

AMAS 05

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Mine/UXO Clearance Marking System

MACCA
House#95, Street Jeem,
Wazir Akbar Khan Avenue
Kabul, Afghanistan
E-mail: mapa@MACCA.org

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Warning

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Programme Director
United Nations Mine Action Centre
Kabul Afghanistan
Email: mapa@MACCA.org

Mine/UXO Clearance Marking Systems

05.1 Introduction

05.1.1 Standard marking systems are essential to safe, efficient and effective demining operations. They provide clear, unambiguous warning of hazardous areas and assist in the control of demining operations. MACCA on behalf of the Afghanistan Government is responsible for developing marking systems for use in demining in Afghanistan and ensuring that mine action organisations comply with the systems.

05.2 Scope

5.2.1 This chapter of the AMAS describes the minimum requirement for mine and UXO clearance marking system in Afghanistan

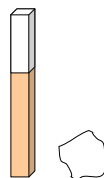
05.3 Minefield Marking Pickets or Rocks

05.3.1 Boundaries between all designated areas, lanes, and points in mine/UXO clearance operations shall be marked with wooden pickets, posts or painted rocks/piled soil, so long as the colouring system remains the same. When using wooden pickets they are to have at least a minimum length of 0.5 metres above the ground. The following painted colouring system is to be used:

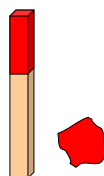
- a) **Long Red Topped Posts (1.2m) or Red Painted Rocks** – Indicate the boundary of the unclear area. A mine warning sign is normally positioned on this post, posts are to be positioned every 5m. if the Red Painted Rocks are going to be used they are to be positioned every two meters.



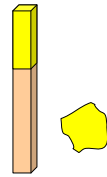
- b) **White Topped or unpainted Posts or White Painted Rocks**: - Indicate all other safe boundaries.



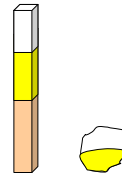
- c) **Red Topped Posts or Red Painted Rocks**: - These posts/rocks indicate the boundary between safe and unsafe areas. They are to be spaced at a maximum of two metre intervals.



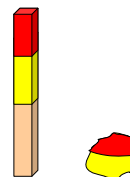
- d) **Yellow Topped Posts or Yellow Painted Rocks:** - Indicate the location of a destroyed Anti-personnel mine.



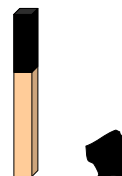
- e) **Yellow/White Topped Posts or Yellow / White Painted Rocks:** Indicate the position of a missing mine.



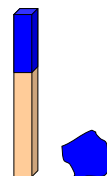
- f) **Yellow/Red Topped Posts or Yellow/ Red Painted Rocks:** - Indicate the location of a destroyed UXO.



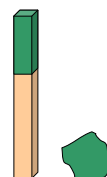
- g) **Black Topped Posts or Black Painted Rocks:** – Indicates location of a destroyed Anti-tank mine.



- h) **Blue Topped Post or Blue Painted Rock:** - Indicate the start and end of daily clearance.



- i) **Green Topped Posts or Green Painted Rocks:** – Indicate boundaries of sampled boxes during Sampling Operations.



05.3.2 Two 25-metre lengths of mine marking tape or rope with eyelet pickets may be used to indicate the lane in which the deminer is currently working. For example, if a deminer is working towards the area on his right, then at the end of each lane he is to roll up the length of tape/rope which lays on his left, in the cleared area.

05.3.3 ALTERNATIVELY - Two Rows of red/white painted rocks may be used to indicate the lane in which the deminer is currently working. For example, if a deminer is working towards the area on his right, then as he progresses forward he is to move the rocks on his left to the right.

