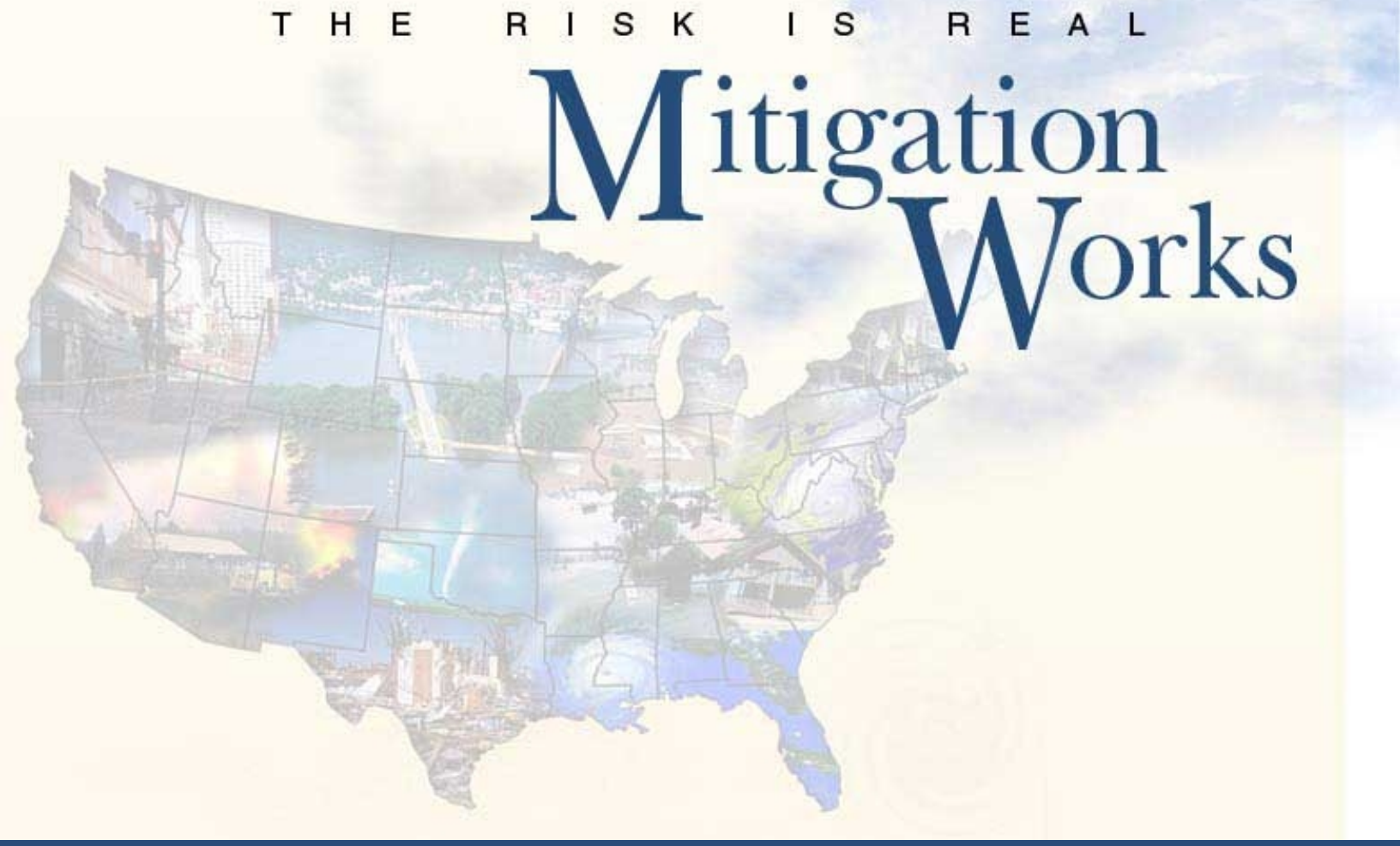

Mitigation Best Practices

Public and Private Sector Best Practice Stories for All Activity/Project Types in Texas relating to All Hazards

June 5, 2010

FEMA

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Mitigation Measures Alleviate Drainage Problem

Tarrant County, Texas

Grapevine, TX – Oak Grove Park's Ballfield Complex, located in Grapevine, Texas, was built in the 1960s and is home to local baseball and soccer teams. Over the years, surface water resulting from inadequate drainage along with additions to the park caused flood and maintenance issues and posed problems for pedestrians.

Acting upon requests and recommendations for new fields, the City of Grapevine came up with a master plan. This plan would create a unique park by creating berms, drainage ditches, retention walls, installing storm water drainage pipes, uprooting and replanting trees, and elevating the land in targeted areas to prevent future flooding of the park.

"During the design and development stage, I along with several staff members toured many, many complexes," said Kevin Mitchell, Assistant Director of Parks and project manager. "We wanted to look at the good as well as the bad. And we tried not to make the same mistakes that we noted."

The first obstacle to overcome was the temporary removal of hundreds of oak trees. Grapevine, Texas, is a member of "Tree City USA," a tree planting and tree care program sponsored by The National Arbor Day Foundation for cities and towns in the United States. A temporary tree farm and irrigation system were created to house and nourish the relocated trees during construction. Construction occurred around groups of trees that could not be uprooted. "We spent just shy of one-fourth of a million dollars digging up trees, moving them, and then moving them back," said Mitchell.

By nature, stormwater collects debris, chemicals, dirt, and other pollutants before flowing into a storm sewer system or directly to a lake, stream, river, or wetland. Hence, the planners utilized stormwater management as a tool to prevent this debris from entering the water system. "We used storm scepters, something new to the project, to separate the sand, silt, and clay and keep debris from going back into the lake," said Mitchell. The scepters allow water to enter into a swirl chamber where it is filtered before moving into a "floatable" chamber. There, general debris are collected before the water is sent to the outlet chamber for disbursement into Lake Grapevine. Berms were created as an additional filtering system, allowing water to flow through grassy areas that serve as a bio-filtering system before it reaches the lake.

Design and development also included land elevation at varying heights. For example, the area where the newly constructed concession building and public restrooms are located was elevated above nine foot. Retention walls were strategically placed to stabilize the soil from down slope movement and erosion, especially since tiered landscaping was utilized throughout the park. It also gave rise to more useable land.

Quick Facts

Sector:
Public

Cost:
$13,000,000.00 (Estimated)

Primary Activity/Project:
Mitigation Planning/Disaster Resistant Universities

Primary Funding:
Local Sources

Homes Built on Slab Foundations Can Be Elevated, Too

Harris County, Texas

Shoreacres, TX - Retrofitting a home to elevate it above the base flood elevation (BFE) level is one of the most common approaches homeowners take to help protect their homes against flooding. But there's a widely held false belief that homes with slab foundations cannot be elevated. While it may be more costly to elevate a home built on a slab foundation compared to one built on pier-and-beam foundation, with the costs varying depending upon the method used, it may prove worth the investment in the event flooding occurs.

A Texas couple whose home had a slab foundation decided to elevate their house after Hurricane Ike (2008) caused a storm surge that flooded their home. Peter and Jessica McCloud of Shoreacres, a city located on Galveston Bay, took the unusual step of elevating their home themselves.

Hurricane Ike's storm surge caused flooding a mile and a half inland in Shoreacres, resulting in widespread damage from floodwaters that reached up to 17 feet. The McClouds's 2,600-square-foot home, which the couple bought three years before Hurricane Ike hit and was near completion of being remodeled, received two feet of water in the storm surge. But the couple never thought of moving away from their home, even though city codes mandated that the home be elevated if it were to be repaired.

Peter is an engineer and so is his father, and they were aided in the project with family friends who were also engineers. So the McClouds had available to them engineering expertise not normally available in a do-it-yourself home project.

"I have a reputation for doing things on my own," said Peter of the couple'ss decision to elevate their home themselves rather than using a contractor. "We had received quotes from contractors, who were supposed to get back to us regarding the work and the engineer's structural drawings. After a month, they still had nothing. Finally, we told them we'd pay for the engineer's drawings, but we were going to do it ourselves."

Jessica added, "When we decided to do it on our own, it was a weight off our minds."

In doing any type of home elevation, it's important to obtain necessary permits and follow local building codes, and the couple was careful to do that.

To repair and elevate their home, Peter and Jessica were able to use funds received from their flood insurance policy with the Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP). Most standard NFIP polices include coverage called Increased Cost of Compliance (ICC) that provide up to an additional $30,000 for hazard mitigation, money the couple used for elevating their home. In addition, they received a low-interest disaster loan from the U.S. Small Business Administration.

Note: Although this couple elevated their home themselves, FEMA recommends that home elevations be undertaken in consultation with experts that include local building code authorities, engineers, and contractors.

Quick Facts

Year:
2008

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Elevation, Structural

Primary Funding:
National Flood Insurance Program (NFIP)

Don't Drop the Ball: See Your Agent About Flood Insurance

Galveston County, Texas

Galveston, TX – When Roy De Gesero and his wife, Stephanie, purchased their Galveston home in 2003, the mortgage lender informed them they were not required to carry a flood insurance policy on the house. De Gesero discovered that the property was outside of, but adjacent to, the regulatory floodplain, an area that has a 1-percent chance of flooding in any year. Despite not needing flood insurance for the mortgage, the De Geseros purchased coverage anyway.

"I've been working in water management and wastewater treatment for the past 40 years," De Gesero explained. "I understand what water does. It's a very powerful medium. I know that if you live close to water, a lot of things can happen that you don't necessarily want to happen."

The De Geseros maintained a flood insurance policy on their home for five years after purchasing the house. On September 13, 2008 Hurricane Ike smashed into Galveston Island as a Category 2 storm, damaging and destroying thousands of homes and commercial buildings. Ike was responsible for significant loss of life, and resulted in billions of dollars in damage and recovery costs throughout the Gulf Coast.

According to De Gesero, Ike's tidal surge forced 18 inches of water into the living space of their home, as well as 26 inches of water into their garage. Damage to the De Geseros' home exceeded $100,000. Fortunately, their flood insurance coverage was enough to repair the structural damage.

De Gesero said he and his wife were lucky, adding that nearby homes were hit with the full force of rushing water and debris that "acted like a battering ram on their homes. All those houses are severely damaged and, unfortunately, many of those folks didn't have flood insurance."

The De Geseros' insurance agent, Reggie Wendell, is affiliated with an agency that focuses on homeowners' policies primarily in Fort Bend, Harris, and Galveston counties. Approximately 25 percent of their clients carry flood policies in addition to homeowners' policies, despite the fact that only a very small number of the structures insured are located in regulatory floodplains and require flood coverage.

"I would say that we were proactive in creating 80 percent of those flood policies," said Wendell. He advised that insurance agents need to pay attention to all customers individually and identify the risks and exposures they have.

"There are a lot of homeowners out there who don't even know they're in danger, because they're not in the floodplain and have never investigated their flood risk," he said.

According to Federal Emergency Management Agency (FEMA) statistics, approximately 25 percent of flood insurance claims filed every year come from areas outside the regulatory floodplain. This figure represents an enormous number of homes that are not required to carry flood insurance and where the owners likely never suspect their homes are at risk from flood damage.

Quick Facts

Sector:
Public/Private Partnership

Cost:
Amount Not Available

Primary Activity/Project:
Education/Outreach/Public Awareness

Primary Funding:
National Flood Insurance Program (NFIP)

FEMA Helped Local Officials with Home Inspections and Technical Assistance

Galveston County, Texas

Galveston TX – When Hurricane Ike slammed into the city of Galveston as a Category 2 storm on September 13, 2008, it pushed a 12-foot storm surge ahead of it, damaging or destroying as many as 70 percent to 80 percent of the residential structures in the city. As residents returned, many found their homes were unlivable. The immediate concern for Galveston's city officials was to get people back in their homes as quickly and safely as possible.

The city's laws apply different requirements for rebuilding of homes in floodprone areas, depending on the amount of damage they received. Before building permits could be issued, determinations needed to be made about the extent of damage.

"My office normally issues an average of 500 residential and commercial repair permits a month," said David Ewald, a 23-year city employee who became the City of Galveston Building Official and Floodplain Manager in 2000. "That's 6,000 permits a year." In contrast, his office issued 14,000 permits in the first four months after Hurricane Ike. "That should tell you with the amount of staff I have, and the tremendous load on us, we just didn't have the time to go out and perform all those inspections," Ewald said.

Ewald's office is responsible for the overall safety and stability of structures within the city. In the specific area of flood safety, he relies on the National Flood Insurance Program, (NFIP) a Federal program that enables people living in participating communities to purchase flood insurance coverage.

To maintain their standing in the NFIP, communities are required to enforce ordinances that regulate building in regulatory floodplains, which are areas that would be inundated in a flood that has a 1-percent chance of occurring in any year, according to engineering studies. These areas are identified as Special Flood Hazard Areas (SFHAs) on Flood Insurance Rate Maps (FIRMs) that are developed by the Federal Emergency Management Agency (FEMA) and adopted by communities that participate in the NFIP.

One responsibility of building officials in participating communities is to determine degrees of structural damage to buildings within regulatory floodplains in their jurisdiction following any type of disaster or damaging event, whether flood related or not. If a building is damaged 50 percent or more of the market value of the structure, it is considered to be "substantially damaged" and the owner is required to bring that structure into compliance with the community's flood damage prevention ordinances. If, on the other hand, the damage is less than 50 percent, the owner may receive permits to rebuild without additional flood safety requirements.

"The problem is, I have three building inspectors, as well as myself, to perform substantial damage determinations," said Ewald. "With a staff that small, and with the size of this disaster, and the number of structures we had to look at, there was no way we could have done it without help."

