

# Roberta Grove – Senator Circle

## Repetitive Loss Area Analysis

### Houma, LA

June 25<sup>th</sup>, 2013



The University of New Orleans

Center for Hazards Assessment, Response and Technology

(UNO-CHART)

[www.floodhelp.uno.edu](http://www.floodhelp.uno.edu)



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## Terminology

**Area Analysis:** An approach to identify repeatedly flooded areas, evaluate mitigation approaches, and determine the most appropriate alternatives to reduce future repeated flood losses.

**1% chance flood:** The flood having a 1% chance of being equaled or exceeded in any given year, is known as the “100-year” or “1% chance” flood

**100-year flood:** The flood that has one percent (1%) chance of being equaled or exceeded each year.

**Base Flood:** The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program are protected to the same degree (“1% chance” or “100-year”) against flooding.

**BFE:** Base Flood Elevation: The elevation of the crest of the base flood or 100-year flood.

**FEMA:** Federal Emergency Management Agency

**FIRM:** Flood Insurance Rate Map

**Floodway:** The channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent annual chance flood can be carried without substantial increases in flood heights.

**Freeboard:** A factor of safety usually expressed in feet above the Base Flood Elevation (BFE) for purposes of floodplain management.

**GIS:** Geographic Information Systems; integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information in the form of maps, globes, reports, and charts.

**Hazard Mitigation:** Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.

**ICC:** Increased Cost of Compliance, a \$30,000 rider on flood insurance policies for policy holders located in the special flood hazard area that can be used to bring the structure into compliance in the event that it is substantially damaged by a flood.

**NFIP:** National Flood Insurance Program

**Repetitive Loss property (RL):** An NFIP-insured property where two or more claim payments of more than \$1,000 have been paid within a 10-year period since 1978.

**Severe Repetitive Loss Property (SRL):** A 1-4 family residence that is a repetitive loss property that has had four or more claims of more than \$5,000 or two claims that cumulatively exceed the reported building’s value.

**Substantial Improvement:** The repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure either, (1) before the improvement or repair is started, or (2) if the structure has been damaged and is being restored, before the damage occurred.

**UNO-CHART:** The University of New Orleans - Center for Hazards Assessment, Response and Technology.

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For more information on this report please contact:

**Monica T Farris, PhD**

Director, UNO-CHART

Phone: 504-280-5760

Fax: 504-280-4023

[chart@uno.edu](mailto:chart@uno.edu)

## Roberta Grove – Senator Circle Repetitive Loss Area Analysis Executive Summary

### Background

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA) and is continually faced with the task of paying claims while trying to keep the price of flood insurance at an affordable level. It has a particular problem with repetitive and severe repetitive flood loss properties, which are estimated to have cost \$13 billion nationwide and \$3 billion in Louisiana alone<sup>1</sup> since 1978. Repetitive flood loss properties represent only 1.3% of all flood insurance policies, yet historically they have accounted for nearly one-fourth of the claim payments. Mitigating these repeatedly flooded properties will reduce the overall costs to the NFIP, the communities in which they are located, and the individual homeowners. Ultimately, mitigating repeatedly flooded properties benefits everyone.

### Study Area

The study area is comprised of two separate neighborhoods; the Senator Circle and Roberta Grove neighborhoods, both located in the city of Houma. The Roberta Grove neighborhood is bounded to the north by Bayou Terrebonne and East Main Street, to the south by Bayou Chauvin, to the southwest by Senator Circle, and to the East by North Boundary Court. There are 103 buildings located in the Roberta Grove area. Of the 103 residential buildings, 62 (60.19 %) are on FEMA's repetitive loss list, and six (5.82%) of those are considered to be a severe repetitive loss property. The Senator Circle neighborhood in Houma is a public-housing complex. There are 197 units<sup>2</sup> in the circle, of which 50 (25.38 %) are on FEMA's repetitive loss list and none are considered to be severe repetitive loss properties.

### Problem Statement

The following bullets summarize the repetitive flooding problems in the areas:

- ❖ Structures in both neighborhoods of the study area fall within a high-risk AE Special Flood Hazard Area;
- ❖ Flooding is caused by heavy rains, storm surge, and backwater flooding, and further aggravated by two problems:
  - Bayou Chauvin's limited capacity to carry water out of the areas due to being undersized, clogged with debris, and shallowness in some areas; and
  - Bayou Terrebonne overflowing into the study areas.
- ❖ The East Houma Surge Levee should add a level of protection from surge waters being funneled up from Lake Boudreaux;
- ❖ There are 300 homes and apartments subject to flooding. 112 of the insured properties have been flooded to the extent that they qualify as repetitive loss structures under the NFIP; six of which are severe repetitive loss properties.
- ❖ These 112 repetitive loss properties have made 270 flood insurance claims for a total of **\$8,770,921.35** since 1978.
- ❖ There is an additional **\$6,417,450.00** in *all flood insurance claims* (Roberta Grove- Senator Circle study area), of which, some properties meet the repetitive flood loss criteria, but are not on FEMA's repetitive loss list. This is problematic because:
  - It further clouds the true extent of the flooding issues in the areas;

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<sup>1</sup> As of December 2012; FEMA, since 1978 when records began.

<sup>2</sup> Each building has at least one unit; most buildings are duplex units.

- Some of the repetitive loss properties in both areas may actually be severe repetitive loss (SRL) properties;
- Being designated as a SRL property triggers a certain mitigation funding mechanism only available to SRL properties.

#### **Recommendations for Terrebonne Parish**

- Adopt this Area Analysis according to the process detailed in the 2013 CRS Coordinator's Manual.
- Encourage the owner of repetitive flood loss structures to pursue mitigation measures.
- Continue to assist interested property owners in applying for mitigation grants.
- Improve the drainage out of Bayou Chauvin.
- Institute a ditch maintenance program that encourages homeowners to frequently clear their ditches of debris to ensure open flow for stormwater.
- Assist the Houma-Terrebonne Housing Authority in mitigating the Senator Circle properties.
- Continue to participate in Community Rating System (CRS) and increase the Parish's Class.
- Continue the CRS credited public information activities, such as outreach projects, website, and flood protection assistance, that help residents learn about and implement retrofitting measures.
- As the floodplain management ordinance is being revised, include provisions to provide higher flood protection levels and measures to trigger substantial improvements determinations after repetitive flooding.

#### **Recommendations for the Houma-Terrebonne Housing Authority**

- Make sure residents in Senator Circle are aware of the flood threat and what they can do to protect their belongings.
- Make sure residents in Senator Circle are aware of the availability of flood insurance for rental property.
- Review the ability of residents in Senator Circle to make structural changes to their apartments for flood protection purposes.
- Work with the Parish to identify structures eligible for mitigation.

#### **Recommendations for the residents of Roberta Grove and Senator Circle**

- Review the mitigation measures listed in this report and implement those that are appropriate.
- Stay up to date with what Terrebonne Parish is doing in regards to flood protection, available online at: [www.tpcg.org](http://www.tpcg.org).
- Purchase or maintain flood insurance policies on the home (if a homeowner) and/or on the contents (homeowner and renters).
- Read through the LSU Homeowner's Handbook to Prepare for Natural Hazards for more information on appropriate mitigation measures, available online at: [www.lsu.edu/sglegal/pubs/handbook.htm](http://www.lsu.edu/sglegal/pubs/handbook.htm).
- Keep informed about the changes being made to the NFIP by the implementation of the Biggert-Waters Flood Insurance Reform and Modernization Act of 2012, available online at: [www.fema.gov/BW12](http://www.fema.gov/BW12) or [www.floodsmart.gov](http://www.floodsmart.gov).

## Introduction

Flooding is a problem far too familiar to many people across the United States. Enduring the consequences of flooding over and over again can be quite frustrating. When the water rises, life is disrupted, belongings are ruined, and hard-earned money is spent.

This report has been created in collaboration with the Terrebonne Parish Consolidated Government and the residents in the Roberta Grove and Senator Circle neighborhoods that have repetitively flooded areas and who continually suffer the personal losses and stresses associated with living in a flood-prone house.

The goal is to help homeowners reduce their flood risk by providing a broader understanding of the flooding problems in their neighborhood, and the potential solutions to the continual suffering that results from repetitive flooding. The availability of possible funding sources for certain mitigation options is also discussed.

In this repetitive loss area analysis, flooding issues and potential mitigation measures are discussed for homes and apartments located in the Roberta Grove and Senator Circle neighborhoods. While the homes and apartments in this study are representative of other homes throughout the city of Houma, not all the mitigation measures reviewed in this report are appropriate for all homes in the study area.

There are many stresses associated with repetitive flooding including worry about how high the water may rise, the loss of personal belongings, the possibility of mold, and whether or not neighbors will return after the next event. Adding to this worry is the uncertainty related to the potential solutions:

- Should I elevate and, if so, how high?
- How much a mitigation project will cost?
- What will my neighborhood look like if I am the only one to mitigate, or the only one *not* to mitigate?
- Is there a solution that might work for the entire neighborhood?

These questions are common, and this report attempts to answer them according to the specific situation faced by residents in the Roberta Grove and Senator Circle neighborhoods. Informed residents can become even stronger advocates for policy change at the neighborhood, city, parish, state and even federal levels. Overall, it is hoped that by gaining a better understanding of the flooding issues, neighborhoods can become safer and homeowners will be better able to confront the hazard of flooding

### **Repetitive Loss Area**

**Analysis (RLAA):** An approach that identifies repetitive loss areas, evaluates mitigation approaches, and determines the most appropriate alternatives to reduce future losses.

**Mitigation:** Any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event (floods, fires, earthquakes, etc.).

### **Repetitive Loss property**

**(RL):** An NFIP-insured property where two or more claim payments of more than \$1,000 have been paid within a 10-year period since 1978.

### **Severe Repetitive Loss**

**Property (SRL):** A 1-4 family residence that is a repetitive loss property that has had four or more claims of more than \$5,000 or two claims that cumulatively exceed the reported building's value.

## Background

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA) and is continually faced with the task of paying claims while trying to keep the price of flood insurance at an affordable level.

It has a particular problem with repetitive and severe repetitive flood loss properties, which are estimated to have cost \$13 billion nationwide and \$3 billion in Louisiana alone<sup>3</sup> since 1978.

Repetitive flood loss properties represent only 1.3% of all flood insurance policies, yet historically they have accounted for nearly one-fourth of the claim payments. Mitigating these repeatedly flooded properties will reduce the overall costs to the NFIP, the communities in which they are located, and the individual homeowners. Ultimately, mitigating repeatedly flooded properties benefits everyone.

The University of New Orleans' Center for Hazards Assessment, Response and Technology (UNO-CHART) receives funding from FEMA to collate data and analyze the repetitive flood loss areas in Louisiana in partnership with local governments, elected officials, residents, and neighborhood associations. Using a Geographic Information System (GIS) and geo-coded flood insurance claims data, repeatedly flooded areas and properties are being prioritized for attention and analysis. In selected locations, UNO-CHART works with local officials and residents to conduct in-depth analyses of the causes and possible solutions to the flooding problem. These efforts are called "Repetitive Loss Area Analyses".

UNO-CHART conducted a repetitive loss area analysis case study in Houma, La. An area analysis follows FEMA guidelines to determine why an area has repeated flood losses and what alternative flood protection measures would help break the cycle of repetitive flooding.

Repetitive Loss Area Analyses are encouraged by and credited under the Community Rating System (CRS), as explained on page 33. Terrebonne Parish participates in the CRS and can receive the credit if this document is adopted and implemented.

## The Area

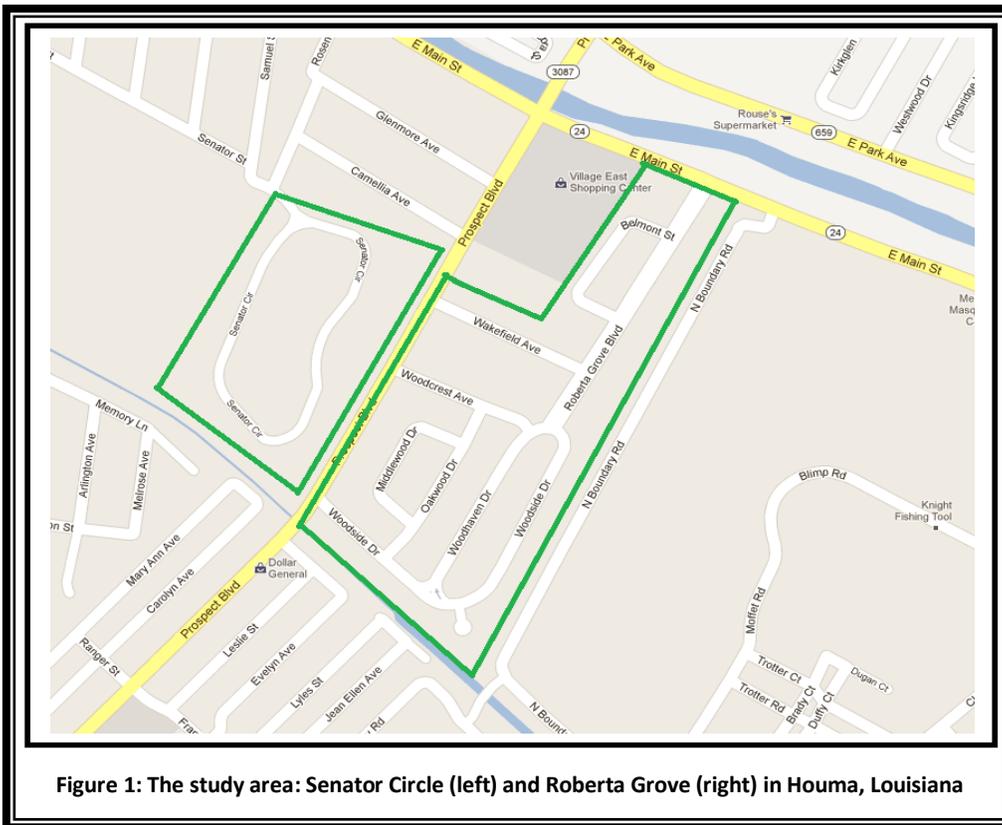
The study area is comprised of the Senator Circle and Roberta Grove neighborhoods, both located in the city of Houma. The Roberta Grove neighborhood is bounded to the north by Bayou Terrebonne and East Main Street, to the south by Bayou Chauvin, to the southwest by Senator Circle, and to the east by North Boundary Court.

There are 103 buildings located in the Roberta Grove area. The area is low lying and predominantly residential. However, there are commercial properties to the north along East Main Street. Of the 103 residential buildings, 62 (60.19 %) are on FEMA's repetitive loss list, and six (5.82%) are considered to be severe repetitive loss properties. The Senator Circle neighborhood in Houma is a public-housing complex. It is bounded to the north by Camellia Avenue, to the south by Bayou Chauvin, and to the east by Prospect Boulevard. There are 197 units<sup>4</sup> in the circle, of which 50 (25.38 %) are on FEMA's repetitive loss list and none are considered to be severe repetitive loss properties. For definitions of repetitive and severe repetitive loss properties, refer to the terminology list on page 3. See the map on the next page for the location of the study areas.

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<sup>3</sup> As of December 2012; FEMA, since 1978 when records began.

<sup>4</sup> Each building has at least one unit; most buildings are duplex units.



The area was selected for this analysis due to the clustering of repetitive loss properties in the neighborhoods which indicates a recurring flooding problem. Local officials also expressed their interest in addressing the repetitive flooding issues in the area making these two neighborhoods ideal to conduct a repetitive loss area analysis.

**The Process**

In October 2012 after a careful review of repetitive flood loss properties throughout the State of Louisiana and discussions with FEMA Region VI, the UNO-CHART team and Terrebonne Parish officials conducted the repetitive loss area analysis (RLAA). Terrebonne Parish, a Community Rating System (CRS) Class 6 is one of only three Class 6 CRS Communities in the State of Louisiana. Given its obvious commitment to floodplain management excellence, Terrebonne Parish was viewed as a good community partner for this project. See page 33 for more information on the CRS program.



