

Detailed Scope of Work

The Tynes Bay Waste to Energy Facility located in Devonshire Bermuda, operates two (2) heat recovery steam generators combusting all of the islands municipal solid waste. The industrial clinker crane plays a critical role for the overall operation by moving the ash by product to be processed in our facility. With a lifetime of over 20 years, the clinker crane has reached its life expectancy and requires full replacement.

The Government (“Client”) requests the services of a single contractor to provide professional engineering and construction services to the Tynes Bay Waste to Energy Facility under the Department of Works and Engineering for the following :

- 1) Design & Engineering of New Clinker Crane
- 2) Supply and Delivery of a Complete Clinker Crane
- 3) Supply and Delivery of Clinker Crane Mechanical & Electrical Systems
- 4) Decommissioning of Existing Clinker Crane, Rails and Systems
- 5) Supply and Delivery of New Rail System
- 6) Installation of Complete Clinker Crane Systems

The contractor shall be required to work under the direction of the Tynes Bay Maintenance Engineer or designated Government Project Manager for the completion of the work task outlined above.

Design & Engineering of a New Clinker Crane

The successful contractor shall work with the selected crane company to design and engineer all aspects as it relates to the replacement clinker crane. The contractor shall be responsible for facilitating the following:

- Verify and certify crane specification meet plant needs
- Certify Material Specification Requirements
- Produce Engineering Shop Drawings of the works. This includes dimensions and weight calculations as required for rigging and installation
- Perform all necessary control and quality assurance standards are met
- Provide all test certificates for equipment supplied
- Provide all mill certificates for materials to be utilized in construction works
- Review and certify all engineering equipment drawings and confirm all equipment specifications meet Tynes Bay system requirements

Supply and Delivery of a Complete Clinker Crane

In an effort to standardize the crane systems at the Tynes Bay Waste to energy Facility, the contractor shall supply a “Clinker Crane” manufactured by KONE CRANE. The contractor shall be responsible for the following:

- Ensure engineering and design specifications are carried out by manufacturer
- Ensure all certifications and test have been performed by manufacturer
- Ensure timely supply and safe delivery of Clinker Crane Equipment, Parts and Accessories

Kone Crane Information:

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General Specification Criteria

The supplier shall provide one (1) complete clinker crane, consisting of the following components according to this specification at a minimum:

- One (1) Complete double girder bridge crane and hoisting trolleys comprising of the following:
 - Hoist motor, hoisting gearbox, rope drum & wire ropes
 - Traversing wheels & traversing motor with brake
 - Trolley frame with service platform & handrails
 - Rubber buffers
 - Upper & lower limit switch
 - Traversing limit switch
 - Electric cable for hydraulic grab supply & control
 - Suspension devices for hydraulic grab
 - Overload protection device
 - Lubrication system for trolley
 - Bridge structure with service platforms
 - Hardened bridge travel wheels
 - Travel gearboxes and motors with appropriate brake system
 - Poly bumpers

- One (1) Electro-hydraulic grab designed for slag handling
- Two (2) End trucks including wheels, bearings, axels, etc. to support the bridge girders

*****Fresh Air Supply***

Historically, the ash plant bunker has produced high levels of carbon monoxide at times which create a health & safety risk for staff operating the clinker crane. It is the intention for the supplier to engineer an independent fresh air supply for the sealed pressurized clinker crane cab area.

This cab fresh air supply shall be presented as an optional item within the pricing.

Performance & Design Specification Criteria

The following data must be verified by the supplier

Crane max. capacity	4 t (incl. grab)
Crane span	4500 mm
Height of lift	7700 mm
Long travel max. wheel load (on rail beam)	3.6 t (excl. grab)
Long travel speed	~ 60 m/min, stepless frequency control
Cross traverse speed	~ 35 m/min, stepless frequency control
Hoist speed	~ 20 m/min, stepless frequency control
Power supply	3 Ph, 460 V, 60 Hz
Uninterrupted power supply (120 V, spare capacity exists)	To be determined by supplier. If required please indicate voltage

The incineration plant consists of two units with a refuse throughput of 6 t/h each. Additionally a third stream is foreseen in the future with a refuse throughput of 7.5 t/h. On average 10 to 20% of the waste input are inert which results in approx. 2-4 tonnes of slag per hour from the units.

The clinker crane is used for the following task:

Moving the bottom ash from the drop-off point (quench tank) further down in the clinker bunker and closer to the ash treatment plant;

Feeding the ash treatment plant.

Additional Notes:

The operating hours of the ash plant are Monday through Friday, 8-hours daily. The clinker crane is not permanently operated but only a couple times a day.

The new clinker crane has to have enough capacity to maintain the current bunker management or better.

