



9th Railway Working Group Meeting

10–12 June 2025 • Bishkek, Kyrgyz Republic

9-е заседание Рабочей группы по железнодорожному транспорту

10–12 июня 2025 года • Бишкек, Кыргызская Республика



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Intermodal Transshipment Facilities

Udo Sauerbrey





Outline

- Background on intermodal transport
- Planning stages of transshipment facilities
- Management models and actors involved
- Practical examples

Intermodal Transport

Intermodal transportation: The movements of freight/passengers from an origin to a destination relying on several modes of transportation.

Each modes of transport has its own advantages / disadvantages:



- Cost effectiveness over long distances
- Efficiency (1 train = 400 trucks)
- Safety
- Environmentally friendly



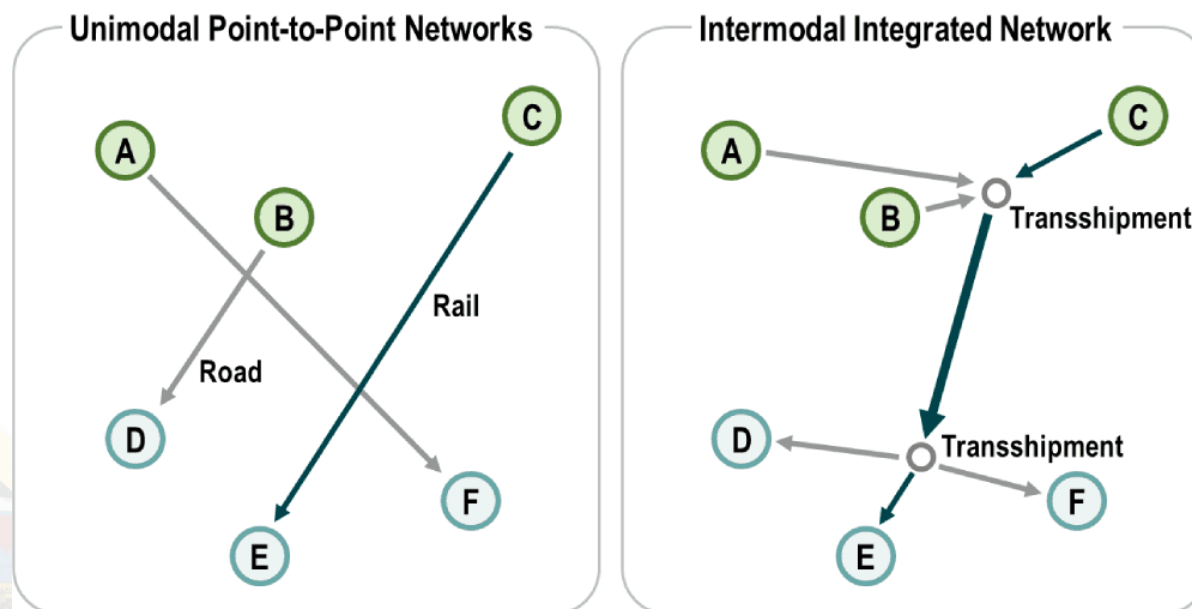
- Cost-effectiveness for shorter distances
- Flexibility
- Door to door service
- Delivery in rural areas

Combined transport: combining the strengths

Intermodal Transport

Intermodal transportation

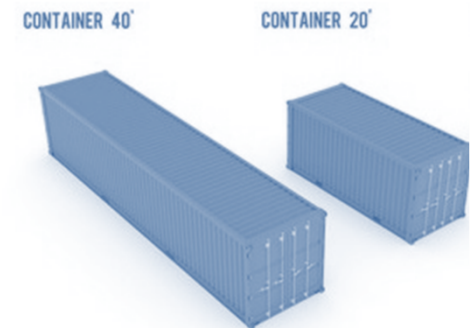
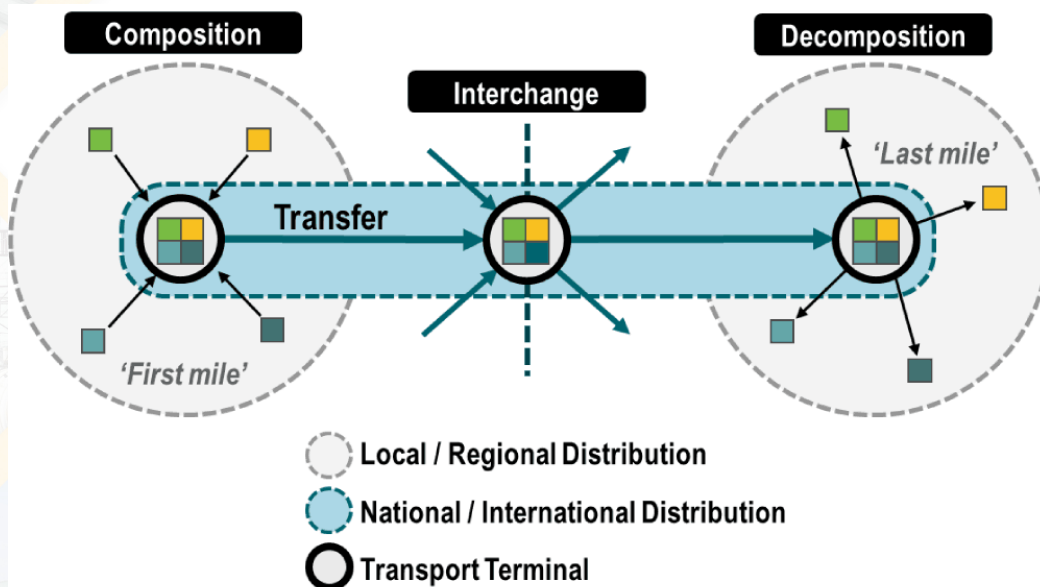
- For long distances with multiple origins / destinations
 - Rail – cost efficiency for long distances
 - Trucks – providing flexible local pick up and deliveries.



Intermodal Transport

Intermodal transportation

- Cargo does not need to be handled, just the load unit
- Standardized loading units enables transport between different modes: Containerization

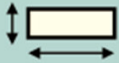


Intermodal Transport

Containerization

ADVANTAGES

Standardization



ISO standard (modes and equipment). Unique identification number and size type code.

Flexibility



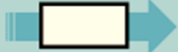
Commodities, manufactured goods, liquids and refrigerated goods.

Costs



Low transport costs. Economies of scale at modes and terminals.

Velocity



Fast transshipment operations. Low terminal turnaround times.

Warehousing



Own warehouse; simpler and less expensive packaging. Stacking capability.

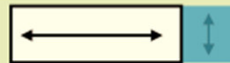
Security & Safety



Contents unknown to carriers. Reduced spoilage and losses.

DRAWBACKS

Site constraints



Large consumption of terminal space. Draft issues with larger containerships.

Capital intensiveness



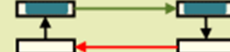
Container handling infrastructures and equipment are important investments.

Stacking



Complexity of arrangement of containers, both on the ground and on modes.

Repositioning



Divergence between production and consumption; repositioning. 20% of all containers.

Theft and losses



High value goods vulnerable to thefts, particularly between terminal and final destination.

Illicit trade



Illicit trade of goods, drugs and weapons, as well as for illegal immigration.

Solution:
Properly planned
intermodal
transshipment
facilities

Intermodal Transshipment Facilities

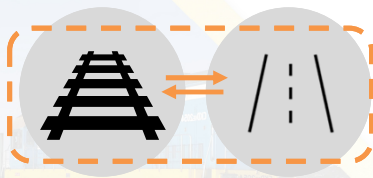
- Ports,
- Dry ports,
- Intermodal terminals (our focus: rail-road),
- Freight Villages,
- Other facilities...