05.4 Base Sticks

5.4.1 Base Sticks SHALL be 1.2-metre long wooden rods, painted white at each end (100 millimetres) and red over the centre. These sticks are used by deminers to mark the boundary between the cleared/unclear areas as the deminer is working. **The rule is that the area behind the stick is safe (cleared of mines), and in front of the stick, it is unsafe (not cleared of mines).** The middle 1 metre part of the stick marks the correct lane width. The white ends (100 millimetres each) serve as a reminder to the deminers to overlap their clearance area into the adjoining lanes

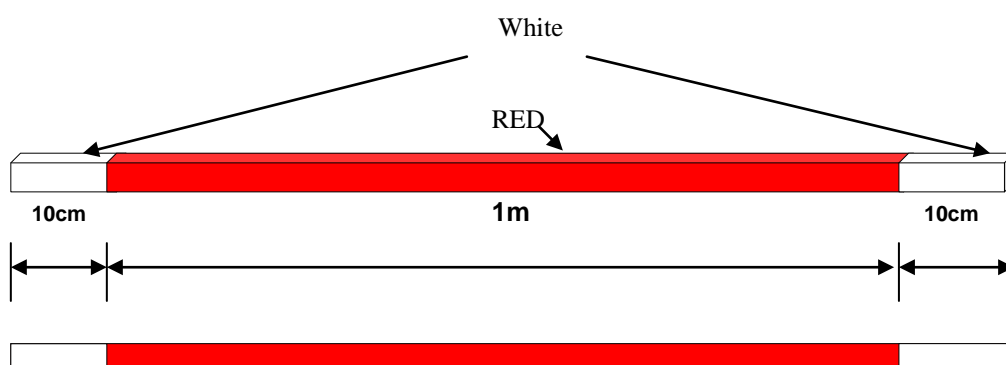


Figure 3.2 the Base Stick

Note: Lane marking is to be placed at the edge of the red/white 1m marks each end of the base stick and not the outside each of the 1.2m base stick.

05.5 Mine Warning Signs

5.5.1 The International triangular mine sign has been adopted as the recognized sign for a SHA in Afghanistan. The minimum size of a mine warning sign is to be 20 cm x 20 cm x 28 cm. This minimum stipulated size of the mine sign ensures that it is clearly visible at a distance of at least 50 meters.

5.5.2 The background color of the sign is red, which is an internationally recognized warning to "stop". The symbolism is white, so that it is clearly recognizable on its red background and discernible by both day and night.

5.5.3 The skull and cross-bones symbol is an internationally recognized symbol, warning of danger. It visually depicts death or serious injury and is easily identified. Mine warning signs should be printed in the Dari and Pashto languages with the word "MINES" printed in bold lettering, so as to be easily identified at a distance of at least 25 meters. The lettering should be in white, to contrast with the red background.

5.5.4 The unmarked side of the sign must face the inside of the minefield and the marked side must be visible from the outside of the minefield. The sign must be securely fastened to the minefield fence at intervals of no greater than 30m.

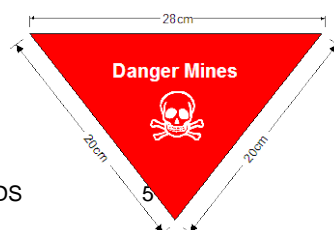


Figure 3.3 Mine Warning Sign

05.6 Minefield Fencing

5.6.1 Fencing is the most effective barrier for mined/UXO areas that are in places of frequent or dense human and animal traffic. Fencing materials such as barbed wire are effective barriers to humans and animals. Coated or galvanized barbed wire will usually endure the elements for a long period of time. Other types of materials, such as plastic rope, plastic tapes etc. are used only for expedient and temporary marking. For selecting the fencing material, the respective AMAC should be consulted.

5.6.2 Strands for fencing shall be placed at heights which are easily visible, and which will not allow a child or an adult, or livestock to cross without specific effort. For example, one strand placed at 25 cm from the ground and one strand placed at 125 cm high would be adequate to cause a man to lift his feet or bend over to penetrate the fence. This action, coupled with the visual warning of painted posts and mine signs, gives ample warning to individuals.

