

Session Track: Effects of Climate in Warm Weather Coastal Locations
Session Code: CS01a

Paper: Nowhere to Run To

Presented by

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Speaker(s) Biography

Soy un arquitecto de 45 años de edad, casada, con el arquitecto Luis V. Badillo tenemos dos hijos uno de 18 otro de 22 ambos estudiantes de arquitectura. Estudié dos años de historia de la arquitectura en la universidad de McGill en Montreal, Canadá y luego hice mi Bachillerato en Diseño Ambiental en la Universidad de Puerto Rico para luego continuar mis estudios obteniendo una Maestría en Arquitectura de la misma universidad, me gradué en el 1988..

Actualmente trabajo en la firma de Méndez, Brunner, Badillo e Ingenieros en San Juan, Puerto Rico, donde estoy desde el 1992. Mi trabajo incluye diseño de interiores, residencias, edificios de gobierno y coordinación de demoliciones por método de implosión. En el 2002 gané una Mención de Honor del AIA por el diseño del Centro de Apendizaje en el radiotelescopio de Arecibo, Puerto Rico. También he estado muy involucrada en el AIA Capítulo de Puerto Rico en varias posiciones, siendo su presidenta el año pasado. Desde que participo activamente en el AIA me propuse elevar la calidad de sus actividades y de sus miembros, he tenido como invitados a jurados de Premios y a nuestras convenciones figuras de alto renombre dentro del campo de la arquitectura y de la restauración y conservación. El año pasado durante una reunión de la región del Sur de la Florida y el Caribe en la isla de St. Thomas USVI, me di cuenta de una situación que vivimos los que vivimos en las islas del Caribe, a raíz de eso escribí un artículo que se publicó en la revista Florida/Caribbean Architect, base fundamental de lo que sería mi ponencia. Debo decir que la primera vez que hago algo de esta naturaleza pero estoy muy honrada de poder someter mis cualificaciones.

Abstract

It was on a beautiful starry January night, while enjoying dinner and the company of fellow architects, at a reception hosted by the AIA, St. Thomas USVI Chapter, at a spectacular, 200 year plus house, perched on a hill overlooking Charlotte Amelia harbor, that I had a moment of reckoning. Colleagues from Florida, who were also attending the event, were astounded at how this delicate house, the de Jongh Residence, set on a steep cliff, had withstood the battering of many fierce storms. There it was, just as it had been for over 200 years, and there was the family who had passed the home down from one generation to the next, never having to wonder if this house, a house made of wood, their home, was safe enough to brave a storm.

Last year I watched on TV, just the whole world did with horror; the damage caused to the Gulf Coast of the United States, by hurricane Katrina and all the others that followed. So many questions came to our heads, why doesn't help get there sooner? Why are people dying from hunger, lack of medicines and thirst, in the most powerful, and richest nation in the world? The image we all got was that we were not looking at pictures of the US, but rather of refugee camps, of African nations, of which we take very little care of learning about. Last year I watched on TV, just the whole world did with horror; the damage caused to the Gulf Coast of the United States, by hurricane Katrina and all the others that followed. So many questions came to our heads, why doesn't help get there sooner? Why are people

dying from hunger, lack of medicines and thirst, in the most powerful, and richest nation in the world? The image we all got was that we were not looking at pictures of the US, but rather of refugee camps, of African nations, of which we take very little care of learning about.

I could not understand, how people could leave a million dollar plus homes to get to a safer place. How could such an expensive and luxurious estate, not withstand the brunt of a storm? How can anybody live in an unsafe structure and site? Questions that I believe no one should have to ask about their homes. Why did hospitals need to be evacuated, when a hospital should be designed to continue to work under severe conditions with redundant back up systems that should foresee to the best of their capabilities any extreme situation? The answer to this question to me is simple, people, citizens of mainland U.S.A., have other places to run to, higher grounds to climb, to escape to and come back and see what's left of what they left behind. When you live on an island, you have, nowhere to run to, when nature decides to show you her strength. This in mind, us islanders, and I believe I speak for most Caribbean Islands, have learned what measures must be taken in order to face a storm, simply because we have nowhere to run to, no higher ground, no other state, no highway to take.

Since we have nowhere to run to, our homes are a safe heaven. Experience has taught us many things, the first of all being that a home is not a disposable commodity, you build your home, to last, to withstand, to protect, be it in wood or concrete, it has to be of sound construction. You do not build in flood prone areas. Homes provide all the basic necessities one might need to survive, during periods of electrical outages, water shortages and post-storm recovery. Every year when hurricane season comes around, and I believe I speak for all us islanders when I say that, we all check for flashlights, batteries, medicines, keep our freezers almost empty in case of power outages, check our storm shutters, stock up on non-perishable food, store water, gasoline or diesel. Dispose of anything that could turn into a deadly flying projectile, trim our trees, check our roof drains, and hope for the best. Public schools go through drills in case they have to be converted into temporary shelters, Red Cross offices stock up on blood, mattress, blankets, food and clothing. Emergency power generators are checked as well as water supply tanks and cisterns. In other words we do our part, our best to survive to the best of our capabilities. We take care of moving those who are unable to do, like the sick, the elderly, those who live alone and our pets. In Puerto Rico we have seen in recent years what a major hurricane can do, and the damage it can cause. We have had our share of misses, near misses and hits, which has made us sort of experts on preparedness. We are very proud of the fact that during Georges in 1998, not a single life was lost and for the most part we all braved the storm in our homes, because our home is the safest place to be.

