1 ANNEX 1: METEOROLOGICAL ENCLOSURE DESIGN

The aim of any Meteorological Equipment Enclosure layout is often a compromise between:

a) Siting each instrument so that it has the best exposure:-
    a. the least impact from other equipment in the enclosure and outside
    b. the least impact on other equipment in the enclosure
b) Siting each instrument to allow maintenance:-
    a. Safely:-
        i. No cramped work spaces
        ii. Where work on one instrument cannot be hazardous to someone working on another instrument – for example, where lowering the anemometer mast brings it in close proximity to other equipment.
    b. With minimal impact on other sensors.
c) Overall size of the enclosed area.

The following examples implement the following rules from the CIMO Class 1 Siting Guidelines.

1.1 Guiding Principles Used in these Examples.

1.1.1 Raingauge

1. Anything that subtends more than 10 degrees [of the 360 degree circle around the gauge], must be 4 times the height different away.

1.1.2 Instrument Screen

1. Less than 1% of 10m circle around the instrument screen can contain equipment
2. Nothing should shade the instrument height if the sun is above 5 degrees on any day of the year. Calculations should be valid for the latitudes relevant to the NMHS. For these examples 1 to 60S is used.

1.1.3 Combined Solar Sensors

A combination of Global/Diffuse Radiation and Direct Radiation sensors are often mounted together.

1. Nothing should shade the instrument height if the sun is above 3 degrees on any day of the year [Direct Radiation sensors require 3 degrees, if just Global/Diffuse Radiation then 5 degrees can be used]. Calculations should be valid for the latitudes relevant to the NMHS. For these examples 1 to 60S is used.
2. Nothing that is non-shading, but above 5 degrees and subtending more than 10 degrees, with an albedo larger than 0.5 [Direct Radiation sensors requirement. This prevents significant light that is reflected by other equipment from being measured].

1.1.4 Anemometer

1. Anything taller than 4m, must be 10 times its height away [not really relevant for Met Enclosure]

1.1.5 From Practical Considerations

1. All equipment needs at least 1m between it and anything else to allow maintenance
2. A space to allow the safe lowering of the mast. In these examples, the space is 11m long [10m mast, with some room to work on the sensors when on the ground], and 2m wide and extends either north or south of the anemometer

1.2 An Example "Good" Enclosure

The example calculations have used the following "equipment". For much of the "equipment" the size and measurement height is larger than for a single piece of equipment in common use – instead it allows a broad range of standard equipment to be place in the position and the siting/exposure will be compliant.

Equipment	Height	Dimensions	Measurement Height Range
Instrument/Stevenson Screen	2.25m	0.5m x 0.5m	1.25-2.0m
Anemometer	10m	0.2m Diameter	10m
Raingauge	1m	1m Diameter Allows for Nipher Screens	0-1m
Combined Solar	2.0	0.5 x 0.5m	1.5m
Control Box	1.0m	1.0m x 0.5m	N/A

If the equipment is laid out as in

Figure 1, then the siting meets all the requirements in 1.1 and has the minimum total area for the enclosure. However, the "cricket pitch"/corridor arrangement of the sensors in this example also demonstrates that siting efficiency may not be the only factor in the layout of an instrument enclosure – the constraints of the site will also play a major part.

