



DEVELOPMENT OF C&W DEPOT INFRASTRUCTURE

TRANSPORT ORGANIZATION

Motto

Quality Service

Maximize Quantity

At Minimum Cost



QUALITY SERVICE

Safety

Security

Punctuality

Comfort – For Passengers

MAXIMIZE QUANTITY

Assets Limited

Better Utilization of Assets
– Rolling Stock

Increase in Speed

Increase in Pay Load

Reduction in Downtime of Assets

MINIMIZE COST

Manpower

Machines

Materials

Infrastructures

Downtime of Assets – Rolling Stock

DEVELOPMENT IN C&W INFRASTRUCTURE

Any formulation of Development

Will be Based on

Quality

Quantity

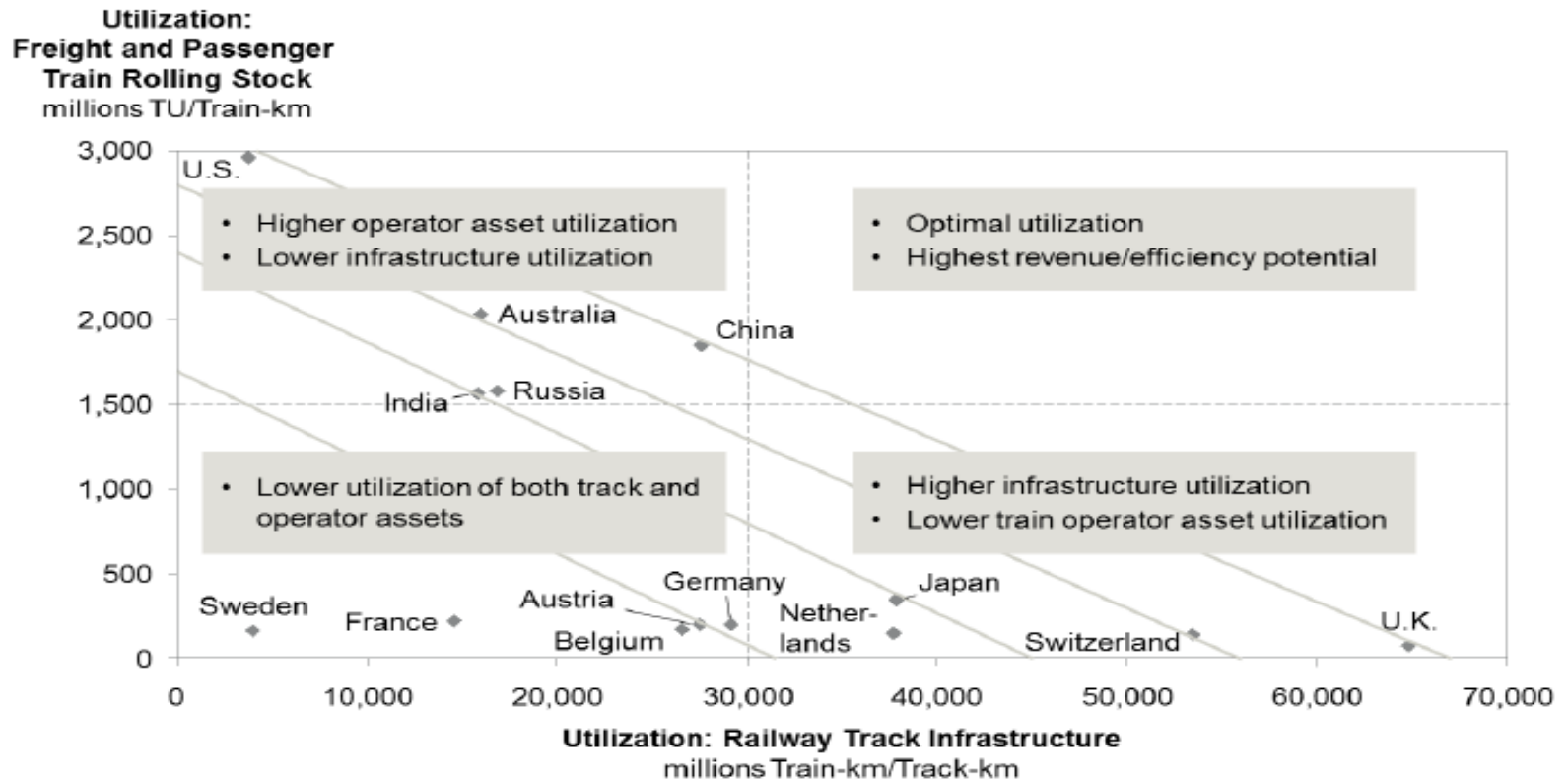
Cost

or Combination of the above

INDIAN RAILWAYS SCENARIO

Research done at International Transport Forum on Railway Efficiency

Figure 3: Train Operator and Railway Infrastructure Utilization by Country, 2011

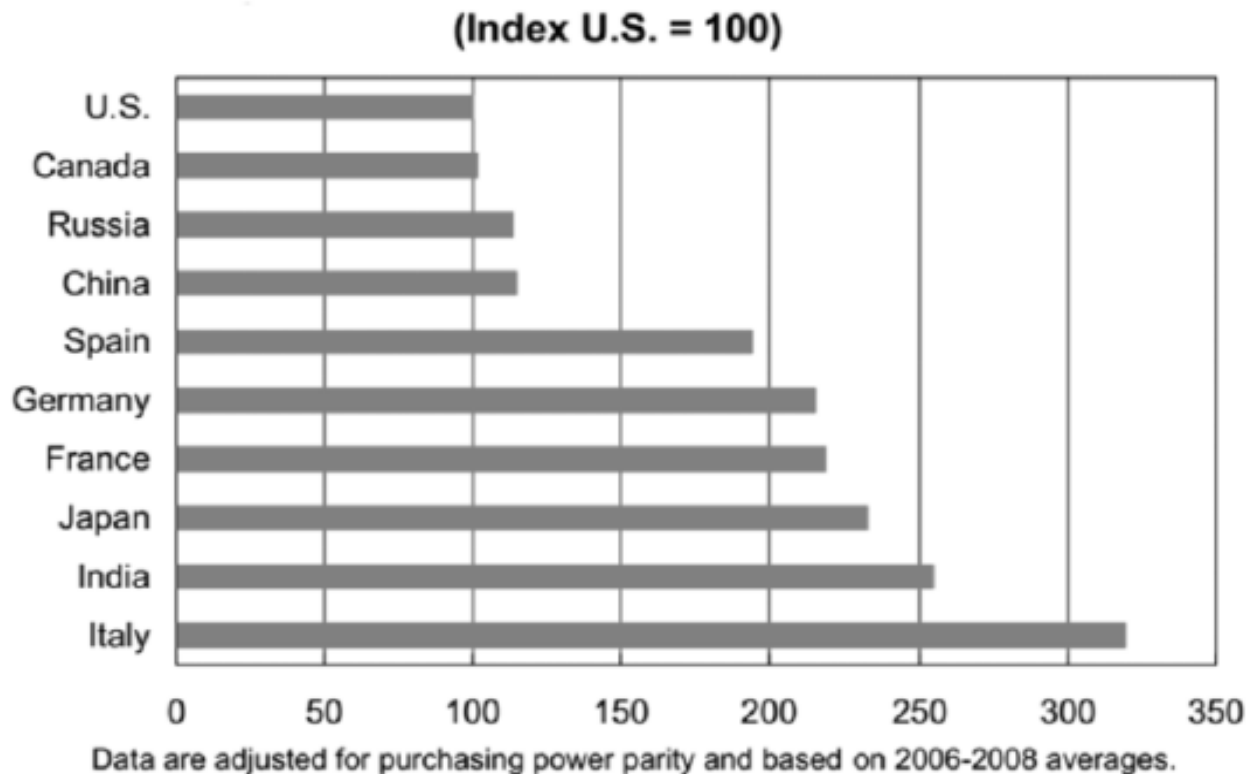


Source: civity Management Consultants benchmarking analysis, based on UIC Railway Data 2011

INDIAN RAILWAYS SCENARIO

In India Logistic Cost is about 14% of Manufacturing Cost --- Too High
Should be 7-8% (China 10%)

Figure 4: **Index of Freight Railroad Rates Charged, 2006-2008 averages**





WAGON

MAINTENANCE DEPOT

To Increase the Quantity

To Improve the Quality

To Reduce the Cost

To Reduce the Downtime of Assets

Maintenance Time to be Minimized

