Construction Quality Assurance (CQA) Mechanism in Grenada

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Outline...

- Housing Situation in Post-Ivan Grenada...
- Construction Quality Assurance (CQA) in Pre-Ivan Grenada;
- Proposed Post-Ivan Construction Quality Assurance (CQA) Mechanism;
- Way Forward...
Post-Ivan Grenada ...

Housing Situation

Housing in Grenada after Sept 7, 2004*:

- 90% of the stock damaged.

Of which:

- 30% needed complete replacement;
- 20% complete roof loss + Damage walls;
- 20% complete roof loss;
- 20% significant loss of roof covering

*UNDP 2004.


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## Estimate of Home Repair Market in Grenada*

<table>
<thead>
<tr>
<th>Size (sq. ft.)</th>
<th>% of total</th>
<th>Number</th>
<th>Avg. repair cost (US$)</th>
<th>Total repair cost (US$M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 to 1000</td>
<td>55</td>
<td>16,500</td>
<td>10,000</td>
<td>165,0</td>
</tr>
<tr>
<td>&gt;1000 to 1500</td>
<td>18</td>
<td>5,400</td>
<td>18,000</td>
<td>97.2</td>
</tr>
<tr>
<td>&gt;1500 to 2000</td>
<td>12</td>
<td>3,600</td>
<td>30,000</td>
<td>108,0</td>
</tr>
<tr>
<td>&gt;2000</td>
<td>15</td>
<td>4,500</td>
<td>50,000</td>
<td>225,0</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>30,000</td>
<td></td>
<td>595.2</td>
</tr>
<tr>
<td>Total &gt;1500</td>
<td>27</td>
<td>8,100</td>
<td></td>
<td>333,0</td>
</tr>
</tbody>
</table>

Challenges for Home Reconstruction

Main Issue:
- Balancing need of having roof over heads (now !!!), and desire to build back Hurricane Resilient homes!

Building Hurricane Resilient homes implies:
- Access to affordable credits for owners with damaged homes;
- Access to design and construction advisory services ensuring resiliency to hurricane forces;
- Existence of a property insurance system supporting damages that cannot be completely prevented from construction standards.
The Grenada Hurricane Resilient Home Reconstruction Program G-(HR)$^2$

Main Components:

1. A Home Reconstruction Lending Operation
   - Administered by local commercial banks – with partial credit risk guaranteed to be provided by the International Finance Corporation of the World Bank (IFC);

2. A Sustainable Construction Quality Assurance (CQA)
   - Extensive Training for local engineers, builders and craftsmen; Capacity building of agencies/institutions involved, e.g. Grenada Physical Planning Unit (PPU).
The Grenada Hurricane Resilient Home Reconstruction Program G-(HR)$^2$ ... cont’d

2. CQA.. Cont’d

- Participation from the mortgage companies- through requiring CQA certification;

3. A property Insurance Component

- Getting Major property insurers to agree on underwriting properties constructed through the CQA at favorable rates; hence,

- Recognizing the attention given to hurricane resiliency in home design and construction;
Home Design and Construction Quality Assurance Systems (CQAS)

Required Characteristics of a CQAS:

- Compatible with/and overcoming any shortcomings of the existing building review system;
- Cost-effectiveness in implementation;
- Attractive to home-owners and Developers;
- Meets requirements of lenders and insurance companies;
- Sustainable – goes beyond the project’s timeframe!
Construction Quality Assurance (CQA) System in Pre-Ivan Grenada

1. Objectives:

- Assessing and analyzing the exiting Construction Quality Assurance System in Pre-Ivan Grenada;

- Identifying shortcomings of the Existing CQA... designing a Sustainable and Effective Quality Assurance System
2. Methodology:

- Survey of Construction Design Applications*
  
  - 17 Construction design Application approved by PPU: 15 residential - 2 commercials;
  
  - All applications submitted between 2001 and 2005, and randomly selected from a total of 1748;

- Review PPU’s on-site construction Control procedures.

