

AERODYNAMICALLY SHAPED CYCLONE SHELTER

A special design of cyclone shelter to withstand cyclonic wind forces

Cyclone shelters are major infrastructural facilities essential for sheltering marooned people during cyclones. CSIR-SERC has developed a novel design for building multi-purpose cyclone shelters with stilts and aerodynamically shaped corners. These shelters can also be used as schools and community halls during normal conditions.

FEATURES / HIGHLIGHTS

- Shelters atleast 1000 people
- Selection of appropriate design wind speed based on the risk analysis of cyclonic wind speeds carried out at CSIR-SERC
- Provision of stilts, and sloping ground to satisfy functional requirements against storm surges/flood
- Selection of suitable aerodynamic shape to effectively resist cyclonic wind forces
- Continuous RC hand rails (GI), lintel and loft (designed)
- Wider staircases at both ends from stilted floor
- Under-reamed pile/strip footing
- 1.2 m high R.C. parapet wall



TECHNICAL DETAILS

- The cyclone shelter has rectangular shape and aerodynamically rounded at the four corners to reduce wind load effects. The overall length of the building between the end frames is 21.0 m. The radius of the circular curve at the inner edge is 1.0 m
- To reduce the effects of storm surge/flooding, the ground level in the area is raised by 1.05 m and with a stilt height of 3.5 m. The building has a corridor of width 1.95 m at first floor level (+4.65 m). A wide staircase with a width of 2 m is provided to reach the corridor from the raised ground level
- The overall dimensions at the roof level are 7.65 m x 23.0 m, which includes an overhang of 1.95 m in front and 0.9 m at the rear of the building. The columns of the frame are circular in shape
- Since the ground floor is left open, there tends to be additional wind loading on the bottom floor slab, which has been duly considered in the design

CYCLONE SHELTER



Cyclone shelter - various views

APPLICATIONS

- 23 cyclone shelters were built along the coast of Odisha based on the CSIR-SERC design. Each of these shelters saved nearly 2,000 people during the super cyclone which hit Odisha in the year 1999
- Many of these structures are still in service, withstanding the recently hit *Phailin* cyclone in October 2013 and *Hudhud* cyclone in October 2014, by providing shelter to about one lakh people in 75 such cyclone shelters

TECHNOLOGY TRANSFER

- The design of the multi-purpose cyclone shelter is transferred to The Indian and German Red Cross Society for constructing cyclone shelters along the Odisha coast



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