

NOTE: PLEASE READ DIMENSIONS SECTION FOR CHANGE and Figure Note

**Balsa Wood Building
Rules and Construction Requirements**

Introduction

The Hilton Hotel desires a hotel to be built along the coast near Georgetown, South Carolina. The desired location requires that the structure be capable of withstanding extraordinary hurricane force winds. They also require that the roof be designed to sustain a dead load for the placement of landscaped scenery and track area atop the roof. Thus, the schools of the Carolina's Conference are charged with the task of designing, as set forth by the following rules. Any rules that are not followed will result in elimination/disqualification from the competition. The team that designs the best building, according to the scoring criteria, will win the contract.

Section 1.

Dimensions

The building height is to be **no less than 12 inches**. The cross-section of the structure is to be **square** and **constant** from top to bottom with **maximum and minimum inside** widths set at **4 inches**. No one member is to be longer than **8 inches** and shall not exceed $\frac{1}{4}$ inch in any other perpendicular linear direction. The building shall also be **permanently** connected to a base plate with the dimensions shown in **Figure 1**. The material of this plate is discussed in **Section 2**. The governing requirement on the base plate, however, is that it shall not exceed **2 ½ inches** in height. The individual walls of the structure shall also not be allowed to exceed $\frac{1}{4}$ inch in width. This will be checked by the judges before allowance of competition. Also, there may be **no members spanning through the interior** of the structure. Tolerances on measures will be allowed to vary from plus or minus $\frac{1}{16}$ inch. In other words, the judge should be able to place a square object, **3 15/16 inches** wide, directly through the roof opening and touch the base plate without interference from members.

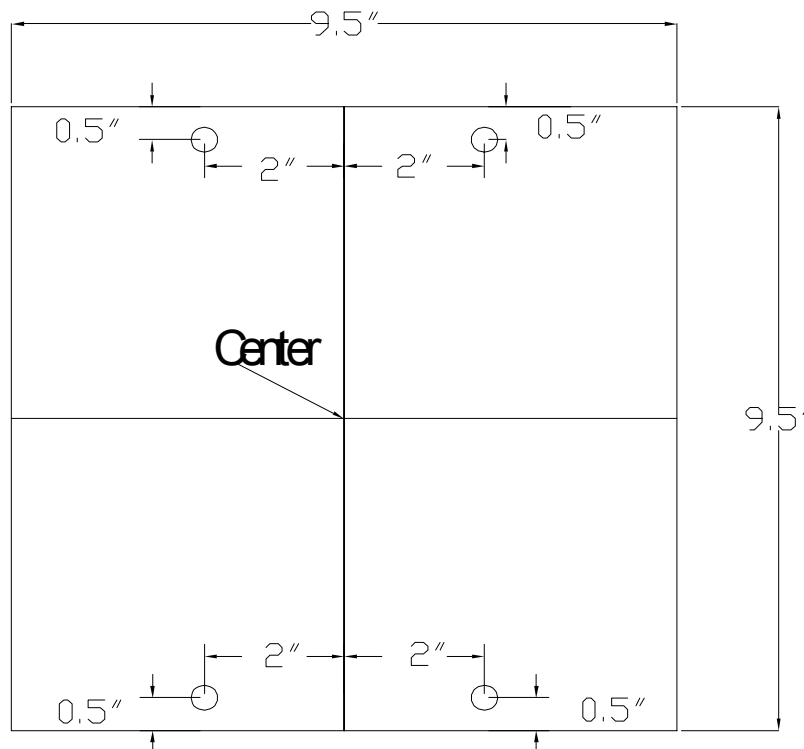


Figure 1: Required layout for building base plate that MUST be permanently attached to building. Circles above represent $\frac{3}{8}$ " diameter holes to be drilled out.

Section 2.

Material

The **framing** of the structure shall only consist of **balsa wood**. The **connection material** for all considerations may **only be an adhesive** substance. Any other connection elements will be terms for disqualification. The base plate may be any material desired. The structure **must** also be wrapped with a clear plastic wrap. The wrap shall cover only the outer walls (not over the top). Any puncture or complete separation of the wrap during testing is grounds for termination from the competition.

Section 3.

Testing and Scoring

Each school may enter up to **two designs** for competition. However, only the better of the two designs, as determined by scoring, may place. Each structure shall undergo 3 phases of testing. These phases include **building weight test (including the base plate)**, **dead weight test**, and **wind velocity test**. The weight of the building will include the framework, clear plastic wrap shell, and the base plate. The second test will be a vertical load test. Each structure shall undergo the application of a linear load up to a peak load of **15 lbs**. The structure must then hold the load for a time period of **2 minutes**. This is a pass or fail test. Any structure not capable of withstanding the load will be disqualified. The last portion of testing will be the application of wind forces against the structure. This shall be done by means of a wind tunnel. The dimensions of the tunnel are **15"** (width) x **15"** (height). The maximum velocity possible is **216 mph**. The initial velocity is **45 mph**. Cracking in members, deterioration of the plastic wrap, or separation of the building from the base plate will indicate failure and testing will cease.

Teams are to number the sides of the base plate **1 thru 4**, and, on the day of competition, a number will be chosen by the head judge. The number will be the same for all schools. This will determine the side of the building that will face the direct wind force. The building will be subjected to until failure or until the maximum capacity of the wind tunnel is reached. Failure will be noted as not only the failure of the framing, but also as puncture of the clear plastic wrap.

Scoring will be as follows:

$$\frac{V}{Bw} + \frac{Dw}{Bw} = \text{Preliminary Score}$$

Preliminary Score * A = Final Score, High Score Wins

V= maximum Velocity Reached

Dw = Dead load applied (15lbs)

A = Aesthetics score

Bw = total weight of the building

Section 4

Aesthetics

The building should be designed not only with engineering aspects, but also with ingenuity. The building will be judged based on design, craftsmanship, and overall appeal. Teams shall receive a score of **0.9 to 1.0**, where 0.9 is the lowest possible score. A scene **shall accompany** the building with the constraint that the base plate may not be permanently attached. The main constraint is that one length of the scene is designated as a **no build area** for a distance of **8 inches** inward. Half of this area is designated to be ocean and the other half to be sandy beach front. With this in mind, the building is allowed to be placed at any other location on the scene. The scene may have any desired attributes but may be **no larger than 24 x 24 x 1** (inches). The scene must also contain the name of the school no larger than **3 inches** as well as the corresponding school mascot. The mascot shall not be any larger than **3 inches in any direction**.