Quick Facts

Year:
2008

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Cooperative Technical Partner Activity

Primary Funding:
Hazard Mitigation Technical Assistance Program (HMTAP)

Harris County Flood Control District: Continuous Updates Program

Harris County, Texas

Quick Facts

Sector:
Public

Cost:
$1,500,000.00 (Estimated)

Primary Activity/Project:
Education/Outreach/Public Awareness

Primary Funding:
Local Sources

Harris County, TX - The Harris County Flood Control District (HCFCD), a Cooperating Technical Partner (CTP) in association with the Federal Emergency Management Agency (FEMA), recently completed a countywide Flood Insurance Study (FIS) restudy for Harris County, Texas (Houston, Texas). This restudy resulted in the modeling and floodplain delineation of 22 major watersheds and approximately 1,300 miles of channels using HEC-HMS and HEC-RAS. The new floodplain maps became effective on June 18, 2007.

Harris County, Texas is a growing community with a highly active floodplain-related development. Presently there are many Letter of Map Changes (LOMC), consisting of both a Conditional Letter of Map Revisions (CLOMR) and Letter of Map Revisions (LOMR), in the queue at FEMA. These map revisions will be approved in the near future and will change the models and floodplains within Harris County. Furthermore, additional CLOMRs and LOMRs will be submitted to FEMA in the future by local floodplain managers and consultants. With the vast number of LOMRs and CLOMRs, maintaining the models into the future by considering all the map revisions is a considerable challenge. HCFCD has developed a solution to properly manage the models into the future on a continuous basis. This program is called “continuous updates.”

The goal of continuous updates is to manage a master set of current and accurate hydrologic and hydraulic models and their supporting data for watersheds in Harris County. These models are developed and maintained to:

1. Support the Flood Control District’s planning and project development activities,

2. Provide local communities an understanding of flood risk [e.g., FEMA’s National Flood Insurance Program (NFIP)], and

3. Provide the development community with realistic tools to assess and plan development projects.

HCFCD has become engaged in the management of the effective models and associated data; these activities are outlined in Mapping Activity Statement (MAS) No. 14. In order to accomplish the objective outlined above, HCFCD shall be the custodian of the model sets and supporting data. The items in MAS No. 14 are as follows:

1. HCFCD development of Modeling Management Standards to ensure consistent products.

2. HCFCD development of a web-based application to distribute, notify, and check models and supporting data.

3. Continuous updating of the FEMA effective model set by incorporating recently approved LOMRs into the master model set, which then can be distributed to the community through HCFCD's web-based application.

School Continues to Serve as a "Beacon of Hope"

Jefferson County, Texas

Sabine Pass, TX - On the morning of September 13, 2008, Hurricane Ike tore into Sabine Pass, located on the upper Texas Gulf Coast. The storm destroyed many of the town's buildings, but one structure, the Sabine Pass School with its "Beacon of Hope" lighthouse, escaped seemingly unscathed. This achievement didn't happen overnight. Knowing the school was the focal point of the community, school officials began planning in 1998 to safeguard it. People used the school for holiday celebrations and many other community activities. Residents were loyal to the school, and so a bond measure was easily passed to help with the costs associated with building a new 57,644-square-foot structure that would be stronger and safer than the original school building.

The school's former superintendent, Dr. Tom Harvey, and other officials wanted to design a structure that could withstand a Category 4 hurricane. They wanted the building to be a reflection of Sabine Pass School and the community. They also wanted a structure that would be a model for other schools along the coast. School officials chose an architectural firm to design and oversee the construction that was knowledgeable in successful coastal mitigation techniques and building and wind code requirements established by the Texas Department of Insurance.

To resist the hurricane force winds, architects designed a flat roof with three layers of protection. These layers begin with corrugated metal decking followed by the placement of rigid insulation, topped off by a rubber membrane. Impact-resistant windows were made of 9/16-inch laminated safety glass.

Meanwhile, strengthening the elevated foundation became one of the main design missions suggested by the architectural firm. "It's amazing what had to be done prior to the actual elevation of the structure," said Malcolm Nash, Sabine Pass School's current superintendent. One of the strengthening techniques was the use of structural elements called auger cast piles, which support the footings and columns of the school's open foundation. Contractors drilled holes 72 feet deep; as the drill came out, concrete was injected into the holes. While the concrete was wet, rebar was inserted as the final reinforcing element. Beneath the school building are 360 auger casts piles, each six to eight inches wide, with two to five auger casts supporting each column that the school sits on. To complete the strengthening process are footings above all of the auger cast piles that hold the columns. Nash said the underground mitigation steps were "crucial to the fortification of elevating the school" and ultimately helped protect it from the powerful forces of both hurricanes Rita (2005) and Ike.

Quick Facts

Year:
1998

Sector:
Public/Private Partnership

Cost:
Amount Not Available

Primary Activity/Project:
Elevation, Structural

Primary Funding:
Local Sources

Flood Insurance Helps Speed Up Recovery

Galveston County, Texas

Galveston, TX – Homes in Galveston were devastated with the arrival of Hurricane Ike, a storm that brought a 12-foot surge to the island on September 13, 2008. Rebuilding will continue for years, but one 83-year-old living in Galveston was able to start rebuilding her home quickly because she had insured it through the National Flood Insurance Program (NFIP).

"I'm the only one on my street who's able to start the re-building process," said Delores King, as she waited for the arrival of bids to repair her home. "I am also one of the few people on this street with flood insurance."

Renters, homeowners, and business owners in participating communities are eligible to purchase flood insurance policies, which are sold and serviced by private insurers. Coverage is available throughout participating communities, but the cost of policies varies according to the degree of risk.

For hundreds of miles along the Texas coast, Ike left behind a numbingly consistent trail of devastation. Houses on Galveston's 56th Street, where King lives, were not spared. Wind gusts removed roofs and shingles and reduced some homes to rubble. Floodwaters inundated every home. King reported four feet of water in her home. As neighbors faced uncertainty about repairing their homes, King's flood insurance claim to help repair her home was being processed.

King, a retired registered nurse and a Galveston resident since 1951, has always been concerned about protecting her home from storms. The 2,100-square-foot structure, located near what is referred to as the "back bay," was built in 1961 before zoning codes were adopted and building codes actively enforced.

Galveston joined the NFIP in 1971, and King boasted that she has held a policy for more than 36 years. "I've had my policy for a very long time, and I've always paid my premium on time," she said.

The NFIP was established with the passage of the National Flood Insurance Act of 1968. It is a federal program enabling property owners, in participating communities, to purchase insurance as a protection against flood losses. In exchange states and participating communities must enact and enforce floodplain management reduce the potential for flood damage.

While the flood claim wasn't sufficient to pay for Kings full recovery, it provided a good start. The most obvious shortfall she faced was the lack of funds to replace her home's contents, as she did not have contents coverage. "When I purchased flood insurance, the idea of contents coverage didn't register. Now, all my beautiful furniture is gone," she said.

Owners of homes, businesses, and other structures may purchase building coverage, and owners and renters can buy contents coverage. The maximum residential coverage is $250,000 for structures and $100,000 for contents. Limits for business policies are $500,000 for structures and $500,000 for contents.

With lessons learned following Hurricane Ike, King plans to purchase insurance to cover the contents in her home.

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Flood Insurance

Primary Funding:
National Flood Insurance Program (NFIP)

Flood Insurance Helps Texas Couple Recover After Apartment is Destroyed

Harris County, Texas

Seabrook, TX – Nestled on the edge of Clear Lake is a waterfront apartment complex that Linda Hart had referred to as home for more than three years. When Hurricane Ike made landfall on September 13, 2008 accompanied by a 12-foot storm surge, its floodwaters damaged the complex extensively and destroyed all the couple's possessions. Fortunately, the Harts were able to recoup some of their losses because their apartment's contents were insured through the Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP).

Fearing the wrath of the coming hurricane, the Harts evacuated farther inland. Upon their return to Seabrook, they found the hurricane had destroyed the apartment complex that was once their home.

"We were living right on the water. For us, it was total loss. We lost everything," Linda said. "We had over three feet of water in our apartment. The entire first floor suffered massive damage. The whole building was condemned."

Linda was familiar with flood insurance from years of working in the mortgage industry, but hadn't seen an immediate need to purchase it because the couple had never suffered a flood loss. The Harts purchased their policy less than a year before Hurricane Ike destroyed their home. The couple had been encouraged to get the policy by Linda's sister, who works for an insurance company.

"Our furniture was less than a year old. Water just picked it up and moved it down the hall," Linda said. "The pictures hanging on the wall and items on the counter tops were all that we could salvage. The rest, we just had to walk away from all of it."

Following the move to another apartment complex, the Harts were able to use the funds provided by the flood insurance claim to began furnishing her new apartment.

"It was the best $159 I ever spent. Within a week, I had $2,500 in my hands, just to get me started," Linda said. "Within another two to three weeks, I had the balance of the claim. I received 100 percent of the face value of my policy."

Many misconceptions surround flood insurance. These include the beliefs that policies are available only to homeowners, that coverage is unnecessary for those who have homeowners' insurance, and that it is unaffordable.

Federally backed policies are widely available in communities that participate in the NFIP. Renters can buy policies for coverage of their personal property in their home. Flood policies supplement homeowners' insurance for flood losses, which are not covered in most homeowners' policies. The Preferred Risk Policy (PRP) offers lower-cost protection for homes and apartments in areas of low-to-moderate flood risk. Depending on the location of a structure, the annual premium for contents coverage can be as low as $39 for $8,000 in coverage.

"We know that I could have purchased a premium with higher coverage. However, at the time we were on a strict budget," Linda said. "We would highly recommend securing residential content coverage. It's quick, it's easy but above all, it's worth it."

Quick Facts

Sector:
Private

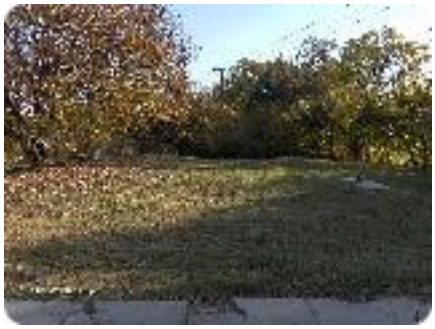
Cost:
Amount Not Available

Primary Activity/Project:
Flood Insurance

Primary Funding:
National Flood Insurance Program (NFIP)

Gainesville, Texas Acquisition Project Saves Millions of Dollars

Cooke County, Texas



Gainesville, TX- The City of Gainesville is located near the confluence of the Elm Fork of the Trinity River and Pecan Creek in Cooke County, Texas. The City has experienced repetitive flooding along both of these streams. In the last 25 years, there have been significant flood events in 1977, 1979, 1981, 1989, 1990, 1993, and most recently in the spring of 2007.

In January 2002 as a result of an ice storm disaster (FEMA-1356-DR-TX), funding through the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP) became available to a number of counties and cities in northern part of the State of Texas. The City of Gainesville applied for $427,000 in Federal funds to acquire and demolish 11 properties along Pecan Creek (Project DR-1356-012).

The project was completed April 5, 2005. This action resulted in a savings of approximately $2,300,000, as calculated using the FEMA loss estimation tool HAZUS-MH) in direct property damages, response, and recovery cost, which would have been incurred as a result of a 25-year flooding event (return period obtained from benefit cost analysis material provided by the City) during the flood event of June 2007. This flood event was part of the area-wide floods, which were later declared DR-1709-FEMA-TX.

Quick Facts

Year:
2001

Sector:
Public

Cost:
$427,000.00 (Actual)

Primary Activity/Project:
Acquisition/Buyouts

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

Computerized Warning System Replaces Word of Mouth

Jackson County, TX – In September 2005, the threat of Hurricane Rita had local officials in Jackson County Texas depending largely on “word of mouth” to warn area residents of the impending storm. Lessons learned from this experience led officials to seek a better and faster way to communicate emergency information. The county then invested in an emergency automated telephone notification system.

Edna Chief of Police Clinton Woolridge said that at an after-action meeting following Hurricane Rita, officials talked about the lack of radio and television stations in the county. “We had no way of telling people to tune in to a local station to get emergency information,” he said. The decision was made to get an emergency telephone notification system for getting out evacuation messages.

The county received a $63,750 grant from the Federal Emergency Management Agency (FEMA) Hazard Mitigation Grant Program (HMGP) to purchase the warning system. HMGP pays up to 75 percent on approved projects that prevent or reduce damage from storms and other natural hazards. Administered by the State, these grants are made available for both public and private projects. The 25 percent match came from a private source.

In the event of an emergency, the 911 dispatcher can identify the affected neighborhood or region of the county, record a message describing the situation, and recommend the protective action residents should take. The computerized system can then call all listed telephone numbers in that geographic area and deliver the recorded message. Residents who have listed their telephone numbers are able to receive messages regarding evacuations, severe weather, flash floods, hazardous material releases, shelter-in-place notifications, dam or levee breaks, bomb threats, abductions, hostage situations, and prison escapes.

Lori McLennan, Edna Police Department office manager and 911 operator, said the system was used for hurricanes Gustav and Ike, a chemical spill at Formosa, and a mock drill at an elementary school.

The system is set up to provide county-wide alerts as well as specific-area alerts according to five geographic zones. “Depending on where the emergency is, I can launch a zone-specific message or a county-wide message,” McLennan said.

“For Hurricane Ike, we launched an initial session to warn residents in the Lavaca Bay area of a voluntary evacuation. As the weather condition worsened, we launched it for a mandatory evacuation for the entire county,” she said, adding that the task was completed in less than two hours.

