World Monuments Fund

HAITI GINGERBREAD RECONNAISSANCE

Short Report (DRAFT)

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Photographs by author unless noted

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Introduction

From April 18th through April 24th, 2010 a five-member team conducted over 200 field assessments of "gingerbread" buildings in the recently designated Gingerbread District in Port-au-Prince, Haiti - a two square mile area extending east from the city center. The gingerbread buildings, characterized by ornate finish carpentry and steeply pitched roofs, are prized for their aesthetic qualities and cultural significance. Although Gingerbread buildings can be found in other parts of Port-au-Prince, and in other cities in Haiti, such as nearby Petionville and the more distant cities of Jacmel and Cap Haitien, the largest concentration and some of the finest examples of gingerbread buildings in Haiti are found in the Gingerbread District. Furthermore, the gingerbread buildings in this district were subject to the most severe effects of the devastating January 12, 2010 earthquake, and were in greatest need of assessment.

Fig.1. A Gingerbread house in Port-au-Prince's Gingerbread District, (32 Lamartiniere)

Purpose of the Mission

Fig. 2. Oblique aerial photography map of a portion of the Gingerbread District. Assessed buildings in red. (Original photos by ImageCat, photo mosaic by Randolph Langenbach)

The primary purpose of the assessments was to establish a global understanding of the performance of the gingerbread buildings in the January 12th earthquake, and to identify patterns of performance based on types of construction and other relevant conditions. It was also intended to strengthen the community of owners and others interested in the preservation of these historically important structures, and to gather information and garner support to assist in subsequent repair and restoration efforts.

Reconnaissance Team

The reconnaissance team was comprised of two civil engineers, two architects, and a builder, each from the United States. Collectively the team has extensive experience in historic preservation, building forensics, assessment and documentation, earthquake engineering, materials science, and building construction methods. The team was greatly assisted on the ground by members of FOKAL (Fondation Connaissance et Liberte / Fondasyon Konesans ak Libete), as well as the owners and occupants of the gingerbread buildings.

History

The gingerbread buildings in Haiti were constructed between 1885 and 1925, and were derived from the architectural styles and construction methods common in France preceding and during that time, but were adapted to the climate, available materials, and cultural environment of Haiti. The term gingerbread, was adopted by Haitians in the 1950's as a result of American tourists visiting Haiti who likened them to the "gingerbread" Victorian-era buildings in the United States. It has remained the most commonly used term to describe these buildings in Haiti. In 1975 the term's use was reinforced by the publication of a book entitled "*Gingerbread Houses: Haiti's Endangered Species*". The book exhibited fine ink drawings of prominent Haitian gingerbread houses, with drawings and text by American artist Anghelen Arrington Phillips.

Fig. 3. *Gingerbread Houses: Haiti's Engangered Species*

Originally and almost exclusively, the gingerbread buildings were constructed as single-family residences (sometimes accommodating servants), and generally for affluent Haitians. However, there also were built, and still exist, many smaller and humbler buildings that exhibit simpler gingerbread characteristics, and employ the same methods of construction.

Fig. 4. A large and elaborate gingerbread house, still surrounded by its original spacious property (9 Rue Bellvue) (photo by Martin Hammer and Randolph Langenbach)

Fig. 5. A smaller and simpler gingerbread. (26 Rue 7)

The majority of gingerbread buildings in the area surveyed still serve as residences, and many are owned and inhabited by residents with direct lineage to the original owners. Some gingerbreads are now occupied by extended or multiple families, or have been divided into apartments. However, many gingerbread buildings in current neighborhoods of mixed-use have been adapted for non-residential use, including religious institutions, offices, numerous schools, and a prominent hotel. One gingerbread building is currently being repaired and renovated as a restaurant.

Fig. 6. Non-residential uses of gingerbread buildings: Left – College de Jeunes Filles (10 Lavaud 1); Center – the Hotel Oloffson has been a hotel since 1936, and was a U.S military hospital from 1915-1935; Right - 84 Lamartiniere is being repaired and renovated as a restaurant.

