EAST WEST CORRIDOR (LINE-2):

Facilities for carrying out inspection activities shall be provided in the inspection bay for following Systems / Equipments of a train:

- Electronics; PA/PIS
- Mechanical components, couplers etc
- Batteries
- Air conditioner
- Brake modules
- Bogie
- Traction Motor
- Vehicle doors, windows and internal fittings
- Power system including converter, circuit breaker etc.

These activities shall be grouped into "A" checks and "B" checks. The minor scheduled inspections ("A" checks) shall be carried out during the day off peak and night. Since "B" checks take longer time, these cannot be completed in the off peak times. Certain inspection lines will be nominated for "A" checks. For "B" checks, separate line will be nominated where the rakes may be kept for long time.

One dedicated line in the shed will be used for minor repairs and for adjustment and testing after the IOH and POH. There shall be a spare line in inspection bay for this purpose.



## 10.8 DESIGN OF DEPOT- CUM- WORKSHOP FACILITIES

### 10.8.1 Stabling lines at depots near Khapri Station for North South Corridor (Line-1) and in SRP Land near Lokmanya Nagar Station for East West Corridor (Line-2):

As per advised dimensions of the Rolling Stock, the length of 3-Car train would be Approx.67.8 mts. For the design of the stabling lines in the depot and terminal stations or elsewhere (as may be required), following approximates lengths have been taken in consideration:

- (i) Length of one 3- car rake= 67.8 m
- (ii) Gap between two trains 3-car rakes = 10m
- (iii) Free length at outer ends of two trains of 3- cars ( for cross pathway, Signal and Friction buffers)= 10m each side
- (iv) Total length of Stabling lines = (iii)+(i)+(ii)+(i)+(iii)= 10+ 67.8+ 10+ 67.8+ 10= 165.6m  $\approx$  166m

Looking to the car width of 2700mm on SG, 5m “Track Centre” is proposed for all the stabling lines. Thus, space between stabling shall be sufficient to include 1 mt. wide pathway to be constructed between tracks to provide access for internal train cleaning and undercarriage inspection with provision of following facilities:

- a) Each Stabling line to have water connection facility so that local cleaning, if required, is facilitated.
- b) Platforms at suitable points at each end of stabling lines to enable train operators to board or de- board conveniently.

### 10.8.2 Inspection Bay at depot-cum-workshop near Khapri Station for North South Corridor (Line-1) and in SRP Land near Lokmanya Nagar Station for East West Corridor (Line-2):

The length of Inspection shed is computed as below:

- (i) Length of a 3-car rake= 67.8 m.
- (ii) Gap between two trains of 3- cars= 10 m
- (iii) Cross- path at each end= 10 m
- (iv) Length of Inspection line= (iii)+ (i)+(ii)+ (i)+ (iii) = 10+ 67.8 + 10+ 67.8 + 10= 165.6m  $\approx$  166m

The width of the Inspection bay in computed as below:

- (i) Centre – to- centre spacing between the three lines= 7.5 m
- (ii) Centre line of outer lines to column of Shed= 3m
- (iii) Width of a 3 line Inspection Bay= (ii)+(i)+(i)+(ii)= 3+ 7.5+ 7.5+ 3= 21 m



- a) There shall be one inspection bay of 166 m X 21 m size each with provision of accommodating three inspection lines each having sunken floor and overhead roof inspection platforms at each of the depot. The floor will be sunken by 1100mm. The track spacing between the adjacent IBLs shall be 7.5 m. For rake requirements in future, there shall be provision of space for extension by one bay of three lines to cater the workload of inspection in future.
- b) Roof Inspection platforms and walkways for roof inspection supported on the columns shall be provided. There would be lighting below the rail level to facilitate the under frame inspection. Ramps of 1:8 slopes, 3 meter wide should be provided with sunken floor system for movement of material for the cars. Further, 10m cross pathways are left at each end for movement of material by fork lifter/Leister/Hand trolley. 415V 3 phase 50 Hz, 230V 1 phase 50 Hz AC supply and Pneumatic supply shall also be made available on each inspection shed columns. Air-circulators shall be provided on each column. The inspection bay shall be provided with EOT crane of 1.5 T to facilitate lifting of equipment.

Roof and walls shall be of such design that optimum natural air ventilation occurs all the time and sufficient natural light is also available. Each Inspection bay will also have arrangement close by for cleaning of HVAC filter under high pressure water jet.

