



PROJECT BRIEF

For Financial Year (2023/24 and 2024/25)

NON-DESTRUCTIVE BOLLARDS LOAD TESTING

1. PURPOSE

The primary purpose of this document is to outline the scope of services and deliverables that the Transnet National Ports Authority (TNPA) will require of a Professional Services Provider, hereafter referred to as the PSP, with extensive experience with development, testing and maintenance of marine bollards.

2. BACKGROUND

Bollard failures are increasing worldwide resulting in an increased risk to human life and safety, as well as damage to infrastructure and vessels. Bollards are used to safely secure vessels alongside jetties, berths, wharves, and dolphins in the ports. During their lifetime, they are exposed to corrosion, metal fatigue and other types of damage, which reduce the bollards' overall capability. Bollards are intended to have a long life, with many being in quayside use for over 60 years.

It has been observed that most bollards within the TNPA ports were designed and constructed when the ports were initially built. Vessel sizes have increased substantially since some of these bollards were installed which increases the risk of bollard failure. It is therefore important to know and understand the current bollard capabilities and strengths since vessels calling in the ports are much bigger than what these bollards were designed for.

The Tanker berth, S & T Berths, Multi-Purpose Terminal and Car Terminal of the Port of East London are going to be used in this study as the sites for execution. Tanker berth, S and T Berths and Car

Terminal are located on the West Bank of the Buffalo River, while the Multi-purpose Terminal is located at the East Bank. They consist of the following factors:

1) Tanker berth

Tanker berth is a petroleum products berth referred to as liquid bulk with installed and theoretical capacity of 3 million kilolitres per annum of the one liquid bulk berth presently available in the Port of East London. The berth is a gravity wall with mass concrete that has 14 cast iron steel bollards embedded within the coping beam and equally spaced at 18.3 m centres, 12 of which are in use full time. It is 259m in length and 10.7m in depth.

2) S & T berths

S and T berths form part of the dry bulk berths, referred to as grain elevator which specialises in import and export of maize, wheat and other grain products. Theoretically they have berth and installed capacity of 2 million tons per annum (MTPA) and 0.98 million tons per annum (MTPA) per berth respectively. The berths are a gravity wall with mass concrete that has 23 cast iron steel bollards embedded within the coping beam and equally spaced at 18.3 m centres, 7 of which are in use full time. The berths are each 194m in lengths, and 10.7m in depth.

3) Car terminal

It consists of the original West Quay which was built in the early 19th century, and the more recently constructed West Quay Extension (R-Extension), which was constructed in 1976 — 78 (100m in length). The original West Quay is a concrete gravity structure with foundation at -8,500m (CD), and the newer West Quay Extension was built with caissons, with a foundation at -9,100m (CD). The total length of the Quay is approximately 550m with 29 cast iron steel bollards embedded within the coping beam and equally spaced at 18.3 m centres, 10 of which are in use full time. Back of quay space includes 2 concrete ramps which have been designed to support the stern ramp of a car carrier during loading and unloading of vehicles. The rest of the pavement is made of asphalt to meet the technical needs of a Ro-Ro terminal. The Port of East London currently handles car carriers which are between 180 m and 230 m including the HERO vessels which are becoming popular due to their high level of efficiency.

4) Multi-Purpose Terminal

The quays on this terminal were built with Gravity Wall (Mass Concrete), except for Quay 4, which was built with concrete blocks. The total length of the terminal is 1235m, with width ranging from 8.5 to 10.7m. This multi-purpose terminal consists of 2 terminals, namely:

- Container terminal - There are currently four MPT berths at the Port of East London. Two of which are effectively available for container handling. These two berths have a theoretical berth capacity of 0.2 million TEUs per annum, while the installed capacity is 0.1 million TEUs per annum respectively.
- Break bulk (which is also used by the cruise ship) - There are currently four MPT berths at the Port of East London where break bulk can be handled. The theoretical berth capacity and installed capacity for break bulk at the Port of East London is 0.57 million tons per annum (MTPA).

