PROJECT SUMMARY REPORT FOR

RED CROSS- PADF AYITI INITIATIVE ON RECONSTRUCTION (REPAIR)

DECEMBER 2012

PADF
PAN AMERICAN DEVELOPMENT FOUNDATION

miyamoto. EARTHQUAKE + STRUCTURAL ENGINEERS

MTPTC

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1.0 Introduction

The catastrophic 2010 Haiti Earthquake devastated the country, negatively impacting the lives of more than 3 million people. Since that day there has been a resounding response from organizations and agencies worldwide. This report describes the work performed for the American Red Cross (ARC) by the Pan American Development Foundation (PADF) and Miyamoto International (MI) partnership, in conjunction with the Haitian Ministry of Public Works, Transport, and Communications (MTPTC), to repair 5,000 houses (later revised to 4,000) in Delmas 9, Carrefour Feuille, and later Delmas 33 and Delmas 19, all neighborhoods of Port-au-Prince Haiti.

The Yellow House Repair Program started in November 2011, lasted 11 months, and is a direct response to the earthquake that damaged hundreds of thousands of buildings, displacing over a million people from their homes. The program is an efficient and permanent solution to the housing problem. It not only focuses on returning families to their homes, but also concentrates on job creation, sustainability, and capacity building, ranging from laborers and masons, to small construction firms and engineers, reaching as high as material manufactures and high level administrators. This program is the result of thousands of man hours from many organizations led by PADF, Miyamoto, and the MTPTC.

The Yellow House Repair Program has been identified by many as one of the most successful housing projects in Haiti due to its efficiency and quality of work. The Carrefour Feuille project was extended later to the areas of Petite Place Cazeau and St. Patrick of Delmas 33, and Delmas 19. The project lived up to this reputation, successfully employing hundreds of local workers and repairing 4,035 houses (Fig 01). More importantly, it has been identified by the Haitian people as a program promoting immediate relief, technical advancement, and long term growth in the private sector.

Fig. 01 – Home before (Left) and after the program (Right)

1.1 The Earthquake

The magnitude 7.0 earthquake occurred at 16:53 local time on Tuesday, January 12th 2010, with an epicenter 25 km west-southwest of the capital city of Port-au-Prince, in the Léogâne District. The damage caused by the main event, and at least 52 aftershocks in the two weeks following, was disproportionately high compared to a typical 7.0 magnitude earthquake. Poor design and construction practices, along with a lack of preparedness contributed to the extensive level of damage and suffering. The human and financial consequences of this event are staggering. Carrefour Feuille and Delmas 33 and 19 were no exception to the devastation caused by the earthquake. The neighborhood's relatively large population and houses at close proximity resulted in a significant amount of earthquake-damaged buildings and internally displaced people. Fig. 02 below shows Carrefour Feuille and Delmas proximity to the epicenter.

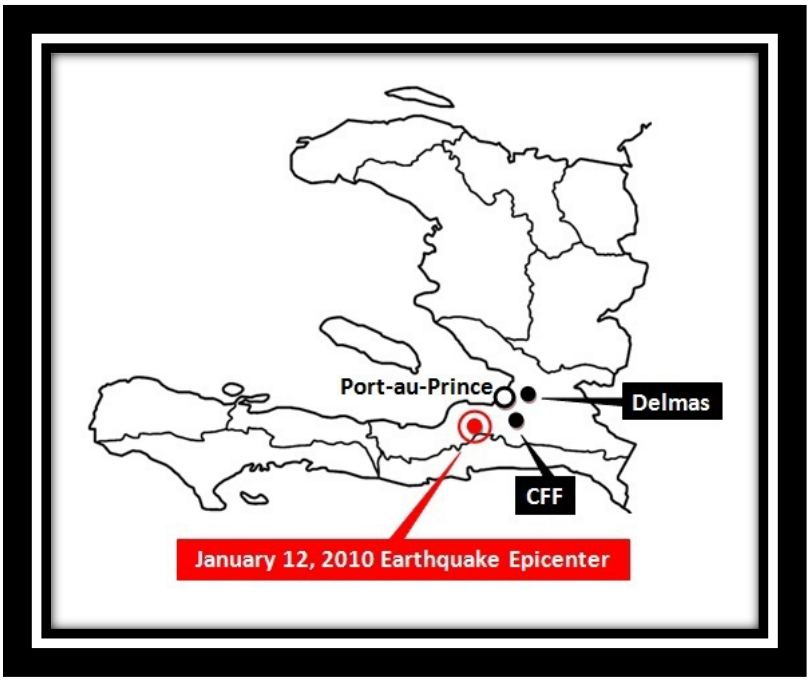


Fig.02 – Epicenter of January 2010 Earthquake & intervention zones

1.2 Earthquake Aftermath

The magnitude 7.0 earthquake had a disproportionately high and drawn out aftermath. Several factors contributed to this outcome, including the following:

- Haiti has unique socio and economic difficulties. Given its scarce resources, adequate planning was not in place to deal with a catastrophe of such a large magnitude.
- Haiti had not experienced a major earthquake in over 200 years. As such, the country's resources had not been allocated to consider earthquakes. This had a twofold effect, including both a lack of proper seismic code for design and construction and a general lack of preparedness to deal with the consequences of such an event.
- This event struck near the center of a metropolitan area and adversely affected the institutions (such as the UN and the Haitian government) that would usually be asked to develop a plan and deal with the aftermath of the earthquake. Many personnel who would provide assistance, and structures that would be used for emergency operations, were not functional following the earthquake.
- Damage to the infrastructure, including roads, adversely affected the response time. Damage to ports and the airport caused delays in humanitarian aid being delivered to the country. After such aid arrived, the lack of adequate infrastructure or a distribution network hampered its disbursement.

1.3 Main Causes of Building Damage

The disproportionately high building damage and resulting loss of life can be directly attributed to poor design and construction practices, which lacked formal and structured quality control (QC) mechanisms. The main factors contributing to the excessive building damage and amplification of this tragedy were the following:

- Design and construction practices had not considered earthquake forces.
- Many engineers and contractors had neither education nor experience in earthquake-resistant design methodologies.
- Haiti lacked an earthquake engineering code.
- The past decade has seen rapid growth of low-income neighborhoods because of migration into the city from outlying areas. In these neighborhoods, unsafe housing had been built using substandard construction materials and practices.

Many of the structures in Haiti are of a building type that is vulnerable to seismic damage. These buildings use a variation of confined masonry construction comprising weak hollow concrete blocks (HCBs) with lightly reinforced and non-ductile beams and columns. See Fig. 03 for typical earthquake damage to houses.

Fig. 03 – Shear cracking in wall pier (Left), Out of plane failure of CMU wall (Right)

The building materials in Carrefour Feuille (CFF), Petite Place Cazeau and St. Patrick Delmas 33, were of poor quality. CFF, a low income neighborhood of Port-au-Prince, is a very mountainous area with limited road access, so transportation costs are very high; this made most property owners choose lesser quality material to offset the high cost of construction. Delmas 33 and Delmas 19 had bigger homes, and Petite Place Cazeau is a product of an old government housing program. Construction in that area suffered lesser damage. The combination of poor quality building materials and unsafe practices resulted in not only a high number of damaged houses, but also a high level of damage to the houses.

Fig. 04 – Community assisting with damage assessments

2.0 Project Overview

The American Red Cross (ARC) funded the project and PADF in partnership with Miyamoto repaired 4,035 yellow-tagged homes, 102 in Delmas 9, 2,047 in Carrefour Feuilles and 1,886 in Delmas 33 and 19 areas. The repair process began with the Damage Assessment, followed by a more detailed Repair Assessment, which ultimately led to the repair and certification of the house. See Fig. 05 below. Throughout the entire process there was a strict quality control – quality assurance (QC – QA) program that ensures the integrity of the final product.

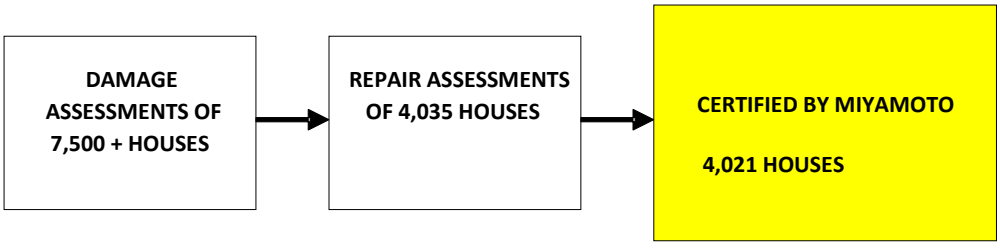


Fig. 05 – Stages of House Reconstruction Efforts

The Repair Assessment program was developed by Miyamoto in collaboration with PADF and other organizations to quantify and record the specific repairs needed to safely reoccupy these homes. Over 7,500 homes have been assessed for repairs per the MTPTC repair guidelines (*Guide Pratique de Reparation de Petit Batiments en Haiti*). The data from the repair assessment program provides a basis for the Yellow House Repair Program as it dictates where and how the houses in any particular zone are to be repaired (via GPS location and quantified repairs). Refer to the "Haiti Emergency Shelter Rehabilitation" report for a detailed explanation of Miyamoto's Damage Assessment and Repair Assessment results and procedures. Many times the engineers were able to use the knowledge of the local community members to help find the yellow tagged houses (Fig. 04).

The yellow house repair program in previous neighborhood of Port-Au-Prince and Léogâne provided a foundation for this repair program. This program's structuring of management, operational staff and material management was a continuation of the proven previous programs. Many of the quality control systems were already developed by PADF and Miyamoto to support the construction efforts and were adapted to fit Carrefour Feuille and Delmas' conditions. Prior to implementation of the repairs, there was close coordination between PADF and Miyamoto to determine clear roles and responsibilities for staff throughout the program and to install systems to anticipate and overcome program challenges.

The project started with the repair in Delmas 9 in November 2011 with the French Red Cross (FRC) as beneficiaries. A total of 102 houses were certified (see Fig A1). FRC generated an observation report to PADF based on a scope of work that seemed different from the agreement Miyamoto had with PADF. The level of repair FRC requested was more involved than what was anticipated. The scope of work started to evolve in Delmas 9, and by the time the project reached Carrefour Feuille, more repair works were done compared to the initial contract.

