EMU SHED INFRASTRUCTURE

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PROFESSOR/DT
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Points to be kept in mind

- 60 % passengers carried by the entire IR travel on the suburban system.
- Perform an extremely arduous duty almost throughout the day
- The reliability of suburban services is a very critical factor in its operation
- Attention to the braking system and under gear due to frequent starts/stops
- Corrosion repairs (coastal areas , fish transportation)

SPECIAL MAINTENANCE INSTRUCTION FOR UNIFORM PERIODICITY OF MAINTENANCE SCHEDULES FOR EMU (AC & DC) & MEMU COACHES

NO. RDSO / PE / SMI / EMU / 0037 -2007(Rev. 0) APRIL-2007 a

LEGENDS USED:

TI	Trip Inspection
POH	18 months Inspection
IA	45 Days Inspection
IC	180 Days Inspection

TYPE OF SCHEDULE AND PERIODICITY FOR AC, AC - DC EMU/MEMU

Type of Schedule	Periodicity
Daily/ Night	-
Trip Inspection (TI)	10 Days
IA	45 Days
6 Monthly (IC)	180 Days
POH	18 Months
Cleaning Schedule	Specified in Para (h)

SCHEDULE MAINTENANCE OF DEMU

- **PERIODICITY OF MAINTENANCE OF CIL ENGINE, ELECTRICS & CONTROLS BRAKE EQUIPMENT.**
- i. Trip Schedule – 7 days
- ii. Monthly Schedule – 1 month ± 3 days
- iii. Quarterly Schedule – 3 months ± 3 days
- iv. Half yearly Schedule – 6 months ± 5 days
- v. Eighteen monthly Schedule – 18 months ± 7 days
- **POH PERIODICITY OF MAJOR ITEMS**
- i. CIL engine E-Check – 18000 (which is eqvt.36months.)
- ii. Traction motors – 18 months.
- iii. Traction Alternator – 36 months.
- iv. Compressor – 18 months.
- v. Coach body and under gear – 18 months.
- The power pack is E-Checked by Cummins
  ,maintained by Shed and coach POH is done by
  carriage

SPECIAL MAINTENANCE INSTRUCTION FOR UNIFORM PERIODICITY OF MAINTENANCE SCHEDULES FOR EMU (AC & DC) & MEMU COACHES

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AC EMU and MEMUs

Sl.no.	Type of Schedule	EMU	MEMU	Remarks
1	TI	10 days	10 days	
2	IA	45 days	45 DAYS	
3	IA1	90 days	90 days	
4	IA2	135 days	135 days	
5	IC	180 days	180 days	+ UT on axles
6	AOH	1 year	1 year	
7	POH	1 ½ year	1 ½ year	

AC-DC EMU MAINTENANCE ACTIVITIES

SCHEDULE	PERIODICITY
ROLLING-IN-EXAMINATION	DAILY
NIGHT EXAMINATION	DAILY IN ALL 18 STABLING DEPOTS.
TI SCHEDULE	10 DAYS.
IA SCHEDULE	45 DAYS.
IC SCHEDULE	180 DAYS
WASHING	15 DAYS
ULTRASONIC TESTING OF AXLES	6 MONTHS.
POH	2 YEARS (1st POH) 1 ½ YEAR REMAINING POH

Codal life of EMU/MEMU is 25 years

- **CLEANING SCHEDULE** :- Washing of exteriors & wet mopping of interiors shall be done during trip inspection and brooming must be done at night stabling points every day.

- **ITEMS FOR DAILY CHECKING AT NIGHT STABLING POINTS :-**

  - Visual Inspection of wheels for cracks, checking of axle boxes, its cover and bolts
  - Check axle guide springs, bolsters spring swings links, bogie frame and all brake riggings. Also check schaku couplers and side buffers.
  - Check brake blocks for their position and replacements if required
  - Drain main reservoirs.
  - Go through the motorman logbook and attend the defects booked during the run
  - [redacted]nd all safety items attention

Passenger Amenities item defects:-

- Broken seats and seats frame
- Worn out / broken chequered plates in doorways
- Missing glass and louver shutter including complete window frame
- Missing doors
- Worn out / tilted foot step in MEMUs
- Vestibule plates and shutters in MEMUs
- Missing overhead handles and hand rails
- Missing of seat handle/luggage rack
- Proper working of compartment Light & Fan