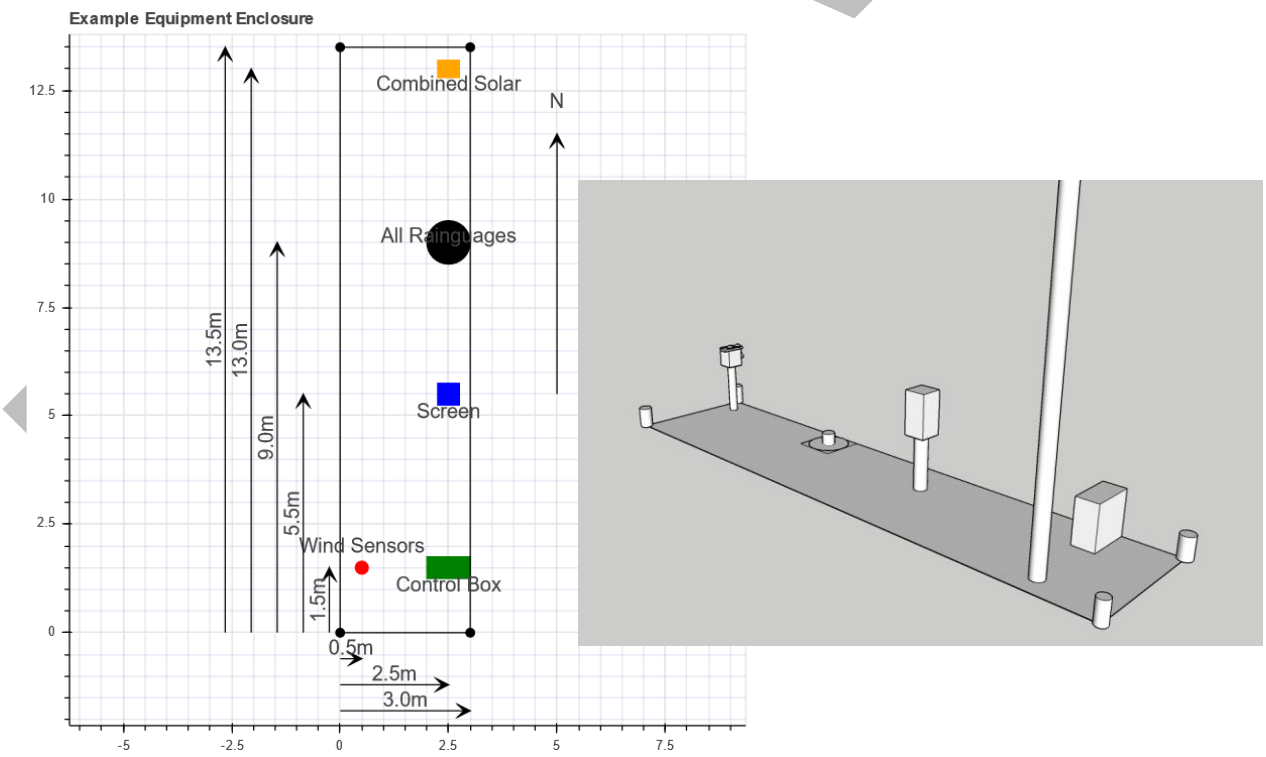

Figure 1: An example of an Enclosure which meets CIMO Class I for sensor siting in the Southern Hemisphere

Figure 2 uses the same instrument "foundations" as

Figure 1, their positions have been rearranged to demonstrate a few of the possible siting failures:-

- The Anemometer is shading the instrument screen (and when the sun angle changes slightly it will also shade the solar instruments). It is also likely that the Solar Sensors will shadow the instrument screen at other times of the year.
- The instrument screen is now in close proximity to the control box, which is a potential source of heat.
- The raingauge, if it is at any height shorter than the corner post [in this example 0.5m], will likely be affected by the post, at least for precipitation from certain directions.
- The Anemometer cannot be lowered inside the enclosure without it being over another piece of equipment [although in the figure it might be able to be lowered outside the enclosure]

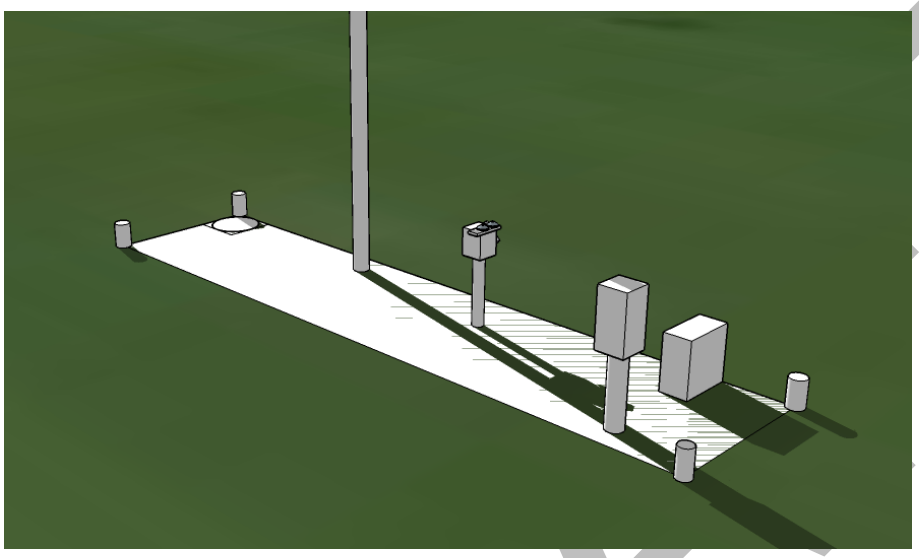

Figure 2: An example of poor instrument siting