THE WORKINGS OF THE PORT/RAIL INTERFACE AT THE PORT OF DURBAN

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ABSTRACT

Globalisation has had a major impact on the South African economy. For countries to be competitive it necessitates adopting high quality standards and lowering logistics costs. The latter is even more relevant to South Africa because of the great distances to Europe and South East Asia.

The transport system in South Africa must be highly reliable and services must be provided at a low system costs. The focus of this topic is on the Port/Rail Interface in the Port of Durban which assesses the transfer of goods particularly from rail transport to and from vessels. Some of the major constraints identified in the Port/Rail Interface study relate to poor infrastructure, operations and levels of services; lack of maintenance, availability of rolling stock, locomotives and cargo stacking space.

Transnet's role is pivotal in providing efficient port and rail operations and services. Transnet is spending R40 billion over the next five years to upgrade infrastructure, operations and capacity of its core business of rail and ports. The development of the Port of Durban is guided by the Port Master Plan and an integrated planning initiative that includes rail and road authorities and the Durban Metro as stakeholders.

1. INTRODUCTION

The Port of Durban is the largest port in Africa in terms of the value of cargo handled as well as the number of vessels handled. It also has the largest container terminal in the southern hemisphere. The port serves its own extensive hinterland which includes Gauteng and many SADC countries. The continued growth in world trade and the globalization of production and markets has created intense rivalry amongst ports and countries. This intense rivalry is causing governments to enhance the efficiency of their ports. This enhanced efficiency must be integrated with the total transportation system to improve supply chain performance to provide comparative advantage against other supply chain systems. Government needs to focus on providing a seamless logistics system that ensures the efficient flow of freight which helps to promote the economy's competitiveness.

2. THE ROLE OF TRANSNET IN THE LOGISTICS CHAIN

The National Ports Authority of South Africa (NPA) is the landlord of the ports and the South African Ports Operations (SAPO) is the major lessee that controls port development and operations respectively. Spoornet is the country's sole rail freight operator and service provider to the port. These divisions are the major transport businesses within Transnet. In 2003 rail transported goods at a cost of R11 billion out of a total transportation cost of R134 billion. This is approximately 18% of the total cost of transportation. This implies that road transportation accounted for 82% of total transportation costs and highlights the small

percentage share of rail transportation relative to road transport. Transnet has been mandated by Government to reduce the cost of transport and logistics in order to make the price of South African goods competitive. In South Africa logistics costs represent 14,7% or R180 billion of GDP compared to 8,5% in the USA

Transnet in announcing its strategy to improve efficiencies adopted the following initiatives:

- To improve operational efficiencies i.e. to increase productivity in cargo handling in the port and in rail yards.
- To increase infrastructure development i.e. to create capacity before demand arises.
- To create logistics integration i.e. optimizes rail and port interface operations and reduce logistic costs.
- To improve customer interaction and third party collaboration i.e. focus on supply chain competitiveness and operational constraints.

Transnet management recognized that the major transport divisions adopted a silo mentality when attempting to render a logistics service to business. There is a need for integrated planning to improve Spoornet's service delivery and market share and that infrastructure development needed to be reviewed from a Transnet and a logistics management perspective as opposed to the major transport divisions viewing its own requirements independently.

3. IMPORTANCE OF THE PORT RAIL INTERFACE

The port/rail interface is primarily an intermodal facility where the modes of rail, road and shipping converge to facilitate the loading and unloading of cargo from ships onto and from road and rail trucks. The roadways, rail tracks and terminal facilities which include the quaywall, warehousing and stacking areas are the fixed components of the intermodal facility. The efficiency of operations determines the adequacy of infrastructure that is provided. The technological improvement in shipping especially through containerization, revolutionized ship design, cargo handling equipment, intermodal facilities, road and rail transport, port design, port investments and inland transportation. Efficient intermodal facilities mean that larger vessels can call only at a few ports known as hub ports where large volumes of containers would be consolidated by land transport, barges and small feeder vessels. Dedicated rail and road terminal facilities in the vicinity of the quayside are required to facilitate the efficient transfer of goods to and from ships. The diagram below reflects a typical port/rail interface layout.