Initially the project was to repair all 5,000 houses in Carrefour Feuille. During the course of the repair program it became clear that all the houses would not be found in the same area. As the project was scheduled to move to a different neighborhood the scope of work changed. PADF decided to reduce the number of houses to be repaired to 4,000 homes. The exclusion criteria, insecurity problem and the geographic limit imposed by ARC were serious challenges. The zone of Campeche/Bariajou, was a restricted zone by ARC, even though it was in the neighborhood of Jean-Philippe where the teams were working. In Delmas 19, Miyamoto encountered a road block during the repair project. The section shown below in Fig 06a was received by Miyamoto on August 6 as being a British Red Cross area of intervention in Delmas 19, thus excluded from Miyamoto work zone. This came after assessment was completed and repair started. It was difficult to clearly identify the limit of that area so PADF sent an updated map on September 5 with the GPS coordinate that identify the limit. (See Fig. 06b)

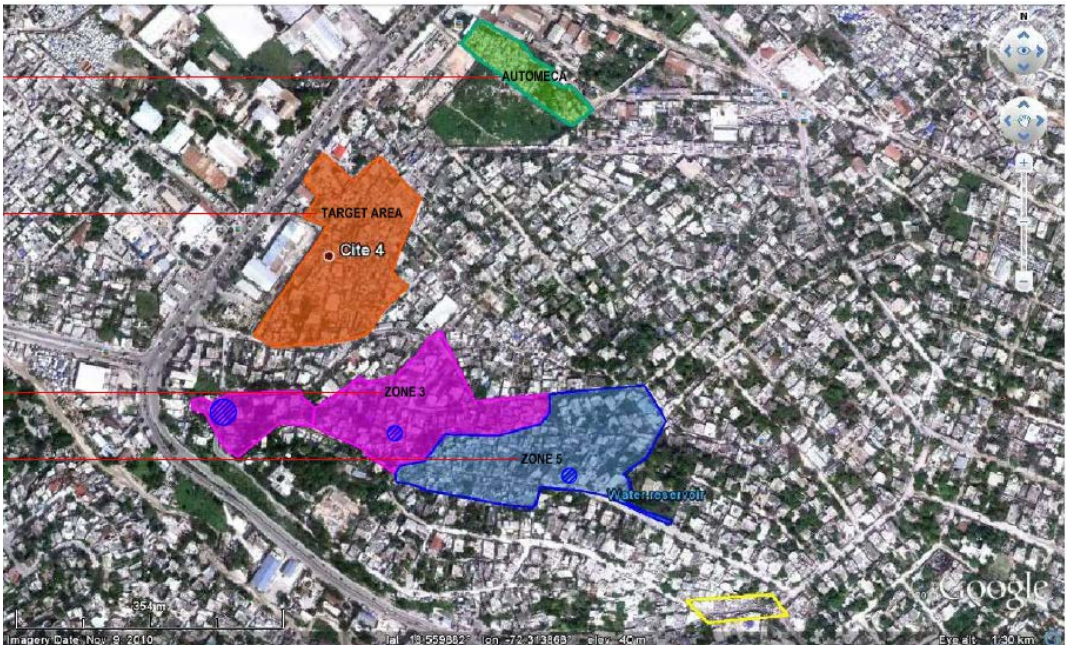


Fig. 06a - BRC Yellow House Repair – Zone 3 & 5 of Delmas 19

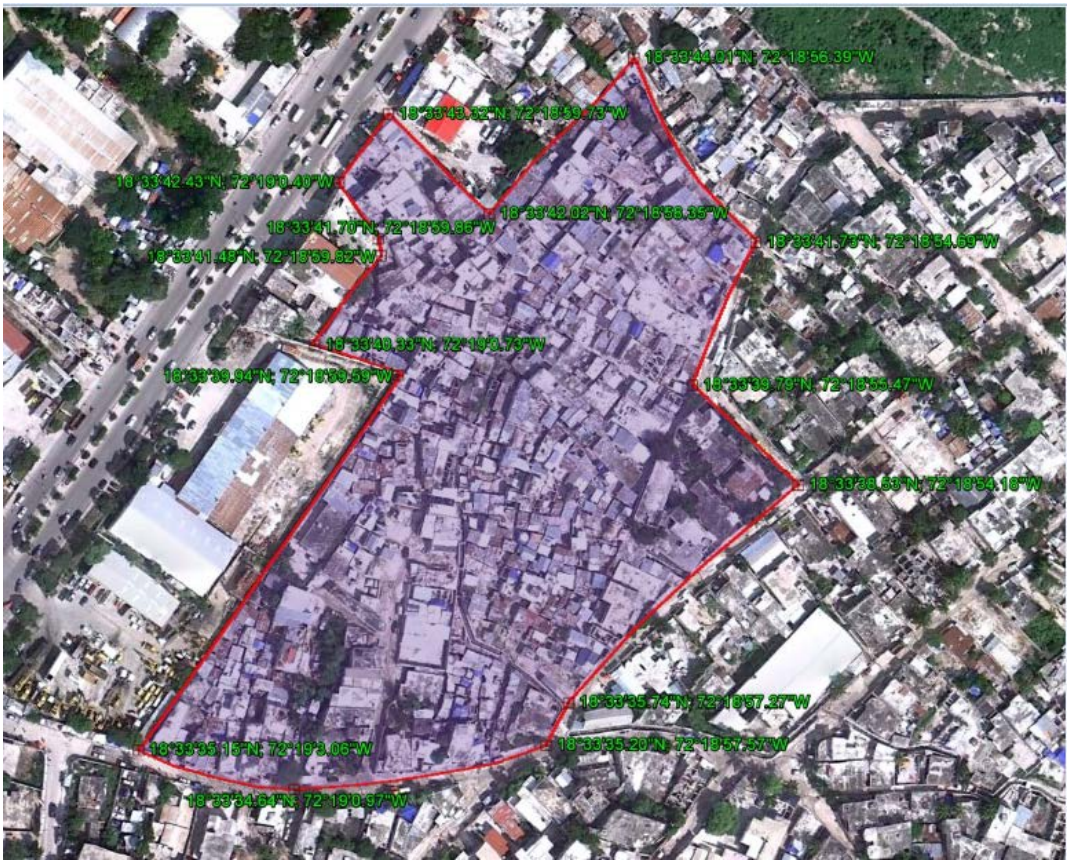


Fig. 06b – GPS Coordinate of BRC zone (Delmas 19)

To accelerate the assessment program at the newly found zones, Miyamoto and the engineers of MTPTC developed a map bordered by ten (10) different zones to facilitate the assessment process (Appendix A – Fig. A5). Detailed assessment started at Petite Place Cazeau (PPC) on May 10th. Initially five (5) teams of two QA were each given two clearly identified zones to do detailed assessments. This area was of a higher economic scale than Carrefour Feuille, so the houses were bigger, and less houses sustained earth quake damages. The percentage of repairable homes was approximately 57% of all houses assessed. PADF informed Miyamoto that repair of houses could start on June 5th in PPC. The assessment for the zone of St. Patrick was delayed again when community outreach did not start ahead of time. Miyamoto informed PADF that to save time, detailed assessment would start concurrently with community outreach.

2.1 Program Setup

Throughout the project Miyamoto and PADF used forms and other administrative technical processes previously established in the repair reconstruction effort in Port-Au-Prince. The program was organized such that PADF was responsible for communication and interfacing with the community and purchase of construction materials. Miyamoto's role as technical advisor provided training for engineers and masons, mentorship, technical form development, material quality verification, and project support and logistics. Program training consisted of classroom and laboratory style lecture and demonstration of program procedures and house repairs. Mentorship consisted of Miyamoto engineers working continuously on-site with QA Engineers and Construction Managers (CMs) in order to ensure the proper execution of repairs, provide training, resolve unique repair conditions, and to ensure program procedures were followed. The actual house repairs were performed by private contractors who utilized community masons and laborers. All contractor teams were continuously supervised by MTPTC Engineers and PADF CMs. Carrefour Feuille was divided into thirteen (13) zones (Appendix - Fig. A3), and each zone had a contractor responsible for the repairs. The first six (6) contractors had an initial contract to repair 200 houses. The contract could be terminated by either party (PADF or the contractor) at any time. The other seven (7) contractors had an initial contract of 100 houses. The progress of a contractor was measured by the number of houses repaired per week. It became clear that some contractors were not pulling their weight in the program. The first contractor that was terminated certified 45 houses in eleven (11) weeks and their last house was certified on April 30th. This contractor's repair average was four (4) houses per week from the day they received their first requisition. This quantity was unacceptable as the weekly average at the time was 10 to 13 houses per contractor. By July 30th there were nine (9) contractors in the program. At the end of August, two (2) contractors merged in order to improve their performance.

Construction started in Delmas 33 Petite Place Cazeau on June 5th, with three (3) of the best performing contractors that had completed their repair work in Carrefour Feuille. Petite Place Cazeau was divided into ten (10) zones to facilitate the management and accountability of the contractors, (Appendix - Fig. A5). Five (5) more contractors moved from Carrefour as the workload progress and the program extended to St. Patrick on July 9th. The last contractor working in Fort Mercredi was moved to St. Patrick as that zone was declared unfit for the engineers to work because of severe security issues. The

program finished with eight (8) contractors. The contractor that finished their assigned work areas was able to move to a new zone, thus increasing the number of houses in their contract.

The QA engineer visited houses to be repaired with construction foremen and masons that worked on the house. The engineers explained the damages and appropriate repair techniques with the fiche technique in hand. Miyamoto engineers continued the community outreach throughout the repair of the home. All Miyamoto engineers were assigned either a construction manager (CM) to work with, or a group of contractors depending on the zone and stage of the project. Each Miyamoto engineer would make rounds of all houses and each QA supervised within their group to ensure all repairs were completed correctly per the guideline. Fig. 07 shows the organization chart of the project teams.

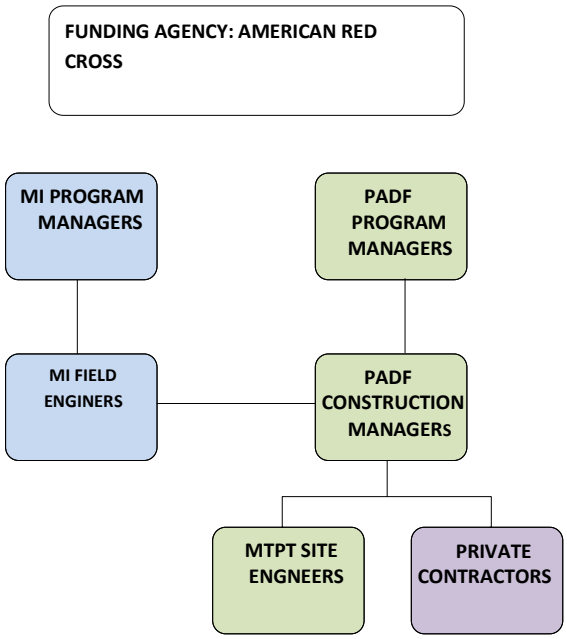


Fig. 07– General Organization Chart of Project Teams

PADF gave the contractors vouchers for all materials given to them based on a material estimation take-off prepared by Miyamoto. Contractors were paid a lump sum of $750 per repaired houses up until the end of May. On May 14, the contractors were asked by PADF to bring all fiches techniques of houses not yet in construction. These returned fiches techniques would be among the first to be used in the new cost system to be developed by PADF. Starting June 2012, the new cost system was developed by PADF, based on the level of repair to be done and the duration of the repair for the house.