### **10.8.3 Workshop Shed depots near Khapri Station for North South Corridor (Line-1) and in SRP Land near Lokmanya Nagar Station for East West Corridor (Line-2):**

Requirement of workshop lines is planned as under:

- a) **Requirement of workshop lines near Khapri Station for North South Corridor (Line 1):**



**Table 10.7 :**  
**Requirement of workshop lines near Khapri Station for North South Corridor**

Year	IOH & POH	Wheel / Bogie storage	Unschedule repairs /lifting	Total	Remarks
2016	1	1 line of 3-car trains and free space of 3-car length for storage of other equipments	1 line x two trains of 3-car	3-lines	The size of workshop shall be the same as inspection bay i.e. 166X21 m with one working bay comprising of two trains lines capable of accommodating two trains 3-car rakes with Bogie turning facility, one line of 3-car rake length with free space of 3-car rake length for storage of wheel/bogie/ equipments etc.
2021	1	-do-	1	3-lines	
2026	1	-do-	1	3-lines	
2031	1	-do-	1	3-lines	
2036	1	-do-	1	3-lines	
2041	1	-do-	1	3-lines	

b) Requirement of workshop lines in SRP Land near Lokmanya Nagar Station for East West Corridor (Line-2):

**Table 10.8 :**  
**Requirement of workshop lines near Khapri Station for East West Corridor**

Year	IOH & POH	Wheel / Bogie storage	Unschedule repairs /lifting	Total	Remarks
2016	1	1 line of 3-car trains and free space of 3-car length for storage of other equipments	1 line x two trains of 3-car	3-lines	The size of workshop shall be the same as inspection bay i.e. 166X21 m with one working bay comprising of two trains lines capable of accommodating
2021	1	-do-	1	3-lines	



2026	1	-do-	1	3-lines	two trains 3-car rakes with Bogie turning facility, one line of 3-car rake length with free space of 3-car rake length for storage of wheel/bogie/ equipments etc.
2031	1	-do-	1	3-lines	
2036	1	-do-	1	3-lines	
2041	1	-do-	1	3-lines	

- (a) There shall be one bay comprising of three lines each (as detailed in 'Remarks' above). Size of the workshop bay is proposed to be 166m x 21m. The unscheduled lifting and heavy repair line shall be fitted with jack system capable to lift the 3-Car unit simultaneously for quick change of bogie, thereby saving down time of Rolling Stock. The arrangement of jack system shall be such that lifting of any coach in train formation for replacement of bogie/equipments is also individually possible. One line shall be available for stocking of Bogies and wheels. These lines are to be provided with pits at regular intervals for inspection of undercarriage with turn tables. Each workshop bay shall be equipped with two trains 15T and 3T overhead cranes, each spanning the entire length of the workshop bay.
- (b) There shall be provided space for repairs of HVAC, Door, and Traction motor etc. repairs. Distinct spaces shall be earmarked for dismantling/repairs/ assembling and testing of each of these equipments. Related machinery for Overhauling / Repairs & testing activities of every equipment are also to be housed in the space earmarked.
- (c) There shall be washing and cleaning equipments on the workshop floor. Bogie test stand shall be provided in the workshop. Other heavy machinery shall also be suitably installed on the workshop floor. Air-circulators, lights, Powers supply points and compressed air supply line shall be provided on each workshop column.
- (d) Workshop lines shall be inter-linked through turn tables, each suitable for movement of a train in AWO (unloaded) condition and shall also be capable to rotate with a fully loaded bogie on it. Repair of heavy equipments such as air conditioners shall be so located so that it does not affect the movement inside workshop.
- (e) There shall be walkways on columns for roof inspections, along the workshop lines. These walkways shall not infringe with cars being lifted/ lowered by means of mobile jacks. Suitable space between the nearest exterior of a car



and farthest edge of the walkway has to be ensured to avoid conflict in lifting and lowering of cars.

- (f) The small component, bogie painting and battery maintenance cells will be located in the workshop with arrangement that fumes are extracted by suitable exhaust systems.
- (g) Workshop will have service building with array of rooms along its length. Total size is proposed to be 166 x 8m. These can be made by column and beam structure and architecture made of brick works. These shall cater for overhauling sections, offices, costly store item, locker rooms, toilets etc. Two trains opposite sides widthwise shall be open to facilitate natural air circulation and cross ventilation besides the egress & ingress for coaches. The sidewalls shall also have sufficient width of louvers for providing adequate ventilation.
- (h) There shall be space for bogie/ axle repair shop with necessary infrastructure for disassembly, overhead, assembly and testing of mechanical components of bogies/ axle. The repair shop shall be easily approachable from with the workshop for transportation of components.

