Reconstruction Award of a Single-Family Housing Unit Affected By Hurricanes Irma and María

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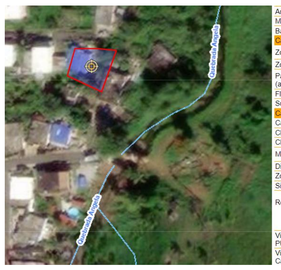
ABSTRACT

Hurricanes Irma and María caused significant damage in 2017 to single-family housing units located at the east coast of the island of Puerto Rico. Eligible homeowners of storm damaged units could apply for the Community Development Block Grant, Repair, Reconstruction and Relocation program (CDBG-R3). An initial assessment to identify storm damage was performed to a single-family housing unit located at the municipality of Río Grande. Storm damages and environmental factors were identified, documented, and analyzed using Xactimate software. Lead Based Paint (LBP) and Asbestos Containing Material (ACM) surveys were performed, finding lead-based paint at ceramic tiles in Bathroom and asbestos in vinyl flooring tiles at the Porch, Bedroom 1 and Bedroom 2 areas. A detailed cost estimate was developed, surpassing the minimum program cap of $60,000, and an initial project intent of reconstruction was proposed, as the property was storm damaged to an extent not feasible to repair. Site walk inspection was performed, an initial scope was submitted by the Construction Manager, and the applicant accepted the reconstruction award for a single story, 2-bedroom model home type. Construction progress inspections were performed, with an Applicant Final Lien Amount of $150,054.34 at closeout.

Figure 1. View of front elevation of the assessed property

INTRODUCTION

Hurricanes Irma and María caused significant damage in 2017 to single family housing units located at the east coast of the island of Puerto Rico. Eligible homeowners of storm damaged units could apply for the Community Development Block Grant, Repair, Reconstruction and Relocation program (CDBG-R3). An initial assessment to identify storm damage was performed to an eligible single-family housing unit located at the municipality of Río Grande and shown in Figure 1. The unit was built of wood walls with metal roofing system in wood framing elements, and was distributed in living room, dining room, kitchen, two bedrooms, bathroom, porch, and carport. The site was located at an area of minimum flood hazard, zone X, as per FIRM map, and located off the ABFE map. A natural stream named "Quebrada Angela" was identified at an approximate distance of 60 meters from site, as shown in Figure 2. According to the Puerto Rico Risks and Hazards dashboard, the site could potentially encounter risks of flood (100 years), hurricane winds, earthquake, liquefaction, and landslide, as shown in Figure 3. minimum program cap of $60,000. As the site was not located at floodway or floodplain and no significant extraordinary site conditions were identified, a reconstruction award for a single story, 2-bedroom model home type was proposed and accepted by the applicant. Construction progress inspections were performed, until case closure was completed.



Area Aprox. (m.c.)	323.6964
Municipio	Río Grande
Barrio	Cienaga Baja
Características Ambientales	
Zona Inund. Advisory	X
Zona Inundabilidad (firm)	X
Panel Inundabilidad (advisory)	72000C0780H
Floodway	No ubica en floodway
Suelo (NRCS)	**MaC2** (Mabi clay)
Calificación y Clasificación de Suelo	
Calificación	**R-I** (Residencial Intermedio)
Clasificación PT	**SU** (Suelo Urbano)
Clasificación PUT	**SU** (Suelo Urbano)
Mapas de Calificación	Río Grande | Mapa PUT
Distrito Sobrepuesto	
Zona Histórica	
Sitio Histórico	
Reglamento Aplicable	• Plan de Uso de Terrenos • Reglamento Conjunto de Permisos para Obras de Construcción y Usos de Terrenos (2020)
Vigencia de Clasificación PUT	30-nov-2015
Vigencia de GeoDato de Calificación	01-MAR-2012