Stabling Points

- Adequate numbers of Stabling lines without pit suitable for one unit length
- Small accommodation having skeleton maintenance line staff with a store room, toilet and one office room be provided at the stabling point of MEMUs with communication facilities with the homing shed, TLC, PPO, Sr.DEE etc
- Yard illumination of the stabling lines should be provided
- Necessary infrastructure for daily inspection of MEMU rakes at stabling point for carrying the safety checks during night stabling should be provided. Safai-wallas for dry sweeping of

[redacted]ed

Problems for maintenance of EMU/MEMU in existing electric loco sheds

- Almost all electrical and mechanical equipments for MEMU are different than in electric locomotives.
- Inspection line, washing lines, stabling line lengths to accommodate 12/16 car rakes not readily available.
- Shunting neck of at least 400 m. is also required on both ends
- Electric loco sheds already over-loaded

- The inter distance between the two car-sheds should be of the order of 400 Kms for MEMU sheds, if being planned for exclusively MEMU services.
- Since EMU services are planned keeping in view the peak requirement of traffic and intensity of services, the inter-distance between the two EMU car sheds should be based on these considerations alone and no value for it can be laid, this being guided solely by service need.

- The proposed facilities and the layout of the EMU shed does not include facilities required for works like POH, Rehabilitation of the EMUs, Complete recabling, Pneumatic Pipe Lines replacement, Major Corrosion Repairs, Accident Damages etc, which should be carried out in the central work shop on the railway. Removal of Wheels from the Axle, Re-tyring of Wheels is not proposed in the Sheds since it may be economical & convenient to send the Wheel Sets to the Work Shops where [redacted] exist.

Requirement in Shed for 30/20/10 rakes for catering to the Schedules

- Inspection Lines (4/3/2 Nos.)
- Washing Lines (2/1/1 Nos.)
- Stabling Lines (4/3/2 Nos.)
- Heavy Lifting Bay
- Medium Lifting Bay
- Light Lifting Bay
- Shed for Pit Wheel Lathe for EMU Tyre Turning
- Mechanical & Electrical Equipment repair/Overhaul

Continued…

- PPO & Supervisors' Cabins
- Machine Shop
- Sr. DEE's Administrative Office & Technical Section
- Yard Layout
- Stores Depot & Oil Godown
- Services (Compressor Room, Sub-Station, Power Distribution, transport)
- Amenities (Time Office, Cycle Stand, Water Coolers, Lockers, Toilets, Canteen)

INSPECTION SHED

- Provision of sunken floor facilitates easier/comfortable access and attention to under frame mounted equipments resulting to better quality with lesser efforts and time.
- In this shed, there shall be provision for pneumatic lines, welding points and at least one drilling point for each Inspection line.

Washing Lines

- Washing lines laid with concrete and provided with good drainage, suitable hydrant points and adequate supply of water for washing the bogies and under gearing of the EMU's should be provided.
- High level platform should be provided on both the sides of the washing lines for easy movements of staff for sweeping inside the coaches.
- Arrangements be made to isolate over-head line over the high level platform to avoid accidental touch of the water jet with the live wires.

HEAVY LIFTING BAY FOR UNSCHEDULED LIFTINGS AND AOH

- The bay is provided with two 25T overhead electrical cranes.
- The distance between track centre to track centre has been kept 11 meters to facilitate the coach movement in lifted condition by EOT crane from one end to other end longitudinally while other lifted coaches are kept in between these two lines on trassels.
- Cross-track facility for movement of bogies

- Provision of pit as well as plain floor alternately shall be made of suitable length
- 5 Nos. of 25 T hydraulic jacks shall be provided in this bay for lifting of body and rolling out the bogie etc. This bay shall also be provided with 12/8/8 sets of accommodation bogies for 30/20/10 rake holdings.
- 1 set of lifting beams for the EMU body shall be kept in the bay

Maintenance sections/facilities adjacent to heavy & medium lifting bay

- Battery charging room
- Axle box roller bearing section
- Tool room
- Brake and pneumatic equipment section
- Welding section
- Machine shop
- Traction motor bearing and pinion section
- Bogie assembly section
- Traction motor repair and overhaul section

MEDIUM LIFTING BAY

- Provided for overhaul and repairs to bogies, wheel sets, axle boxes, gears, brake rigging, brake cylinders, traction motor repairs, smoothing reactor repairs.
- Provision of 2 pits of 30m length each separated by a plain floor of 10m length to facilitate Material/Staff movement should be made.
- The above Bay shall be equipped with two 15 T EOT Cranes and will be Primary Shop for Overhauling and Assembling Bogies along with the Traction Motors. The Pits will work as Assembly Bay for the under gear equipment.