While the length of time required to transmit messages varies according to the number of phone lines activated, validating the success of the transmitted message is almost immediate. The computer generates a report on how many people picked up the phone to listen to the message, how many answering machines picked up, and the number of unheard messages.

“The system works better than ‘word of mouth’ because it provides an accurate message,” Woolridge added. “When the message is delivered by ‘word of mouth’ by the time it gets around to the third person its context has changed considerably.”

Jackson County, Texas

Quick Facts

Year:
2005

Sector:
Public

Cost:
$85,000.00 (Actual)

Primary Activity/Project:
Warning Systems

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

KPRC Weatherman Builds Above Hurricane Ike Storm Surge

Galveston County, Texas

Galveston, TX—"Build high and build strong. Build back better and smarter." That's the advice from Frank Billingsley, chief meteorologist for KPRC-TV, to survivors of Hurricane Ike and to his thousands of viewers in Galveston and Houston and elsewhere along the Texas Gulf Coast.

"I can't control the weather, but I can be there to warn people when their lives or property are in danger, and that's what makes my job worth it to me," Billingsley said. "I feel like I have a chance to give back to the world."

Before Hurricane Ike came ashore in Galveston at 2:10 a.m. on Saturday, September 13, 2008, KPRC had provided 24/7 coverage for more than a week. During much of that time, Billingsley was on the air every half hour for 8- to 10-minute segments. From Friday to Saturday noon, he went 24 hours straight, closed his eyes for two hours, and then continued until midnight.

A Houston weatherman since 1982, Billingsley is fiercely dedicated to keeping his viewers safe. "This is what Frank does," reported writer and real estate agent Alice Melott in the 2008 Recovery issue of *The Islander Magazine.* "The way he provided…a true service to the people of Galveston may well be remembered as one of the most humane acts of journalism most of us have ever seen."

During the long hours that Billingsley was reporting on the storm—on the air, in the air, on the phone, in the street—he knew his own Galveston Island house was at risk. At the peak of the storm, flood water surged into his neighborhood from the bay.

After the storm, officials blocked re-entry to the island for ten days for safety reasons. It was 2½ days before Billingsley knew that 30 inches of water surged into his lower-level garage, but otherwise left his house largely unaffected.

In the meantime, rumors and fears began to abound among displaced residents frantic to learn what was happening with their homes and their futures. Billingsley stepped into the information void, Melott said.

"Once he was cleared to fly there, Frank not only spent four hours reporting from over the west end, he did so with residents on the phone who were guiding him through their neighborhoods and narrating as he flew in for the close-ups," Melott wrote.

"Over a thousand requests came into the station that afternoon, and Frank was able to visit with about 40 property owners," Melott continued. "As they saw their homes for the first time, each owner choked with emotion. Some homes were in remarkably good shape; a few were flattened. It was real reality TV, and it was riveting."

Billingsley spent days walking through the devastation on Bolivar Peninsula and on Galveston's east and west ends, reporting what he saw to anxious evacuees.

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Elevation, Structural

Primary Funding:
Homeowner

Researching Prior to Building is a Smart Move

Galveston County, Texas

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Building Codes

Primary Funding:
Homeowner

San Leon, TX—Before starting construction of their waterfront home in San Leon, Texas, George and Diana Click spent time researching safe building practices. They obtained information on choosing a builder, current building codes, coastal construction mitigation techniques, and adequate insurance coverage.

On September 13, 2008, Hurricane Ike brought high winds and a 12-foot storm surge to San Leon, a 5,000-acre peninsula located on Galveston Bay. The storm devastated the area and wiped out the local multi-million dollar fishing and shrimp industry. About 80 percent of the homes, businesses, and commercial fishing and shrimping boats were destroyed in the small, relatively unknown community of 4,944 residents. The Clicks' home was the only one left standing on their street.

"I didn't do anything extra," said George Click. "It's about following the codes. It's about knowing what to do." Galveston County adopted and enforces the International Residential Code (IRC) and the National Electrical Code for all residential construction in its jurisdiction. The Clicks discovered that this is an important form of hazard mitigation.

"The first thing we did was secure a certificate of elevation," said Diana Click. Elevation certificates, which are usually prepared by licensed surveyors, are important tools in floodplain management that document the elevation of structures in relation to the base flood elevation. The Clicks knew they would need to build up their low-lying land and the elevation certificate provided precise information about their site. To stay above the mean high tide, their first floor would need to be 11 feet high. They went up to 11 feet, 6 inches.

The Clicks chose a builder who had a long history in construction and monitored the construction process. Efforts were made to strengthen connections from the roof to the foundation, creating a "continuous load path." A load path is the route taken by a force, such as the pressure exerted by high wind, as it makes its way through a structure. When a building has a continuous load path, the force is eventually transferred to and resisted by the ground. A continuous load path usually requires the use of metal connectors, fasteners (like nails and screws) and strong wall design. Like a chain, a load path is only as strong as its weakest link.

"When the inspector came out to inspect the frame, the builder had it all strapped, and I thought it was done," George said. "But the inspector said, 'You don't have enough straps on the top. You have to fix that. And I will be back.' He had me so nervous I was going up at night, after the builder left, putting more straps. I wanted to keep the building process moving forward." Weather conditions and other factors caused delays, but eventually the Clicks became proud owners of a completed beach house.

Building Codes Helped Bolivar Peninsula Homes Survive

Galveston County, Texas

Bolivar Peninsula, TX – Hurricane Ike tore across this 33-mile-long arm of land that juts out into Galveston Bay, leaving devastation in its path. Unprotected by a seawall or other barrier, the peninsula suffered arguably the worst of Ike's fury. Winds of up to 110 mph and a 14-foot storm surge hit the peninsula broadside from the gulf, crossed far inland, and then doubled back around.

The full impact of the September 2008 storm on the people of the Bolivar Peninsula may never be known. Officials with the Galveston County Office of Emergency Management said 20 people were either confirmed dead or still missing months after the storm. Some 5,300 buildings, most of them homes, were located on the peninsula before the storm. Afterwards emergency managers in aircraft could count 2,087 rooftops, including those on sheds and skeletons of shattered homes. Only 102 buildings were left unscathed.

The owners of a few surviving homes on Bolivar Peninsula, such as Jimmy and Debbie Bishop, have important stories to tell and lessons to share.

The Bishops came back to check on their vacation house a few days after the storm and had to circle through a field, maneuvering around downed power lines, pieces of buildings and twisted debris. Their subdivision had about 35 houses before the storm and no more than a dozen afterward. Many of their neighbors' houses, including the first two rows along the beachfront, had simply disappeared. The Bishops' had been on the third row back from the beach; now it is open to the sea. When they reached their house, they found the bottom-level breakaway walls gone, as the design had called for. Their stairs were a little askew but still sturdy enough to climb to the second-level living area.

"We opened the door and everything was just fine. Everything was just as it had been before the storm. If I had not been outside, I would not have known there was a storm," Mr. Bishop said. "The only thing out of place inside was one mirror that fell to the floor, and it wasn't even broken."

Why did the Bishops' house survive while neighbors' homes did not? The Bishops' house was the newest occupied home in the subdivision. Their builder has a nearby new house, still for sale, that also held up well in the storm. Both were built under the new coastal building codes and followed specifications provided by a structural engineer. In keeping with the letter and the spirit of the code, the Bishop house is elevated high above the water, located back from the coast, held together with steel connectors, fortified with sturdy materials, and shielded by a storm-resistant roof. Impact-resistant glass on windows also helps protect the interior.

The building elevation may have been the most important safety factor. The required elevation was 16 feet, but the house was raised an additional 7 feet, as a margin of safety. The additional amount of height above the required elevation is called "freeboard." It provides added protection and helps lower flood insurance premiums.

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Building Codes

Primary Funding:
Homeowner

Hazard Mitigation Saves Historic Galveston Home

Galveston County, Texas

Galveston Island, TX − When Hurricane Ike slammed ashore on Galveston Island in September 2008, the storm's 100-mph winds and 11-foot storm surge took aim at one of the most important historic buildings in Texas – Moody Mansion.

The mansion suffered some rainwater intrusion and flooding from Hurricane Ike's surge, but damage was minimal, thanks to hazard mitigation measures that dramatically reduced disaster losses, said Betty Massey, executive director of the Mary Moody Northern Endowment, which owns and operates the mansion. The measures are all part of the endowment's phased, systematic, strategic approach to protecting historic resources through disaster planning, preparation, and hazard mitigation.

The mansion is, by any standard, a priceless treasure. Construction spanned 3 years, from 1892 to 1895. The building is crafted of red brick generously iced with limestone, sporting bold arches, towers, dormers, and a pyramidal red-tile roof. It contains 31 rooms on three floors atop a raised basement. Perhaps the most stunning feature is a 12-foot-tall leaded, stained-glass window overlooking the landing of the finely crafted staircase in the oak-paneled central hall.

During Hurricane Ike, winds hurled debris broadside into the stained-glass window, but the window had been covered with safety glass to protect it in a storm. Mary Hoehne, Moody Mansion facility manager, said, "The covering did its job. There's no question that without the safety glass we would have lost that window."

Broken windows would also have allowed substantial water intrusion and damage throughout the home. That's why most of the other 50-plus windows are covered with clear storm coverings of polycarbonate, a kind of plastic shield that is nearly as clear as glass.

The best of the polycarbonate glazing products are touted for their high-impact strength, flame resistance, insulation, and clarity. This type of shield is often used in bus stop shelters, sky lights, and similar projects that demand both transparency and extreme strength. Placing the polycarbonate on the windows protects the mansion's openings without detracting from the historic building's façade. The window protection system has been a major investment that the mansion is continuing in installments as funds are available.

According to Ms. Massey, Moody Mansion stewards believe their responsibility to safeguard the property requires hazard mitigation measures. Some people think historic properties cannot be protected from hazards because those protective measures could detract from the historic buildings. To the contrary, she feels hazard mitigation is imperative for historic buildings because these structures represent priceless resources that cannot be lost.

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Retrofitting, Structural

Primary Funding:
Non-profit organization (NPO)

Read All About It: Galveston Newspaper Never Misses a Beat

Galveston County, Texas

Galveston, TX - The Galveston County Daily News has written countless stories about the challenges and heroes of Hurricane Ike (2008). But there is one story they have refused to write: Their own. During the worst of Ike, they didn't miss an edition.

When the eye of the hurricane passed over the newspaper building at 2 AM on September 13, workers who were there overnight rushed out and boarded up cracked windows in preparation for the second half of the storm. The worst was yet to come: The second half of the storm brought 110-mph winds, rain coming in and around the windows, and a 12-foot surge that flooded the carpet. They lost their roof covering, power, generator, satellite phones, and nearly all their technology.

"We were working around the clock," editor Heber Taylor said. "Our reporters were operating out of emergency management centers in Galveston and League City." Dedicated to their readers and their craft, reporters filed stories using whatever technology they could muster, including cell phones, laptops, and wireless air cards. The News would then export copy editing to the mainland and printed through sister newspapers, starting with the Herald Zeitung in New Braunfels, Texas.

Leigh Jones, one of the News reporters, had to resort to text messaging the news from her cell phone when most communications channels were down. She sent short, 140-character (not words, characters) bulletins, called "tweets," through Twitter, a social networking Web site that works over multiple networks and devices:

5:44 p.m. Sept.12 – People are calling for help now but no one can get to them. The water is really coming up fast now. …

7:55 a.m. Sept.13 – Crews pulling people from high water. …

8:30 a.m. Sept.13 – Entire row of houses on fire. Nothing crews can do. …

8:42 a.m. Sept.13 – Structures from the beach are now on the street. …

In another city, a reporter who had traveled with evacuees to cover their story was able to get to the Twitter site and convert the bulletins for The News to post online in real time. Soon other media discovered the bulletins and used the Twitter text for regional and national coverage.

When the newspaper was ready for delivery, finding readers proved nearly impossible. Delivery personnel went where they thought people might be, dropping bundles at emergency centers and hotels. "People would see our trucks and flag them down," Taylor said, "and I don't know how many people told me they hiked to the points of delivery just to find out what was happening. Think about it: There was no cable, no CNN, no local news stations. This was the way they got information, and information is critical.

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Education/Outreach/Public Awareness

Primary Funding:
Private funds

Homes Built With Love -- and Lots of Extra Nails

Brazoria County, Texas

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Floodplain Management

Primary Funding:
Non-profit organization (NPO)

Freeport, TX – Hurricane Ike rudely interrupted Frank Bartolomeo and his team of Habitat for Humanity volunteers just as they were finishing the framing of their latest house in Freeport. Winds through the coastal town reached higher than 90 miles per hour (mph) in the early hours of September 13, 2008 with scattered tornadoes. Nearby on the Gulf Coast, storm surge and hurricane-force winds shattered neighborhoods. It was only a matter of days, however, before they were back at their labor of love: building Habitat homes.

Bartolomeo, 77, a retired chemist, and the volunteers evacuated inland until it was safe to return and begin moving downed trees and repairing ripped roofs throughout southern Brazoria County, west of Galveston.

“We have built 66 homes in southern Brazoria County since 1991,” Bartolomeo said. “We had no more damage to any of them than a few lost shingles here and there and minor water damage in one of the units. We are relieved but not surprised. We have never had structural wind damage or flooding from rising water in any of our Habitat units.”

The secret to their good record is hidden in the details of how and where they choose to build.

“First of all, we go by the city codes on everything,” Bartolomeo said. “The city code officials are a great help to us and keep us updated on all the latest code changes. We are lucky to have a Texas Windstorm Program inspector in our group, and we abide by everything he says, too.”