Examination Time

Repair Time

Detachment and Attachment Time

To improve the Quality

100% Mechanized Inspection

Without depending on Human Interface

To Minimize the Cost of

Manpower

Cost of Downtime of Rolling Stock

Possible Solution is

LESS DETACHMENT SMART YARD

LESS DETACHMENT SMART YARD

Existing Practice of Rake Examination

Rake Arrival

Examination Testing (About 4 Hrs.)

Sick Wagon Marking and Detachment

Fit Wagon Attachment

Engine On Load

Dispatch

Time Required - 8 Hrs. Approx

Manpower Required - 20 Approx

LESS DETACHMENT SMART YARD

Existing Practice of Wagon Repair

Detachment in Yard

Waiting for Placement

Placement in Sickline

Repair in Sickline

Taken in Yard

Finally Attached to Load

Time Required - 24 Hrs. Approx

LESS DETACHMENT SMART YARD

There will be Reduction in
Manpower Cost

Manpower Required will be 8 against
Existing 20

Cost of Downtime of Asset

Examination takes place in 45 min
against existing 4 hrs

For Saving the Examination Time

Use of Mechanized Equipments on Trackside
Detects the Defects while Train on Run
Generates Reports in Advance

LESS DETACHMENT SMART YARD

Equipment

Machine Vision Equipment

- Analysis of Laser Images

 - Low Air Hose Detection (Hanging Part Detector)

 - Wheel Profile Detector

 - Brake Equipment Detector (Brake Blocks)