The calculations of the necessary crane sizing, is the responsibility of the supplier. Volume of grab as well as the different speeds of the crane is the responsibility of the supplier.

Site Conditions

Corrosive environment

Medium dust concentrations

Room Temperature range between 15 and 40 °C

Supply and Delivery of Clinker Crane Mechanical & Electrical System

General Specification Criteria

The contractor shall supply all mechanical and electrical equipment, components and systems for the operation and control of the clinker crane. The necessary parts include but may not be limited to the following:

- All electrical panels on the crane
- All electrical panels for main switch, hoisting, traversing and traveling control located in the remote MCC room including necessary MCC cabinets
- Cables and conduits for installations in the buildings
- Festoon or appropriate cable system for the hoisting trolley with crane span of 4500mm
- Fixed cables and cable raceways for the whole crane (all fixed cables on the crane are to be laid in cable trays)
- Travel limit switches
- One (1) enclosed cab suspended from the crane bridge with operators console for one (1) operator c/w joystick controllers and push buttons including forward facing seat. The following ventilation and air conditioning options shall be explored and presented within the pricing:
 - **Option 1:** The cab shall be ventilated and air conditioned as well as include everything necessary for operation.
 - **Option 2:** The cab shall be supplied with an independent pressurized fresh air supply drawn from an area outside of the bunker to ensure safe breathable levels of

oxygen at all times. Contractor should reference standard Health and Safety regulations for air supply requirements.

- One (1) radio controller for maintenance duty
- All panels shall have anti-condensation heaters, panel lights, service outlets and the according enclosures
- All motors shall be suitable for operating in tropical environment
- Protection category in bunker area shall be IP 65
- Control system including all necessary parts such as as:
 - PLC (preferably Allen Bradley)
 - All basic encoders and limit switches
 - Encoders on the trolley and bridge
 - Remote I/O between the crane, MCC room and pulpit
 - Complete monitoring system consisting of :
 - All required software (factory tested)
 - Modem and network connections
 - PLC's, etc.
 - Diagnostic systems and detection elements
 - Festoon cable system with cables and trolleys including junction box at runway end of the crane bridge

Options:

- Remote monitoring and control center (operation of crane remotely from “offsite” location)

Decommissioning of Existing Clinker Crane, Rails and Systems

The contractor shall be responsible for the complete demolition of all associated Clinker Crane equipment, parts and accessories. This includes but is not limited to the clinker crane cab, trolley, grab system, rail system, electrical wire system and associated auxiliary equipment.

The contractor shall be responsible for disassembly of all equipment and transport of disassembled equipment into waste skips provided by Government which will be onsite. See further details below.

Tynes Bay Waste to Energy Facility shall provide a large waste skip on the 6 meter level for all equipment, metal and debris to be placed. Any motorized equipment containing oil or fluids shall be drained in accordance to Bermuda Environmental standards, laws and procedures.

All waste generated as a result of the decommissioning process are the responsibility of the contractor to dispose of properly in accordance to the agreed procedure detailed below.

Failure to dispose of equipment, materials, etc. in accordance to the outlined above could result in suspension of the project, fines, or removal from the project.

Supply and Delivery of New Rail System

General Specification Criteria

The existing rail system requires replacement due to a misalignment issue that results in unnecessary stress on the clinker cab structure and wheels during operation. A new rail system shall be supplied that meets the needs of the Clinker Crane. The contractor shall supply all crane steel structures as per crane manufacturer specifications in order to adequately support crane equipment.

- Crane steel structures shall include but not limited to the following:
 - Double girder with crane span of 4500 mm
 - Trolley traversing rails
 - Trolley end stoppers
 - Walkway and hand railing on one side
 - Movable festoon system brackets
 - Surface preparation and painting for corrosive and dusty environment according to TC-10 'Painting and Coating' or comparable
- Runway rails (approx.. 60m of track from bunker to ash handling plant) for both runway beams suitable for the new end trucks
- Necessary safety equipment
- Shop testing
- Training for personnel
- Transportation and packaging

Options:

- Weighing equipment incl. PLC with automatic registration and network connection
- Busbar system instead of festoon

The supplied rail system shall be in accordance to the crane manufacturer's specifications for waste to energy systems. The contractor shall be responsible for the following:

- Ensure rail materials fall in line with the manufactures specifications
- All welding and securing materials required for installation are provided
- Contractor in consultation with manufacturer shall supply engineering drawings for rail installation

Installation of Complete Clinker Crane Systems

The contractor shall be responsible for all installation and construction for the replacement of the Clinker Crane and its corresponding mechanical and electrical systems. The contractor shall supply all equipment, labour and materials to ensure that this project is carried out in a timely and safe manner. The installation works shall be in accordance to the engineering specifications and approved drawings.