*OAS/FEMCIDI - Consulting Engineering Partnership (CEP) ltd., 2005
A. Existing PPU Construction Quality Assurance System

1. Processing Construction Permits Applications
   - Grenada National Building Code and guidelines contain appropriate building design and construction standards
   - All residential applications are checked for compliance with Grenada Building Standards;
   - Structural Engineer designs’ compliance outsourced to a private engineering company;
   - Most applications reported approved... either first or on submitting of additional information
2. Conducting on-site Inspections

- On-site inspections carried out by only 6 PPU inspectors;
- Only 20% of the houses receiving construction permits are inspected during plan execution (e.g. 80 of 390 for 2004);
- A final site inspection not always required for Certificate of Occupancy permit approval;
B. Resources, Institutions, Groups Involved:

1. Governmental Agencies:
   - PPU checks planning concerns, based on the Physical Planning & Development Control (PPDC) Act/GBG: Zoning and setback distances
   - Ministry of Public Health: sanitary waste disposal
   - Ministry of Public Works: drainage
   - Structural Engineering Firms: Structural design check outsourced to a private Structural Engineering firm – paid directly by Ministry of Finance
   - Agency for Reconstruction and Development (ARD) – Reconstruction coordination in post-Ivan Context.
B. Resources and Institutions involved... cont’d

2. Mortgage Agencies (MA):
   - Submission of an approved PPU application first condition;
   - Perform valuations at varied construction stages for disbursement approval;
   - Valuations performed by a Quantity Surveyor (QS) provided by MA to the Dev/homeowners;
   - Valuation focuses on Quantity **not** Quality.
   - Quantity surveyors are paid directly by Homeowners for a total of 4 to 6 visits @ EC $ 300 to EC$ 600.
Mortgage Agencies (MA) cont’d :
- Houses are often over-evaluated as Quantity Surveyor not able to evaluate the Quality of construction !!

3. Insurance Agencies (IA) :
- Only 30% of insurable properties insured (Sept 05);
- Underinsurance rate estimated to 40% (Sept 05);
- Do not perform design check;
- Generally assume accuracy of information submitted by homeowners;
- Do not conduct site visits – unless site location declared in a vulnerable area by homeowners: coastline, e.g.
   - Professional Engineers, and Engineering Firms;
   - Structural Engineering Firms;
   - Architects / Planners;
   - Credit Unions lending important- CQA procedures not well know.
   - Contractors: construction design execution and management
   - Community-Based Construction Groups: friends, neighbors, families- “Konbit”
C. Survey Findings and Analysis

1. PPU approved applications:
   Review for structural deficiencies of 15 residential development- and 2 Commercial approved applications revealed:
   - No cover to the reinforcement in contact of the ground
   - Inadequate reinforcement lap lengths
   - Concrete in columns not being compacted
   - Absence of Mortar between adjoining concrete blocks
   - Incorrect placement of wall reinforcement
### Construction Quality Assurance (CQA) System in pre-Ivan Grenada ... cont’d

#### Table II: PPU Approved application Survey Findings - OAS 2005

<table>
<thead>
<tr>
<th>Description of Deficiency</th>
<th>Frequency Of Occurrence</th>
<th>Applicable Applications</th>
<th>Percentage of frequency occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inadequate stair reinforcement</td>
<td>16</td>
<td>17</td>
<td>94%</td>
</tr>
<tr>
<td>2. Missing roof connection details</td>
<td>15</td>
<td>17</td>
<td>88%</td>
</tr>
<tr>
<td>3. Missing roof metal sheeting thickness</td>
<td>14</td>
<td>17</td>
<td>82%</td>
</tr>
<tr>
<td>4. Missing beam to wall connections</td>
<td>13</td>
<td>17</td>
<td>76%</td>
</tr>
<tr>
<td>5. Inadequate or missing concrete cover</td>
<td>13</td>
<td>17</td>
<td>76%</td>
</tr>
<tr>
<td>6. Inadequate purling spacing</td>
<td>9</td>
<td>17</td>
<td>53%</td>
</tr>
<tr>
<td>7. Inadequate rafter to ridge board connections</td>
<td>9</td>
<td>17</td>
<td>53%</td>
</tr>
<tr>
<td>8. Inadequate suspended reinforced concrete floor thickness</td>
<td>8</td>
<td>13</td>
<td>62%</td>
</tr>
<tr>
<td>9. Inadequate thickness of external walls</td>
<td>7</td>
<td>17</td>
<td>41%</td>
</tr>
<tr>
<td>10. Inadequate suspended reinforced concrete beam depths</td>
<td>6</td>
<td>13</td>
<td>46%</td>
</tr>
</tbody>
</table>
## Construction Quality Assurance (CQA) System in pre-Ivan Grenada … cont’d