After meeting with Planning & Zoning officials, the Councilmen representing the proposed study areas, the Parish President, and other Parish officials, the final study area was selected. For the first time in the UNO-CHART Repetitive Loss Project, the study area consists of two separate and unique neighborhoods: Senator Circle and Roberta Grove.

This project follows a five step CRS process. UNO-CHART has always taken a social science perspective during the process, and FEMA recently offered a new approach to emergency management that melds the two methods: The Whole Community Approach.

The Whole Community Approach: FEMA has come out with a new approach to emergency management: The Whole Community Approach. This philosophical approach to emergency management seeks to leverage the social and cultural resources of a community along that of its private and non-profits. In essence, this approach brings together the *whole* community in order to generate a comprehensive view of the hazards to which that community is vulnerable too as well as to cooperatively develop solutions to mitigate those risks.<sup>5</sup> By applying the Whole Community Approach to RLAA's the hope is that the local officials and residents living in repetitively flooded communities will come to see the problem as a *shared* issue and not just one for the local government or residents to handle on their own.

The five step process in the 2013 *CRS Coordinator's manual* for conducting a RLAA is as follows:

**Step 1:** Advise all the property owners in the repetitive flood loss area that the analysis will be conducted and request their input on the hazard and recommended action through informational meeting.

**Step 2:** Contact agencies or organizations that may have plans that could affect the cause or impacts of the flooding.

**Step 3:** Collect data on the analysis area and each building in the identified study area within the neighborhood to determine the cause(s) of the repetitive damage.

**Step 4:** Review alternative mitigation approaches and determine whether any property protection measures or drainage improvements are feasible.

**Step 5:** Document the findings, including information gathered from agencies and organizations, and relevant maps of the analysis area.

### **Step 1: Neighborhood Notification**

The first step in five-step CRS process is to notify the residents in the area about the project. Considering that this study area contains two separate and unique neighborhoods; the decision was made by the UNO-CHART team to divide the study area into two in order to streamline the process.

On January 2<sup>nd</sup> and 3<sup>rd</sup> of 2013, Terrebonne Parish sent out a letter to the homeowners introducing them to UNO-CHART and the project. Accompanying the letter was a data sheet that asked residents basic questions about their building and their flooding history. The letters also invited residents to an "Informational Meeting" where the project process would be explained more in detail than it could be in the letter.

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<sup>5</sup> FEMA A *Whole Community Approach to Emergency Management: Principles, Themes, and Pathways for Action*; FDOC104-008-1, 12/2011

Informational Meetings: Residents of both neighborhoods were given the opportunity to either return the data sheets at the Informational Meetings or to drop them off with a neighborhood representative if they were unable to make the meetings.

The UNO-CHART team worked with Terrebonne Parish and the Roberta Grove Neighborhood Watch Association to schedule the Informational Meeting for January 17<sup>th</sup>, with the letters being mailed out two weeks prior on January 3<sup>rd</sup>. Of the 134 letters mailed out, 31 came back as “undeliverable” or “vacant.” Out of the remaining 103, 16 were returned at the Informational Meeting.

The UNO-CHART team scheduled the Informational Meeting for Senator Circle residents with The Houma-Terrebonne Housing Authority for January 16<sup>th</sup>. The letters were mailed to the residents on January 2<sup>nd</sup>, two weeks before the scheduled meeting. Of the 300 letters mailed out, 103 came back as “undeliverable” or “vacant.” Out of the remaining 197 letters, eight were returned at the Informational Meeting.

More detailed information on the data sheets is discussed on page 23, while the Informational Meetings are discussed on page 22 under “On-site Data Collection.” Copies of the letters and data sheets and summary statistics are found in Appendices A, B, and C.



Figure 3: Residents at the Senator Circle Informational Meeting (top); and the Roberta Grove Informational Meeting (bottom)

## **Step 2: Review Plans**

The second step in the CRS process is reviewing of the plans and flood insurance data that pertain to the area. The plans, insurance maps and drainage information were collected from several agencies and departments. This report also includes a review of stakeholders who contributed to the project. Coordination with relevant agencies, offices, and organizations is an important step in the analysis process. The following agencies and organizations were contacted by the UNO-CHART team in order to complete this analysis:

- FEMA Region VI, Mitigation Division
- Terrebonne Parish President’s Office
- Terrebonne Parish Council
- Terrebonne Parish Planning & Zoning Department
- Terrebonne Parish Public Works Department
- Roberta Grove Neighborhood Watch Association
- Houma-Terrebonne Housing Authority
- LSU Sea Grant

This step helps to open lines of communication among those interested in flood protection in the Roberta Grove and Senator Circle area, and to see what other groups are doing to address the flood problems.

The UNO-CHART team collected and reviewed the following reports/data:

- A. Terrebonne Parish, Flood Damage Prevention Ordinance update, (in progress)
- B. Terrebonne Parish Hazard Mitigation Plan Update, November 2009
- C. Vision 2030: Building Sustainable Communities; Terrebonne's Plan for Its Future
- D. Flood Insurance Data
- E. Drainage Information

A. Terrebonne Parish, Flood Damage Prevention Ordinance:

In order to reduce flood losses, the Terrebonne Parish Flood Damage Prevention Ordinance requires the following in all areas of special flood hazards:

- (1) All new construction and substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;
- (2) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damage;
- (3) All new construction or substantial improvements shall be constructed with materials resistant to flood damage;
- (4) All new construction or substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding;
- (5) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system;
- (6) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharge from the systems into floodwaters; and
- (7) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.<sup>6</sup>

The ordinance also states that encroachments in adopted, regulatory floodways are prohibited unless it can be demonstrated that the proposed encroachment would not result in any increase in flood levels within the city during the occurrence of the base flood discharge. This is intended to limit encroachments such as fill, new construction, substantial improvements or other development that would otherwise increase flood heights on other properties. This means there are restrictions on the construction of new buildings, additions, levees, floodwalls, or placing fill on properties in the floodway.

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<sup>6</sup> Municode, accessed online 01/22/13: <http://library.municode.com/index.aspx?clientId=10737>

Since local ordinances determine the threshold at which substantial damage and /or repetitive claims are reached, adopting language that would lower these thresholds would benefit the homeowners of repetitive loss properties.

According to the Ordinance, *substantial improvement* means any reconstruction, rehabilitation, addition, cumulative substantial improvement (CSI) or other improvement of a structure, the cost of which equals or exceeds fifty (50) percent of the market value of the structure before "start of construction" of the improvement, and shall be a cumulative cost of all previous permitted work and proposed work to the structure to determine a cumulative substantial improvement. This includes structures which have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either:

- Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary conditions; or
- Any alteration of a "historic structure" provided that the alteration will not preclude the structure's continued designation as a "historic structure."

Adopting alternative language allows for cumulative damage to reach the threshold for federal mitigation resources more quickly, meaning that some of the properties in both study areas that sustain minor damage regularly would qualify for mitigation assistance.

As of March 2013, Terrebonne Parish is amending its Flood Damage Prevention Ordinance. Focus groups are being organized in order to shape and guide the ordinance amendments. Residents interested in the progress of this ordinance amendment should check the Parish's website for more information<sup>7</sup> or contact the Terrebonne Parish Planning & Zoning Department at (985) 873-6569.

#### B. Terrebonne Parish Hazard Mitigation Plan, November 2009:

In 2009, Terrebonne Parish ("the Parish") updated its Parish-wide hazard mitigation plan ("the Plan"). In the Plan, it is noted that in the Parish 94.6% of the total acreage is "forested, wetlands or water," and that only 5.6% is "urbanized and/or under cultivation".<sup>8</sup> With developed land being limited to less than 6% of the land in Terrebonne Parish, officials and residents alike share the risk and the need to be proactive in protecting themselves from the surrounding waters.

In the Plan, several hazards are identified and described as having the potential to affect the Parish. A subsequent list was developed detailing the hazards that were more likely to occur and expose the Parish and its residents to the risks associated with them.

There were six (6) hazards that made the list of "prevalent hazards to the community".<sup>9</sup>

- (1) Levee Failure
- (2) Flooding
- (3) Hurricanes and Coastal/Tropical Storms

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<sup>7</sup> [www.tpcg.org](http://www.tpcg.org)

<sup>8</sup> Terrebonne Parish Hazard Mitigation Plan Update 2009; p 10

<sup>9</sup> Terrebonne Parish Hazard Mitigation Plan Update 2009; pc2-10

- (4) Saltwater Intrusion
- (5) Tornadoes
- (6) Subsidence

Of these six hazards identified, flooding has been identified as the hazard with the greatest potential to affect the Parish and its communities. Flooding in the Parish has the probability to take many forms, and it is important for residents to understand the different types of flooding they are susceptible to and the ways they can mitigate themselves against flood loss.

Flooding in the Parish can come from any of the following sources:

- Levee failure resulting from extreme flood events
- Flooding from riverine sources, stormwater, tropical storms, and hurricanes in the following forms:
  - Riverine (primarily high water related to rivers and bayous)
  - Stormwater (rain fall)
  - Surge
  - Back water flooding (as the result of riverine flooding and surge)
- Wind damage resulting from hurricanes, tropical storms, and tornadoes
- Saltwater intrusion resulting from storm surge<sup>10</sup>

The Plan has a detailed “Hazard Mitigation Strategies” section that outlines the actions the Parish will pursue to protect its citizens and resources from the various hazards which the region is prone. There is one objective and three Action Items that are relevant to this project. They are as follows:<sup>11</sup>

**Objective 3.1:** Eliminate the threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure

**Action Item 3.1.1 Upgrade current drainage infrastructure**

A project is in the works to provide protection to the study area. The Bayou Chauvin Drainage Improvements are currently under design, funded for 2013, and are designed to protect the study areas from rain events internal to the system. A hydraulic study was analyzed for the system improvements. More about this project is listed under the Step 2: review Plans section E: “Drainage Information” found on page 17.

**Action Item 3.1.2 Construct new flood control structures and levees**

The East Houma Surge Levee is a levee that stretches between LA 56 and LA 57 and acts as a barrier to surge waters being funneled up from Lake Boudreaux. The East Houma Surge Levee was built to 9-9.5 feet so that settlement and consolidation could take place and provide for a final levee elevation of +8.0 feet.

**Action Item 3.1.3 Elevate or acquire all RL and SRL structures in Terrebonne Parish**

The Parish has elevated 20 properties; 13 of which were RL and 5 of which were SRL in the Roberta Grove neighborhood.<sup>12</sup> The Parish has also acquired and cleared 5 properties, all of which were RL properties in the Roberta Grove neighborhood.

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<sup>10</sup> Terrebonne Parish Hazard Mitigation Plan Update 2009, p 2c-10-11

<sup>11</sup> Only action items relevant to this report were included here; for a full list of the strategies, please see appendix E of this report located on page 43.

### C. Vision 2030: Building Sustainable Communities; Terrebonne’s Plan for Its Future:

Terrebonne’s Comprehensive Plan “Vision 2030” does specifically mention hazard mitigation, but not in the same depths as the Parish’s Hazard Mitigation Plan. “Vision 2030” does briefly discuss the Parish’s involvement in the Community Rating System (CRS). The Parish’s participation and more details about the CRS will be discussed on page 33 of this report.

### D. Flood Insurance Data

The team reviewed three sources of flood insurance data. Those sources of data are:

- A. Flood Insurance Rate Map (FIRM)
- B. Preliminary Digital Flood Insurance Rate Map (DFIRM)
  - I. DFIRM Appeal

**A. Terrebonne Parish Flood Insurance Rate Map, May 19, 1981:** A Flood Insurance Rate Map (FIRM), published by FEMA, shows identified flood risk according to zones of severity and is used in setting flood insurance rates. The regulatory floodplain used by FEMA for the floodplain management and insurance aspects of the NFIP is based on the elevation of the 1% chance flood or base flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program are protected to the same degree against flooding. For another frame of reference, the 100-year flood has a 26% chance of occurring over the life of a 30-year mortgage. It is becoming more common to refer to the 100-year storm as the 1% annual chance flood. It is important to note that more frequent flooding does occur in the 100-year floodplain, as witnessed by the number of repetitive loss properties. The study areas fall in the same flood zone, though they have differing base flood elevations (BFE). Roberta Grove and Senator Circle are in the AE Zone on the effective FIRM for Houma.

Roberta Grove is in an AE EL9 Zone, while Senator Circle is in an AE EL8 Zone; the numbers behind the “AE” indicate the BFE for that area which is the elevation of the 1% chance annual storm above sea level.<sup>13</sup>

It should also be noted that the BFE is above *mean sea level (MSL)*, not above *ground level*. The ground elevation in both areas varies between 4.9 feet and 5.2 feet above MSL.<sup>14</sup> The only way to have an accurate reading of the ground elevation is to have a licensed land surveyor, architect, or engineer complete an elevation certificate.

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<sup>12</sup> The remaining two properties were neither RL nor SRL properties

<sup>13</sup> FIRM & DFIRM images (Figure 4) from:

[http://www.lsuagcenter.com/en/family\\_home/home/design\\_construction/Laws+Licenses+Permits/Getting+a+Permit/Your+Flood+Zone/flood\\_maps/](http://www.lsuagcenter.com/en/family_home/home/design_construction/Laws+Licenses+Permits/Getting+a+Permit/Your+Flood+Zone/flood_maps/)

<sup>14</sup> This is not exact information and should not be used for any building or insurances purposes. The information presented here is general.