Intermodal Transshipment Facilities

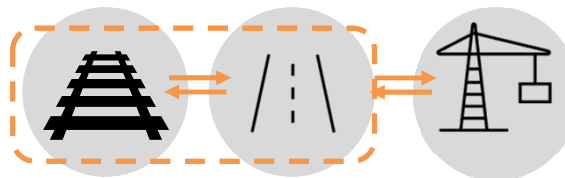
Intermodal Terminal

Represents the facilities that enable the transshipment between two modes of transport. Basic functions: Rail connection, road connection, freight handling equipment, gate, administration.



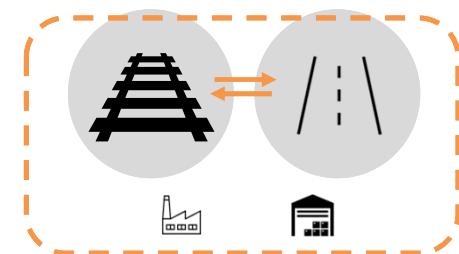
Dry Port

Intermodal terminals that are directly connected by road or rail to a seaport, operating as customs service center for the transshipment of sea cargo to inland destinations



Freight villages

Logistic centers that involve intermodal transshipment facilities together with other logistics related functions such as warehousing and other actors from the industry

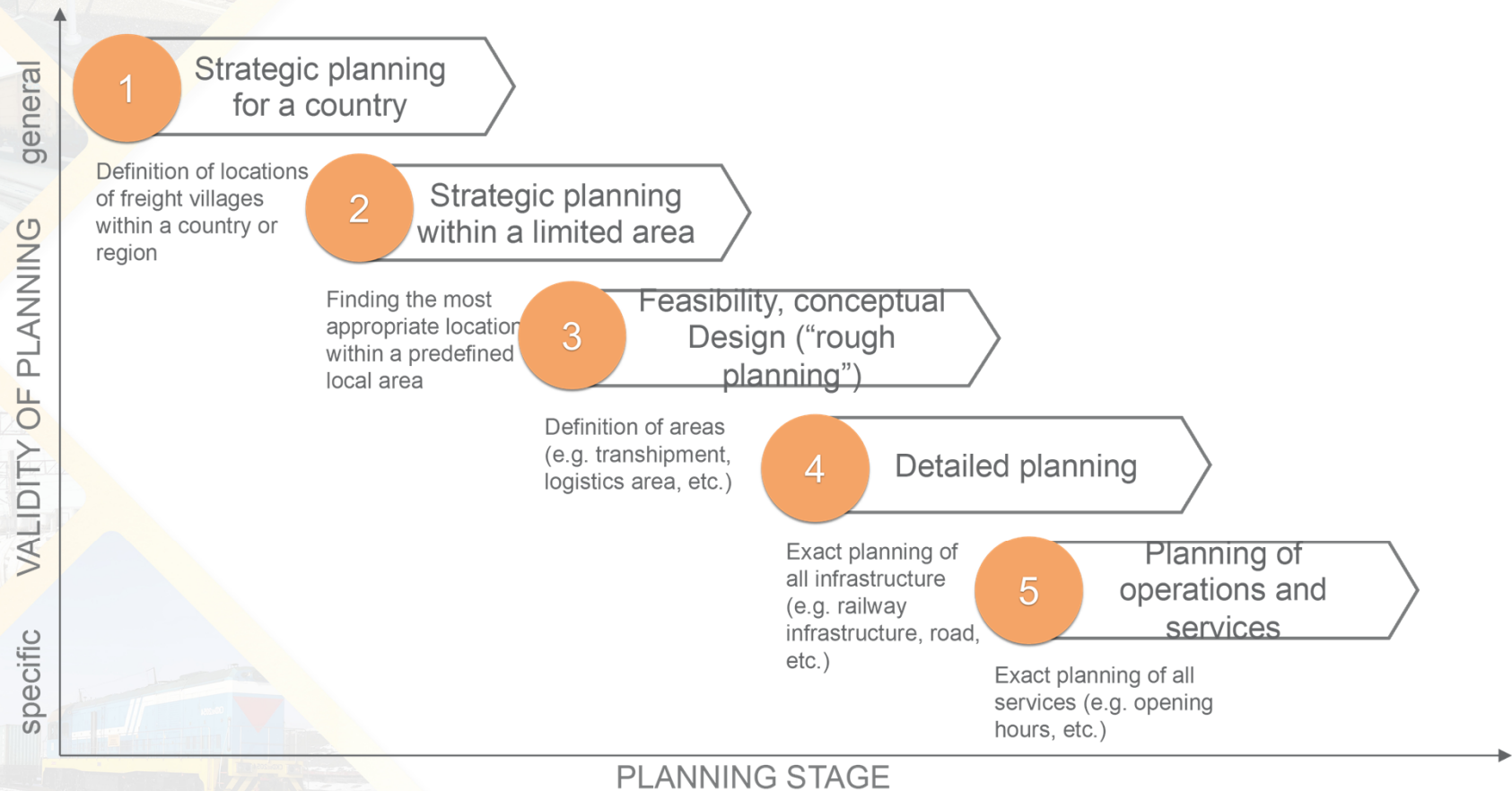




INTERMODAL TERMINAL PLANNING STAGES

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Intermodal Terminal Planning Stages



Intermodal Terminal Planning Stages

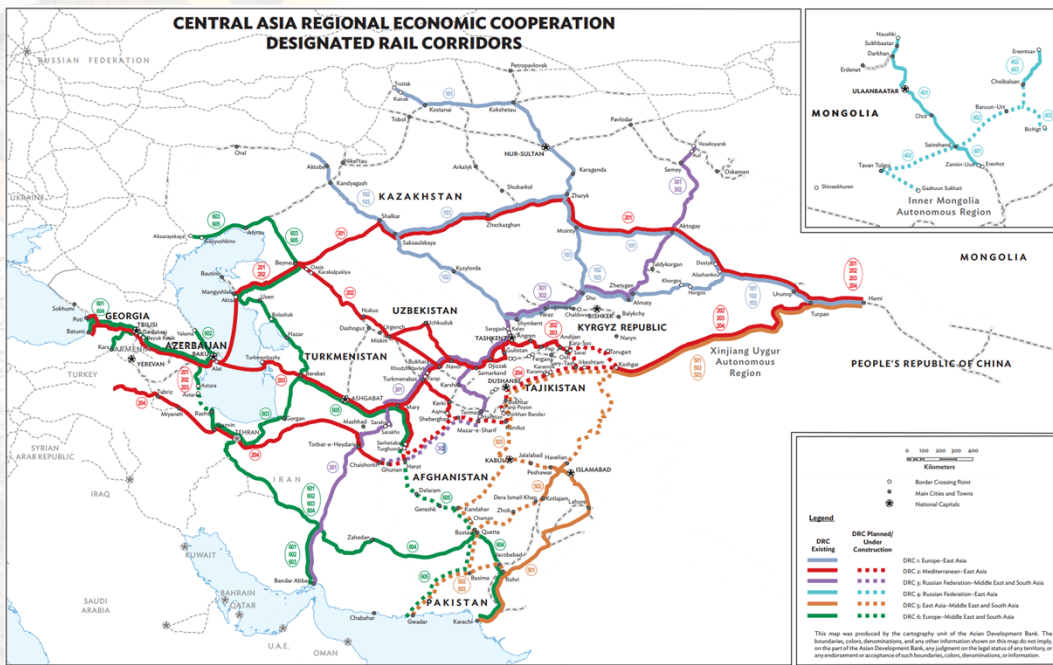
Strategic planning for a country

Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning



Definition of the most important areas that have the highest potential for freight villages based on

- International transport corridors and their relation to the country,
- National transport corridors,
- Forecast of the freight volumes on the corridors,
- Strategic decisions at national or regional level regarding development of logistic and transport sector, etc..