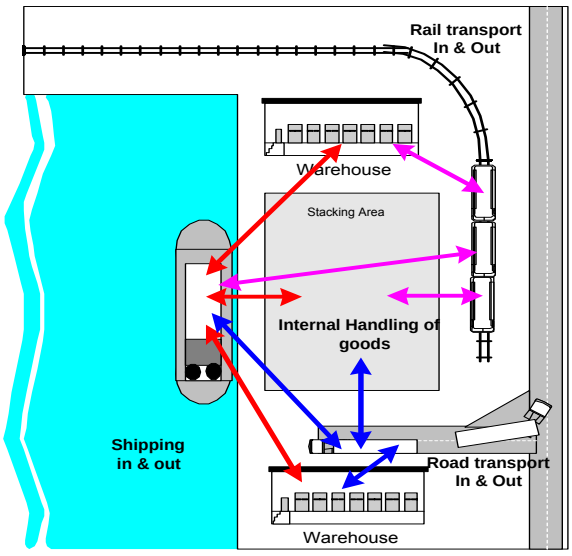


fig.1

The impact of the efficiency of intermodal facilities is illustrated by means of an example of soya beans which is produced in the USA at a cost of $195 a ton and loaded on board a ship at a cost of only $20 per ton for a total of $215. In Brazil soya beans cost $165 per ton to produce and the cost of loading it on board a ship is $65 per ton. The total cost is $230 per ton. This example illustrates that the competitiveness of a country's commodities is largely influenced by the efficiency and the lower cost of intermodal operations

A typical logistics Transformation Model is reflected in the diagram below:

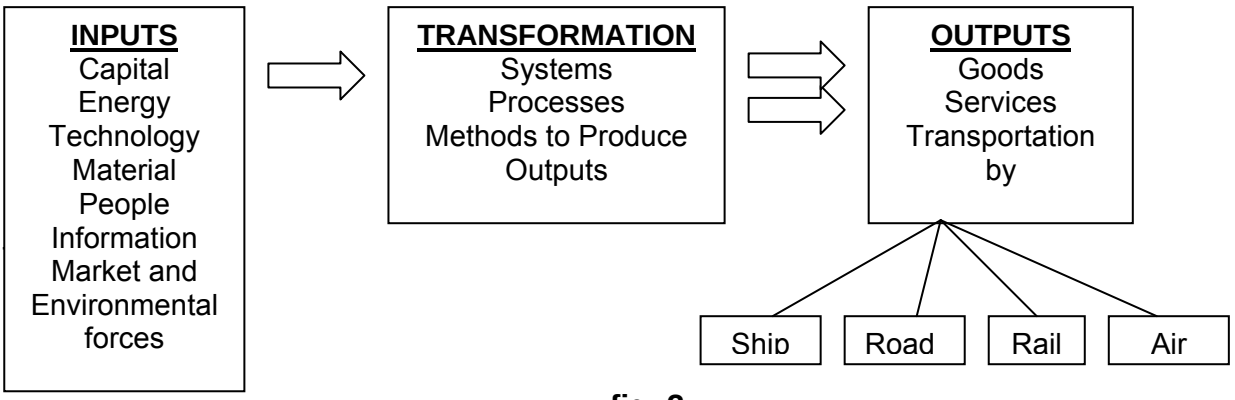


fig. 2

The Transformation Model can be applied to the logistics process within the port/rail interface to reflect the production of goods and services. The operations function is responsible for creating this service. The inputs of people, energy capital, materials, technology are transformed into an output in this case a service. This process focuses on operations management in a logistics environment with outputs related to port, road and rail and air transport services. These services must be efficient and are critical to the creation of value and the competitive pricing of goods and services that are produced for export. The operations function is quite crucial when analyzing the efficiency of the various facilities comprising the port/rail interface. The throughputs of cargo loaded and unloaded from vessels, rail trucks and road vehicles and the time taken to achieve the turnaround of these assets is a critical measure in assessing the efficiency of the port/rail interface as there is a strong inter-relationship between the provision of infrastructure and efficiency. If the operations function is not performing at an optimal level, it could lead to unnecessary expenditure for the provision of infrastructure. Simulation is useful in the design of complex operation processes e.g. computer simulation can help a designer to obtain a understanding on how best to construct a process in order to optimize the use of resources.