Acoustic Bearing Monitoring System

Trolley Performance Detector

Wheel Impact Load Detector

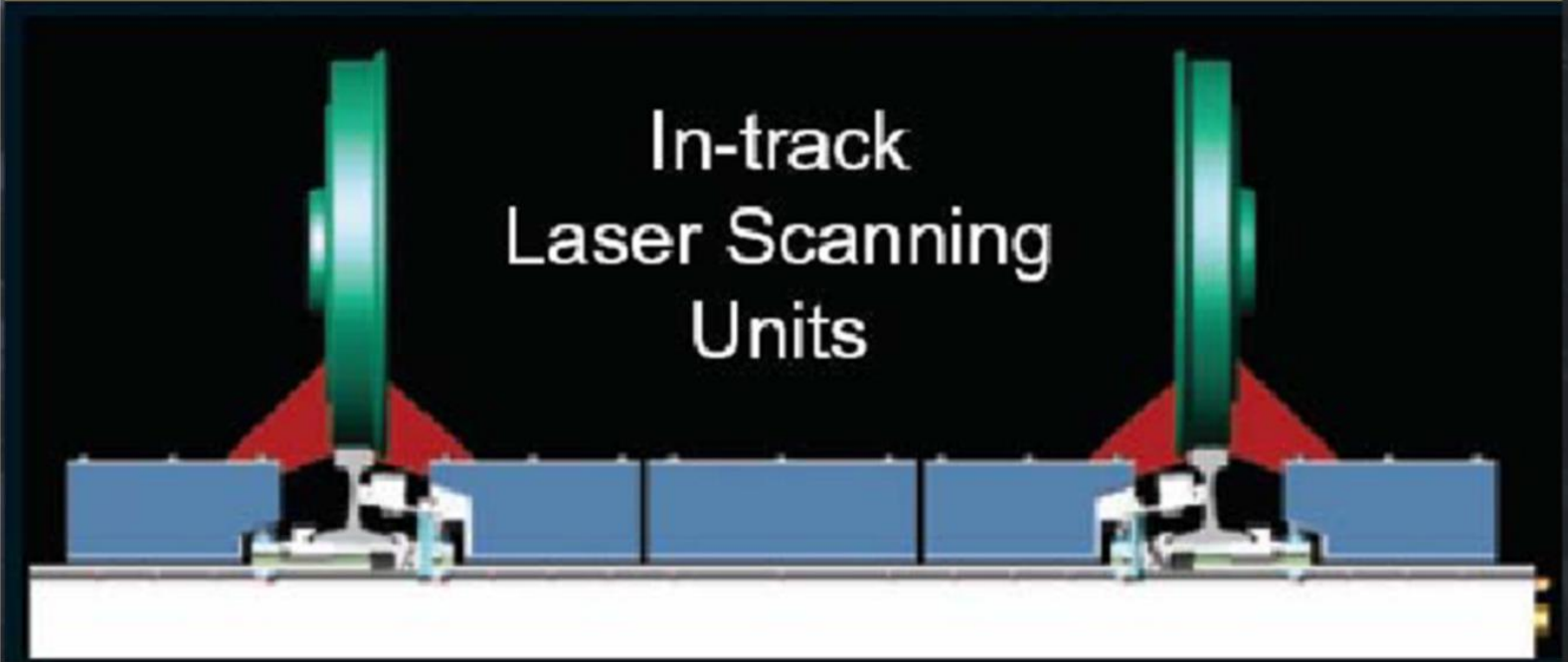
MONITORING EQUIPMENT

INSTRUMENTED DETECTIONS

LOW AIR HOSE DETECTION



WHEEL PROFILE



ACOUSTIC BEARING MONITORING SYSTEM

Trackside microphone array



WHEEL IMPACT LOAD DETECTOR

AT ARRAKONAM

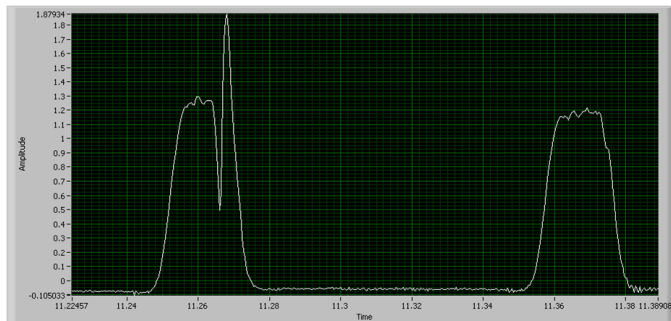


TRACK CLOSEUP



WHEEL IMPACT LOAD DETECTOR

WILD SIGNAL FROM TRACK



WILD EXCEPTION REPORT

Exception Report: 04/06/2000, 10:11:00, Peru, Track ONE

[Consist Report](#) [Full Report](#) [Overload Report](#) [Enhanced Exception Report](#) [Main Menu](#)

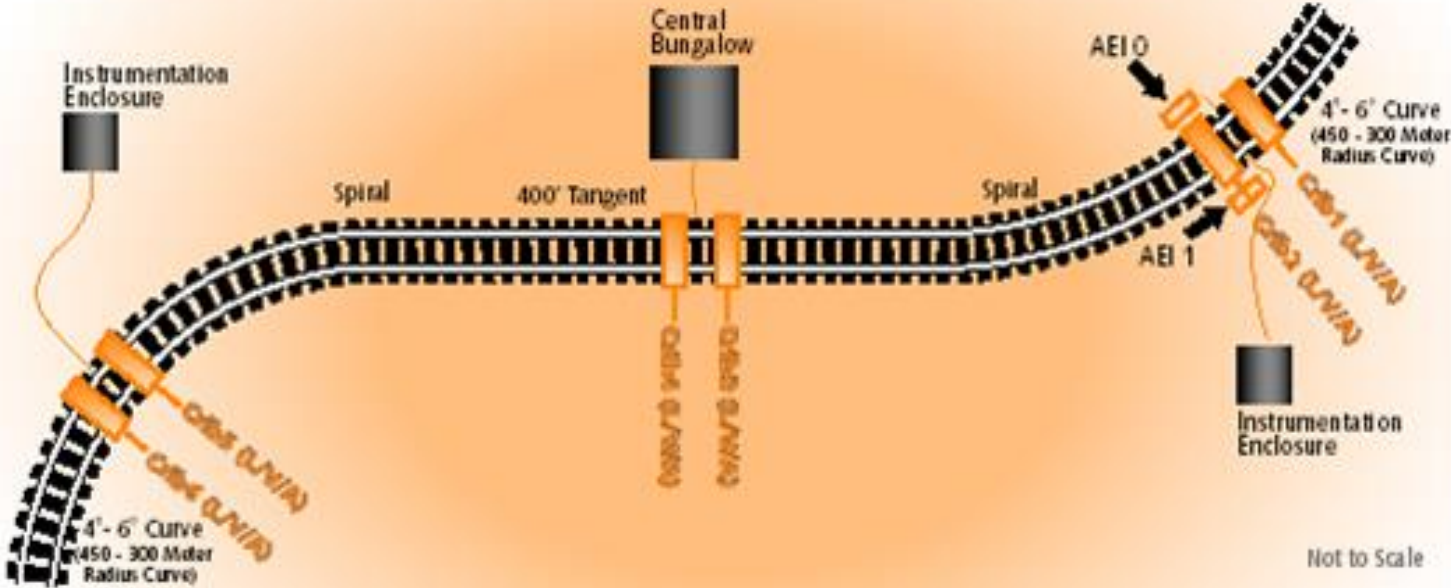
Criteria File:

EASTBOUND Train passed Peru, Track (ONE), Detector at 10:11 06 Apr 2000
TE 52.9 degF, RH 25.4 %, TI 63.3 degF, WS 14.4 knots, WD 296 degrees
Train speed = 35.5 MPH
4 Loco and 98 Cars counted
Loco axles = 24, Total axles = 424
Gross tons - Loco(s): 760 Car(s): 10263 Total: 11043
Car tags read: Lead Loco #1 tag: UP 9705

