In-Survey and Out Survey Guide Lines for Harbor Construction.

(as of January 2013)

Maldives Land and Survey Authority (MLSA),
Ministry of Housing and Environment.

In-Survey:

Scope and Method of Survey.

Topography:

Topography of the island facing the entire stretch and thirty meters (30m) further of construction area should be surveyed. All shapes of natural terrain, natural features (such as vegetation boundaries, shore line) and artificial structures (such as road, harbor facilities, buildings, houses) and alike, from thirty meters (30m) inside of the shore to the edge of the reef shall be surveyed.

Natural features of the specified area should be done with a horizontal accuracy of less than 1 meter and vertical accuracy variation less than 0.05 meter.

Artificial structures of the specified area should be done with a horizontal accuracy of less than 0.1 meter and vertical accuracy variation less than 0.05 meter.

Levels of the specified area should be done at 5-10 meter grid with a horizontal accuracy of less than 1 meter and vertical accuracy less than 0.05 meter. In case of steep slopes, boulders and pits, additional spot levels should be measured in order to draw accurate contour lines.

Survey should be carried out by using one or more of the following methods.

- Differential GNSS
- Total Station
- Auto or Digital Level

Bathymetry:

Bathymetry of the area of construction defined by the authorities and twenty meters further should be surveyed. Data should be collected at 5-10 meter grid with a horizontal accuracy of not more than 1 meter and vertical accuracy less than 0.1 meter. In case of steep slopes, boulders and pits, additional spot levels should be measured in order to draw accurate contour lines.

Echo sounder should be used for bathymetric survey. The positioning should be done by D-GPS or Total station. Where use of echo sounder is found inappropriate like shallow water area or surf zone, Total station method, lead or leveling staff can be used.

Mapping:

The standards of mapping for both topography and bathymetry.

Projection: UTM Zone 43 North for areas north of the equator and UTM Zone 43 South for areas south of the equator
Spheroid: WGS 84
Datum Level for Elevations and Depths: MEAN SEA LEVEL (MSL).

1. All the points should be measured in Northing Easting and Orthometric Height coordinates. The coordinate values (horizontal) of the four corners of the map sheet should be labeled.
2. The scale of mapping is 1:1000. Major contour interval should be 1 meter and minor 0.25m.
3. Where available a satellite or aerial image of the area should be inserted to background and aligned to the map (Geo-referenced).
4. The topographic and bathymetric map should be combined and incorporated in the final products (both digital and printed map).
5. The final map should be created using AutoCAD system.
6. The size of the map sheets should basically be A3. Where A3 is in-appropriate the next larger size should be used or tiled as A3 papers. Incase of tiling an index map showing page breaks should be produced.
7. All maps should show all the survey marks (permanent and temporary). Location Diagrams should be produced for all the permanent and temporary survey marks.
8. All linear measurements should be in meters and all angular measurements should be in degree minutes seconds. Areas in square meters and Volume in cubic meters.

Monumentation:

Monumatation should be done according to the Survey control Stations Guideline provided by the Maldives Land and Survey Authority.

Deliverables:

Final Report:

Final Report should explain the methods of surveys, survey equipments and devices, the dates of surveys, details of the Control Points, condition of the site, information about the surveyors and people involved in the survey from community side.

Map Sheets:

Topographic and bathymetric maps printed at 1:1000 scale on A3 or larger sheets.

Digital Copy of Final Reports and Products:

- All field notes, sketches digitized to PDF format.
- All reports in PDF format.
- All raw and processed data in ASCII and PDF format.
- All drawings in AutoCAD and PDF format.

Out Survey:

Scope and Method of Survey.

Topography:

Shoreline and vegetation line for a stretch of fifty meters further from construction area should be surveyed. All the structures of construction during the project should be surveyed. If the island has been reclaimed that area should be included in the survey.

Natural features of the specified area should be done with a horizontal accuracy of less than 1 meter and vertical accuracy variation less than 0.05 meter.

Artificial structures of the specified area should be done with a horizontal accuracy of less than 0.1 meter and vertical accuracy variation less than 0.05 meter.

Levels of the specified area should be done at 5-10 meter grid with a horizontal accuracy of less than 1 meter and vertical accuracy less than 0.05 meter. In case of steep slopes, boulders and pits, additional spot levels should be measured in order to draw accurate contour lines.

Survey should be carried out by using one or more of the following methods.

- Differential GNSS
- Total Station
- Auto or Digital Level

Bathymetry:

Bathymetry of the area of construction (harbor basin and channels) should be surveyed. Data should be collected at less than 5 meter grid with a horizontal accuracy of not more than 0.5 meter and vertical accuracy less than 0.1 meter. In case of steep slope, boulders, pits, additional spot levels should be measured in order to draw the accurate contour lines.

Echo sounder should be used for the bathymetric survey. The positioning should be done by D-GPS or Total station. Where use of echo sounder is found inappropriate like shallow water area or surf zone, Total station method, lead or leveling staff can be used.

Mapping:

The standards of mapping for both topography and bathymetry.

Projection: UTM Zone 43 North for areas north of the equator and UTM Zone 43 South for areas south of the equator
Spheroid: WGS 84
Datum Level for Elevations and Depths: MEAN SEA LEVEL (MSL).

1. All the measurements of intended points should be in Easting Northing and Orthometric Height coordinates. The coordinate values (horizontal) of the four corners of the map sheet should be labeled.

2. The scale of mapping is 1:1000. The contour interval should be 0.5 meter.
3. Where available a satellite or aerial image of the area should be inserted to background and aligned to the map (Geo-referenced).
4. The topographic and bathymetric map should be combined and incorporated in the final products (both digital and sheet map).
5. The final map should be created using AutoCAD system.
6. The size of the map sheets should basically be A3. Where A3 is in-appropriate the next larger size should be used.
7. All maps should show all the bench/station marks and where applicable permanent stations with all details.
8. All distances should be in metric unit system and all angles should be in degree minutes seconds.

Control point of the Survey

The STATION MARKS installed for the in-survey of the project should be used as controls points of out-survey. Conditions of these control marks should be verified before occupying the station. These stations should be properly recorded according to the specification laid by the Ministry of Housing and Environment.

Deliverables:

Final Report:
Final Report should explain the methods of surveys, survey equipments and devices, the dates of surveys, details of the Control Points, condition of the site, information about the surveyors and people involved in the survey from community side.

Map Sheets:

Topographic and bathymetric maps printed at 1:1000 scale on A3 or larger sheets.
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