

EMPLOYER'S REQUIREMENT

SCOPE OF WORKS

The scope of works of the project includes Harbour Development / Harbour Repair / Harbour Protection Structures (but not limited to)

1. Detailed design of the harbour and jetty based on the preliminary design layout as per the requirements in attached drawing
2. Detailed surveys including bathymetry of basin and channel, bathymetry of potential harbour expansion area, shoreline facing the harbour area, dimensions of existing coastal structures including any existing harbour or jetty and shore protection structures near the harbour area, dimension of structures located where potential harbour expansion may occur, elevation profile from the harbour area to the island vegetation line, and scaled aerial photograph of the entire island and harbour area.
3. Construction of jetty, quay walls, breakwaters and revetments and related amenities, and (if required) maintenance dredging of the existing harbour basin including the channel. If required by the work methodology proposed by the contractor, the scope of works should include removal/demolition, transportation and disposal of existing harbour structures.

DESIGN CRITERIA

1. New Harbour basin shall be dredged to a minimum depth of 3.5 metres (MSL), if extension the basin depth to be as existing harbour depth unless otherwise stated in the layout and entrance channel shall be dredged to a minimum depth of 4 metres below Mean Sea Level (MSL). The harbour structures should be designed accordingly.
2. The harbour shall be designed with proper water circulation within the basin. Any openings made for water circulation **shall not cause sediment movement into the harbour basin.**
3. Harbour design layout shall ensure minimum sediment accumulation at the entrance channel and inside the basin to allow for a maintenance dredging period of not less than 5 years. Structures beyond the harbour area can be proposed to ensure sediment control.
4. Harbour components shall be designed for a minimum maintenance free period of 10 years. Design life of all structures shall not be less than 50 years.
5. Minimum Breakwater/Revetment height should not be less than 1.6m above MSL. **Crest height to be determined by survey and proper calculations.** Geotextile should not be less than 800 GSM for break water and revetments.
6. Breakwater rock size to be determined by proper calculations. It **should not be less than 800kg** even though with calculation a lower figure is shown.
7. If the revetment location is in a high wave impact area, rock size should not be less than 800kg even though with calculation a lower figure is shown.
8. Breakwater and Groyne design to be made with consideration of sand movement. If a core has to be provided it should be incorporated in to the design. This is to be determined with proper

surveys. Coral stone should not be used in any rock structures.

9. Groyne crest height should not be less than 1.4m above MSL. **The height to be determined by survey and proper calculation.**
10. Top of quay shall be the higher of the following
 - a. 1.4 m above MSL
 - b. 0.15m above ground level.

Even though our minimum requirement is said, the height of the quay wall need to be determined by proper survey and need to be submitted for approval of the Client before construction.

11. Spacing between quaywall blocks should not exceed 25mm.
12. Appropriate number of access stairs shall be incorporated into the quay wall. An access platform for High-Speed Ferry Network should be provided as per the drawings provided. Location of the access platform to be decided once the project is awarded.
13. Every anchored block has to have a mooring hook minimum. But the contractor can propose location and number of hooks not less than the minimum proposed. Size of the mooring hooks should not be less than 30mm and should be of SS 316 L grade.
14. **Geotextile should be placed to entire quay wall length.** Geotextile should not be less than 600 GSM.
15. Pavement and drainage to be included around the quay wall perimeter. Width of pavement shall be 5m. Pavement shall be made with interlocking blocks of strength 45 MPa **OR Reinforced Cement Concrete slabs as approved by the client.**
16. Double armed Sodium vapour harbour lights/Led lights of at least 120-150 W shall be **placed at a sufficient distance** to provide visibility in the harbour area along the pavement. Lap post should be hot dip galvanized with coating thickness of 100 microns. Electricity connection to the harbour lights from the island mains shall be proposed.
17. Adequate drainage must be placed taking into consideration topography of the harbour area. Water shall not retain in between the island vegetation line and harbour area beyond the island's average flood water retention duration.
18. Sand cement bag construction shall not be proposed for any component of the works.
19. If required as per the layout provided floating platform / Concrete Jetty shall be proposed for the leeward side of the main breakwater as a walkway for passengers accessing small vessels moored along the area.
20. If required as per the layout provided Concrete walkway designed for 1.5Ton vehicles with proper railing shall be proposed to access the long breakwater side from the quay wall.
21. Unless substantiated with relevant data soil properties shall be assumed as below.
 - a. Angle of friction of sand not greater than 32°.
 - b. Bearing capacity of sand not greater than 100 KN/m²
22. All reinforced concrete shall be a minimum of grade C40 and a minimum concrete cover of 50mm shall be provided to all steel reinforcement.
23. Marine Grade Cement shall be proposed for all concrete works.
24. Marine Grade stainless steel shall be proposed for all railings and hooks.
25. Mooring buoys tied to concrete blocks at sufficient distances. with high strength rope and epoxy coated hooks shall be proposed
26. Solar powered navigation beacons within minimum nominal light range of 2 nautical miles shall be

proposed for lagoon entrance and/or harbour entrance, and at any critical vessel turning points, with a **proper stable base**.