REPORT 2 -- Database Exception Report

Axle	Car/M	B-Axle	Type/Tag	Non	Dyn	Ratio	Peak	DL	RL	PL
325	8	90 / 1	L1 Medium Pr. Car	33.0	97.9	4.0	130.9	E	E	
	N		R1 ACPX76406	33.0	13.2	1.4	45.2			

TROLLEY PERFORMANCE DETECTOR



TROLLEY PERFORMANCE DETECTOR



- Angle of Attack (axle)
- Lateral Wheel Load
- Vertical wheel load
- L/V (lateral/ vertical) ratio
- Automatic Equipment Identification

LESS DETACHMENT SMART YARD

Concept of Yard Centers

Monitors All Activities and Maintenance Work

Acts as Communication Center

Generates and Distributes

The Rake Diagnostic Report

Prior to Arrival of Rake

To take Decision in Time

LESS DETACHMENT SMART YARD

To Reduce the Downtime of Rolling Stock

Necessity to Facilitate In Situ Repair

To Control Detachment/Attachment Time

Each Detachment/Attachment
has Cost

In Terms of

Time

Finally Money

LESS DETACHMENT SMART YARD

In Situ Repair

Availability of Jacks

To Facilitate Lifting of Body

Material Handling Equipment

To Carry Jacks Materials to Examination Line

Welding Lines

Gas Cutting Equipments

Illumination

Concrete Pathways

LESS DETACHMENT SMART YARD

Requires Heavy Investment

As Pilot Project

Work Has Been Sanctioned in 2009
At Tughalakabad
For Cost Rs 31 Crores

But Work Not yet started

LESS DETACHMENT SMART YARD

Requires Heavy Investment

Another Work Sanctioned

Smart Yard at

Mugalsarai Dn Departure Yard

Cost Rs. 33 Cr





COACHING

MAINTENANCE DEPOT

INTEGRATED COACHING MAINTENANCE CONCEPT

Why should the Present System
needs to be changed

Economical Design of Infrastructure

To increase the Productivity of Manpower

To reduce the Maintenance Time

To improve the Reliability

To reduce the Detachment of Coaches

INTEGRATED COACHING MAINTENANCE CONCEPT

Integration of All the Maintenance Activities

Mechanical

Electrical

Standardization of

Layout

Infrastructure – Mech & Elect

Tools and Plants – Mech & Elect

Service Rooms

Other Facilities – Mech & Elect

INTEGRATED COACHING MAINTENANCE CONCEPT

To minimize the Construction Time and Cost
Present System of Pitline with Catwalk

Due to Catwalk Construction

Long Construction Time

Uneconomical Design

Proposed System of Coaching Depot

One side or No Catwalk with

Easy to Construct – On Steel Pillar


Economical and Expeditious Completion

DMRC Coach on Pillar Design Pitline



INTEGRATED COACHING MAINTENANCE CONCEPT

To increase Productivity of Manpower
By providing comfort and security
Covered Shed of Maintenance Bay
With Boundary Wall for security
of Manpower and Rake



INTEGRATED COACHING MAINTENANCE CONCEPT

To increase Productivity of Manpower

Present System of Coaching Depot
Pitline

Bothside Catwalk

Clumsy Layout

Restricted Daylight

Cross Movement Restricted

INTEGRATED COACHING MAINTENANCE CONCEPT

To increase Productivity of Manpower
Proposed System of Coaching Depot
Pitline

Oneside or No Catwalk

Less Clumsy Layout

Ease of Material Handling

Easy movement of Staff

Ample Daylight

INTEGRATED COACHING MAINTENANCE CONCEPT

Present System of Coaching Depot
Pitline

Single depth Centre Pit of 960 mm
Staff have to bent in moving
During Examination