But they don’t stop with the codes. The volunteers go above and beyond the code so the house will hold together, even in a stiff coastal wind.

“We want to build homes to last,” said Marc Bartolomeo, Frank’s son. “The people who live in these houses are not earning so much, so the homes need to be maintenance-free. They can’t afford damage. They help with the construction, of course, and building to the highest quality gives them a certain sense of pride – and for us, too.”

Ask Bartolomeo and the southern Brazoria Habitat volunteers about the construction and you will get a whirlwind tour of the framed-in house, top to bottom. Here are the steel braces on all connections and the bolts that anchor the frame to the slab, and over there are the extra-strong roofs, the added bracing over the doors and windows, the precise pattern of nails tying the sheathing to the roof.

“We build to combat the wind sheer that could suck up the roof, like an airplane gets lift.

1907 Elevation Saved Galveston Church From Flooding

Galveston County, Texas

Galveston Island, TX – In 1907, Galveston was still recovering from one of the nation's worst natural disasters - the hurricane of 1900, which had killed 6,000 people in a terrifying surge of wind, water, and debris. The bell tower of St. Patrick's Catholic Church crashed down into the church, killing 200 members who had sought sanctuary from the storm. It was all ruined – the walls, the roof, the ceiling, the bell tower, the pews, the pipe organ, and the stained glass windows, all tangled together in a massive, sodden heap.

By 1902, parishioners had rebuilt their church. The new structure was even grander than the original, although the bell tower was only half the height of the original.

Shortly after the church's reopening, Galveston County officials made a fateful decision to build a 17-foot-high concrete seawall stretching for miles along the Gulf of Mexico. In an even more audacious move, the town of Galveston decided to raise the land, starting high behind the seawall and sloping down toward the bay for drainage. Overall, officials proposed to raise the ground an average of 8 feet.

To accomplish the goal, townspeople jacked up houses on pilings, erected wooden walkways high in the air, dredged out a ship channel, and piped the slurry sand across the town and beneath the lifted buildings. Then they topped the sand with mainland soil.

Elevating St. Patrick Church, the largest of the 2,156 buildings that were raised, presented an engineering challenge because of its size, its weight, and its many pillars and arches. To prevent cracking, its weight had to be evenly distributed throughout the process. The townsmen accomplished the job, by hand, in scarcely more than a month.

By 1910, the seawall stretched along 5 miles, and much of the grade raising was complete. In 1915, the island was hit by another hurricane, said to be the equivalent of the 1900 storm. Due to the mitigation efforts, Galveston was protected from total devastation.

In 2008, a tidal wave pushed by Hurricane Ike washed ashore over Galveston, damaging at least 75 percent of the island's buildings. In the church complex, buildings that were not elevated — the school and the priests' house — flooded along with many others across the island. Underneath the church, in the crawl space left open by the elevation, floodwaters damaged ductwork as well.

Inside St. Patrick, however, it was as if Ike never happened. "When they elevated this church by 5 feet, they saved it," said the Rev. John Bok, parish priest. "Without their work, we would have had terrible damage inside our church, not only in Hurricane Ike but in other storms, too."

Rev. Bok pointed to the faint debris line left by floodwaters on the church's foundation, about 5 feet above today's street level. Had the church not been elevated, water would have risen 4 to 5 feet high inside the sanctuary.

Also contributing to St. Patrick's survival were the plastic storm windows the congregation had installed in 1991 to protect the ornate windows from wind-driven rain and debris, Rev. Bok said. "One plastic sheet was broken during Hurricane Ike, but the covering did its job, and there was no damage to any of the stained-glass windows," he said.

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Elevation, Structural

Primary Funding:
Private funds

Galveston Neighborhood Gets High Marks in Hurricane Test

Galveston County, Texas

Galveston Island, TX - Hurricane Ike may have devastated most of Galveston, but one of the city's newest neighborhoods – Evia – suffered only minor wind damage and developers say it is thanks to features in the town's design.

Crystal Ruiz, who runs the neighborhood coffee shop, was filled with apprehension when she came back on the island a couple of weeks after the September 2008 storm. "When you drive into Galveston, you are hit by what happened here," she said from the counter of the Sugar Bean Coffee and Cream. She said everything was damaged and described the scene with people dragging their belongings out of ruined homes.

"You drive past that big mountain of trash; you don't know what you will find. You get to Evia, and it is beautiful! A couple of street signs were down. Some siding was missing. But the sun was shining, the grass was green, the lakes were sparkling, and the homes - even the little details like the gardens were spotless. It was fantastic!" said Ms. Ruiz.

It is no accident that the subdivision survived the storm so well. It was carefully planned to offer gracious living and classic design with structural integrity and sustainability.

The first new neighborhood in the city in three decades, Evia is named for Jose Antonio de Evia, an 18th Century Spaniard credited with discovering the island and naming it "Galveston" after his patron, Bernardo de Galvez.

Evia is what planners call a New Urbanist community. It's a traditional, mixed-use neighborhood that echoes the past. Curving streets encourage neighbors to visit and walk or bike around. Pastel houses in Victorian, Craftsman, and classical designs are scattered across the landscape. The 361-lot, 93-acre subdivision is also a green, sustainable community, designed to protect the environment and to minimize disaster losses that are ultimately huge, wasteful burdens for the environment.

What helped the Evia neighborhood survive Hurricane Ike?

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Floodplain Management

Primary Funding:
Private funds

FEMA HMGP Funding Provides Security in Port Neches

Jefferson County, Texas

Port Neches,TX – As Hurricane Ike ravaged the coast near the Louisiana-Texas border with wind gusts of more than 110 mph, Emergency Management Coordinator Stephen Curran and Police Chief Paul Lemoine hunkered down in the Port Neches fire house. The two local officials could only hope that mitigation measures funded through the Federal Emergency Management Agency's (FEMA's) Hazard Mitigation Grant Program (HMGP) would spare the town from the degree of damage caused by Hurricane Rita 3 years earlier.

The purpose of HMGP is to reduce the loss of life and property in future disasters by funding mitigation measures during the recovery phase of a disaster. FEMA provides up to 75 percent of the funding, with the remainder coming from the state or applicant or both. The state administers the program and selects the projects with approval by FEMA. Applicants, which must have FEMA-approved hazard mitigation plans, may be states, local governments, Indian tribes, or certain nonprofits. Funds can be used for long-term mitigation measures, including protection of public or private property.

Following Hurricane Rita, Port Neches received funding through the FEMA Public Assistance Grant Program to return damaged public facilities to their pre-disaster conditions. City officials then became aware of the HMGP opportunity to strengthen the facilities. "We went to a seminar and found out what kind of projects would be considered for funding, and we took advantage of the program," Curran said.

In January 2007, Port Neches received eight HMGP grants, totaling $1,512,825, to implement wind retrofit projects. Retrofitting measures were completed on the public works building, library, community center, fire station, city hall, sewer plant, senior citizens center, and police station.

The projects involved re-roofing using FM Global 1-150 rated roofs. This type of roofing meets design and installation criteria mandated by the Factory Mutual Research Corporation, the nonprofit research arm of the Factory Mutual Insurance Company. The 1-150 rating is laboratory tested using an uplift test load of 150 pounds per square foot. The mitigation projects also included replacing existing entry doors with heavy-duty, impact-resistant doors and adding electric roll-down storm shutters to windows.

"During Hurricane Ike, all shutters were in place. It was neat to simply push a button to secure the buildings. This freed up our time to concentrate on getting people to safety," Curran said. "In the past, it took us a couple of days to secure public buildings with plywood."

Some of the HMGP funds were used for the safe room at the Effie and Wilton Hebert Public Library. A safe room is an interior space that is fortified to provide a high level of protection against extreme winds, such as those in hurricanes and tornadoes.

Curran speaks proudly of the advantages of the mitigation measures undertaken and plans to take advantage of future HMGP funding. "We spent every penny that FEMA gave us, wisely. With the high winds from Hurricane Ike, those high impact doors were awesome, the roofs remained intact and the shutters did their job. It was definitely money well spent."

Quick Facts

Year:
2005

Sector:
Public

Cost:
$241,969.00 (Estimated)

Primary Activity/Project:
Retrofitting, Non-structural

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

Mayor Steers Tiki Island Turnabout

Galveston County, Texas

Tiki Island, TX – When Hurricane Ike (2008) was bearing down on his town in late summer 2008, Mayor Charlie Everts knew it would be Tiki's toughest test. Townspeople had been working for years to prepare for a Hurricane Ike. "We've worked hard to build above and beyond the standards for coastal construction," said Everts. "Hurricane Ike proved we did the right thing."

Storm winds topping 100 mph blew waters from the Gulf of Mexico across the island, causing surges of 10 to 12 feet. The first blast came from the gulf, across nearby Galveston Island. After the eye passed, a second surge, blown from the opposite direction, soaked the island. The result? "Everything appeared to work as planned," Mayor Everts said. "People evacuated when we asked. Nobody died. Nobody was injured during the storm. Nobody is missing from Tiki Island."

The majority of Tiki's 950 homes are supported on tall concrete pilings. "We lost the downstairs on most of these houses, as we expected – the breakaway walls broke away with the force of the water, just as we planned," Everts said. "The breakaway walls on one house took out the breakaway on the next one. We got a lot of debris from the neighboring communities, too. We had to bring in volunteers with front-end loaders to get through the streets. But, overall we did pretty well. I am really proud of how it turned out here."

Tiki Island, a town of only 1.5 square miles, is largely a manmade island. It was built in the 1960s when developers excavated for a channel and used the fill to elevate the land to between 4 and 10 feet above sea level. At first, Tiki was primarily a small fishing camp, although it evolved into a place for weekend homes, and then into a village that was incorporated in 1983. It is now home to about 1,250 people whose upscale homes sit mainly on the waterfront.

In the town's early years, Tiki Island stayed in hot water with the National Flood Insurance Program (NFIP) over a tangle of floodplain management compliance disputes. "Tiki had a terrible reputation in floodplain management circles then and probably deserved it," said the Federal Emergency Management Agency's (FEMA's) Dale Hoff, who worked with the community for years to try to resolve the compliance issues. He credits Everts with turning the situation around.

When Everts took office in 1992, Tiki was on probation with the NFIP, in danger of losing federal flood insurance for its citizens. "We were concerned that we would have no insurance, no mortgages, no future," recalled Alderman Phil Hopkins. "We were all pulling in different directions then," Everts said. "It took years of building community consensus. Now I think we're all pulling together, everybody has come together."

Now the village is off probation and has progressed so far that the NFIP gives Tiki Island residents a 10 percent break on their flood insurance premiums. "We're very proud of our building standard," said the mayor. "We try to go above and beyond the minimum standard set by FEMA and the standard coastal codes. I think we do it better than a lot of other areas."

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Building Codes

Primary Funding:
Private funds

House Built Above Building Codes Stood Strong Against the Wind

Harris County, Texas

Shoreacres, TX – In 2002, when David and Cynthia Garza decided to build their 2,200-square-foot dream home, they had no idea the road to achieving their dream would be paved with building codes. Initially frustrated by the requirements, they later credited the city's "hard-nosed" building inspector for their home's survival during Hurricane Ike (2008).

Their land sits in a low, coastal area less than a mile from Trinity Bay, so the Garzas decided to build on higher ground by adding fill to the construction site. They brought in dirt to create a raised pad, which they assumed was at or above the base flood elevation (BFE), the level that can be reached by a flood that has a 1-percent chance of occurring in any year.

"We had already put our form up when the building inspector walked out here and told us we were a foot too low," David said. "I asked, 'How can you tell? You are just looking.' He was really hard-nosed."

The inspector then asked the Garzas whether they had obtained an elevation certificate, an important tool in floodplain management that documents the elevation of a structure in relation to the BFE. David said, "When I told him I hadn't, he says, 'So you've got two choices: You can go ahead and pour the cement and be told it's too low, or you can stop right now, get your Certificate of Elevation and continue building.'"

Although they were angry and annoyed, the Garzas decided to get the certificate. "Oh boy, I was mad," David said. "The additional elevation would cost more money. I also had to make certain that the land sloped so that I wouldn't flood my neighbors out."

The survey done for the certificate showed that although the house was at the BFE of 11 feet, it was still one foot too low. The City of Shoreacres requires a foot of "freeboard," an additional amount of height above the BFE that provides added protection and can result in lower flood insurance rates. In the end, the Garzas elevated their home approximately nine inches above the city's 12-foot requirement—well above the level needed for flood insurance.

The Garzas also became frustrated with the building inspector during the framing process.

"Although I thank him now, because my house is sturdy, I had some choice words for him," David said. "He comes up and says, 'You have to strap this, you have to tie that down, you have to wrap that.' Oh man, he was tough. He and my builder were always butting heads."

Determined not to have more problems with the inspector, the builder "went overboard," David said. "He tied down, strapped, and wrapped everything. We showed him."

In September 2008, Hurricane Ike brought tremendous winds and a 12-foot storm surge to Shoreacres, dismantling waterfront properties and flooding approximately 575 of the town's 650 homes. Some of the Garzas' neighbors got more than three feet of water, while floodwaters reached within five feet of David and Cynthia's front door.

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Building Codes

Primary Funding:
Homeowner

Elevation Saved Family Home from Hurricane Ike

Galveston County, Texas

Kemah, TX - Paul Strizek's home on Galveston Bay is much more than just a house. For more than 50 years, his bayside cottage has been at the center of the most important of his family memories, and it was his mother's house. So it was worth it to Strizek to have the home elevated onto concrete columns in the 1990s. "It cost some money," he said, "but I didn't want to lose that house."

