

Permanent Survey Control Stations.

(as of March 2008)

Engineering Section,
Ministry of Construction and Public Infrastructure.

Control Stations which are used as origin, intermediate check, and closure points such as but not limited to, intervisible station pairs and/or RTK base station points are recommended to be permanent in nature. Examples include and are not limited to, poured-in-place concrete monuments with uniquely stamped disks, ferro rods with disks, steel rods/ re-bars with caps uniquely identifiable, and drill holes in solid foundations.

General Rules for Control Stations

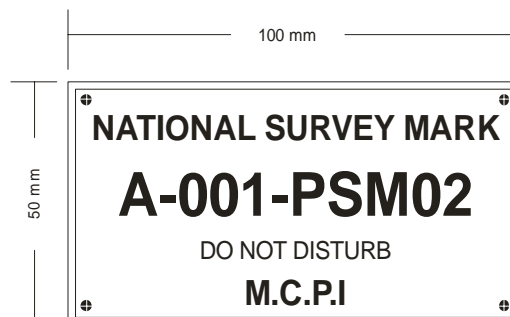
- Locality Diagram of the control station must be either sketched close-to-scale with recovery ties and should contain descriptions in a text format to fully identify the station.
- For all the Control Stations except where position is irrelevant a Visibility Obstruction Diagram should be prepared.
- The Control Stations should be named and labeled according to the guide lines set by MCPI.

Naming of the station marks.

- When naming first comes the atoll/area code followed by island code. Then use Control Station Class and sequential two digit number.

Example:

- a) The second **Permanent Station Mark (PSM)** of Haa Alif. Thuraakunu is **A-001-PSM02**.
 - b) The first **Bench Mark (BM)** of R. Fainu is **E-014-BM01**.
 - c) The first **Photo Point (PP)** of H. Dh. Finey is **B-004-PP01**.
- The name and other details of PSM should be engraved on a stainless steel plate as below and fixed on the monument. If monument is completely buried the name plate can be fixed to the nearest long lasting object such as a wall.



Permanent Station Mark (PSM)

Permanent Station Mark (PSM) is the main control station for all the surveys of every island. At least one PSM is to be established in each island. **Approval from The Ministry of Construction and Public Infrastructure should be obtained before the establishing a PSM.** The names of PSMs will be issued from Ministry of Construction and Public Infrastructure.

- The horizontal coordinates (X,Y) of the first PSM of any island should be determined if possible relative to the Male' IGS Station. If relative positioning is not possible single point localization should be done for more than six hours with a GNSS receiver.
- The vertical coordinate (Z) of the first PSM of any island should be related to the mean sea level which should be determined after an analysis of local tide.
- All successive PSMs of any island should be related to PSM01 of that island.
- All monuments of PSM shall be constructed to the *Type A* specification.
- If the use of an existing structure or a solid rock is more suitable, both in stability and location wise, construction of a Type A monument is not necessary.
- Semi-permanent points, typically large nails/re-bars, can be used for all other recovery/tie points

Bench Mark (BM)

Bench Mark (PSM) is used as the vertical control for all the surveys which leveling is necessary. **Approval from The Ministry of Construction and Public Infrastructure should be obtained before the establishing a BM.**

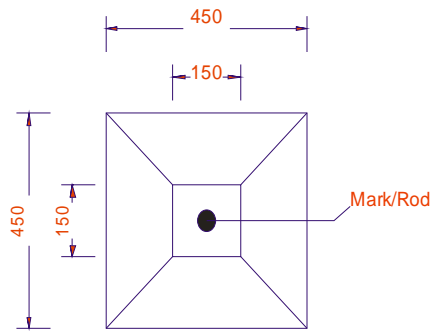
- The horizontal coordinates (X,Y) of all the BMs of any island should be related to the PSM of that island.
- If no PSM is present on the island a single point localization should be done for more than six hours with a GNSS receiver to determine the position of the first BM of the island. If GNSS receiver is not available a local coordinate can be assigned to the first BM.
- The vertical coordinate (Z) of the all BMs of any island should be related to the PSM of that island.
- If no PSM is present on the island the vertical coordinate (Z) of the first BM of any island should be related to the mean sea level which should be determined after an analysis of local tide.
- Where a PSM is not present on the island all BMs should be related to the first BM.
- All monuments of BMs shall be constructed to the *Type B* specification.
- If the use of an existing structure or a solid rock is more suitable, both in stability and location wise, construction of a Type B monument is not necessary. But a point should be there to place the leveling staff.
- Semi-permanent points, typically large nails/re-bars, can be used for all other recovery/tie points.

Monument Type A.

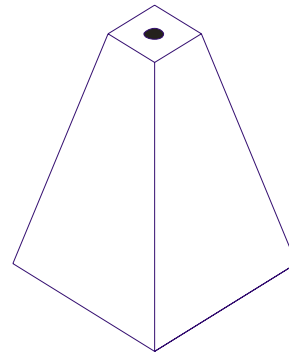
- The mark/ reinforcement rod should be placed in the top of a concrete block cast in-situ having a volume of at least 0.05 cubic meter and shaped as shown below.

- In urban areas it is recommended to bury the whole monument until the top is about 75mm below the surface of the ground.
- In rural areas it is recommended to bury the monument leaving the top 150mm above the surface of the ground.
- A reinforcement bar/rod with a diameter between 8mm to 12mm should be inserted from the top of the concrete as the mark.
- One CM of the rod should be left above the top surface of the concrete in order to place the leveling staff.
- The top half of a plastic bottle can be inserted in to the concrete as shown to provide a water tight protection for the mark (tip of the rod).
- This bar/rod should be lengthy enough to reach the hard ground.

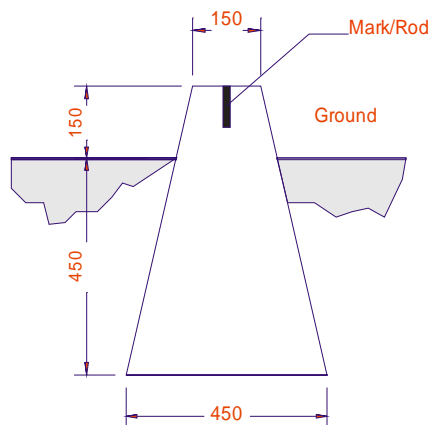
Monument Type A



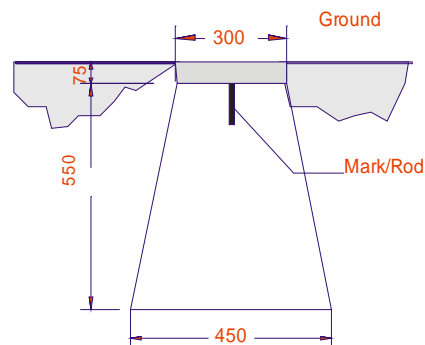
Plan View



3D View



Side Elevation
(recommended for
rural area)



Side Elevation
(recommended for
urban area)

Monument Type B. (The *Dabiyaa* Concept)

- A 24 x 24 x 34 cm *dabiyaa* can be used as the form work to pour in-situ concrete.
- A reinforcement bar/rod with a diameter between 8mm to 12mm should be inserted from the top of the concrete as the mark.
- One CM of the rod should be left above the top surface of the concrete in order to place the leveling staff.
- The top half of a plastic bottle can be inserted in to the concrete as shown to provide a water tight protection for the mark (tip of the rod).
- This bar/rod should be lengthy enough to reach the hard ground.

Monument Type B *The Dabiyaa Concept*

