



18. Road infrastructure within the port of Durban

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ABSTRACT

Roads are considered as the most important transport mode in South African Ports especially at Port of Durban.

Road transport has taken almost 80% of the import and export cargo while railway transport is left with approximately 20%.

Over the past years road traffic has increased at the Port of Durban and this has resulted in an increase in road maintenance work including its budget.

There are eight major roads within the Port that connect the South, West and North of eThekweni Municipality namely Bayhead, Quay-side, Maydon, Francois, Wisely, South Coast, Bluff and Iran Roads. The Port of Durban is an important vehicle for facilitating economic growth of local, regional and national industries. For Port to maintain global competitiveness with the current trend of globalization, it has to ensure that the road infrastructure is well maintained and has a smooth traffic flow with no delays.

This paper provides an overview of the road infrastructure within the Port of Durban. Asset verification and assessment of the condition for existing infrastructure were conducted. Traffic studies were conducted in the form of volume counts for vehicles entering and exiting the Port of Durban to determine the utilization of existing infrastructure.

INTRODUCTION

Background on roads within Port of Durban

In the eighty five years leading up to 1995, the South African Railways and Harbours held a monopoly on transport over a 50 km lead distance from the port and therefore all cargo owners, both import and export, were obliged to dispatch their produce by rail.

This led to large areas of the Bayhead becoming the preserve of the railways, large marshalling yards and carriage and wagon workshops were established in the area. When rail was the dominant mode of transport to the port, all the marshalling yards were used and in fact lack of marshalling space often proved to be the bottleneck of the port (Department of Transport, 2008).

In the last fifteen years with deregulation of road transport there was an immediate and extensive switch of general cargo from rail to road transport with current split being close to 80% road and 20% rail. The result of this switch has placed tremendous pressure on the road network while railway facilities are now greatly under-utilised and the usage of this prime space needs to be incorporated into the future planning of the port (Department of Transport, 2008).

The following Figure 1 highlights the location of the eight major roads within the Port of Durban namely Bayhead, Quayside, Maydon, Francois, Wisely, South Coast, Bluff and Iran Roads:

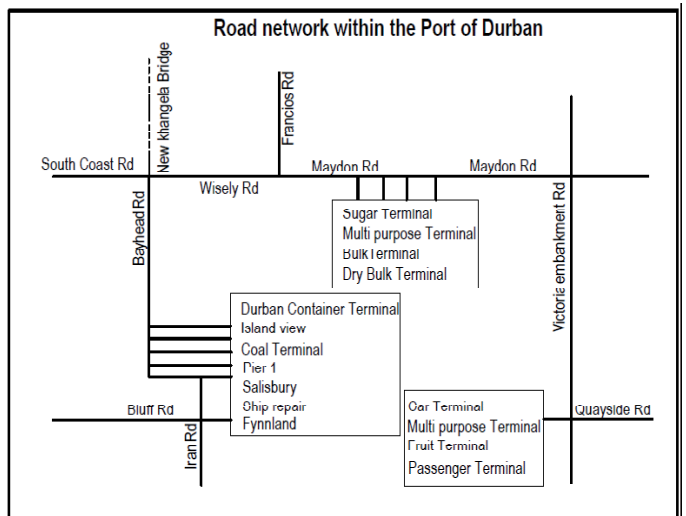


Figure 1: Road network within Port of Durban

Problem statement

Some of the problems that are currently being experienced at the Port of Durban:

- Most of the major roads within Port of Durban are in a poor condition and will require an increase in the maintenance budget.
- Too many level crossings at Maydon Road resulting in road traffic congestion.
- Shortages of parking areas close to the Port resulting in vehicles parking on the road thus reducing the effective width of the road.
- The road infrastructure at Bayhead Road is over-utilised and this has resulted in major traffic congestion. Mostly heavy vehicles use this route to access the Durban Container Terminal.
- The link or connection between road and rail transport is not working effectively.

Objectives of the study

- To identify and assess the existing road infrastructure and its condition.
- To determine the utilization of existing road infrastructure by conducting traffic counts.
- To recommend guidelines that can be used to maintain the road infrastructure.
- To recommend strategies that can assist in reducing road traffic congestion.

