Plateway

Rail Terminal Design

October 2009

Corporate Background

Sydney Office

Plateway Pty Ltd
6/3 Sutherland Street
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Melbourne Office

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Melbourne VIC 3000
Phone: +61 3 9600 1537
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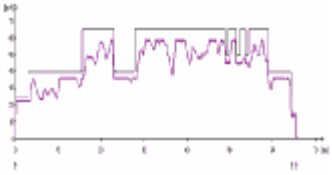
Phillip Imrie

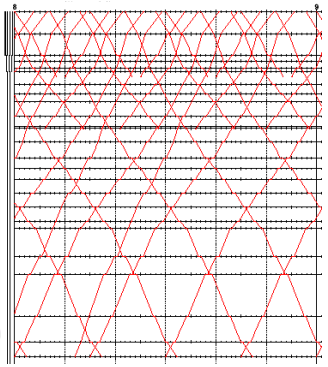
Plateway Capability

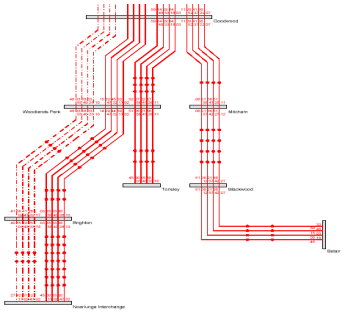
- Railway Management Service
  - Project management
  - Tendering and estimating
  - Contract management
  - Contract strategy selection
  - Contract performance assessment
- Railway Engineering
  - Technical standards and requirements assessments
  - Reliability analysis
  - Asset condition and assessment
  - Work program development
  - Infrastructure and rollingstock acceptance testing
  - Terminal design

Plateway Capability

- Financial Assessment of Railway Operations and Projects
  - Project economic evaluations and cost/benefit analysis
  - Value management studies
  - Due diligence
- Railway Service Design
  - Single train simulation using OpenTrack
  - Railway network simulation using OpenTrack
  - Timetable design using Viriato
  - Haulage system capacity
- Management System Development
  - Development of Railway Safety Management Systems
  - Railway safety audits
  - Risk assessments

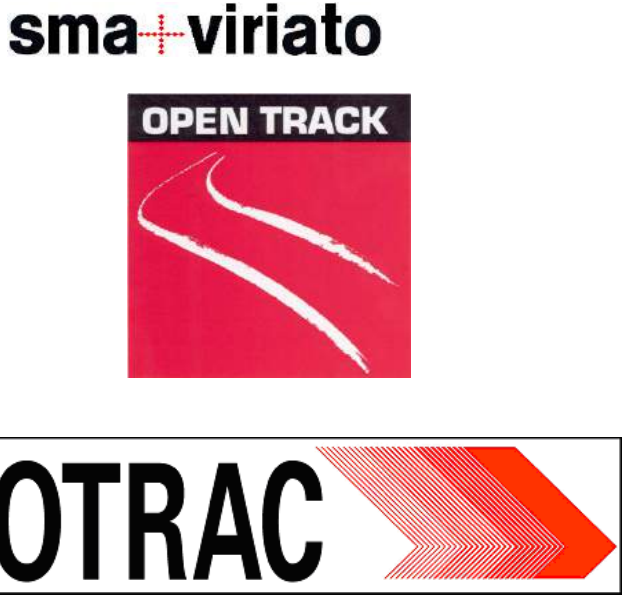






Partners

- Plateway works in close collaboration with several leading partners
  - SMA and Partners Zurich
  - OpenTrack GmbH
  - Enotrac



Swiss Transport Philosophy

- Start with recognition of the market demand
- Based on Supply Side Economics
- Support demand by the provision of an attractive service
- Service Features
- High Service frequency
- Regular clock face departures
- Serve as wider area as possible using connecting services
- High Reliability

Terminal Market

Fundamental Questions

- What market does it serve?
- What is the competitive advantage of the supply chain?
- Why use the intermodal terminal?

Terminal Market

- Potential Markets
  - Industrial Facility (Bluescope Steel Long Island, Allied Mills Picton)
  - Bulk Products (AWB Terminals, Brooklyn, Bairnsdale log yards,)
  - Export Containers (Melbourne Ports, Mooroopna, Bomen, Blayney)
  - Domestic Containers (South Dynon, Chullora, Acacia Ridge)
  - Hub (Tottenham Yard, Nth Geelong Yard, Morandoo Exchange Sidings, Port Augusta)

Terminal Market

Melbourne Operations Yard

Environment

- Increase in the number of metro and regional passenger trains.
- Increase in the number of medium and long distance freight services.
- Significant increase in the land freight transport task.

Environment

- “Open Access” provides opportunity to explore which solution maximises the value to an organisations supply chain.
- Increase in the amount of rollingstock available for lease.
- Increase in number of maintenance service providers

Environment

CFCL AUSTRALIA PTY. LIMITED
A subsidiary of Chicago Freight Car Leasing Co.

VL CLASS LOCOMOTIVE

General

Class	VL	**Manufacturer**	Avteq Pty Ltd
Locomotive Numbers	351 - 362	**Year of Manufacture**	2007
Quantity	12		

Operating

Load Category	L4	**Live Weight**	132.0T
Speed Category	S5	**Dead Weight**	145.0T
Drawbar Capacity	1.80MN	**Axle Load**	22.0T
Maximum Speed	115km/h	**Track Gauge Options**	☑ Broad 1600mm
Fuel Capacity	9,200L		☑ Standard 1435mm
Length Over Couplers	18.30m		☒ Narrow 1067mm
Operating Station	Single – Short end leading		

Technical

Locomotive Model	GT26C	**Wheel Arrangement**	Co-Co
Engine	EMD 16/645E3B (turbo)	**Wheel Diameter**	1016mm
Maximum Gross Power	2460kW/3300hp	**Alternator**	AR10A4
Engine rpm	235 - 900	**Traction Motors**	D78
Lube Oil Capacity	920L	**Control System**	Wabtec QES3
Cooling Water Capacity	1,120L	**Air Brake**	Knorr-Bremse CCB26
Continuous Tractive Effort	344kN	**Dynamic Brake**	650A Extended range
Starting Tractive Effort	-	**Air Conditioning**	Fitted
Adhesion	27%	**Toilet**	Fitted
Gear Ratio	61:16		

CFCL Australia Pty. Limited
ABN 61 089 217 814
Level 5, 8 Windmill Street, Millers Point NSW 2000
Telephone: 02 8969 0000 Fax: 02 8969 0011
www.cfcla.com.au