**Following equipment repair/overhaul facilities are planned in the workshop and wheel repairs shop at the workshops depots near Khapri Station for North South Corridor (Line-1) and in SRP Land near Lokmanya Nagar Station for East West Corridor (Line-2):**

1. Body furnishing
2. Bogie
3. Wheels
4. Traction Motors
5. Axle Box and Axle Bearing
6. Pantographs
7. Transformer, converter/inverter, circuit breaker
8. Battery
9. Air Compressor
10. Air-conditioner
11. Brake Equipment
12. Door actuators
13. Control and measuring equipments
14. Pneumatic equipment
15. Dampers and Springs
16. Couplers/Gangways
17. Coach Painting (Applicable only for Aluminum coaches, if any).



## 10.9 CAR DELIVERY AREA

There shall be rail connectivity between the Depot-cum- Workshop and mainline and all trains due for scheduled/ unscheduled works shall reach the depot-cum-Workshop by rail.

However in case of newly procured coaches, which are transported by road, these shall reach the Depot-cum Workshop by the road on trailers. To unload the coaches and bring them to the track, provision of space, along the side of shunting neck, has to be made for unloading of cars and other heavy materials. This area shall have an insulated track embedded in the floor facilitating the movement of road trawler, which brings in the cars. The length of the track embedded area shall be about 40m long. There should be enough space available for movement of heavy cranes for lifting of coaches. The unloading area should be easily accessible for heavy duty hydraulic trailers.

## 10.10 OPERATIONAL FEATURES

The rake induction and withdrawal to main line will be primarily from the stabling shed. Further, provisions are there for direct rake induction and withdrawal to main line from Inspection Shed/workshop area. Movement from depot to the main line is so planned that the headway of main line is not affected. Simultaneous receipt and dispatch of trains from depot to main line is feasible in the present site scenario. Both of these activities will be done effectively without effecting the train operation on the main line. The stabling lines would be interlocked with the main line thereby induction of train from the stabling would be safe and without loss of time. The proposition for a transfer track on the incoming line as well as on the outgoing line to facilitate the movement of rake in the depot by Operation Control Centre (OCC) even though the further path inside the depot is not clear shall be explored in the detailed design stage depending on the actual availability of land.

An emergency line is also provided from which an emergency rescue vehicle may be dispatched to main line in the event of emergency if necessary.

## 10.11 INFRASTRUCTURE FACILITIES : Infrastructure Facilities in depots near Khapri Station for North South Corridor (Line-1) and in SRP Land near Lokmanya Nagar Station for East West Corridor (Line-2)

### I. Inspection and Workshop facilities:

As indicated in 10.8.2 & 10.8.3 above.

### II. Stabling Lines in Depot:

- a) The requirement of lines shall be in accordance with the details indicated in para 10.8.1 above. A part of the stabling siding in the depot shall be covered with a roof in order to facilitate testing of air conditioning of trains and their pre-cooling under controlled condition of temperature.



- b) Separate toilets adjustment to stabling lines shall be provided with small room for keeping cleaning aids and for utilization by the working staff.

### **III. Automatic Coach Washing Plant (AWP)**

Provision to be made for Rolling Stock exterior surfaces to be washed using a fully automated Train Washing System, with a throughput capacity of approximately ten trains per hour. The AWP shall be situated at such a convenient point on the incoming route so that incoming trains can be washed before entry to the depot and undesirable movement/shunting over ingress and egress routes within the depot is avoided. Additional space for plant room for AWP system shall be earmarked alongside the washing apron as indicated at Para 10.12.1 (a) & 10.12.1 (b).

### **IV. Train Operators Booking Office**

Suitable office facility adjacent to the stabling lines at each depot should be provided so that train operators reporting 'On' duty or going 'Off' duty can obtain updates regarding 'Special Notices', 'Safety Circulars' and other technical updates/information in vogue. These offices should have an attached a cycle/scooter/car stand facility for convenience of the train operating staff.

### **V. Test Track**

A test track of 1000 mts. in length covered & fenced should be provided beside workshop in the depot. It shall be equipped with signaling equipments (ATP/ATO). It shall be used for the commissioning of the new trains, their trials and testing of the trains after the IOH and POH. Entry into the test track shall be planned for a 3-car train. In compliance to safety norms, the boundary of the track shall be completely fenced to prevent unauthorized trespassing across or along the track.

### **VI. Heavy Cleaning Shed**

Monthly heavy cleaning of interior walls, floors, seats, windows glasses etc, outside heavy cleaning, Front/rear Face, Vestibule/ Buffer area, outside walls and roof shall be done manually in the interior cleaning plant designed for cleaning of one at a time. A line adjacent to inspection shed should be so provided that placement of rakes is possible from workshop or inspection lines & vice – versa conveniently and with ease.