27. The ramp for landing craft access shall be designed with a cope edge protector for protecting the concrete edge of ramp.
28. Scour Apron for quaywall blocks should be provided with 30-50kg rock placed on 200-300 GSM geotextile cloth. The cross section of the apron should be 600mm x 1500mm.
29. Based on the design, the contractor shall submit technical specification for evaluation and approval.
30. The concrete jetty / platform should be able to cater loading / unloading of cargo and passenger vessels.
31. Maximum LOA of vessel berthing at jetty / platform is 15m.
32. Mooring rings / bollards should be provided adequately to allow safe berthing / unberthing of vessels at the jetty.
33. Mooring rings / bollards should be provided from SS 316 L grade materials.
34. Jetty should be made from Reinforced Concrete.
35. Concrete used for all permanent works of Jetty should be C40 grade concrete.
36. Cover to all reinforcement should not be less than 60mm.
37. Designer may propose Jetty column / beam arrangement to best cater for the loading / unloading of cargo

The contractor shall submit the following within 14 days of signing of the contract.

1. Final design of quay wall.
2. Contractor's proposed equipment's to carry out the works, including the proposed work methodology. Preliminary design calculations.
3. Project In-survey Report
 - (a) Survey report
 - (b) Raw data in .csv format
 - (c) Scaled aerial survey map(s)
 - (d) Survey data in (.dwg) format
 - (e) All drawings in (.dwg and .pdf) format
4. Detail Design Report
 - (a) Quay wall calculations
 - (b) Breakwater calculations
 - (c) Revetment calculations
 - (d) Jetty/Walkway/platform calculations
5. Detail design drawings
 - (a) All drawings in (.dwg) format
 - (b) All drawings in (.pdf) format
6. Proposed equipment for dredging works and work methodology.
7. Work schedule

The contractor shall submit proposed work schedule. The work schedule shall be subdivided into each island harbour and shall indicate the major works to be carried out under the scope of the project. The work schedule shall clearly show the proposed start and end date for each island harbour. Following points shall be taken into consideration when preparing the work schedule.

- a) Detail design and EIA period shall be clearly specified and should be included within the total duration of the project
- b) The total duration of the project shall not be more than 12 months.

- c) Contractor shall allow for yearly climatic conditions in the Maldives.

OTHER INFORMATION

1. Ground water shall not be used for any construction. Coral sand shall not be used for any concrete works. Sand shall not be taken from the island or the island lagoon except as specified under the scope of the project.
2. All designs shall be to the relevant and latest British Standards or an equivalent standard.
3. Quality of construction and materials shall be as specified in the technical specifications. Contractor shall submit manufacturers and / or suppliers' specifications for any materials or works not covered in the technical specifications.
4. The contractor shall have his quality control measures in place and submit quality reports regularly. Apart from this the employer may at any time without notice carry out independent quality assurance tests to verify the quality of materials and works. If the quality of materials or works is below the specified standard the contractor shall rectify the situation to the satisfaction of the employer at his own expense
5. The contractor shall provide the testing results provided by an independent third party.
6. Electricity and water required for the project shall be supplied by the contractor at his expense.
7. It is contractors' responsibility to obtain all the permits required (from regulatory authorities, service providers etc.) for the designs, and for construction.
8. The metric system of units shall be used throughout.
9. Provide Out-Survey Report at completion of Project. Should submit the following
 - a) Survey report
 - b) Raw data
 - c) Aerial survey map(s)
 - d) Survey data in (.dwg) format
 - e) All drawings in (.dwg and .pdf) format

The confirmation of the ground conditions is the responsibility of the contractor. The sub-surface soil condition in the coastal zone in the Maldives, relevant to harbour construction, should be well known from previous experience. Hence encounter of hard strata that cannot be removed from a standard excavator would not be considered as an unforeseeable condition. The contractor shall allow for the possible use of drop hammer or any other means to remove the hard strata, if encountered, in the dredging rate. Hence the cost of any such work would be deemed to have been covered in the contract price.