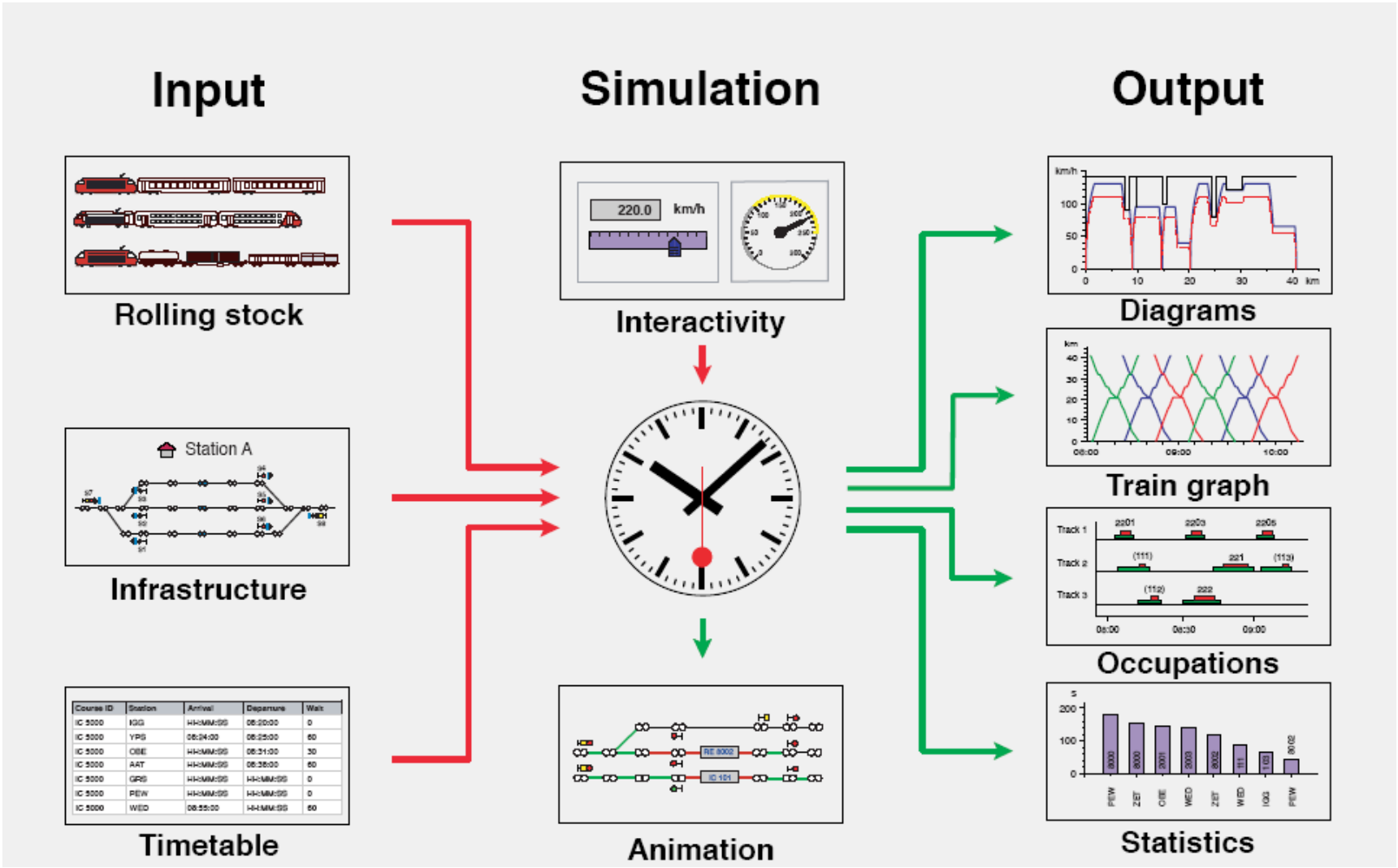
Train Lengths

Train Type	Current Operation	Available Maximum
Interstate Intermodal	1500m	1800m
Intrastate	1500m	1500m
Industrial	1200m	1800m
Export Containers	600m	750m
Bulk	750m	1000m