Light Lifting Bay

- One EOT crane of capacity 5 T shall be provided in this bay for lifting equipment for repairs, overhauling & Testing of

i) Transformers- bushings and oil pump.
ii) Compressors.
iii) Switch Groups.
iv) Rectifiers.
v) Circuit Breakers.
vi) Pantographs.
vii) Resistors.
viii) High Voltage testing.

- Attached to the Light Lifting Bay, there shall be the following electrical repair sections:-

  i) Electronic Laboratory With Air Conditioning facility.
  ii) Rectifier Block Section.
  iii) Relay Room.
  iv) Circuit-Breaker Room.
  v) Electrical Switch Gear including EPCs, Reversers, & Master Controller.
  vi) Laboratory for chemical analysis and testing of metal & rubber Components.
  vii) Stores.
  viii) Lights & Fans.

Services required

- Compressed Air supply:- Two screw type air compressors each of capacity 600 cfm, 9 kg/cm2 are provided in the compressor room.
- Electric sub-station :- A separate sub-station of indoor type with 2-x 1000 KVA transformers for supply of 415V, 3 phase, 50 Hz should be provided for electrical services.
- Two D.G Sets of 250 KVA rating shall be provided to take care of emergency loads.
- Material handling transport system

Important M&Ps

LIST-1 : MACHINE TOOLS (GENERAL PURPOSE MACHINES).
Compressor
DG Set
Portable transformer welding Plant

LIST-2: SPECIAL PURPOSE MACHINES AND TOOLS.
Pit Wheel Lathe
Pinion Extractor

LIST-3:TESTING AND MEASURING INSTRUMENTS AND PANELS.

LIST-4: LIFTING, HANDLING AND TRANSPORT EQUIPMENT.
Cranes 25T,15T,5T

LIST-5: W[illegible]KERS ETC.

MAINTENANCE SECTIONS

GROUND FLOOR OF ADMINISTRATIVE BUILDING

1. RECTIFIER BLOCK SECTION
2. CIRCUIT BREAKER ROOM
3. ELECTRICAL SWITCH GEARS SUCH AS EPCs, REVERSERS, MASTER CONTROLLERS etc
4. RELAY ROOM
5. ELECTRONIC LABORATORY WITH AIR CONDITIONING FACILTY
6. LABORATORY FOR CHEMICAL ANALYSIS & TESTING FOR METAL & RUBBER COMPONENTS
7. CUSTODY STORE
8. LIGHTS & FANS

GROUND FLOOR OF CENTRAL BUILDING

1. MACHINE SHOP
2. TOOL ROOM
3. BATTERY CHARGING ROOM
4. WELDING SECTION
5. BRAKE & PNEUMATIC EQUIPMENT SECTION
6. AXLE BOX ROLLER BEARING SECTION
7. TRACTION MOTOR ROLLER BEARING SECTION
8. SHIFT SUPERVISOR'S STORE

IMPORTANT FEATURES OF FACILITIES FOR EMU / MEMU CAR SHEDS

	WASHING LINES		STABLING LINES		INSPECTION LINES (COVERED SHED)	
RAKE HOLDING	12 Car Length/No	16 Car Length/No	12 Car Length/No	16 Car Length/No	12 Car Length/No	16 Car Length/No
10	260/1	350/1	260/2	350/2	260/2	350/2
20	260/1	350/1	260/3	350/3	260/3	350/3
30	260/2	350/2	260/4	350/4	260/4	350/4

