



## **Reef Ball™ Designed Reefs Beaches, Turks and Caicos Final Report**

The Beaches Reef Ball™ Designed Reef Project has now been completed and being utilized by Beaches clients. As per the proposal submitted, two designed reefs of approximately 100 units each were fabricated and deployed off the shoreline of the Beaches Resort. The first reef area is centered within the swim zone of the resort confines, with the second reef located to the east of their dock, within the buoyed swim zone. Both reefs are demarcated with buoys to indicate their approximate location.



**Aerial of site 1. Center of Beaches property**

**Figure 1.**



**Figure 2. Aerial of site 2. Located east of the dock. The floating platform is in the center of the surrounding pods.**

The reef modules were constructed July 22<sup>nd</sup> thru August 5<sup>th</sup> 2007 at the Treasure Beach lot located to the South of the hotel. The construction process was performed by 6 people, 3 persons from Reef Innovations, Inc. and 3 local laborers. Concrete and sand was purchased from Butterfield Concrete, forklift by a local contractor and shells and rock from local sources. Local coordination and transportation was provided by Beaches and expertly directed by Michael Clarke, the Water Sports Manager.



**Figure 3. Early fabrication stages.**



**Figure 4. Modules prior to deployment.**

The fabricated units were deployed and transplants added the week of August 25-September 2, 2007. A total of 205 reef units were placed, with approximately 124 balls on the eastern site and 91 balls on the western site (5 balls were broken in process and counted as two). Of the 205 units, there were 20 pallet balls, 60 bay balls, 60 mini bay balls, 30 lo-pro balls, and 30 oyster balls with 50% of those being fabricated in the "layer cake" design.



**Figure 5. Transporting modules to site.**

The coral transplants were taken from 2 different sites; the Third Turtle Beach Nourishment Project area and the sunken barge off of Water Cay. A total of 712 transplants were accomplished in the 7 day period, not including small corals (single finger corals divided from larger colonies) and red algal clumps (*Amphiroa* and *Neogoniolytho* spp.) that were added. The western site (Site 1) received a total of 314 hard corals, 27 soft corals, and 65 "live rocks" with associated invertebrates. The eastern site (Site 2) received 243 hard corals, 16 soft corals, and 47 "live rock" formations. All transplants have been photo-documented for further monitoring, and as of 1 week post construction, are all in good health. The following photos show examples of the work.



**Figure 6. An array with hard and soft corals and live rock.**

. Two different techniques were used to attach the corals to the Reef Ball modules. The first utilizes a non-toxic type of putty that hardens within 24 hours. The second technique uses a special blend of Hydraulic cement which hardens within just a couple minutes. Utilizing the cement requires a team of people to mix, swim and apply, but is necessary for larger transplants that are not completely stable with surrounding water movements



**Figure 7. More attachments of coral.**

Anchoring of the units was accomplished by inserting Helical sand anchors at each pod, then attaching stainless steel cable that ran thru each of the reef structures. The cable was ran low on the units and buried in the sand as much as possible to be less visible. We intend to incorporate other anchoring techniques in future projects to better facilitate the aesthetics of the anchoring process.



**Figure 8. Turtle on reef and anchoring cable through units.**



**Figure 9. Marine life at home.**

A total of 16 people worked on the fabrication and deployment teams, with five of those being volunteers and half of the team being locally based in Provo. Beaches staff also assisted in many ways as needed. The hospitality provided by the Beaches Resort was exemplary and much appreciated by all team members.

We recommend that the two reefs be demarcated with a different color buoy system to facilitate users finding the sites. We also recommend that an in house publication or flyer be produced to introduce guests to the reefs and to also highlight the rules of reef etiquette. As per the proposal, Phase 3 trail markers and maps are still an option to complete the reef. A final recommendation is to continue the monitoring, initially on a quarterly basis as the corals begin to stabilize and overgrow, and bi-annually thereafter to document the progress as well as to assess and repair any damages caused by heavy snorkeling activity.

We appreciate the opportunity given the Reef Ball teams to provide our services and we hope to assist you again at other Beaches/ Sandals Resorts.