5.6.3 Pickets are used to suspend fencing material and to hang or affix mine signs. Picket material can range from reinforced concrete to angle iron, and wood poles. The use of these types of materials may depend on their cost. Pickets shall be designed for the soil type in which they will be placed. For example, clay type soils are capable of holding a picket in place with only a short portion of the picket below the surface of the ground, whereas sandy soil requires a much larger portion of the picket to be driven into the ground. The height of the picket shall be calculated to permit suspension of mine signs at the appropriate height so as to be clearly visible, despite surrounding vegetation, the minimum height is 1.5 m above ground level. The maximum distance between pickets should be 15 m

5.6.4 Fasteners for fencing materials and mine signs shall be a material that has equal or greater durability than the product it is fastening.

5.6.5 Material used for all aspects of mine marking shall be durable enough to resist the deteriorating forces in their environment, and to conform with the length of time of their intended use. Minefield marking material should be such that it has no economical local use.

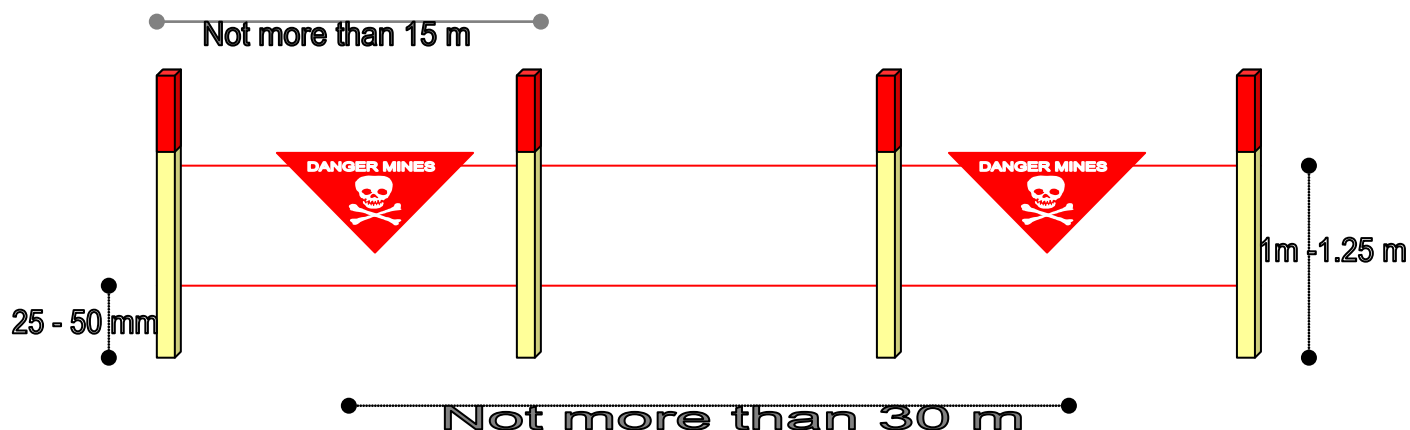


Figure 3.4 Minefield Fencing

05.7 Marking a Cleared Area

5.7.1 The marking of any cleared area following clearance shall be unambiguous and permanent. When the entire mined area has been cleared and no adjacent areas are left unclear, then all perimeter points have to be permanently marked by using rods driven in to the ground.

5.7.2 The Bench Mark (BM) should be marked with a white painted concrete slab measuring 50 cm x 50cm x 20cm. It should be set into the ground so that the top face is flush with the ground surface. Three 0.3m metal pickets should also be inserted flush into the concrete to act as an anchorage and means of detection. The task number, clearance organization and Lat & Long shall be embossed into the slab surface and highlighted in red. The Bench Mark may also be a permanent fixed natural or manmade object as long as the same information as required above is recorded on the benchmark permanently.