### **VII. Power Supply**

Auxiliary substations are planned for catering to the power supply requirement of the whole depot and workshop. Details of connected load feeder shall be worked out. Taking diversity factor of 0.5 the maximum



demands shall be computed. Two trains Auxiliary substations are proposed, as the demand by machines in Workshop area would be very large. The standby power supply is proposed through DG set with AMF panel. The capacity of DG set will be adequate to supply all essential loads without over loading.

**VIII. Compressed Air Supply**

Silent type compressor units shall be suitably installed inside the depots at convenient location for the supply of compressed air to workshop and Inspection sheds. Thus, the pneumatic pipeline shall run within the workshop and inspection bays as to have compressed air supply line at all convenient points.

**IX. Water Supply, Sewerage and Drainage Works**

In house facilities shall be developed for the water supply of each depot. Sewerage, storm water drainage shall be given due care while designing the depots for efficient system functioning. Past records of Municipal Corporation shall be used to design the drainage system. Rainwater harvesting would be given due emphases to charge the under ground reserves.

**X. Ancillary Workshop**

This workshop will have a line at floor level with provision of pits. Arrangement for repairs of Shunters, Rail Road Vehicles and other ancillary vehicles will be provided. These vehicles will also be housed here itself. Heavy lifting works can be carried out in main workshop.

Ancillary workshop will be used for storing OHE/rigid OHE parts and their maintenance/ repair for restoration of 25 kV feed system.

**XI. Watch Towers**

There shall be provision of adequate number of watchtowers for the vigilance of depot boundary.

**XII. Administrative Building**

An administrative building close to the main entrance is planned. It can be suitably sized and architecturally designed at the detailed design stage. A time and security office is also provided close to main entrance. It shall be equipped with suitable Access control system for all the staff working in the complex.

**XIII. Parking Facilities**



- a) Ample parking space shall be provided for the two trains wheelers and four wheelers at the following points.
  - i) Close to the depot entry.
  - ii) Close to the stabling lines.
  - iii) Close to the Workshop/IBL.
- b) Space for parking of road and re-railing equipments  
Enough space for parking of road vehicle/ trailers/ trucks etc. Enough space will also have to be earmarked adjacent to workshops. Similarly, provision of space for parking of re-railing equipments will have to be made close to the main exit gate of the Depot.

#### **XIV. Shed and Buildings**

The shed and buildings normally provided in the depot with their sizes and brief functions are indicated in Para 10.12.1 (a) & 10.12.1 (b). At the detailed design stage depending upon the land availability, the decision to locate these buildings can be taken. These can then be architecturally and functionally grouped.

#### **XV. Plant and Machinery**

- a) A separate building is planned for housing pit wheel lathe (PWL), approachable from workshop, inspection bay and stabling lines through rail and road for placement of cars for re- profiling of wheels within the depot along with space for depot of scrap.
- b) Requirement of buildings and major plants and machinery, is given in Para 10.12.1(a), 10.12.1 (b), Para 10.12.2 (a) & 10.12.2(b).

#### **10.11.1 Following Safety features should be incorporated in the design of the Maintenance Depot-cum-Workshop near Khapri Station for North South Corridor (Line-1) and in SRP Land near Lokmanya Nagar Station for East West Corridor (Line-2):**

- a) 1.5 EOT cranes in the inspection bay should be interlocked with 25 kV ac OHE in such a way that, the cranes become operational only when the OHE is isolated and grounded.
- b) Red flasher lights should be installed along the inspection lines at conspicuous location to indicate the OHE is 'Live'.
- c) Multi level wheel and TM stacking arrangement should be an inbuilt feature at the end of Workshop Lines.
- d) Pillars in the inspection bay & workshop should have provision for power sockets.
- e) Placement of rakes from inspection/workshop lines on to washing lines for interior cleaning on their own power should be possible. Linking of OHE



- and its isolation at the cleaning area should be provided. Necessary requirements of safety should be kept in view.
- f) The roof inspection platform should have open-able doors to facilitate staff to go up the roof for cleaning of roof. Suitable safety interlock should be provided to ensure maintenance staff are enabled to climb on the roof inspection platform only after the OHE is isolated.
  - g) Control Centre, PPIO & store depot must be close to Workshop.
  - h) Width of the doors of the sections wherein repairs of equipments are done should be at least 2 meters wide to allow free passage of equipment through them.
  - i) Provision of water hydrants should be done in workshops & stabling yards also.
  - j) Compressed air points along with water taps should be available in interior of buildings for cleaning.
  - k) Ventilation arrangement inside the inspection shed and workshop should be ensured. Arrangement for natural cross ventilation from one side to another of inspection & workshop bays to be incorporated along with optimum availability of natural light at floor level.