4. SPOORNET'S ROLE AS THE RAIL FREIGHT SERVICE PROVIDER

Rail transport is an extremely capital-intensive business with a high percentage of fixed to total costs. Declining tonnages transported since the deregulation of road transport in 1988 resulted in the loss of revenue, poor asset utilization and inadequate funding to maintain infrastructure and rolling stock. Hence rail operations management would be challenged to deliver a reliable and cost competitive service. In 2002/03 Spoornet transported 180m tons of freight and achieved a turnover of R10,6 billion. In 2003/04 Spoornet transported 82m tons whilst capacity demanded was 97m tons. In 2003/04 Spoornet made a loss of R668m on a turnover of R13,4 billion.

A summary of the major issues experienced by Spoornet can be summarised as follows:

- Lack of maintenance
- Lack of availability of good and suitable rolling stock
- Poor maintenance of infrastructure and rolling stock
- Lack of integrated planning and investment
- Lack of availability of railworthy locomotives
- Lack of training and appropriate skills
- Lack of understanding of processes
- Spoornet's rolling stock is on average 27 years old

Workings Of The Bayhead Marshalling Yard

The following is a brief overview of the workings of the Bayhead Marshaling Yard.

The Bayhead Yard was constructed in the mid 1950's and the layout of the yard complemented the nature of rail traffic for that period. Rail traffic enjoyed preferential status until the deregulation of road transport. The Bayhead Yard comprises the following:

			Capacity
i)	Reception Yard No.1	34 No. lines	994 trucks
ii)	Reception Yard No. 2	24 No. lines	840 trucks
iii)	Classification Yards	52 No. lines	1930 trucks
iv)	Exchange Yard	11 No. lines	264 trucks
v)	Mainline Yard	40 No. lines	970 trucks

The static capacity of the yard is 5018 trucks

Traffic originating from the Gauteng and North Coast Line utilize Reception 1 as their arrivals yard from which point trucks are marked and humped into the Classification Yard onto dedicated roads representing various local destinations and satellite stations that are in the greater Durban area. Loads are made up on these lines. The 14 no. satellite stations fall under control of the Bayhead Yard from where a two-way feeder service operates to the satellite stations. Loaded traffic originating from various destinations and destined for Gauteng, North Coast and South Coast Lines are staged in Reception Yard no. 2 where they are marked and humped onto roads dedicated to particular destinations. The Bayhead Yard also serves City Terminals, Maydon Wharf, Pier No. 1 and Pier No. 2 in the Port of Durban. Normally empty rail trucks are dispatched from the Bayhead Yard to the terminals in the port and when loaded return to the Bayhead Yard from where they are dispatched to their various onward destinations. Adopting a revised operations philosophy would imply utilizing the block load concept where 40 or 50 wagon loads are placed directly from origin to destination thus reducing the need for a marshalling yard

4.1 Spoornet Re-Engineering

International consultants have been appointed to assist Spoornet to improve its operations, capability of delivering efficient logistic solutions and profitability. One of the first major initiatives is to upgrade its fleet over a period of fifteen years which will involve capital expenditure of R42 billion. R14 billion will be spent over the next five years to rehabilitate infrastructure, locomotives and wagons. Infrastructure capacity constraints are being addressed by expediting maintenance by utilizing high-capacity track maintenance machines. These machines will substantially reduce occupation times on high density tracks. It is envisaged to eliminate railway lines adjacent to the quayside to load/unload directly from ships from/onto rail wagons as this is an inefficient manner of handling cargo and increases the turnaround times of vessels and rail trucks especially in view of higher

cargo throughputs. Rail terminals shall be utilized at all berths which would be located about 250m to 300m from the quayside for multi-purpose terminals. Here the discharge and loading operations of vessels can be undertaken independently using cargo stacking areas. Cargo for export can be stacked and ready for loading prior to a vessel's arrival and similarly cargo discharged from a vessel can be stacked and loaded for its outward transportation without causing any delay to a vessel. Rail terminal facilities reduce the potential of congestion and demurrage charges as a result of delays caused by either rail or road transport. The concept of block loads shall be widely utilized to eliminate the need for shunting of trains in marshalling yards where trains are generally made-up and broken-up. Marshalling operations are generally time consuming and expensive. With a review of rail's operations philosophy, block loads of 50 wagons can be compiled at a rail terminal in the port and dispatched directly to its onward destination. The same can be done for trains arriving from the hinterland.