5.7.3 The Start Point (SP) and each Turning Point (TP) should be marked with 30 cm metal rods driven into the ground (one rod for TP and 3 rods for SP). These pickets should not be driven flush with the ground until after the QA Completion evaluation has taken place, and the site accepted. Only on acceptance of the site the pickets will be driven flush with the ground.

5.7.4 If only a portion of a minefield is cleared, and suspected areas remain, then the unclear areas shall be fenced in accordance with the rules and regulations previously detailed. Unclear areas that are assessed as not posing a hazard need not be fenced but should be recorded as not being cleared with any clearance asset.

5.7.5 All perimeter points shall be indicated on both the IMSMA Completion Report and associated schematic diagram or map submitted, along with all perimeter coordinates (distances and bearings). Instances where the ground may be unsuitable for metal picket insertion, then a stone pile is to be built and painted red.

5.7.6 IMSMA Completion Reports and sketch map shall define the parameters of **all** different clearance assets used on the site and also to identify those areas that received confirmation clearance.

5.7.7 Any unclear areas shall also to be marked in accordance with Para 5.8 – 5.12 (Minefield Marking) and Para 5.15 above.

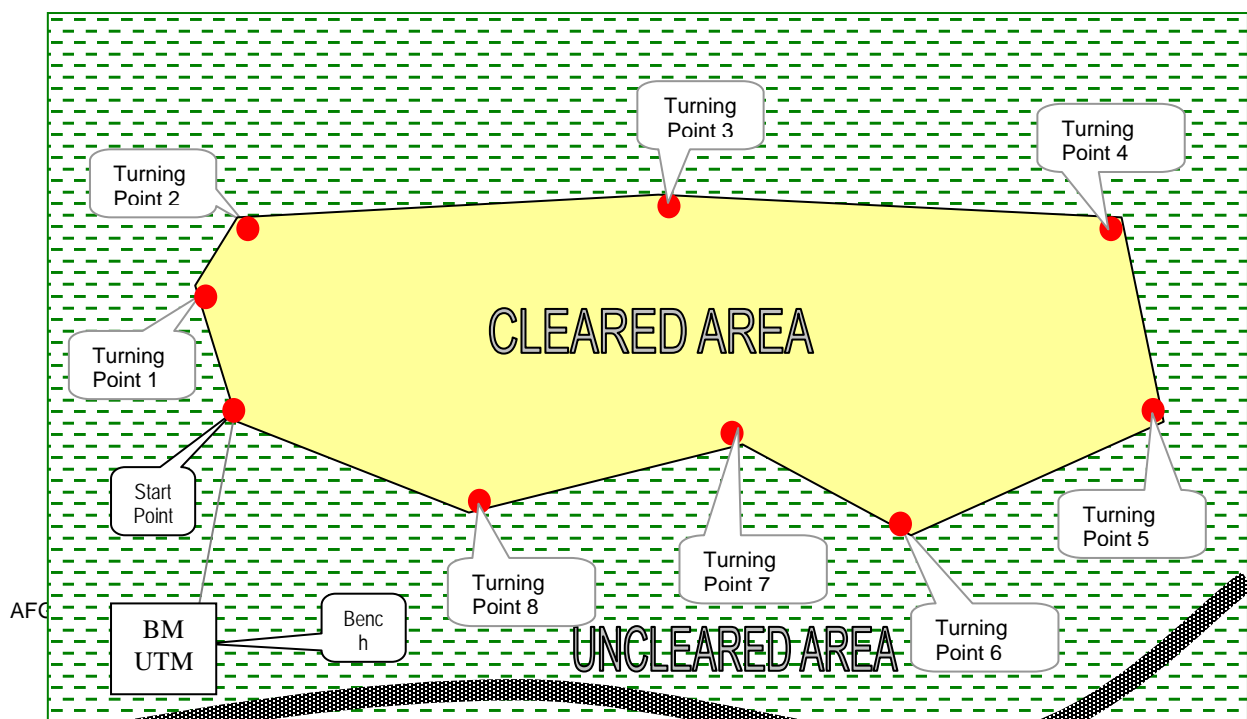


Figure 3.5 Perimeters Coordinate Marking

05.8 The Use of Rocks as Hazard Markers:

05.9 Painted rocks are the most common form of hazard marker in Afghanistan. When used as hazard markers, rocks should be at least 15cm in diameter.