- Future long haul train lengths 2,400 – 3,600m

Plateway

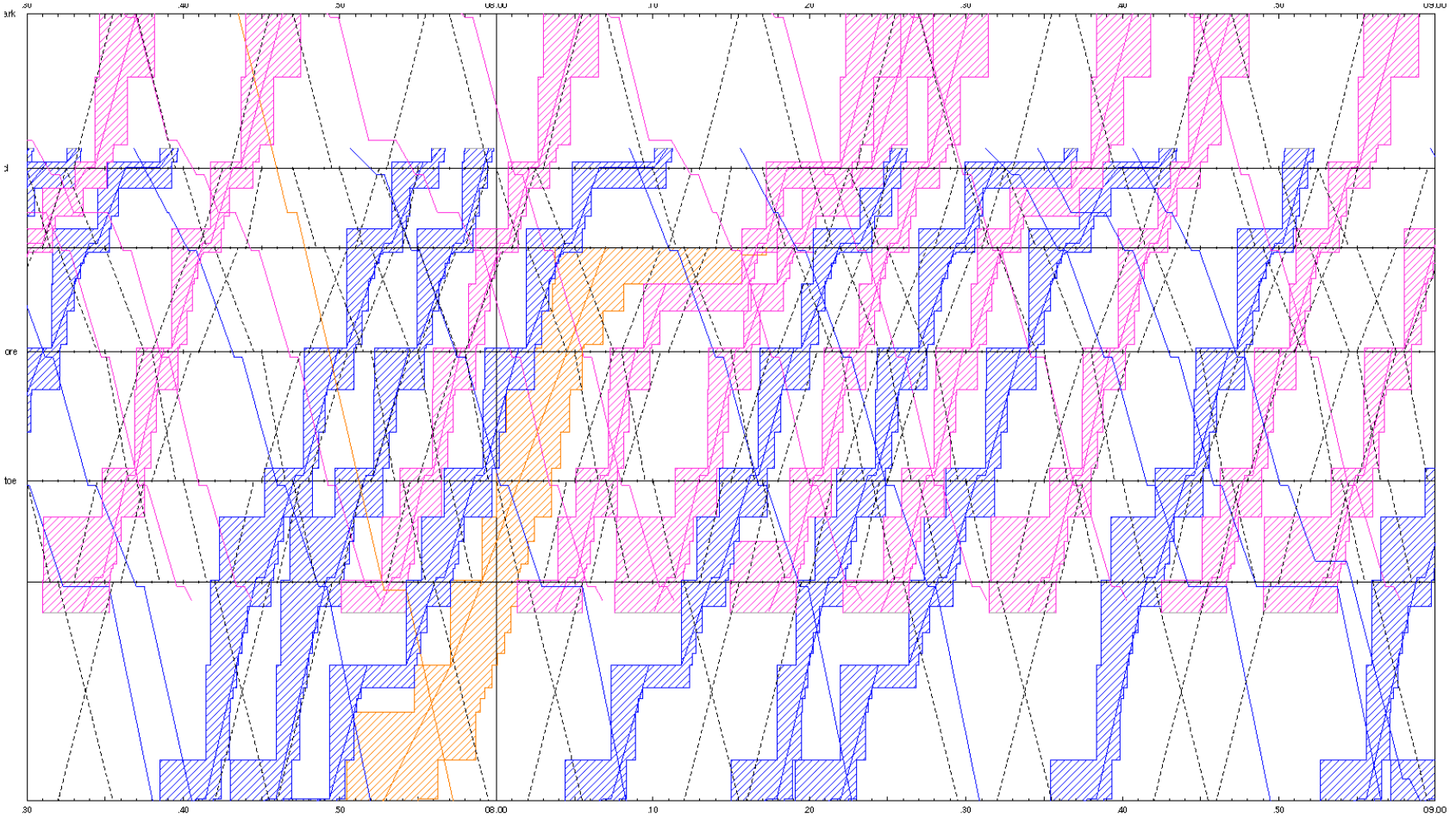
Network Simulation



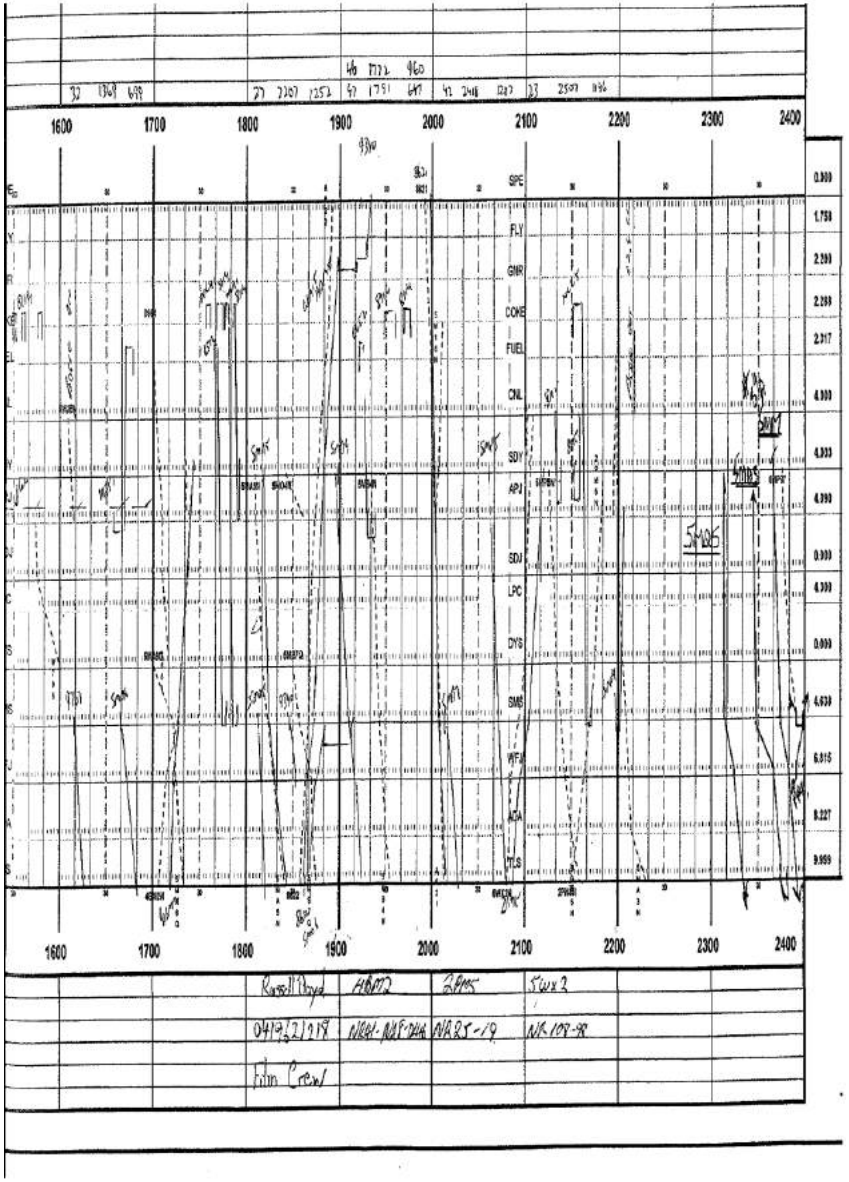
Network Provider's Requirements

- Rail industry still has multiple below rail network owners / lesee's each with differing requirements.
- Enter and Exit the Network at Line Speed
- Use Standard Components
- Train shunting to be carried out clear of the mainline.
- Passenger services have priority.
- Network owner may have a different agenda
- Network owner will not usually maintain terminal