5. REVIEW OF PORT OPERATIONS

The Port of Durban has been experiencing high growth rates in container traffic and bulk and break bulk goods. The port operations business is experiencing severe problems with the lack of stacking space and berthing. This is primarily due to the geographical constraints of the port and environmental issues which are delaying port expansion plans. Appendix No. 1 and No.2 reflect the current port layout and the rail layout servicing the Port of Durban. The congestion experienced at the terminals has a major impact on the efficiency of operations of the port/rail interface due to the fact that goods may have to be double handled and that unsuitable equipment is utilized to move cargo. A case point is utilizing forklifts to move cargo over a distance of 200m whereas its economical usage is over a radius of 50m. The maintenance costs of forklifts are exorbitant and their poor application is inefficient and expensive. If processes are reviewed regularly and costs and continuous improvements monitored, one could have easily utilized tractors and trailers for the operations described above. SAPO also needs to urgently procure a whole range of cargo handling equipment to replace current equipment and to provide additional units to cope with the increase in berth throughputs. The container terminal has been experiencing phenomenal growth rates between 8 – 10% year on year since1994. Its current capacity is about 1,99m TEU's which limit it is bound to be exceeded shortly. SAPO has placed orders for about 10 ship-to-shore cranes and 50 straddle carriers in an attempt to improve productivity. Currently 2 cranes are utilized to load and unload containers to and from vessels. This will be increased to 3 cranes per ship which will result in a 30% improvement in loading/unloading times, hence better turnaround times for vessels. The intention is to utilize one crane per 100m of berth length.

6. INTEGRATED PLANNING

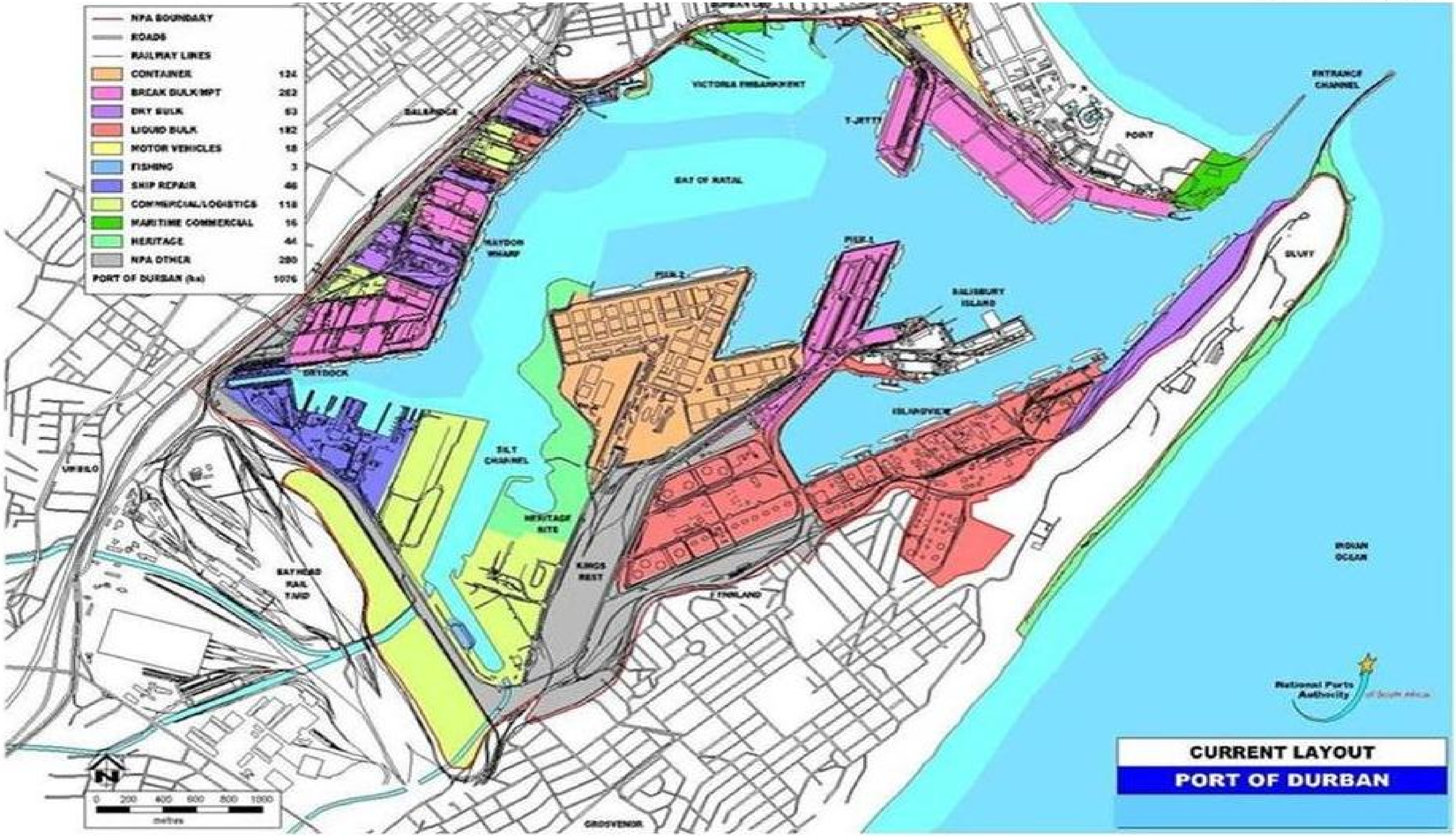
Transnet has recognized the need for integrated planning between road and rail transport and cargo handling operations. To this end a consolidated Port Master Plan is in the process of being finalized together with the commissioning of a Rail Master Plan. Appendix No.3 and No.4 provide some perspectives of the future expansion of the Container Terminal in the Port of Durban. Collaborative working is necessary and there should be an integration of rail and port masterplans, business plans and capital investments. For the master planning exercise market demand analyses are performed for each sector of the economy and freight types and flows are ascertained based on growth projections for the various types of commodities. Transnet has set-up a centralized planning and project execution office to manage its capital expenditure programme. R40 billion shall be spent over the next 5 years. This office shall also have to ensure that infrastructure is created