When marking the boundaries of hazardous areas or Suspected Hazardous Areas (SHA) with rocks, the following systems may be used:

5.9.1 A **single line** of rocks along the boundary. They shall be painted red, on one side and white on the other. The red side of the rock shall face the hazard area and the white side is to face the safe area.



5.9.2 White rocks are used to indicate boundaries of any safe useable areas. This includes any areas that have been checked as part of technical survey operations and determined as being 'Free from Hazards'.



5.9.3 The spacing between rocks along the boundary should be 2m except when in uneven ground, areas of vegetation or 1m either side of a Turning Point (TP) on a boundary. In these instances, the spacing between rocks should be less than 2m.

05.10 Control Markers:

5.10.1 All the control markings shall be placed in safe areas. They shall be visible in daylight from a minimum distance of 30m and are to be durable. They may be identified by rocks or signs, if appropriate, or marks on existing structures.

The control markers to be used for key points of reference are:

- a. Reference Point (RP).
- b. Benchmark (BM).
- c. Start Point (SP).
- d. Turning Point (TP).
- e. Intermediate Point (IP).

05.11 Reference Point

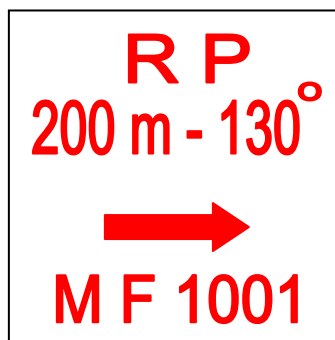
5.11.1 A RP is a fixed point of reference and is located to a suitable distance outside the hazardous area. It should be a permanent and easily recognizable landmark or feature in the general area. The position of the RP shall be such that other control markers are able to be located from it. The location of a RP shall be surveyed and Global Positioning System (GPS) should be used for obtaining its positions (Lat & Long). RP shall be marked with a sign to be

clearly distinguishable from other RPs and control markings in the area. Where possible, the sign should be positioned approximately 125 cm above the ground level.

The sign shall include:

- a. The letters "RP"
- b. An arrow indicating the direction of the hazardous area or BM
- c. A distance and bearing to the hazardous area
- d. A unique task number, prefixed by either "MF" for a minefield or "BAC" for battle area clearance

An example of a RP sign



5.11.2 This sign shows the RP for Minefield Number 1001. This indicates that the BM for minefield 1001 is located 200 meters from this point on a magnetic bearing of 130 degree.

05.12 Benchmark

5.12.1 BMs are fixed points of reference used to locate a hazard or hazardous area. On large clearance sites more than one BM may be established covering different areas on a site.

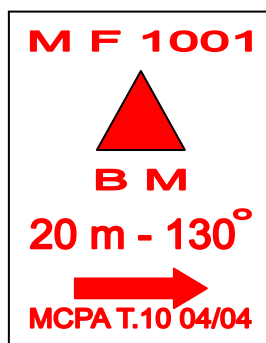
5.12.2 They shall consist of three metal rods of approximately 30cm in length driven flush into the ground with the rods forming a triangle with sides of approximately 30cm. The exact position of the BM is the centre of the three rods. The location of the BM should be determined by GPS. BM shall be located a short distance outside the hazardous area and are to be clearly marked with a signs distinguishing it from other BMs and control markings in the area. Where possible, the BM sign is to be positioned approximately 125 cm above the ground.

