BUIILDING CODE TRIAGE TEAMS AFTER ACTION REPORT
HURRICANE CHARLEY

I. PROCEDURES FOLLOWED:

1. DEPLOYMENT: The deployment of the Building Code Triage was accomplished under a Tracker 2000 Mission Number, input by the Infrastructure Branch Chief (POC: Dean Griffin, DEM).

2. NOTIFICATION: The notification of DCA team members was accomplished internally and augmentation by former Triage Team Member, Charley Hickey, was done in absence of current team member, Buster Case. Additional augmentation of the team was provided by retired CBO Red Wilkes, President of the Suwanne River BOAF Chapter.

Outside contractor PBS&J's primary contact notified the Triage Team Leader on Saturday that he would not accompany the Triage Team, albeit contractual obligation to do so, but would provide the prepositioned equipment, opting for deployment under FEMA, according to the individual. Realizing the contractual obligations, he subsequently changed his mind and joined the Team in Sarasota on Sunday.

Further augmentation by FEMA and ARA (Applied Research Associates) was volunteered and accepted with some restraint on numbers because of the logistics of coordination. The industry also wanted to provide representatives to accompany the Triage Team, but was denied due to logistics constraints.

3. ACTIVATION: The activation of the team and rendezvous was done at the State EOC on Sunday morning at 0630 with PBS&J providing one computer technician, relatively a new hire to PBS&J (2 months) and completely new to the Building Failure Analysis System (BFAS) installed on the iPacs. Notwithstanding his demonstrated knowledge of computers and software, it was clearly a disadvantage to the team that he was performing "on-the-job-training".

4. TRANSPORTATION & LOGISTICS: The logistics of transportation for the DCA members of the team and the PBS&J computer rep from the State EOC to the designated hotel in Sarasota, FL (nearest hotel with electricity) was provided by the Team Leader-- a Ford F-250 crew cab pickup truck. PBS&J also provided a 4-wheel drive vehicle from Jacksonville, FL with prepositioned equipment.

NOTE: A major problem was experienced, (and can be anticipated in future deployments), in finding hotel rooms, then, a contractual obligation of PBS&J.
NOTE: Some of FEMA's reserve engineers were dependent on DCA to make their reservations, despite the FEMA contact being told to do so by the Team Leader. The FEMA reserve engineers are an excellent source of expertise and come ready to provide support, but lack logistic support coordination.

II. FINDINGS:

1. **CHARLOTTE COUNTY:** The Triage Team deployed initially to Port Charlotte in Charlotte County on Monday morning (08/16/04) and contacted Assistant CBO. At the time, Charlotte County Government was not re-established and was in a state of reorganization. The Triage Team Leader explained why we were there and requested a local area map annotating residences built to the FBC. This request took over 2 ½ hours and delayed our entry into the impacted zones, wasting numerous manhours.

NOTE: Based on the above experience, maps of the local area should be brought with the team, perhaps generated by the DEM GIS. This is recommended, in addition to the GPS units, which, at the time

of deployment, the iPacs were not GPS capable, due to recent reloading of the revised BFAS program by PBS&J and the unfamiliarity with the iPac software by the PBS&J computer technician.

NOTE: The Charlotte County Assistant Building Official preferred to lead the team around the housing developments, which proved to be a logistics challenge because of the large amount of traffic (returning homeowners) and the outage of all traffic signals. This attempt to caravan in the Triage Team's three different vehicles in this environment proved to be impracticable, reinforcing the need for maps and individual deployment of teams to different areas. This would eliminate the need for the teams to follow each other around in congested traffic areas, particularly with power outages and no traffic signals.

FLORIDA BUILDING CODE (FBC) AND CODE COMPLIANCE: Residences designed to the Florida Building Code (FBC) and built since March 01, 2001, proved to be very adequate, which was repeatedly demonstrated in newly constructed homes that sustained only cosmetic damage (soffits) compared to older homes in the same neighborhood that had significant roof damage (failed barrel tiles, shingles, doors and windows). Measured wind gusts to 150 mph were recorded in Charlotte County, which exceeds ASCE wind design standards contained in the Florida Building Code.