2.2 Assessment Efforts and Procedures

Shortly after the earthquake, a Rapid Assessment Program was implemented to systematically identify and categorize the level of safety of homes in the earthquake-affected areas in and around Port-au-Prince. Two (2) months after the earthquake (March 2011), over 400,000 homes were already assessed for earthquake damage, classified and tagged as green, yellow or red. See Fig. 08 for a description of these classifications. The information gathered during this process is the basis for the repair of yellow-tagged buildings in the Yellow House Repair Program.

Green-tagged	Unlimited Occupancy; the building is structurally undamaged and may be occupied.
Yellow-tagged	Limited Occupancy; the building should not be occupied for extended periods of time and parts of the building might be considered off-limits.
Red-tagged	No Occupancy; the building cannot be safely inhabited

Fig. 08 – Rapid Assessment Classification Categories

Before PADF and Miyamoto teams arrived a mobilization was done in the area by PRODEPURE to explain to the community what the program was and how the community should participate. A flyer explaining each partner responsibility was distributed to homeowners to help them understand the program (see Appendix - Fig. B2a & B2b)

After the PADF and Miyamoto teams arrived it became apparent that the existing markings and classifications could serve as an indication of the condition of the house, but new assessments would be carried out simultaneously with the program in order to repair all homes that met the project criteria. The newly classified houses were clearly identified with the yellow MTPTC tag while corresponding information was gathered in preparation for the repairs. Upon further inspection by trained and experienced MTPTC engineers, they were found to be repairable within the constraints of the program.

Exclusion Criteria:

During the course of the yellow house repair program, Miyamoto International made some changes, clarifications, and additions to the project exclusion criteria. One major change included additional restrictions to the MTPTC's requirement for house proximity to ravines and cliffs (10 meters or less). To account for other possible environmental conditions, discovered in Carrefour Feuille, the 60 degree rule was instated shown on pg. 3-8 of 'Projet de Reparations de Maisons Etiquetees Jaunes, Guide de Chantier'. This change was made due to houses near Carrefour Feuille's Ravine Zonyon where repairs were started/completed by contractors prior to approval by Miyamoto International engineers. This issue also led to changes to the assessment procedure. All potential repairable houses were then required to be verified by Miyamoto International engineers. Other environmental and structural exclusion criteria were addressed such as:

- Houses with possible exposure to flooding.
- Deterioration limitations,
- Wall stability issues comprised several of the Exclusion criteria in the guidelines which were more clearly established during the Carrefour Feuille repairs.

Re-tagging of houses was added to the program in order to increase the number of houses repaired. Houses initially tagged green with significant earthquake damage were changed to yellow. Yellow houses could also be re-tagged to either green or red, as necessary. This was necessary as the rapid assessments done after the earthquake were made from the exterior, without engineers having the ability to enter the structure, in many cases. However, red houses were to remain tagged as originally evaluated. Proximity of repairable houses to red houses vulnerable to collapse also became an issue. All of these details were addressed and shared with the MTPTC engineers. Modifications to the program were presented in training sessions for the MTPTC engineers.

After entering into the zones of Petite Place Cazeau (Delmas 33), concrete slab reinforcement deterioration issues became more prevalent. A training session, with all of the MTPTC engineers present, was conducted to present examples of acceptable and unacceptable concrete slab reinforcement deterioration. The requirement was later changed to allow a maximum of 25% concrete slab damage to be repairable in the yellow house repair program. This change resulted in a significant increase in the number of repairable houses in this zone. These changes created delays during the assessment phase because large groups of houses had to be reassessed. The project took steps back when the guidelines were questioned. At the end, a very efficient assessment process with all houses accounted for was developed.

The following changes in the Miyamoto International guide midway through the Carrefour Feuille repair program involved the following:

<u>Environmental cases:</u>

- Ravine Case 1
- Ravine Case 2
- Flood Region
- Building

<u>Deterioration/ Undermining cases:</u>

- Owner Refusal
- Already Repaired
- Red or green tagged houses
- Yellow tagged but actually green or red
- Earth Stabilizing - Wall vulnerability

With the implementation of a stricter requirement to eliminate all houses containing slabs with any sort of damage or signs of deterioration, a significant amount of repairable homes were excluded. Many of these homes had to be certified as structurally satisfactory to repair by Miyamoto engineers. After the requirement was improved to include homes with concrete slab damage of 25% or less, those houses were then revisited and the majority eventually repaired.

PADF set a new contract limit on the number of houses to be repaired by the contractors in Carrefour Feuille on the last week of May 28th. Any contractors with fiche techniques in hand not yet open and/or in excess of that limit needed to bring them back to PADF. For example, one of the contractors initially had 200 houses to repair in contract, but had only repaired 111 houses by the week of June 4th. This contractor's limit was changed to 135 houses; another contractor with also 200 in initial contract had already repaired 330 houses by the same date PADF set their limit to 334 houses. This created confusion among the contractors, especially for a couple contractors who had some fiche techniques in their procession for months but had not yet repaired. The limit set for the contractors was not static, as there were initially 5,000 houses to repair and thirteen (13) contractors, thus average of 385 houses per contractor.

When all fiches techniques were returned, a new map was developed for Carrefour Feuille. This map regrouped the original zones, creating only seven (7) areas instead of thirteen (13), and only three (3) contractors were given houses to repair in Carrefour Feuille (Appendix – Fig. A4). Repair at Fort Mercredi was the first area to start with the new cost system in CFF, as several houses were still unfinished in that zone due to the insecurity reasons.

By the month of April 2012, it became clear in order to meet the construction schedule, the project had to find another neighborhood with more concentrated damaged homes. PADF for a week had a team of six (6) quality engineers (QA) do a quick assessment from Delmas 41 to Delmas 75 to identify a new zone of work. This exercise showed that most homes have been repaired in that area. By the end of April, with the help of MTPTC engineers, using the yellow house database, Miyamoto identified the area of Petite Place Cazeau (PPC) and St. Patrick in Delmas 33 that had a cluster of yellow houses not yet repaired (Appendix – Fig. A5). On April 27th PADF informed Miyamoto assessment of houses in Carrefour Feuille will stop soon, since only few new houses were found repairable per week. This was made official on May 10th. By the week of May 7th PADF asked Miyamoto to stop the issuance of new fiches techniques to contractors in Carrefour Feuille. More than ever now assessment had to start in the new zone, so the repair program was not interrupted. PADF needed to do community outreach before Miyamoto started assessment in Petite Place Cazeau. This delayed the processes by couple weeks.

To accelerate the assessment program at the newly found zones, Miyamoto and engineers of MTPTC developed a map bordered by ten (10) different zones to facilitate the assessment process by the engineers. Detailed assessments started at Petite Place Cazeau (PPC) on May 10. Initially 5 teams of two QA were each given two clearly identified zones to do the detailed assessments (Appendix – Fig. A5). This area was of a higher economic scale than Carrefour Feuille, so the houses were bigger, and less houses sustained earth quake damages. A total of 257 houses were deemed repairable at the time,

approximately 57% of all the assessed houses. PADF was responsible for community mobilization and informed Miyamoto that repair of houses could start on June 5th in PPC. During the repair process additional houses were assessed as more people approached the engineers to visit their houses that were not yet tagged in the initial rapid assessment. Some houses were placed on the exclusion list because the owner refused, or was not present. These home owners were seeing firsthand how the project worked.

The scope of worked had evolved throughout the project, especially when moved from Carrefour Feuilles to Delmas 33 zones.

1. No rough and finished plaster on principle façade
2. No rough and finished plaster on one side of wall
3. More thin roof material (tôles) as the number of houses was reduced to 4,000
4. Windows were replaced when repair work was done on a wall that had a window

Several alterations were made to the yellow house repairs once the program was shifted primarily to the Delmas 33 area. Plaster was no longer applied to the principal facades of each house repaired. For new walls constructed, both sides were no longer plastered. Depending upon the location, the homeowner was then given the choice of deciding which side of the wall they preferred to have plastered. After the many homeowner issues experienced with sheet metal in Carrefour Feuilles, each house was allotted a higher percentage, approximately 60% of sheet metal in Delmas 33, to properly repair the house. As an aesthetic addition to B1 and B2 repairs, decorative concrete blocks (clostra) were introduced into the program to seal window openings, or replace the existing ones. This pleased the homeowners and provided them with increased security.

2.3 Mason Training

Prior to repairing houses, community masons were trained and certified by MTPTC for performing the repairs in compliance with MTPTC repair guidelines. The training consisted of a one day seminar with continued field support throughout the duration of the project. The seminar was split into two portions. The morning portion was focused on the introduction and implementation of new techniques (Fig. 09). For the afternoon portion, the local masons were then asked to construct demonstration walls, which were checked by trainers. Training continued in the field as masons became more familiar with new methods and techniques. To date over 600 masons have been trained on the proper (and seismically improved) construction of concrete block walls and other various repairs in Carrefour Feuille and Delmas 33 and surrounding.

Fig. 09 – Mason Training

2.4 Engineer Training

For Carrefour Feuille project, 35 MTPTC Engineers were selected from among those who were previously experienced in the Rapid and Detailed Assessment programs and were then trained in QA practices and procedures. Miyamoto provided a refresher presentation which detailed and discussed team roles and responsibilities; structural theory; the how, why, and solutions to structural failures relevant to the program (Fig. 10).

Miyamoto met at MTPTC on Thursday August 2 with 16 engineers of MTPTC that would do the assessment of the houses in Delmas 19. The engineers were briefed of the information Miyamoto needs in these fiches techniques in order to calculate the material take-off efficiently. To accelerate the processes two (2) QAs experienced in the assessment done for PADF/Miyamoto were added in the locality of Ti Jérémie as technical support for the new MTPTC engineers.

Training of the QA and CM engineers did not stop in the classroom. Miyamoto Engineers worked side-by-side with all of the Site Engineers and Construction Managers throughout the program, continuing to provide technical mentorship and quality control of administrative procedures and repairs.

Fig. 10 – Engineer Training

2.5 Materials

Material quality is an integral part of house repairs and is essential to the success of any repair program. Miyamoto and PADF worked with local suppliers to identify and utilize construction materials that are in conformance with the guideline specifications. Local contractors were evaluated for the quality of their materials and their capacity to meet the project demands. During the planning phase of this project, several suppliers were evaluated and given detailed instruction on how they could improve the quality of their products in order to participate in the program.

PADF pre-paid for all the materials for the project at selected suppliers and it was Miyamoto's responsibility to verify that the materials met the MTPTC standards. Any materials received on site that did not meet the standards were not accepted, and in a few cases, resulted in the temporary disruption of work. Miyamoto and PADF worked together during the program to establish a list of approved materials and material suppliers in order to avoid any confusion and ensure the purchase of materials meeting the MTPTC criteria. All materials and suppliers were regularly inspected to ensure continuous compliance and the list was updated to include additional suppliers who meet the requirements.