The original gingerbread residences were typically set on generously sized properties (Fig. 4). Decades of development pressure, especially close to the city center, commonly resulted in single or multiple subdivisions of properties, with subsequent construction of residential or non-residential buildings on the new properties. The new buildings, without exception, were constructed of concrete frame and/or concrete block walls with reinforced concrete slab floors and roofs. Increased urbanization of the Gingerbread District and associated security concerns have led to the prevalence of tall security walls and gates surrounding the Gingerbread properties. These security walls, as well as the infill buildings and the commonly seen additions of concrete and concrete block, have all conspired to cut off many of the gingerbread buildings from public view.

Fig 7. A security wall and a modern streetside residence obscure most of a weathered gingerbread building from public view.

Fig. 8. A concrete addition all but conceals the original building's identity as a gingerbread. (4 Ave. Christophe)

GINGERBREAD TYPOLOGY

The gingerbread buildings fit into one of three categories according to their system of exterior wall construction.

1. ***Masonry Bearing Wall***: Consisting of piers of fired brick with lime mortar, sometimes with brick arches or brick cornices or intermediate horizontal brick banding. Infill load-bearing panels are typically made of irregular limestone with earthen or lime mortar, with a lime plaster finish. Infill panels in some cases are of fired brick. Masonry walls are often entirely unreinforced, but in many cases include lengths of linked, iron tension-rod embedded horizontally in the tops of the masonry walls, with an iron washer and threaded nut at each end.

Fig. 9. Masonry bearing wall structure. Exhibits partial collapse of corner tower. (Catholic seminary, 110 Rue Fleur Du Cheine)

Fig. 10. Delamination of finish plaster reveals the limestone infill panel bounded by the corner brick pier. MTPTC 6 indicates inspection deemed tower unsafe for occupancy.

Fig. 11. Iron tension rods. Left – Linked rods exposed. Limestone infill panel was discharged. Tension rod may have prevented complete wall collapse. Center - End rod isolated, showing hooked end and threaded end with star plate and nut. Right - Brick corner with one end plate missing, showing separation of corner pier from rest of wall in that direction.

2. ***Colombage*** (also known as *pan de bois*): Timber frame with masonry infill. The infill is either: a) fired brick with lime mortar; or b) irregular limestone with earthen mortar and a lime plaster finish. Timber framing includes top and bottom plates, vertical studs, and diagonal braces. Framing members connected with mortise and tenon with or without wooden pegs, and/or with toenails. Wood planks run horizontally on the interior face of framing (on rare occasion planks are omitted). Interior bearing and non-bearing walls use the same method of wood planking on one or both sides of framing, or utilize single planking centered between framing and stopped in place.

Fig. 12. Colombage with brick and lime mortar infill. (30 Lamartiniere)

Fig. 13. Colombage with limestone and earth mortar infill, with lime plaster finish. Interior planking can be seen. (5 Rue Jose Marti)

3. ***Wood Frame***: Wood frame with horizontal lapped wood siding on exterior, and wood planks run horizontally on the interior, with no infill between framing members. Framing elements and connections are similar to those in colombage construction.

Fig. 14. Wood frame gingerbread next to the site of a collapsed concrete building. (Episcopal University. Rue Capois)

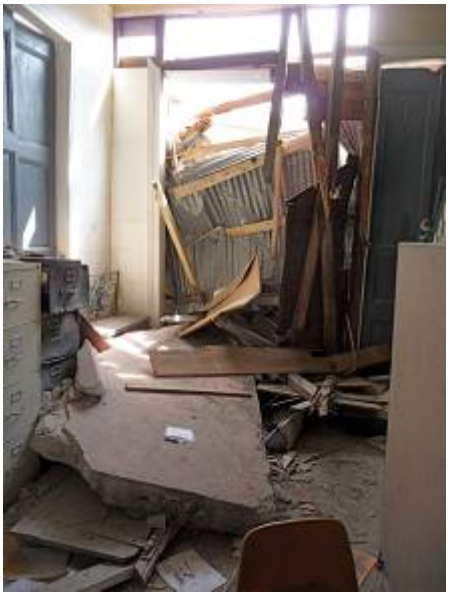

Fig. 15. The most damage this building suffered was from a concrete slab ejected through its back door from the collapsed concrete building behind.

Hybrids: It is very common for a single gingerbread building to exhibit two, and occasionally all three exterior wall systems. Hybrid buildings typically utilize a different system for each story, with the heavier system for the first story walls, and the lighter system(s) for the second story and/or attic walls.

