



**Photo 10** Typical Example of Fallen Trees

### **Coastal Damage**

The area from Soubise to Marquis was severely impacted by storm surge and wave effects. As a result of this, almost of all the houses and boats on the seaward side of the road were washed over to the landward side of the road, thereby blocking the road. After the passage of the storm, residents of the area cleared the demolished housing. Many of these residents have started to rebuild homes on the same lots that were affected by the hurricane storm surge and wave action (Photo 11). Mitigation action for this low lying area should ideally be relocation/resettlement of this community. Failing this, some form of coastal protection works (e.g. breakwaters) should be implemented, so that widening and increase in height of the beach lands may be achieved. The cost of construction of breakwaters for this area is estimated to be approximately ECS\$3.0 million.



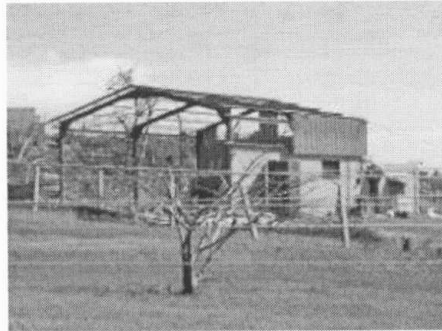
**Photo 11 Reconstruction of housing at Soubise/Marquis**

## **Airports**

The passage of Hurricane Ivan resulted in damage to the Point Salines International Airport (PSIA). Damage was sustained to:

- Navigational aids (VOR, DME and NDB)
- Precision approach craft indicators (PAPI's). Two of these units are presently functional out of a total of four.
- The tower radio and equipment.
- Automatic flight plan processing system.
- Miscellaneous antennae.
- Approach lights, turning lights and runway lights.
- Air conditioners.

Structural damage was noted in the Tower, Terminal Building, Crash Fire and Rescue Building, Central Generating Station, Aviation Services office, Taxi Association office, Staff House. Of note was the collapse of the Store Equipment Building (Photo 12).



**Photo 12 Total Collapse of Walls of Store Equipment Building for PSIA**

The estimated cost of structural repairs is EC\$1.0 million. This does not include the cost of repairs for specialized equipment, which is presently being assessed. It should be noted that after the passage of the hurricane, all flights, with the exception of emergency and relief flights, were put on hold. Passenger service resumed after a period of approximately one week. During this period, September 6<sup>th</sup> to 13<sup>th</sup>, there was loss of revenue from: landing fees; cargo through-put; navigational Aids; Fuel through-put; aircraft overtime; ground handling; aircraft parking; concessionaires; offices; departure tax; and passenger facilitation charges. Discussions with PSIA management revealed an approximate estimate of lost revenues as a result of the hurricane, of EC\$500,000.

### **Seaports**

Damage to the main port terminal was confined to structural building damage (Photos 13 and 14). No damage was reported as occurring to the container stacking equipment, to the docks or to the fendering system. At the new cruise terminal location, no damage was reported as occurring to the dock, although minor damage occurred to the new Welcome Centre. In particular, a damage assessment commissioned by the Port Authority revealed that damages were recorded to the:

- Storage sheds;
- Caricom shed;
- Administration offices;
- Baggage shed;
- Police Station;
- Yard office.
- Lighthouse;
- Post office

This damage assessment revealed a total damage estimate of EC\$3.4 million. Following the hurricane, operations resumed at the port after a period of approximately one week. This delay resulted from a difficulty in getting staff to return to work within that period, and also was due to the fact that efforts were concentrated on the processing and clearing of relief supplies. It should be noted, however, that resumption of normal commercial activities has taken approximately three weeks. An approximate estimate of lost revenues for the port was obtained by assuming a value equivalent to 75% of the revenues

recorded in September 2003. This gave a value of indirect losses for the Port of EC\$670,000.



Photo 13 Queen's Warehouse



Photo 14 Damaged Geest Warehouse

## 4. Effects on the Environment

### 4.1 The Environmental Baseline

The state of Grenada, which includes the islands of Carriacou and Petit Martinique and several small uninhabited islands mainly off the east coast. The highest point is Mount Saint Catherine, at 840m. Carriacou, located 24km to the northeast of Grenada is much less mountainous and has an area of 34km<sup>2</sup>. Petit Martinique is 2.3km<sup>2</sup> and lies east of the northern section of Carriacou.

Despite centuries of agricultural cultivation and recent tourism activity, Grenada, up to the time of hurricane Ivan, still retained some of its mountaintop forests and coral reefs, over 450 species of flowering plants, 150 species of birds, and mostly undamaged landscape vistas. The nation has also had a diversity of cultural resources: Carib (Amerindian) archeological sites; historical sites spanning over 400 years of human drama and socio-economic activity (including forts, sugar mills, rum distilleries, and estate houses).

Mountain peaks, steep ridges and deep narrow valleys dominate the interior of Grenada. The volcanic geology of the interior is the dominant factor that produced this landscape. The coastal periphery of Grenada presents a landscape which is much more subdued than the interior. The western side of the island displays a more rugged aspect as the central ridge is nearer to the coast on that side; the slopes are gentler on the east, and there are some fairly extensive coastal plains. The topography of the southwestern and northeastern parts of the island consists of low hills.