3.0 The Repair Efforts

The primary causes of building damage and the resulting loss of life were due to decades of poor design and construction practices and a lack of quality control. A large majority of the houses in Carrefour Feuille and Delmas were built using a variation of confined masonry construction, made of weak hollow concrete blocks (HCBs) and lightly reinforced and non-ductile beams and columns. The repair methodology applied focused on the efficient repair of the yellow-tagged houses of this construction type, in accordance with the MTPTC Guideline. MTPTC and Miyamoto engineers worked in close proximity with private contractors and their construction crews to teach and enforce the standardized repair methods for a fast paced repair process. This QC-QA process is the key to successfully repairing a high volume of houses without sacrificing the integrity of the repairs, or the profitability of the private sector involved.

3.1 Repair Procedure

The actual repair process begins by choosing a large geographical area where the repairs will take place. In this case, the program focused on the neighborhood of Carrefour Feuille. Miyamoto and PADF staff mapped the area using streets and topical features to divide the area into small workable zones (Fig. 11). The CMs were then each assigned to zones in which they organized and controlled the repair process. To begin, the QA engineers were teamed with a CM and sent to their zones to identify and assess the damage of the houses that were to be repaired.

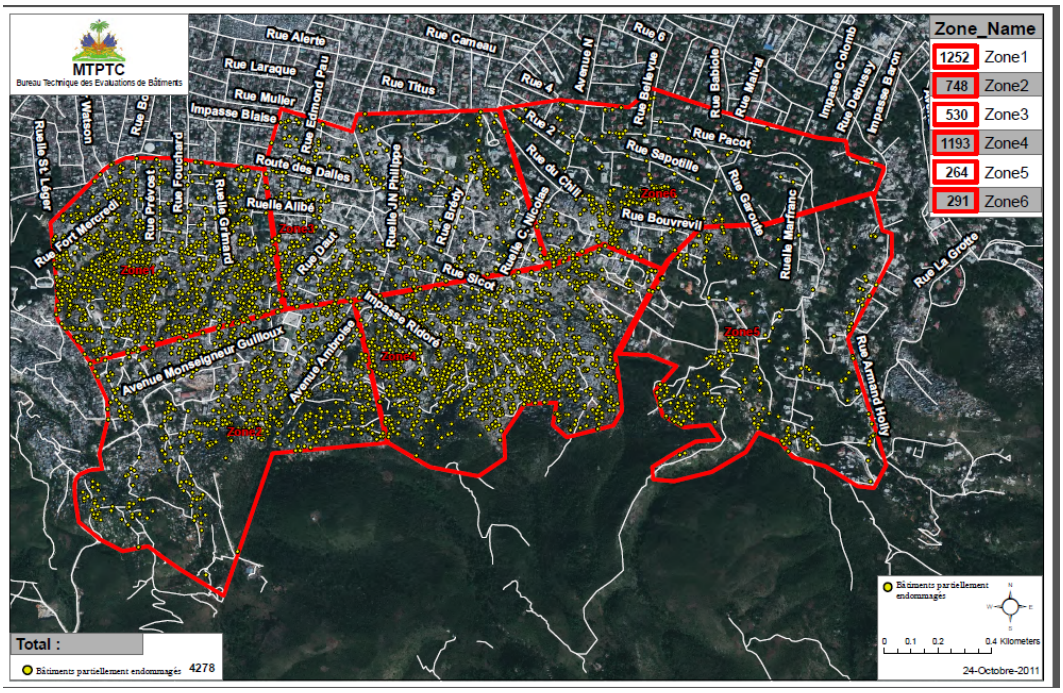


Fig. 11 – Map Identifying Yellow Houses - CFF

After the houses had been classified as a building that can be repaired by the program, the homeowner signed a Home Owners Agreement (HOA) form, accepting the terms in the contract and agreeing to provide, for example, water and cleanup for the repairs. Sometimes problems arose due to the homeowner not completely understanding the contract limitations. Miyamoto engineers and CM continued the community outreach allocated specifically to visiting each home and confirming each homeowner is in complete understanding of what they can expect from the program.

A Construction Agreement (CA) was then prepared by the engineers that listed the repairs to be performed and provided a sketch of the house showing the location and size of the repairs. Initially once the HOA and CA were completed, they were returned to the CM who controlled their distribution. By January the distribution of the CA was done differently. Miyamoto took control of the material estimation take-off, gave the summary of the requisition to the contractor then sent the material estimation requisition to PADF. PADF prepared the material voucher and gave it to the contractor. Later in June 2012, to reduce the additional material issue, Miyamoto gave the contractor a detailed copy of the material estimation, so it could be known upfront how much material is estimated per house, as the house was no longer paid as a lump sum.

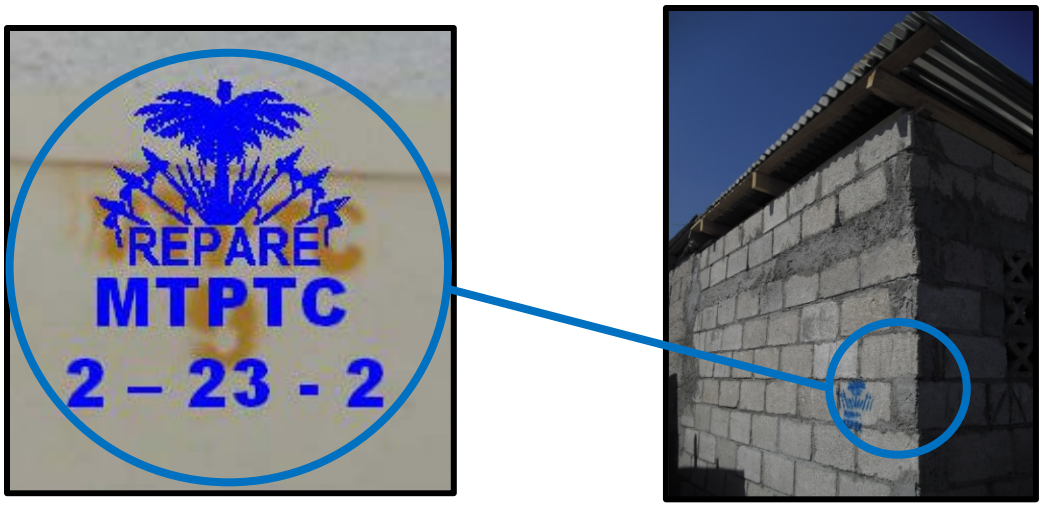


Fig. 12 – Example MTPTC Stamp of Repaired House

The CMs organized and controlled the repair process by assigning contractors houses to repair houses in small clusters determined by their geographical location. They also assigned their QA engineers to multiple houses for which they were responsible for maintaining a high quality of work and ensuring the repair methods specified in the repair guide were followed. The CM also received a copy of the requisition in order to properly monitor all the houses received by the contractor and the quantity of material. The CM would be able to predict material shortage. Small contractors were hired to perform the repairs; the contractors were required to employ masons and laborers from within the project boundaries.

All Miyamoto engineers were typically assigned either a construction manager to work with or a group of contractors depending on the zone and stage of the project. Each Miyamoto engineer would make rounds of all houses, each QA was supervising within their group to ensure all repairs were completed in conformance to the fiches techniques and repair guideline.

The QA/MTPTC engineer would first verify the house was completed; next the CM was responsible for signing off on the completed work and then informed Miyamoto engineer to come and certify that the house was in fact finished to the standards set by the Red Cross, PADF, and Miyamoto International. Upon the completion of house repairs, an MTPTC Engineer would sign-off on the Construction Agreement and the house would be eligible to receive a standardized MTPTC blue seal as shown in Fig. 12.

The flow chart in Fig. 13 shows steps of the repair process. Houses completed or near completion not certified by Miyamoto engineers were reported to PADF. A total of fourteen (14) houses were repaired but not certified by Miyamoto engineers based on the revised exclusion criteria. For example, some of the houses were not certified because of their proximity to a ravine.

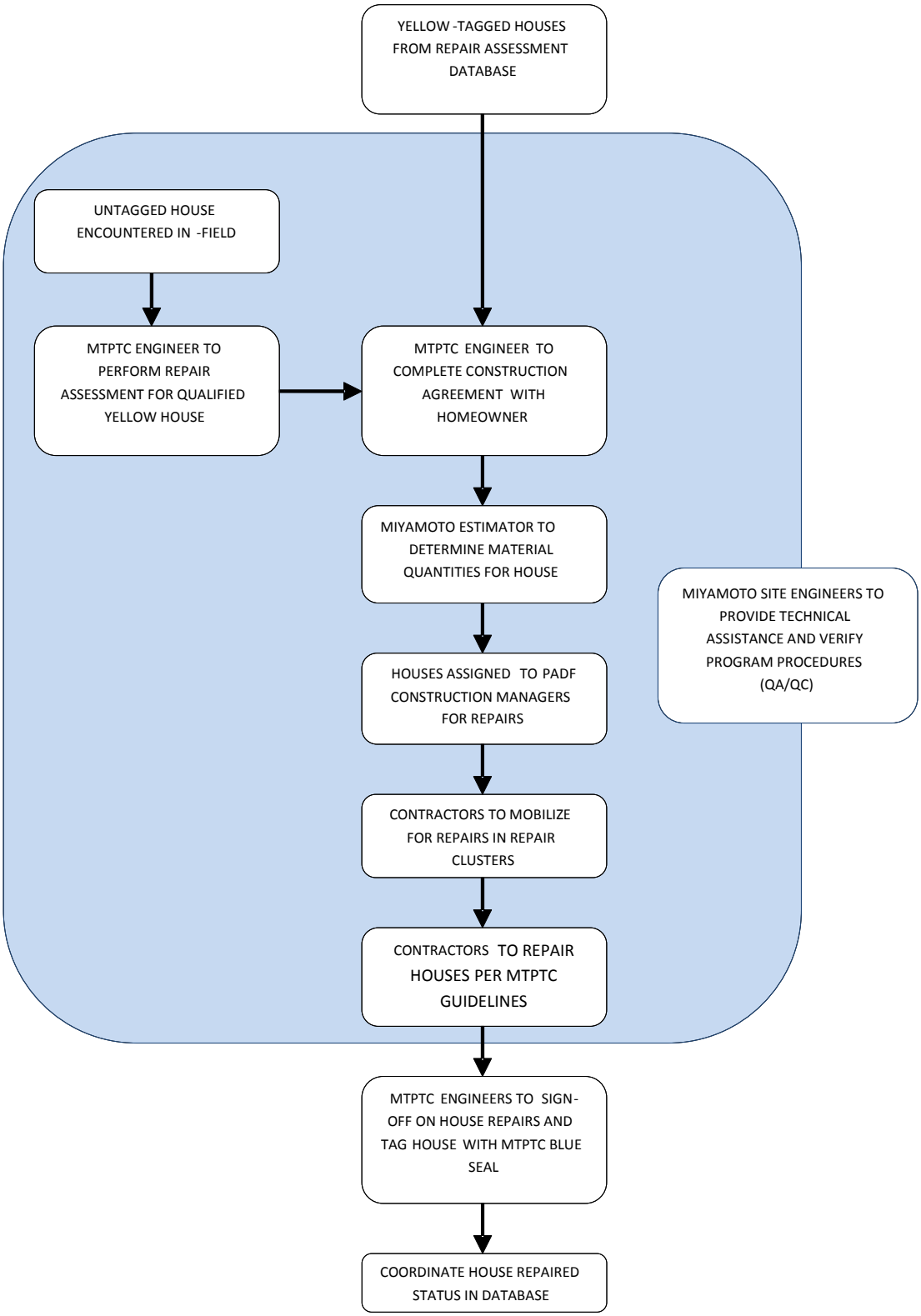


Fig. 13 – General Yellow House Repair process

3.2 Organization of Work Zones

Construction Managers (CM) and their corresponding contractors were given clear and discrete geographic boundaries of responsibility. Within their boundaries, the four (4) CM's were responsible for the organization, assignment, and repair of homes. This was found to be an efficient system of managing the overlapping construction efforts and avoiding unnecessary confusion of labor and material transportation during peak repair activities. Furthermore, giving Construction Managers and Contractors responsibility for a specific geographic boundary encouraged a sense of personal accountability to their reconstruction efforts and provided the community an opportunity to become familiar and involved with the program. To make the CM more efficient they receive each of the requisitions given to the contractors so they could better manage houses repaired in the area under their supervision.