His investment paid off September 13, 2008 when Hurricane Ike stormed ashore over Galveston Island just 20 miles south of Strizek's house. The Category 2 hurricane carried winds up to 125 miles per hour (mph), driving storm surge up the bay. Wind and water assaulted its colorful tourist shops, blue-striped lighthouse water tower, lavish restaurants, festive boardwalk, and 3,200-foot roller coaster.

The storm surge took down Strizek's steps, a dock, and the lower level's breakaway walls. All were carried out to sea. But the house survived, in excellent shape. However, many of his neighbors' houses were shattered. Two homes away, the surge swept an unelevated bay house out to sea.

He thinks the surge reached 12 feet at his house. The piers hold the house up 14 feet. "If I hadn't raised that house, it would be gone," Strizek said. A concrete sea wall that Strizek built after Tropical Storm Frances in 1998 helped curb erosion and dissipate wave energy. In addition, the windows were boarded up before the storm.

Despite the risk of facing the wind and sea on Galveston Bay, his house matters to Strizek in part because of the pervasive charm of the area. The site of Strizek's home, with its sweeping blue-green vistas of the bay and prime access at the Clear Creek outlet, is irresistible.

Strizek knows that Hurricane Ike is not the first or the last storm to hit Kemah, whose name is derived from an Indian word that means "facing the wind" and is home to nearly 2,300 residents. The specific town was founded in 1898 for railroad expansion. Two years later, it was leveled by the 1900 Galveston hurricane, one of the worst disasters in U.S. history. The town was virtually destroyed again by Hurricane Carla in 1961.

Another reason for Strizek's attachment is the house itself. "This house was built around 1919, as far as we have been able to determine," he said. "The materials and workmanship are superb." The inside was finished with old-growth East Texas pine, a wood considered to be of exceptional building quality.

The house is also Strizek's link with his past and his mother, Jane Strizek.

"My mother bought this house in 1963 as our summer home. Then we moved here full time in 1966, and I went to high school here. It was a sleepy little town then, with a drawbridge where the highway bridge is now. The house was low, on the ground, an old bay house on short pilings maybe three feet into the ground. I could crawl under it. She named it 'The Ark.'

"Lots of the bay houses were like that then. And a lot of them washed away in Carla. I have a picture of mother's house from 1961, undermined and heavily damaged. But somehow it has survived, all these years, all these storms," Strizek said.

Quick Facts

Sector:
Private

Cost:
$62,130.00 (Estimated)

Primary Activity/Project:
Flood Insurance

Primary Funding:
Homeowner

Mitigation Measures Keep Hospital Afloat During Storm

Jefferson County, Texas

Beaumont, TX — In September 2005, Hurricane Rita hit the Texas-Louisiana coast as a Category 3 storm, leaving behind catastrophic damage. Damage to Memorial Hermann Baptist Hospital-Beaumont alone reached an astounding $58 million.

“We had water infiltration on the first floor of our buildings and in the towers,” said Jay DeVille, Memorial Hermann Baptist Beaumont Hospital director of facility management. “With wind gusts at 95 miles per hour (mph), the roofs of our fifth floor and Day Surgery Unit were also heavily damaged.”

To minimize the effects of future storms, Memorial Hermann Baptist has successfully initiated mitigation measures.

The hospital received a $2.6 million grant from the Federal Emergency Management Agency (FEMA) through the Hazard Mitigation Grant Program (HMGP) to invest in mitigation measures. HMGP assists states and local communities in implementing long-term mitigation measures following a major disaster declaration. It provides up to 75 percent of a project’s total cost and can be used to fund projects to protect either public or private property.

DeVille said the hospital was able to undertake several mitigation projects thanks to funding from FEMA. “We installed hurricane shutters on entry doors and on all windows on the first and second floors of our buildings. We added a water well and two quick-connect systems, one for each of our buildings,” he said.

DeVille said the hospital also water-proofed all the exterior walls, added through-wall flashing, and replaced roofs with the roofing material recommended by the facility’s insurance company.

All that work paid off. By the time Hurricane Ike drilled in with 100-mph winds on September 13, 2008, the 400,000-square-foot facility was prepared to weather it. In fact, the hospital remained virtually unscathed.

“We escaped the storm with minimal damage to our facility,” said DeVille. “We got a little water resulting from wind-driven rain in a few areas. The water-proof sealant was not as effective as we thought it would be. However, our hurricane shutters protected our entrances and our windows.”

DeVille said Hurricane Rita was a major business interruption for the hospital, forcing it to utilize temporary power for 12 days. “With Hurricane Ike, we were better prepared. We had two large generators and all of our electrical equipment functioned at capacity,” he said.

Quick Facts

Year:
2005

Sector:
Public

Cost:
$3,465,000.00 (Actual)

Primary Activity/Project:
Flood-proofing

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

Beaumont Winning Flood Fight With Help from Texas and FEMA

Jefferson County, Texas

Beaumont, TX — Folks in Beaumont used to call their town “Bayou City” because it was under water so often.

“We can get more than 100 inches of rain in a year,” said Richard LeBlanc, Jr., general manager of Jefferson County Drainage District #6. It’s his job to manage all of that rainwater, for Beaumont and nearly the whole county.

It’s challenging work. LeBlanc and his staff can tick off the years — 1998, 2001, 2002, 2003, 2004, and 2005 — that brought 10 to 15 inches or more of water each time it rained. In 2001, Beaumont got a total of 103 inches of rain. Jefferson County has consistently ranked among the top places in the United States for flood losses, including hundreds of properties that experience severe repetitive losses.

As a result of only two storms in 2001 and 2002, the National Flood Insurance Program (NFIP) paid out more than $19 million in claims for widespread residential damage in Beaumont, according to Gilbert Ward, manager of the Flood Mitigation Assistance (FMA) program for the Texas Water Development Board.

To make matters worse, Jefferson County is almost entirely flat, so it doesn’t drain naturally. Moreover, Beaumont is an old town, incorporated in the 1800s, and like many U.S. cities it was built without an adequate drainage system.

But Drainage District #6 is making progress on reducing flooding in Beaumont and the greater Jefferson County area, thanks to the district’s strategic work and its partnerships with the State of Texas, the Federal Emergency Management Agency (FEMA), and many other state and Federal agencies.

That progress became apparent when Hurricane Ike roared ashore on September 13, 2008. Ike delivered a 17.5-foot storm surge on the county’s coastal plain and dropped anywhere from 6 to 20 inches of rain, depending on where it was measured. The surge caused flooding in the county’s sparsely developed coastal areas, though no flooding occurred as a result of rain. “I don’t know of a single house that flooded from the rain in Hurricane Ike,” said Doug Canant, District #6 engineer.

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Mitigation Planning/Disaster Resistant Universities

Primary Funding:
Flood Mitigation Assistance (FMA)

Quick Reopening of Supermarket Served Hurricane Survivors

Galveston County, Texas

Galveston, TX - In the wee hours of Saturday, September 13, 2008, Hurricane Ike barreled ashore as a strong Category 2 storm, bringing wind gusts up to 125 miles per hour (mph) and a storm surge that spilled over the 17-foot high Galveston seawall.

The disaster shut down the island for many long days thereafter. But a bright spot beckoned in the landscape of destruction. Next to the seawall, one grocery store reopened in only three and a half days. For many more days, townspeople could find few other sources of food and essential provisions.

“I have talked to probably 400 of our regular customers, and they say this store was their only ray of normal reality,” said Tom Hearring, manager of the Signature Kroger Grocery Store at 5730 Seawall Blvd., shortly after the storm. “They could come in and enjoy air conditioning, get hot food, get away from their daily trouble for a couple of hours before going back to start cleaning again.”

How did the store do it? Hearring said, “We were able to survive the storm with very minimal damage and to reopen quickly because of many things that we did before, during, and after the storm.”

Hearring explained that the beachfront store, built in 2000, “was designed to have water roll to the left and the right, so the store wouldn’t be impacted so much.” He continued, “When they built this store, they brought in extra fill to raise the lot, built up more on a concrete pad, and raised the store quite a bit. We have a disaster plan, but everything hinges on the physical structure of the building, whether anything survives or not.”

“The sturdy masonry structure complied with all building codes when the structure was built,” said David Ewald, City of Galveston building official. In fact, the structure was built more than two feet above the height required by floodplain regulations, according to Kroger officials.

The building sits on a prized though precarious spot along the Gulf of Mexico behind the seawall. “If that seawall wasn’t there, we wouldn’t be standing here today,” Hearring said. “It did its job of keeping the majority of the water at least off the properties where there is a seawall.” Some of the surge came over the seawall, which is considerably higher than the popular frontage businesses, including Kroger.

Kroger’s staff conducted a blitz of preparedness activities before the storm hit. “We had shutters on all our windows — which were already protected by a masonry-columned promenade — sandbagged the doors and put heavy pallets of merchandise on our bay doors to keep them from blowing in,” Hearring said. “What we did is like the normal precautions you would do at your house before a storm, but on a little larger scale.

“So when we opened the door to check things out on Monday after the storm, there was no water in the store, and very minimal roof damage; a few small leaks, hardly any damage at all to the store,” Hearring said.

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Elevation, Structural

Primary Funding:
Property Owner, Commercial

Hurricane Rita Sparks Need for Mitigation

Orange County, Texas

Orange, TX – Fearing the wrath of Hurricane Rita, staff at Memorial Hermann Baptist Hospital in this southeast Texas city hurriedly evacuated patients a little more than 20 miles away to the hospital's affiliate in Beaumont, Texas. Their actions came just in time. The Category 3 storm rolled in with a vengeance on September 24, 2005, rendering the hospital inoperable for more than two weeks. That hard lesson prompted hospital officials to take mitigation measures for future events.

Hurricane Rita, which made landfall in Texas and Louisiana, was the fourth most intense Atlantic hurricane ever recorded. It also was the most intense tropical cyclone ever observed in the Gulf of Mexico. Rita's storm surge caused extensive damage along the Louisiana and extreme southeastern Texas coasts, completely destroying some coastal communities.

"We were without power for two to three weeks," said Hal Gardenhire, facilities manager for Memorial Hermann Baptist, the primary provider of health care in Orange County. "The 100-mile-per-hour winds forced water under entry doors and through weep holes above windows. We needed to find a way to keep our facility operating and to keep our patient census during a storm or other emergency situation," he said.

Hospital officials turned to the Federal Emergency Management Agency (FEMA) for a solution — and found one. The hospital was awarded a $933,750 grant through FEMA's Hazard Mitigation Grant Program (HMGP) to initiate mitigation measures. HMGP assists states and local communities in implementing long-term mitigation measures following a major disaster declaration. It provides up to 75 percent of a project's total cost and can be used to fund projects to protect either public or private property.

"We moved the power units that house the automatic transfer switches for our older section of the hospital from the basement to the second floor," said Gardenhire. "We also elevated the unit that houses the automatic transfer switches for our newly installed 1,250-kilowatt generator 12 inches above ground level. The generator can power the entire hospital."

Electrical roll-down shutters were placed above all the entry doors and windows on the hospital's first floor, eliminating the need for the lengthy boarding-up process, and deterring wind-borne debris or water intrusion.

Gardenhire said it used to take two men a day and a half to board up all the hospital's windows. The job required drilling holes in the frames, which later had to be patched up. For Hurricane Rita, the hospital was forced to pay a contractor to do the boarding-up work so hospital employees could concentrate on other jobs, such as sandbagging.

The hazard mitigation measures the hospital took after Rita changed all that. "Now all we have to do is push a button and in 15 minutes, with two men, we are all boarded up," Gardenhire said.

Quick Facts

Year:
2005

Sector:
Public

Cost:
$1,245,000.00 (Actual)

Primary Activity/Project:
Retrofitting, Non-structural

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

Storm Proves Surfside Beach Buyouts Were Good Investments

Brazoria County, Texas

Storm Proves Surfside Beach Buyouts Were Good Investments

Surfside Beach, TX — It's smart to know when to say, "Enough is enough." That was Mayor Larry Davison's assessment after Hurricane Ike struck Surfside Beach on September 13, 2008. He's glad his town knew when to pull back from its beloved beachfront. The decision wasn't easy at the time — but it saved millions of dollars and countless tears.

In 2006, Surfside Beach bought and cleared nine houses from a beachfront row along the Gulf of Mexico. In 2008, Hurricane Ike proved it was a sound investment. The storm wiped out all of the remaining houses on the front row.

The buyout was made possible in part with funds from the State of Texas and from the Federal Emergency Management Agency (FEMA), whose Hazard Mitigation Grant Program (HMGP) is aimed at reducing risk and chronic losses from flooding and wind damage. The program in Surfside Beach also includes relocation of 11 other beachfront homes and the construction of a new sea barricade.

Surfside Beach, which traces its history to 1821, is the kind of place that people up north dream about on cold winter nights. The Gulf sparkles in the sunlight and white-capped waves lap softly against the shore. Homes are painted in soothing sea-foam green, coral, and lavender. Sand drifts lazily along streets, which bear such idyllic names as Seashell, Saltgrass, and Sandpebble.

The village, however, is in a fight for its future. The cherished beach is eroding dramatically, leaving many homes at severe risk of ruin from storm and sea. After a series of tropical storms and bouts of flooding from Hurricanes Katrina and Rita, Hurricane Ike tore through the town with a storm surge of 7 to 10 feet and winds above 100 miles per hour (mph). Homes along the first row were ripped off their moorings and either given up to the sea or hurled in pieces into the second row of houses.

Davison said he originally paid little attention to letters he received advertising the availability of FEMA's HMGP funds. Now he says he is thrilled he learned of the grant program in time for Ike.