well before demand arises and that Transnet must deliver on its mandate of providing cost effective logistics management services.

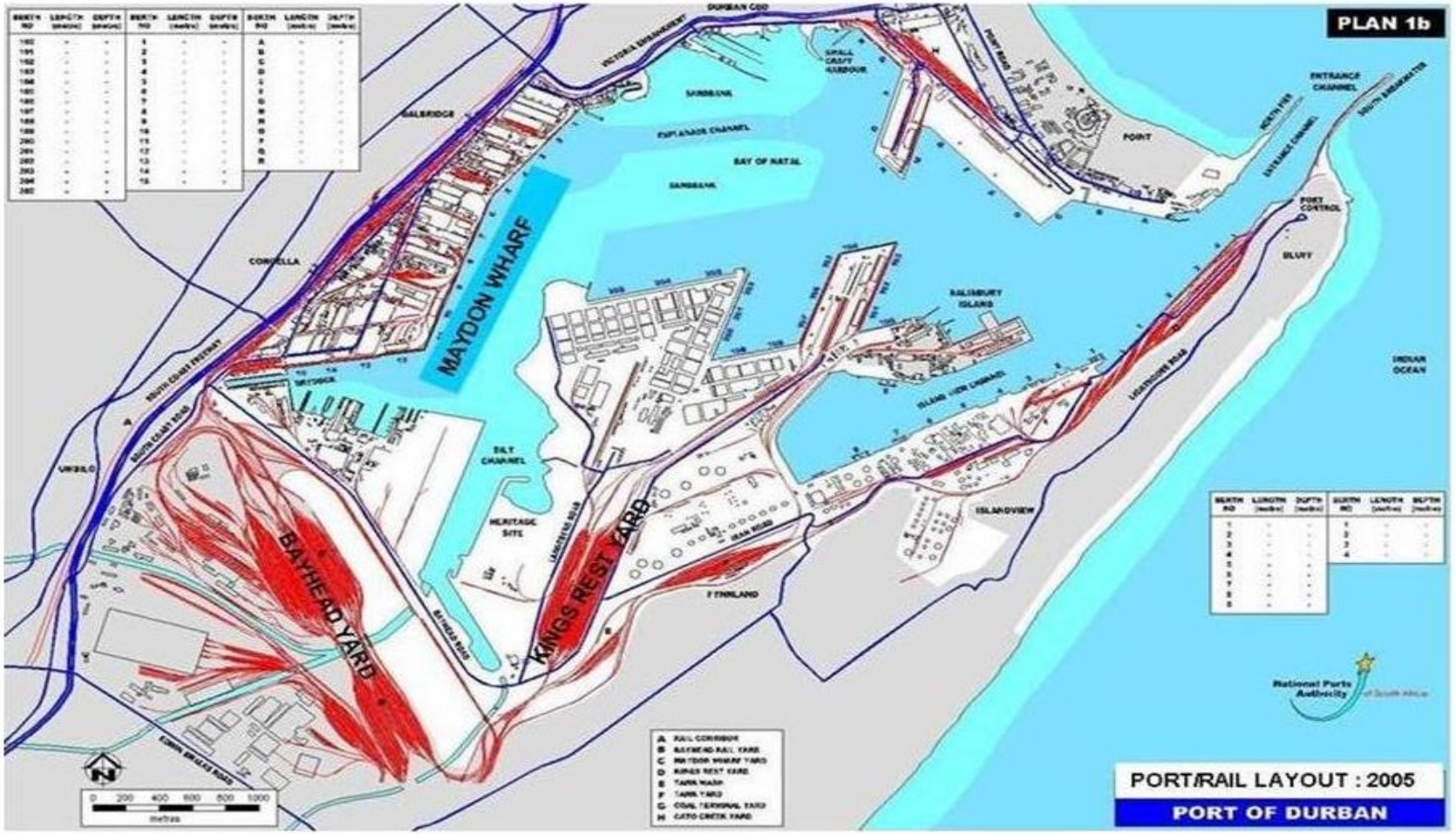
7. CONCLUSION

The aforementioned is merely an overview of the workings of the port/rail interface at the Port of Durban, the complexities of operations and some of the initiatives to improve efficiencies. The task on hand is onerous and is further compounded by the lack of engineering and construction skills and capacity, experienced operational personnel and the long lead times before realizing the benefits of infrastructure development.