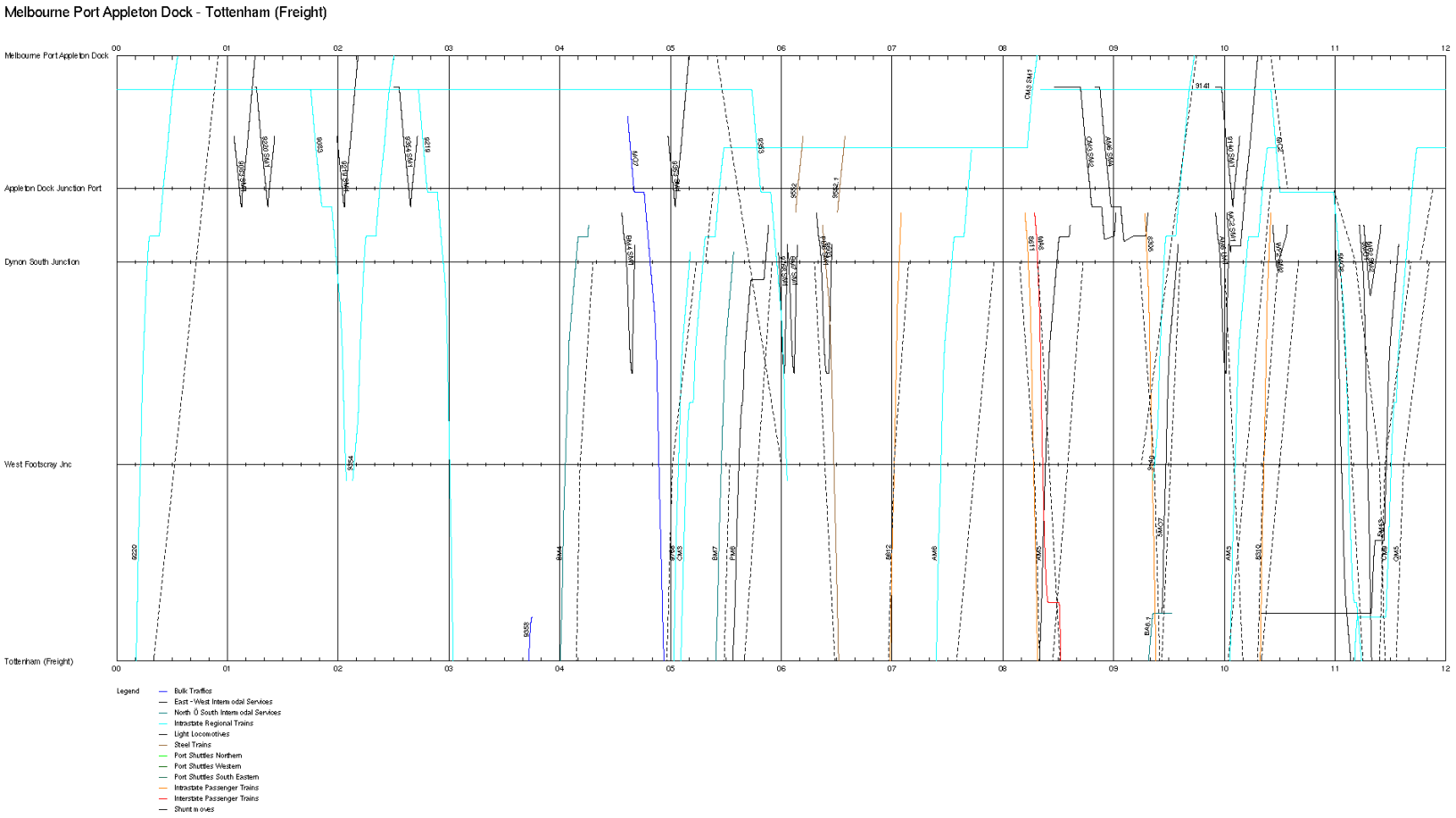
Network Providers Requirements



Network Providers Requirements

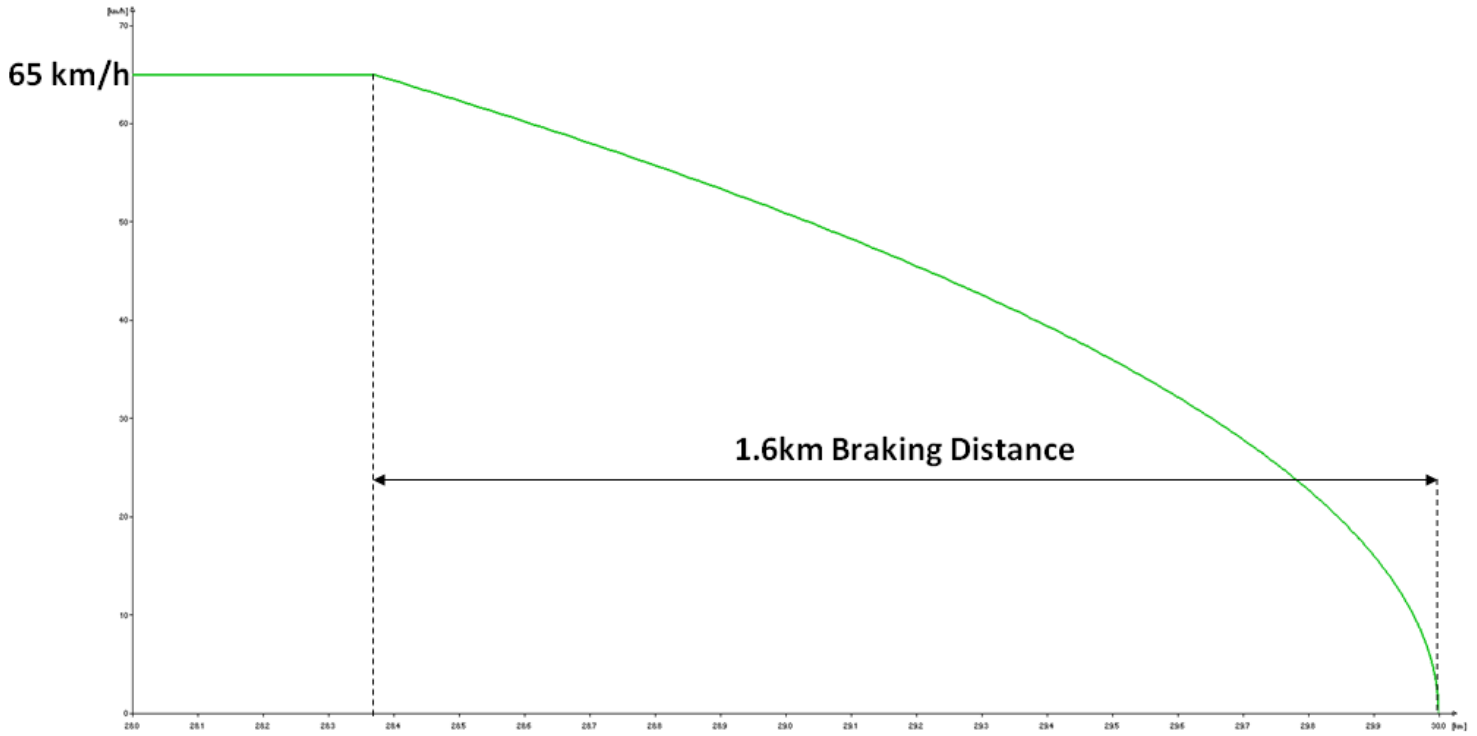


Network Providers Requirements



Stopping Distance

- 4,400t freight train
- Travelling at 65 km/h



Rail Safety and OH&S

- Rail Safety
  - Covered by 7 state/territory regulators
  - SA, NT, Vic, NSW, Qld, WA, Tas
  - New requirements for private sidings require partial or full accreditation.
- Occupational Health and Safety
  - Terminals after rail crossings are the most dangerous places on the railway due to:
    - Lack of safe standing areas
    - Long rates of wagons being pushed (without a loco on the front)

Technology

New technologies providing market advantage

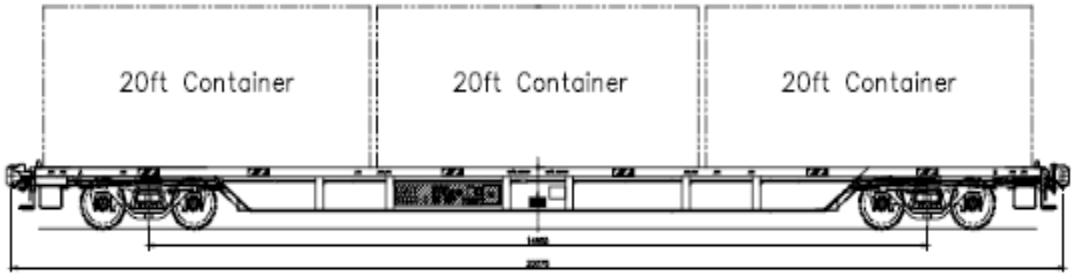
- ECP Brakes
- Distributed motive power
- ATMS
- Automated Vehicle Inspection
- I.T.
- Automation

Throughput

TEU pa	15,000	20,000	25,000	30,000	60,000	120,000	180,000
Trains pa (205 TEU / train)	73	97	121	146	291	583	874
Trains per day (205 TEU / train)	0.2	0.3	0.4	0.4	0.9	1.8	2.6
Trains per annum (75 TEU / train)	200	267	333	400	800	1,600	2,400
Trains per day (75 TEU / train)	0.6	0.8	1.0	1.2	2.4	4.8	7.3

Note 30 % rail mode share approx 600,000 TEU pa

Axle Loads



- CQGY Wagon
- Tare weight (19.5t)
- Gross mass (92t)

Average Container Weight	Gross Mass (3 containers)	Gross Mass (2 containers)	Axle Load (3 containers)	Axle Load (2 containers)
16t	67.5t	51.5t	16.875t	12.875t
20t	79.5t	59.5t	19.875t	14.875t
28t	103.5t	75.5t	25.875t	18.875t
34t	121.5t	87.5t	30.375t	21.875t

Reference:

- CFCLA Wagon Data Sheet (CQGY)
- Loading in red text beyond wagon capacity

Axle Loads

- VQCX Wagon
- Tare weight (20t)
- Gross mass (80t)

Average Container Weight	Gross Mass (3 containers)	Gross Mass (2 containers)	Axle Load (3 containers)	Axle Load (2 containers)
16t	68t	52t	17t	13t
20t	80t	60t	20t	15t
28t	104t	76t	26t	19t
34t	122t	88t	30.5t	22t

References / Notes:

- ARTC Train Operating Conditions Manual (2009)
- Loading in red text beyond wagon capacity

Allowable Axle Loads

Rail Network	Allowable Axle Load	Potential Axle Load
Victorian BG	20t	23t
ARTC	23t	25t
AAR	32t	35t

Maintainability

- Preferred maintainer multi skilled terminal staff.
- Avoid use of timber components.
- Avoid use of components for which there is no “spares” pool such as 47 kg/m rail, VRI turnouts.