## 10.12 LIST OF BUILDINGS

### 10.12.1 List of Buildings at Depot- Cum- Workshop at Khapri Station near Khapri Station for North South Corridor (Line) :

**Table 10.9**  
**List of Buildings at Depot- Cum- Workshop (NS Corridor)**

S.No	Name of Building	Size	Remarks
1.	Inspection Shed	166m x 21m • One way of 3 lines (2 trains of 3-cars in each line)	Servicing of Cars for 15 days & 45 days inspection. This shed will have scope of expansion by 3 lines (1 additional bay of 3 lines for future requirement).
	Workshop Shed	166m x 21m	Major repair & overhaul of rolling stocks, diesel shunters, electric tractors, tower wagons. All heavy lifting jobs.
	Associated Sections	166m x 8m	Rooms for carrying out the inspection & workshop activity.
	Stabling line shed	166m x 55m (for 20 trains)	Provisional for total area as per requirement of stabling of 20 rakes during year 2041 is to be made (with initial provision for 12 rakes only).



S.No	Name of Building	Size	Remarks
2.	Stores Depot & Offices including Goods Platform with Ramp	45m x 45m	<ul style="list-style-type: none"> <li>i. Stocking of spares for regular &amp; emergency requirement including consumable items.</li> <li>ii. This store caters for the requirement of depot for rolling stock &amp; other disciplines.</li> <li>iii. To be provided with computerized inventory control.</li> <li>iv. Loading/Unloading of material received by road.</li> </ul>
3.	Elect. Substation & DG set room	20m x 15m	To cater for normal and emergency power supply for depot, workshop, service and all other ancillary buildings, essential power supply for essential loads and security light.
4.	Traction repair depot and E &M repair shop	80m x 30m (partly double storey)	Stabling and routine maintenance of shunting engine etc. & Traction maintenance depot. For maintenance of lifts/escalators and other General service works.
5.	Cycle / Scooter / Car Parking	100m x 6m 60m x 6m	<ul style="list-style-type: none"> <li>i. Close to the depot entry.</li> <li>ii. Close to the stabling lines.</li> </ul>
6.	Auto coach washing plant	40m x 10m	For automatic washing of coaches. Provision of Washing apron for collection of dripping water and its proper drainage to be ensured.
7.	Washing apron for Interior Cleaning	166m x 6.5m	Heavy wet washing of rakes from inside, under frame, roof at 30 days interval.
8.	P-way office, store & Workshop including Welding plant	80m x 20m	<ul style="list-style-type: none"> <li>i. For track maintenance of section and depot.</li> <li>ii. To weld rails for construction period only.</li> <li>iii. To stable track Tamping machine.</li> </ul>
9.	Security office & Time Office Garages (4 Nos.)	15m x 8m	For security personnel. For time punching For parking vehicle jeep, truck etc.
10.	Check Post (2 Nos.)	5m x 3m	For security check of incoming/outgoing staff material and coaches.
11.	Watch Tower (4 Nos.)	3.6m x 2.5 m	For security of the depot especially during night time.
12.	Depot control centre & Crew booking centre	25mx20m (double storey)	To control movement of trains in and out of the depot and for crew booking.
13.	O.H raw water	1,00,000 Ltrs.	For Storage of water.



S.No	Name of Building	Size	Remarks
	Tank	Capacity	
14.	Pump house Bore well	7.3mx5.4m (200 mm bore)	Submersible type pump planned with 200 mm diameter bore well.
15.	Dangerous goods Store	15m x 10m	For Storage of paints, inflammables & Lubricants
16.	a)Traction 25/33kV/66kV sub station b) Feeding Post	a)120m x 80m b) 15m x30m	Traction Power Supply
17.	Waste Collection Bin	10m x 10m	Garbage dumping
18.	Repair shops for S & T	40m x 20m	For the AFC gates, Signaling and telecom equipment.
19.	Work shop Manager Office	30m x 20m	Office of Depot in charge
20.	ATP & ATO Room	10m x 8m	To keep equipments of ATP/ATO
21.	Waste Water Treatment Plant	12m x 6m	For treating the discharge waters of the depot and remove the oil, acids etc. before discharging into the river, with U/G tank.
22.	Canteen	200 sqm.	To cater staff of depot and workshop. Should be in a separate building with modern kitchen ware and facilities. Obligatory as per statutory requirements.
23.	Toilets -Gents -Ladies	10m x 7m 10m x 7m	These toilets shall be approachable both from workshop as well as from inspection bay and ladies toilets shall be completely insulated from gent's toilet.