Extensive soffitt failures allowed horizontally blown rain to enter attics and penetrate ceiling membranes. One resourceful homeowner had actually poked holes in his ceiling with a piece of rebar to prevent saturation of the gypson (sheetrock) in the ceiling. Horizontally blown rain penetrated some concrete block and stucco construction, which is the predominant method of construction in southern Florida. Horizontally blown rain penetrated around some window installations. These issues may be an area for further study by the Florida Building Commission.

Major destruction was observed of aluminum pool coverings, lanais, sheds and carports, with some anchoring bolts actually pulled from the concrete decking and aluminum vertical support members sheared off at the base. In cases where these accessories were attached to the roof and the accessories failed, this ultimately led to partial roof failure where the aluminum attachment was attached to the roof. Galvanized connectors do not perform well in this salt environment, leading to the conclusion that only stainless steel should be used.

Some damage was observed to unprotected openings, while other sustained no damage. Most protected openings performed well when installed properly, unless damaged by windborne debris, which ultimately led to failure. Improper installation of the anchoring system led to the failure of some steel shutters.

Some critical and essential facilities sustained major damage to roofs and structural components, causing evacuation of the building. Extensive power outages and total destruction of the electric grid were observed. A significant number of power polls failed at ground level, leading to the observation that a lack of maintenance or scheduled poll replacement may have permitted rotting of some power polls at the ground level.

The Triage Team examined over 30 individual damaged homes and an estimated 100 area surveyed [undamaged] homes in Port Charlotte, Punta Gorda and Punta Gorda Isle that were subjected to an estimated 145 mph winds, with 150 mph or greater gusts. Some of these homes had been in the eye of this storm and subjected to winds from both easterly and westerly directions. In one upscale neighborhood in Punta Gorda Isle, which required barrel tile roofs under a county ordinance, numerous older homes had sustained significant roof damage from 40% or greater in the ridge and field areas of the roof. The newer homes built to the FBC sustained 10% or less roof damage in those same areas, but this damage was directly attributable to the windborne debris from failure of the older roofs. Had not new homes in this same area

sustained damage from the failed tiles of the older homes, they would have remained unscathed due to improved methods of installation.

Numerous commercial (standing seam) metal roofs performed exceptionally well, sustaining little or no damage. Of the damages to these roofs, only the leading edge cosmetic flange material was observed to sustain damage in isolated cases, due to either flying debris or different installation methods.

Coastal storm surge in Charlotte County was minimal due to the forward velocity (22mph) of this fast moving storm from the time it changed course and came ashore. Potential storm surges of 16-18 feet were not experienced due to the approximately 45 minutes from course change to landfall. Actual storm surge of 8 feet did account for substantial damage to waterfront residences, but nothing compared to what it could have been.

Code compliance is being vigorously enforced in Charlotte County, which accounts for the minimal damage to homes built to the FBC (since March 01, 2001) and the adequacy of the FBC.

2. **DESOTO COUNTY**: The Triage Teams followed the trace of the hurricane eye northeastward up Route 17 to Arcadia, FL in Desoto County on 08/17/04. Despite significant flooding, this major road was open, having been cleared of debris by county officials in both Charlotte and Desoto Counties.

The Desoto County Building Official was contacted and maps were furnished and areas were identified with no delays. The teams were split up and one team proceeded on to Hardee County while the other team covered Desoto County.

The Arcadia Agri-Civic Center was a designated hurricane shelter that experienced major structural failure of the east wall and roof, with approximately 1400 Desoto County citizens inside. Reportedly, thanks to some quick thinking and cool heads on the part of some fire and rescue folks, who were part of the sheltered people, no one was harmed. Apparently, they stopped the panic stampede for the main south doors, (which would have placed anyone running out into the estimated 130-145 mph winds, in severe danger), calming the people and moving them to the west end of the building just prior to the failure of the east wall and east portion of the roof, which most assuredly would have killed everyone in the path of the fallen debris.