METHODOLOGY

The study covers the asset verification and assessment of existing road infrastructure. It also includes road traffic surveys that were conducted in the form of volume counts for vehicles entering and exiting the Port of Durban. Asset verification, assessment and traffic surveys were conducted on the following eight major roads: Bayhead, Quayside, Maydon, Francois, Wisely, South Coast, Bluff and Iran Roads.

Asset verification

The Pavement Management System Manual TMH9 was used as the reference for physical site measurements for the eight major roads within the Port of Durban were conducted as part of the asset verification process.

Infrastructure assessment

The visual inspection (eyeball method) was identified as the suitable method for assessing the condition of the road infrastructure. This method is a quick visual inspection of the road on a routine basis to identify problems. The visual inspections were conducted on all eight major roads highlighted in Figure 1. During the visual inspection of each road, an inspection report was compiled which included the following components: road markings, traffic signs, potholes, cracks, rutting, aggregate loss, riding quality, surface drainage and unpaved shoulders. Each component was rated using the rating method shown in Table 1 below:

Table 1: Rating method
Source: Transnet National Ports Authority, 2004

Percentage	Description	Rating	Description
100-90%	Excellent	A	It is new and perfect. No maintenance work required at this stage
89-70%	Very good	B	It looks like new and minor maintenance work may be required at a later stage
69-50%	Good	C	It is moderate and maintenance work may be required within 12 months
49-30%	Fair	D	It is reasonable but maintenance work may be required within 6 months
29-10%	Poor	E	It is not safe and needs urgent attention
9%-0%	Very poor	F	It is very poor and reconstruction work required urgently

Utilization of existing infrastructure

Vehicle counts were taken at the eight major roads to determine the utilization of existing infrastructure. The vehicles enter and exit the Port through these roads highlighted in Table 2 below:

Table 2: Survey stations

No.	Road names	Stations/intersections	Survey Direction
1	Bayhead Road	South Coast & Wisely Road	Inbound & Outbound
2	Quayside Road	Victoria Embankment & Esplanade Road	Inbound
3	Quayside Road	Stanger Street, Victoria Embankment & Esplanade Road	Outbound
4	Maydon Road	Victoria Embankment, Wisely & Francois Road	Inbound & Outbound
5	Francois Road	Sydney Rd, Maydon, Wisely Rd & section of Francois Road	Inbound & Outbound
6	Wisely Road	Francois, Maydon, South Coast & Bayhead Road	Inbound & Outbound
7	South Coast Road	Wisely, Bayhead, section of South Coast Road	Inbound & Outbound
8	Bluff Road	Iran & section of Bluff Road	Inbound & Outbound
9	Iran Road	Bayhead & Bluff Road	Inbound & Outbound

FINDINGS

Asset verification

Eight major roads were verified and the following results shown in Table 3 were obtained:

Table 3: Road Measurements

	Bayhead Road	Quayside Road	Maydon Road	Francois Road	Wisely Road	South Coast	Bluff Road	Iran Road
Length	2.9km	0.25km	2.4km	0.4km	0.6km	2.3km	2.4km	1.6km
Number of lanes in each direction	two	one	one	one	two	one	one	one

Note: The measurements for Bayhead, Maydon, Wisely and Iran Road were taken on site and represent the full length of the road. Quayside, Francois, South Coast and Bluff Road measurements represent the section of the road within the Port of Durban.

Infrastructure assessment

The findings of the assessment on eight major roads were recorded on the inspection report. Table 4 shows an example of an inspection report that was conducted on Bayhead Road:

Table 4: Example of an inspection report conducted on Bayhead Road

Component	Weight	Rating	Weighted Average
Road markings	10	65%	6.5
Traffic signs	10	65%	6.5
Potholes	20	45%	9
Cracks	10	45%	4.5
Rutting	10	45%	4.5
Aggregate loss	10	45%	4.5
Riding quality	10	50%	5.0
Surface drainage	15	45%	6.75
Unpaved shoulders	5	65%	3.25
TOTAL	100		50.5