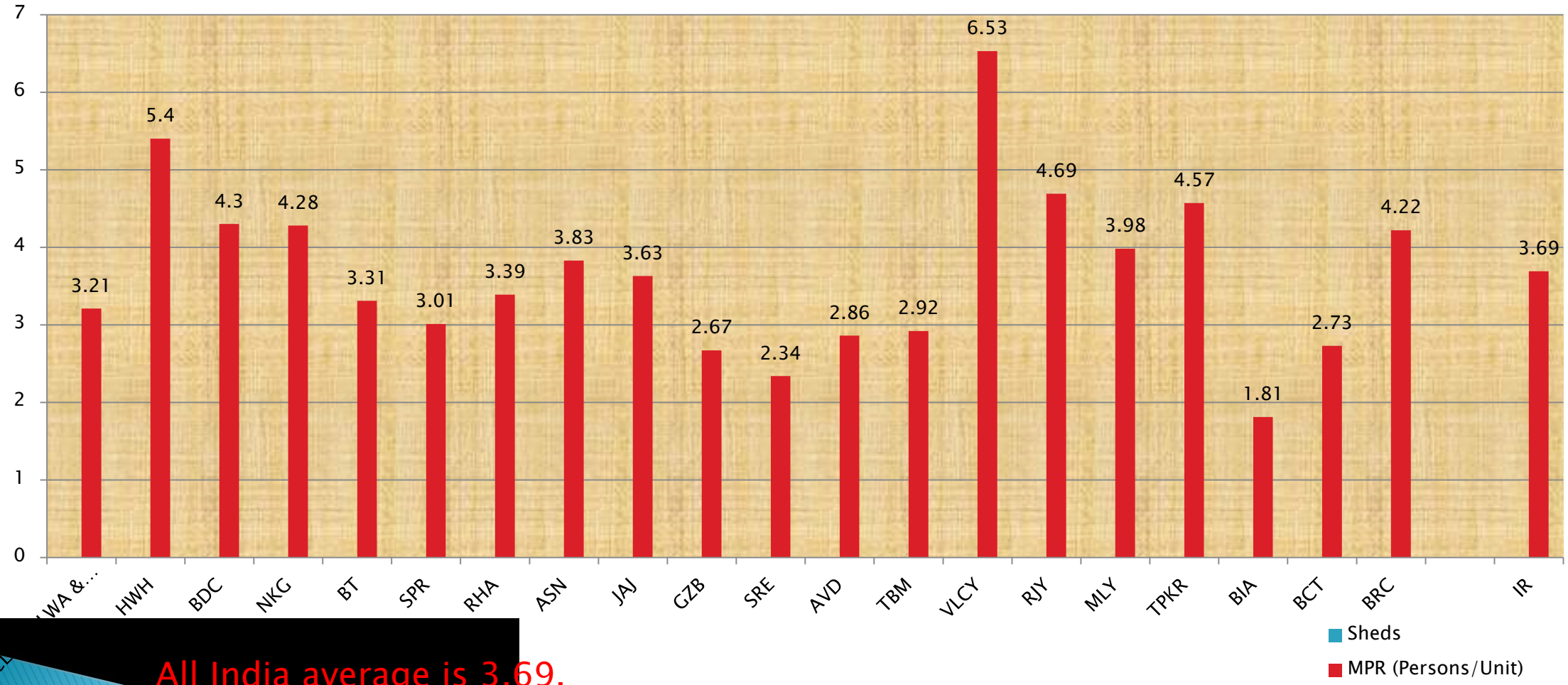
	COVERED SHED MEDIUM BAY		COVERED SHED HEAVY BAY		COVERED SHED LIGHT BAY	
RAKE HOLDING	12 Car Length/No	16 Car Length/No	12 Car Length/No	16 Car Length/No	12 Car Length	16 Car Length
10	48/1	48/1	48/2	48/2	48	48
20	80/1	80/1	80/2	80/2	80	80
30	104/1	104/1	104/2	104/2	104	104

	COVERED SHED MEDIUM BAY		COVERED SHED HEAVY BAY		COVERED SHED LIGHT BAY	
CRANE(S) CAP / NO.	12 Car CAP/ NO.	16 Car CAP/ NO.	12 Car CAP/ NO.	16Car CAP/ NO.	12 Car CAP/ NO.	16 Car CAP/ NO.
10	15T/1	15T/1	25T/2	25T/2	5T/1	5T/1
20	15T/1	15T/1	25T/2	25T/2	5T/1	5T/1
30	15T/2	15T/2	25T/2	25T/2	5T/1	5T/1

Man Power and Benchmarks

(As reported in July 17)