Contractors, QA and CM were informed by Miyamoto and PADF during a meeting on May 22nd that MTPTC was clear that quality control personnel should not be owners or partners of any contractors working in the program in CFF or Delmas 33. In the event that such partnership exists, one party should cease working in the program. This would help ensure the highest quality control measures that can be provided in the program. That was taken into consideration on how to organize the supervision of the different zones of work.

3.3 Quality Control – Quality Assurance

Despite the devastating effects of the earthquake, there is still ample evidence of damaged structures being repaired using the same or worse, pre-earthquake, unsafe methods. It was crucial to the safety of the general public, and therefore imperative to this repair program, to enforce a QC-QA program ensuring the improved techniques were implemented. The program was developed to have both an internal QC, by the contractor, and an external QA, by the MTPTC and Miyamoto engineers. Together, the construction crews were held to a high standard of quality.

Throughout the repairs, MTPTC and Miyamoto Engineers monitored progress and verified conformance to the Guideline by visiting each house multiple times per day. The progress was documented on the QAs journal and available for review at any time. The QAs also provided technical guidance and instruction as required. Although both the masons and engineers were required to attend a training course, the unique repair conditions encountered in the field necessitated constant learning and advanced application of engineering and construction principles. Miyamoto engineers worked continuously along-side of the MTPTC Engineers and CMs to provide this mentorship and training.

The QA engineers were assigned specific homes to supervise; it was important that the same person worked on a house from beginning to end. This helped with communication between the construction crew and the homeowner. In the event a QA had to be moved to a different zone he or she would brief the newly assigned QA of all the work done as per the fiche technique, and of any additional work requested for that house. However, a QA would also be rotated to other contractors in order to avoid too much familiarity with a crew, thus being lenient on their supervision.

Material consumption represents a significant portion of project costs. Mismanagement of materials can negatively impact the project goals. Miyamoto engineers regularly reviewed contractor's requests for primary construction materials (masonry blocks, bags of cement, timber, sheet metal roofing, etc.) to ensure that material consumption was within project parameters and to justify material requests if exceptions were encountered. As the program advanced, the material totals were checked and constantly re-visited to compare the amount of materials used versus the amount requested. During the course of the project there were many instances requiring the close coordination between Miyamoto, PADF, and the contractors to manage materials and resolve discrepancies as they occurred.

Weekly meetings between PADF, Miyamoto, CMs and contractors were at first held at a location rented in Carrefour Feuille (CFF). When security issues became more frequent in CFF, the meeting location was moved at MTPTC local in Delmas 33. These weekly meetings were to gather critical information regarding the repair progress and to discuss and address field issues (community issues, technical issues, internal program issues, etc.) before they occurred, or to resolve them as quickly as possible. They were also used to gather information from all parties involved to improve the program as it progressed and encourage teamwork to help everyone meet their goals.

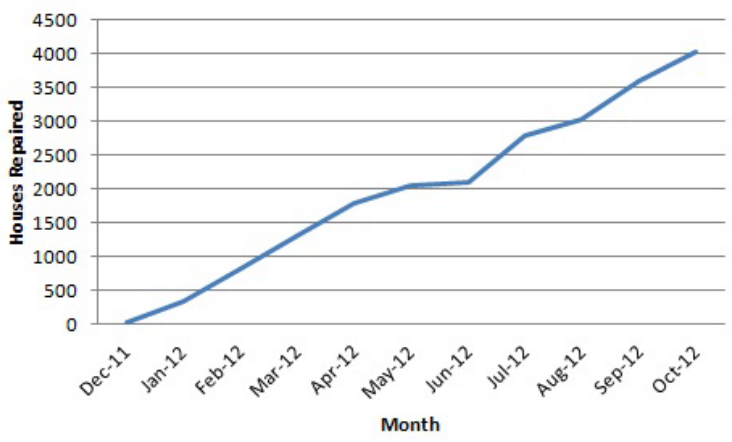
3.4 Field Personnel

The effort to repair 5,000 houses in Carrefour Feuille was a collaborative effort between the PADF and Miyamoto offices and the following field personnel:

- (2) PADF Construction Managers
- (3) PADF On Site Staff
- (7) Miyamoto Engineers
- (4) Construction Managers (CM)
- (1) Miyamoto Project Manager
- (1) Miyamoto Project Coordinator
- (41) MTPTC Engineers (at its peak)
- (13) Private Contractors (at its peak)

3.5 Repair Timeline

A graphical summary of the repair efforts can be seen in Fig. 14.



Month	Certified Houses Running Total
Dec-11	40
Jan-12	331
Feb-12	825
Mar-12	1312
Apr-12	1796
May-12	2044
Jun-12	2091
Jul-12	2783
Aug-12	3035
Sep-12	3613
Oct-12	4021

Fig. 14 – General Repair Timeline Table

At the end of each week, a Weekly Construction Report was prepared by Miyamoto and sent out to all parties involved with notes specifying any causes for delays, if applicable. See Appendix B (Fig. B1) for an example of a typical weekly construction report table.

4.0 Program Accomplishments

As a result of the Yellow House Repair Program, 4,035 additional houses were repaired in Port-Au-Prince; however, 4,021 of these were certified by Miyamoto.

An estimated 27,100 people will be able to return to their homes and/or occupy them in full confidence that they have been repaired to a standard that is better than pre-earthquake condition. These results lay the foundation for a brighter future for more than 6,000 families and stronger sense of community within the region. The majority of the homes repaired are in the Carrefour Feuille area with 2,135 houses (53.1%) and 1,886 in Delmas 33 and Delmas 19 (46.7% of the total). In order to repair these houses more than 7,500 houses were assessed, of which 45% (3,396 houses) were excluded based on the criteria set forth by Miyamoto and MTPTC. More than 61,800 tôles were replaced on approximately 2,908 houses, the most popular material in the project. That is on average 21.3 tôles per house; only 41% of houses in Delmas and 100% of houses in Carrefour Feuille repaired had thin roof material. A total of thirteen (13) private small contractors were employed to do the repair of the houses. The contractor that repaired 780 houses and certified 778 houses is the best performing contractor with 19.35 % of the total houses repaired in the program. The contractor that comes in

distant second repaired 698 houses (17.21% of the total houses repaired). The project had high and low production weeks due to all the reasons previously mentioned. The best performing week was July 16th with 200 houses certified. For seven (7) nonconsecutive weeks, the project certified more than 150 houses per week, greatly exceeding the projected number. The weekly projected number of certified houses for these weeks was 91 houses. The Summary Construction Progress Report in Fig. 15 shows the total number of houses repaired per each contractor.

Summary Construction Progress Report
American Red Cross/ PADF/ Miyamoto Yellow House Repair

Contratcors	Rank	Total Certified	% Certified	Repaired Not Certified	Grand Total Repaired
Sagess	1	778	19.35%	2	780
CP	2	692	17.21%	6	698
PJS	3	508	12.63%		508
Finenet	4	405	10.07%		405
SECA	5	318	7.91%		318
Bucotec	6	266	6.62%	2	268
TBO	7	260	6.47%		260
Archidecor	8	243	6.04%	4	247
FINAH	9	203	5.05%		203
Sam	10	137	3.41%		137
CTS	11	99	2.46%		99
SEDA	12	67	1.67%		67
BS	13	45	1.12%		45
		4,021	**100%**	**14**	**4035**

Fig. 15 - Summary Construction Progress Report

During the course of this program over 630 masons were trained in earthquake resistant repairs and construction per the MTPTC Guideline. This training provides the communities with a talent pool that can continue to repair and build improved structures in the future. The program offered people the opportunity for work that greatly benefited and advanced their careers in the construction industry. In many cases, some of the foremen and masons were asked to be a permanent part of the contracting firms and offered positions in the ongoing Port-Au-Prince operations. The effects of the program will continue to benefit those in and around its boundaries for years to come. Figure 17 shows the time frame and zones of intervention of the project.

The construction trade was not the only local industry spurred by the immense scale of the program. Thirteen (13) contracting firms, ranging from 150 to over 300 employees brought a large demand for food, which also benefited the local neighborhood economy. This successful completion of the project not only delivered the desired results, but also carried with it a sense of empowerment and pride for

those who took part in it. The map in Figure 16 shows the repaired houses in Carrefour Feuille, identified in blue dots.

A field manual was developed by Miyamoto in order to standardize the yellow house repair program. This manual took into consideration the different conditions encountered during the previous repair programs. Miyamoto created a document that reflected the latest engineering practices to address certain specific issues encountered in the field during the repair process.

