

# A decade of rapid growth: expansion of Kingston's Container Terminal

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## Introduction

This article looks at some of the key planning challenges that have been overcome in developing Kingston Container Terminal to where it is today and some of those which remain to be faced in the future.

The growth in China's ability to export containerised cargoes around the world and the impacts that this has had and continues to have on the liner shipping and container terminal sectors has been well documented. A key driver of this growth is the North American consumer's continued demand for imported goods from East Asia and from China in particular.

The large volumes of containerised imports which need to be handled have presented significant challenges for North American terminals, particularly terminals in the United States: these challenges being over and above those presented in the form of limited natural water depths and regulatory constraints such as the Jones Act. In order to overcome these constraints significant investments have been made in container transshipment terminals at locations outside the United States, particularly in the Caribbean Basin. Of the insular Caribbean terminals, Kingston, in Jamaica, operated by the Port Authority of Jamaica, has emerged as the pre-eminent container transshipment terminal. Kingston's success is built on its central location within the Caribbean Basin close to east-west and north south trade routes and in particular routes passing through the Panama Canal.

## Development of container transshipment – a decade of growth

Container volumes at Kingston have grown dramatically in the last decade: rising fourfold from 478,000 TEU in 1996 to 1.9 million TEU in 2006. This equates to an annual growth rate of approximately 15 per cent. In recent years, development of this growth has been assisted further by the Port Authority's appointment of APM Terminals as terminal managers and the subsequent adoption of Kingston as a key regional hub by Maersk Line.

This level of growth has created several major challenges for the Port Authority, notably the need for:

- Deeper, wider navigation channels and manoeuvring basins
- Space for terminal yard expansion, both for full and increasingly – post industrial economies such as the United States generate major imbalances between import and export trade flows – empty containers
- Meeting throughput handling pressure to maintain carrier sailing schedules
- Resolution of spatial land use planning conflicts as the expanding port encroaches into the immediate urban hinterland

These challenges have needed to be resolved in a short time period and against a backdrop of competing demands for scarce coastal development frontage, particularly in a sensitive Caribbean coastal environment.

## Meeting the planning challenges

Rapid expansion of Kingston's container terminal has been eased by its location at the western end of the seventh largest natural harbour



View of Terminal 5 expansion area being formed by cutter suction dredger.

in the world. The natural harbour affords deep water and good protection from hurricanes and avoids the need for high initial capital investment and time consuming breakwater construction – potentially key issues for a container terminal whose financing depends on relatively volatile transshipment revenues.

With no need for expensive breakwater construction the particular challenges to be addressed at Kingston were:

- Planning decisions as to which design container vessels should be adopted
- How to phase improvements to the Terminal's maritime access to accommodate the selected design vessels
- How to make maximum use of the dredged material arising from the maritime access improvements
- How to resolve any potential conflicts with the requirements of the adjacent, flagship Highway 2000 project
- How to take account of any potential airfield operational constraints imposed by the proximity of the existing Norman Manley International Airport; and finally
- How to resolve any potential conflicts arising from the need to ensure that proposed terminal expansion zones do not interfere with existing river flows and also existing large scale urban drainage networks

## Upgrading maritime access

In an era of rapid growth, it is important to ensure that adequate consideration is given to design vessel selection as although phased capital dredging may enable a better match between capital investment and terminal revenues, there may be strong environmental or port operational reasons for 'over dredging' in an earlier terminal development phase. This was the approach adopted for Kingston with two design container vessels being selected as part of the terminal development process.

The first phase of maritime access improvement was based on a hybrid approach with channel design being based on real time ship simulations using a 7,000 TEU vessel such as the K Class Maersk Line vessel Regina Maersk. However, critically, the outer, environmentally sensitive and exposed outer channel sections were dredged to 18m Chart Datum in anticipation of a future 10,000



Deepening Kingston's busy container terminal basin often meant close encounters needed to be planned for.



View of upgraded North Terminal in operation with Terminal 5 area bounded by the Highway 2000 realignment.

TEU plus container vessel calling into Kingston. Subsequently, a second real time ship simulation study was carried out using a notional 14,000 TEU PS Class container vessels such as the Emma Maersk. The need for two simulations demonstrate the need for future proof maritime access: container ship theoretical (geometric) capacity has effectively doubled in less than a decade.

### Accommodating the Highway 2000 Project

Another key consideration in the terminal development process was how to accommodate the requirements of the major Highway 2000 project. The project is one of the largest infrastructure projects carried out in the Caribbean and is planned to connect Kingston with Montego Bay, Jamaica's second city, with a high quality motorway connection. The project was let to a European consortium on the basis of an alignment that that would pass through an area planned for future container yard expansion. Although possible mitigation measures such as a viaduct were considered, extensive consultations and negotiations with the Highway 2000 developer ensured that a more rational solution – from a port planning standpoint at least – was agreed and the motorway was realigned around the perimeter of the container terminal.

### Norman Manley airport operations

Planning of additional longer term container terminal capacity required consideration to be given to the operational requirements of another key element of national transport infrastructure – Norman Manley International Airport. Longer term capacity requirements of Kingston Container Terminal are currently planned to be met by the development of a new terminal in the Fort Augusta area just seaward of the existing Port Bustamante container terminal complex.

This area is likely to have good potential for container terminal operations but an important planning consideration is the relative proximity of Norman Manley Airport's single runway. The proximity of the runway required careful consideration to be given to the runway operational areas. In the event, it was possible to select a terminal location which minimised the container terminal's impact on airport operations and avoided the need for specialist low profile ship to shore gantry cranes.

### Protecting the environment

Finally, in a sensitive coastal environment subject to high rainfall, hurricanes and a growing urban population, the planning of terminal expansion areas needed to ensure that impacts on existing natural watercourses and drainage sources were minimised. A key aspect of the environmental mitigation measures for the outer channel improvements was the need to carry out a major coral relocation exercise – one of the largest carried out in the world.

### Conclusion

This short article has sought to show how the development of container terminal capacity to meet rapid growth in demand often requires a wide range of complex and apparently unrelated planning challenges to be addressed. This is particularly the case when a terminal is being expanded within a port city context with competing demands for scarce waterfront development area. The need to balance economic development needs against environmental requirements in a fragile coastal environment only strengthens the requirement for careful planning and consultations. To date, Kingston's container terminal developments have achieved this difficult balancing process.

#### ABOUT THE AUTHOR AND THE COMPANY

Vincent Crockett has over twenty-five years' professional experience in port planning and design, project management, construction supervision and design roles. His experience spans working in over eighteen different countries in all aspects of ports and shipping encompassing the planning of capital and maintenance dredging projects and several energy developments, including the management of several technical due diligence projects for commercial investment banks. He has a Master's degree in International Transport Studies (Ports and Shipping).

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the environment to health and education, industry and communications. Our breadth of skills, sectors, services and global reach makes us one of the world's top players in delivering management, engineering and development solutions for public and private sector customers from 30 centres throughout the UK and offices in over 60 countries across Europe, Asia and the Pacific, the Middle East, Africa and the Americas.

We're a leading player in advising on the planning, development and ongoing provision of the full spectrum of maritime infrastructure. This extends from some of the largest dry bulk and tanker terminals to dedicated high volume container ports plus ro-ro connections to the wider port hinterland.

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