Intermodal Terminal Planning Stages

Strategic planning for a country

Strategic planning for a region

Feasibility study, design

Detailed planning

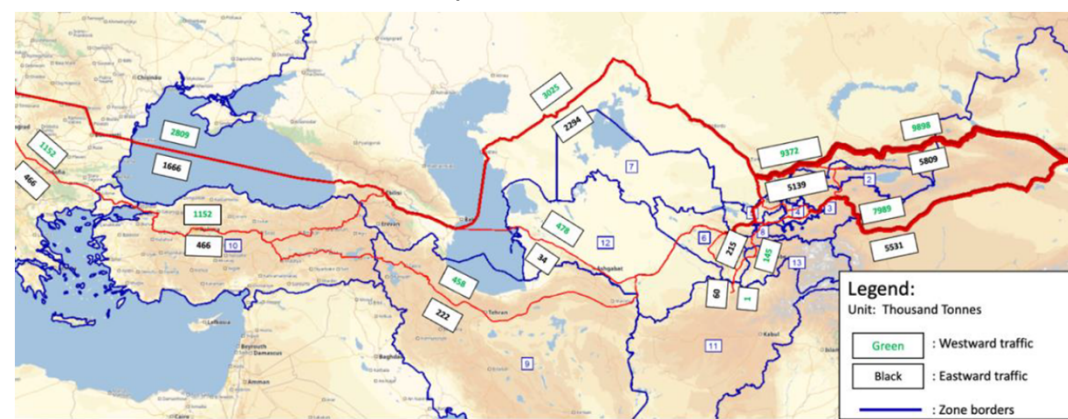
Operational planning

Identification of main trade routes



Source: <https://automotive.messefrankfurt.com/global/en/facts-figures/growth-market-central-asia.html>

Identification of main transport flows and directions



Source: Consultant

Intermodal Terminal Planning Stages

Strategic planning for a country

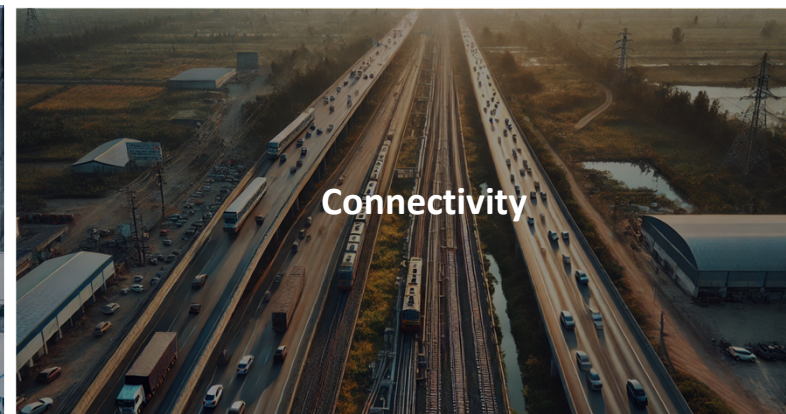
Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

Key factors influencing the location of the Intermodal Terminals



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Intermodal Terminal Planning Stages

Strategic planning for a country

Strategic planning for a region

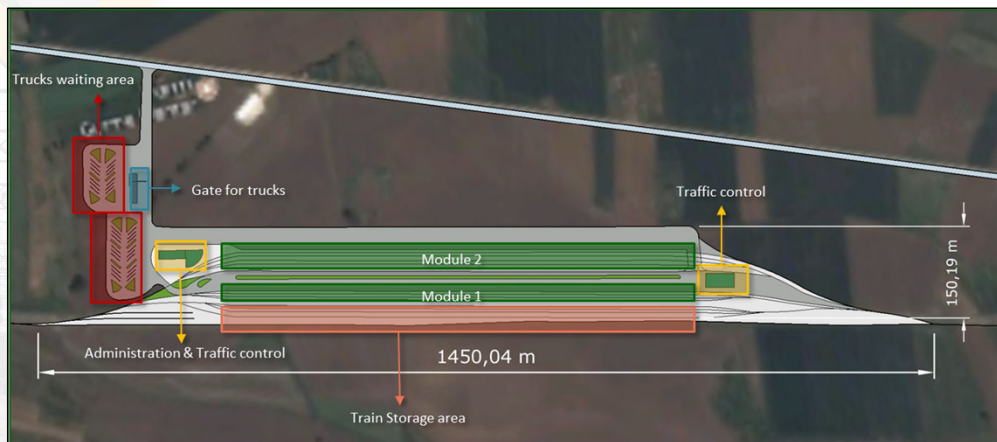
Feasibility study, design

Detailed planning

Operational planning

Feasibility study:

1. Conceptual layout(s)
2. Rail and road operations
3. Costs and revenues based on the capacity
4. Social and environmental effects



Intermodal Terminal Planning Stages

Strategic planning for a country

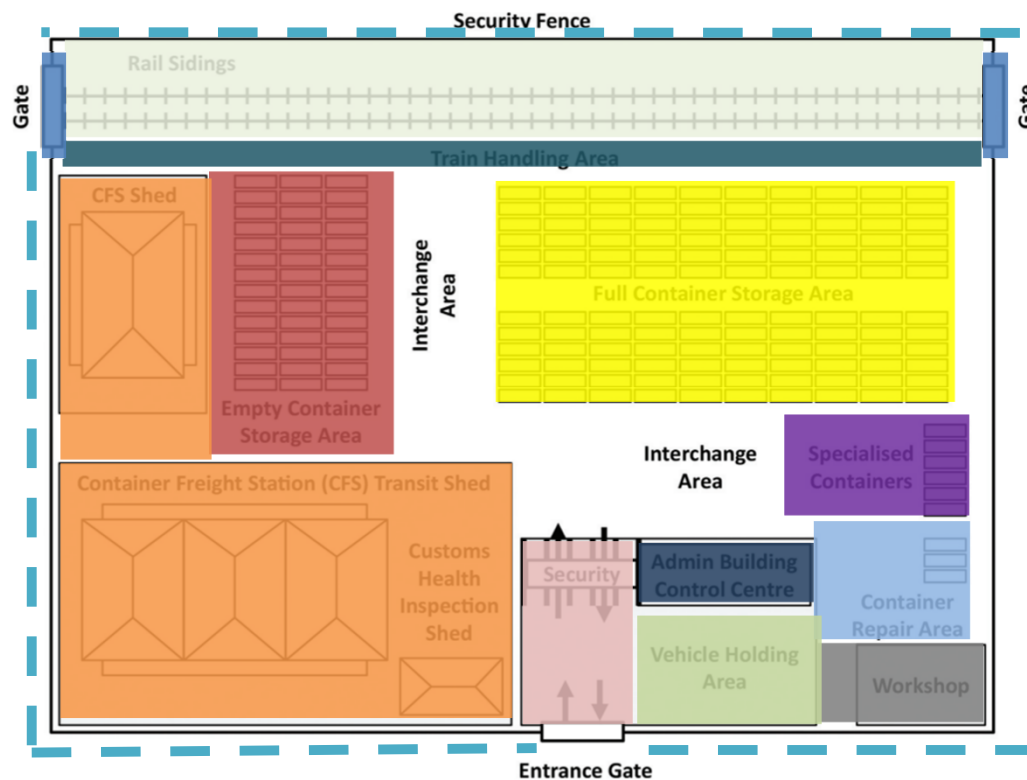
Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