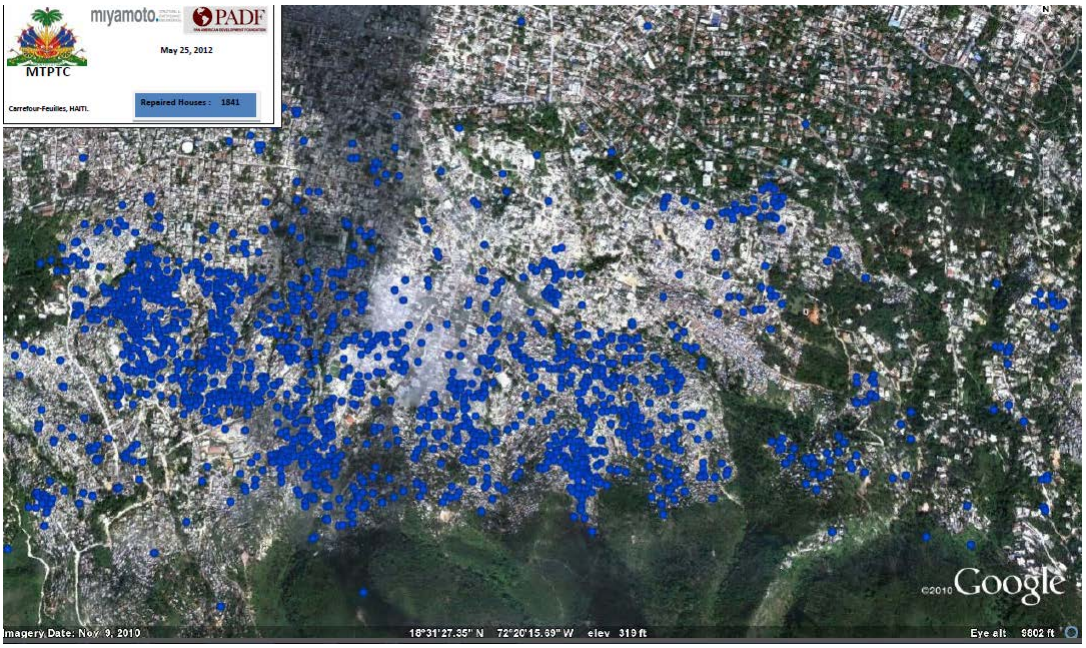


Fig. 16 – Map of Repaired Houses - Carrefour

Funding Agency	Time Frame	Area	Houses Repaired
American Red Cross	November 2011 to January 2012	Delmas 9	102
American Red Cross	November 2011 to October 2012	Carrefour Feuille	2,047
American Red Cross	June 2012 to October 2012	Delmas 33, 31, 19	1,886
			4,035 Total

Fig. 17 – Repair Program Timeframe, Zones and Houses Repaired

5.0 Program Challenges

Over the course of the repair project there were some challenges that proved to negatively impact progress. These challenges included:

- Community Labor Disputes
- Material Supply Issues
- Security
- Terrain

5.1 Community Labor Disputes

Community labor disputes occurred at times when payments to the mason teams were not made in a timely manner. This was by far the biggest reason for delay amongst a few of the contractors in the program. Whether it was due to a lack of funds or mismanagement, the labor force would typically stop working altogether. The result was construction delays for days, and in some cases weeks. Despite mentoring and business coaching efforts by PADF and Miyamoto, prompt payment to construction crews remained a problem throughout the program for some contracting firms. Significant improvement was seen in their management skills and operations as the program progressed.

Some home owners had a work contract in hand for weeks, but no work had been done in their damaged home. These home owners created a hostile environment when a construction crew was working close to their home. During the week of April 23, a Miyamoto engineer and a QA were dispatched to identify these cases in order to assess if these houses were indeed repairable. Some home owners had contract in hand before the revised exclusion criteria was in effect. As a result, several of these houses were in exclusion without their knowledge. This situation was encountered before the CMs were informed of the ID numbers of the houses given in requisition to the contractors. Several times contractors did not repair a house that had major damages, as they were getting paid a lump sum for each house repaired. In Carrefour Feuille this led to several houses being abandoned by the contractor; however, material had already been delivered to the house. This problem was remedied once the homeowner contract was signed prior to releasing the fiche technique to the contractor, preventing them from depositing material on sites without the intent of completing the house. This situation is one of the reasons the cost system was changed by PADF.

In several instances, there were homeowners that decided to work on their house while the program teams were in the process of repairing that home. Whether they were attempting to repair their concrete slab and causing serious safety issues, or removing sheet metal that could have been recycled from the house and selling it for profit, the homeowner should not have been working concurrently with the contractors of the program. This should have been clearly communicated to the home owners during community outreach phase of the program.

5.2 Material Supply Issues

Due to the lack of an access road in Carrefour Feuille, this area presented a unique challenge for the stock and supply of materials. Contractors would bring material to a central location (warehouse/dépôt) and then dispatched it to houses being repaired. Local residents, or the owner of the house, were hired to bring the material up to the site. Often times material had to be carried on their heads, as even a motorcycle will not be able to go up the stairs of the many corridors.

The coordination of material delivery was a constant cause of delay and hardship to the contractors. Construction crews were paid per day and also per contract/house, which resulted in a loss for the contractor if they did not have the material available to continue work for an entire day. Many contractors lost time and money waiting for materials to be available in order to continue working. At times, material was available at the contractor's warehouse, but due to insecurity reasons it was not delivered to the houses being repaired. Great effort was spent on working with contractors to communicate with one another to trade and borrow materials on a daily (sometimes weekly) basis in order to continue progress.

Material supply issues were by far the biggest hindrance to the project and caused the greatest delays. Material Suppliers several times ran out of a specific material in stock. Cement was once not available, as there was a security problem at the Haitian-Dominican border. In September, the only thin roof (Tôle) supplier did not have any inventory for two weeks. However, it cannot be overlooked that these delays were accepted in place of accepting lower quality materials common to other projects in the area. The quality of material used in the program was the best available in Haiti and met the requirements set forth by the MTPTC.

Material used onsite too often exceeded the total material given to the contractors in material requisition. On March 5th, three (3) months after Miyamoto began to preparing the material take-off, an audit was initiated to reduce the amount of additional material requested by the contractors. Miyamoto audited one contractor at a time to verify the amount of material given in requisition verses the amount of material used, as reported by the contractor in their weekly payment sheet. This audit helped the contractors understand why they should monitor the material in their warehouses, and to verify the amount of material they receive in the vouchers given by PADF. Some contractors realized they still had a material balance at PADF, or were clear that based on the numbers they should have enough material in stock. Roofing materials, sand and gravel were among the most popular additional material requested. The request for additional material was greatly reduced when all the contractors understood that a system was put in place to verify whether or not they have material in stock. It is clear in their contract that they are responsible of loss of material due to theft or mismanagement.

5.3 Material Distribution Issues

Tôle Wars" were a daily battle throughout the entire length of the project. Homeowners were rarely satisfied with partially replacing tôle on their roofs. Homeowners often caused problems and heated discussions between all parties involved and the surrounding members of the community. Many times in CFF there were angry mobs stopping work because of tôle. The engineers were often afraid to inform them of the project guidelines and the amount of sheet metal that had been allocated to them during the assessment phase because of these potential confrontations. This issue was most frequent in CFF because contractors would replace entire roofs of tôles without approval. Once this was done a few times in an area, it was hard to justify partially repairing one person's house while their next door neighbor had a brand new roof. This problem arose early in the program, when contractors were doing the material take-off and had some liberty to allocate material per house. Miyamoto solved this issue in January 2012 by doing the material take-off and printing the material estimation sheets which showed how much material should be allocated per house. The contractors were also advised on March 19 to deliver to the houses the roofing materials only when the house is ready to work on the roof.

Generally, homeowners seemed content with the work when completed. In some cases, contractors hired homeowners to move material, especially in CFF. A better explanation of the project and what they could expect to receive during the community outreach could have helped alleviate this issue significantly. Often, the homeowner expected a full replacement of their existing roof. This also goes back to either the homeowner not fully understanding the contract they signed or the program was not clearly presented to them.

5.4 Security

Security was a major problem in Carrefour Feuille, from stealing of material to aggression against quality control engineers, and gang terrorizing the neighborhood. The project schedule was greatly affected by these issues. Despite efforts to control materials, such a large project attracts a lot of attention and some materials were lost to theft.

On April 14 two engineers were attacked in Morne l'Hopital. Both men required stiches when they got stoned by a resident of the area during a dispute over stolen materials. Two contractors were not able to work in Fort Mercredi most of the last week of April.

A group of local residents, facilitators, and COPRODEC members were introduced into the program the week of April 16 by PADF. These facilitators were to help the QA, CM and Miyamoto engineers work better in Carrefour Feuille as security was becoming a very serious problem for the survival of the project. Descayette and Fort Mercredi were among the most dangerous zones. In September repair work stopped completely in Fort Mercredi as it became impossible for the contractor to enter the area.

Problems were identified in Fort Mercredi; engineers were being threatened. The decision was made on April 23 to not have any engineers work in that zone until community public relations had addressed the issue and it was safe to return to work. PADF was notified. This situation lasted for several weeks. When the contractor stared working again the week of May 14th it was only for four days. By Saturday of that

week, the residents became agitated thus stopping all construction activities again. It was only after the restructuring of the zones in Carrefour Feuille that work resumed in Fort Mercredi, during the second week of July. QA engineers and the resident of several contracting firms were verbally assaulted by a local gang.

On August 1st, a QA and a resident of a contractor were confronted by a couple residents/gang at gun point in Descayette. This prompted work to stop in that area for a day.

On Friday August 3rd, assessment stopped in the area of ti Jérémie, Delmas 19 mid-day when a police officer was shot and another wounded. The assessment resumed on the following Saturday.

In St. Patrick area a local gang, Immigration, intimidated the engineers and contractors several time. They managed to work through a lot of negotiation, mobilization and pay off.

The security problem was worse in Carrefour Feuille, but the residents wanted so much to benefit from the program that they helped and assisted the engineers and contractors as much as they could so they could do their jobs.

5.5 Terrain

One of the great advantages to the program was the ability to work on houses in small clusters and neighborhoods, which facilitated the distribution of human and material resources. The grouping of houses was one of the key responsibilities of the CMs and proved vital to the speed at which the houses were repaired. CFF presented a new challenge to the program. The houses were difficult to access because they were built far from the principle roads, situated very close to each other and in a very steep hilly area.

These were all contributing factors to the duration and extended schedule of the program. In order to overcome and limit the effects of these challenges, there was a great emphasis placed on planning and working methodically in order to ensure the steady progression from one zone to another without unwarranted travel between homes.

The accumulation of these challenges contributed to the project running longer than initially planned. The average number of days spent in construction per house was more than projected. This was due in part by the scope of work changing several times. The average number of days spent in construction was just over five (5) days in Carrefour Feuille, while in Delmas 33 there was a seven (7) day turnaround time. These delays were mainly from the challenges of access to houses from the road, amount of damage, and mobility issues. However, these challenges can be planned for and dealt with accordingly. In addition, delays caused from days not worked due to lack of materials, labor disputes, and other issues, served as great experience and provided room for improvement in the execution of future programs. The Yellow House Repair Program is constantly evolving and progressing to meet the needs of such a dynamic program.

6.0 Lessons Learned

Planning is everything: The most important lesson learned throughout the Carrefour Feuilles, Delmas 33 repair project was that planning is everything. The dramatic change in flow truly happened during our transition from Carrefour Feuille to Delmas 33. Zones were better organized, all information was tracked, the assessment process was more clearly defined, and material mobilization went much smoother.

