Hurricane Dorian: A Reset

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Part 3

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Rethinking Building Code

In the aftermath of Hurricane Dorian, it is imperative that The Bahamas adopts a climate change resilient Building Code to guide restoration rebuilding in Abaco and Grand Bahama, the construction of new buildings and retrofitting key infrastructures throughout The Bahamas. Since this rebuilding will be funded by a combination of private, state borrowing and international grants, it is in the public interest that the rebuilding be done in a way to make Abaco and Grand Bahama more resilient for the next hurricane.

The Bahamas is one of the first Commonwealth Caribbean countries to implement a mandatory building code in 1971 to regulate building design and construction. Its Building Code was updated in 1987 along the lines of the South Florida Building Code. In 2003, a new edition of the Code was created, patterned after the ASCE 7 load standards, where the design wind speeds were increased and the installation of hurricane shutters was made mandatory. Dorian's windspeed of 185 mph, gusting up to 220 mph, and flooding storm surge at reported heights of over 20

feet in Grand Bahama, exceeded the design requirement of the Bahamian Building Code.

According to Aman Karamlou and Karthik Ramanathan in their essay "What Hurricane Dorian Taught Us about the Bahamas Building Code", the Building Code of The Bahamas, while one of the best in the Caribbean, lacks thorough specifications and construction detailing requirements for some critical regions and elements of the roof and weak enforcement by its inspectorate due to limited resources, training and geography.

Florida, after Hurricane Andrew in 1992, requires that structures in vulnerable areas to be able to withstand winds of 111 mph and higher, while Miami -Dade and Broward buildings must be able to withstand winds of at least 130 mph. In the Florida Keys, structures must be able to withstand winds of up to 150 mph. In Munroe County, structures must be elevated above the flood plains to allow storm surge to pass underneath living spaces. Bottom floors can only be used for limited purposes such as storage and recreation.

Since the most of land area of The Bahamas is at sea level or below, the Building Code of The Bahamas should be adapted to this new reality of global warming. While the Building Code makes provision for wind speed, there is no provision for sea surge and wave action. After conferring with a number of Bahamian architects, engineers and contractors, I propose that the following measures should be considered, for areas zoned as hazardous zones (low lying coastal and swamp areas where there have been hurricane sea surges of 8 feet or more) to reduce risks

and increase resilience for buildings, subdivisions and public infrastructure:

- **Elevated Structures**
- Elevation of buildings in low lying coastal and vulnerable areas by creating a drag line. Built structures should be elevated, with minimum floor elevations above the crown of the road or 15 feet above high tide. Like vulnerable areas in the Carolinas and Florida, commercial and residential structures are built on 12 feet high columns, on stilts with breakaways on the ground level which are used for parking, recreation and storage. Similarly, in the Miami International Airport, the concourses and key operational centers are located on the higher floors, at least one floor above the ground.

- **Enforcement**
- More effective enforcement of the Building Code, better preparation of the inspectorate, contractors and elimination of shortcuts.

- **Policing & Testing of Concrete Quality**
- Ensure that designed mixture of concrete is strictly observed to ensure that that there is no reduction in the strength and reliability by adding water or not observing the recommended chemical formula. Mandatory testing of concrete for strength and reliability before applying to structure.

- **Roof**

- Tie down Roof with screws, rather than nails, and reduce roof overhangs
- Windows & Doors
- Require impact rated windows and doors for proper sealing to ensure stability and integrity during hurricane winds.

- **Drainage Systems**
- Institute new drainage requirements for all subdivisions and commercial complexes, such as protective dunes planted with indigenous salt tolerant plants and trees. Water features can be used as retention lakes or ponds to mitigate flooding and to drain off storm water.
- **Utilities**
- Electricity, water and cable distribution systems should be built underground.

- **Freeport Airport**
- Flooded with over ten feet of water during Hurricanes Frances and, Jeanne, Matthew and Dorian, a reset is necessary to reduce the risk of flooding and destruction of this vital infrastructure in the future. Like the Miami Airport, the departure and arrival lounges, the control tower, concourses and other vital operations of this airport should be constructed at least 15 feet above the ground or high tide.

- **Shelters**
- Schools, community centers, Government complexes and major subdivisions should be required to construct shelters, equipped with water tanks, generators, upper level structures

to provide secure shelter during hurricanes for local communities during hurricanes. This was the client's brief, based on stakeholder consultation, in designing and constructing the current T.G. Glover Primary School to serve as a shelter for the community of Fort Charlotte.

- **Stakeholder Consultation.**
- To achieve resilience for the rebuilding of the Marsh Harbour City Centre, the Freeport Airport, residential communities and public infrastructure requires, I believe, proper scientific review and consultation with national stakeholders on hurricane vulnerabilities, strengthening of the Building Code, enhancing the resources of the Building Inspectorate and clarification of a national development strategy to deal with the new normal of global warming.

These adaptation measures will reduce the risks of damage from hurricanes and improve resilience of the built environment of Abaco and Grand Bahama as well as the entire Commonweal of The Bahamas.

In the final Part 4 of this series, I will propose a number of policy measures to achieve hurricane disaster mitigation and improve resilience, such as enhanced local government, debt forgiveness, climate financing, properly resourced research facility and climate justice claims/lobby for investments in resilience and reconstruction.