INTEGRATED COACHING MAINTENANCE CONCEPT

Proposed System - Pitline Centre Pit

Twin depth Pit

Now examination staff can

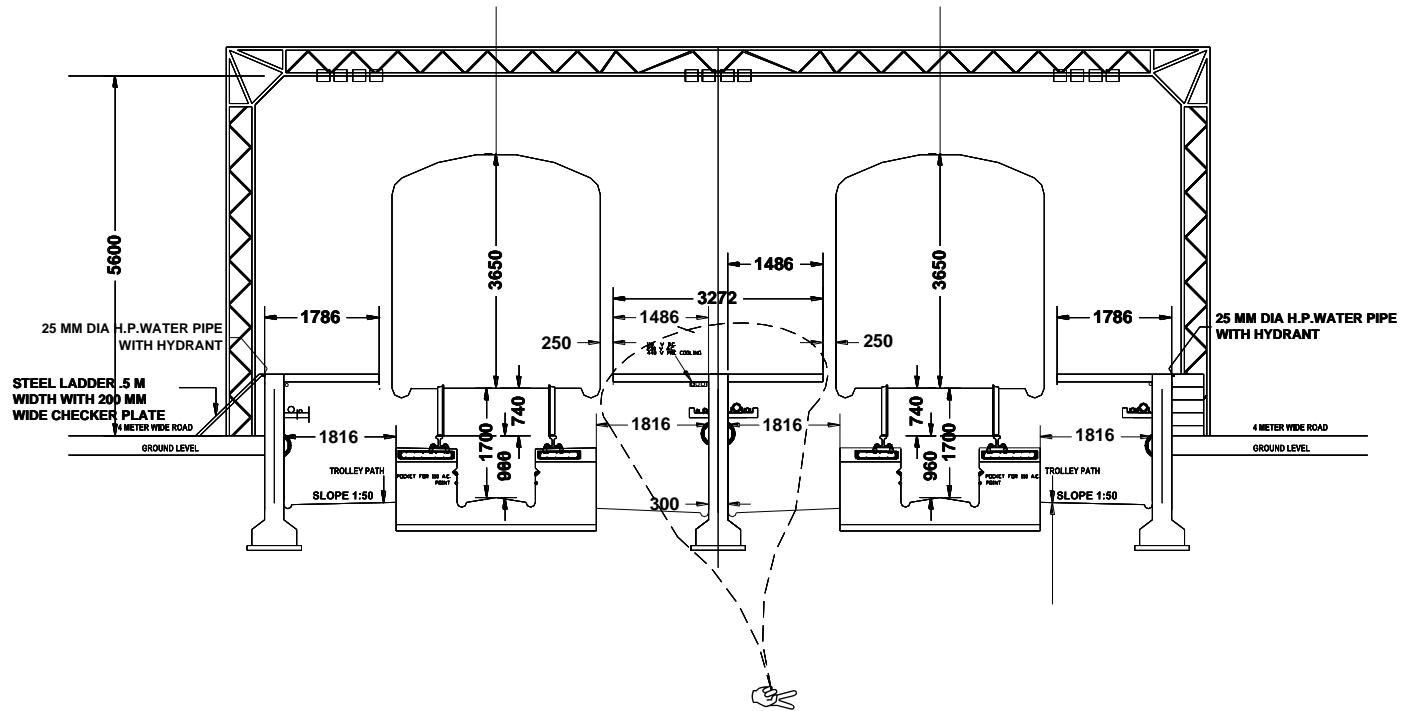
move inside pit without bending

Size 600mm X 450mm inside pit

This Pit also serve as Drainage

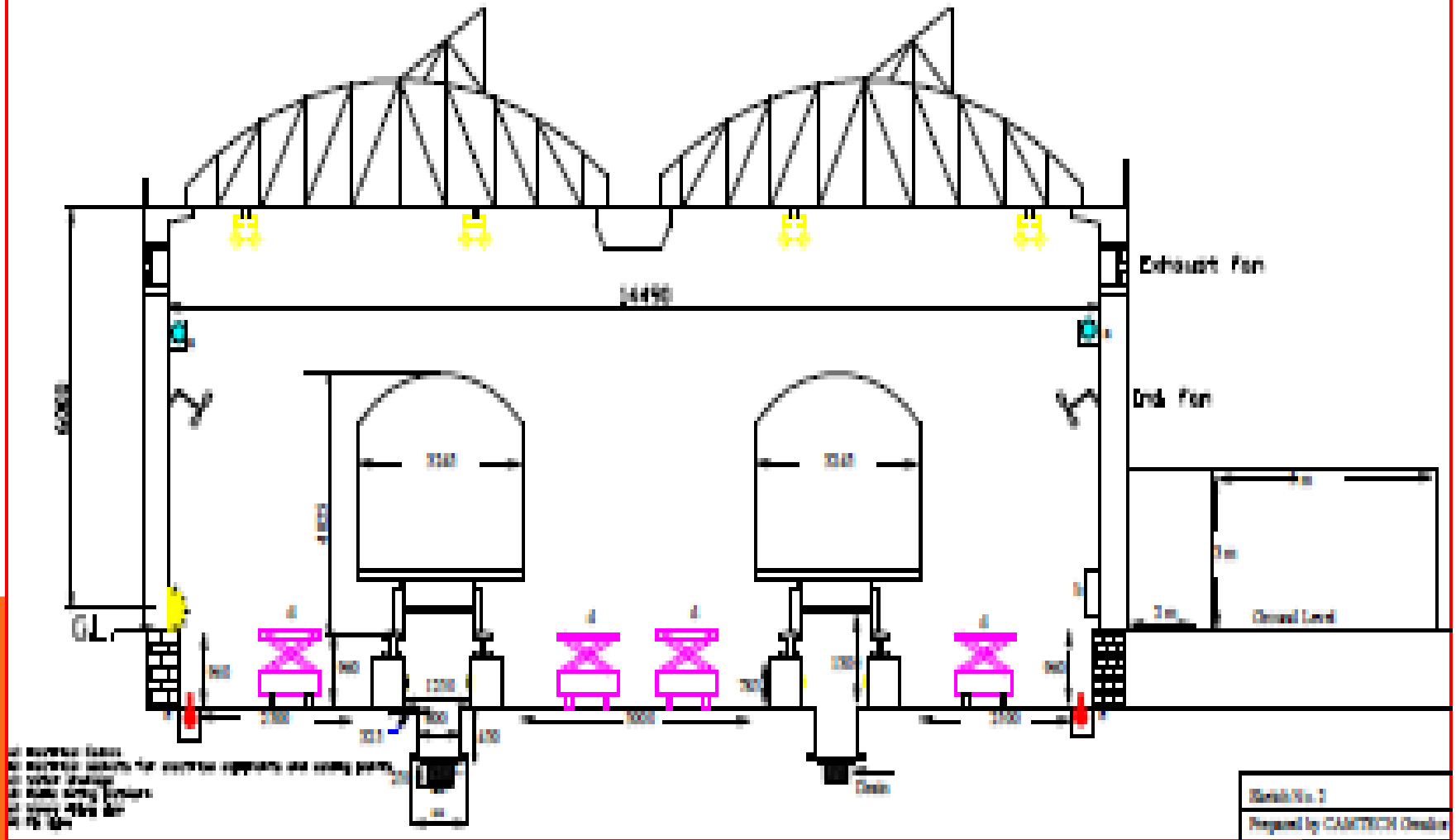
Will increase the Productivity of Manpower