< Fig. 16. Hybrids are very common. This gingerbread house utilizes all three wall construction systems.

Attic walls - Wood Frame

Second story - Colombage

First story - Masonry Bearing Wall

Note also the one-story concrete addition at the back left corner.

(59 Lavaud 3)

Other Structural Elements or Systems of the Gingerbread Buildings:

Foundations – From examination of the few foundations or portions that are readily visible, it appears that the typical gingerbread building foundations are made of either fired brick with lime mortar, or stone with earthen or lime mortar. It is a fair assumption that all original foundations are unreinforced. However, the foundation depth, width, reinforcing (or lack of), and a thorough determination of material makeup require further investigation.

Fig. 17. Spalling of the exterior finish plaster reveals two contiguous sections of foundation stem wall. One of irregular limestone (left), and one of brick (right). (84 Lamartiniere)

Fig. 18. >

An excavated crawl space shows an original above-grade brick pier, and its uncovered, original limestone and earth mortar footing.

(84 Lamartiniere)

Floor Systems – Wood framed with perpendicular wood plank flooring (often tongue and groove). This is usually the system for the first floor, over a shallow crawl space, and for any second or third floors. In some instances the first floor is of mortar (or concrete) on grade, usually with a tile finish.

Fig. 19. Wood floor framing with wood plank floor removed. (32 Lamartiniere)

Fig. 20. Tile over slab on grade. (5 Lavaud 1)

Roof Systems - Wood framed, often employing braced configurations in the attic, typically with mortise and tenon joinery with wooden pegs. Roof slopes are typically steep (often greater than 1:1 slope). Almost all finish roofing is now corrugated steel over skip sheathing, but some examples still exist of the original slate shingles over skip sheathing at tighter spacing (Fig. 22).

Fig. 22. Original, thin slate roofing. (14 Ave. John Brown)

< Fig. 21.
Corrugated steel roof with braced roof framing.

< Fig. 23.
Attic framing with mortise and tenon joinery with wooden peg.

Additions

Concrete and concrete block additions to the gingerbread buildings are very common, especially close to city center. Less common, and in earlier years, are additions of unreinforced masonry. Occasionally remodels using concrete and concrete block were built to replace a portion of the building that had suffered deterioration or damage, or replacement may have been seen as an upgrade.

Fig. 24. Concrete additions are often awkward or compromise the gingerbread buildings architecturally. (51 Ave. Christophe)

Fig. 25. A replacement side wall of concrete block suffered partial collapse. (19 Lamartiniere)

There are three reasons concrete and concrete block have been utilized for additions (as well as for the surrounding infill buildings): a) a ban on wood construction was declared in Port-au-Prince in 1925 in response to a number of devastating fires in the city; b) after the 1940's, concrete and concrete block were increasingly seen as the building materials of choice in Haiti – more durable, technologically advanced, and modern – even becoming a status symbol; and c) in particular, concrete and concrete block are resistant to the strong wind and rain of hurricanes.

Fig. 26. A small colombage school building suffered minor damage to infill panels. (16 Lamartiniere)

Fig. 27. An expansive two-story, concrete classroom addition behind the original building suffered first story collapse.

In the January 12th earthquake, the concrete and block additions generally performed poorly compared to the original gingerbread buildings. Apart from their independent performance, the additions often caused damage to the gingerbread buildings through pounding, or by otherwise laterally loading them with their substantial mass. In a few instances, nearby concrete buildings that collapsed, ejected walls or slabs onto a gingerbread building, causing the greatest damage that it suffered (Fig. 15). However, on occasion a well-designed and well-built concrete addition appeared to help the gingerbread structure resist the earthquake.

Fig. 28. This second floor concrete bathroom addition landed on the ground after its concrete columns buckled as it pulled away from its parent gingerbread house. Note sewer pipes in the center of the rebar of the buckled columns. (5 Lamartiniere)

SEISMIC PERFORMANCE

The ***masonry bearing wall*** buildings as a class performed better than the concrete and block buildings in the vicinity, but not as well as the ***colombage*** and ***wood frame*** buildings. Substantial damage to the masonry walls was common. The weak, limestone masonry panels (with earthen or lime mortar) between the brick piers were problematic. In addition to commonly exhibiting shear cracks, the panels often suffered enough loss of material to subject the brick columns to increased shear or buckling stress, sometimes resulting in partial or full collapse of a wall. The masonry buildings performed best when horizontal iron tie rods were present at the tops of the exterior walls (see Fig. 11).