1. Conceptual layout(s)



Functions of the intermodal terminal

- Rail sidings ★
- Container handling area ★
- Full container storage area ★
- Empty container storage area ★
- Specialised container storage
- Container repair area
- Workshop
- Customs inspection area
- Gate & security ★
- Truck park (Vehicle holding) ★
- Admin Building ★
- OCR Gate
- Fence

Intermodal Terminal Planning Stages

Strategic planning for a country

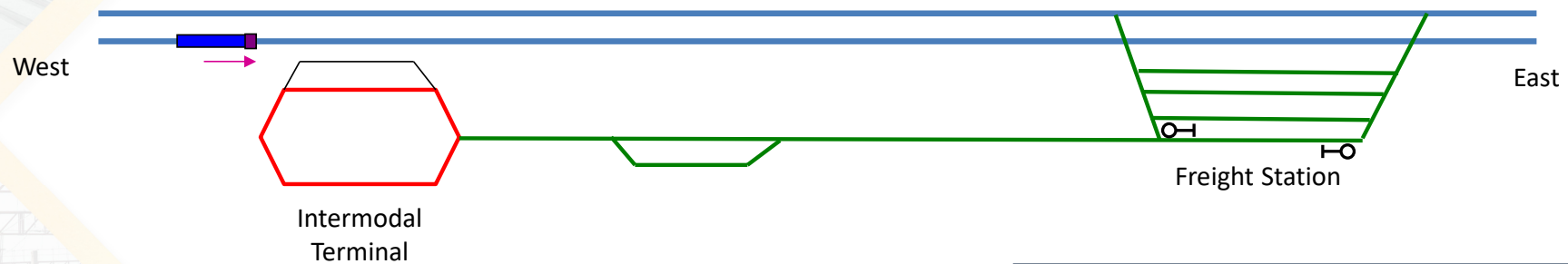
Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

2. Rail operations



	Mainline
	Subline with catenary
	Terminal tracks (non-electrified)
	Bypass track
	Signal

- Train is approaching from the west

Intermodal Terminal Planning Stages

Strategic planning for a country

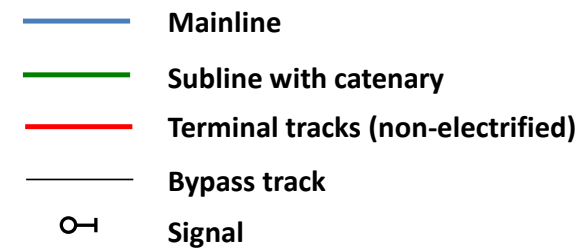
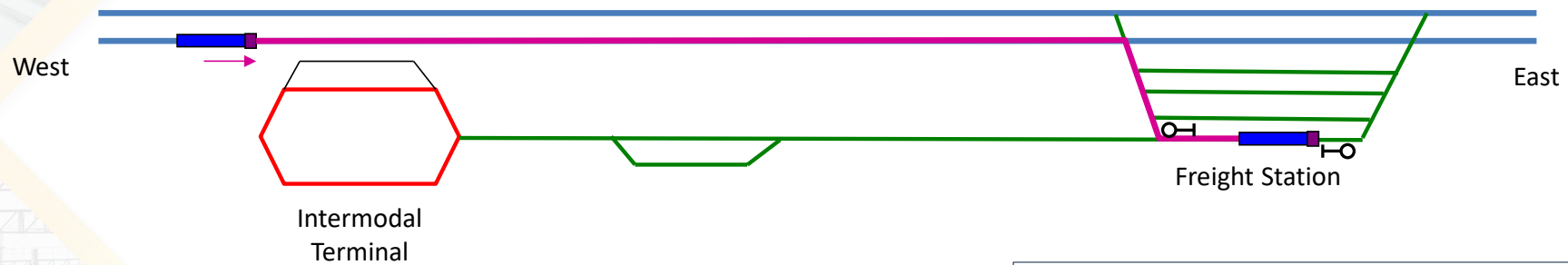
Strategic planning for a region

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Operational planning

2. Rail operations



- Train is entering to through the freight station

Intermodal Terminal Planning Stages

Strategic planning for a country

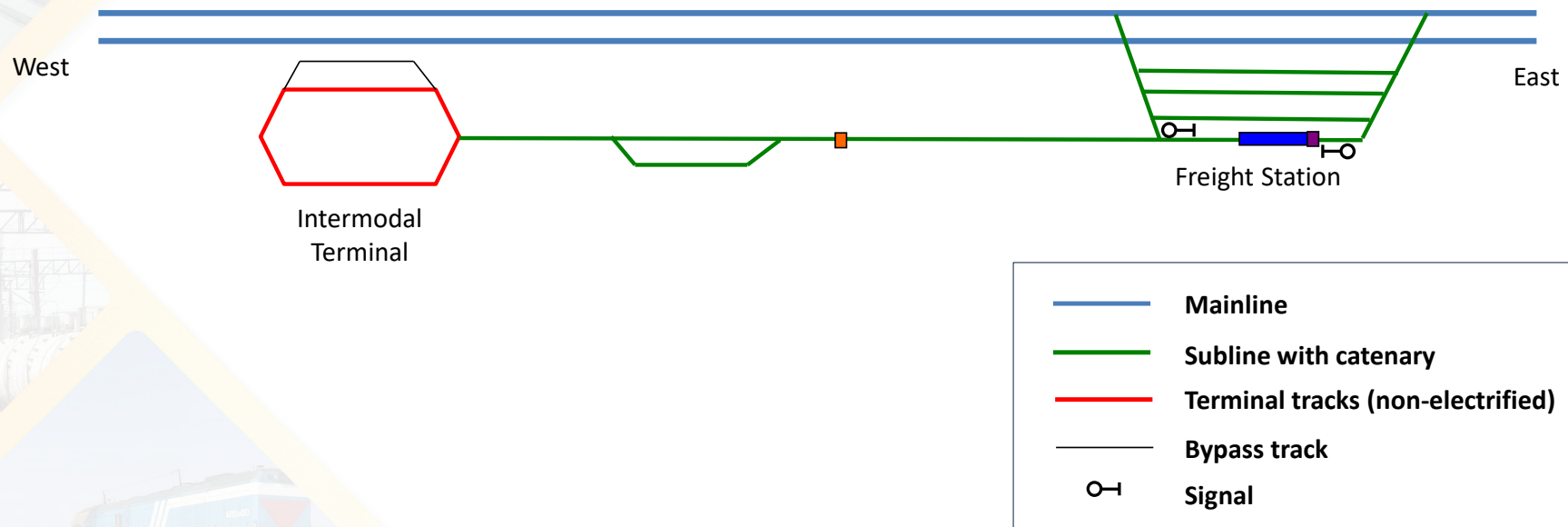
Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

2. Rail operations



- Shunting locomotive (diesel) will replace the main-line locomotive (electric)