Don't change program mid-zone: Many issues in the communities arose when the decision was made to eliminate plastering the principle facades of homes and both sides of newly constructed walls. Homeowners voiced their many negative opinions on the subject and it created a lot of confusion within the Carrefour Feuille zones. Many houses next to one another were from different parts of the program and the results were visible to all. In future programs the repairs to be made should be set in the beginning and not change midway through.

Keep zones with same engineers for assessments and repairs: During the assessment process, the MTPTC engineers became well acquainted with their various zones. It would have been more beneficial to keep the MTPTC engineers in those zones. Using engineers who knew the homeowners, locations of houses, and neighborhoods from the assessment process would have made things run more smoothly and in a timelier manner. A major challenge for the MTPTC engineers was finding houses to be repaired in neighborhoods they had never worked in previously. They often called for help from those who had done the assessments in those zones. Locating houses was a very difficult task, especially in Carrefour Feuille, which caused the team to dedicate a lot of valuable time to simply finding the houses to be repaired.

Homeowner contracts: Changing the time at which the team signed and collected the homeowner contract dramatically changed the project. These changes allowed the team to keep track of exactly how many houses had been started and how many were in construction. Rather than relying on the contractor to inform Miyamoto of how many houses they were working on, we had concrete data to determine and keep track of this number. Also, after having many problems in Carrefour Feuille, houses no longer fell through the cracks and all houses opened were eventually repaired as a resulted of this revised accounting procedure.

Houses assessed but not repaired: A community issue we ran into often during the course of the project was the assessment of houses but not following through on the repair. This gave many homeowners a false sense of hope and problems between the MTPTC/MI engineers and people living in the neighborhoods. This issue was addressed with the changes mentioned above on the "Home Owner Contract". Miyamoto engineer and the CM signed a contract with the homeowner only when the house was deem repairable.

Informing homeowner of exclusion criteria and house rejection: Many engineers were fearful of backlash if a homeowner was told their house would be categorized as excluded from the program due to the criteria. Community outreach to inform which houses would not be repaired due to

environmental and building conditions would have alleviated this issue from the beginning rather than depending on the engineer to handle this problem during the assessment and repair process.

Community Outreach: Information sessions held in each new zone in which the teams were working would have been extremely helpful. Spreading the scope of the project, explaining what the homeowner should expect, and what is expected from the homeowner throughout the community could have saved the MTPTC/MI engineers a lot of time and cut down on the problems faced in the field during assessments and constructions.

Information Sessions: Due to the problems with material mobilization and slow repair completion, a training of the contractors on how to properly manage the construction process more efficiently would have been useful. The majority of the delays were due to materials not arriving on site, theft due to poor security at depots, and late/unorganized transport to repairable houses.

7.0 Summary and Conclusions

The 2010 Haiti earthquake demonstrated to the world once again the danger and vulnerability of unreinforced masonry and non-ductile concrete construction to earthquakes. Following the emergency response and relief efforts of organizations worldwide, PADF in partnership with Miyamoto continue to lead the repair efforts providing a dynamic and responsive program that relies on the talents and hard work of local masons and contractors while expanding their technical knowledge and building their capacity for administration. To date over 9,900 houses have been repaired through the Yellow House Repair Program.

Through the trainings and technical oversight of the Yellow House Repair Program, the knowledge of improved construction techniques and proper repair of homes was transmitted to local contractors and masons, building their technical capacity that will resonate throughout their careers (Fig. 18).

The local economy was stimulated from the jobs provided by the program and as a result, surrounding businesses and merchants also benefited. Small contracting firms have found steady contracts within the Port-Au-Prince projects and continue to grow and develop in their capacity to operate as viable companies. This project with all the information gathered and lessons learned, provides a model for other repair programs in and outside of Port-Au-Prince, thus extending the reach of the program and the benefits it provides.

Fig. 18 – Typical Repairs

8.0 References

Miyamoto, H.K., Gilani, A.S., 2011. "Haiti Emergency Shelter Rehabilitation". Miyamoto International, West Sacramento, CA, United States.