Existing System of Maintenance bay

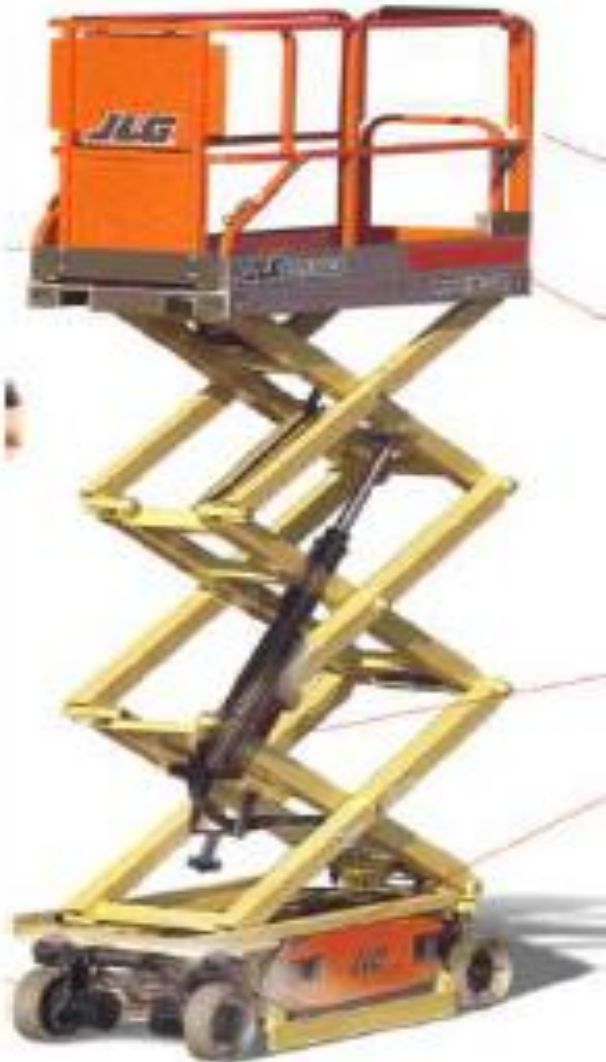


Pitline without catwalk with Twin Depth Pit

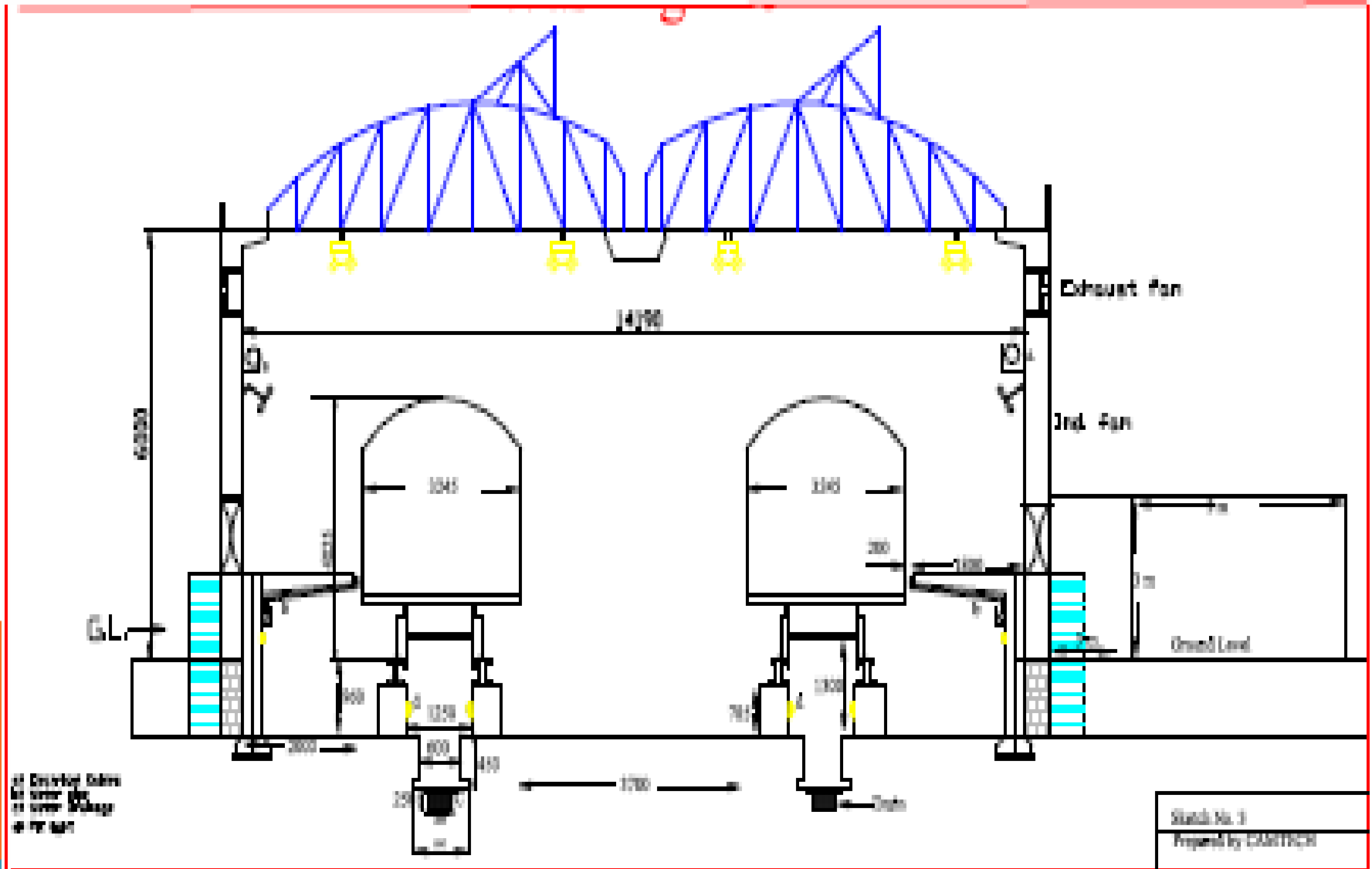
PIT LINE WITHOUT CAT-WALK



Mobile Lifting Platform



Pitline with One side catwalk with Twin Depth Pit



DMRC Coach on Pillar Design Pitline Twin Depth



DMRC Coach on Pillar Design Pitline



INTEGRATED COACHING MAINTENANCE CONCEPT

Proposed System of Coaching Depot
Pitline - Oneside or No Catwalk

Attention to

Window Glass

Destination Board

Coach Indication Board

Linen Supply

With Help of Mobile Lifting Platform

Watering Pipeline/Water Pipeline
for Inside Cleaning - ???