"We didn't understand about hazard mitigation," he said. "Now we understand — it's an investment up front to save money in the long term by reducing disaster losses. Those savings will be multiplied again and again over the years."

Now that the Gulf has claimed the first row of houses, homeowners Peggy and Norman Llewellyn know they made the right decision in 2006. After a lot of soul-searching, they took advantage of the state and Federal funding to relocate their house several blocks from the beach.

"It was very hard to move off the beachfront," said Peggy Llewellyn, an engineer and Surfside Beach city councilor. "We had a lovely house. But we kept getting damages — Katrina, Rita, the tropical storms and the bull tides two years ago. We were constantly making repairs."

Quick Facts

Sector:
Public

Cost:
$628,410.00 (Actual)

Primary Activity/Project:
Acquisition/Buyouts

Primary Funding:
Hazard Mitigation Technical Assistance Program (HMTAP)

Multiple Measures Protected University from Floods

Harris County, Texas

Harris County, TX – As a leading research institution with a distinctive commitment to undergraduate education, Rice University aspires to path-breaking research, unsurpassed teaching, and contributions to the betterment of our world. Unfortunately, it shares a history of flooding with other critical facilities in Houston. To protect its property against floods, the university has invested over $2 million in flood mitigation measures with astounding success. When Hurricane Ike slammed into Texas in September 2008, the university experienced rising water from the deluge of rainfall that accompanied Ike, but did not flood.

“Wwe have a great deal of surface flooding. With a strong summer thunderstorm, we would get surface flooding,” said Doug Tomlinson, assistant vice president in the Project Management and Engineering Department at Rice. “The water would impede traffic flow.”

In 2001, Tropical Storm Allison devastated southeastern Texas. The storm dropped heavy rainfall along its path, peaking at over 40 inches in Texas. The worst flooding occurred in Houston. Downtown Houston was inundated, causing severe damage to hospitals and businesses. Rice was not spared.

“Following Tropical Storm Allison, we had a lot of surface flooding,” continued Tomlinson. “We have a bunch of underground utility systems that provide services to the campus. We got some water in them, which migrated to some of the buildings. We had water come in through some basement level windows also. In some places the water got up as high as five feet. Street flooding was probably around two feet.”

While Tropical Storm Allison may have been a deciding factor in the university’s decision to apply for funding to initiate mitigation measures, poor drainage was a constant woe long before the storm.

A portion of the university’s 285 acres sits on top of what is commonly known as Harris Gulley. Back in the 1950s, two, 11-foot by 11-foot box culverts were installed. Surface water was supposed to drain off the campus into Harris Gulley before finding its way to the Brays Bayou. Over time this feat became less likely. With the amount and rate of rainfall, Harris Gulley would surcharge, and water would simply stand on the surface.

“The [mitigation] projects executed following Tropical Storm Allison were multiple small projects; however, all were initiated as a result of the storm,” said Tomlinson.

The university received a $2,059,747 grant from the Federal Emergency Management Agency (FEMA) through its Hazard Mitigation Grant Program (HMGP) to fund 11 projects. HMGP pays 75 percent on approved projects that will prevent or reduce damage from storms and other natural hazards. These grants are made available for both public and private projects. With Rice University’s 25 percent portion, the total funding was $2,746,328.

Quick Facts

Year:
2001

Sector:
Public

Cost:
$2,059,747.00 (Actual)

Primary Activity/Project:
Flood Control

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

Shutters Provide Peace of Mind During Storm

Harris County, Texas

Houston, TX – With wind gusts approaching 100 miles per hour (mph), Hurricane Ike (September 2008) roared into Houston as a Category 2 storm, peeling sheets of steel off skyscrapers, downing power lines and trees, blowing out windows, and dumping mountains of debris. As the storm raged, patients at Houston Hospice were securely tucked away behind hurricane shutters.

"They say 'Run from the water and hide from the wind.' That's what we chose to do," said Christine Blackmon, vice president of finance for Houston Hospice. "We bunkered in, so to speak, and pulled those shutters down so that the patients would be protected."

Located in the Texas Medical Center in Houston, the hospice provides inpatient and respite care at its 25-bed inpatient facility. It provides dignified and compassionate care for people in the last phase of a terminal illness so they can live as fully and comfortably as possible. The goal of hospice care is to enable patients to continue an alert, pain-free life and to manage other symptoms so their last days may be spent with dignity.

"We didn't have any broken windows [due to Ike]. We actually had some wind-driven rain that came in through the windows in some of the patients rooms," said Blackmon. "It wasn't anything severe. We were able to put towels down and get the rooms cleaned up."

Houston Hospice saw the need for hurricane shutters following damage to the Patient Care Unit, estimated at $45,000, incurred from Tropical Storm Allison (June 2001). In January 2003, the hospice received a $131,250 grant from the Federal Emergency Management Agency (FEMA) through its Hazard Mitigation Grant Program (HMGP) for the placement of storm shutters on the windows and doors of its Patient Care Unit. HMGP pays 75 percent on approved projects that will prevent or reduce damage from storms and other natural hazards. Administered by the state, these grants are made available for both public and private projects.

Hurricane shutters are often used to protect window openings in a storm, although impact-resistant windows are increasingly popular. According to the Hurricane Research Division of the National Oceanic and Atmospheric Administration (NOAA), people who live in coastal areas from Texas to Maine, and in other hurricane-prone areas, will find shutters an excellent investment for protecting against wind and wind-borne debris. These shutters provide protection of not only the windows and doors they cover but also possessions and people inside. Once a window or door has been breached by hurricane-force winds, tremendous pressure is brought to bear on interior walls. Upward pressure on the building's roof can lead to roof failure, which exposes the entire contents of the building to the storm. Shutters are a first line of defense against the hurricane. Much of the damage and building failure in Hurricane Andrew (1992) could have been prevented by well-installed hurricane shutters over windows and doors.

Quick Facts

Year:
2001

Sector:
Public

Cost:
$175,000.00 (Actual)

Primary Activity/Project:
Retrofitting, Structural

Primary Funding:

South Padre Island: Living with Mother Nature's Wrath

Cameron County, Texas

South Padre Island, TX - Jay Mitchim has weathered his job in South Padre Island's building department for more than 20 years—longer than many of the buildings in this town known as the "Tropical Tip of Texas." These buildings have survived some of Mother Nature's toughest tests.

Now the town's chief building official, Mitchim speaks of the island's buildings with personal affection, as if he were describing his children. So he watched with interest July 23, 2008 when Hurricane Dolly stormed ashore as a Category 2 storm with winds estimated at between 100 and 140 miles per hour and rain totaling 12 to15 inches.

"I have often wondered how the new buildings, built on my watch, would hold up to a storm," he said. "There's a lot of damage, but there's not a lot of structural damage to the newer buildings. They did pretty well."

A case in point is City Hall, completed just before Hurricane Dolly. It fared very well with just minor water damage from rain that came through and under a door.

City Hall is a shiny new building, colorful and very pleasant, with generous impact-resistant windows that fill the rooms with sun and light. But on closer inspection, it is also a vault. It has a concrete, monolithic-pour roof deck, and its floors and ceilings are poured concrete with concrete blocks filled between the massive columns.

"This building is equipped with an on-site generator and was built to weather a moderate storm, the kind we just had with Dolly," Mitchim said. "The entire two-story City Hall is built 10 feet above sea level. That's two feet higher than the code requirement. Why? To build in an extra measure of safety for this critical public building near the sea."

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Building Codes

Primary Funding:
Local Sources

Rio Grande Valley Buyout
Moves Floodplain Residents Out of Harm's Way

Cameron County, Texas

Cameron County, TX—In the summer of 2008 when Hurricane Dolly swamped the old neighborhood, now largely vacant ground, she unleashed nearly a foot of rain over Antonia Iberra's old home, but nobody was home. In 2006, Antonia and most of her neighbors had moved out as part of a government floodplain acquisition program.

Most of what remains of Del Mar Heights today is only memories, and they are not good ones for Antonia."It flooded there so much—oh, yes, it flooded every time it rained," she said. "I suffered there for 17 years."

When the government bought her house, Iberra recouped enough money to buy a better house, free and clear, in a safe neighborhood.

"We had built our own house there, from whatever we could find," Iberra said from the shaded porch of her family's pink-framed house. The pleasant neighborhood she lives in now is a far cry from the house in Del Mar Heights. Her husband, Moises, looks after a few black chickens in the backyard, and she cultivates flowers.

"It was all we had—that old house. Every time it rained, we could not get out. I had to put plastic bags on the shoes of the children and walk with them for a long, long way through the mud and the dirty water"—she measured up to her thigh to show the depth—"to try to get the bus to school. I had to carry the little ones. My husband is disabled. An ambulance could not get there when people were sick."

Before the buyout, the residents of Del Mar Heights lived with chronic, contaminated flooding that trapped them in their isolated south Texas neighborhood in rural Cameron County, Texas. The unincorporated 300-acre tract is at the southernmost tip of Texas: 20 miles to the south is the Mexican border; 20 miles east is the edge of the Gulf of Mexico.

Quick Facts

Year:
2002

Sector:
Public

Cost:
$1,300,000.00 (Actual)

Primary Activity/Project:
Acquisition/Buyouts

Primary Funding:

San Benito's “Safe Box” Shuttered Against the Storm

Cameron County, Texas

San Benito, TX - “We felt very, very safe. It seemed like we were in a safety deposit box.” That’s how San Benito Mayor Joe Hernandez describes riding out Hurricane Dolly in his City Hall, Emergency Operations Center – protected by storm shutters.

“We were very grateful for those shutters,” Mayor Hernandez added.

On calm days, the almond-colored steel shutters roll up neatly into unobtrusive metal casings above doors and windows. They can be unrolled down to clamp securely over the windows during a storm – such as Hurricane Dolly, which brought winds of more than 55 to 70 miles per hour to San Benito.

“I will never forget that wind and the rain—horizontal rain, for hours and hours. It seemed like it was never going to end,” said Martha McClain, San Benito’s Community Affairs Officer. McClain was one of a dozen people working in the Emergency Operations Center around the clock for two days during the storm. All around them, Dolly was uprooting trees, tearing roofs apart, and turning debris into airborne missiles.

“I was very grateful that those storm shutters were there during the storm,” said McClain. “So much debris was blowing around, big trees coming down. We knew the shutters would prevent missiles coming through the windows and doors. I would not have wanted to be there without them. I remember when our former emergency manager got the grant to install those shutters,” McClain said. “He was so proud. And now it paid off.”

A few blocks away in this pleasant Rio Grande Valley town of 33,000 people, similar shutters protected the San Benito Public Library. “I wasn’t worried about the library at all, because of the shutters,” said librarian Cindy Hart.

Quick Facts

Sector:
Public

Cost:
$20,000.00 (Estimated)

Primary Activity/Project:
Retrofitting, Structural

Primary Funding:
Other FEMA funds/ US Department of Homeland Security

Three Island Homes Pass Hurricane Dolly's Test

Cameron County, Texas

South Padre Island, TX – Richard Ehrlich, a South Padre Island building inspector and builder, knew all too well what Hurricane Dolly could do to the three housing units he had built on this trendy barrier island. He says Dolly was “like blasting your house with a car wash sprayer, for hours and hours.”

Hurricane Dolly came ashore on Padre Island July 23rd in 2008 as a Category 2 hurricane. Winds of 100 to 140 miles per hour lifted roofs, blasted through windows and garage doors, hurled debris, and drove horizontal rain. Most of South Padre Island’s buildings sustained wind and/or water damage, some quite severe.

It was a tough test for the three housing units Ehrlich had built on this island at the bottom of the Texas Gulf Coast. Walking through his houses after the storm, Ehrlich was relieved to find mostly cosmetic damage.

“I was real happy with those houses during Dolly,” Ehrlich said. “We felt quite safe in there. When I build, I’m always thinking, Where are we? On a barrier island, with wind, water, hurricanes....”

Ehrlich built his first island house 12 years ago. “I was a builder in Colorado and had just moved to Padre Island. I was real worried about hurricanes, so I built it as strong as I knew how at the time.” The house was first tested in what he describes as a straight-line wind shear in May of 2000.

Quick Facts

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Building Codes

Primary Funding:
Homeowner

Brownsville's “Blue Ribbon” Resacas Reduce Hurricane Dolly Flood Losses

Cameron County, Texas

Brownsville, TX—When Hurricane Dolly came in the summer of 2008, Brownsville was ready with an ingenious disaster defense that kept hundreds of homes from flooding. The Rio Grande Valley leaders capitalized on natural assets, creativity, and teamwork to handle Hurricane Dolly’s 10 to14 inches rainfall across the city.

As Brownsville’s Joe Barrera, who manages the Brownsville Irrigation District, explains, this Texas town is networked with what they call resacas, water-filled, winding “blue ribbons” that aid in flood control and water storage, and add an aesthetic character to the city. Recently, city officials thought to use the resacas for flood control in a management network that stretches across multiple agencies.

“Resacas are the piecemeal remains of old channels of the Rio Grande River that used to meander all through what is now Brownsville. The river now flows along the city’s southern fringe,” said Barrera. “A hundred years ago, farmers in the [Rio Grande] Valley hit on the idea of damming up the dry resaca channels so they could become linear lakes. We use the water to irrigate crops – sunflowers, soybeans, wheat, corn, rice, onions, cabbage.”

Over time, flooding became a chronic problem in this city of 150,000 that dubs itself “On the border by the sea.” Hurricane Beulah, for example, dropped up to 30 inches of rain in 1967, and is the kind of storm that Brownsville leaders know may occur again in any year. In more recent years, Brownsville has experienced serious flooding in 1984, 1993, 1996, 1997, 1998, and 2004.

