I.6: Developments in construction & services

A) Design & Construction of SCRF cavity test laboratory:

This article highlights constructional features of the facility developed for testing of super conducting cavities. The layout of building for research & development laboratory though predominantly dependent on functional requirements, yet, requires attention for design & detailing of various building elements. The requirement of auxiliary services, man & material movement for safe installation & operation of equipment & machinery, environmental conditions are the objectives of planning and design of efficient building. The cavity test lab includes test set up for vertical & horizontal test stand. The building lay out has a high bay of dimensions 15.00m x 35.00m with a height of 12.50m. The layout of the building is as depicted in figure I.6.1.

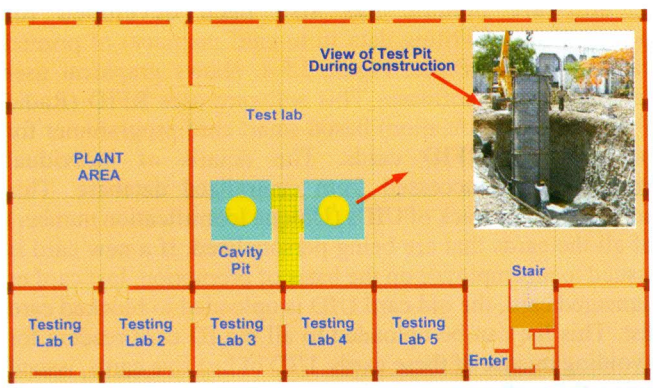

Figure I.6.1: Layout of cavity test facility building

Salient features of the building are as follows:

- Deep underground pits with concrete lining using permanent shuttering.
- High bay of 15.00m span & 12.50m height with provision of electrically operated crane.
- Self levelling epoxy flooring.

The area for vertical test stand has platform of size 11.30m x 7.30m. This includes, two deep circular pits of diameter 1.70m and depth 6.00m. The pits are constructed with RCC (Reinforced Cement Concrete) lining using M.S. (Mild Steel) sheet as permanent shuttering which on setting of concrete becomes integral part of lining. This has also ensured smooth surface. Bottom of the pits, have also been provided with concrete plug, which are similar to general well foundations. This arrangement has ensured clean pit, preventing accidental seepage of sub-soil water. The platform has provision for installation of RCC movable shield which is required for the testing of cavity.

The high bay has provision of one electrically operated crane of capacity 5MT (Metric Ton) to lift the test set up and install in pit as shown in figure I.6.2. The double storied RCC block of building includes labs and offices for the facility and one compressor room adjacent to the building which has been constructed as per the requirements. The 15 m wide hall has been provided with steel trusses and galvalume roof sheeting. Perforated gypsum board false ceiling has been provided with rock wool insulation for sound and thermal insulation.

The ground topography at the location of building has sloping terrain with ground level RL (Reduced Level) 582.17 as highest at one corner of building and lowest RL 580.86 at diagonally opposite corner. The main road in front of building also has slope 1 in 45 i.e. drop of level 0.77m in 35.00m. The finished floor level of the building has been finalized keeping sloping ground contours in view and this has avoided excessive cutting or filling. However, excavation in hard rock in test pits was in-evitable. The excavation by even controlled blasting was not permitted, since this could have affected the functioning of other sensitive labs, which are located in close proximity of the site. The excavation was carried out, partly by chiseling and partly using liquid nitrogen. Some trials were conducted to accelerate the rate of excavation using liquid nitrogen. It was noted that the heating of rocks followed by pouring of liquid nitrogen in them, induced thermal stresses and consequent cracking. After that, the rock with fissures was excavated easily by chiseling.

Figure I.6.2: View of high bay to house test stand for cavity

The testing hall has been provided with self levelling epoxy flooring to maintain dust controlled environment.

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