All mechanical and electrical systems installed shall meet the needs of the plant and comply with manufacturers specifications. All equipment installed should be approved by authorized Tynes Bay technical and management personnel. Authorization should be sort in a timely and written formal format.

Conditions of Service Provision

The service to be provided is one of technical resource support to the Ministry of Public Works, Tynes Bay Waste to Energy Facility detailed below. The cost of these services will be provided by the Contractor and agreed with the Client prior to award of contract and commencement of work.

The Contractor shall perform the services expeditiously to meet the requirements of the Client and shall complete any portion or portions of the services in such order as the Client may require. The Client shall have the right to take possession of and use any completed or partially completed portions of the work. All design calculations, drawings, investigations, reports and other like intellectual property will become property and copyright of the Client.

Service Package Deliverables

Below are the required duties of the Contractor, (this list is not inclusive of all task but serves to provide a general oversight);

1. Design & Engineering of New Clinker Crane

- a. Perform initial site visit and system inspection in collaboration with KONE Crane Manufacturer
- b. Develop recommendations for Clinker Crane client review
- c. Produce and provide Engineering drawings and all specification documentation for clinker crane cab, components and auxiliary systems
- d. Review and verify all engineering drawings and specifications for clinker crane meet the needs as outlined

2. Supply and Delivery of Complete Clinker Crane

- a. Review and verify all pre-installation testing and certification documentation
- b. Review all specification documentation for accuracy

- c. Ensure that material specification meets the needs of the facility and the environmental conditions
- d. Coordinate all aspects of shipping and transport
- e. Coordinate all local transport logistics
- f. Inspect and certify all equipment, auxiliary systems and parts for defects or completeness

3. Supply and Delivery of Clinker Crane Mechanical and Electrical Systems

- a. Review and verify all pre-installation testing and certification documentation
- b. Review and verify all specification documentation for mechanical, electrical and control systems
- c. Coordinate all aspects of shipping and transport
- d. Coordinate all local transport logistics
- e. Inspect and certify all equipment, auxiliary systems and parts for defects or completeness prior to installation

4. Decommissioning of Existing Clinker Crane, Rails and Systems

- a. Complete decommissioning and dismantling of clinker crane and all related equipment, systems.
- b. Contractor shall be responsible for ensuring all aspects of waste debris are placed in Government provided laydown disposal areas and loaded in Government provided skip bins for waste transport. (All Equipment should be drained of fluids)
- c. All disposal arrangements shall fall in line with the facility best practices and comply with Bermuda Environmental Law.

5. Supply and Delivery of New Rail System

- a. Liaise with manufacturer to determine rail specification for specific Clinker Crane
- b. Ensure that material specification meet the needs of the facility and the environmental conditions
- c. Coordinate all aspects of shipping and transport
- d. Coordinate all local transport logistics
- e. Inspect and certify all equipment, auxiliary systems and parts for defects or completeness

6. Installation of Complete Clinker Crane Systems

- a. Provide all equipment, labour, supervision and services to construct and install a fully operational Clinker Crane System
- b. Manages site supervision on a daily basis. Directs and monitors work of all contractors and sub-contractors.
- c. Leads installation of all Clinker Crane Equipment and all associated systems
- d. Ensures that project is constructed to specification, on time and within financial constraints.

Special Considerations

Clinker Crane Environment and Operation

Equipment, Facilities and Services to be provided by the Bermuda Government

Item to be provided specifically by Tynes Bay

- Client to provide access to site as required
- Staging area close to work area
- Use of forklift for loading and unloading equipment
- General Waste Dumpster close to work area
- Metal Waste Dumpster close to work area
- 480/3 –phase power as required close to work area
- 110V single-phase power as required close to work area
- Use of toilet and shower facilities
- Personnel Onsite communal Area
- Office Space Area
- Site specific safety training

Any item not included in this list should be included in contractors pricing. Bidder should seek clarification on any items which are not clear. It is the responsibility of the bidder to include pricing for all items not included in this list that are deemed necessary for the success of the project.

Project Timeline

The Tynes Bay Waste to Energy Facility is normally continuously fully operational except during times of maintenance or low volume of garbage. In order to accommodate the crane installation, we have provided the maximum amount of continuous time that can be reasonably provided for plant full shutdown. To meet our operational mandate for trash reduction, the shutdown time for this project shall be limited as follows:

Full Plant Shutdown (maximum): 14 consecutive calendar days

Ash Plant Bunker Non-Operation (maximum): 14 consecutive calendar days

The bidder should utilize this information to provide a work plan and methodology that meets this specific criteria and limitation. The contractor shall be given 24 hour access to the facility if required. Work scheduling should also take this into consideration.