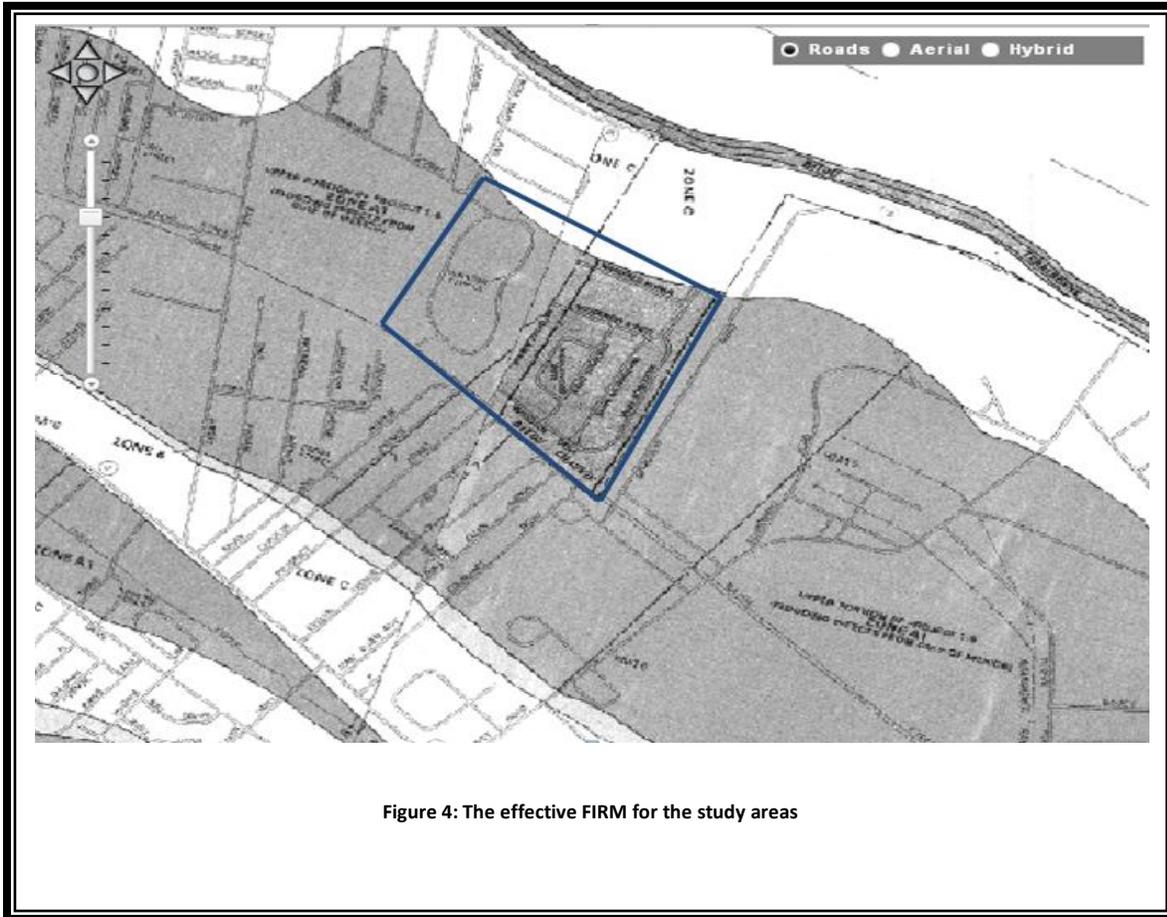
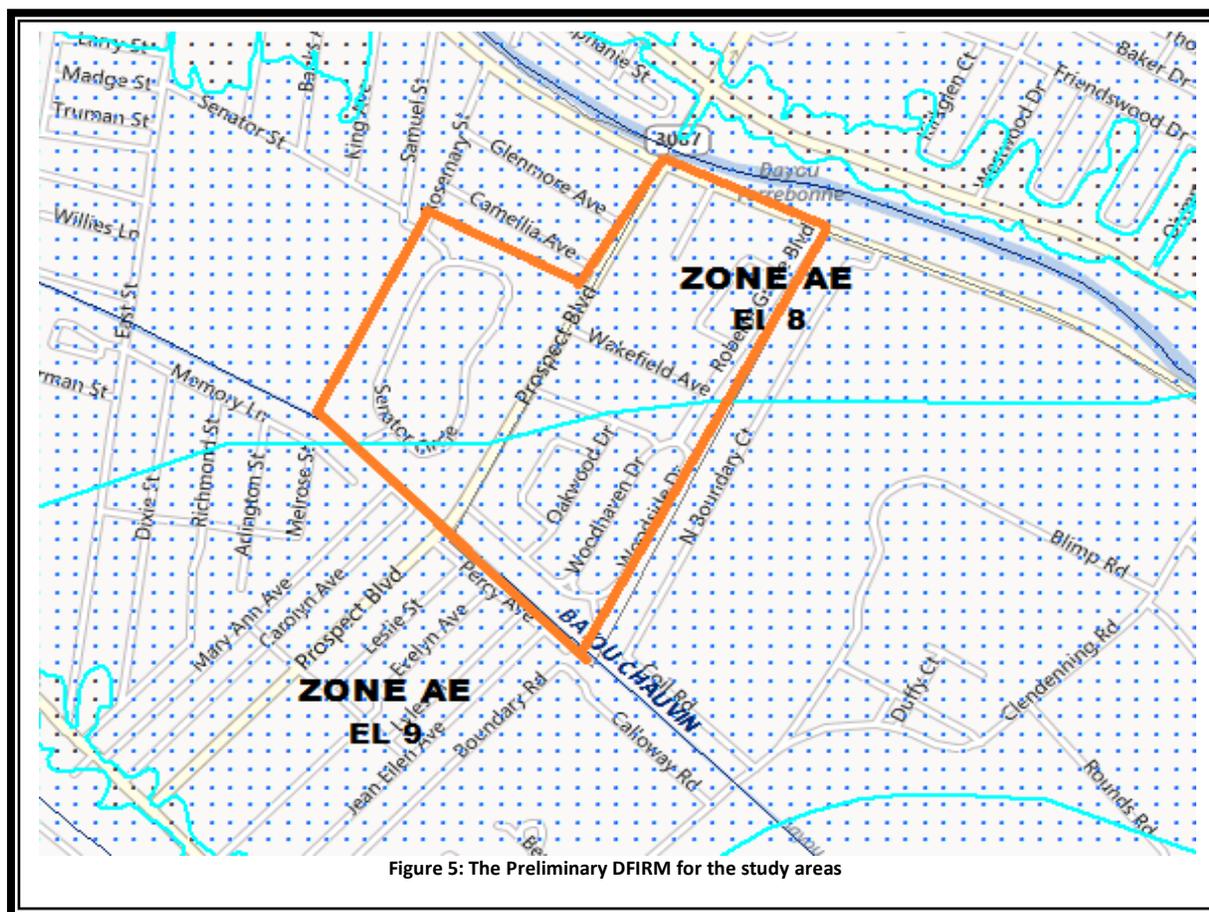


Figure 4: The effective FIRM for the study areas

**B. Preliminary Digital Flood Insurance Rate Map (DFIRM):** As part of the FEMA Map Modernization Program, FEMA has been charged with updating and developing Digital Flood Insurance Rate Maps (DFIRMs).

The first DFIRMs for Louisiana were released beginning in 2008; some parishes saw little to no change, while some of the coastal parishes saw dramatic changes. Please see DFIRM in the following page:



**BI. DFIRM Appeal:** Terrebonne Parish appealed the release of its Preliminary DFIRMs after it was determined that a majority of the Parish would see a dramatic increase in the BFE. The Parish, along with Shaw Coastal Inc., examined the data used to develop the 2009 Preliminary DFIRMs and found deficiencies that warranted an official appeal of the new DFIRM for Terrebonne Parish.<sup>15</sup> At this time, the effective FIRM for the City of Houma is still May 1981 and May 1985 for the rest of Terrebonne Parish. Residents who are interested in reading the official appeal in its entirety can find it on Terrebonne Parish’s website under the Planning & Zoning section, or available online at <http://www.tpcg.org/view.php?f=planning>

E. Drainage Information

Terrebonne Parish relies heavily on levees for forced drainage and pumping stations throughout the parish, much like the rest of Southeast Louisiana. Given the relatively flat ground elevation, Terrebonne Parish uses levees not only to reduce storm surge, but also “to force water to drain in certain patterns”.<sup>16</sup>

<sup>15</sup> Terrebonne Parish Appeal of FEMA’s 2009 Preliminary DFIRMs, September 2009, pg. 42

<sup>16</sup> Terrebonne Parish Hazard Mitigation Plan Update 2009, pc2-22

There are 157 pump stations located in the Parish that work in conjunction with the levees to move water out of the parish during a storm or rain event. The forced drainage, levees, and the drainage pumps form 61 individual drainage systems that are managed by the Terrebonne Parish Department of Public Works.<sup>17</sup>

As previously mentioned, both study areas have two bayous near them: Bayou Chauvin and Bayou Terrebonne. Residents in both areas mentioned that Bayou Chauvin is in need of dredging, widening in parts, and clearing. Bayou Chauvin actually runs through Senator Circle, though it is shallow to the point of being considered a swale (see Figure 6).

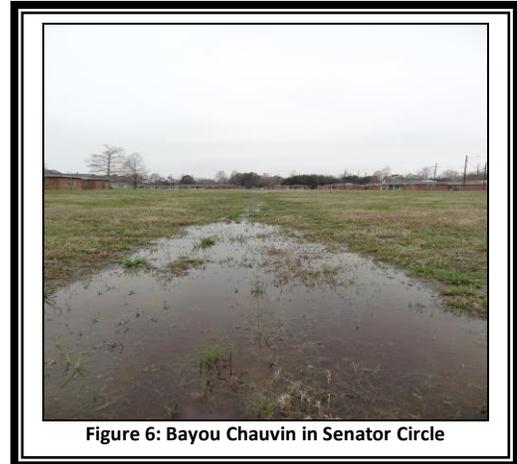


Figure 6: Bayou Chauvin in Senator Circle

UNO-CHART reviewed Terrebonne Parish’s Hazard Mitigation Plan’s Action Items where the Parish listed the projects they would pursue to reduce risk in the parish. One of those action items, “Upgrade current drainage infrastructure” included a study that addresses Bayou Chauvin. The details of this study are discussed under Step 4 - Mitigation Measures; under Drainage Improvements on page 31.

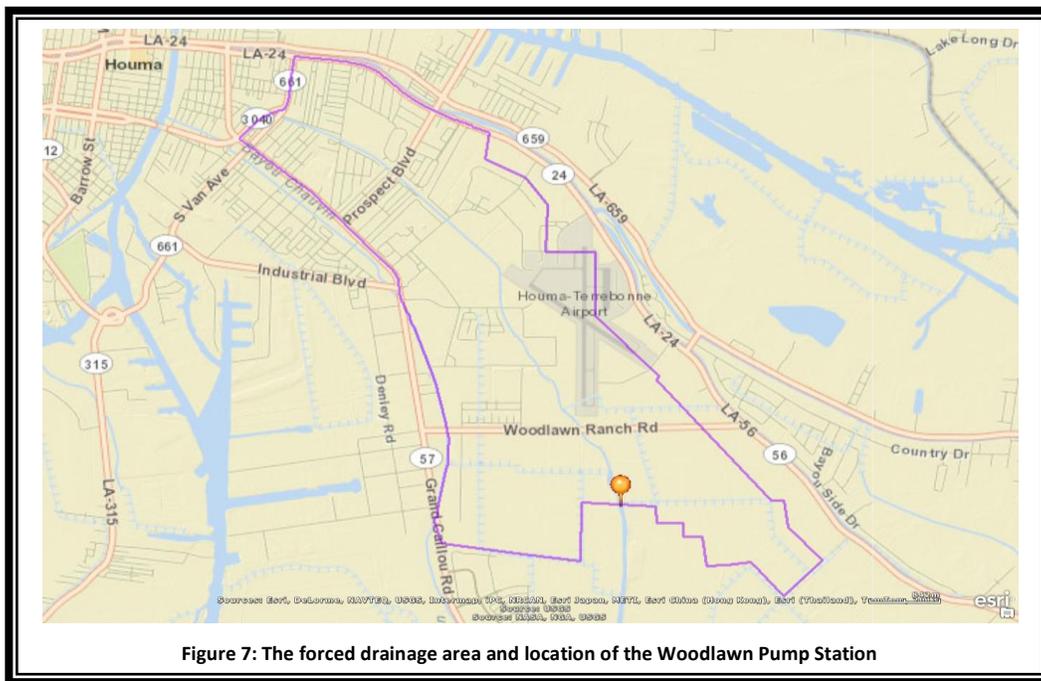


Figure 7: The forced drainage area and location of the Woodlawn Pump Station

<sup>17</sup> Terrebonne Parish Appeal of FEMA’s 2009 Preliminary DFIRMs, September 2009, pg 14

<sup>17</sup> Terrebonne Parish Hazard Mitigation Plan Update 2009

<sup>17</sup> Tropical Cyclone Report: Hurricane Lili, National Oceanic and Atmospheric Administration (NOAA)

### **Step 3: Building Data**

#### **A. Claims Data**

The Privacy Act of 1974 (5 U.S.C. 522a) restricts the release of certain types of data to the public. Flood insurance policy and claims data are included in the list of restricted information. FEMA can only release such data to state and local governments, and only if the data are used for floodplain management, mitigation, or research purposes. Therefore, this report does not identify the repetitive loss properties or include claims data for any individual property. Rather, it discusses them only in summary form. UNO-CHART obtained claims data from FEMA Region VI for all repetitive loss properties in the Roberta Grove-Senator Circle study area. The results are presented below and separated by neighborhood:

**Roberta Grove:** There are 62 (60.19%) properties within the 103 property study area that qualify as repetitive loss. Of those 62 repetitive loss properties, six are considered to be severe repetitive loss property. The homeowners for the 62 repetitive loss properties have made 170 claims, and received \$7,785,536.02 in flood insurance payments since 1978. The average repetitive flood loss claim is \$45,797.27.

**Senator Circle:** There are 50 (25.38%) units within the 197 building units of the study area that qualify as repetitive loss. Of those 50 repetitive loss properties, none of them are considered to be severe repetitive loss properties. The homeowners for the 50 repetitive loss properties have made 100 claims, and received \$ 985,385.33 in flood insurance payments since 1978. The average repetitive flood loss claim is \$19,707.70.

**Major Flood Events:** There have been five major flood events in the Roberta Grove- Senator Circle study area: Hurricane Lili in September 2002, Hurricanes Katrina and Rita in September 2005 and Hurricanes Gustav and Ike in September 2008. In September 2002, 100 properties/units out of combined total of 112 repetitive loss properties/units in the Roberta Grove-Senator Circle study area filed a claim. The total loss amount for this event is the second largest for the study area, totaling \$2,618,200.80.

Lili became a hurricane on September 30, 2002 while passing over Cayman Brac and the Little Cayman Islands. With a wind speed of approximately 80-knots, Hurricane Lili made landfall on the Louisiana coast on October 3, 2002 as a category 1 hurricane. Strong winds toppled trees onto houses and into roadways, stripped shingles from roofs, and blew out windows. A combination of storm surge and rain caused levees to fail in the southeastern part of the state. Lili also temporarily curtailed all oil production in the Gulf of Mexico. The latest insured property damage total from the American Insurance Services Group is \$415 million for Louisiana.<sup>18</sup> Terrebonne Parish was declared a major disaster area by the President because of Hurricane Lili.

The storm was responsible for damage associated with both wind (greater than 78 miles per hour) and storm surge (6 to 8 feet) in Terrebonne Parish. The strongest effects of the storm were experienced in the southern portion of the parish. Damage included widespread power outages, destruction of approximately 35% of the parish sugarcane crop, substantial damage of more than 300 homes, and breached levees.<sup>19</sup>

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<sup>18</sup> Tropical Cyclone Report: Hurricane Lili, National Oceanic and Atmospheric Administration (NOAA)

<sup>19</sup> Terrebonne Parish Hazard Mitigation Plan Update 2009

| Event Date                                     | Claims Made | Total Loss (\$) |
|--|-------------|-----------------|
| September 1998<br>(Heavy Rain event)           | 16          | \$220,947.97    |
| September 2002<br>(Hurricane Lili)             | 50          | \$1,917,145.66  |
| September 2005<br>(Hurricane Katrina and Rita) | 37          | \$ 1,699,596.05 |
| September 2008<br>(Hurricane Ike and Gustav)   | 55          | \$ 3,829,502.43 |

Table 1: Major Repetitive Loss Claims for the Roberta Grove Study Area

| Event Date                                     | Claims Made | Total Loss   |
|--|-------------|--------------|
| September 2002<br>(Hurricane Lili)             | 50          | \$701,055.14 |
| September 2005<br>(Hurricane Katrina and Rita) | 49          | \$215,693.41 |

Table 2: Major Repetitive Loss Claims for the Senator Circle Study Area

In August and September 2005, 86 of the 112 repetitive flood loss properties filed a claim. Hurricane Katrina made U.S. landfall for the second time on August 29, 2005, near Buras/Triumph, Louisiana. The hurricane was a Category 3 storm with wind speeds of 125 miles per hour. Much of that damage, which was limited to southeast Louisiana and Terrebonne Parish, was caused by high winds and storm surge<sup>20</sup>. Hurricane Rita made landfall on September 24, 2005, along the Louisiana-Texas border near Johnsons Bayou, Louisiana. The hurricane came ashore as a Category 3 storm with sustained winds of 120 mph. Hurricane Rita initially followed a path along the western Louisiana-Texas border and then turned northwest. It caused an estimated \$10 billion in damage.<sup>21</sup> Despite the fact that the eye of the storm made landfall approximately 190 miles west of Houma, Hurricane Rita had a significant impact on Terrebonne Parish—a greater impact than Hurricane Katrina.

The impact was largely a result of storm surge that caused extensive flooding, primarily south of Houma. Reportedly, all levees south of the Intracoastal Canal were breached and more than 10,000 homes and businesses were flooded. Interestingly, there were just two claims during Hurricane Katrina in our Roberta Grove- Senator Circle study area.

In September 2008, Hurricanes Gustav and Ike impacted the state of Louisiana. Gustav, a strong Category 2 hurricane, made landfall on September 1<sup>st</sup> in Terrebonne Parish and on September 12<sup>th</sup> and 13<sup>th</sup> Ike's storm surge battered most of the state's coastline. Hurricane Gustav emerged into the southeast Gulf of Mexico as a major category 3 Hurricane with rainfall considerably ranging from around

<sup>20</sup> Terrebonne Parish Hazard Mitigation Plan Update 2009

<sup>21</sup> National Oceanic and Atmospheric Administration

4 to 10 inches. Hurricane Ike made a landfall as a Category 2 hurricane with a surge height of 4-6 ft. affecting east Houma and flooding the Intracoastal Waterway and Houma Navigation Canal.