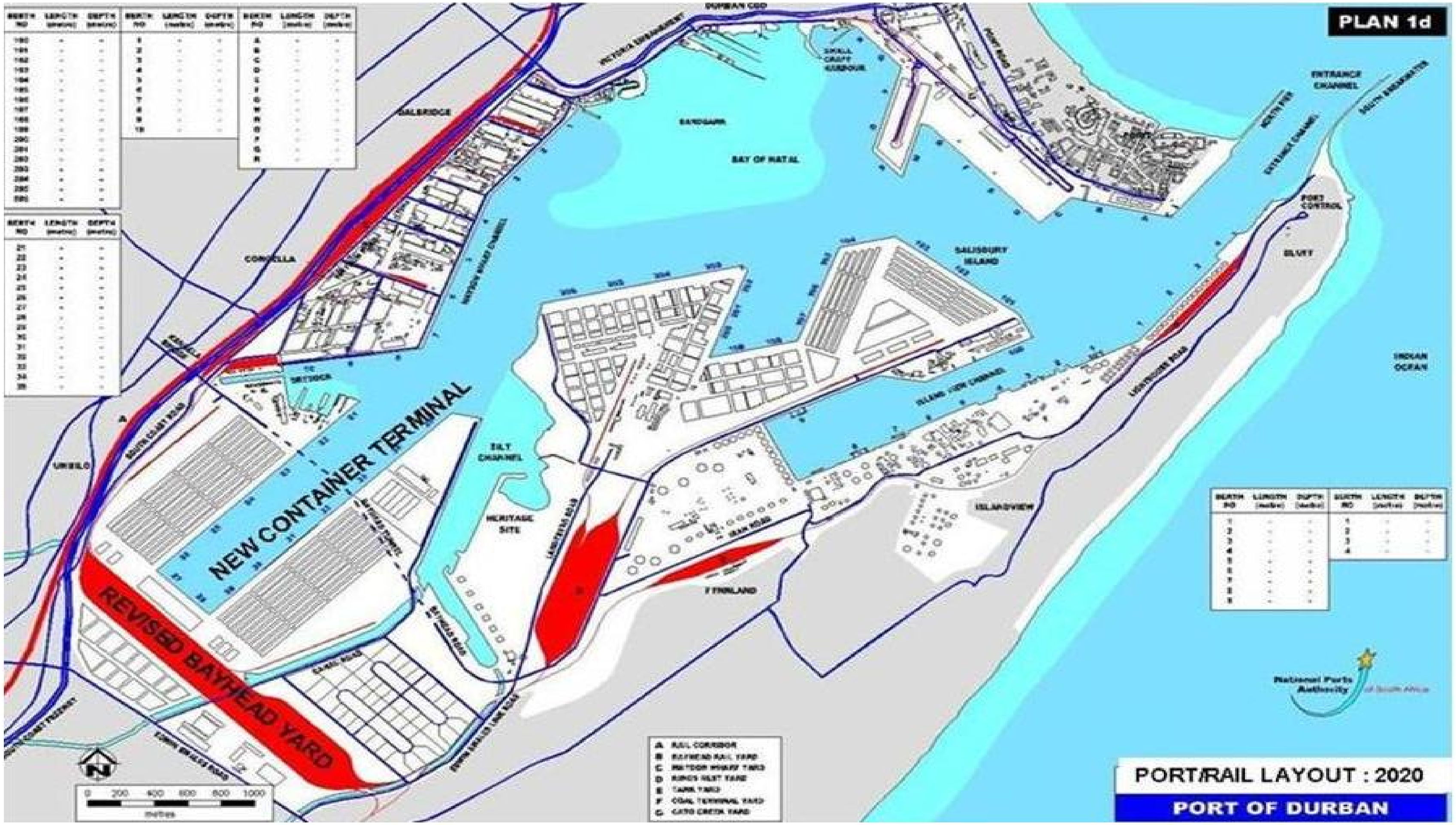
APPENDIX 1


NPA BOUNDARY
ROADS
RAILWAY LINES
CONTAINER 124
BREAK BULK/MPT 262
DRY BULK 63
LIQUID BULK 182
MOTOR VEHICLES 18
FISHING 3
SHIP REPAIR 46
COMMERCIAL/LOGISTICS 118
MARITIME COMMERCIAL 16
HERITAGE 44
NPA OTHER 280
PORT OF DURBAN (ha) 1076
VICTORIA EMBANKMENT
T-JETTY
POINT
ENTRANCE CHANNEL
BAY OF NATAL
MAYDON WHARF
PIER 2
PIER 1
SALISBURY ISLAND
BLUFF
DRYDOCK
ISLANDVIEW
SILT CHANNEL
HERITAGE SITE
KINGS REST
BAYHEAD RAIL YARD
UMBILO
GROSVENOR
INDIAN OCEAN
National Ports Authority
0 200 400 600 800 1000
metres
CURRENT LAYOUT
PORT OF DURBAN

APPENDIX 2


PLAN 1b
MAYDON WHARF
BAYHEAD YARD
KINGS REST YARD
PORT/RAIL LAYOUT : 2005
PORT OF DURBAN

APPENDIX 3