There is a lesson to be learned always, especially when human lives are at stake, for me the most important being, that a home has to be a secure haven for everyone, no matter how economical or expensive it is. Some areas must be declared unsafe places to build and flood maps have to be respected. Hospitals and schools have to be capable of functioning no matter what nature throws at us, and we must take care of those who are not able to take care of themselves. We must live as if we have nowhere to run to. Us islanders have unconsciously adopted the same attitude towards impending storm systems as Sir Winston Churchill did when he refused to abandon London, faced with the threat of the city being bombarded by the Germans during WW II. He said, and I quote "Let them do their worst, we will do our best", and I guess that is what we do, probably because it is the only choice we have, since we have NOWHERE TO RUN TO.

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Session Code: CS01b

Paper: Improving Hurricane Survivability for Heritage Structures

Presented by

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Speaker(s) Biography

Mr. Sparks is president of Sparks Engineering, Inc. in Austin, Texas, a consulting engineering firm specializing in the investigation, analysis, and rehabilitation of existing structures. He is a member of the American Society of Civil Engineers and the Structural Engineers Association of Texas, and is a former director of the Association for Preservation Technology. Mr. Sparks has been involved in the stabilization and hardening of important heritage structures throughout the Gulf Coast.

Abstract

In Mississippi, Katrina delivered a storm surge in excess of 30-feet, creating a zone of destruction covering over 70 miles of coastline. The physical damage in Mississippi was far beyond what has been reported in the media. Many areas were obliterated, including the complete destruction of tens of thousands of homes and hundreds of commercial buildings. The structural damage was extreme, having more in common with earthquake or blast damage than with most hurricanes in modern memory. Other major storms, such as Ivan in 2004, and Rita and Wilma in 2005, were also extremely destructive. The immense destructive power of hurricanes became tragically clear. Worldwide, hurricanes or tropical cyclones cause more damage and loss of life than do earthquakes, yet we do not have a clear set of guidelines for improving the survivability of heritage structures.

Current guidelines are mainly focused on new construction, and regulations are written from the perspective of government insurance programs. Building codes address wind forces, but not storm surge, which is much more destructive. Often, heritage structures are in the most vulnerable areas, and the prescriptive rules result in inappropriate interventions.

Buildings of traditional unreinforced masonry, timber-frame, or balloon-frame wood construction constitute a large part of the existing building stocks in areas vulnerable to hurricanes. As is the case in many natural disasters, heritage structures are likely to constitute a large proportion of all damaged structures. The severity of the recent events and the scope of the recovery efforts have made it possible to draw broadly applicable conclusions regarding building behavior and ways to improve survivability, while respecting the historic fabric.

The speaker's work has included structural triage, detailed evaluations, and repair design in Florida, Texas, and Mississippi. The presentation will synthesize lessons learned in practice regarding appropriate mitigation and retrofit approaches. Examples will include timber frame, masonry, and other structures, with discussion of wind and storm surge forces, regulatory issues, and the strengths and vulnerabilities of traditional construction.

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Session Code: CS01c

Paper: Adaptations of Traditional Bermudian Construction Using Modern Materials

Presented by

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Speaker(s) Biography

Abstract

CedarBridge Academy (CBA) is a ten-year old public high school facility located in the sub-tropical climate of Devonshire, Bermuda. The 250,000 square foot facility was recently surveyed for design and construction deficiencies. The building has deteriorated from a combination of poor ventilation, an imperfect exterior envelope membrane, and other basic design flaws.

Traditionally, Bermudian buildings were built of locally quarried sandstone. Soft stone buildings were often both rendered and lime-washed on the exterior to protect against the outdoor elements. Stone was typically machine cut into standard sizes, 24 inches long x 6 inches high x 8, 10, or 12 inches wide. Walls were built directly onto roughly leveled bedrock or sometimes even onto clay. There were no damp courses set into the building walls to stop moisture from rising up the wall. To prevent water from penetrating the interior, walls were liberally lime-washed externally and plastered internally.

These 24-inch thick stone walls were deliberately constructed based on their permeability properties. Using the knowledge of material science, a builder would naturally use a thicker wall if the rock was extremely porous. Conversely, a thinner wall would be constructed from less permeable stone.

Until recent history, most of the buildings in Bermuda were small in scale. Hence, the rooms were also smaller in size. Through a process of opening and closing windows, it was possible to pressurize the interior spaces, thus making the rooms comfortable. Most Bermudian houses were equipped with slatted louvered shutters that allow for great circulation of air, and provided protection against hurricanes and winter storms. The side-hung fixed louvered shutters seen today are a more recent addition that protect from storms when closed but do not offer shade from the sun.

The exterior walls of CBA were designed as a single-layer membrane system which uses the skin of the wall to defeat differential pressure and the intrusion of water. The membrane of this facility consists of a 5/8-inch acrylic film membrane covering a typical 10-inch thick, un-reinforced concrete masonry block wall. The heavy acrylic film acts as a vertical membrane. Unfortunately, these acrylic films are incapable of bridging cracks wider than 2 or 3 mils; therefore, cracks wider than 3 mils, of which were observed in the building.

Solid walls, such as the one at CBA, are imperfect barriers. These walls have pore paths that connect the outside to the inside and, ultimately, time is the only element preventing water from penetrating. If a rainstorm lasts less time than is required to pull the water through the pore path, the wall begins to dry via evaporation at the surface from which the water was supplied. It is also not unusual for solid walls to wick lingering moisture to the inside surface, and for that water to evaporate at the surface long after the rain has dissipated.

This paper will explore the design details and building techniques employed, both traditionally and currently, for exterior wall systems in Bermuda. CBA, the ten year old high school will be the case study in which to present the adaptations to traditional building and the subsequent problems associated with these new techniques.