Rail Size

Rail Size	Sidings Maximum Axle Load
41 kg/m	23t
47 kg/m	25t
53 kg/m	25t
60 kg/m	30t

- Axle load only achievable with long life sleepers, well maintained geometry, low volume

Design Parameters

Parameter	Standard	Absolute Minimum	Desirable Minimum
Curve Radius	ARTC	150 m	200 m
Length of Straight Between Curves	ARTC	13 m	60 m

Source ARTC Code of Practice

Design Parameters

Parameter	Standard	Absolute Minimum	Desirable Minimum
Curve Radius	RailCorp	160 m	200 m
Length of Straight Between Curves	RailCorp	13 m	13 m
Turnout Crossing Angle	RailCorp	1:8.25	1:9
Max Gradient	RailCorp	1 in 80	1 in 100

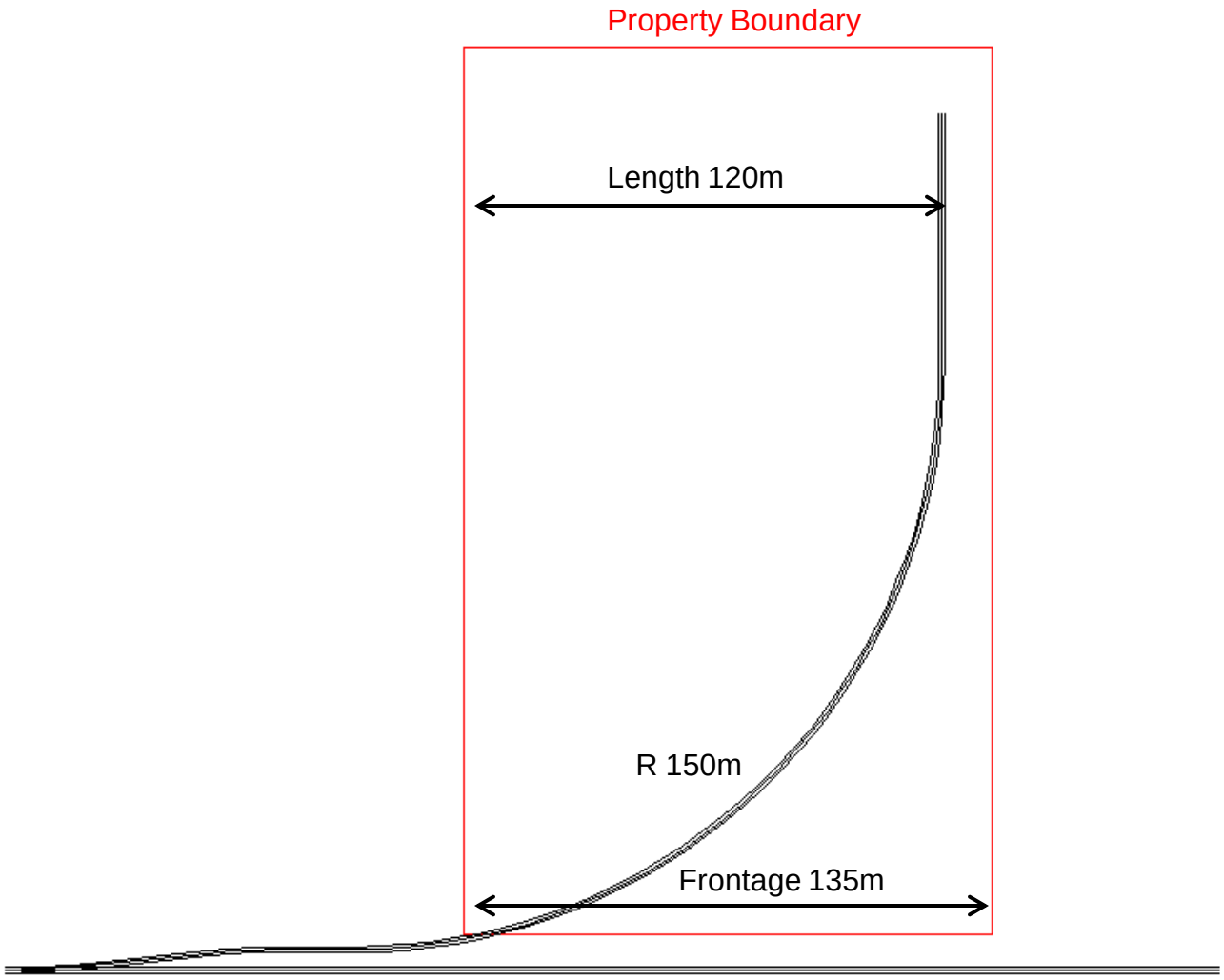
Source RailCorp Standard ESC210

Design Parameters

Parameter	Standard	Absolute Minimum	Desirable Minimum
Curve Radius	VRI	150 m	200 m
Length of Straight Between Curves	VRI	15 m	15 m
Turnout Crossing Angle	VRI	1:7.5	1:8.7
Max Gradient Approach Sidings	VRI	1 in 50	1 in 100
Max Gradient	VRI	1 in 250	

Source Metrail Track Design Guide

Narrow Frontage

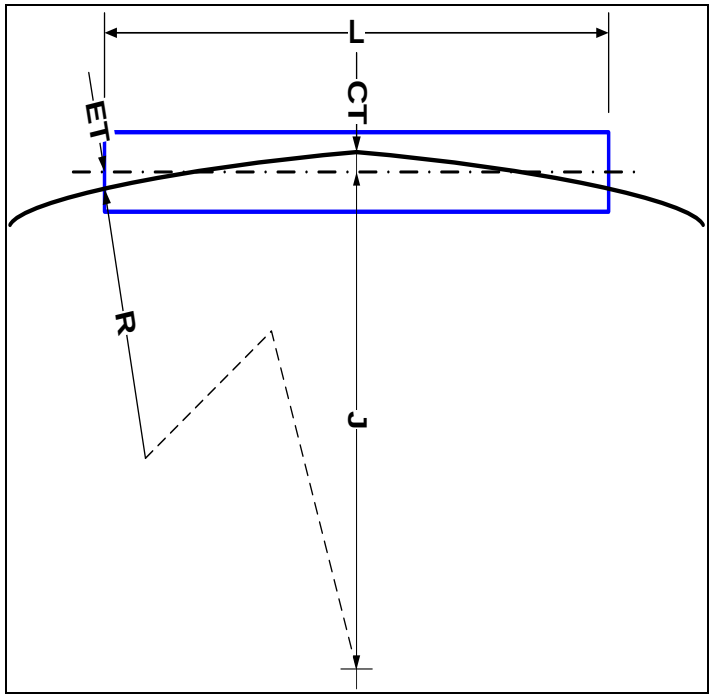


Clearances

- Separation between tracks to allow to trains to load simultaneously
- Issues surrounding use of the “minimum” values
  - Lack of safe standing
  - Increase in maintenance cost
  - Increase in wear and noise
  - Decrease in reliability/availability
  - Slower Operation as area has to be “locked out” to move trains