APPENDIX-A

Fig. A1 - Completed Houses Delmas 9

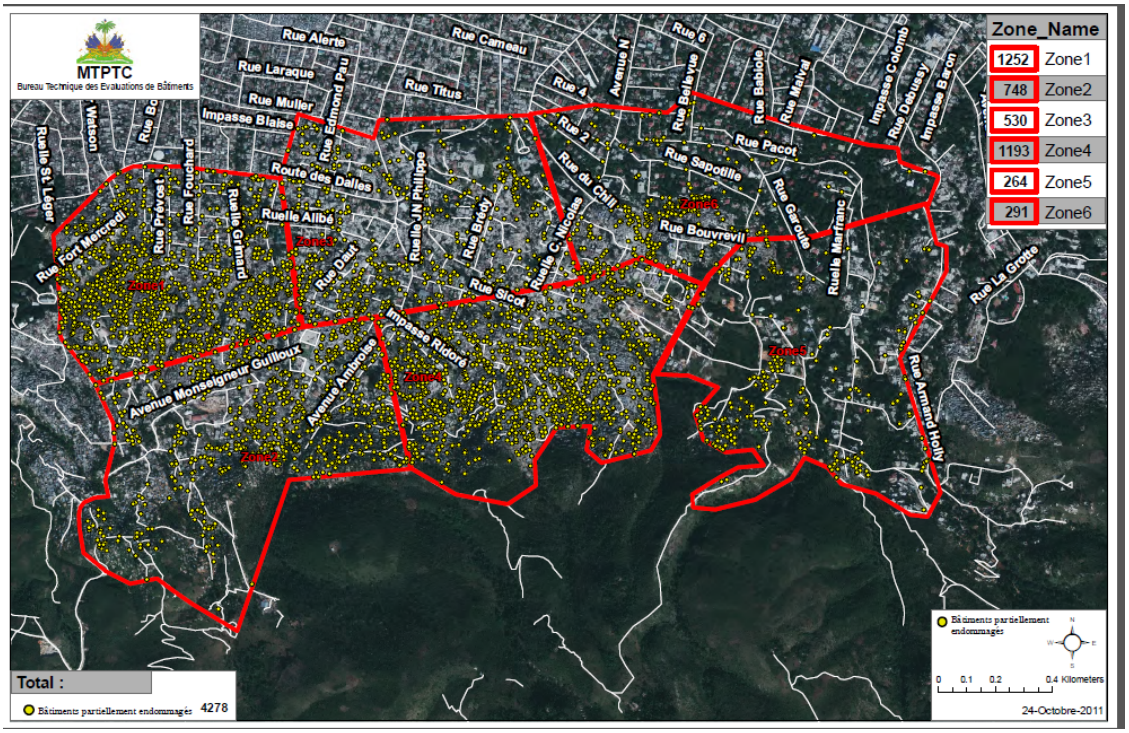


Fig. A2- Yellow tags Map - Carrefour Feuille

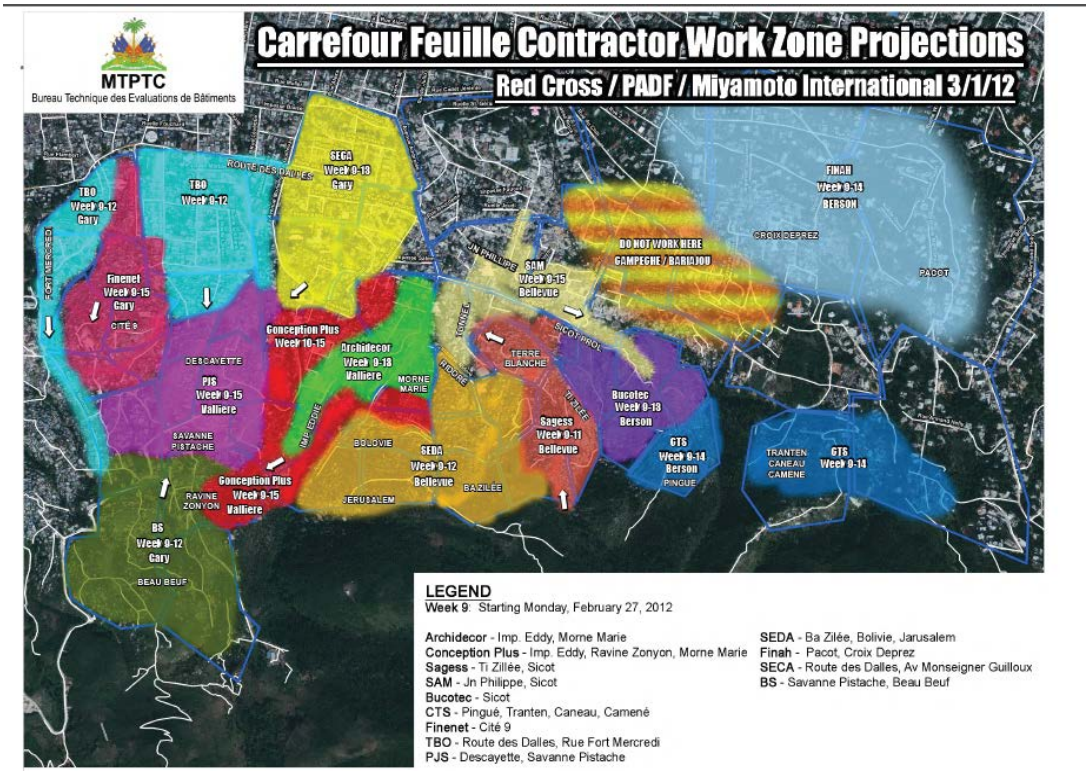


Fig. A3 - Carrefour Feuille divided by Zones - Original Map

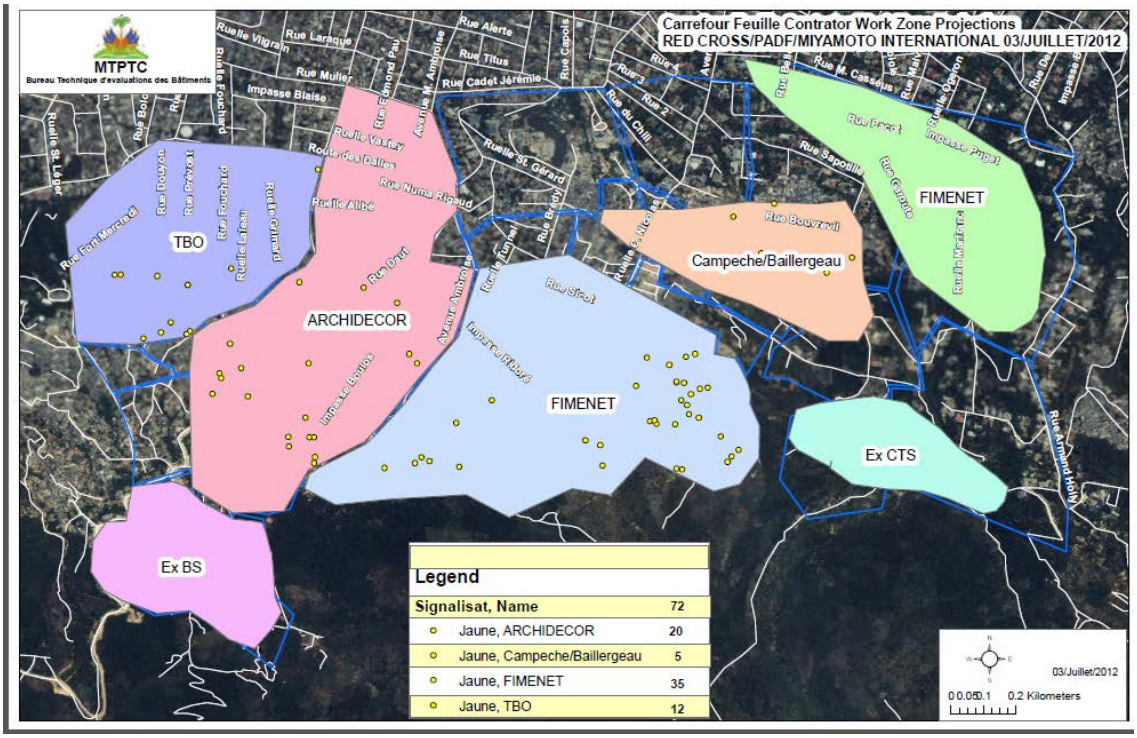


Fig. A4 - Carrefour Feuille Divided by Zones – Revised Map

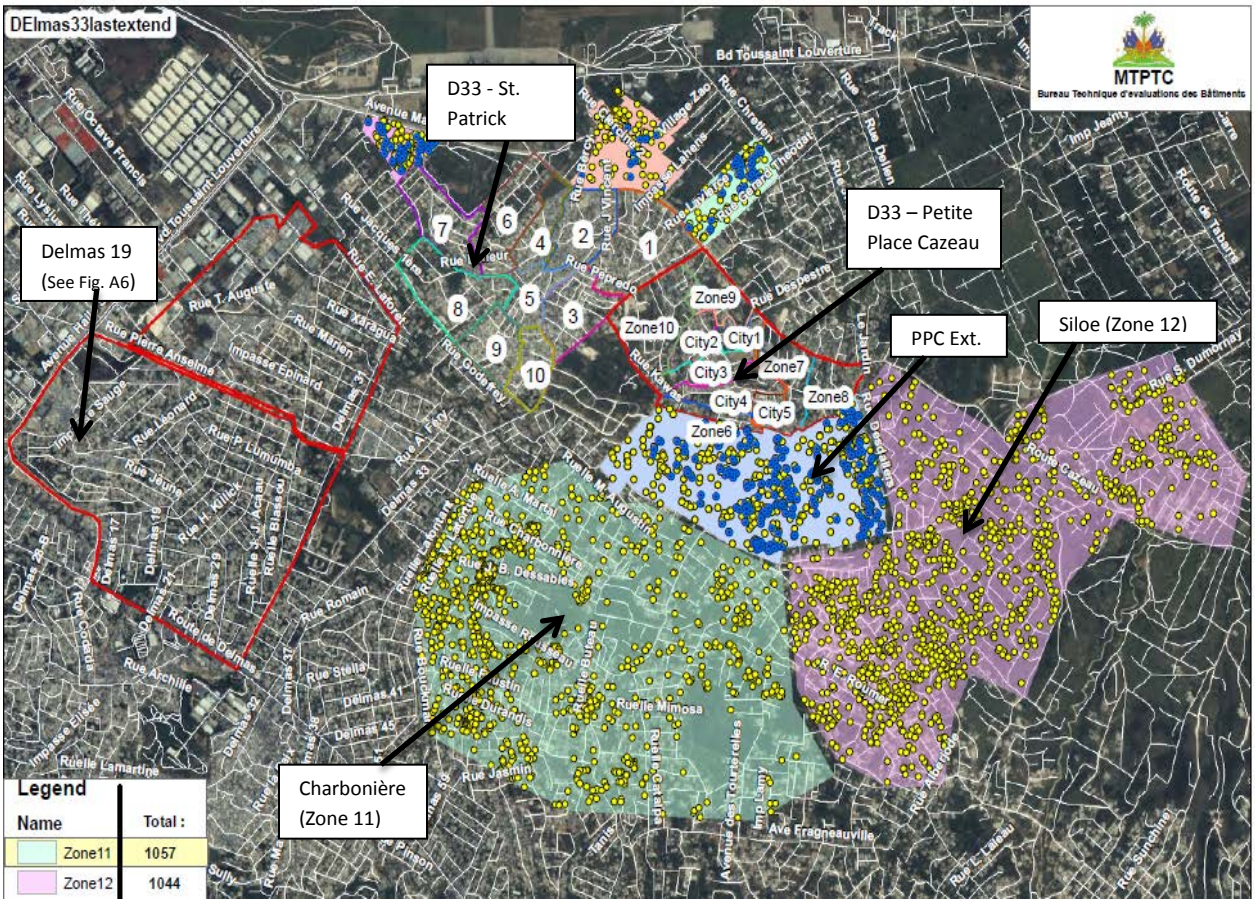


Fig. A5 – Global Map (Delmas 19, Delmas 33: Petite Place Cazeau, St. Patrick, Siloe and Charbonière)

Fig. A6 – Map Identifying Yellow Houses – Demas 19

APPENDIX-B

Week of: Monday, October 22, 2012

Contractor	Zones of Repairs	Quantity of Houses					
		C.A Issued This Week	CA taken back or refused	Under Construction	Certified This Week	Total Certified	In Const. + Certified
Bucotec	St. Patrick **(Delmas 33)**	0	0	0	0	266	266
Sagess	**Delmas 33 - St. Patrick**	0	3	0	21	748	748
Sagess	Carrefour Feuille - Zone A	0	0	0	12	30	30
CP	St. Patrick **(Delmas 33)**	0	1	0	4	692	692
Archidecor	Imp Edy, Morne Marie	0	3	0	0	243	243
SAM	Sicot, Jn Phillipe	0	0	0	0	137	137
Finenet	St Patrick **(Delmas 33)**	0	2	1	11	405	406
TBO	Route des Dalles, Rue Fort Mercredi	0	10	0	10	260	260
CTS	Pingué, Tranten, Caneau, Camené,	0	0	0	0	99	99
SECA	St. Patrick **(Delmas 33)**	0	0	0	1	318	318
PJS	Petite Place Cazeau **(Delmas 33)**	0	13	0	43	508	508
SEDA	Bas Zilée, Bolivie, Jerusalem	0	0	0	0	67	67
BS	Savanne Pistache, Beau Boeuf	0	0	0	0	45	45
FINAH	Petite Place Cazeau **(Delmas 33)**	0	0	0	0	203	203
	Totals:	**0**	**32**	**1**	**102**	**4,021**	**4,022**

NOTES: SECA repaired three (3) of PJS 43 certified houses

TBO Certified 5 houses in CFF and 5 houses in Delmas 33

FINENET: The house left under construction was completed after October 31, 2012 (on 11-5-2012)

Fig. B1 - Last Weekly Report – October 22, 20012

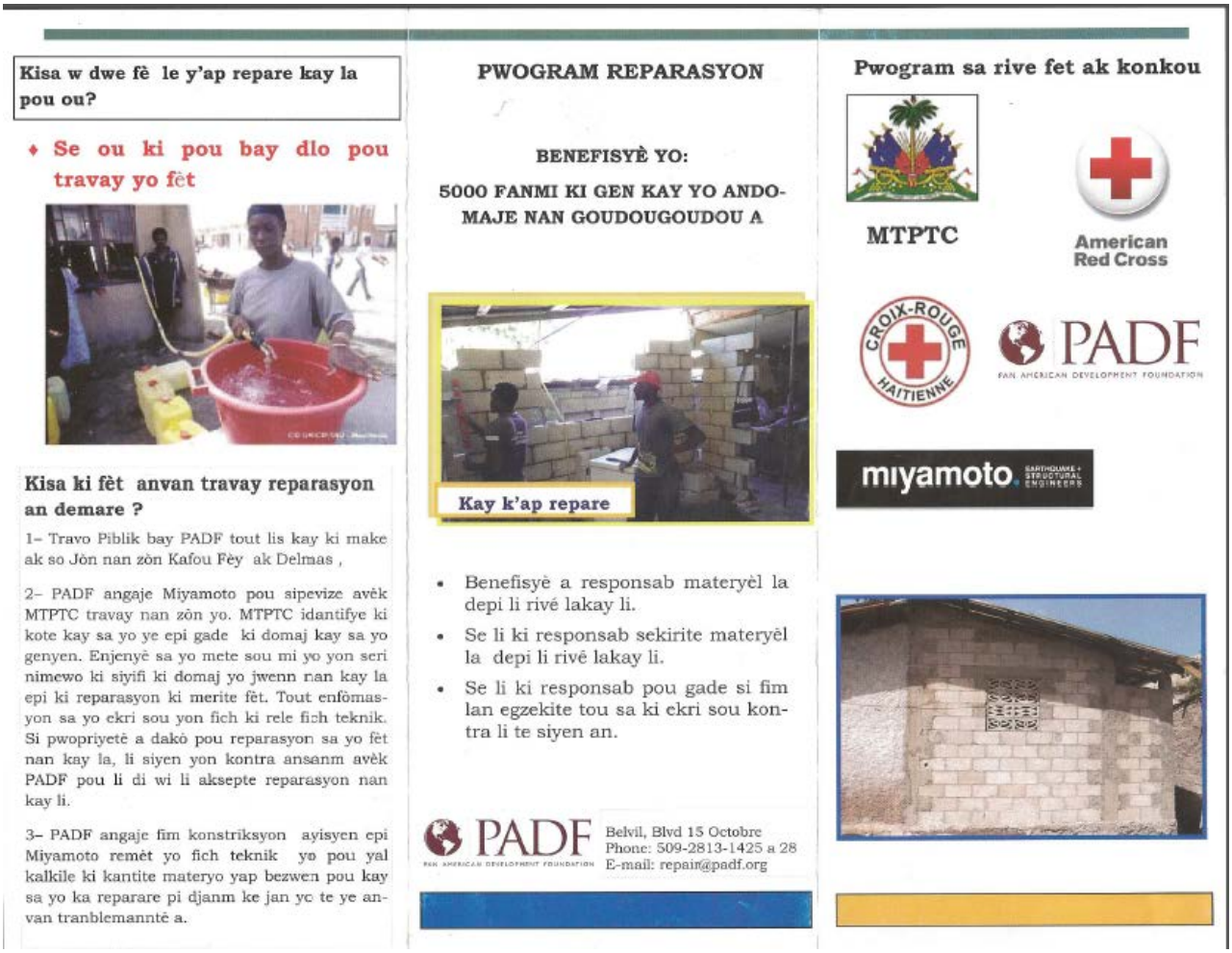


Fig. B2a - Front - Flyer of Community Mobilization

Fig. B2b - Back - Flyer of Community Mobilization