<table>
<thead>
<tr>
<th>Description of Deficiency</th>
<th>Frequency of Occurrence</th>
<th>Applicable Applications</th>
<th>Percentage of frequency occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Inadequate thickness of internal walls</td>
<td>3</td>
<td>17</td>
<td>18%</td>
</tr>
<tr>
<td>12. Missing wall bracing</td>
<td>1</td>
<td>17</td>
<td>6%</td>
</tr>
<tr>
<td>13. Bottom steel reinforcement laps at mid-span of suspended beams</td>
<td>1</td>
<td>17</td>
<td>6%</td>
</tr>
<tr>
<td>14. Missing column reinforcement</td>
<td>1</td>
<td>17</td>
<td>6%</td>
</tr>
<tr>
<td>15. Conflicting beam information.</td>
<td>1</td>
<td>17</td>
<td>6%</td>
</tr>
<tr>
<td>16. Retaining wall reinforcement on wrong side of the wall</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
<tr>
<td>17. Inadequate cantilever reinforcement anchorage</td>
<td>1</td>
<td>1</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Table II-1: PPU Approved application Survey Findings - OAS 2005*
2. Scoring of Existing Construction Quality Insurance

<table>
<thead>
<tr>
<th>Effectiveness of the Existing QA System in Disaster Vulnerability Reduction and Energy Conservation</th>
<th>Not effective</th>
<th>Minimally effective</th>
<th>Moderately effective</th>
<th>Adequately effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness Score</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entity</th>
<th>Structural Vulnerability</th>
<th>Energy Wastage</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draftsman</td>
<td>1</td>
<td>1</td>
<td>Mainly checks geometry.</td>
</tr>
<tr>
<td>Contractor</td>
<td>1</td>
<td>1</td>
<td>Mainly checks geometry and materials.</td>
</tr>
<tr>
<td>Homeowner</td>
<td>1</td>
<td>1</td>
<td>Mainly checks geometry.</td>
</tr>
<tr>
<td>Architect</td>
<td>1</td>
<td>2</td>
<td>Mainly checks geometry and finishes.</td>
</tr>
<tr>
<td>Structural Engineer</td>
<td>2</td>
<td>2</td>
<td>Mainly checks geometry and structure.</td>
</tr>
<tr>
<td>Physical Planning Unit</td>
<td>2</td>
<td>1</td>
<td>Mainly checks geometry and structure.</td>
</tr>
<tr>
<td>Mortgage agency</td>
<td>2</td>
<td>1</td>
<td>Relies on an approved planning application.</td>
</tr>
<tr>
<td>Insurance agency</td>
<td>0</td>
<td>0</td>
<td>Does not check designs.</td>
</tr>
</tbody>
</table>

*Table II-2: PPU Approved application Survey Findings - OAS 2005*
Effectiveness of the Existing QA System in Disaster Vulnerability Reduction and Energy Conservation