When Dolly stormed ashore July 23rd in 2008 as a Category 2 hurricane, rain across Brownsville varied from 6 to 14 inches. Some Brownsville residents call Dolly a 100-year storm; others say it was less. Nonetheless, in the old days, they would have been awash.

But not this time. "We did a lot of things differently this time, and it paid off well,” said Brownsville Assistant City Engineer Doro Garcia, Jr. “I don't think in the history of Brownsville we have been able to manage that much water without flooding."

Joe Barrera said, “I didn’t have a single complaint call.” The city reported some flooded streets but virtually no complaints of water in buildings.

Brownsville leaders reduced Dolly’s flooding impact dramatically with a multi-pronged program of prevention, pipes, pumps, planning, and partnerships. The city’s flood-mitigation program requires careful planning, vigilant management, and close cooperation among a patchwork of entities with differing authorities.

“I have to say,” said Barrera, “we’ve worked on it. This is a joint effort among a lot of people who work together well. It could never work without our partners.”

Together, they developed updated plans and procedures, starting with a major flood protection study in 2004. They created flood detention basins in strategic areas, using a combination of local money and other funds such as U.S. Housing and Urban Development (HUD) Community Development Block Grants (CDBG). Three detention ponds reduced flooding directly for more than 35,000 people, according to Ben Medina, Brownsville Planning and Community Development Director.

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Flood Control

Primary Funding:
Local Sources

All Dressed Up to Brave the Wind

Brazoria County, Texas

Brazoria County, TX – During man-made and natural disasters, the Freeport Fire and EMS Department is designated as the Emergency Operations Center and the Freeport Police Department as the Incident Command Post for the city of Freeport and several surrounding cities.

After years of the tedious task of boarding up the buildings to secure them during impending disasters, the city applied for and received a grant to install hurricane shutters.

The shutter retrofit project began in August 2006 and was completed June 2007 at a cost of $38,394. Freeport received a grant of $28,795 from the Federal Emergency Management Agency (FEMA) through its Hazard Mitigation Grant Program (HMGP).

HMGP pays 75 percent on approved projects that will prevent or reduce damage from storms and other natural disasters. These grants are made available for both public and private projects.

Hurricane shutters were a logical choice because they save lives and property. The demand continues to grow as more individuals realize their value, and they offer more than just protection from hurricane-force winds and flying debris.

Depending on the type of shutter, they can add security, increase the resale value of property, decrease chances of looting and theft, give protection from outdoor noise, allow for light control, add visual appeal to homes and buildings, and decrease insurance premiums.

In addition, they act as a time-saver. “One of the problems that we’ve run into in the past is that when a storm is imminent a lot of windows have to be boarded up. It’s very labor intensive. Another problem is when you have an EOC such as our building and you keep a crew back for a storm with all the windows boarded up it gets to be a little claustrophobic,” said Stanford.

Electric roll-down shutters were placed on all windows and doors of the police department. A manual override was also installed in the event of power loss. The fire department also has electric roll-downs on the first floor as well as manual roll-downs on the second.

Quick Facts

Sector:
Public

Cost:
$38,394.00 (Actual)

Primary Activity/Project:
Retrofitting, Non-structural

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

Hospital Gear Up to Combat Flood

Harris County, Texas

Harris County, TX – A nightmare, to put it mildly, is how Houstonians refer to the reign of Tropical Storm Allison. In June 2001 she ruled with a vengeance, creating massive flooding.

Among those worst hit by flooding was the Texas Medical Center. Located in the heart of the low-lying downtown area of Houston, Texas, the medical center consists of 42 medical institutions, 19 of which are hospitals, including St. Luke's Episcopal Hospital. Most of the buildings are connected by an underground tunnel system. The rainfall overwhelmed flood protection systems, allowing rushing water to enter through inter-connected basement-level tunnels.

Following the 2001 flood, an engineering firm was retained to perform a study prior to developing a comprehensive flood mitigation plan. Installation of water-tight sub-basement doors was a part of the plan. The submarine-type doors have a seal (bladder) surrounding their perimeter, which is inflated once doors are closed. They can withstand water up to 12 feet deep.

The Dry Flood Proofing Project began in December 2002 and was completed in December 2004, at a cost of $5,013,496. St. Luke's received a $3,866,698 grant from the Federal Emergency Management Agency (FEMA) through its Hazard Mitigation Program (HMGP). The hospital paid the other 25 percent. The project called for the installation of 20 submarine doors.

St. Luke's Episcopal Hospital, home of the Texas Heart Institute, has been providing primary and tertiary health care to patients in the Houston metropolitan area and around the world for nearly 50 years.

The area that flooded is in the second basement, which houses the majority of the power distribution center. It had been protected by "flood logs" intended to prevent flooding. They were installed in the Texas Medical Center after a 1976 flood.

Manufactured in light weight aluminum, the "logs" provide an economical barrier against water flow through doorways. But it took time and manpower to operate. According to Garcia, it took about one-half hour and two men to bolt and secure the logs in place.

"The water came so fast it was impossible to secure all of the logs," Garcia said. "As soon as we secured the first log, the water began to rise above it. We tried a second, then a third. By the time we got to the fourth log the water was above my thighs. I knew it was time to head for safety."

As Garcia ran for safety, he said he saw water rushing against the giant barriers and spewing through the cracks like a fountain. The logs were no match for what lay ahead. Now that the submarine doors are in place, there is a definite feeling of security.

Quick Facts

Year:
2001

Sector:
Public

Cost:
$5,013,496.00 (Actual)

Primary Activity/Project:
Flood Control

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

Mitigation Project Gets an 'A' Plus

Harris County, Texas

Harris County, TX – The prediction of rain was not welcomed at Klein High School prior to 2003. Due to the expansion of the campus and the rapid development of the surrounding areas, storm drains were heavily taxed. Heavy rain often flooded some of the school's buildings. After sandbagging for several years, Klein Independent School District (ISD) sought a better solution.

"We used to have these cute little Home Depot type plastic storage units right outside entry doors, and we had a good stock of sandbags," said Donald Blue, Director of Capital Projects for Klein ISD. "Every time we got a good rain, we'd put a little sandbag down around the doors. Students had to step over them, and of course we couldn't put handicap accessible ramps over the sandbags."

Klein ISD retained an engineering firm to perform a study and make recommendations. A stormwater drainage project was proposed.

The Drainage Project was initiated in April 2003 and completed in January 2006 at a cost of $970,113. Klein ISD received a $727,580 grant from the Federal Emergency Management Agency (FEMA) through its Hazard Mitigation Grant Program (HMGP).

Phase I of the project consisted of three parts. First, the removal and relocation of existing facilities at the practice field and excavating a stormwater detention pond located on the practice field. The detention pond is two feet deep, and the excavated dirt was used to create a berm around the practice field.

The second part was the installation of Tide Flex Check Valves (backflow) to the school's existing storm sewer system to ensure that potential off campus stormwater cannot flow back through the system and flood the campus.

Last came the removal and replacement of approximately 400 square yards of asphalt pavement to install 400 linear feet of 12-inch gravity flow stormwater pipe from the gymnasium to an existing drainage ditch.

Phase II of the storm water drainage improvements was the installation of a 54-inch gravity pipe, buried 15 feet deep. Since the improvements, Klein ISD has not had any problems.

Quick Facts

Sector:
Public

Cost:
$970,113.00 (Actual)

Primary Activity/Project:
Flood Control

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

Now That You Know What Are You Going To Do?

Taylor County, Texas

Taylor County, TX – If only the people of Merkel, Texas knew then what they know now. “Then” was before extensive rainfall last August flooded a neighborhood, damaging 60 homes that never had flood damage before.

“Then” was when townspeople couldn’t buy flood insurance because the town did not participate in the National Flood Insurance Program (NFIP).

“Then” was before City Manager Donnie Edwards learned how simple and beneficial it is to join the NFIP and how everyone could benefit, not just those who live in the most flood-prone area, known as a floodplain.

“We had a flood event in an area which doesn’t normally flood,” said Donnie Edwards, who had only been on the job as City Manager for seven months. “I got a call from insurance agents regarding people wanting to purchase flood insurance for their homes. I had no idea that it wasn’t available. That’s kind of how we got to where we are now.”

Edwards continued, “When I first started looking into it [flood insurance], I thought to myself if Merkel had not joined the NFIP, there had to be a good reason. I couldn’t find it. There wasn’t any."

The flood damage in Merkel was one reason that Taylor County was included in a major presidential declaration for severe storms and flooding in Texas this summer, from June 16, 2007 to August 3, 2007. Edwards began to learn about the NFIP.

It was then that Edwards learned of misconceptions about the flood insurance program. One was that flood insurance could only be purchased by persons living in the floodplain. Another was that to file a claim, the flooding had to be a direct result of water rising out of its banks. The third was that flood insurance is too expensive.

A FEMA NFIP specialist, Kathy Graf, explained the program. “A flood is an excess of water on land (two or more acres) that is normally dry,” Graf said. “The NFIP definition includes inland tidal water; unusual and rapid accumulation or runoff of surface waters from any source; mud flow; collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood.”

Once a community joins the NFIP by adopting and agreeing to enforce an approved local floodplain management ordinance (or equivalent county court order), residents can buy flood insurance through local insurance agencies. The insurance generally does not take effect until 30 days after purchase; however, it is effective immediately on a newly purchased home.

Flood insurance is available to homeowners for dwellings and contents, businesses for buildings and contents, and to renters for contents. Rates begin at $112 per year for minimum coverage of a house that is outside the floodplain boundaries or $317 yearly for the maximum coverage of $250,000. Rates are higher in the floodplain.

Quick Facts

Year:
2007

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Education/Outreach/Public Awareness

Primary Funding:
National Flood Insurance Program (NFIP)

KnoWhat2Do
A Regional Public Education Program

Multiple Counties, Texas

Tarrant County, TX – When it comes to disaster preparedness, residents in North Central Texas have access to a wealth of information. As a result, citizens in North Central Texas will “KnoWhat2Do” in the event of a wide-scale disaster or crisis situation.

“KnoWhat2Do” is a public education and outreach campaign, which is presently in Phase II of development.

Phase I of the project includes a variety of resources that educate the public on how to think, prepare and act in case of an emergency.

The “KnoWhat2Do” disaster preparedness program was developed through the collaboration of local governments in the North Central Texas area. It arms citizens with the knowledge and skills needed to effectively manage nearly every possible disaster or crisis situation common to North Central Texas, including severe weather and exposure to hazardous materials. Evacuation procedures are also addressed.

Each jurisdiction allocated money from their individual UASI awards.

“The main reason we pooled our funds was because we found out that we were competing against ourselves,” added Juan Ortiz, Emergency Management Coordinator. “We decided to join forces and maximize our dollars.”

Wilhelm explained the program more in depth. “The three-part program begins with think, which provides detailed information on severe thunderstorms and lightning, tornados, flooding and flash floods, terrorism, extreme heat, drought and wildfire, hail, storm spotting, storm watching and warnings, and chemical hazards,” she said.

“Next is prepare, which provides ideas for creating a personal safety plan that includes a home emergency supply kit, a vehicle emergency kit, a communications plan with emergency contact telephone numbers, care plan for individuals with special needs, and planning for pets and livestock welfare,” she continued.

“The final part is act, which advocates taking personal responsibility in developing a household preparedness plan and emergency supply kit, staying alert to severe weather and being knowledgeable about hazards. It also encourages becoming involved in volunteer services such as disaster relief groups, community safety organizations, fire departments, emergency medical services, and first responders. Those efforts include training in emergency preparedness, response capabilities, fire suppression, first aid, cardiopulmonary resuscitation (CPR), and search and rescue procedures,” finished Wilhelm.

In Phase II of the program, sections of the preparedness guide will be expanded to better serve the public. It will also have an advertising component which will include outdoor billboards, radio, and television commercials.

Quick Facts

Sector:
Public/Private Partnership

Cost:
Amount Not Available

Primary Activity/Project:
Education/Outreach/Public Awareness

Primary Funding:
Other FEMA funds/ US Department of Homeland Security

Technology To The Rescue

Tarrant County, Texas

Tarrant County, TX – Disaster strikes without warning. While first responders do all within their power to handle emergencies efficiently, having additional information regarding the rescue mission can expedite the process. Fort Worth's Emergency Management Department is currently equipped to rapidly supply accurate information about residents with disabilities.

The Special Needs Assistance Program (SNAP), which encourages online enrollment, provides Fort Worth's emergency responders with vital information about residents with permanent disabilities, both adults and children. The elderly population is also targeted. Residents are encouraged to register annually with the Office of Emergency Management.

The program begin in the mid 80s, which allowed residents to fill-out a paper form that was distributed by the city's community partners, and the data was entered into a history file in our computer-aided dispatch system.

Through the years, the program was restructured several times with marginal success because, after a period of time, the data became unreliable and difficult to update in the computer-aided dispatch system. Due to advances in technology and a series of lessons learned from the 2004 power outage, flooding, and Katrina, the office decided to revamp the program again.

The database includes the resident's name, gender, age, weight, address, primary language, emergency contact, and handicapping condition. Other information includes use of aids such as a walker/cane, crutches, a wheelchair, a guide dog, oxygen, or a life support system. Whether equipment requires an intermittent or continuous electrical supply is also noted. Space is provided for additional comments.

"It's important that registrants know that their information is being obtained on a secured site and to know that our office is the only office with administrative rights to the data," Moss said.

The website is in compliance with the Americans with Disabilities Act (ADA), which protects the rights of people with disabilities.

Online registration is preferred, and the program is user friendly; however, the Office of Emergency Management will continue to accept mail-ins from registrants.