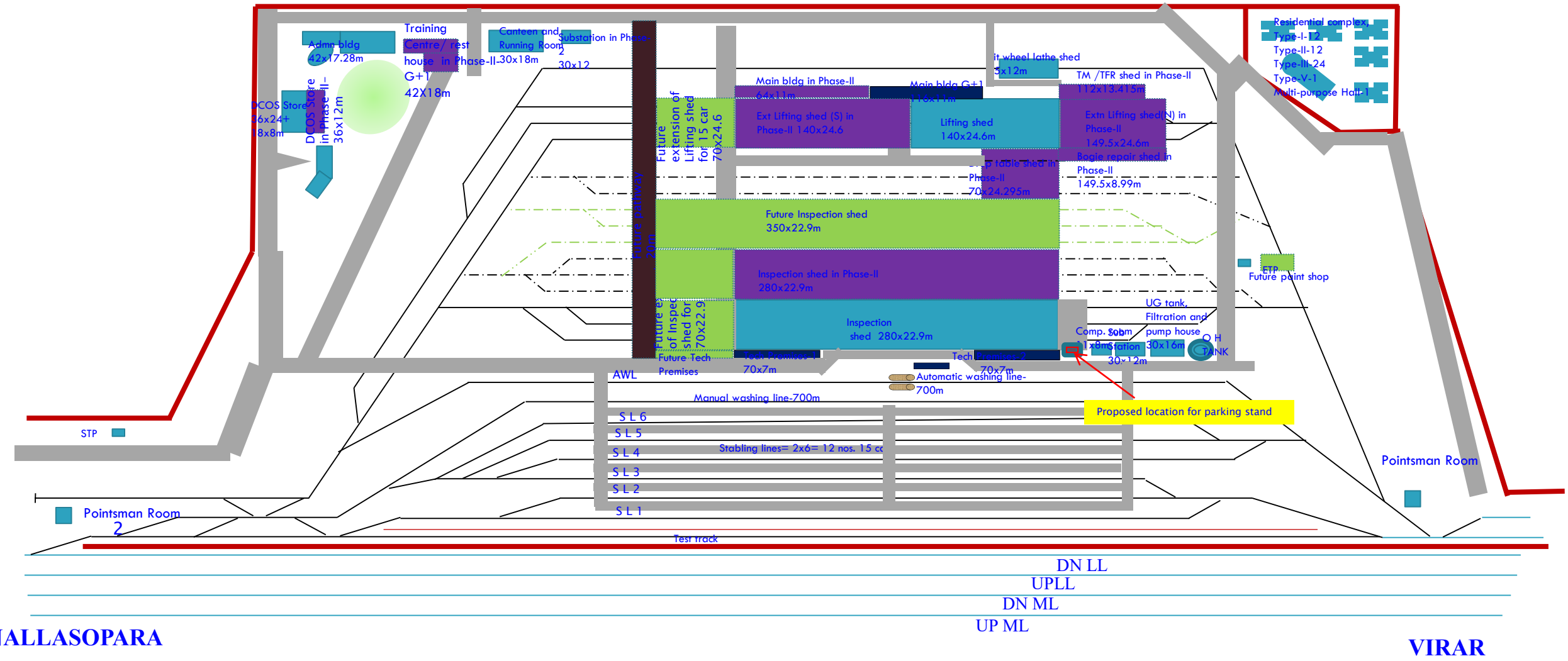
Sheds	Railway	MPR (Persons/Unit)
CLA (Kurla), KALWA & SNPD (Sandispur)	CR	3.21
HWH	ER	5.4
BDC (Bandel)		4.3
NKG (New koylaghat)		4.28
BT (Barasat)		3.31
SPR (Sonarpur)		3.01
RHA (Ranaghat)		3.39
ASN		3.83
JAJ	ECR	3.63
GZB	NR	2.67
SRE (Saharanpur)		2.34
AVD (Avadi)	SR	2.86
TBM (Tambaram)		2.92
VLCY (Velacheri)		6.53
RJY (Rajahmundry)	SCR	4.69
MLY (Maula Ali)		3.98
TPKR	SER	4.57
BIA (Bhilai)	SECR	1.81
[illegible]	WR	2.73
BRC		4.22
IR		3.69



All India average is 3.69.