Aside from the visual inspection of quay infrastructure and associated furniture which is conducted annually as per the Asset Maintenance Principles and Procedures of TNPA, a bollard pilot study is required which aims at physically testing the bollards to confirm their capacity.

This bollard test study will be the first for TNPA and will focus on the Port of East London, and will focus on the Terminals mentioned above. The service provider will be required to provide an innovative technique that simulates an actual ship's mooring line on the bollard, provide the testing equipment and test 116 bollards at the Tanker Berth, S and T Berths, Multi-Purpose Terminal and Car Terminal. The location of the Berths and Terminal can be seen in Figure 1 below. A technical report detailing the angles each bollard showed local or general failure in will be submitted at the end of the pilot study. The testing method and equipment must not be destructive on the bollard and surrounding property.

Even though there are no mandatory testing rules on mooring bollards in place, guidance can be drawn from the OHS Act, National Ports Act, Construction Regulations Act; British Standards: Code of Practice and Design of Fendering and Mooring Systems and the Oil Companies International Marine Forum (OCIMF) Mooring Equipment guidelines. It is through these guidelines that TNPA will

be able to ensure that infrastructure has the required capacity and is safe for use by the vessels that call at these Berths and Terminal.



Figure 1: Site location relative to Port layout

3. SITUATION ASSESSMENT/ PROBLEM STATEMENT

The quayside bollards in all ports are inspected visually each year as part of the annual infrastructure inspections and they are generally in good condition. Bollards in the TNPA are generally maintained through cleaning of the steel using a wire brush before applying a coat of paint to protect the steel and to curb corrosion. Other than that, generally no major maintenance of the quay bollards takes place at the ports. It is the purpose of this study to ensure that the current capacity of the bollards meets the design requirements; to ensure that the structural integrity for the bollards is maintained thus ensuring safety of bollards, vessels, quay walls and users.

4. OBJECTIVES

The objective of this study is to establish the capacities of bollards through non-destructive load testing of bollards on site. It is the intention of this study to use the Tanker berth, S and T Berths, Multi-Purpose Terminal and Car Terminal of the Port of East London as the pilot sites.

5. SCOPE OF WORK

TNPA requires an experienced and knowledgeable PSP to undertake a bollard safe working load test (SWL) that will ascertain the capacity of the cast iron steel bollards located at the East London Tanker berth, S and T Berths, Multi-Purpose Terminal and Car Terminal.

The PSP is required to provide an innovative and practical non-destructive testing method, along with the equipment which will help mimic the manner in which a bollard is loaded during operations. This will be followed by the testing of 116 bollards to a safe working load of 50 tons. Each bollard must be loaded in stages to ensure that the test is non-destructive and can be stopped if or when local failure occurs before the proof load is reached. The Port Tug can be used a platform, but the service provider is required to use its equipment and staff to undergo the testing. The service provider is expected to undertake the following work:

- Presenting the method statement to the client for approval
- Provide testing equipment
- Test 116 bollards and provide certificates for each bollard tested.
- TNPA Project Manager to witness all the non-destructive bollard test.
- Provide typical drawings (dwg format) of tested bollards.
- Provide pictures (jpeg format) for before and after each test.
- Provide technical report detailing the test angles and performance for each bollard. The current bollard working line angles are 45°C and 90°C. The service provider is required to test both these angles and any other angle deemed to be working.

Reasonable care must be taken to ensure that the test is not destructive. Safety measures will need to form part of the method statement where the service provider can demonstrate control measures that will ensure the coping beam is not compromised. It is also important to note that the test will need to be conducted without disturbing operations. It is the intention of this study to ensure that efficiencies at the Port of East London Tanker berth, S and T Berths, Multi-Purpose Terminal and Car Terminal precincts are not reduced, all planning will need to include all the relevant stakeholders.