INTEGRATED COACHING MAINTENANCE CONCEPT

To reduce Maintenance Time

Present System of Coaching Depot

Pitline – Bothside Catwalk

Outside Body Washing

Spillage of Water at Examination Area

Causing Hindrance with

the Undergear Examination

Considerable Time Required

for Manual Cleaning

INTEGRATED COACHING MAINTENANCE CONCEPT

To reduce Maintenance Time

Automatic Coach Washing Plant

Outside Body Cleaning

In moving condition

Reduce the Coach washing time

Reduction in Water Spillage

At Work Area - Clean

Less Hindrance with Maintenance

INTEGRATED COACHING MAINTENANCE CONCEPT

Proposed System

Water Recycling Plant

For Conservation of Water

Need of the Hour

Environment Concern

Will reduce the Environment Hazard

AUTOMATIC COACH WASHING PLANT



Automatic Coach Washing Plant



AUTOMATIC COACH WASHING PLANT



AUTOMATIC COACH WASHING PLANT



INTEGRATED COACHING MAINTENANCE CONCEPT

To improve Reliability and

To reduce Maintenance Time

Automatic Wheel Diagnostic System

To improve reliability

In light of reduction

in maintenance time

On line monitoring of wheel profile

On line Crack detection

On line detection of Flat Place

Automatic Wheel Diagnostic System



INTEGRATED COACHING MAINTENANCE CONCEPT

To reduce Detachment of Coaches

Underfloor Lifting Plant

In Lieu of Synchronized Lifting Jacks

For Lifting of Whole Train Set

Coach Body

Bogie

Less Inconvenience to