Yard stick _ 7 man per unit

Infrastructure
EMU carshed Virar



SCHEMATIC LAY OUT PLAN OF EMU CARSHED VIRAR

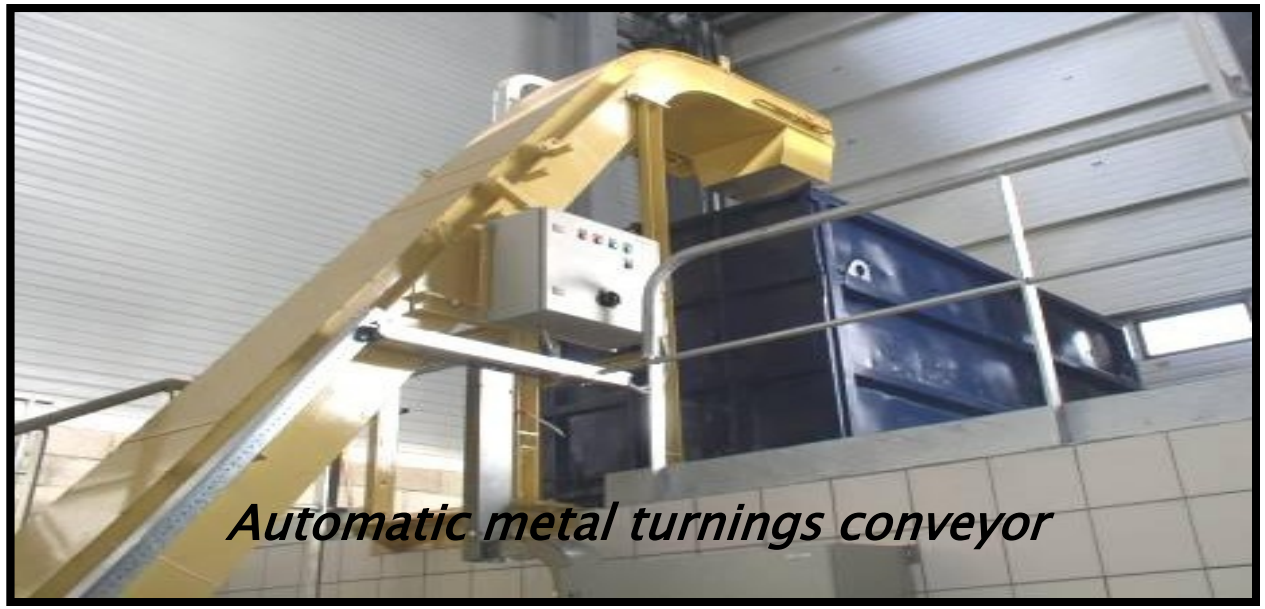
STABLING YARD AT EMU CARSHED VR

1. Stabling yard has 06 lines. Each line accommodates two 15 car rakes.
2. One Test Track .
3. Two washing lines (Manual & Automatic).
4. Stabling yard has provision of pathways on both sides of each line for maintenance staff.

INSPECTION SHED

UNDER FLOOR WHEEL LATHE

CNC Based Under Floor Wheel Lathe supplied by M/s. SCULFORT equipped with a winch device & Chip crusher with automatic conveyor .