**10.12.1** List of Buildings at Depot- Cum- Workshop at Khapri Station in SRP Land near Lokmanya Nagar Station for East West Corridor (Line-2)

**Table 10.10**  
**List of Buildings at Depot- Cum- Workshop (EW Corridor)**

S.No	Name of Building	Size	Remarks
1.	Inspection Shed	166m x 21m • One way of 3 lines (2 trains of 3-cars in each line)	Servicing of Cars for 15 days & 45 days inspection. This shed will have scope of expansion by 3 lines (1 additional bay of 3 lines for future requirement).



S.No	Name of Building	Size	Remarks
	Workshop Shed	166m x 21m	Major repair & overhaul of rolling stocks, diesel shunters, electric tractors, tower wagons. All heavy lifting jobs.
	Associated Sections	166m x 8m	Rooms for carrying out the inspection & workshop activity.
	Stabling line shed	166m x 60m (for 23 trains)	Provisional for total area as per requirement of stabling of 23 rakes during year 2041 is to be made (with initial provision for 13 rakes only).
2.	Stores Depot & Offices including Goods Platform with Ramp	45m x 45m	<ul style="list-style-type: none"> <li>i. Stocking of spares for regular &amp; emergency requirement including consumable items.</li> <li>ii. This store caters for the requirement of depot for rolling stock &amp; other disciplines.</li> <li>iii. To be provided with computerized inventory control.</li> <li>iv. Loading/Unloading of material received by road.</li> </ul>
3.	Elect. Substation & DG set room	20m x 15m	To cater for normal and emergency power supply for depot, workshop, service and all other ancillary buildings, essential power supply for essential loads and security light.
4.	Traction repair depot and E & M repair shop	80m x 30m (partly double storey)	Stabling and routine maintenance of shunting engine etc. & Traction maintenance depot. For maintenance of lifts/escalators and other General service works.
5.	Cycle / Scooter / Car Parking	100m x 6m 60m x 6m	<ul style="list-style-type: none"> <li>iii. Close to the depot entry.</li> <li>iv. Close to the stabling lines.</li> </ul>
6.	Auto coach washing plant	40m x 10m	For automatic washing of coaches. Provision of Washing apron for collection of dripping water and its proper drainage to be ensured.
7.	Washing apron for Interior Cleaning	166m x 6.5m	Heavy wet washing of rakes from inside, under frame, roof at 30 days interval.
8.	P-way office, store & Workshop including Welding plant	80m x 20m	<ul style="list-style-type: none"> <li>iv. For track maintenance of section and depot.</li> <li>v. To weld rails for construction period only.</li> <li>vi. To stable track Tamping machine.</li> </ul>
9.	Security office &	15m x 8m	For security personnel.



S.No	Name of Building	Size	Remarks
	Time Office Garages (4 Nos.)		For time punching For parking vehicle jeep, truck etc.
10.	Check Post (2 Nos.)	5m x 3m	For security check of incoming/outgoing staff material and coaches.
11.	Watch Tower (4 Nos.)	3.6m x2.5 m	For security of the depot especially during night time.
12.	Depot control centre & Crew booking centre	25mx20m (double storey)	To control movement of trains in and out of the depot and for crew booking.
13.	O.H raw water Tank	1,00,000 Ltrs. Capacity	For Storage of water.
14.	Pump house Bore well	7.3mx5.4m (200 mm bore)	Submersible type pump planned with 200 mm diameter bore well.
15.	Dangerous goods Store	15m x 10m	For Storage of paints, inflammables & Lubricants
16.	a)Traction 25/33kV/66kV sub station b) Feeding Post	a)120m x 80m b) 15m x30m	Traction Power Supply
17.	Waste Collection Bin	10m x 10m	Garbage dumping
18.	Repair shops for S & T	40m x 20m	For the AFC gates, Signaling and telecom equipment.
19.	Work shop Manager Office	30m x 20m	Office of Depot in charge
20.	ATP & ATO Room	10m x 8m	To keep equipments of ATP/ATO
21.	Waste Water Treatment Plant	12m x 6m	For treating the discharge waters of the depot and remove the oil, acids etc. before discharging into the river, with U/G tank.
22.	Canteen	200 sqm.	To cater staff of depot and workshop. Should be in a separate building with modern kitchen ware and facilities. Obligatory as per statutory requirements.
23.	Toilets -Gents -Ladies	10m x 7m 10m x 7m	These toilets shall be approachable both from workshop as well as from inspection bay and ladies toilets shall be completely insulated from gent's toilet.