Clearances

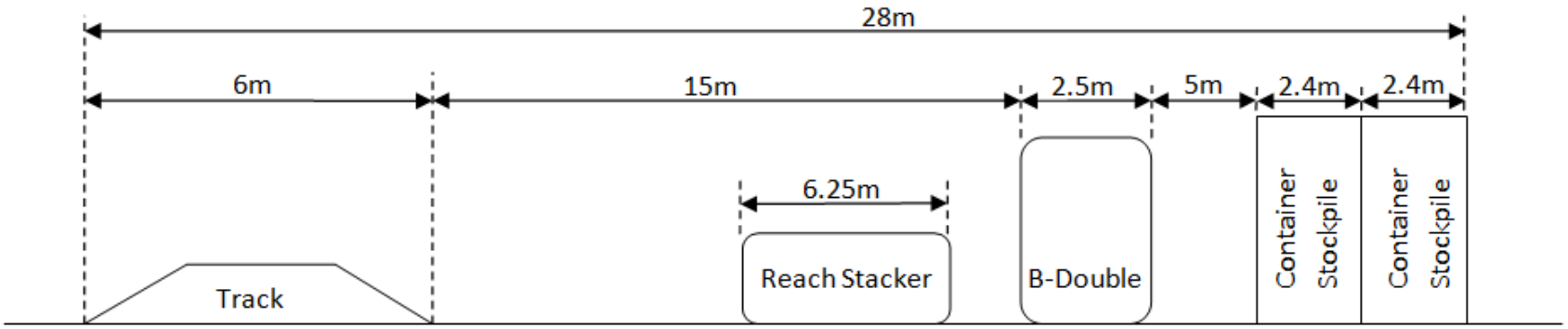
- Centre and end throw refer to the sweep path clearance required at the centre and ends of the vehicle



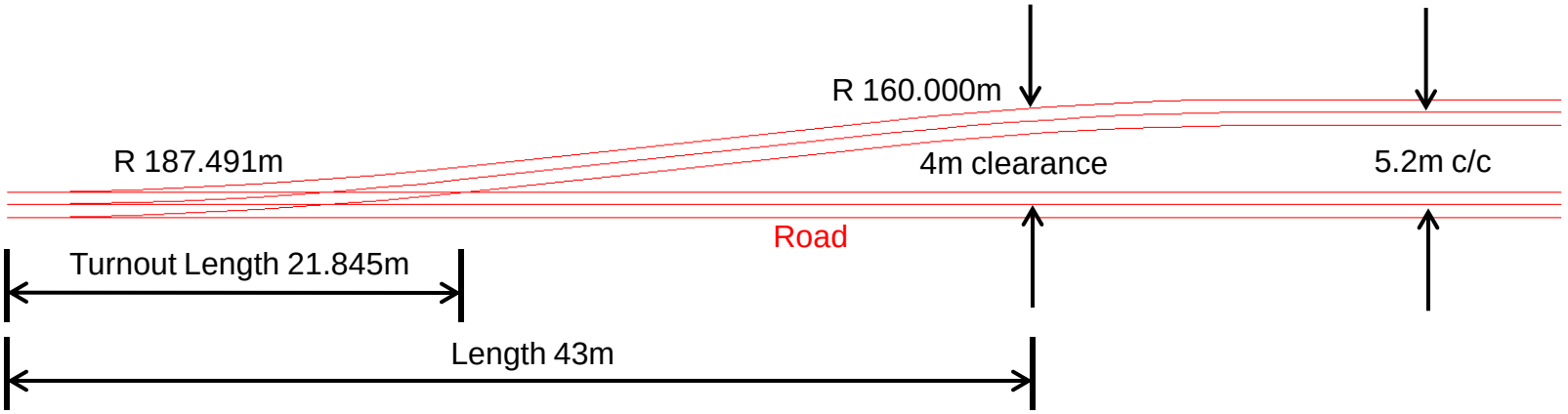
Reference:

- Rail Industry Safety and Standards Board (RISSB) – Clearances 2.5.2

Terminal Cross Section



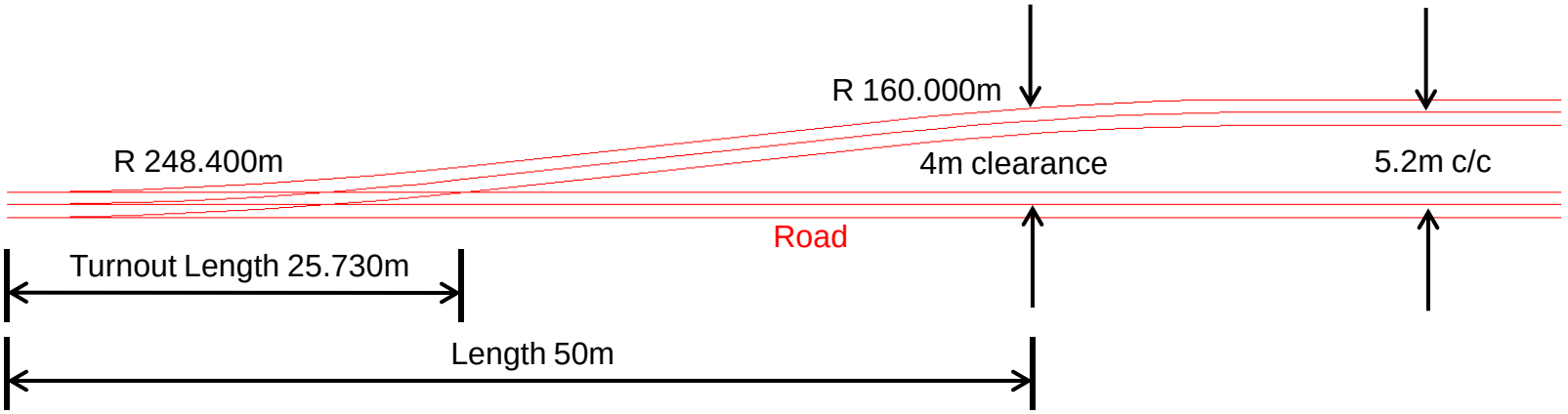
Turnout 1 in 9 [NSW]



Reference:

- ARTC Structure Gauge 1994 - BDS12
- ARTC Standard Turnouts - LDS 02
- ARTC Basic Track Design Standards - TDS 06

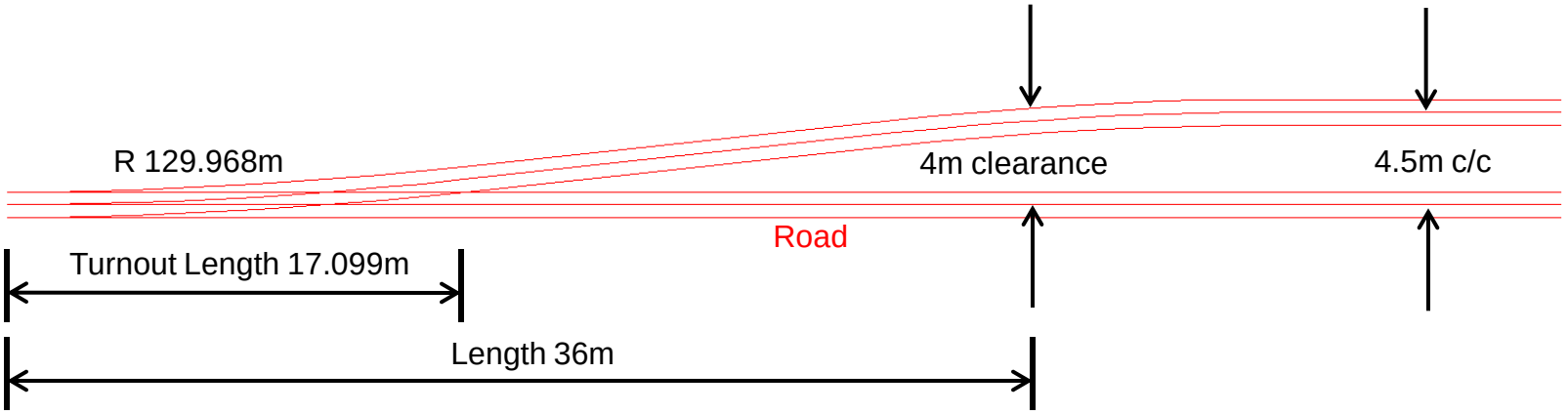
Turnout 1 in 10.5 [NSW]