Louisiana Economic Development (LED) reported that Gustav: “followed a northwest path into central Louisiana, causing widespread physical damage, power outages, and/or flooding across the vast majority of parishes in Louisiana.”

Preliminary estimates of the combined total physical damage in Louisiana from Hurricanes Gustav and Ike range from roughly \$8 billion to \$20 billion. Hurricane Gustav caused severe damage to Terrebonne Parish including scattered power outages, knocking down trees, smashing roofs and burning of houses. 56 repetitive loss properties out of the combined total of 112 repetitive flood loss properties filed a claim. The total loss amount for this event is the largest at \$3,898,139.21.

**All Claims:** The NFIP tracks all flood insurance claims, not just the repetitive loss flood insurance claims. The UNO-CHART team investigated whether or not properties in the study areas were *not* considered to be repetitive loss properties, but had still made flood insurance claims. The reason for this was to show the extent to which the study areas were susceptible to flooding.

| Senator Circle  | # of properties | # of claims made | Total Loss      |
|-----------------|-----------------|------------------|-----------------|
| All Claims List | 150             | 389              | \$5,251,474.00  |
| RL properties   | 50              | 100              | \$985,385.33    |
|                 |                 |                  |                 |
| Roberta Grove   | # of properties | # of claims made | Total Loss      |
| All Claims List | 13              | 21               | \$1,165,976.00  |
| RL properties   | 62              | 170              | \$ 7,785,536.00 |

**Table 3: Repetitive loss properties that had claims placed in the wrong file**

What was found, however, was that not only were there other properties in the area that had made flood insurance claims, there were also repetitive loss properties that had made claims but did *not appear* on the repetitive loss list. This means that there are properties on the repetitive loss list that have *additional* claims that are not included in the repetitive loss totals. Looking at the table above, there were 150 units<sup>22</sup> in Senator Circle that have made 389 claims. Of those 150 units, some of them seem to meet the repetitive loss criteria.

<sup>22</sup> Because of how the data was entered, it is impossible to decipher if the claims were made by one or both.

That means, for Senator Circle there is additional \$5,251,474.00 worth of flood insurance claims payments, of which some of the buildings seem to meet Repetitive flood loss criteria but do not show up on the FEMA repetitive loss list. For Roberta Grove, there is additional \$ 1,165,976 worth of repetitive loss flood insurance claims, some of the properties seems to meet the repetitive flood loss but are not included on the FEMA list.

The implications of this are that:

- a) The true extent of the flooding issue is not clear;
- b) Some of these repetitive loss properties may *actually be* severe repetitive loss properties; and
- c) Being designated as a severe repetitive loss property opens certain funding mechanisms that are not open to regular repetitive loss properties.

This is an issue that is common across the nation. It can be difficult to ensure that flood insurance claims from a single property are entered in the same manner because it is hardly ever the same person who is entering the information into the system each time a claim is filed. One person may write down an address using an abbreviation, while another person writes out the full address. This can result in multiple, but different, entries for the same address.

#### B. On-site Data Collection

On January 16<sup>th</sup> and 17<sup>th</sup>, 2013 the UNO-CHART team visited the study areas and collected data on each property. The team collected information such as the estimated elevation of each structure above the street and the grade, the type of foundation, and the type of structure.

- In Roberta Grove, 90 (82%) structures in the area are built slab-on-grade and 22 (20%) are elevated on a crawlspace. The average height above grade is actually at grade (0-1 feet) for most structures in the area (81.81%).
  - 4.5% of the structures are elevated 1-2 feet above grade.
  - 0.90% of the structures are elevated 2-4 feet above grade.
  - 10% of the structures are elevated 4-5 feet above grade.
  - 2.7% of the structures are elevated 5-6 feet above grade.

109 buildings (98.19%) in Roberta Grove are at the street level; 97% of all structures are single-story, and a good number (42.69%) are wood frame buildings. A summary of this data is found in Appendix D.

- All the structures in Senator Circle are built slab-on-grade. The average height is actually at ground level (0-1 feet) for all the structures in the area while just the security complex is elevated 1-2 feet above grade. Average elevation above street is approximately 1-2 feet for all the housing units. All of them (100%) are single-story and brick-faced buildings. A Summary of this data is found in Appendix D.

Informational Meetings: After the on-site data collection, UNO-CHART along with the Parish invited residents to Informational Meetings to explain the project and process in more detail than what was in the introductory letter.

The Roberta Grove neighborhood Informational Meeting was scheduled in conjunction with its Neighborhood Watch organization. That meeting was held on January 17<sup>th</sup> at the Gymnastics Development Center. Representatives from the Parish were in attendance as well as 27 residents.

The Senator Circle neighborhood Informational Meeting was held on January 16<sup>th</sup> at the Community Center located within the neighborhood. Representatives from the Housing Authority and the Parish were in attendance as well as Councilman John Navy and eight residents from the neighborhood.

Residents at both meetings were presented with an overview of the process and purpose of the RLAA. They were also given the opportunity to fill out and return their data sheets and ask questions. Residents at both meetings expressed concern over the flooding issues and the possibility of exacting real change to address the risk.

### C. Data Sheets

As discussed in Step 1: Neighborhood Notification, the letter that was mailed out to the residents included a data sheet. This data sheet offered residents the opportunity to provide UNO-CHART with details about their flooding experiences and to voice their concerns regarding the flooding in the area.

The UNO-CHART team mailed 134 letters and data sheets in the Roberta Grove neighborhood; 31 came back as “undeliverable” or “vacant.” Of the remaining 103, 16 were returned filled out at the Informational Meeting. The Roberta Grove neighborhood had a return rate of 15.5% for the data sheets. The residents in Roberta Grove who completed their data sheet and turned them in to the UNO-CHART team offered insight into the flooding issues in the area:

- ❖ 62.5% have reported their property being flooded or having a water problem.
- ❖ The most reported flood events were Hurricane Gustav and on September 1<sup>st</sup>, 2008.
- ❖ 31.25% of respondents cite drainage from a nearby home as the reason they have flooded.
- ❖ 43.75% of respondents cite a clogged or undersized drainage ditch as the source of their flooding.
- ❖ 75% of respondents have reported taking on a mitigation measure to protect their property.

The UNO-CHART team mailed out 300 letters and data sheets in the Senator Circle neighborhood with 103 returned as “undeliverable” or “vacant.” Out of the remaining 197 letters, eight were returned at the Informational Meeting. Senator Circle had a return rate of 4% for the data sheets. For those residents who turned in their data sheets, it was reported that:

- ❖ 37.5% have reported their property being flooded or having a water problem.
- ❖ The most reported flood events were Hurricane Ike on September 12<sup>th</sup> and 13<sup>th</sup>, 2008.
- ❖ 62.5% of respondents cite drainage from a nearby home as the reason they have flooded.
- ❖ 62.5% of respondents cite a clogged or undersized drainage ditch as the source of their flooding.
- ❖ 50% of respondents have reported taking on a mitigation measure to protect their property.

The full results of the homeowners’ data sheets are found in Appendices A and B of this report.

## **Problem Statement**

Based on the data collected from the five sources of information (community reports and plans, flood insurance data, drainage information, on-site surveying, and property owners), the following bullets summarize the repetitive flooding problems in the areas:

- ❖ Structures in both neighborhoods of the study area fall within a high-risk AE Special Flood Hazard Area;
- ❖ Flooding is caused by heavy rains, storm surge, and backwater flooding, and further aggravated by two problems:
  - Bayou Chauvin’s limited capacity to carry water out of the areas due to being undersized, clogged with debris, and shallowness in some areas;
  - Bayou Terrebonne overflowing into the areas;
- ❖ The East Houma Surge Levee should add a level of protection from surge waters being funneled up from Lake Boudreaux;
- ❖ There are 300 homes and apartments subject to flooding. 112 of the insured properties have been flooded to the extent that they qualify as repetitive loss structures under the NFIP; six of which are severe repetitive loss properties.
- ❖ These 112 repetitive loss properties have made 270 flood insurance claims for a total of **\$8,770,921.35** since 1978.
- ❖ There is an additional **\$6,417,450.00** in all flood insurance claims, some of which meet the repetitive flood loss criteria, but are not on FEMA’s repetitive loss list. This is problematic because:
  - It further clouds the true extent of the flooding issues in the areas;
  - Some of the repetitive loss properties in both areas may actually be severe repetitive loss (SRL) properties;
  - Being designated as a SRL property triggers a certain mitigation funding mechanism only available to SRL properties.

## **Step 4: Mitigation Measures**

Knowing the flooding history, and the types and condition of buildings in the area leads to the third step in the area analysis procedure – a review of alternative mitigation approaches to protect properties from flood damage.

Property owners should consider the following alternatives, but understand they are not all guaranteed to provide protection at different levels of flooding. Nine approaches were reviewed:

- I. Elevating the houses above the 100-year flood level
- II. Barriers to floodwaters
- III. Dry floodproofing
- IV. Utility protection
- V. Drainage improvements
- VI. Drainage maintenance
- VII. Maintaining flood insurance coverage on the building

It should be noted that the residents in Senator Circle are limited to what mitigation measures they can implement as they are renters. This applies to renters in Roberta Grove as well. There is also a section that covers funding following the discussion of mitigation measures.

### I. Elevation

Raising the structure above the flood level is generally viewed as the best flood protection measure, short of removing the building from the floodplain. All damageable portions of the building and its contents are high and dry during a flood, which flows under the building instead of into the house. Houses can be elevated on fill, posts/piles, or a crawlspace. A house elevated on fill requires adding a specific type of dirt to a lot and building the house on top of the added dirt. A house elevated on posts/piles is either built or raised on a foundation of piers that are driven into the earth and rise high enough above the ground to elevate the house above the flow of flood water. Terrebonne Parish has already raised a number of properties in Roberta Grove, and is currently developing a grant application on behalf of the Houma-Terrebonne Housing Authority to try and raise some units in Senator Circle.

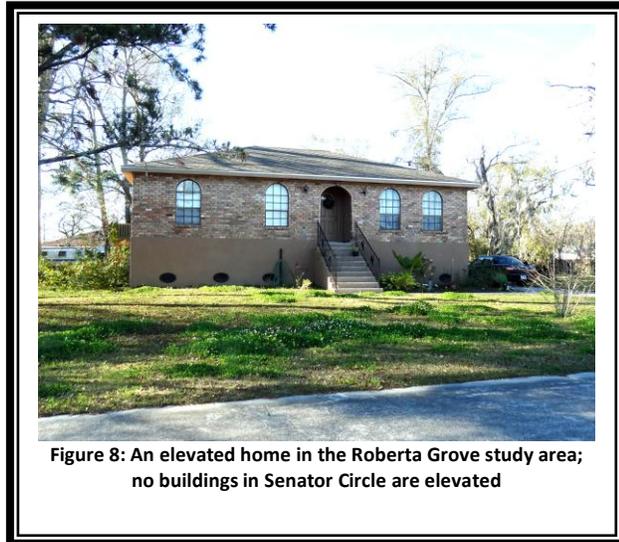


Figure 8: An elevated home in the Roberta Grove study area; no buildings in Senator Circle are elevated

A house elevated on a crawlspace is built or raised on a continuous wall-like foundation that elevates the house above the flood level. If a crawlspace is used, it is important to include vents or openings in the crawlspace that are appropriately sized: one square inch for each square foot of the building's footprint. Figure 8 shows an elevated structure in the Roberta Grove study area. No structures in Senator Circle were elevated.

**A. Cost:** Most of the cost to elevate a building is in the preparation and foundation construction. The cost to elevate six feet is little more than the cost to go up two feet. Elevation is usually cost-effective for wood frame buildings on posts/piles or crawlspace because it is easiest to get lifting equipment under the floor and disruption to the habitable part of the house is minimal.

Elevating a slab house is much more costly and disruptive. In Senator Circle, 100% of the buildings in the study area are slab-on-grade, while in Roberta Grove, 82% of the homes are slab-on-grade. The actual cost of elevating a particular building depends on factors such as its condition, whether it is masonry or brick faced, and if additions have been added on over time.

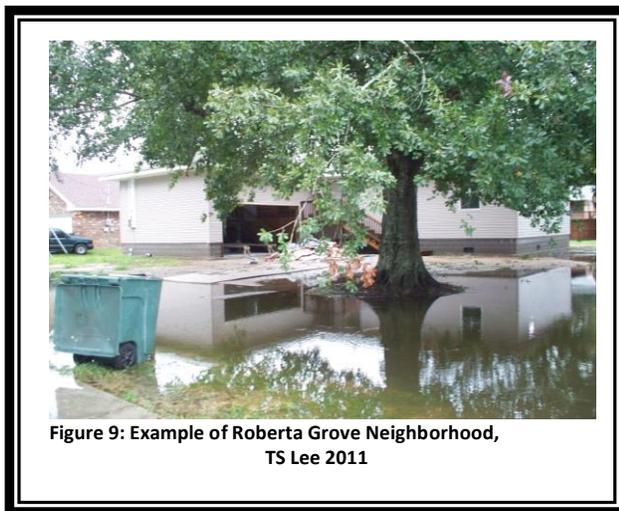


Figure 9: Example of Roberta Grove Neighborhood, TS Lee 2011

While the cost of elevating a home can be high, there are funding programs that can help. The usual arrangement is for a FEMA grant to pay 75% of the cost while the owner pays the other 25%. In the case of elevating a slab foundation, the homeowner's portion could be as high as \$25,000 or more. In some cases, assistance can be provided by the Increased Cost of Compliance (ICC) provision of a flood insurance claim payment, which is discussed on page 35, or state funds.

**B. Feasibility:** Federal funding support for an elevation project requires a study that shows that the benefits of the project exceed the cost of the elevation. Project benefits include future savings in insurance claims that would otherwise be paid on the structure. Elevating a masonry home or a slab can cost over \$100,000, which means that benefit/cost ratios may be low. Looking at each property individually could result in funding for the worst case properties, i.e., those that are lowest, subject to the most frequent flooding, and in good enough condition to elevate.

## II. Barriers to Floodwaters

Small floodwalls, levees, or berms constructed around one or more properties are more dependable if flood depths are less than 3 feet and floodwaters rise and fall quickly. Small floodwalls are appropriate for some of the homes in the Roberta Grove study area, since 60% of the respondents in Roberta Grove and 12.5% in Senator Circle said they had experienced up to 3 feet of floodwater during a flood event.

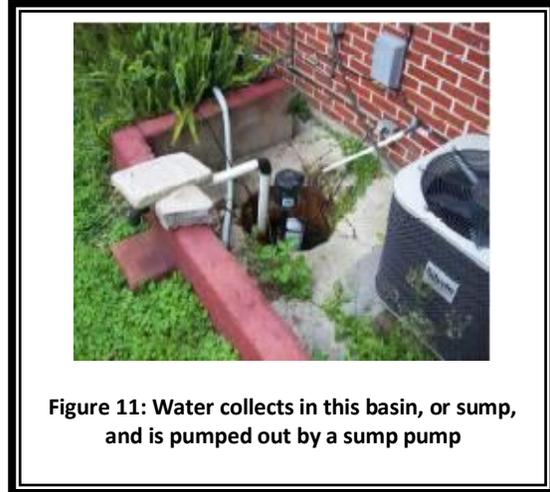
Homes that typically receive 3 feet of floodwater or less, or where the water does not stay up for a considerable amount of time, can benefit from small floodwalls, levees or berms. Levees and berms are more suitable for larger lots, and small floodwalls that are located close to the house are appropriate for suburban style neighborhoods with front and side yard space. Given the suburban setting in both study areas, floodwalls are more appropriate than levees and berms that take up space in the smaller lots. Given the flood depths reported by residents on the returned data sheets, barriers could be an appropriate mitigation measure for some homes in both areas. However, the residents in the Senator Circle study area are not allowed to make structural changes to their properties as they are renters.