Intermodal Terminal Planning Stages

Strategic planning for a country

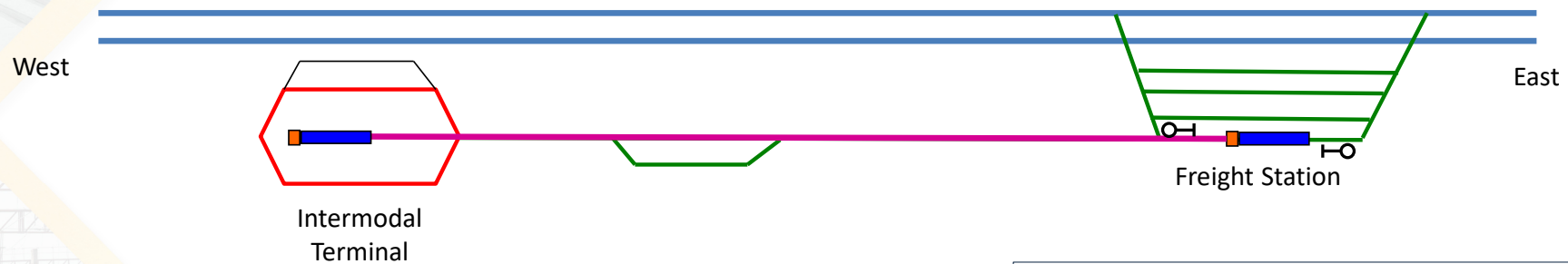
Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

2. Rail operations



	Mainline
	Subline with catenary
	Terminal tracks (non-electrified)
	Bypass track
	Signal

- Train is shunted to the intermodal terminal

Intermodal Terminal Planning Stages

Strategic planning for a country

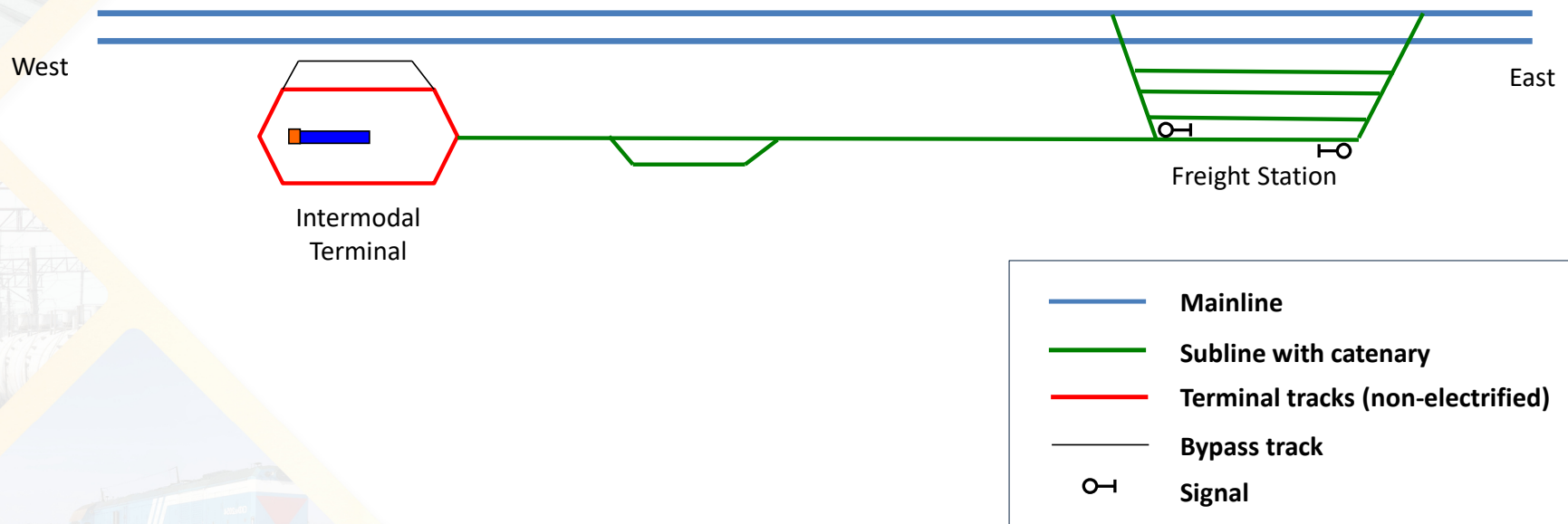
Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

2. Rail operations



- Shunting locomotive will detach and attach again to pull the train outside of the terminal

Intermodal Terminal Planning Stages

Strategic planning for a country

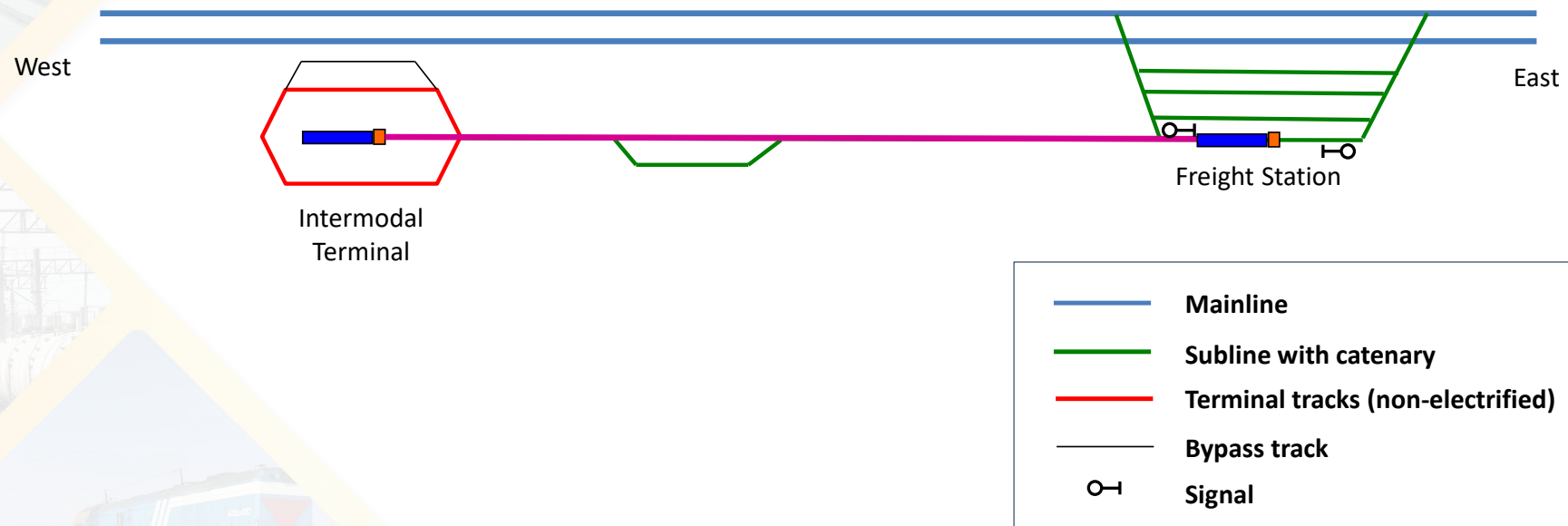
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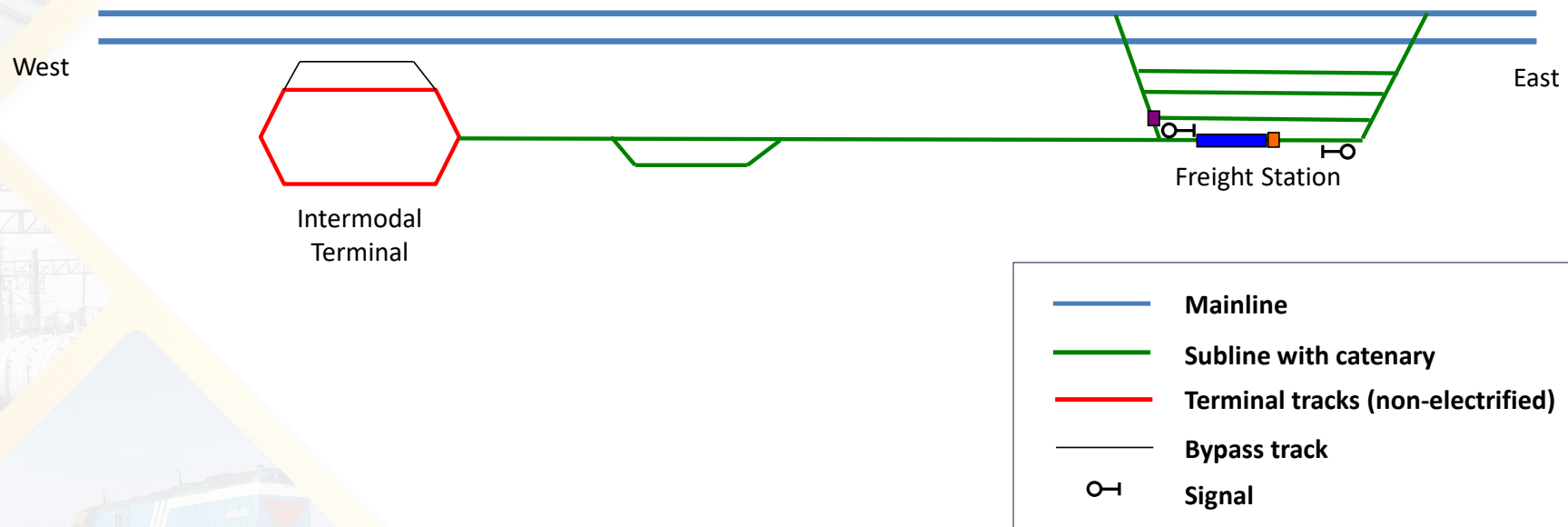
Strategic planning for a region