NOTE: No accurate measurement of winds could be ascertained at the site of the Arcadia Civic Center at the time of our inspection. NOAA weather information or computer modeling will have to be used to determine these winds.

Access to this failed building, which was in lockdown and guarded by both security guards at the gate and armed Florida National Guardsmen at the door, took consent of the Charlotte County Attorney through the County EOC. We were not allowed inside the building, but were able to survey the building from the outside and take pictures.

On this metal building, we found significant indications of improper wall-to-foundation structural rebar ties, which most assuredly accounted for the failure of the east wall, which took the brunt of the wind force. The roof lacked proper bracing, as determined by a retired building official accompanying the Triage Team. Pictorial evidence was gathered at the site to substantiate these claims. The plans were not reviewed, nor building inspected by the County Building Department; deferring instead to the engineer for inspection of this threshold building. The building permit was issued based on an affidavit from the Design Architect. According to the local building official, the breakdown apparently occurred by the contractor and threshold building inspector.

Subsequent investigation by the Triage Team revealed that initial approval by DCA of this building as a designated hurricane shelter was based on acceptance of affidavit of the design architect, attesting to the adequacy of the design as qualifying for the shelter program.

FLORIDA BUILDING CODE (FBC) AND CODE COMPLIANCE: Residences built to the FBC (since March 2001) survived the storm with little or no damage, attesting to the vigorous code enforcement by the County Building Official and the adequacy of the FBC. This included roofs with three tab composite asphalt-fiberglass shingles, which, when properly installed, did indeed survive major hurricane force winds. No barrel tile roofs were observed in DeSoto County in the residences that the team inspected.

3. **HARDEE COUNTY**: FLORIDA BUILDING CODE (FBC) AND CODE COMPLIANCE: Largely rural and sparsely populated Hardee County had substantial damage to outlying farm buildings and in-town older structures. No damage was observed on any new buildings built to the FBC, though few in number, attesting to vigorous code enforcement. Residences built to the FBC (since March 2001) survived the storm with little or no damage, attesting to the vigorous code enforcement by the County Building Official and the adequacy of the FBC. Soffitt failure was not as prevalent in this area as was in Charlotte County. CBS construction and horizontally blown rain continues to be a potential problem, which needs further study. Extensive power outages and damage to the electric grid were observed.

4. **POLK COUNTY:** FLORIDA BUILDING CODE (FBC) AND CODE COMPLIANCE: The Triage Teams once again split up to cover both the county and city simultaneously. The cities of Bartow and Lake Wales were visited by the teams, surveying over 300 homes subjected to reported 125 mph winds near the eye of the storm path.

Soffitt failure was not as prevalent in this area as was in Charlotte County. CBS construction and horizontally blown rain continues to be a potential problem, which needs further study.

Almost total destruction of any aluminum pool coverings, lanais, sheds and carports was observed, with some anchoring bolts actually pulled from the concrete decking and aluminum vertical support members sheared off at the base. In cases where these accessories were attached to the roof, this ultimately led to partial roof failure where the aluminum attachment was attached to the roof.

Some damage was observed to unprotected openings, while other sustained no damage. Most protected openings performed well, if installed properly. Improper installation of the anchoring system led to the failure of some steel shutters.

No significant structural damage was observed on any homes built to the FBC (since March 2001), except for some minor ridge shingle failure due to the roofer not using a longer roofing nail. The longer nail is needed for full penetration of 2-3 layers of shingles, underlayment and sheathing on the ridge. Code compliance within Polk County and the cities of Bartow and Lake Wales is vigorously being enforced, which accounts for the survivability of these homes and the adequacy of the FBC.

END OF REPORT