PLAN 1d
NEW CONTAINER TERMINAL
REVISED BAYHEAD YARD
PORT/RAIL LAYOUT : 2020
PORT OF DURBAN
BAY OF NATAL
SALISBURY ISLAND
INDIAN OCEAN
HERITAGE SITE
SILT CHANNEL
ISLANDVIEW
BLUFF
PORT CONTROL
ENTRANCE CHANNEL
CONGELLA
UMBILO
FYNNLAND
DURBAN CBD
SMALL CRAFT HARBOUR
National Ports Authority
A RAIL CORRIDOR
B BAYHEAD RAIL YARD
C MAYDON WHARF YARD
D KINGS REST YARD
E TANK YARD
F COAL TERMINAL YARD
G CATO CREEK YARD

APPENDIX 4


BAYHEAD BASIN - CONTAINER EXPANSION PROJECT
EDWIN SWALES LINK ROAD
BAYHEAD LOGISTICS PARK
RAIL YARDS
EDWIN SWALES DRIVE
CAR TERMINAL
HERITAGE SITE EXPANSION
BAYHEAD BASIN
CONTAINER TERMINAL
BAYHEAD ROAD TUNNEL
MAYDON WHARF
MAYDON BOULEVARD
KANGELA BRIDGE
BAYHEAD BASIN
PORT OF DURBAN 2020