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Operational planning

2. Rail operations



- Main-line locomotive (electric) will replace the shunting locomotive (diesel)

Intermodal Terminal Planning Stages

Strategic planning for a country

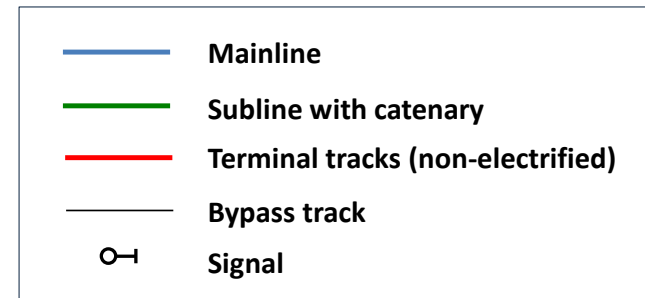
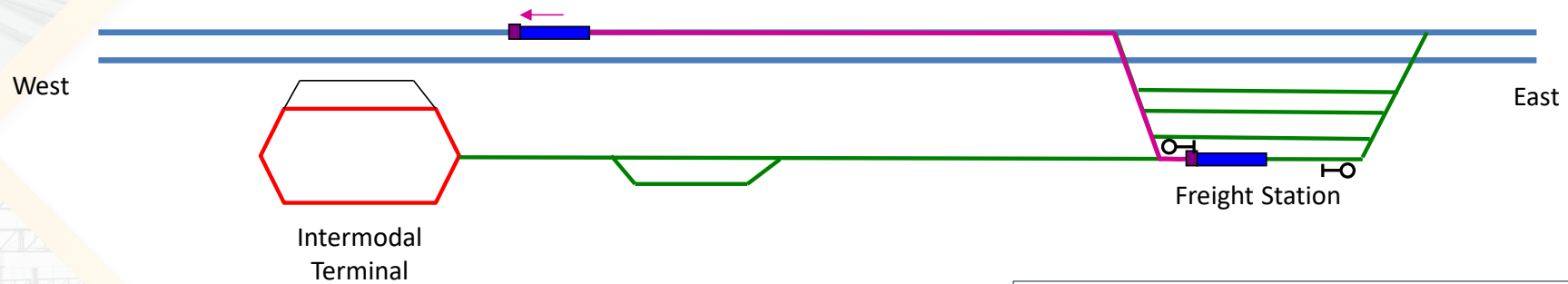
Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

2. Rail operations



- Train will leave the terminal (after examination, brake test, paperwork)

Intermodal Terminal Planning Stages

Strategic planning for a country

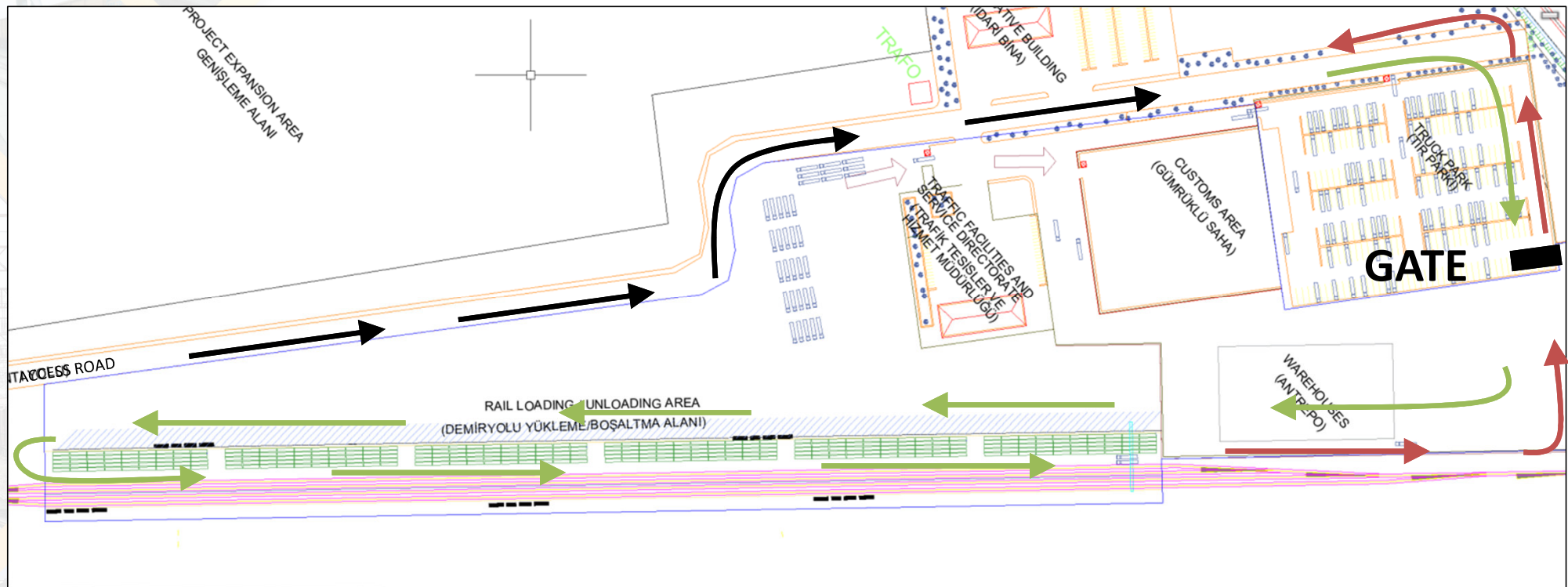
Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

3. Road operations – One-direction driving



Intermodal Terminal Planning Stages

Strategic planning for a country

Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

4. Costs and revenues based on the capacity and potential market

Internal factors:

Track capacity

Handling capacity

Storage capacity

External factors:

Network capacity & rail operations

Market development

Intermodal Terminal Planning Stages

Strategic planning for a country

Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

4. Costs and revenues based on the capacity

Straddle Carrier



Circulate over container piles. Can go over stacks up to 3 in height. Density of 500 to 700 TEU per hectare.