### 10.13 LIST OF PLANTS & EQUIPMENTS AT DEPOT-CUM-WORKSHOP

**10.7.6.1** List of Plants & Equipments at Depot-cum-Workshop near Khapri Station for North South Corridor (Line 1):

**Table 10.11**  
**List of Plants & Equipments at Depot- Cum- Workshop (NS Corridor)**

S. No.	Equipment	Qty.	Unit
1.	Under floor Pit wheel lathe, Chip crusher and conveyor for lathe on pit, Electric tractor for movement over under floor wheel lathe	1	No.
2.	Under floor lifting systems for 3-car unit for replacement of bogie	1	Set
3.	Mobile jacks 15T for lifting cars (set of 12 jacks)	1	No.
4.	Rerailing equipment consisting of rail cum road vehicle and associated jack system etc.	1	Set
5.	Run through type Automatic Washing plant for Metro cars.	1	No.
6.	Rail fed Bogie wash plant	1	No.
7.	Bogie test stand	1	No.
8.	Work lift platform	4	No.
9.	Electric bogie tractor for pulling cars and bogies inside workshop	1	No.
10.	Chemical cleaning tanks, ultrasonic cleaning tanks, etc	1	Set
11.	Compressor for Inspection shed & shop air supply	2	No.
12.	(i) Travelling O/H crane Workshop 15T/3 T (ii) 1.5T Capacity (IBL):- 2 Nos.	2 2	No. No.
13.	Mobile jib crane	2	No.
14.	Mobile lifting table	4	No.
15.	Carbody stands	24	No.
16.	Bogie turn tables	2	No.
17.	Underframe & Bogie blowing plant & small parts/equipment	2	No.
18.	AC filter cleaning machine	1	No.
19.	Portable cleaning plant for rolling stock	1	No.
20.	High-pressure washing pump for front and rear end cleaning of car	2	No.
21.	Industrial furniture (Work Test Benches)	1	L.s.
22.	Minor diagnostic equipment and collective tools	-	Set
23.	Induction heater	1	No.
24.	Oven for the motors	1	No.
25.	EMU battery charger	2	No.
26.	Welding equipments (Mobile welding, oxyacetylene, fixed arc welding)	2	Set
27.	Electric and pneumatic tools	-	Set



S. No.	Equipment	Qty.	Unit
28.	Measuring and testing equipment	-	Set
29.	Tool Kits	-	Set
30.	Mobile safety steps	12	No.
31.	Fork lift tractor	2	No.
32.	Pallet trucks	6	No.
33.	RRV	1	
34.	Road vehicles (pickup van/ truck)	1	Set
35.	Miscellaneous office equipments	-	Set
36.	Vertical Boring Mainline for wheel discs	1	No.
37.	Press for removal and pressing of the wheel on axles	1	No.
38.	Axle journal turning and burnishing lathe	1	No.
39.	Special jigs and fixtures and test benches for Rolling Stock	1	set
40.	Stackers (1T for DCOS)	2	No.
41.	Storage Racks (W/shop & DCOS stores)	1	Set
42.	Test benches	1	Set
43.	Auto panto strip thickness meter		-
44.	Vehicle mounted crane		-
45.	Impulse Tester for TMs		-
46.	Bearing puller		-

**10.13.2** List of Plants & Equipments at Depot-cum-Workshop in SRP Land near Lokmanya Nagar Station for East West Corridor (Line-2):

**Table 10.12**  
**List of Plants & Equipments at Depot- Cum- Workshop (EW Corridor)**

S. No.	Equipment	Qty.	Unit
1.	Under floor Pit wheel lathe, Chip crusher and conveyor for lathe on pit, Electric tractor for movement over under floor wheel lathe	1	No.
2.	Under floor lifting systems for 3-car unit for replacement of bogie	1	Set
3.	Mobile jacks 15T for lifting cars (set of 12 jacks)	1	No.
4.	Rerailing equipment consisting of rail cum road vehicle and associated jack system etc.	1	Set
5.	Run through type Automatic Washing plant for Metro cars.	1	No.
6.	Rail fed Bogie wash plant	1	No.
7.	Bogie test stand	1	No.
8.	Work lift platform	4	No.
9.	Electric bogie tractor for pulling cars and bogies inside workshop	1	No.