6. DELIVERABLES

The Service Provider shall provide test certificates for all the bollards that will be tested. The certificates should include the bollard number, electronic jpeg picture(s), test date, test angle, test

load and overall status. The picture of local failure must also be included in the case of such failure with reasons why failure might have happened.

The PSP is required to present the findings of the study in a presentation and through a detailed engineering report. The proposed structure of the report shall be submitted to TNPA for review and acceptance before writing the report. Structure of the report will be determined by TNPA upon award. All input data, model outputs and observations made in order to arrive at conclusions/recommendations should be included as an annexure to the reports. Details pertaining to each outcome report are discussed below. The descriptions below are to serve as a guideline and are not to be considered all inclusive.

Study Report

The expected output of the study is an engineering report documenting and detailing the testing method, outcomes of the study and all tests that were conducted to determine the capacities of the bollards. The recommendations are also to be included on the report with a list of all lessons learnt through the study.

Drawings

The PSP is required to produce drawings that must display the following outcomes from the study:

- The type of bollards tested
- Mode of failure where local failure took place

Pictures

The PSP is required to produce the jpeg picture of the bollards as they looked before and after each test that will be conducted.

Formats of Deliverables

Reports

- One signed and bound hard copy including all appendices.
- One signed searchable soft copy including appendices in pdf format.
- One unsigned soft copy in .docx format.

Drawings and Pictures

- One unbound set of signed hard copy drawings.
- One set of signed soft copy drawings in searchable pdf format.
- One unsigned copy in .dwg format.
- Pictures in jpeg format

Schedule

- MS Projects format

7. MEETINGS

All meetings will be held at the Port of East London. The PSP is to ensure that team members attending project meetings are capable to engage the TNPA project team on any matters arising. Attendance by the PSP lead is compulsory.

7.1. Project Kick off Meeting

The Project Kick-off Meeting is to be held at the Port of East London upon appointment of the PSP. The aim of this meeting is to align the project team with the study deliverables, execution strategy, PSP requirements etc. It is advised that the main role players from the PSP project team be present for this meeting. It is expected that the outcomes of the meeting will include the dates for future progress meetings, finalisation of access and security at the site, and working hours. This is a once off meeting which will occur one week after award. The PSP should allow at least four (4) hours for the Kick off meeting.

7.2. Progress Meetings

Project progress meetings will be held by weekly to discuss project progress thus far and plan for the upcoming month.

7.3. Project Close-Out Meeting

This will be held at the end of the study approximately two (2) weeks before the final deliverables are submitted. At this meeting the PSP will be required to present all of the outcomes of the study conducted in the form of a formal presentation to the TNPA project team.

The PSP will be required to submit draft documents one week prior to this meeting in order to enable the TNPA project team to review and give feedback. This is also to ensure that all aspects of the scope are met to the required completeness and quality standards.

Following the presentation, a further one week will be given to attend to any irregularities, clarifications and errors that are present in the draft deliverables before the final deliverables are delivered.

8. POST STUDY PROJECT SUPPORT

Post study support may be requested for clarification as and when required.

9. TENDER CLARIFICATION

TNPA Procurement shall arrange tender clarification briefing.

10. ESTIMATED COST

The activity schedule below used to develop the quoted price for the works:

| Items | Description | Unit measure | Quantity | Amount (R excl VAT) |
|-------|---|--------------|----------|---------------------|
| 1. | Preliminaries and General (P & G's) | Sum | 1 | |
| 2 | Project Initiation and approved method statement | Sum | 1 | |
| 3. | Presentation of Results from bollards tested at Car Terminal. | Sum | 1 | |
| 4. | Presentation of Results from bollards tested at Tanker Berth | Sum | 1 | |
| 5. | Presentation of Results from bollards tested at S & T Berths | Sum | 1 | |
| 6. | Presentation of Results from bollards tested at Multi-Purpose Terminal. | Sum | 1 | |
| 7. | Final Detailed Engineering Report | Sum | 1 | |
| | TOTAL | | | |