Fig. 29. The Dufort House, a hybrid structure, exhibited substantial damage to the masonry first story walls, including its limestone panels and brick piers, but significantly less damage to its colombage and wood frame second story walls. Notwithstanding the increased seismic loads on the first floor walls, the difference in performance of the systems is indicative of a tendency seen throughout the surveyed buildings. (Rue du Travaill II)

Both the ***colombage*** buildings and the ***wood frame*** buildings, with their more flexible, energy dissipating systems, tended to perform best among the gingerbread buildings. However, many of these buildings did suffer substantial damage, and sometimes even partial collapse.

Wood rot, and to an even greater extent termite damage, were commonly observed in *colombage* and *wood frame* buildings and appeared to play a role in the extent of earthquake damage suffered. For example, severely rotted or termite damaged bottom plates sometimes failed and

allowed entire masonry panels to fall out under their own weight. Wood elements directly exposed to weather or to leaks in the building envelope were subject to rot. This is especially true at locations that invite rainwater collection (bottom plates, 'V'-shaped diagonal-to-vertical joints, bottoms of porch posts) and at locations in poor drying environments (areas of constant shade and/or limited air movement). Termite damage was most often seen in the following structural elements: timber framing in *colombage* walls and in *wood frame* walls, floor planking (first *and* second floor), floor joists, and porch posts.

Fig. 31. Rot of timber frame members at corner of colombage house. (32 Lamartiniere)

Fig. 32. Termite damage in second story floor joists.

Repairs Have Begun

Repairs of numerous gingerbread buildings were witnessed. Some repairs appeared improper, including the use of cement mortar for laying brick, or cement plaster finish or monolithic infill in colombage construction. Lime mortar and lime plaster are appropriate in these applications. A contractor converting a colombage residence to commercial use said he was considering not reinstalling the brick infill where it had been discharged. He did not understand that the brick infill is an important part of the structural system. These and other errors in repair point to an urgent need for a repair manual and training program. (See Repair and Restoration Manual, and Training Program below)

Fig. 32. Well-intentioned but improper repairs with cement mortar in brick work (left and center), and cement plaster for colombage infill (right). Lime mortar and lime plaster should be used.

RECOMMENDATIONS

- **Discourage Demolition of Gingerbread Buildings**: Identify buildings where demolition is being considered. Educate owners about repair and restoration possibilities of their buildings. This may include encouraging a thorough assessment (see Full Diagnostic Assessments below), helping to estimate costs of repair, and exploring or making owners aware of funding possibilities (see Funding Possibilities below)

- **Emergency Shoring**: Create and distribute guidelines, and educate owners and builders about safe shoring methods to protect against collapse from fatigue or in an aftershock. Examine reconnaissance forms to see which buildings surveyed were deemed to require shoring. Conduct broader and more thorough survey to fully identify such buildings.

- **Temporary Protection From Weather**: Encourage or assist owners in the protection of their earthquake damaged buildings from additional damage from rain and hurricanes, until permanent repairs and protection are achieved.

- **Salvage Materials**: Initiate a campaign to salvage materials from gingerbread buildings that require partial or full removal. Encourage that such buildings be dismantled, not demolished, in order to salvage materials for reuse in the repair and restoration of those or other gingerbread buildings. Of particular value are fired brick, wood framing in good condition, doors and shutters, and ornate finish carpentry assemblies. Designate a common storage yard for owners not willing or able to keep such materials on their property. A revenue generating business could be created to facilitate the purchase, collection, storage, and sale of salvaged materials for the gingerbread buildings. (Could be same property as Training Facility, see below)

- **Full Diagnostic Assessments**: It is recommended that the gingerbread owners have their buildings more thoroughly examined and assessed. The WMF assessments were conducted to establish global understanding and patterns of performance of the gingerbread buildings, not to thoroughly assess and make recommendations for any particular building. Such subsequent assessments should be made by a qualified professional (i.e, architect, engineer, trained builder). Reconnaissance forms can be examined to see which buildings surveyed warranted further inspection (the large majority of them).