Rubber-tired Gantry



High storage densities (1,000 TEU per hectare). Difficult to move from one stack to the other. High acquisition but low operating costs.

Front-end Loader



Use container top anchor points. Handle most containers. Can reach stacks up to 3 in height.

Rail-mounter Gantry



Highest storage density (wide span; +1,000 TEU per hectare); mostly used at port terminals. Lowest operating costs. Fixed to rail tracks.

Reach Stacker



Flexible side loaders. Can reach stacks up to 3 full or 5 empty containers in height. 500 TEU per hectare.

Portainer



Load and unload containerships. Various sizes (Panamax and Super-Panamax).

Intermodal Terminal Planning Stages

Strategic planning for a country

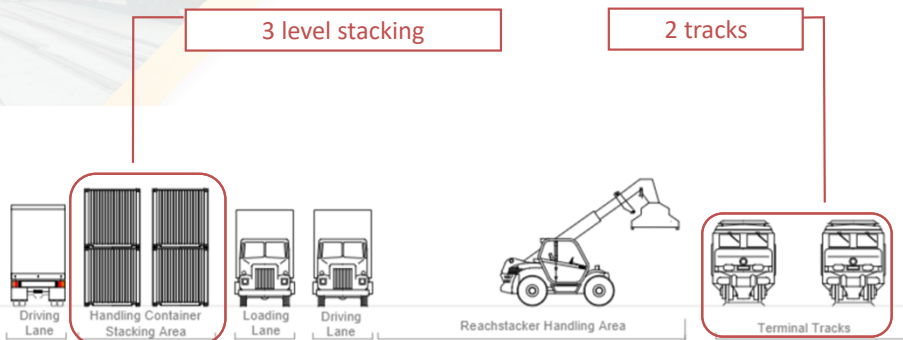
Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

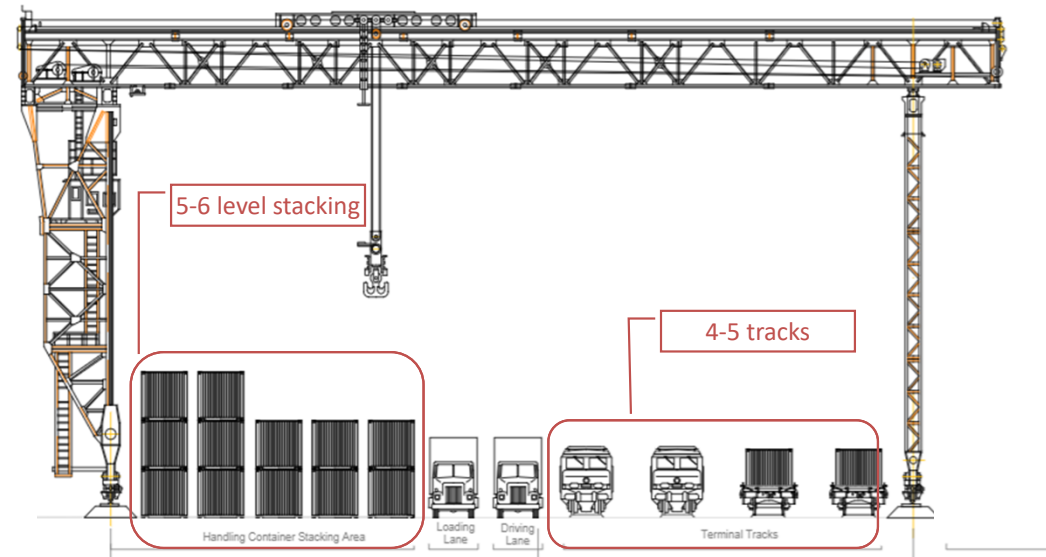
4. Costs and revenues based on the capacity



Reach Stacker Layout

- Lower investment costs
- Requirement of larger space
- Lower Capacity (handling & storage)
- Higher operational costs

20/h



Rail Gantry Crane layout

- Higher investment costs
- Compacter layout (less space)
- Higher capacity (handling & storage)
- Lower operational costs

30/h

Intermodal Terminal Planning Stages

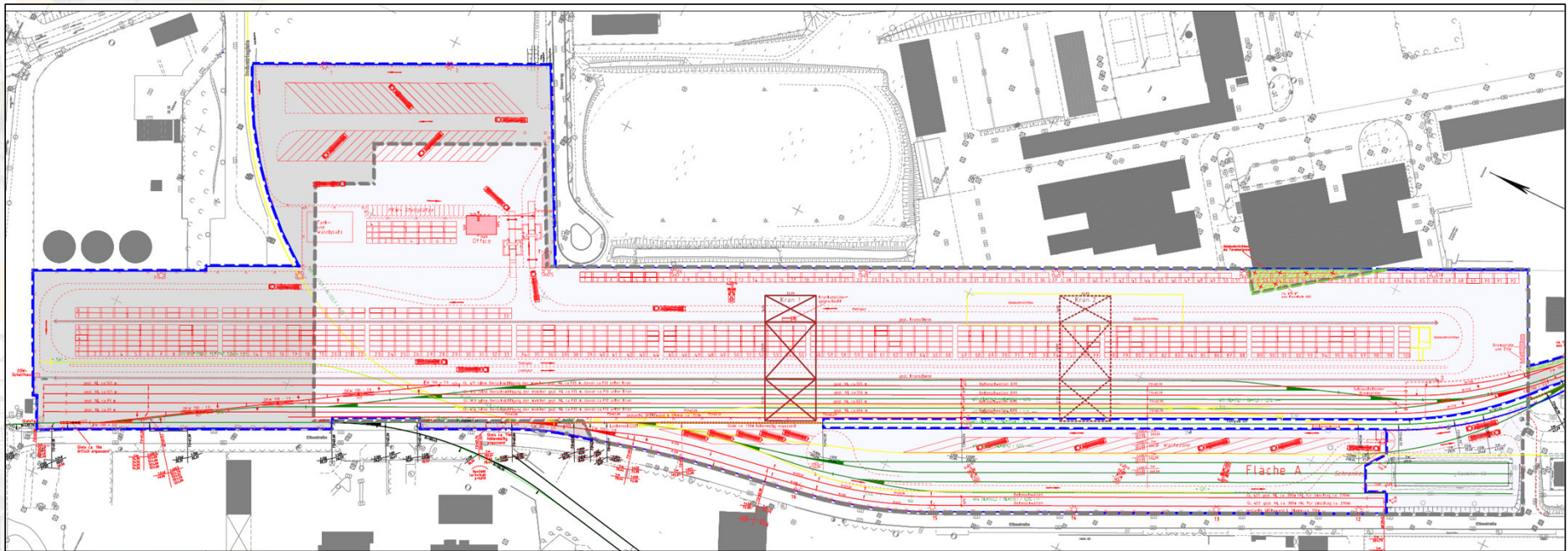
Strategic planning for a country

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Feasibility study, design

Detailed planning

Operational planning



Planning standards related to various disciplines such as:

- Railway engineering: Curve radius, switch types, etc.
- Highway planning: Truck speed, truck curve radius, stability of the asphalt
- Civil engineers
- Geological engineering: Stability of the ground, extend of earth works, etc.
- Environmental engineering: Effects of the construction and operations on the existing natural sources.