Figure 2. Property site, as per Puerto Rico Planning Board site

LITERATURE REVIEW

Homes that suffered damage from Hurricanes Irma and María in 2017 have been informally reconstructed due to lack of recovery support and denial of assistance due to ownership status. Vulnerability can limit a home's opportunity to engage with a formal construction alternative for recovery [1]. The original assessed property was informally constructed in wood walls and metal roofing system in wood framing elements. As the applicant was found to be eligible for the program and the ownership status of the property was traditional, a reconstruction award for the property was offered and accepted by the applicant. Presence of Lead-based paint in homes built before 1978 was considered possible due to the construction codes, methods, and practices of the time [2]. The Renovation, Repair and Painting rule (RRP) was implemented by the United States Environmental Protection Agency to address this issue. The assessed property was found to be built around the year 1977. Hence, a Lead-based paint survey was performed by a certified environmental inspector, and wall and floor ceramic substrates resulted positive in Lead-based paint contains, as shown in Table 1. The Clean Air Act, 42 U.S.C. S. 7412 for hazardous air pollutants was implemented to prevent health and safety hazards and concerns. A contractor in Atlanta was notified of the presence of Asbestos – Containing Material (ACM), specifically in a siding element, in a property he was hired to renovate [3]. The contractor did not obtain the necessary permits to remove asbestos and did not provide protection equipment to his employees before starting to renovate, violating the Clean Air Act, 42 U.S.C. S. 7412 for hazardous air pollutants. It is the responsibility of the contractors and inspectors to ensure the necessary tests or surveys are carried out, before beginning construction or repair. An environmental inspector performed an Asbestos - Containing Material survey at the assessed property, and vinyl tile samples were found to have 2% and 3% asbestos, as it can be seen in Table 2.

Table 1. Summary of components identified with Lead - Based Paint in the property

ID NO	RESULTS	COMPONENT	SUBSTRATE	SIDE	COND	COLOR	SITE	INSP.	FLOOR	ROOM	RESULTS (MG/CM2)	QUANTITY (FT2)
990	POSITIVE	WALL	CERAMIC	ABCD	FAIR	TAN	10114	AYALA	FIRST	BATHROOM	1.8	80
991	POSITIVE	FLOOR	CERAMIC	LOWER	FAIR	BROWN	10114	AYALA	FIRST	BATHROOM	3.9	40

Table 2. Asbestos Analysis of Bulk Materials

Sample	Description	Appearance	Non-Asbestos % Fibrous	Non-Asbestos % Non-Fibrous	Asbestos % Type
01-VFT 042205220-0001	Porch - 12x12 Beige VFT	Beige Non-Fibrous Homogeneous	HA: 01	98% Non-fibrous (Other)	2% Chrysotile
01-Mastic 042205220-0001A	Porch - Mastic	Yellow Non-Fibrous Homogeneous	HA: 01	100% Non-fibrous (Other)	None Detected
02-VFT 042205220-0002	Bedroom 1 - 12x12 Beige VFT	Beige Non-Fibrous Homogeneous	HA: 01	98% Non-fibrous (Other)	2% Chrysotile
02-Mastic 042205220-0002A	Bedroom 1 - Mastic	Beige Non-Fibrous Homogeneous	HA: 01	100% Non-fibrous (Other)	None Detected
03-VFT 042205220-0003	Bedroom 2 - 12x12 Beige VFT	Beige Non-Fibrous Homogeneous	HA: 01	97% Non-fibrous (Other)	3% Chrysotile
03-Mastic 042205220-0003A	Bedroom 2 - Mastic	Yellow Non-Fibrous Homogeneous	HA: 01	100% Non-fibrous (Other)	None Detected

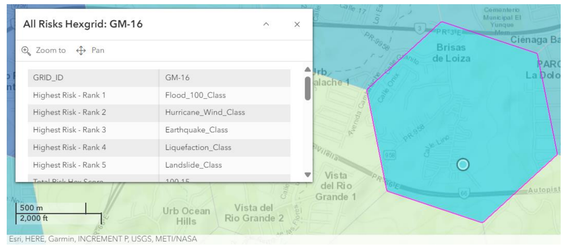


Figure 3. Potential risks at site, as per the Puerto Rico Risks and Hazards Dashboard