Reference:

- ARTC Structure Gauge 1994 - BDS12
- ARTC Standard Turnouts - LDS 02
- ARTC Basic Track Design Standards - TDS 06

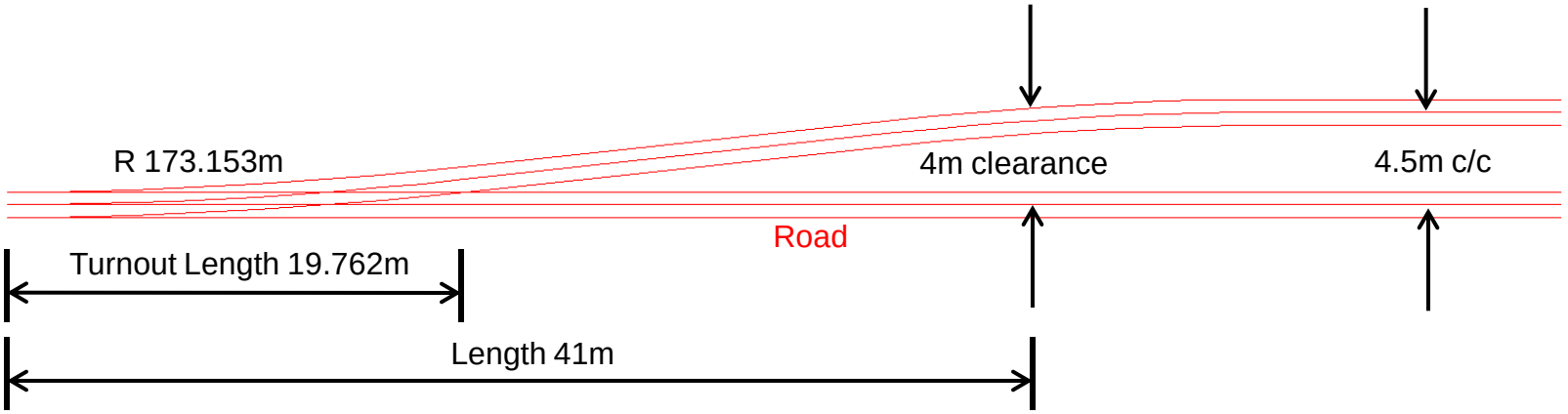
Turnout 1 in 7.52 [VIC]



Reference:

- Metrail Track Design Manual

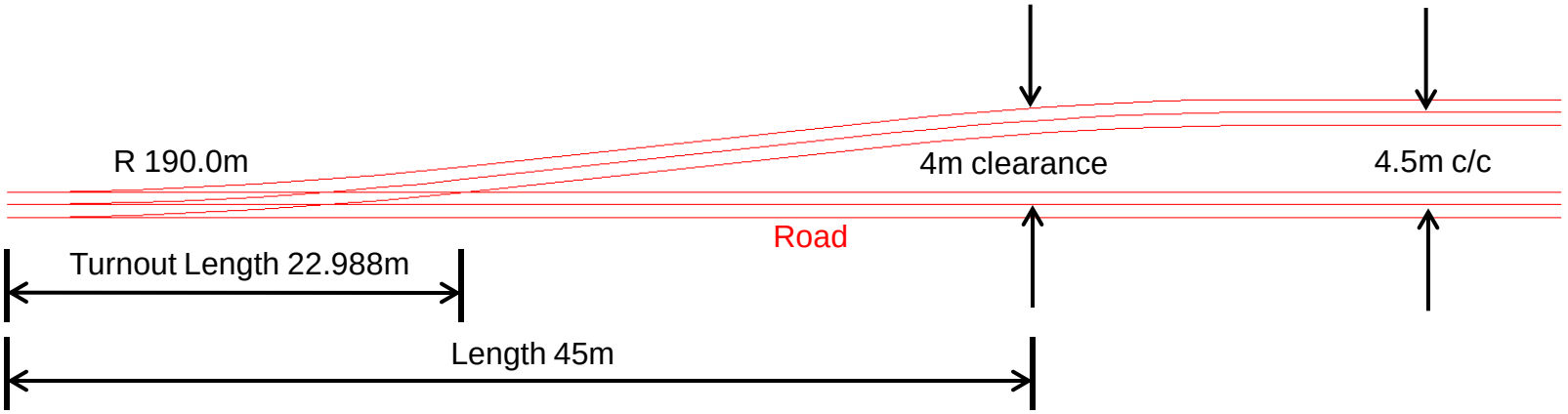
Turnout 1 in 8.7 [VIC]



Reference:

- Metrail Track Design Manual

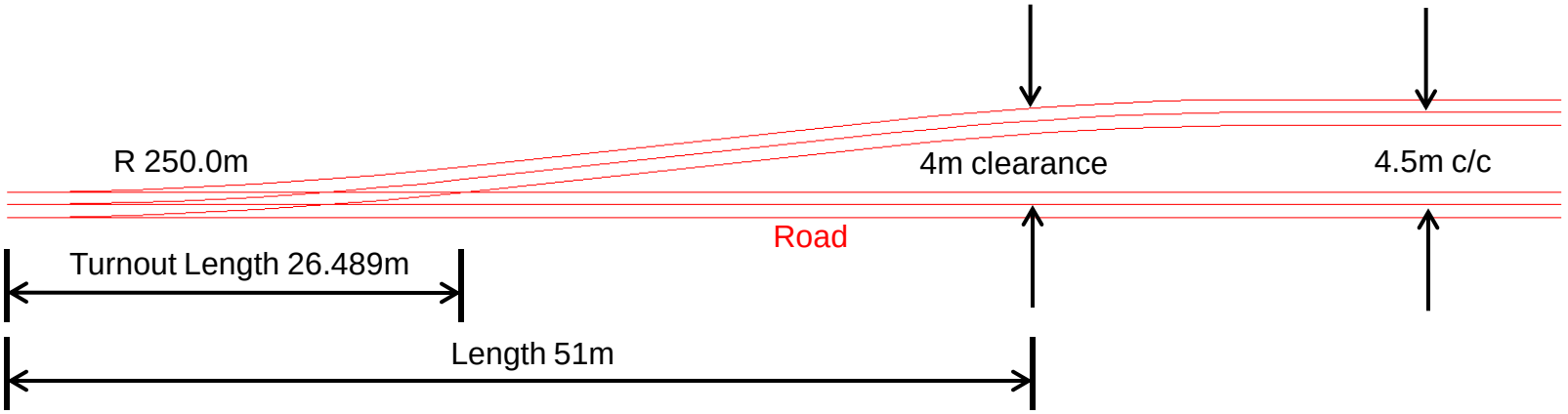
Turnout 1 in 9 [VIC]



Reference:

- VRIOG 001 (2005) – Structure Gauge Envelopes
- ARTC Track and Civil Code of Practice – Section 3: Points and Crossings