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Intermodal Terminal Planning Stages

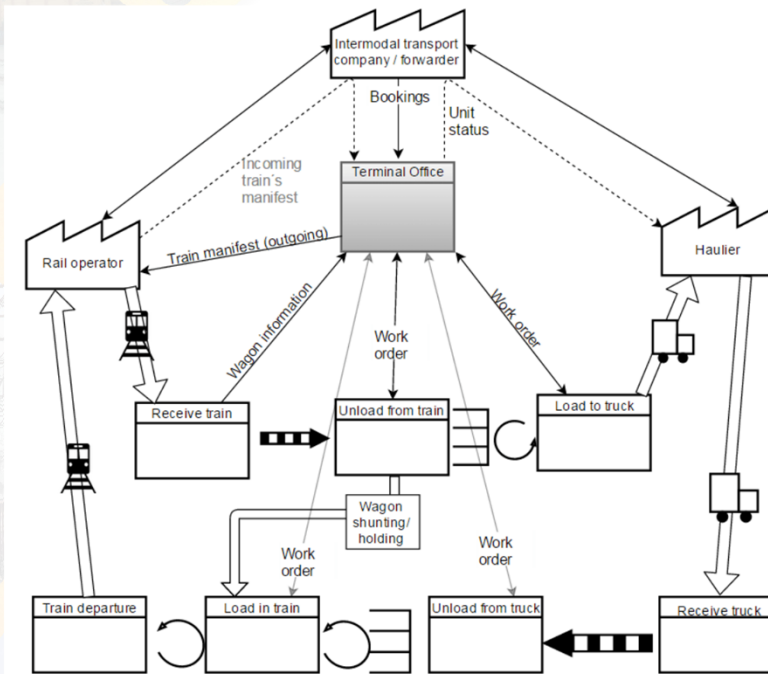
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Detailed planning

Operational planning



Depending on the scale of intermodal facility and the multiple functions it involves, the operations of different services and the correlations among them need to be planned carefully.

The services that need to be planned carefully can include:

- Booking,
- Yard control,
- Rail control,
- Billing,
- Vehicle/Crane control,
- Maintenance and repair,
- Warehouse management,
- Etc.



INTERMODAL TERMINAL MANAGEMENT MODELS

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Intermodal Terminal Management Models

Strategic planning for a country

Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

IMT operation to be performed by the state railway operator

IMT is managed by a private operator, which is in fact a public-private partnership

IMT is financed and managed by joint organizations

Intermodal Terminal Management Models

Strategic planning for a country

Strategic planning for a region

Feasibility study, design

Detailed planning

Operational planning

Regardless different governance models adopted by different countries, the common understanding of terminals should be based on the following principles:

- Principle of non-discriminative access to terminals (at least for those terminals that have received public funding):
 - Rail-side access for all licensed railway undertakings
 - Road-side access for all operators/forwarders
- Transparent capacity allocation and pricing
- Bundling of different cargoes (maritime container, continental cargoes), and market segments (international and domestic relations) and thus improved capacity utilization.

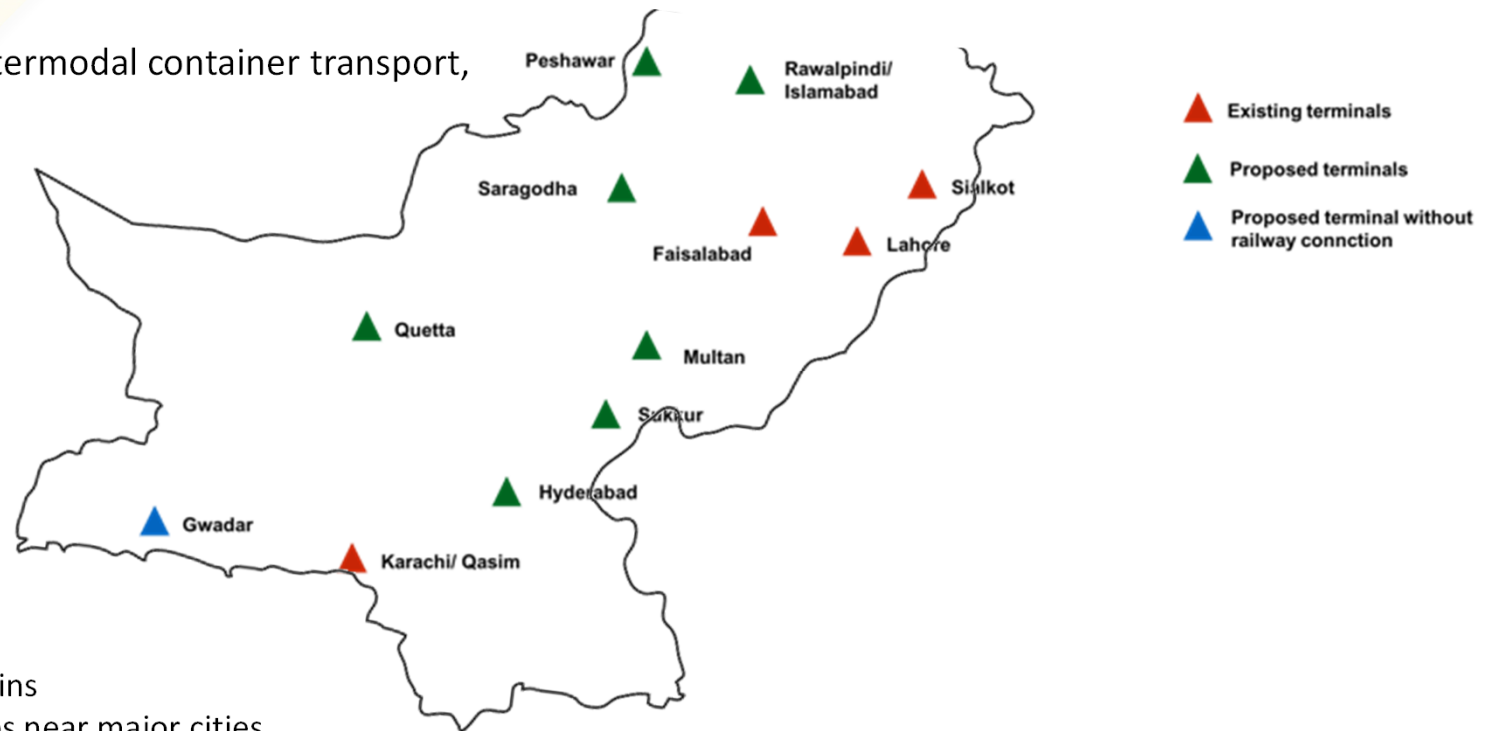


PRACTICAL EXAMPLES

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PRACTICAL EXAMPLES / PAKISTAN

Building a network of intermodal container transport,



with...

- Scheduled container trains
- Modern intermodal hubs near major cities
- Serving Karachi Port and Quasim Port for international trade and establish rail connection to Gwadar deep sea port
- Connect with trucking companies and logistics managers to organise an efficient transport chain (reduce the transport of empty containers)
- Expanded network and services based on economic demand, not on goodwill

PRACTICAL EXAMPLES / PAKISTAN

- Intermodal solutions might also serve special goods such as bulk and/or chemicals and heavy load
- Containerization allows easier combination of freight, better bundling and thus lower costs through better utilization of trains





Thank you