In Roberta Grove, barriers could also be appropriate, although residents who experience floodwaters that remain for several hours or days should include internal drainage provisions, as seepage can occur and water will end up inside the barrier. The more permeable the soil, the more floodwaters seep under the barrier. It is important to have a soil sample checked by an engineer to determine rate of permeability. Homeowners who are interested in constructing a barrier to protect their house should consider the following requirements:

- A method to close openings, such as the door in the photo in Figure 16 on page 29. Generally, this requires "human intervention," meaning someone needs to be available and have enough time to take action.
- A system to prevent sanitary sewer backup from flowing into the building.
- Internal drainage provisions are also recommended, including:
  - A system of drain tile (perforated pipes) that collects water that falls or seeps into the protected area and sends it to a collecting basin or "sump,"
  - A sump pump to send the collected water outside the barrier (Figure 11), and
  - Power to operate the sump pump around the clock during a storm.



**Figure 10:** This home is surrounded by a floodwall that doubles as a planter. The garage door must be sandbagged during a flood event



**Figure 11:** Water collects in this basin, or sump, and is pumped out by a sump pump

**A. Cost:** The cost of a local barrier depends on the depth of flooding and the amount of engineering put into the design. Where flooding is only inches deep and of short duration, almost any barrier of concrete or earth will work. The most conservative cost estimate for a floodwall is based on a two foot high engineered cantilevered concrete floodwall. A cantilevered wall has a footing to provide stability and keep the water pressure from pushing it over. The budget shown in Table 4 is for a 40'x 40' home with a wall one foot outside the building wall. Labor accounts for about half of the price in the cost estimate.

It should be noted that smaller, non-engineered walls such as the ones in Figures 10 and 11 have been built by their owners for less than \$10,000. FEMA does not fund individual floodwalls for residential properties; therefore, the homeowner must pay 100% of the cost for a floodwall. However, each person can determine how much of its own labor they want to contribute (which reduces out-of-pocket costs) and whether the cost of the wall is worth the protection from flooding that it provides.

|  |                 |
|--|-----------------|
| Two Foot high reinforced concrete cantilever wall, 168 feet @ \$200/foot | \$33,600        |
| Internal drainage and sump pump system                                   | \$5,000         |
| Sewer backup valve   | \$4,500         |
| Generator for power outages  | \$900           |
| <b>TOTAL</b>   | <b>\$44,000</b> |

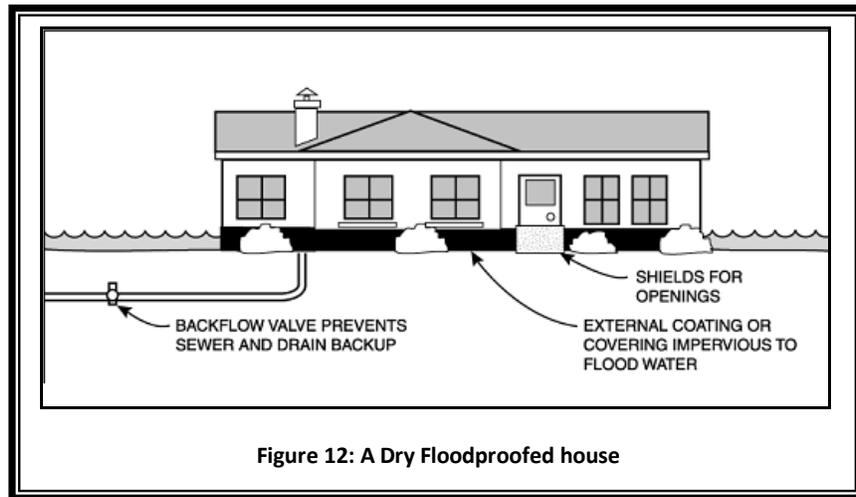
### III. Dry Floodproofing

This measure keeps floodwaters out of a building by modifying the structure. Walls are coated with waterproofing compounds or plastic sheeting. Openings (e.g., doors, windows, and vents) are closed either permanently, or temporarily with removable shields or sandbags.

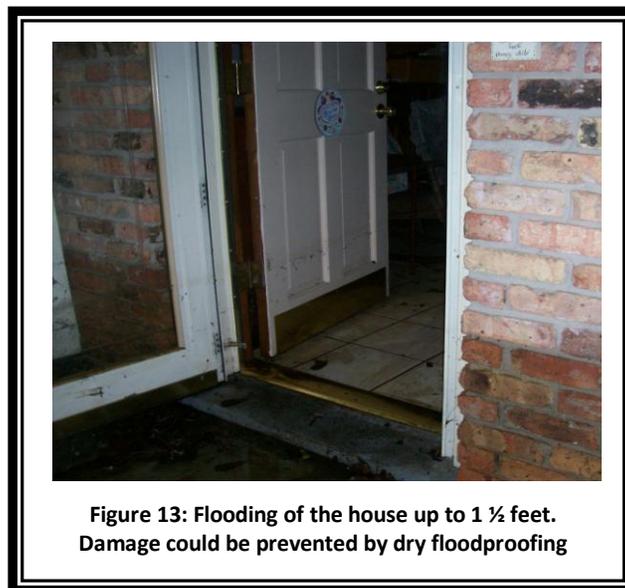
A floodproofing project has three components:

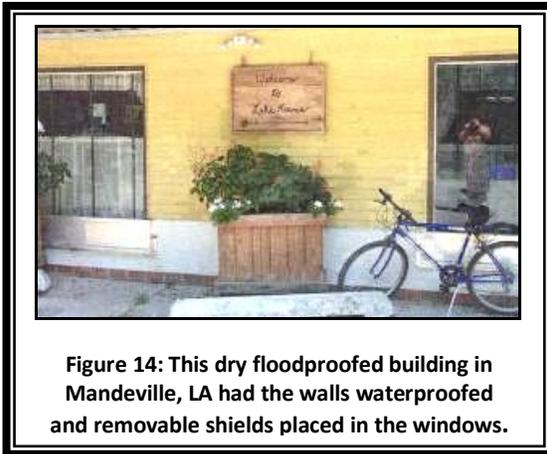
- The walls are made watertight. This is easiest to do for masonry or brick faced walls. The brick or stucco walls can be covered with a waterproof sealant and bricked or stuccoes over with a veneer to camouflage the sealant. Houses with wood, vinyl, or metal siding need to be wrapped with plastic sheeting to make walls watertight, and then covered with a veneer to camouflage and protect the plastic sheeting.

- Provide closures, such as removable shields or sandbags, for the openings; including doors, windows, dryer vents, and weep holes.
- Account for sewer backup and other sources of water entering the building. For shallow flood levels, this can be done with a floor drain plug or standpipe; although a valve system is more secure.



As seen in Figure 12, dry floodproofing employs the building itself as part of the barrier to the passage of floodwaters, and therefore this technique is only recommended for buildings with slab foundations that are not cracked. The solid slab foundation prevents floodwaters from entering a building from below. Also, even if the building is in sound condition, tests by the US Army Corps of Engineers have shown that dry floodproofing should not be used for depths greater than 2 feet over the floor, because water pressure on the structure can collapse the walls and/or buckle the floor.





**Figure 14: This dry floodproofed building in Mandeville, LA had the walls waterproofed and removable shields placed in the windows.**



**Figure 15: This home in Jefferson Parish, LA has permanent shields sealing the space under the windows.**



**Figure 16: This Baton Rouge home has a steel door with gaskets that seal when closed**



**Figure 17: The same Baton Rouge home has thin facing brick placed over the waterproofing materials**

Dry floodproofing is a mitigation technique that is appropriate for some houses in the both study areas: those with slab foundations that typically receive floodwater up to three feet in the house. From the fieldwork it was found that 82% of the houses in Roberta Grove and 100% in Senator Circle are slab-on-grade foundations, and according to the data sheet responses, 60% of the respondents in Roberta Grove and 12% of respondents in Senator Circle experienced flooding.

Not all parts of the building need to be floodproofed. It is difficult to floodproof a garage door, for example, so some owners let the garage flood and floodproof the walls between the garage and the rest of the house. Appliances, electrical outlets, and other damage-prone materials located in the garage should be elevated above the expected flood levels. Examples of floodproofed houses can be seen in the above Figures 14 through 17.

Dry floodproofing has the following shortcomings as a flood protection measure:

- It usually requires human intervention, i.e., someone must be home to close the openings.
- Success of dry floodproofing depends on the building's condition, which may not be readily evident. It is very difficult to tell if there are cracks in the slab under the floor covering.

- Periodic maintenance is required to check for cracks in the walls and to ensure that the waterproofing compounds do not decompose.
- There is no government financial assistance programs available for the dry floodproofing of residential buildings, therefore the entire cost of the project must be paid by the homeowner.
- The NFIP will not offer a lower insurance rate for dry floodproofed residences.

**A. Cost:** The cost for a dry floodproofing project can vary according to the building's construction and condition. It can range from \$5,000 to \$20,000, depending on how secure the owner wants to be. Owners can do some of the work by themselves, although an experienced contractor provides greater security. Each property owner can determine how much of its own labor they can contribute and whether the cost and appearance of a project is worth the protection from flooding that it may provide.

**B. Feasibility:** As with floodwalls, floodproofing is appropriate where flood depths are shallow and are of relatively short duration. It can be an effective measure for some of the structures and flood conditions found in the analysis areas. It can also be more attractive than a floodwall around a house.

#### IV. Utility Protection

This measure applies to several different utilities that can be adversely affected by floodwaters such as:

- Heating, Ventilation, and Air Conditioning (HVAC) systems
- Fuel meters and pipes
- Electrical service boxes, wiring and fixtures
- Sewage systems
- Water systems

Damage to utilities can prevent a residence that remains structurally sound after a flood from being reoccupied. Retrofitting utilities includes things as simple as raising them above the flood level and building small walls around furnaces and water heaters to protect from shallow flooding as shown in Figure 18.

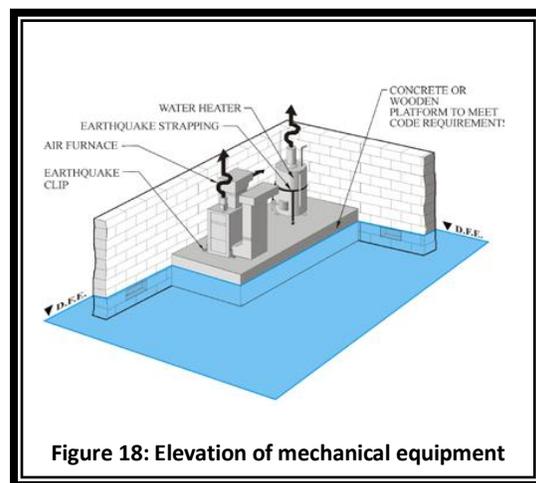


Figure 18: Elevation of mechanical equipment

According to the homeowner's data sheets, 25 (41%) of respondents in Senator Circle and 6% of respondents in Roberta Grove answered that they had moved utilities and/or contents to a higher level as a mitigation measure. There is a FEMA publication that is tailored towards protecting utilities from floodwaters. FEMA document 348: *Protecting Building Utilities from Flood Damage* covers various ways to protect utilities; whether the building is a new construction, declared substantially damaged, or simply an existing structure in need of retrofitting, this document covers different techniques used in protecting utilities.

**A. Cost:** The cost for protecting utilities varies and is dependent upon the measure itself, condition of the system, structure, and foundation. Although, methods for protecting utilities can be performed by the homeowners themselves, it is always a good idea to consult a professional contractor and/or

engineer (depending on the project). The costs can be lower when done as part of a repair or remodeling project.

Residents interested in pursuing a retrofitting measure to protect their utilities should contact the Terrebonne Parish to determine whether a permit is required.

**B. Feasibility:** Given that the flooding experienced by the residents in the study areas includes both shallow and deep flooding, utility protection is a recommended mitigation measure. It should be incorporated even if the building will be protected by a levee or dry floodproofing to provide an extra layer of protection.

## **V. Drainage Improvements**

Residents in both neighborhoods commented that a main reason they flood is due to the poor drainage in the area, namely from Bayou Chauvin. As previously mentioned on page 17 a study was recently completed and the Parish will be implementing recommendations from the study by:

- Digging a 30 acre retention pond north of the Woodlawn pump station; the 30 acres retention pond reduces the peak tail waters by 12 inches;
- Widening the earthen channel of Bayou Chauvin and removing heavy overgrowth which causes debris, build up, and restricts flow; the widening of the channel in addition to the 30 acre retention pond further reduces the peak flows by 2 additional inches.

Coupled with the East Houma Surge Levee, the Bayou Chauvin improvements should provide more protection for the residents of Roberta Grove and Senator Circle than before. While the East Houma Surge Levee is complete, work has not yet begun on the Bayou Chauvin improvements as of this report.

## **VI. Drainage Maintenance Program**

Roberta Grove - Senator Circle's drainage system covers a fairly large area and includes stream channels, backyard, swales, ditches and bayous. The system may not be able to perform to its capacity if trash and debris are allowed to clog storm sewer inlets or the sewer lines. A regular program of drainage system inspections can catch problems in the system before they turn into major obstructions. Therefore, Terrebonne Parish and City of Houma have a drainage maintenance program. They have divided the drainage system into two separate systems:

- A. Gravity drainage system
- B. Forced drainage system.

### A. Gravity Drainage system:

This system includes all the canals, roadside and lateral ditches, culverts and catch basins in the gravity drainage area within the City of Houma and the developed areas of Terrebonne Parish. Gravity Drainage staff inspect and maintain drainage system components on public property and along state highways. Drainage ditches, canals, etc. on private property are the responsibility of the property owner, however, the parish has the authority to perform required maintenance when it is not accomplished by the owner or is an emergency. Gravity drainage staff will also perform required maintenance on drainage components along state highways when it is not provided in a timely manner by the State of Louisiana Department of Transportation.

### B. Forced Drainage System:

Forced Drainage staff covers all the pumps stations, canals and laterals within the forced drainage area of the City of Houma and developed areas of Terrebonne Parish.

Most of the Roberta Grove- Senator Circle study area is in the Forced Drainage System because of the levee protection. However, certain parts of it could also be categorized under Gravity Drainage System; especially around Bayou Chauvin and the ditch near the Roberta Grove subdivision.

### *Inspection and Maintenance:*

The drainage system components within the Gravity Drainage and Forced Drainage areas are inspected at least monthly. The drainage system is also inspected within 24 hours after any storm event that could have an adverse impact on the capacity of the system. Drainage staff also responds to citizen's complaints or notifications of problems with the drainage system. These complaints are usually handled within 1-2 hours.

In addition to regular inspections, screw gates and culverts not associated with pump stations are inspected once per month due to recurring accumulation of debris. Whenever a problem is noted during a routine inspection or responding to a citizen's complaint, a work order is completed and workers are assigned to correct the problem. All trash, garbage, rubber tires or other materials, vegetative growth, and any type of minor or major obstruction are removed. The materials removed from the drainage canals, ditches, etc. are transported to a landfill or suitable repository.

A record of the inspections performed and maintenance work orders is kept to document that problems have been corrected.

## **VII. Maintaining Flood Insurance**

Although not a mitigation measure that reduces property damage from a flood, a NFIP policy has the following advantages for the homeowner or renter:

- A flood insurance policy covers surface flooding from the overflow of inland or tidal waters or from storm water runoff.
- Flood insurance may be the only source of assistance to help owners of damaged property pay for cleanup and repairs.
- Once in effect there is no need for human intervention.<sup>23</sup>
- Coverage is available for the contents of a home as well as for the structure.
- Renters can buy contents coverage, even if the building owner does not buy coverage for the structure itself.

**A. Cost:** Flood insurance rates are based on several factors including what flood zone the building falls in and the age of the structure. All the structures in both areas fall in the AE Zone. Homes constructed before May 19, 1981 in the City of Houma are "pre-FIRM" buildings, which mean that they were built before the date of the first Flood Insurance Rate Map (FIRM) for the community.

A building that is located in the Special Flood Hazard Area (SFHA) and constructed or substantially improved after the date of the most current FIRM - such as one built or substantially improved in 1982 –

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<sup>23</sup> There is a 30-day waiting period for a new flood insurance policy before it goes into effect.

is required to be built above the base flood elevation and is therefore subject to rates based on the actual risk rather than a subsidized rate. Rates on pre-FIRM buildings that are currently insured are subsidized because the flood risk was unknown at the time of construction.