Automatic metal turnings conveyor

BOGIE DROP TABLE

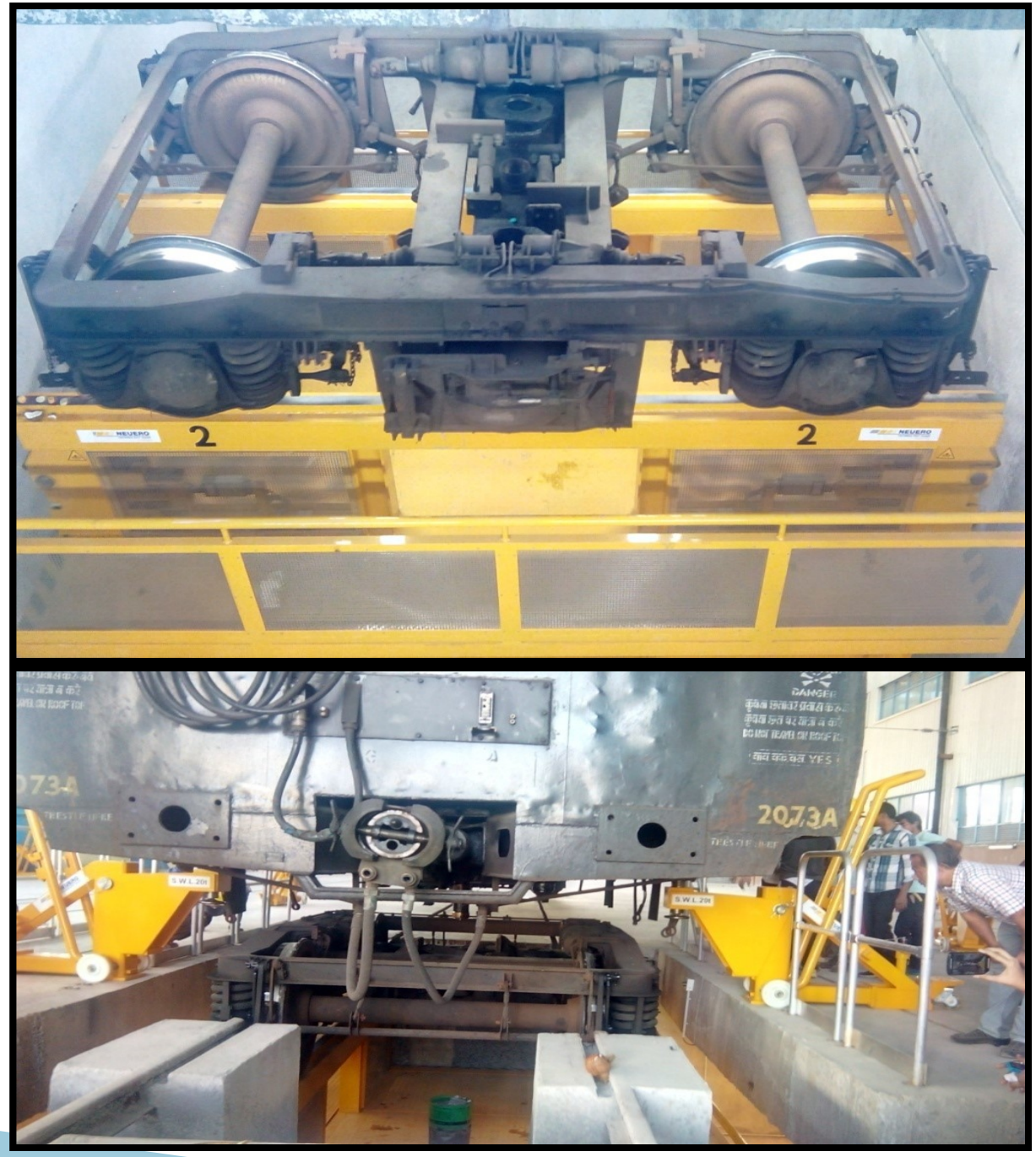
- Bogie dropping table supplied by M/s. NEUERO Technology/ Germany.

- It consists of
  - Mobile lifting table
  - Two Rail bridges
  - Mobile car body support stands.

- It is used to change Bogie axle of rail vehicle with total weight of 50 Ton (Max.).

- Bogie maintenance can be done without uncouple the rake.

- It can be operated by remote control and manually.



AUTOMATIC WASHING PLANT

- PLC base automatic washing plant is installed for exterior washing of EMU.
- Plant is automatically started as soon as its sensors detect rake
- One rake washing is carried out in 30 minutes.
- MMI is provided to monitor the various data of plant
- 08 rakes washing is carried out daily.
- There are four stages of washing:
  - **Pre wet.**
  - **Detergent spraying & scrubbing**
  - **Fresh water scrubbing**
  - **Final rinsing with RO water**

MANUAL WASHING PLANT

- Manual washing Plant is comprised of 3 nos. high pressure pumps.
- Exterior and interior manual washing is carried out.
- Manual washing line has length to accommodate 2x15 coach trains.
- Platforms is constructed on both sides of washing line to enable staff to carry out the job without fatigue.
- The washing line is provided on RCC slab to avoid collection of water on the track. Drainage is provided for used water to reach the Effluent Treatment Plant (ETP).

ANCILLARY BUILDINGS

- Administrative Block to accommodate the office of the Sr.DEE and other officers, technical assistants, drawing office and IT centre.
- Training centre building to train motor man and maintenance staff.
- Rest house accommodation for trainees, supervisor and officers on first floor.
- Two substations and compressor room.
- Under ground tank and water filtration plant.
- Security check posts and signal huts on both end of shed i.e. NSP and VR.

RUNNING ROOM & CANTEEN BUILDING

Running rooms for Motormen & Guards along with canteen for carshed staff is constructed covering the area of 1080 sqm.

It has easy access from sheds as well as Administrative building and Training Centre.

- Canteen is well furnished and has the seating capacity of 152 staff.

- Running rooms accommodated 13 well furnished rooms (27 beds) for the Motormen and Guards.

Electrical training center / Virar

THANK YOU