5.12.3 BM signs shall be painted red for minefields (MF) and cluster sub-monition strike areas and blue for BAC areas. The signs are to include:

- a) The letters 'BM'.
- b) A unique task number prefixed by the letters 'MF' or 'BAC'.
- c) An appropriately colored triangle with sides at least 15cm in length.
- d) An arrow indicating the direction of the hazardous area.
- e) A distance and bearing to the SP for the hazardous area.
- f) The identification of the survey team, which positioned the BM.

g) The date the BM was positioned.

An example of a BM sign



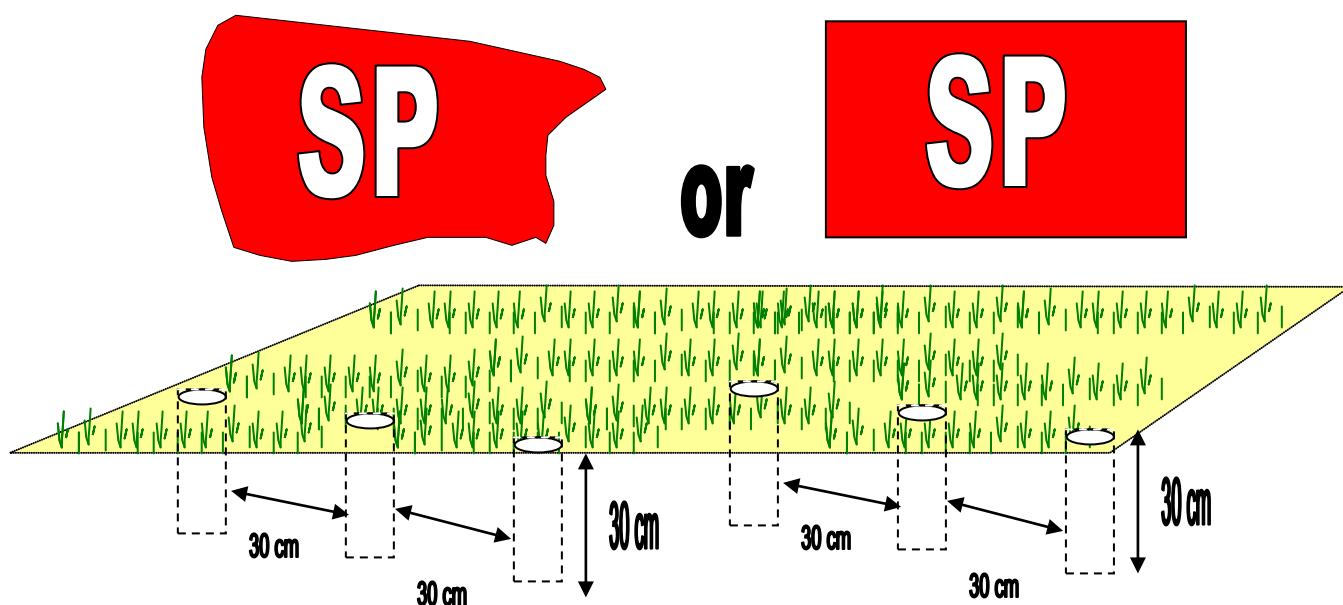
5.12.4 This illustrates the BM sign for Minefield # 1001 positioned by MCPA Team No-10 in April 2004. It indicates that the SP for the minefield No-1001 is located 20 meters from this point toward on a magnetic bearing of 130 degree.

05.13 Start Point

5.13.1 A SP is the point at which the surveyed hazardous area boundary line begins. SP shall consist of three metal rods of approximately 30 cm in length driven flush into the ground with the rods forming a line approximately 30 cm apart. The exact position of the SP is the centre of the three rods. The SP should be located by bearing and distance from a BM.

5.13.2 SP shall be clearly marked with an appropriate painted sign or rocks positioned above the rods. The sign or rocks are to be marked with the letters 'SP' in white. If a sign is used, it should be square in shape with sides at least 50 cm in length and, where possible, is to be positioned approximately 125 cm above the ground.