**Biggert-Waters Flood Insurance Reform and Modernization Act of 2012 (“BW12”):** Congress passed, and the President subsequently signed into law, BW12 on July 6, 2012. The main purpose of the Act is to phase out subsidies paid on flood insurance policy premiums with the end goal of making the NFIP financially sound. This is a complicated and intricate act. Certain provisions are already being implemented, and more provisions that will be implemented over 2013 and 2014.

Any resident who wants to know more should go to: [www.fema.gov/BW12](http://www.fema.gov/BW12).<sup>24</sup> It is also important to talk with your flood insurance agent to make sure your policy is up-to-date and to learn more about the impending changes.

**B. Community Rating System (CRS):** The CRS is a voluntary program that incentivizes NFIP participating communities to go above and beyond the minimum requirements for floodplain management. Participating communities are rewarded with reduced insurance premiums. Communities that join the CRS complete floodplain management activities that are worth a certain amount of credit. The more credit earned, the better the class ranking of that community. The CRS has 10 classes; a Class ranking of 10 carries the lowest flood insurance premium reduction, whereas a Class 1 carries the maximum discount. Terrebonne Parish is currently a Class 6; one of only three Class 6 communities in the State of Louisiana.<sup>25</sup> Class 6 is the highest CRS Class achieved by any community in Louisiana.

**Possible Funding Sources:** There are several possible sources of funding for mitigation projects:

- A. FEMA grants
- B. Flood Insurance
- C. Rebates
- D. Small Business Administration Mitigation Loans

**A. FEMA grants:** Most of the FEMA programs provide 75% of the cost of a project. In most Gulf communities, the 25% non-FEMA share is paid by the benefitting property owner. Each program has different Congressional authorization and slightly different rules.

| CRS Class | Discount on SFHA premiums | Discount on non-SFHA premiums |
|-----------|---------------------------|-------------------------------|
| 10        | 0%                        | 0%                            |
| 9         | 5%                        | 5%                            |
| 8         | 10%                       | 5%                            |
| 7         | 15%                       | 5%                            |
| 6         | 20%                       | 10%                           |
| 5         | 25%                       | 10%                           |
| 4         | 30%                       | 10%                           |
| 3         | 35%                       | 10%                           |
| 2         | 40%                       | 10%                           |
| 1         | 45%                       | 10%                           |

**Table 5: CRS Classes and their discounts**

<sup>24</sup> Also, [www.floodsmart.gov](http://www.floodsmart.gov)

<sup>25</sup> The other communities are Jefferson Parish and East Baton Rouge Parish

**1. The Hazard Mitigation Grant Program (HMGP):**<sup>26</sup> The HMGP provides grants to states and local governments to implement long-term hazard mitigation measures after a major disaster declaration. Projects must provide a long-term solution to a problem (e.g., elevation of a home to reduce the risk of flood damage as opposed to buying sandbags and pumps to fight the flood). Examples of eligible projects include acquisition and elevation, as well as local drainage projects.

**2. The Severe Repetitive Loss Program (SRL):**<sup>27</sup> The SRL grant program funds mitigation projects for properties on the severe repetitive loss list. Eligible flood mitigation projects include:

- Acquisition and demolition or relocation of structures that are listed on FEMA’s severe repetitive loss list and conversion of the property to open space.
- Elevation of existing SRL structures to at least the Base Flood Elevation (BFE).

**3. The Flood Mitigation Assistance Program (FMA):**<sup>28</sup> FMA funds assist states and communities in implementing measures that reduce or eliminate the long-term risk of flood damage to structures insured under the NFIP.

- **Project Grants** to implement measures to reduce flood losses, such as elevation, acquisition, or relocation of NFIP-insured structures. States are encouraged to prioritize FMA funds for

| Types of Projects Funded                                 | HMGP | FMA | PDM | RFC  | SRL | ICC  | SBA |
|--|------|-----|-----|------|-----|------|-----|
| Acquisition of the entire property by a gov't agency     | ✓    | ✓   | ✓   | ✓    | ✓   |      |     |
| Relocation of the building to a flood free site          | ✓    | ✓   | ✓   | ✓    | ✓   | ✓    | ✓   |
| Demolition of the structure                              | ✓    | ✓   | ✓   | ✓    | ✓   | ✓    | ✓   |
| Elevation of the structure above flood levels            | ✓    | ✓   | ✓   |      | ✓   | ✓    | ✓   |
| Replacing the old building with a new elevated one       | ✓    |     |     |      | ✓   | ✓    | ✓   |
| Local drainage and small flood control projects          | ✓    |     |     |      | ✓   |      |     |
| Dry floodproofing (nonresidential or historic buildings) |      | ✓   | ✓   |      | ✓   | ✓    | ✓   |
| <b>Percent paid by Federal program</b>                   | 75%  | 75% | 75% | 100% | 75% | 100% | 0   |

**Table 6: Different FEMA grants and the projects covered under each**

applications that include repetitive loss properties; these include structures with 2 or more losses each with a claim of at least \$1,000 within any ten-year period since 1978.

**4. Pre-Disaster Mitigation Program (PDM):** The PDM program provides funds to states, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. There are several requirements that must be met in order to receive PDM funding. For more information please visit <http://www.fema.gov/government/grant/pdm/index.shtm>.

<sup>26</sup> For more information please visit <http://www.fema.gov/government/grant/hmgp/index.shtm>

<sup>27</sup> For more information please visit <http://www.fema.gov/government/grant/srl/index.shtm>

<sup>28</sup> For more information please visit: <http://www.fema.gov/government/grant/fma/index.shtm>

These FEMA grants and the mitigation projects that they cover are summarized in table 6 below summarize the different FEMA grants and the projects they cover.

The Biggert-Waters Act has provisions in it that would consolidate certain grant programs into one umbrella grant program. As previously mentioned in this report, BW12 is complex and still being sorted at this time;<sup>29</sup> and as such, FEMA has not made an official statement regarding the proposed changes to these grant programs.

**B. Flood insurance:** There is a special funding provision in the NFIP for insured buildings that have been substantially damaged by a flood, “Increased Cost of Compliance (ICC)”. ICC coverage pays for the cost to comply with floodplain management regulations after a flood if the building has been declared substantially damaged. ICC will pay up to \$30,000 to help cover elevation, relocation, demolition, and (for nonresidential buildings) floodproofing. It can also be used to help pay the 25% owner’s share of a FEMA funded mitigation project.

The building’s flood insurance policy must have been in effect during the flood. This payment is in addition to the damage claim payment that would be made under the regular policy coverage, as long as the total claim does not exceed \$250,000. Claims must be accompanied by a substantial or repetitive damage determination made by the local floodplain administrator. For more information, contact the insurance agent who wrote your flood insurance policy or visit [www.fema.gov/plan/prevent/floodplain/ICC.shtm](http://www.fema.gov/plan/prevent/floodplain/ICC.shtm).

Coverage under the ICC does have limitations:

- It covers only damage caused by a flood, as opposed to wind or fire damage,
- The building’s flood insurance policy must have been in effect during the flood,
- ICC payments are limited to \$30,000 per structure.
- Claims must be accompanied by a substantial damage determination made by the local floodplain administrator.
- Homeowners should make themselves aware of the approximate value of their homes, and in the case of incurring flood damage, be aware of the need for a substantial damage declaration in order to receive the ICC coverage.

Alternative language adopted into the local floodplain management ordinance would enable residents with shallower flooding to access ICC funding. Since local ordinances determine the threshold at which substantial damage and /or repetitive claims are reached, adopting language that would lower these thresholds would benefit the homeowners of repetitive loss properties. Adopting alternative language allows for cumulative damage to reach the threshold for federal mitigation resources more quickly, meaning that some of the properties in both study areas that sustain minor damage regularly would qualify for mitigation assistance through ICC.

**C. Rebates:** A rebate is a grant in which the costs are shared by the homeowner and another source, such as the local government, usually given to a property owner after a project has been completed. Many communities favor it because the owner handles all the design details, contracting, and payment

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<sup>29</sup> April 2013

before the community provides funding. The owner ensures that the project meets all of the program's criteria, has the project constructed, and then goes to the community for the rebate after the completed project passes inspection. Rebates are more successful where the cost of the project is relatively small, e.g., under \$5,000, because the owner is more likely to be able to afford the bulk of the cost. The rebate acts more as an incentive, rather than as needed financial support.<sup>30</sup>

**D. Small Business Administration Mitigation Loans:** The Small Business Administration (SBA) offers mitigation loans to SBA disaster loan applicants who have not yet closed on their disaster loan. Applicants who have already closed must demonstrate that the delay in application was beyond their control. Measures eligible for SBA mitigation loans may only protect real estate property, not personal items, from the same type of future declared disaster. For more information visit the website <http://www.sba.gov/home> or call 1-800-827-5722. For example, mitigation loans made following a flood can only be used for a measure to protect against future flooding, not a tornado. If the measure existed prior to the declared disaster, an SBA mitigation loan will cover the replacement cost. If the measure did not exist prior to the declared disaster the mitigation loan will only cover the cost of the measure if it is deemed absolutely necessary for repairing the property by a professional third-party, such as an engineer<sup>31</sup>.

## **Step 5: Findings and Recommendations**

### **I. Findings**

Properties in both study areas are subject to flooding due to storm surge, heavy rains, and drainage issues. Bayou Chauvin is unable to move water out of the areas quickly enough due to being undersized, clogged with debris, and shallow in some areas. There are plans in the works currently that aim to address Bayou Chauvin limited capacity. The East Houma Surge Levee has also been completed and should protect the study areas from storm surge coming from the south.

The mitigation recommendations are based on the data shown in the table (Appendices H & I) and data not included in this report (the photographs of the properties, responses on the data sheets, and insurance data subject to the Privacy Act).

### **II. Recommendations**

#### **For Terrebonne Parish**

**Implemented by:** Terrebonne Parish.

**Project duration:** As needed

**Funding sources:** FEMA, Flood Insurance and Small Business Administration Loans.

- Adopt this Area Analysis according to the process detailed in the CRS Coordinator's Manual, 2013.
- Encourage the owners of repetitive flood loss structures to pursue a mitigation measure.

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<sup>30</sup> More information on rebates can be found in the Corps of Engineers' report Local Flood Proofing Programs found at: [http://www.nwo.usace.army.mil/nfpc/NFPC\\_Publications.htm](http://www.nwo.usace.army.mil/nfpc/NFPC_Publications.htm).

<sup>31</sup> For more information visit the SBA Disaster Loans home page on the web at <http://www.sba.gov/services/disasterassistance/>

- Continue to assist interested property owners in applying for a mitigation grant.
- Improve the drainage out of Bayou Chauvin.
- Institute a ditch maintenance program that encourages homeowners to frequently clear their ditches of debris to ensure open flow for stormwater.
- The proposed drainage improvements to Bayou Chauvin will alleviate standing water from heavy rains in both neighborhoods.
- Assist the Houma-Terrebonne Housing Authority in order to mitigate Senator Circle properties.
- Continue to be a part of the CRS and improve the Parish's Class.
- Continue the CRS credited public information activities, such as outreach projects, website, and flood protection assistance, to help residents learn about and implement retrofitting measures.
- As the floodplain management ordinance is being revised, include provisions to provide higher flood protection levels and measures to trigger substantial improvements determinations after repetitive flooding. Also, building of low flood walls around several buildings, rather than addressing each building individually could be useful.

#### **For the Houma-Terrebonne Housing Authority**

**Implemented by:** Houma-Terrebonne Housing Authority

**Project duration:** As needed

**Funding sources:** FEMA, Flood Insurance, Rebates and Small Business Administration Loans

- Make sure residents in Senator Circle are aware of the flood threat and what they can do to protect their belongings.
- Make sure residents in Senator Circle are aware of the availability of renters flood insurance.
- Review the ability of residents in Senator Circle to make structural changes to their apartments for flood protection purposes.
- Work with the Parish to identify structures eligible for mitigation.

#### **For the residents of Roberta Grove and Senator Circle**

**Implemented by:** Residents of Roberta Grove and Senator Circle

**Project duration:** As needed

**Funding source:** NA

- Review the mitigation measures listed in this report and implement those that are appropriate.
- Stay up to date with what Terrebonne Parish is doing in regards to flood protection: [www.tpcg.org](http://www.tpcg.org)
- Purchase or maintain flood insurance policies on the home (if a homeowner) and/or on the contents (homeowner and renters). More information can be found at [www.floodsmart.gov](http://www.floodsmart.gov)
- Keep informed about the changes being made to the NFIP by the implementation of the Biggert-Waters Flood Insurance Reform and Modernization Act of 2012: [www.fema.gov/BW12](http://www.fema.gov/BW12) or [www.floodsmart.gov](http://www.floodsmart.gov)

## Appendix A – Data sheet responses for Senator Circle

| Total Respondents = 8  | %    | Answer   | Number out of 8                           |
|--|------|--|---|
| In what year did you move into the apartment/home at this address? | 12.5 | 1971-1980  | 1   |
|  | 12.5 | 1981-1990  | 1   |
|  | 50   | 2001-2012  | 4   |
|  | 25   | No Response  | 2   |
| What type of foundation does your home have?                       | 62.5 | Slab   | 5   |
|  | 12.5 | Post/Piles   | 1   |
|  | 25   | No Response  | 2   |
| Has the property ever been flooded or have a water problem?        | 37.5 | Yes  | 3   |
|  | 37.5 | No   | 3   |
|  | 25   | No Response  | 2   |
| In what years did it flood?<br>(multiple answers were allowed)     | 37.5 | 2008 (Gustav and Ike)  | 3   |
|  | 12.5 | 2009 (Rain event)  | 1   |
|  | 12.5 | 2012 (Isaac)   | 1   |
|  | 37.5 | No Response  | 3   |
| What was the deepest the water ever got?                           | 25   | 0-2 feet; yard only  | 2   |
|  | 12.5 | Aren't all Senator Circle properties on slab? How would this apply? 12.5 | 3-6 feet; In crawlspace/under first floor |
|  | 12.5 | over first floor   | 1 (5ft. CS;5 ft. First floor)             |
|  | 50   | No Response  | 1 (3 inches)                              |
|  |      |  | 4   |

| <b>Total Respondents =8</b>   | <b>%</b> | <b>Answer</b>                               | <b>Number out of 8</b>    |
|---|----------|---|---------------------------|
| What was the longest time water stayed in the house?<br><br><b>(Multiple answers were allowed)</b>                      | 12.5     | 1 day                                       | 1                         |
|   | 12.5     | 3 days                                      | 1                         |
|   | 75       | No Answer/Not sure                          | 6                         |
| What do you feel was the cause of you flooding?<br><br><b>(Multiple answers were allowed)</b>                           | 62.5     | Drainage from nearby properties             | 5                         |
|   | 62.5     | Storm surge                                 | 5                         |
|   | 37.5     | Clogged/undersized drainage ditch/canal     | 3                         |
|   | 62.5     | Overbank flooding                           | 5                         |
|   | 25       | Storm sewer backup                          | 2                         |
|   | 25       | Other                                       | 2 (Sanitary sewer backup) |
|   | 25       | No Answer/Not sure                          | 2                         |
| Have you taken any flood mitigation protection measures on your property?<br><br><b>(Multiple answers were allowed)</b> | 25       | Sandbagged when water threatened            | 2                         |
|   | 25       | Moved utilities/ contents to a higher level | 2                         |
|   | 62.5     | No answer                                   | 5                         |
| Do you have flood insurance?  | 87.5     | No  | 7                         |
|   | 12.5     | No answer                                   | 1                         |
| Are you interested in learning more about mitigation?   | 50       | Yes   | 4                         |
|   | 25       | No  | 2                         |
|   | 25       | Not sure/No Answer                          | 2                         |