- **Repair and Restoration Manual**: Create a Repair and Restoration Manual to give specific instruction as to how to properly repair the gingerbread buildings. (Creation of this manual may be possible through a potential second phase of WMF's gingerbread preservation project.) The manual should include the subjects of: shoring, material choices, retrofitting (making improvements to the original structural system), and maintenance. Important materials issues include the use of: pressure treated wood or wood of natural resistance to decay (then painted), lime mortar (not cement) for fired brick, earthen mortars for limestone masonry (in *colombag**e*** only), fired brick or other stronger masonry unit to replace the limestone masonry panels in *masonry bearing walls*, and galvanized steel fasteners.

- **Reactivation of Lime Kilns**: Campaign to reactivate, or establish new lime kilns in country. Good quality lime is an important and necessary material in the repair and restoration of the gingerbread buildings.

- **Training Program**: Establish a training program for builders and tradespeople to properly repair the gingerbread buildings. A certificate would be awarded after the training is complete (and possibly a test is passed) as a means of demonstrating minimum competence to building owners. (Assistance in establishing such a program may be possible through a potential second phase of WMF's gingerbread preservation project.)

- **Training Facility, Demonstration Project, Gingerbread Headquarters**: Collectively purchase a prominent, accessible, moderately damaged gingerbread property. Repair and restore the building as a demonstration project, a facility for the Training Program, and as headquarters for dissemination of information and advocacy for the repair and restoration project. (WMF has indicated interest in possibly assisting in such an effort.)

- **Funding Possibilities**: Although outside the purview of the WMF team's work, the importance of adequate funding of the repair and restoration of the gingerbread buildings deserves mention and cannot be overstated. Access to sufficient financial resources will be the largest obstacle for many property owners. This was expressed by numerous owners. Every effort should be made, and every avenue explored, for funding possibilities to maximize the number of gingerbread buildings that can be fully and properly restored. Upper level FOKAL members have proposed the idea of an investment fund. This should be aggressively pursued. Participation and assistance from entities such as the US State Department, international historic preservation organizations, and the Haitian government should be pursued (see National Historic Monument Designation below).

- **National Historic Monument Designation**: Pursue designation of the Gingerbread District as a National Historic Monument. This is achieved through Presidential decree and Legislative approval. Such an official designation would give further credibility and stature to the repair and restoration effort, and is a necessary precursor to the dedication of funds from certain international preservation and aid organizations. Because such designation can take time, this should be pursued immediately. The possibility of an emergency Presidential decree should be explored.

CONCLUSION

The Gingerbread buildings are greatly valued for their aesthetic qualities by their owners and others who reside in and utilize them, but also by the many Haitian citizens who see them from the street in their day-to-day lives, or see them in their collective memory. Successful restoration of these buildings has a value that goes well beyond the direct value to the property owners, and extends to realms such as neighborhood identities, civic pride, tourism, local and regional economies, and national cultural heritage. The importance of repairing and reviving these buildings and their neighborhoods as a bright spot in Haiti's reconstruction cannot be overstated.

I close by relating two comments I heard during the period of these initial assessments in the Gingerbread District. One day, a Haitian driver and translator whose services I utilized on a previous reconnaissance said the following to me after I told him of the WMF team's mission:

"*I can't tell you how happy I am that you will try to save the gingerbread buildings*."

This individual does not own a gingerbread property, nor has he ever lived in a gingerbread house. But his comment is indicative of the love that so many Haitians have for these buildings.

Or the gingerbread owner who at our team's first meeting with the owners said:

"*The ugly modern buildings that collapsed around the gingerbread buildings. Can they be prevented from being built again?"*

The ugly 'modern' concrete buildings that betrayed the Haitian people, becoming common death traps during the 35 seconds of the earthquake. Buildings that have no spirit or soul, and only obscure the ample spirit and soul of the gingerbread buildings.

It is my fervent hope that this important Haitian resource - the gingerbread buildings of Port-au-Prince - will be restored and preserved for generations to come. They are uniquely Haitian, and contain a piece of the history and soul of the Haitian people. I will continue to work towards that end in whatever way I can, and I encourage others to do the same.

Martin Hammer
Port-au-Prince, Haiti
& Berkeley, California
June 18, 2010

Thank you to my fellow team members, the World Monuments Fund, ICOMOS, and the people at FOKAL.

< A gingerbread house awaits repair and restoration . . .