<table>
<thead>
<tr>
<th>Entity</th>
<th>Structural Vulnerability</th>
<th>Energy Wastage</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draftsman</td>
<td>0</td>
<td>0</td>
<td>Does not perform site inspections.</td>
</tr>
<tr>
<td>Contractor</td>
<td>2</td>
<td>2</td>
<td>Mainly checks geometry.</td>
</tr>
<tr>
<td>Homeowner</td>
<td>1</td>
<td>1</td>
<td>Mainly checks geometry.</td>
</tr>
<tr>
<td>Architect</td>
<td>1</td>
<td>2</td>
<td>Mainly checks geometry and finishes.</td>
</tr>
<tr>
<td>Engineer</td>
<td>3</td>
<td>2</td>
<td>Mainly checks geometry and structure.</td>
</tr>
<tr>
<td>Physical Planning Unit</td>
<td>1</td>
<td>1</td>
<td>For the 20% of houses that are checked.</td>
</tr>
<tr>
<td>Mortgage agency</td>
<td>0</td>
<td>0</td>
<td>Checks cost only.</td>
</tr>
<tr>
<td>Insurance agency</td>
<td>0</td>
<td>0</td>
<td>Does not check.</td>
</tr>
</tbody>
</table>

*Table II-3: PPU Approved application Survey Findings - OAS 2005*
D. Findings Summary

- Appropriate Building Standards Exit - GBG published since 1999;
- Effective construction Application review lacking;
- Construction control Enforcement Mechanism lacking;
- Houses are often over-evaluated as Quantity Surveyor not able to evaluate the Quality of construction;

E. Conclusion:

Considering that approval + enforcement are PPU’s role, shortcomings are therefore mainly due to:
- Inadequate Physical Planning Unit design Check;
- Inadequate Physical Planning Unit Construction Check
Proposed Construction Quality Assurance (CQA) Mechanism for Grenada

A- Main Requirements:

- Clear Land Titling: Homeowner has title to land and/or permission from landowner to build;
- Capacity Building for Governmental Agencies;
- Commitments of the Mortgage & Insurance Agencies;
- Legal Framework and Accountability mechanisms for Professional Builders (Contractors, Engineers/Architects);
- Certification Mechanisms for all Professional Builders;
- Loans guaranteed Coverage;
B. Main Components/Stages

1. Design Stage
2. Financing Stage
3. Construction Stage
4. Insurance Stage
Proposed Construction Quality Assurance (CQA) Mechanism for Grenada... cont’d

A. Design Stage

1. Dev/Owner’s Construction Application submitted to PPU

2-a: PPU Review in House

2-b: PPU Outsource QA Engineer Cies

3. Approved Application/ returned Dev/Homeowner’s

B. Financing Stage

1. Dev/Owner’s Approved Construction Application submitted to Mortgage Agency for financing.

If Approved by MA

3. MA: Provides list of QAE Cies to Dev/Owners.
   - QAE Cies:
     - DEV/HMW hires one!
     - QAE managed loan disbursements
     - QAE fees 0.5% construction costs
     - Costs included in initial loan;
     - MA absorbed part of QAE costs – after certificate of Occupancy is issued by PPU.

Figure 1- Managing Construction Design Review – Approval and Financing - OAS, May 2005
 Proposed Construction Quality Assurance (CQA) Mechanism for Grenada ... cont’d

C. Construction Stage

1. On site Inspection
   - Under the Control of QAE Cies

2-a: After each Inspection
   - QAE informs PPU, Mortgage and DEV/HMOW of state of Compliance

2-b: After Final Inspection
   - QAE advises PPU, Mortgage and DEV/HMOWN on site Ability for Occupancy

3. If Positive Compliance with PPU
   Issuance of Certification of Occupancy (CoO) to HMOWN/DEV

D. Insurance Stage

1. Dev/Howners Submits to IA:
   - Certificate of Occupancy/ Final Report

21A Decision:
   - Provide a lower premium to DEV/HMOWR-
   - Shares Costs

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Figure II- Managing Construction Execution and Insurance Financing - OAS, May 2005
Proposed Construction Quality Assurance (CQA) Mechanism for Grenada… cont’d

Way Forward....

✓ Continue in Country Stakeholders Consultation;
✓ Stakeholders Commitments;
✓ IFC – Home Reconstruction Lending Procedures to finalize;
✓ Implementation to Start in Sept 2006 (Trainings, Courses, and Symposium) with support from the Canadian International Development Agency (CIDA).
✓ Regionalization.
Contact Information

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Thank YOU !!!

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