## Appendix B: Data sheet responses for Roberta Grove

| Total Respondents = 15   | %     | Answer      | Number out of 15    |
|--|-------|-------------|---------------------|
| In what year did you move into the apartment/home at this address? | 40    | 1970-1980   | 6                   |
|  | 6.6   | 1981-1990   | 1                   |
|  | 20    | 1991-2000   | 3                   |
|  | 20    | 2001-2012   | 3                   |
|  | 13.33 | No Response | 2                   |
| What type of foundation does your home have?                       | 100   | Slab        | 15                  |
|  | 6.6   | Post/Piles  | 1 (Originally slab) |

|   |       |                       |   |
|---|-------|-----------------------|---|
| Has the property ever been flooded or have a water problem?                     | 60    | Yes                   | 9 |
|   | 40    | No                    | 6 |
| In what years did it flood?<br><br>(multiple answers were allowed)              | 26.6  | 2002 (Lili & Isadore) | 4 |
|   | 33.33 | 2005 (Katrina & Rita) | 5 |
|   | 53.33 | 2008 (Gustav and Ike) | 8 |
|   | 6.66  | 2009 ( Rain event)    | 1 |
|   | 13.33 | 2012 (Isaac)          | 2 |
|   | 26.66 | No Response           | 4 |
| What was the deepest the water ever got?<br><br>(Multiple answers were allowed) | 40    | 0-2 feet; yard only   | 6 |
|   | 60    | over first floor      | 9 |
|   | 26.66 | No Response           | 4 |

| <b>Total Respondents =15</b>  | <b>%</b> | <b>Answer</b>                           | <b>Number out of 15</b>                                       |
|---|----------|---|---|
| What was the longest time that the water stayed in the house?<br><br><b>(Multiple answers were allowed)</b> | 13.33    | 2 days                                  | 2 (Ike)   |
|   | 13.33    | 5 days                                  | 2 (Gustav, Rita)  |
|   | 26.66    | 7 days                                  | 4 (Ike)   |
|   | 6.6      | weeks                                   | 1   |
|   | 6.6      | Never Flooded                           | 1   |
|   | 40       | No Answer/Not sure                      | 6   |
| What do you feel was the cause of you flooding?<br><br><b>(Multiple answers were allowed)</b>               | 33.33    | Drainage from nearby properties         | 5   |
|   | 73.33    | Storm surge                             | 11  |
|   | 46.66    | Clogged/undersized drainage ditch/canal | 7   |
|   | 60       | Overbank flooding                       | 9   |
|   | 13.33    | Storm sewer backup                      | 2   |
|   | 13.33    | Standing water                          | 2   |
|   | 6.66     | Other                                   | 1 (water rise in canals, sanitary back up, pumps not working) |
|   | 13.33    | No Answer/Not sure                      | 2   |

|   |                              |   |                           |
|---|------------------------------|---|---------------------------|
| Have you taken any flood mitigation protection measures on your property?<br><br><br><br><br><b>(Multiple answers were allowed)</b> | 33.33                        | Sandbagged when water threatened            | 5                         |
|   | 20                           | elevated all parts of the building          | 3                         |
|   | 6.66                         | Regraded yard                               | 1                         |
|   | 6.66                         | Installed Drains                            | 1                         |
|   | 6.66                         | Moved utilities/ contents to a higher level | 1                         |
|   | 6.66                         | other                                       | 1 (house above sea-level) |
|   | 26.66                        | No answer                                   | 4                         |
|   | Do you have flood insurance? | 0   | No                        |
| 100   |                              | Yes   | 15                        |
| Are you interested in learning more about mitigation?   | 73.33                        | Yes   | 11                        |
|   | 6.66                         | No  | 1                         |
|   | 20                           | Not sure/No Answer                          | 3                         |

## Appendix C: Letter to residents in Senator Circle



P. O. BOX 6097  
HOUMA, LOUISIANA 70361  
(985) 868-5050



P. O. BOX 2768  
HOUMA, LOUISIANA 70361  
(985) 868-3000

### TERREBONNE PARISH CONSOLIDATED GOVERNMENT

#### PLANNING & ZONING DEPARTMENT REGULATORY DIVISION

January 2<sup>nd</sup>, 2013

Dear Senator Circle Resident:

Terrebonne Parish has partnered with the University of New Orleans' Center for Hazards Assessment, Response and Technology (UNO-CHART) to conduct a study that looks into the repetitive flooding of your neighborhood. The purpose of this study is to get a better understanding of what the flooding issues in the neighborhood are, as well as to offer ideas about how to mitigate the flood losses.

Terrebonne Parish, The Housing Authority, and UNO-CHART would like to invite you to an informative meeting being held on **Wednesday, January 16<sup>th</sup>, 2013 at 6:00pm in the Management and Maintenance (M&M) Auditorium** located at 100 Senator Circle, Houma, LA 70363. At this meeting, there will be a short presentation explaining the study and how it will be carried out.

This work would be greatly improved with additional information that you might be able to provide. Attached is a data sheet that we hope you will complete. After you fill the form out, please bring it with you to the meeting on January 16<sup>th</sup>, 2013 – **or** – bring it to the Office in the Management and Maintenance (M&M) Building if you are unable to attend the meeting.

Before the meeting on January 16<sup>th</sup> 2013, UNO-CHART will be in the area doing "fieldwork:" taking pictures from the street of each building noting the foundation type, estimated elevation above the street, etc. If you would like to talk to the research team about your flooding experiences, this information would greatly enhance this study. The research team **will not** enter your home unless you invite them.

After the study is completed, some preliminary recommendations will be developed. You will be invited to a final meeting with the UNO-CHART team to review the findings. The meeting time and location will be announced once the analysis is near completion. If you have any questions about this project, please feel free to call Lisa Ledet with the Planning & Zoning Department at (985)873-6789 or if you want to talk to the research team call Erin Merrick from UNO-CHART at (504)280-1404. Thank you for your assistance in helping us to complete this project.

Geoffrey Large, MDipMS, CBO, CHCO, CCI, CSI.  
**Assistant Director, Planning and Zoning**  
Head of Regulatory Division & Parish Building Code Administrator  
Terrebonne Parish Consolidated Government

## Appendix D: Letter to residents in Roberta Grove



P. O. BOX 6097  
HOUMA, LOUISIANA 70361  
(985) 868-5050



P. O. BOX 2768  
HOUMA, LOUISIANA 70361  
(985) 868-3000

### TERREBONNE PARISH CONSOLIDATED GOVERNMENT

PLANNING & ZONING DEPARTMENT  
REGULATORY DIVISION

January 3, 2013

Dear Roberta Grove Resident:

Terrebonne Parish has partnered with the University of New Orleans' Center for Hazards Assessment, Response and Technology (UNO-CHART) to conduct a study that looks into the repetitive flooding in your neighborhood. The purpose of this study is to get a better understanding of what flooding issues in the neighborhood are, as well as to offer ideas about how to mitigate the flood losses.

Terrebonne Parish and UNO-CHART would like to invite you to the Roberta Grove Neighborhood Watch Meeting being held on **Thursday, January 17, 2013 at 6:00pm at The Gymnastics Development Center, 110 Rome Commercial Place, Houma, LA 70363**. At this meeting, UNO-CHART will give a short presentation explaining the study and how it will be conducted.

This work would be greatly improved with additional information that you might be able to provide. Attached is a data sheet that we hope you will complete. After you fill the form out, please bring it with you to the meeting on January 17, 2013 – **or** – bring it to Mrs. Mary Aucoin's home at 201 Garden Lane, Houma, LA, 70363 by the meeting date if you are unable to attend.

Before the meeting on January 17, 2013, UNO-CHART will be in the area doing fieldwork: taking pictures from the street of each building, noting the foundation type and estimating elevation above the street, etc. If you would like to talk to the research team about your flooding experiences, this information would greatly enhance this study. The research team **will not** enter your home unless you invite them.

After the study is completed, some preliminary recommendations will be developed. You will be invited to a final meeting with the UNO-CHART team to review the findings. The meeting time and location will be announced once the analysis is near completion. If you have any questions about this project, please feel free to call Lisa Ledet with the Planning & Zoning Department at (985)873-6789 or if you want to talk to the research team call Erin Merrick from UNO-CHART at (504)280-1404.

Thank you for your assistance in helping us to complete this project.

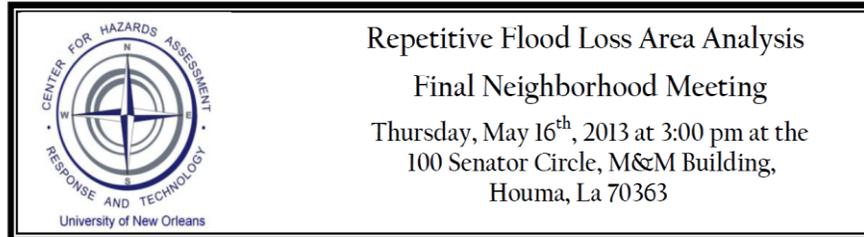
Geoffrey Large, MDipMS, CBO, CHCO, CCI, CSI.  
**Assistant Director, Planning and Zoning**  
Head of Regulatory Division & Parish Building Code Administrator  
Terrebonne Parish Consolidated Government

## Appendix E: Terrebonne Parish Hazard Mitigation Goals

| GOAL #   | Objective  | Action Items   | Timeframe   | Funding                        | Staff                          |                       |
|----------|--|--|---|--------------------------------|--------------------------------|-----------------------|
| <b>1</b> | 1.1 Ensure existing structures are structurally sound to endure hurricane-force winds        | 1.1.1 wind harden structures   | 1-5 years as funding permits  | HMGP; local, regional, federal | Existing parish administration |                       |
|          | 1.2 ensure all citizens and employees of Terrebonne Parish are safe from high winds          | 1.2.1 Construct safe rooms at critical facilities  | 1-5 years as funding permits  | HMGP; local, regional, federal | Existing parish administration |                       |
|          |  | 1.2.2 Install a hazard early warning system  | 1-5 years as funding permits  | HMGP; local, regional, federal | Parish administration          |                       |
|          | 1.3 ensure all 1 <sup>st</sup> responders are adequately equipped to respond to a storm even | 1.3.1 Purchase communication devices   | 1-5 years as funding permits  | HMGP; local, regional, federal | Existing Parish administration |                       |
|          |  | 1.3.2 Purchase generators for critical facilities to ensure operation during and after a hazard event                                | 1-5 years as funding permits  | HMGP; local, regional, federal | Existing Parish administration |                       |
|          | 1.4. Protect citizens from saltwater intrusion   | 1.4.1 Maintain dual potable water intakes  | Ongoing   | Local                          | Existing Parish administration |                       |
|          |  | 1.4.2 Acquire bottled water in event of saltwater intrusion  | As needed   | Local, federal                 | Existing Parish administration |                       |
|          |  | 1.4.3 Pursue Morganza to the Gulf surge protection levee which would in turn reduce the effects of saltwater intrusion               | 1-5 years   | Local, federal                 | Existing Parish administration |                       |
|          | 1.5 Reduce the effects of Land Subsidence  | 1.5.1 Pursue coastal protection projects to reduce land subsidence in coastal areas  | Ongoing   | Local                          | Existing Parish administration |                       |
|          |  | 1.5.2 Ensure accurate survey points are located throughout the parish to monitor continued subsidence                                | Ongoing   | Local, federal                 | Existing Parish administration |                       |
|          |  | 1.5.3 Monitor agricultural activities and encourage smart farming practices to reduce soil compaction and acceleration of subsidence | As needed   | Local, federal                 | Existing Parish administration |                       |
|          | 2  | 2.1 Increase public awareness of hazard areas and educate the public on mitigation   | 2.1.1 Continue to advertise public meetings during the hazard mitigation planning process | 3-5 years                      | HMGP                           | Parish administration |

|          |  |  |                                |                              |  |
|----------|--|--|--------------------------------|------------------------------|--|
| <b>3</b> | 3.1 Eliminate threat of flood damage to structures in Terrebonne Parish including storm surge and levee failure  | 3.1.1 Upgrade current drainage infrastructure  | 1-5 years                      | HMGP                         | Existing designated full-time personnel in public works department |
|          |  | 3.1.2 Construct new flood control structures and levees  | 1-10 years                     | Local, regional, federal     | Existing Parish administration                                     |
|          |  | 3.1.3 Elevate or acquire all RL and SRL structures in Terrebonne Parish  | 1-10 years, as funding permits | HMGP                         | Existing Parish administration                                     |
|          |  | 3.1.4 Elevate equipment that is vulnerable to flood damage   | 1-5 years                      | HMGP                         | Existing Parish administration                                     |
|          |  | 3.1.5 Flood proof all public buildings vulnerable to flood damage  | 1-5 years, as funding permits  | HMGP                         | Existing Parish administration                                     |
|          |  | 3.1.6 Construct Morganza to the Gulf Hurricane Protection Levee which would protect both new and current developments  | 1-10 years, as funding permits | Local, regional, federal     | Existing Parish administration                                     |
| <b>4</b> | 4.1 Promote and permit commercial and industrial development, including public critical facilities, outside of hazard areas to limit business interruption, property damage, and impairment to critical facilities in strict accordance with the parish zoning, flood management, and other applicable state and federal regulations | 4.1.1 Ensure that future development does not increase hazard losses by enforcing building codes   | Ongoing                        | No additional funds required | Parish Administration  |
|          |  | 4.1.2 guide future development away from hazard areas using zoning regulations while maintaining other parish goals such as economic development and improving the quality of life | Ongoing                        | No additional funds required | Parish Administration  |
|          |  | 4.1.3 Enforce the International Building Code requirements for all new construction to strengthen buildings against high wind damage   | Ongoing                        | No additional funds required | Parish Administration  |
|          |  | 4.1.4 Examine current zoning regulations and determine what new regulations could be passed to reduce the effects of hazards on new buildings and infrastructure                   | Ongoing                        | No additional funds required | Parish Administration  |

## Appendix F: Roberta Grove- Senator Circle Invitation Postcard



The University of New Orleans' Center for Hazards Assessment, Response and Technology (UNO-CHART)

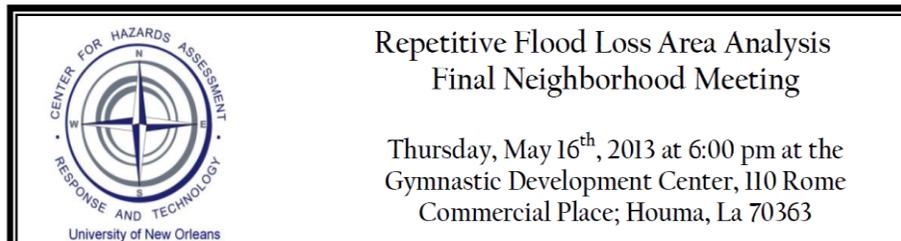
2000 Lakeshore Drive  
Milneburg Hall Room 102  
New Orleans, LA 70148

Phone: 504.280.1404  
Fax: 504.280.4023  
Email: CHART@uno.edu

UNO-CHART has conducted a Repetitive Flood Loss Area Analysis for the City of Houma in the Roberta Grove- Senator Circle neighborhood.

Repetitive Flooding is a shared, community-wide problem. This Repetitive Loss Area Analysis will offer mitigation techniques appropriate for the residents of Roberta Grove & Senator Circle, as well as the City of Houma.

A draft of the report will be presented, and there will be a discussion following the presentation. A copy of the draft report can be found on our website at:  
[www.floodhelp.uno.edu](http://www.floodhelp.uno.edu)



The University of New Orleans' Center for Hazards Assessment, Response and Technology (UNO-CHART)

2000 Lakeshore Drive  
Milneburg Hall Room 102  
New Orleans, LA 70148

Phone: 504.280.1404  
Fax: 504.280.4023  
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A draft of the report will be presented, and there will be a discussion following the presentation. A copy of the draft report can be found on our website at:  
[www.floodhelp.uno.edu](http://www.floodhelp.uno.edu)

## Appendix G: Houma Terrebonne Housing Authority Newsletter about Informational meeting

**Houma Terrebonne Housing Authority**

7491 Park Avenue  
Houma, LA 70364

P.O. Box 3816  
Houma, LA 70361

Your Editors,  
*HTHA Staff*

PRESORTED STANDARD  
U.S. POSTAGE PAID  
Houma, LA  
Permit No. 458

***H.T.H.A Board of Commissioners***

*Allan Luke- Chairman*  
*Pat Cazes-Vice Chairperson*  
*Melissa Ardoin-Commissioner*  
*Chester Dillard-Commissioner*  
*Joe Thompson-Commissioner*

*Don't judge each day by the harvest you reap but by the seeds that you plant.*  
~Robert Louis Stevenson

***Words from the Executive Director***

HUD's Quality Housing and Work Responsibility Act (QHWRA) of 1998 mandates that each and every Public Housing adult Head of Household and household members, with certain exceptions, are required to volunteer and contribute no less than **8 hours of work per month** within the community in which they reside, or to participate on an ongoing basis in an economic self-sufficiency or job training program. All residents should know that Annual Leases are required in public housing and Annual Compliance Reviews are required for the work requirement and your **Dwelling Leases Shall Not Be Renewed** unless the resident, **YOU**, are in compliance with the work requirement. All should know that **This Rule** will be enforced by the Housing Authority! Exceptions from community service work are provided for working families, senior citizens (62 and older), disabled families (must provide proof of the disability) persons attending school or vocational training, or physically impaired persons and tenants who believe they are covered by any of these exceptions should immediately present evidence supporting their claim to the housing manager.