The weighting of each component was identified based on importance and damage that can be caused if that particular component was not repaired. Rating score was based on the condition of the component and Table 1 was used during the rating process. The results from the inspection reports conducted at the eight major roads are shown in Figure 2 below:

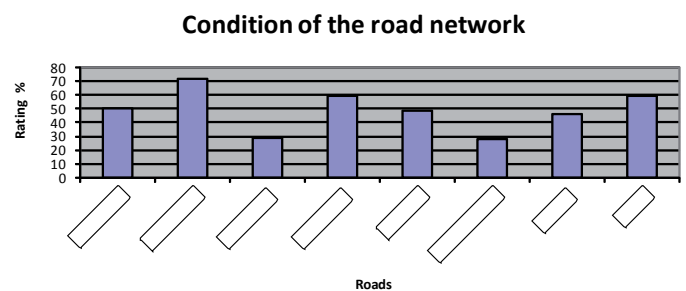


Figure 2: Assessment of road condition within the Port

- Quayside Road (71.5%) falls under B (very good) category. It looks like new and minor maintenance work may be required at a late stage.
- Francois Road (59.5%), Iran Road (59.5%) and Bayhead Road (50.5%) fall under C (good) category. It is moderate and maintenance work may be required within 12 months.
- Wisely Road (49%) and Bluff Road (45%) fall under D (fair) category. It is reasonable but maintenance work may be required within 6 months.
- Maydon Road (28.8%) and South Coast Road (28%) fall under E (poor) category. It is not safe and needs urgent attention.

Utilization of existing infrastructure

Figure 3 shows clearly that Bayhead and South Coast Road are over-



utilized and major traffic congestion is experienced on these roads. This has resulted in major delays on the import and export of cargo. It will also result in an increase in the road maintenance budget.

Inbound & outbond traffic counts

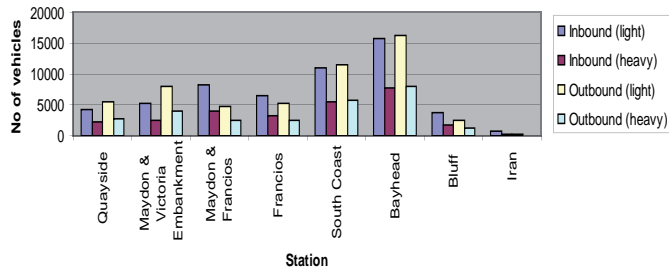


Figure 3: Sample of manual traffic counts per station

The peak period in the morning (06h00 to 09h00) and late afternoon (16h00 to 18h00) for total vehicles is shown in Figure 4 below. Heavy vehicles are normally constant between 500 to 550 vehicles per hour travelling on Bayhead Road.

Inbound traffic on Bayhead Road

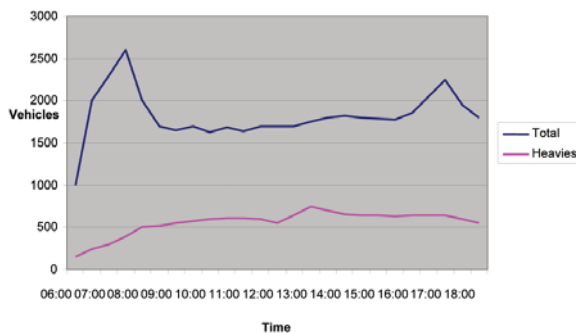


Figure 4: Profile for heavy and total vehicles on Bayhead Road

CONCLUSION & RECOMMENDATIONS

Assessment guidelines

- It is recommended that these eight major roads be treated and assessed separately to other roads because of their importance.
- It is recommended that the Area Supervisor, Maintenance Manager and Road Engineer for both parties (eThekweni Municipality and Transnet National Port Authority) conduct visual inspection annually.
- It is recommended that site or laboratory material testing be conducted as and when there are failures to the base, sub-base and road surface layers (asphalts or concrete).

It is further recommended that problem areas be inspected as often as required.