METHODOLOGY

Storm damage identified at the property was documented and a detailed cost estimate was developed in Xactimate format, with an Applicant Final Lien amount of $150,054.34 at closeout. A sketch of the property was developed in Xactimate, as seen in Figure 4. Storm damage identified at the property was documented and a detailed cost estimate was developed in Xactimate format, with an Applicant Final Lien amount of $150,054.34 at closeout. A sketch of the property was developed in Xactimate, as seen in Figure 4. For the Lead-Based Paint survey methodology, it was unobtrusive in that surfaces were not damaged by the testing. All painted or coated surfaces at the property were tested with an X-Ray Fluorescence (XRF) analyzer. The survey did not include destructive, intrusive and/or exploratory testing. Hazard of lead in paint has been defined by HUD as any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm^2 as measured by XRF or laboratory analysis, or 0.5 percent by weight (5000 mg/g, 5000 ppm, or 5000 mg/kg) as measured by laboratory analysis [Atomic Absorption Spectroscopy (AAS) or Inductive Coupled Plasma (ICP)]. Results can be interpreted as negative if the lead concentration measured by the XRF Spectrum Analyzer is less than 1.0 mg/cm^2. On the contrary, if the lead concentration measured by the XRF Spectrum Analyzer is equal or greater than 1.0 mg/cm2, results are considered positive. For the Asbestos-Containing Material (ACM) survey, ACM is a material with greater than one percent (>1%) asbestos by Polarized Light Microscopy (PLM). Materials with detectable but less than one percent (<1%) are considered "trace ACM". Assumed ACM are those materials that are suspected to contain asbestos, but have not been sampled to verify, and are therefore assumed to contain asbestos unless testing proves the contrary. Materials containing asbestos are evaluated on their inherent ability to easily release asbestos fibers, which is called "friability". A material that is considered friable is a material that, when dry, can be crumbled, pulverized, or otherwise reduced to powder by hand pressure after an inspector has collected a bulk sample of the material and holds it in the palm of their hand. A material that is non-friable is a material that cannot be crumbled, pulverized, or reduced to powder by hand pressure.

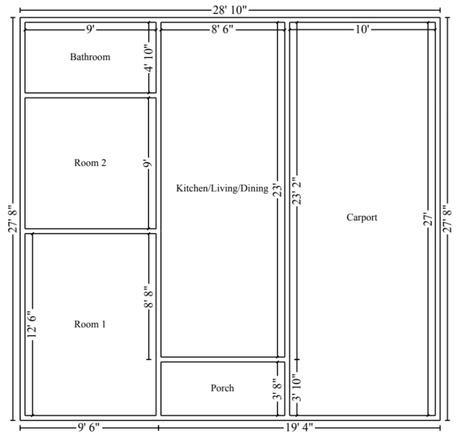


Figure 4. Sketch of assessed property, including actual measurements and descriptions of rooms

RESULTS

Storm damage at the property surpassed the minimum program cap for repairs of $60,000. As the property was located at a zone of minimum flood hazard, zone X, as per FIRM and ABFE maps, and no extraordinary site conditions were identified, a reconstruction award was proposed and accepted by the applicant, for a one-story 2-bedroom model home. A Lead-Based Paint survey was performed by a certified environmental inspector, and wall and floor ceramic substrates resulted positive in Lead-based paint contains, as shown in Table 1, with results of 1.8 and 3.8 mg/cm^2. An Asbestos - Containing Material survey at the assessed property was also performed, and vinyl tile samples were found to have 2% and 3% asbestos, as shown in Table 2. Site walk and construction progress inspections were performed, including foundation, walls, structure, substantial and final milestone inspections, with total construction time of 261 days. A total task order cost of $392,940.44, distributed in demolition costs of $20,458.52, environmental tests and abatement costs of $9,482.46, soft costs for storm damage location of $38,832.95, hard costs of $159,452.72, and cap exception costs of $184,612.19, was submitted by the construction manager and approved by the grant manager, resulting in an Applicant Final Lien amount of $150,054.34 at closeout.

CONCLUSION

Storm damages at the property surpassed the minimum program cap for repairs of $60,000, as the property was built in wood walls and metal roofing system in wood framing elements. As the property was damaged to such an extent that it was not feasible to repair, it was declared a total loss. Moreover, as the site was located at a zone of minimum flood hazard, zone X, as per FIRM and ABFE maps, and no extraordinary site conditions were identified, a reconstruction award was proposed and accepted by the applicant. As presented in Figures 5 and 6, a one-story two-bedroom model home was built in 261 days, with a total task order cost of $392,940.44 and an Applicant's Final Lien Amount of $150,054.34 at closeout.

Figure 5. One-story 2-bedroom model home unit constructed at the original assessed site

Figure 6. View of main entrance towards property site

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