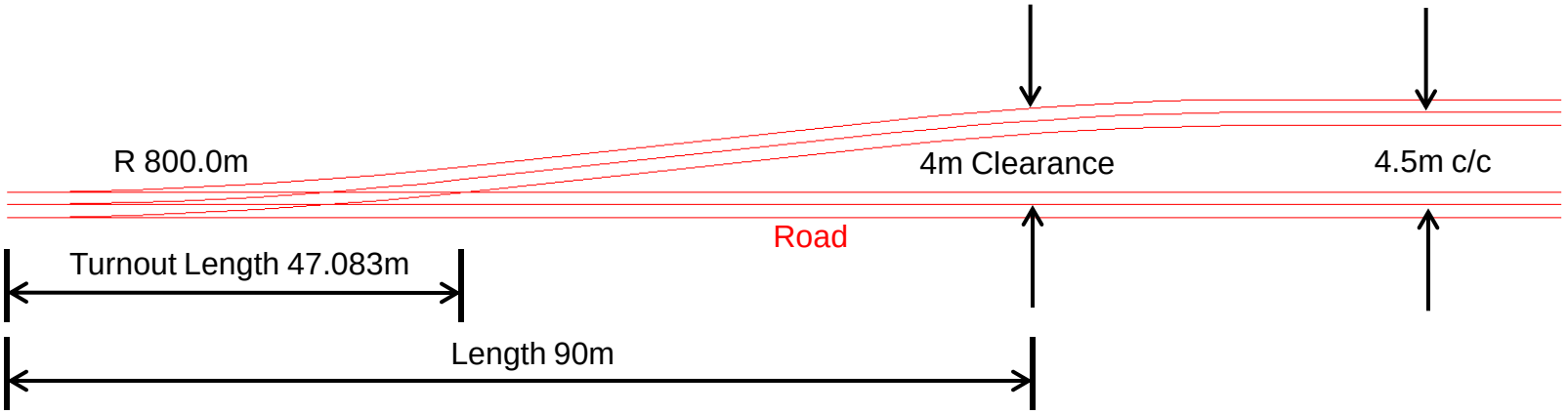
Turnout 1 in 10.5 [VIC]



Reference:

- VRIOG 001 (2005) – Structure Gauge Envelopes
- ARTC Track and Civil Code of Practice – Section 3: Points and Crossings

Turnout 1 in 18.5 [VIC]



Reference:

- VRIOG 001 (2005) – Structure Gauge Envelopes
- ARTC Track and Civil Code of Practice – Section 3: Points and Crossings

Regional Terminals

Blayney Container Terminal

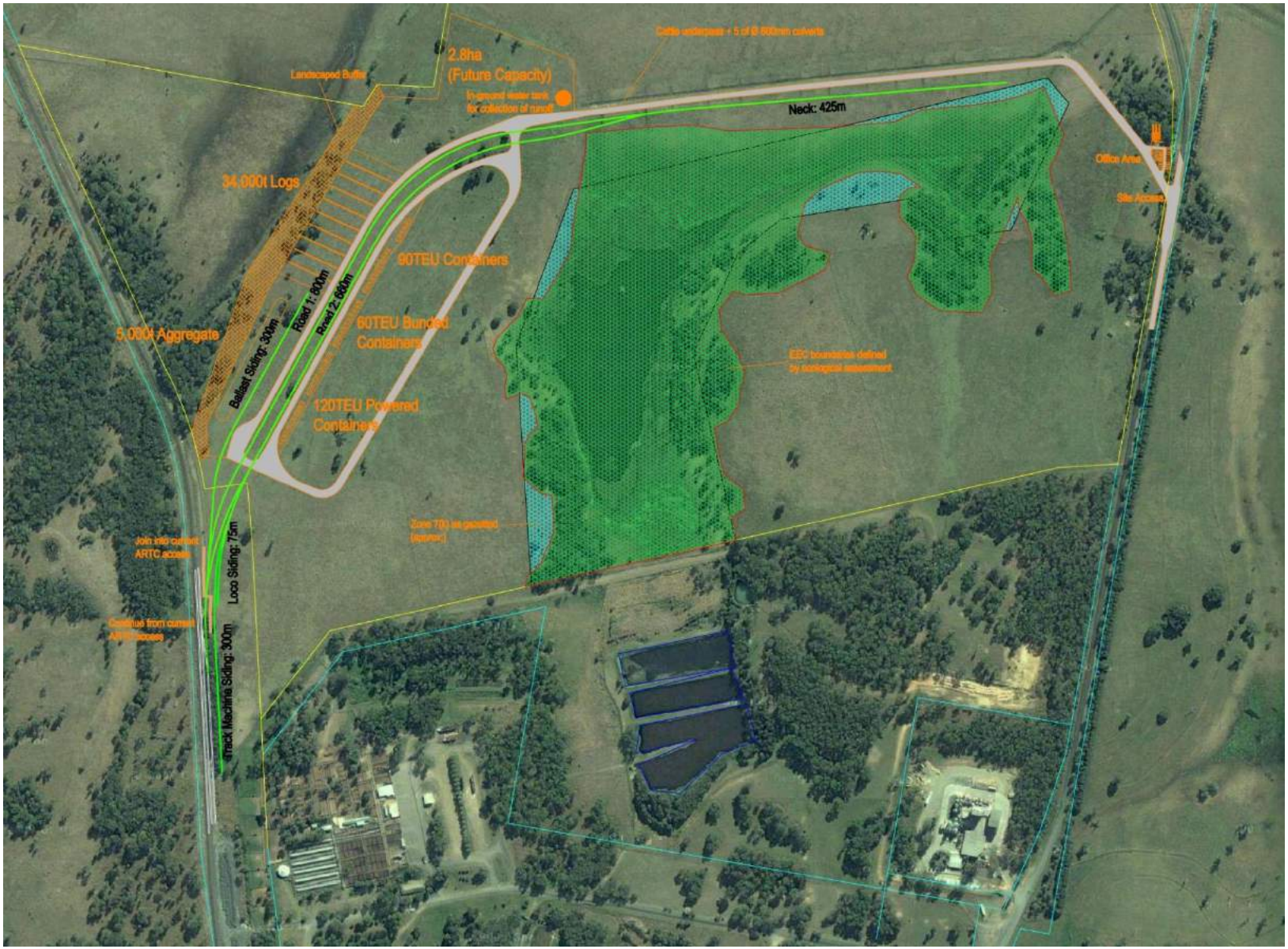
Regional Terminals

Katherine Container Terminal

Terminal Design

Mountain Industries Container Terminal Forbes

Terminal Design



Advantages of Terminal

- Uses current rail network
- Reduces transport carbon footprint
- Lower fuel costs
- Lower transport costs
- Reduces heavy vehicle traffic

Advantages of Terminal

- Remove rail activity from Casino town centre (reduced noise and blockages of level crossing)
- Moves rail terminal closer to major potential users and expanded Casino Industrial area
- Develops new regional industries (plantation timber products, speciality grains)

Glossary

Term	Definition
Turnout	Diverge between two lines
Track Centres	Distance between track centrelines
Gauge	Distance between the two rails Narrow Gauge (1067mm) Standard Gauge (1435mm) Broad Gauge (1600mm)

References

- Structure Gauge 1994 – BDS12
- ARTC Standard Turnouts – LDS02
- ARTC Basic Siding Track Design Standards – TDS06
- ARTC Track and Civil Code of Practice SA/WA and VIC – Infrastructure Guidelines Section 3: Points and Crossings
- ARTC Track and Civil Code of Practice SA/WA and VIC – Infrastructure Guidelines, Section 5: Track Geometry
- VRIOG 001 (2005) – Structure Gauge Envelopes
- Rail Industry Safety and Standards Board (RISSB) – Clearances 2.5.2