Maintenance Staff

UNDERFLOOR LIFTING PLANT



UNDERFLOOR LIFTING PLANT



INTEGRATED COACHING MAINTENANCE CONCEPT

To reduce Detachment of Coaches

Portable Wheel Profiling Machine

For Profiling of Wheel in Position

Without detaching the Coach

INTEGRATED COACHING MAINTENANCE CONCEPT

To make Environment Clean

Bio-toilets, ZDTS, Vacuum Toilets

Getting installed increasingly

Waste Removal System

Needs to be installed to

Handle Such Waste

INTEGRATED COACHING MAINTENANCE CONCEPT

Other Facilities

Pliable Concrete Road

Concrete Flooring

Service Rooms

Proper Illumination

**Will make Working Area Tidy
And Ease in Maintenance**

INTEGRATED COACHING MAINTENANCE CONCEPT

To Summarize

Facilities Required in Coaching Depot

Auto Coach Washing Plant

Wheel Diagnostic System

Maintenance Bay Pitline

Maintenance Bay Sickline

Service Rooms

Shunting Neck

Stabling Line

INTEGRATED COACHING MAINTENANCE CONCEPT

To Summarize

Sequence of Operation - Coaching Depot

Train Entering Depot

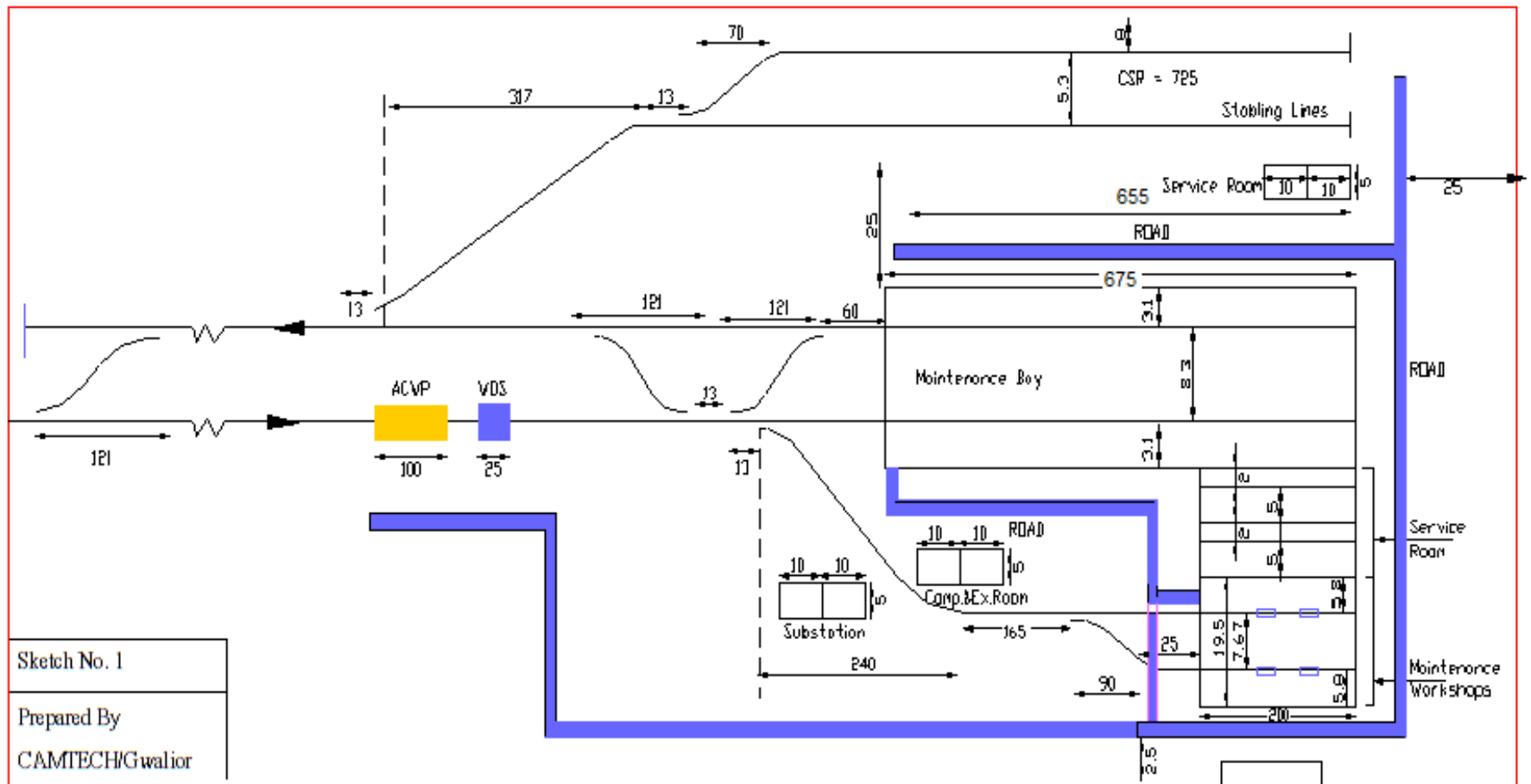
Outside Washing at ACWP

Wheel Defect Detection at WDS

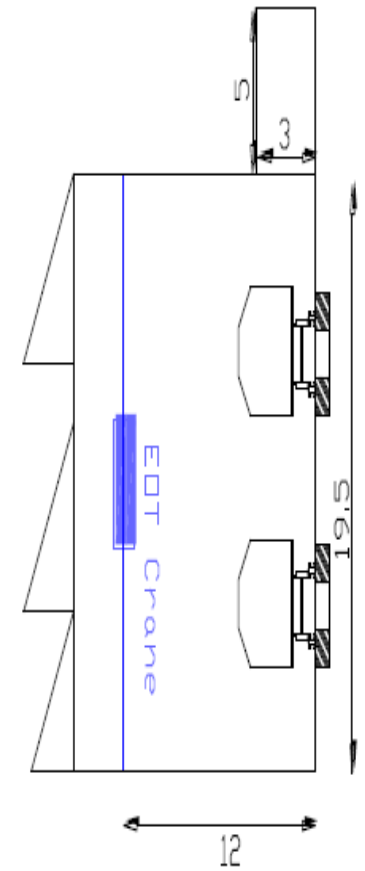
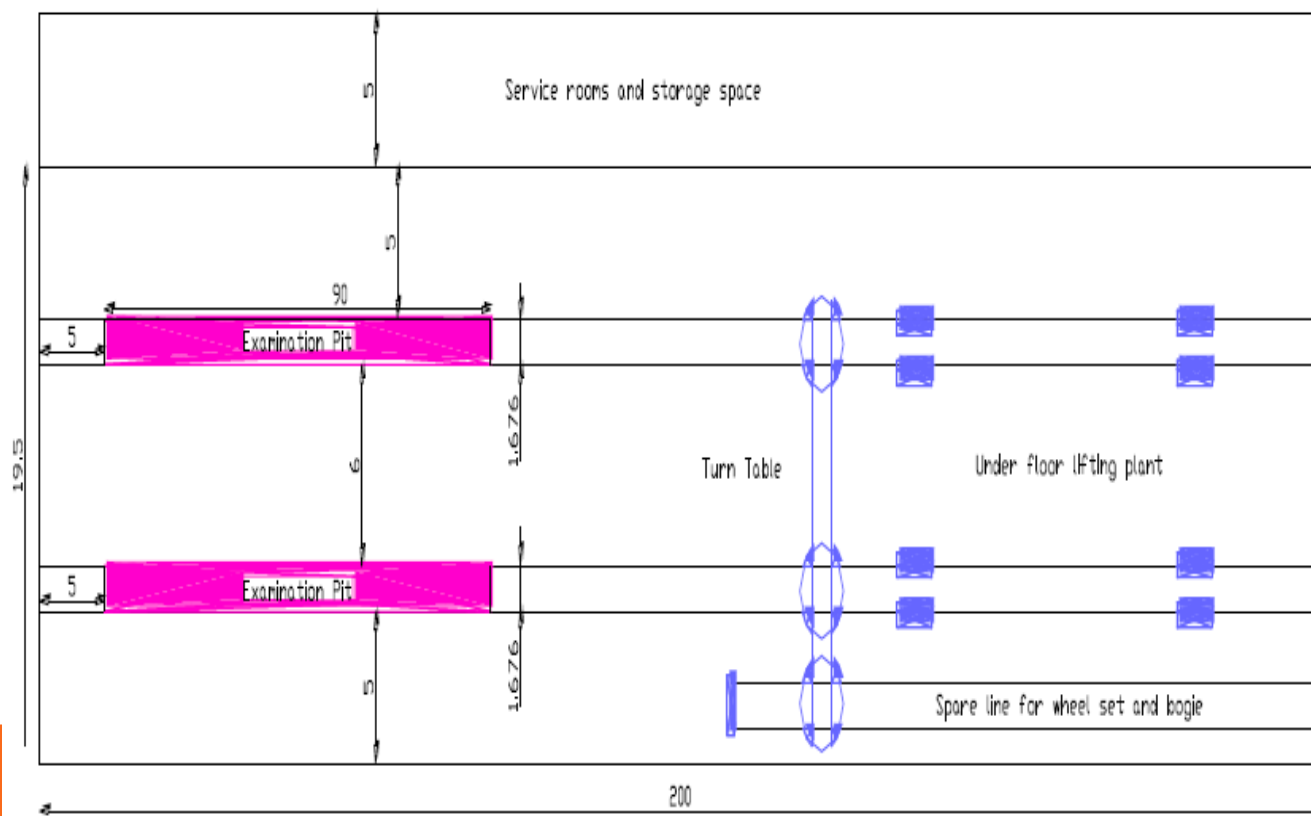
Placement of Rake at Pitline

Pulling to Shunting Neck

Going Out of Coaching Depot



Layout of Integrated Coaching Complex



End View

Maintenance Sickline

REFERENCE

Report of CAMTECH on
Infrastructural Facility for
Maintenance of LHB Coaches