Senator Circle Residents are urged to attend a very important informational meeting on Thursday, May 16, 2013, 3:00 p.m. in the Senator Circle M & M Auditorium which deals with flood Hazards faced while living in the Senator Circle Development and hazard mitigation funding and plans that may affect you. Tenants who have lived in the Development through storms such as Allison, Katrina, Rita, Gustav, Ike, etc. should attend because you may learn of available funding sources pertinent to any losses had during these events and financial assistance previously unknown to you. FEMA officials will be present as well as Terrebonne Parish personnel and elected officials including District 1 council member, the Honorable John Navy.

Finally, tenants should read and become familiar with their dwelling lease. It and it alone represent the legal agreement between you and the PHA. It explains your obligations to the Authority and the Authority's duty to you. Issues such as your failure to report problems inside your unit to housing someone not reported by you as a member of your household, is cause for eviction. The Housing Authority is adopting a zero tolerance position for these type violations. If discovered, these violations will subject you to eviction!

Wayne Thibodeaux  
985-876-4755

## Appendix H: Senator Circle Data Collection and Findings

| Building number | Street Name    | APT_LOT | Occupied? | # of Stories | Elevated above grade | Elevated above street | Structure type | Foundation Type | Foundation Condition | Retrofitted | Mitigation recommendations |
|-----------------|----------------|---------|-----------|--------------|----------------------|-----------------------|----------------|-----------------|----------------------|-------------|----------------------------|
| 100             | SENATOR CIRCLE | A       | YES       | 1            | 1--2                 | 2--3                  | BF             | S               | GOOD                 | NO          | FW                         |
| 100             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 101             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 101             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 102             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 102             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 103             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 103             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 104             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 104             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 105             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 105             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 106             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 106             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 107             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 107             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 108             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 108             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 109             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 109             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 110             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 110             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 111             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 111             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 112             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 112             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 113             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 113             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |

| Building number | Street Name    | APT_LOT | Occupied? | # of Stories | Elevated above grade | Elevated above street | Structure type | Foundation Type | Foundation Condition | Retrofitted | Mitigation recommendations |
|-----------------|----------------|---------|-----------|--------------|----------------------|-----------------------|----------------|-----------------|----------------------|-------------|----------------------------|
| 114             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 114             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 117             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 117             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 118             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 118             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
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| 121             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 122             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 122             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 123             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 130             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 130             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 131             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 131             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 132             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 132             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 133             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 133             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 134             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 134             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 135             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 135             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 146             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 147             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 147             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 148             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 149             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |

| Building number | Street Name    | APT_LOT | Occupied? | # of Stories | Elevated above grade | Elevated above street | Structure type | Foundation Type | Foundation Condition | Retrofitted | Mitigation recommendations |
|-----------------|----------------|---------|-----------|--------------|----------------------|-----------------------|----------------|-----------------|----------------------|-------------|----------------------------|
| 150             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 151             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 151             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 152             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 153             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 153             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 154             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 154             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 155             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 159             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 160             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 160             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 161             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 162             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 162             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 163             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 164             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 164             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 165             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 166             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 167             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 168             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 168             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 169             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 170             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 170             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 171             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 172             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 172             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 173             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 178             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 178             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 179             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |

| Building number | Street Name    | APT_LOT | Occupied? | # of Stories | Elevated above grade | Elevated above street | Structure type | Foundation Type | Foundation Condition | Retrofitted | Mitigation recommendations |
|-----------------|----------------|---------|-----------|--------------|----------------------|-----------------------|----------------|-----------------|----------------------|-------------|----------------------------|
| 179             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 180             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 180             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 181             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 181             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 182             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 182             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 185             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 185             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 186             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 186             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 187             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 187             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 188             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 188             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 189             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 189             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 190             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 190             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 191             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 191             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 192             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 192             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 193             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 193             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 194             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 194             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 195             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 195             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 196             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 196             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 197             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 198             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |

| Building number | Street Name    | APT_LOT | Occupied? | # of Stories | Elevated above grade | Elevated above street | Structure type | Foundation Type | Foundation Condition | Retrofitted | Mitigation recommendations |
|-----------------|----------------|---------|-----------|--------------|----------------------|-----------------------|----------------|-----------------|----------------------|-------------|----------------------------|
| 198             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 200             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 200             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 201             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 201             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 202             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 202             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 203             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 203             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 204             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 204             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 209             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 210             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 210             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 213             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 214             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 214             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 217             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 217             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 218             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 218             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 219             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 219             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 220             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 221             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 221             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 222             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 222             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 225             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 225             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 226             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 226             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 229             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |

| Building number | Street Name    | APT_LOT | Occupied? | # of Stories | Elevated above grade | Elevated above street | Structure type | Foundation Type | Foundation Condition | Retrofitted | Mitigation recommendations |
|-----------------|----------------|---------|-----------|--------------|----------------------|-----------------------|----------------|-----------------|----------------------|-------------|----------------------------|
| 229             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 230             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 233             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 233             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 234             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 234             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 237             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 237             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 238             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 238             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 241             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 241             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 242             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 242             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 244             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 244             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 245             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 245             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 246             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 246             | SENATOR CIRCLE | B       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 247             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 247             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 248             | SENATOR CIRCLE | A       | NO        | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 250             | SENATOR CIRCLE | A       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |
| 250             | SENATOR CIRCLE | B       | YES       | 1            | 0-1                  | 1--2                  | BF             | S               | GOOD                 | NO          | FW                         |

## Appendix I: Roberta Grove Data Collection and Findings

| Building number | Street Name | Occupied? | # of Stories | Elevated above grade | Elevated above street | Structure type | Foundation Type | Foundation Condition | Adeq. Vents | Retrofitted | Mitigation recommendations |
|-----------------|-------------|-----------|--------------|----------------------|-----------------------|----------------|-----------------|----------------------|-------------|-------------|----------------------------|
| 2               | GOODWOOD    | YES       | 1            | 5--6                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 3               | GOODWOOD    | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 4               | GOODWOOD    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 5               | GOODWOOD    | YES       | 1            | 3--4                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 100             | ROBERTA GR  | YES       | 1            | 0-1                  | 3--4                  | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 103             | ROBERTA GR  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 200             | ROBERTA GR  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 201             | ROBERTA GR  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 201             | GARDEN LN   | YES       | 2            | 1--2                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | ELVT                       |
| 203             | ROBERTA GR  | NO        | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 203             | GARDEN LN   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 204             | ROBERTA GR  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 205             | ROBERTA GR  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 205             | GARDEN LN   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 206             | ROBERTA GR  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 207             | GARDEN LN   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 209             | ROBERTA GR  | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 301             | ROBERTA GR  | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 302             | WAKEFIELD   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 304             | ROBERTA GR  | YES       | 1            | 4--5                 | 0-1                   | BF             | S               | GOOD                 | YES         | YES         | MITI                       |
| 309             | ROBERTA GR  | YES       | 2            | 4--5                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 401             | ROBERTA GR  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 402             | ROBERTA GR  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | YES         | DF/FW                      |
| 403             | ROBERTA GR  | YES       | 2            | 1--2                 | 0-1                   | ?              | CS              | GOOD                 | ?           | YES         | ELEV                       |
| 499             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 500             | MIDDLEWOOD  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |

| Building number | Street Name | Occupied? | # of Stories | Elevated above grade | Elevated above street | Structure type | Foundation Type | Foundation Condition | Adeq. Vents | Retrofitted | Mitigation recommendations |
|-----------------|-------------|-----------|--------------|----------------------|-----------------------|----------------|-----------------|----------------------|-------------|-------------|----------------------------|
| 501             | WOODSIDE    | YES       | 1.5          | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 502             | MIDDLEWOOD  | YES       | 1            | 0-1                  | 0-1                   | WF             | S               | GOOD                 | NA          | NO          | MITI                       |
| 503             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 504             | WOODHAVEN   | YES       | 1            | 4--5                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 504             | WOODSIDE    | NO        | 2            | 0-1                  | 0-1                   | BF             | S               | FAIR                 | NA          | NO          | DF/FW                      |
| 505             | WOODHAVEN   | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 505             | MIDDLEWOOD  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 505             | WOODSIDE    | YES       | 1.5          | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 506             | WOODHAVEN   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 506             | OAKWOOD     | YES       | 1            | 4--5                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 507             | OAKWOOD     | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 507             | MIDDLEWOOD  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 507             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 509             | OAKWOOD     | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 509             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 510             | WOODHAVEN   | YES       | 1            | 4--5                 | 0-1                   | BF             | CS              | GOOD                 | ?           | YES         | MITI                       |
| 510             | MIDDLEWOOD  | YES       | 1            | 5--6                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 510             | WOODSIDE    | NO        | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | TO BE MITI                 |
| 511             | WOODHAVEN   | YES       | 2            | 1--2                 | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 511             | OAKWOOD     | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 511             | WOODSIDE    | YES       | 2            | 5--6                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 512             | WOODHAVEN   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 512             | MIDDLEWOOD  | YES       | 1            | 1--2                 | 0-1                   | WF             | CS              | GOOD                 | NA          | NO          | ELEV                       |
| 512             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 513             | OAKWOOD     | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 514             | WOODHAVEN   | YES       | 1            | 4--5                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 514             | OAKWOOD     | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 515             | WOODHAVEN   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 515             | OAKWOOD     | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 515             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |

| Building number | Street Name | Occupied? | # of Stories | Elevated above grade | Elevated above street | Structure type | Foundation Type | Foundation Condition | Adeq. Vents | Retrofitted | Mitigation recommendations |
|-----------------|-------------|-----------|--------------|----------------------|-----------------------|----------------|-----------------|----------------------|-------------|-------------|----------------------------|
| 516             | WOODHAVEN   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 516             | MIDDLEWOOD  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 516             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 517             | WOODHAVEN   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 517             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 518             | WOODHAVEN   | YES       | 1            | 4--5                 | 0-1                   | BF             | CS              | GOOD                 | YES         | NO          | MITI                       |
| 518             | OAKWOOD     | YES       | 1            | 4--5                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 518             | MIDDLEWOOD  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 518             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 519             | OAKWOOD     | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 519             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 520             | MIDDLEWOOD  | YES       | 1            | 0-1                  | 0-1                   | WF             | S               | GOOD                 | NA          | NO          | FW                         |
| 520             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 521             | OAKWOOD     | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 521             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 522             | MIDDLEWOOD  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 522             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 523             | OAKWOOD     | YES       | 1            | 4--2                 | 0-1                   | WF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 524             | MIDDLEWOOD  | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | MITI                       |
| 525             | MIDDLEWOOD  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 528             | MIDDLEWOOD  | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 530             | MIDDLEWOOD  | YES       | 1            | 5--6                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 601             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 605             | WOODSIDE    | NO        | 1            | 0-1                  | 0-1                   | WF             | S               | GOOD                 | NA          | NO          | FW                         |
| 606             | WOODSIDE    | NO        | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 607             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 608             | WOODSIDE    | NO        | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 609             | WOODSIDE    | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 613             | WOODSIDE    | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 614             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 616             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | WF             | S               | GOOD                 | NA          | NO          | DF/FW                      |

| Building number | Street Name | Occupied? | # of Stories | Elevated above grade | Elevated above street | Structure type | Foundation Type | Foundation Condition | Adeq. Vents | Retrofitted | Mitigation recommendations |
|-----------------|-------------|-----------|--------------|----------------------|-----------------------|----------------|-----------------|----------------------|-------------|-------------|----------------------------|
| 617             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 620             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 621             | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 622             | WOODSIDE    | NO        | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3008            | WOODCREST   | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3009            | WOODCREST   | YES       | 1            | 1--2                 | 0-1                   | WF             | CS              | GOOD                 | NO          | NO          | MITI                       |
| 3301            | WAKWFIELD   | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3302            | WAKWFIELD   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3304            | WAKWFIELD   | YES       | 1.5          | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3304            | WOODCREST   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3305            | WOODCREST   | YES       | 1            | 3--4                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 3306            | WAKEFIELD   | YES       | 1            | 4--5                 | 1--2                  | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 3306            | WOODCREST   | YES       | 1            | 0-1                  | 0-1                   | WF             | S               | GOOD                 | NA          | NO          | DF                         |
| 3307            | WAKEFIELD   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3308            | WAKEFIELD   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3309            | WOODCREST   | YES       | 1            | 1--2                 | 0-1                   | WF             | S               | GOOD                 | NA          | NO          | MITI                       |
| 3311            | WOODCREST   | YES       | 1            | 4--5                 | 0-1                   | BF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 3313            | WOODCREST   | YES       | 2            | 4--5                 | 0-1                   | WF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 3400            | WAKEFIELD   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3401            | BELMONT     | YES       | 2            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3402            | WOODCREST   | YES       | 2            | 0-1                  | 0-1                   | WF             | S               | GOOD                 | NA          | NO          | DF                         |
| 3403            | WAKEFIELD   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3403            | WOODCREST   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 3419            | BANCROFT    | YES       | 1            | 2--3                 | 0-1                   | WF             | CS              | GOOD                 | YES         | YES         | MITI                       |
| 3500            | WOODSIDE    | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 9496            | MAIN ST     | YES       | 1            | 0-1                  | 3--4                  | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |
| 9470            | E MAIN ST   | YES       | 1            | 0-1                  | 0-1                   | BF             | S               | GOOD                 | NA          | NO          | DF/FW                      |

BF = Brick Faced; WF = Wood Frame; S = Slab; FW = Flood Wall; DF = Dry floodproofing; CS = Crawl Space  
 ELVT = Elevated; MITI = Mitigated

### Final Informational Meeting, May 16<sup>th</sup>, 2013

A pre-draft-submission informational meeting was held at Roberta Grove and Senator Circle neighborhoods on May 16<sup>th</sup>, 2013. Neighborhood Residents, Department of Planning and Zoning, Terrebonne Parish Council District 1 and District 8, Homeowners Association (Roberta Grove), Housing Authority (Senator Circle), LSU Sea Grant and FEMA Region VI were notified (3) three weeks prior to the meeting dates. Senator Circle Housing Authority had also sent out a notice on their newsletter to remind the residents about the meeting. Copies of the notice and the invitation post card can be found in Appendices F and G.

Erin Merrick and Nandini Seth undertook the Repetitive Flood Loss Area Analysis (RLAA) for the neighborhood and represented UNO-CHART at the meeting. The following were presented and explained:

- The intent of the informational meeting requirement in a RLAA was explained to the community,
- Copies of Repetitive Loss Area Analysis (RLAA) draft were handed out to the residents to encourage them to send feedbacks to the UNO-CHART team,
- Project findings were discussed in detail,
- Alternative mitigation measures were suggested by UNO-CHART team of experts,
- Community Rating System (CRS) was discussed in relation to earning credits by utilizing RLAA.
- Recommendations were explained for both the neighborhoods separately.

The following is the summary of attendees concern/ comments:

- Many attendees stated that cleaning, widening and deepening of Bayou Chauvin can alleviate flooding problems in the study area.
- The institution of Wal-Mart and the new subdivision was discussed. The residents suggested that building a retention pond near the new subdivision will be used to capture excess runoff that Bayou Chauvin cannot contain.



Figure 19: Final Informational meeting at Roberta Grove



Figure 20: Final Informational meeting at Senator Circle