Examples of SP markers:



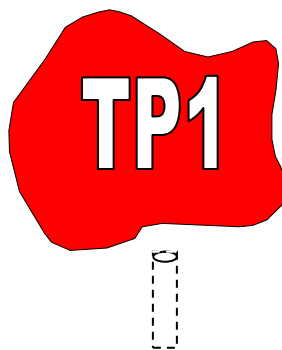
05.14 Turning Point

5.14.1 A TP should be positioned at each point at which the boundary of the hazardous area changes direction. A TP should consist of a single metal rod driven flush into the ground. The

position of each TP should be located using a bearing and distance from the previous TP or the SP and is to be recorded with an accuracy of not less than +/- 30cm and +/- 2 degrees. Positions of TPs are not recorded using GPS.

5.14.2 All TPs shall be clearly marked with an appropriate painted sign or rock placed above the metal rod. The sign or rock is to be marked with the letters 'TP' and the TP number, determined sequentially from the SP, in white. If a sign is used, it should have a diameter of not less than 30cm and, where possible, it should be positioned approximately 125 cm above the ground. The bearing of each direction change and the distance between the SP and TP1 and between individual TPs are to be recorded on the hazardous area map included with the IMSMA Minefield report.

An example of a TP marker:

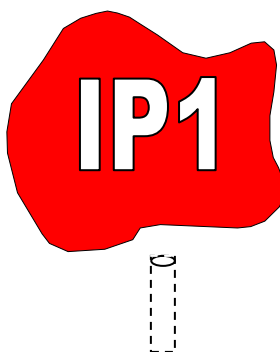


05.15 Intermediate Point

5.15.1 If the distance between two TPs is more than 50m, IPs should be used to ensure that the direction between TPs can be easily and accurately followed. As for TP, IP shall consist of a single metal rod driven flush into the ground and are to be marked with a sign or rock above the rod. They shall be colored the same as TPs but shall not be numbered. If a sign is used, it should have a diameter of not less than 30cm and, where possible, is to be positioned approximately 1.25m above the ground.

5.15.2 IPs shall be positioned at intervals appropriate to the site conditions and shall be located using bearings and distances from a previous TP or SP. Positions of IPs may not be recorded using GPS. The bearing and distance from the previous TP/SP or the previous IP may be recorded on the hazardous area map included with the 'MACCA IMSMA Minefield Report'.

An example of an IP marker:



05.16 Miscellaneous Issues:

5.16.1 Marking of Suspected Hazardous Areas:

5.16.2 There may be a requirement to mark a SHA prior to a technical survey being conducted. Should this be the case, the suspected perimeter of the hazardous area is to be marked in accordance with section 5.2. of this chapter. These rocks are to be positioned in a safe area back from the edge of the suspected hazardous area.

05.17 Marking of Individual Mines or UXO:

5.17.1 There may be situations where a hazard is caused by a single UXO or mine. Often in such cases, the mine or UXO can be dealt with immediately by the demining organization that discovered the item or to whom it was reported. If this is not possible, the item shall be clearly marked using appropriately colored rocks or signs positioned approximately 2m from the item.

05.18 Marking On Walls and Structures:

- a) There are situations in Afghanistan where marking systems are used on walls or other vertical features. Where such marking is carried out, the systems shall conform to the following general requirements:
- b) The marking system colors of red for mined and cluster sub-munitions strike areas, blue for BAC areas and white for safe areas are to apply.
- c) Markings shall be positioned approximately 125 cm above the ground level.
- d) Markers identifying a boundary shall be spaced no more than 2 meters apart.
- e) Marking shall be clearly visible from a distance of at least 30 meters in daylight conditions.
- f) Marking systems shall be understood by all personnel who works with.
- g) Local communities shall be briefed on the marking system.