Areas to be improved with regard to road infrastructure

The results of the road traffic survey have confirmed that approximately 83000 vehicles are entering the Port via the eight major roads. Approximately 30% of the total road traffic entering the Port came through Bayhead Road. The strategies that are highlighted below are possible solutions to the high traffic volume at the Port of Durban:

- Infrastructure Developments - As the cargo traffic grows faster at Port of Durban especially on container cargo, it is a challenge to the Port to fast track the Infrastructure Development Program (implementation of Ports Master Plan) in order to meet the demand. Transnet has delivered

a number of projects such as Conversion of Pier 1 into a Container Terminal, A-Check (Truck staging - Phase 1), Khangela Bridge, Car Terminal Durban, Container Terminal (DCT) Re-engineering, Entrance Channel Widening and Point Development. There are a number of projects in the pipeline such as Bayhead Dig-out, Remodeling of Maydon Wharf, Berth Deepening at Pier 1, National Container Strategy (New Container Terminals). Khangela Bridge has assisted in reducing the traffic congestion at Bayhead Road/ South Coast Road intersection by providing alternate routes for both light and heavy vehicles. There is still a need for other routes to relieve the traffic congestion on Bayhead Road.

- Improve Port functions - Improve efficiency such as vessel turnaround time (Transnet), loading and unloading of cargo (Transnet), transportation of goods by rail (Transnet), trucks (Private) or pipelines (Transnet).
- Truck stop/staging area - Truck stop/staging and storage of empty containers need to be located outside the port area (Inland Port). The departing traffic should never interfere with the arrival traffic. Empty containers must not be mixed with full containers. The demand for storage facilities can be reduced by limiting the time during which cargo is stored free of charge, and by sharply increasing the storage charge day by day after the free time has expired. In order to speed up operation, reduce bottlenecks and avoid accidents, it is essential to prepare the layout of the land areas in such a way that different traffic categories are kept separate (Telford, 2004).
- Increase in pipeline capacity - At present, Transnet Pipelines transport refined fuels from the Sapref and Enref fuel refineries in Durban, and imported fuels from the Port of Durban at Island View, through a 12 inches diameter pipeline known as Durban-Johannesburg Pipeline (DJP). The demand for the fuel in South Africa is increasing yearly by 4,2%. To meet the future fuel demand Transnet Pipeline has in progress the construction of a New Multipurpose Products Pipeline. The new 525 km multi products liquid fuel pipeline or trunkline with 24 inches diameter made from carbon steel will be constructed from Durban to Jameson Park near Heidelberg in Gauteng (Transnet, 2007). This project will assist in reducing road traffic since most of the heavy vehicles that are currently transporting petroleum products will not be used as often.
- Separation of cargo - To suggest a policy that separates the cargo which needs to be transported by road, rail or pipeline. The possible classification is shown in Table 5 below:

Table 5: Classification of products related to mode of transport

Product	Mode of transport		
	Road	Railway	Pipeline
Agricultural products		√	
Livestock	√		
Food	√		
Fodder	√		
Oil & fuel gas			√
Solid metal fuels		√	
Iron and iron-ore		√	
Metal scrap		√	
Steel		√	
Non-ferro metal		√	
Raw metal		√	
Construction material		√	
Fertilizers		√	
Chemical			√
Vehicles & machinery		√	
Wood products		√	
Petroleum			√

- Promote intermodal split - Split or share amount of traffic between road and rail, and not rail vs road. There is a need for integrated planning in order to improve Transnet Freight Rail's (Spoornet)



service delivery market share and capacity. The infrastructure development needs to be reviewed from a Transnet and a logistics management perspective as opposed to the major transport divisions viewing its own requirements independently (Transnet Projects, 2007 a).

- The long tenant leases at Maydon Wharf area need to be reviewed by Transnet because it currently causes “width constrain” on rail yards, the inappropriate location of buildings and equipment within the rail yards, the intrusive layout of Port yards, unfavorable modal split and limited rail usage. However, it is recommended that rationalization of the rail infrastructure within the port yards be encouraged in order to support future clustering (Transnet Projects, 2007 b).
- Promote trans-shipment - Moving cargo from Port to Port e.g. moving cargo from Port of Durban to Port of Richards Bay by ship instead of using road or rail transport.

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