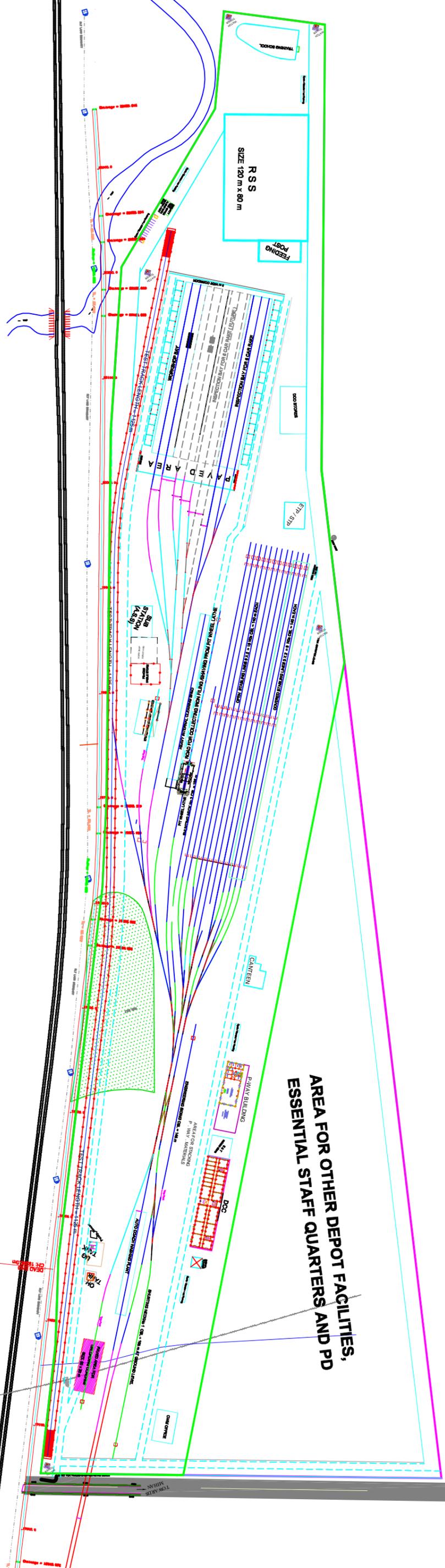


S. No.	Equipment	Qty.	Unit
10.	Chemical cleaning tanks, ultrasonic cleaning tanks, etc	1	Set
11.	Compressor for Inspection shed & shop air supply	2	No.
12.	(i) Travelling O/H crane Workshop 15T/3 T (ii) 1.5T Capacity (IBL):- 2 Nos.	2 2	No. No.
13.	Mobile jib crane	2	No.
14.	Mobile lifting table	4	No.
15.	Carbody stands	24	No.
16.	Bogie turn tables	2	No.
17.	Underframe & Bogie blowing plant & small parts/equipment	2	No.
18.	AC filter cleaning machine	1	No.
19.	Portable cleaning plant for rolling stock	1	No.
20.	High-pressure washing pump for front and rear end cleaning of car	2	No.
21.	Industrial furniture (Work Test Benches)	1	L.s.
22.	Minor diagnostic equipment and collective tools	-	Set
23.	Induction heater	1	No.
24.	Oven for the motors	1	No.
25.	EMU battery charger	2	No.
26.	Welding equipments (Mobile welding, oxyacetylene, fixed arc welding)	2	Set
27.	Electric and pneumatic tools	-	Set
28.	Measuring and testing equipment	-	Set
29.	Tool Kits	-	Set
30.	Mobile safety steps	12	No.
31.	Fork lift tractor	2	No.
32.	Pallet trucks	6	No.
33.	RRV	1	
34.	Road vehicles (pickup van/ truck)	1	Set
35.	Miscellaneous office equipments	-	Set
36.	Vertical Boring Mainline for wheel discs	1	No.
37.	Press for removal and pressing of the wheel on axles	1	No.
38.	Axle journal turning and burnishing lathe	1	No.
39.	Special jigs and fixtures and test benches for Rolling Stock	1	set
40.	Stackers (1T for DCOS)	2	No.
41.	Storage Racks (W/shop & DCOS stores)	1	Set
42.	Test benches	1	Set



S. No.	Equipment	Qty.	Unit
43.	Auto panto strip thickness meter		-
44.	Vehicle mounted crane		-
45.	Impulse Tester for TMs		-
46.	Bearing puller		-

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**AREA FOR OTHER DEPOT FACILITIES,  
ESSENTIAL STAFF QUARTERS AND PD**

R S S  
SIZE 120 m x 80 m

TOTAL LAND AREA = 339077.712 Sqm.

<b>DELHI METRO RAIL CORPORATION LTD</b> <small>Delhi Metro Rail Corporation Limited, Plot No. 1, Sector 16, Gurgaon, Haryana</small>	
TITLE:-	<b>KHAPARI DEPOT OF NAGPUR METRO N - S CORRIDOR</b>
VALIDATED BY:-	DESIGN BY:-
A.K. SINGH	K.L.LUTHRA
DATE:-	SCALE:-
28-11-2013	1:1000
REV:-	0 M
RO	20 M
	40 M
	80 M
DRAWING NO:-	SHEET NO.
DMRC / NAGPUR / KHAPRI DEPOT / 2013	1
	SHEET SIZE
	A0