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Education/Outreach/Public Awareness

Primary Funding:
Local Sources

RSDE
Speeds Up Evaluation Process

Wichita County, Texas

Wichita Falls, TX - In July 2007, water from the Wichita River rose out of its banks, hurdled over the Duncan floodgates, and inundated 167 homes in Wichita Falls, Texas. Utilization of the Federal Emergency Management Agency's (FEMA) Residential Substantial Damage Estimator (RSDE) hastened the process for determining damage estimations.

The RSDE software is based on regulatory requirements of the National Flood Insurance Program (NFIP) and is provided free of charge as a tool for those responsible for preparing substantial damage determinations.

Communities participating in the NFIP are required to adopt a local floodplain ordinance that meets the NFIP criteria and to comply with guidelines that require homes located in the FEMA 100 year floodplain or Special Flood Hazard Area (SFHA) be evaluated for substantial damage after a flood event. Substantial damage is damage of any origin sustained by a home whereby the cost of restoring it to its pre-damaged condition equals or exceeds 50 percent of the market value of the home before the damage occurred.

Teague along with six building inspectors from other Texas cities---Hutto (Williamson County), Frisco (Collin County), Irving and Rowlett (Dallas County) began the evaluation process within three days following the flood. The standardized software enabled them to borrow inspectors utilizing inter-community agreements.

Using the RSDE Damage Inspection Worksheet (a checklist), the building inspectors went into the homes and manually recorded the data. The data was entered into the software. The software provided reasonable and defendable building values and damage estimates in a short time frame. The task was completed within a week.

FEMA does not require the use of the software. The homeowner has the right to require the use of alternatives, including professional appraisals, contractors' damage estimates, and community damage estimates for making substantial damage determinations.

The software assists in assessing residential building values. It's a tool for evaluating a home's market value prior to the damage and for determining the amount of damage following a disaster event. It shows how to rapidly, efficiently, and consistently assess substantial damage. It allows communities to compile a data base of inspected houses as well as help to identify areas that have received repetitive damages.

Quick Facts

Year:
2007

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Community Rating System Activity

Primary Funding:
National Flood Insurance Program (NFIP)

Mitigation Can Be Appealing

Guadalupe County, TX – Gilbert Acuna and his wife, Angie, wanted to live closer to their daughters - three in San Antonio and one in Austin. They chose the small town of Seguin knowing that the town's flood history meant that their dream home would have to be elevated.

"We consulted the city's building official and were told that we needed to elevate eight feet above the floodplain to get a permit. We decided to add three more feet," Acuna said. "My wife designed the home, and we had an architect to draft the plans."

Construction of the 1,805 square foot stucco home began in March 2005 and was completed within six months by a local builder. The first floor is elevated 12 feet above the slab foundation on 32 concrete pilings with embedded anchor plates for added support. The open space below provides parking, storage, and building access. The home backs up to Geronimo Creek, which feeds into the Guadalupe River.

In June 2007, Geronimo Creek flooded. More than three-and-one-half feet of water entered ground-level homes in their neighborhood causing damage. The Acuna's home was unscathed.

The elevation project is one form of hazard mitigation recommended by the Federal Emergency Management Agency (FEMA). Mitigation is any sustained action taken to reduce or eliminate the long-term estimated impact a hazard would have on human life and property.

Guadalupe County, Texas

Quick Facts

Sector:
Private

Cost:
$180,000.00 (Estimated)

Primary Activity/Project:
Elevation, Structural

Primary Funding:
Property Owner, Residential

Is There Room For The Animals In Your Sheltering Plan

Walker County, Texas

Walker County, TX – In 2005 Hurricane Rita pummeled many cities causing a mass exodus of people and animals. Some found their way to Huntsville, Texas, a designated shelter hub.

Officials were faced with a dilemma: what to do with the animals that tagged along with their owners? Fearing a disaster within a disaster, they hoped for the best, sought help, and vowed never to be caught in that position again. They developed the first animal sheltering plan in Texas called the Animal Issues Plan.

"We were equipped to shelter 1,600 people. We had 360 evacuees following Hurricane Katrina. Here comes Hurricane Rita. We received about half of the population of Galveston. Then the mayor of Houston decided that they were going to evacuate Houston," said A.L. Davis, Chief Deputy and Emergency Management Coordinator for the Walker County Sheriff Department.

"We received a little over 15,000 [people]. Jack Colley, director of the Governor's Division of Emergency Management, advised evacuees to bring their animals. We did not know where we were going to place them. We had no cages or leashes, no food, nor means of transporting them. We had no way of associating animal and owner," continued Davis.

According to regulations, pets are not allowed in a Red Cross approved facility. Service animals are the only exception. Huntsville had to quickly provide shelter for 360 small animals and about 50 cattle and horses.

Later, Davis met with Reggie Leplay, county agent, John Powledge, chairman of Walker County Fair Association, and Dusty Bouillion, director of Texas Animal Health, to develop a comprehensive emergency plan, one that would address animal issues.

Two subcommittees were formed--large animal and small animal. Each had chairpersons, co-chairs, and team leaders. An organizational chart was established. Forms and instructions were developed. Instructions on Intake of Live Animals, Intake and Disposal of Dead Animals, and Procedures for entering Triage Unit were written.

"Following Rita we had a real bad flea infestation problem. We had to get medical help. So we knew that we needed a medical team," Davis said. "Another problem was identifying pets. Upon deactivation, we went to each shelter and told evacuees to get on a bus if they had an animal. We took them to the fairgrounds and instructed them to walk up and put their hands on their animal. That was the only way we had to identify the owner. Now, the registration group takes a picture of the animal and owner and collects shelter information from the owner. We now tag the animal and the owner. The transportation team accompanies the registration team to the pet owner's shelter and transports the pet to the animal shelter."

The arena at Sam Houston University is the designated animal shelter. It's equipped with radio communication, proper lighting, heating and air, and stalls to accommodate horses. Making certain there's sufficient supplies and food remains an issue. The county relies upon donations.

"We tested our Animal Issues Plan during our hurricane exercise. We used live animals and some small, stuffed animals. We have a pretty good system. It works," Davis said.

Quick Facts

Year:
2005

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Mitigation Planning/Disaster Resistant Universities

Primary Funding:
Local Sources

Volunteer Firemen Create Mobile Command Unit

Eastland County, Texas

Eastland County, TX – A 2006 wildfire destroyed nearly 25 percent of Eastland's land mass burning 60 homes within 12 hours. Part of the problem stemmed from a lack of communication and management. Lessons learned prompted the need for a mobile command unit.

"We had fire departments from our county and the surrounding areas scattered out over 20 miles. People were trying to contain the fire at different sections of the community. Logistics was extremely difficult," said Steven Watson, professional firefighter and 911 dispatcher.

A meeting was held to evaluate performance following the incident.

"We had a big critique session. What did we do right? What were our problem areas?" Watson said. "The biggest problem was communication. We didn't have anyone with tools available to them to coordinate efforts."

As a result, a 2003 motor home was donated to Eastland County. Firemen from Eastland's eight volunteer fire departments used their skills, on weekends, to create a mobile command unit.

"We went to a trade show in Dallas hosted by Fire Rescue International to look at the mobile command units on display. We consulted with representatives to determine how each piece of equipment was utilized," Watson said. "Texas Department of Homeland Security gave us $30,000, and we received a donation of $20,000. We used that money to equip the unit, and we furnished the labor." The unit was appraised at $175,000.

In June 2007 Lake Leon flooded, endangering the lives and property of the residents living on the waterfront. Residents had received a warning to evacuate. Only 35 percent heeded it. Boats and military trucks were used to rescue 150 people.

"Instead of someone running a section of the incident with maps spread out on the hood of a truck and a portable radio that you can barely communicate messages back to the town, we had a unit centrally located at the lake and ready to handle the flood event," Watson said.

Having the unit on site resulted in smooth rescue efforts.

Quick Facts

Sector:
Public

Cost:
$175,000.00 (Estimated)

Primary Activity/Project:
Mitigation Planning/Disaster Resistant Universities

Primary Funding:
Private funds

Austwell: A Small Town With Big Plans

Refugio County, Texas

Refugio County, TX – In July 2003, Austwell suffered extensive damage when Hurricane Claudette ravished homes and businesses in the city. Now the unpaid mayor and a building official have joined forces to adopt and enforce strict building codes.

“To protect lives and property from natural disasters, we adopted the International Building Codes as the municipal building code for all construction, alteration, remodeling, enlargement, and repair of any residential and commercial structures within the municipality,” said Earl Bluhm, building official. The codes are recommended by the Texas Department of Insurance.

Individuals seeking to build or renovate a home in Austwell must have their plans reviewed by a wind-storm engineer. “We require that you hire a wind-storm engineer who is approved by the state of Texas,” Bluhm said. “I inspect building for the city of Austwell. I will not issue you a permit to build until your plans are reviewed by the engineer.”

New construction also must be elevated at least a foot above the street. “If you build at least a foot higher than the street you should never have a flooding problem,” said Bluhm.

“There is another hazard that led to flooding in 2007,” Bluhm said. Area farming is creating small dams as well as causing ditches to overflow. The local hazard mitigation plan has been revised, and a request for federal assistance has been made to address this issue.

“We recognized that this was going to be a problem. Rather than take pot shots and waste money, we got an engineer to survey elevations of ditches and culverts and to make recommendations,” said Thomas Bernal, mayor of Austwell. “We know what we need to do. Now it’s a matter of funding to implement the projects.”

Bluhm surveys the condition of existing homes and gives advice on bringing them into voluntary compliance or tearing them down. “Mr. Bluhm means business. He doesn’t show favoritism” Bernal said. “I received a letter requesting that I tear down my mother’s unoccupied residence.”

If owners do not comply, city officials will remove the building and place a lien on the property for costs incurred. “Eight buildings have already been condemned,” Bluhm said.

Overall, Bernal is confident about the outcome. "If a category two or three hurricane comes through, we are going to look golden. We are enforcing these codes. It’s for the benefit of the residents.”

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Building Codes

Primary Funding:
Homeowner

EMERGENCY MANAGER FINDS NEW USE FOR CABLE AND CELL PHONES

Guadalupe County, Texas

Seguin, TX - Fearing that residents along the Guadalupe River were not receiving flood warnings in a timely manner, Seguin County's emergency management coordinator, Dan Kinsey, developed and piloted an emergency callout system.

"Here we could very easily have a situation where we would have a flash flood. If 20-30 percent of your population doesn't have the traditional home phone, you need to find a way to warn them," said Kinsey.

He took advantage of an automated telephone notification system the county has purchased in 2003. It was set to place calls by zones. "We already had everything in place," Kinsey said. "It's a great tool with a lot of possibilities. It was just a matter of creating a database, collecting the information and getting it into the system."

Kinsey continued, "That database could not just rely on traditional land-line telephone numbers, however. There are so many people using cable phones and cell phones nowadays. Your normal land-line database just doesn't cover enough people."

He drafted an Emergency Callout System Voluntary Registration form. Participants are required to list the location of their waterfront property, two phone numbers (designating whether they are land-lines, cell phones or cable/internet phones), and an email address.

Residents are asked to update their numbers in writing, or to notify the Office of Emergency Management if they move out of the flood hazard zone.

However, being able to notify residents is only half of the system. The other half is being able to know when to notify them. Kinsey monitors water flows measured by the Guadalupe River Authority at its hydro-electric dams. Based on those numbers, he can predict when flooding is imminent.

While all emergencies cannot be avoided, Kinsey tries to prevent some and manage others in ways that minimize their impact.

Quick Facts

Sector:
Public

Cost:
$30,000.00 (Estimated)

Primary Activity/Project:
Warning Systems

Primary Funding:
State sources

Levee Provides Time For Animal Rescue

Cooke County, TX - Attempting to avoid the rushing waters of the Trinity River, a little elephant clung tightly to a tree during the 1981 flood in Gainesville, Texas. The Frank Buck Zoo lost more than 40 animals in the flood. To ensure the safety of the animals and to minimize the effects of future flooding, an earthen levee was erected. On the morning of June 18, 2007, that levee bought the staff much needed time to evacuate the animals.

Built in a creek bed on 13-acres of land, Frank Buck Zoo is home to approximately 130 animals from four continents. The zoo opened in 1951 with a mission to offer a wholesome, educational environment, one that has been threatened repeatedly by floods.

As a result, the city proposed to construct a flood control levee. The project was initiated April 1991 and completed November 1993. Total project cost was $127,184. Gainesville received a $63,592 grant from the Federal Emergency Management Agency (FEMA) through its Hazard Mitigation Grant Program (HMGP).

The HMGP paid 50 percent of the cost. On December 3, 1993, the President signed the Hazard Mitigation and Relocation Act of 1993, which significantly increased funding available for hazard mitigation grants under section 404 of the Stafford Act. Presently HMGP pays 75 percent on approved projects that will prevent or reduce damage from natural hazards. The grants are made available for both public and private projects. Funds are administered by the state.

When flood waters rose on June 18, 2007, 112 animals were evacuated to a facility outside the floodplain before the levee was topped. Buildings located on higher grounds remained unscathed. Those same buildings were under water in the flood of 1981.

“The levee definitely protected the animals, and the structures that were on higher grounds and did not compromise the safety of the staff,” Kleven said. “Otherwise, they would have been confronted with flood waters while rescuing the animals. We also were able to re-open the zoo more quickly than we did in 1981.” The zoo opened within three days after the 2007 flood.

Cooke County, Texas

Quick Facts

Year:
1981

Sector:
Public

Cost:
$127,184.00 (Actual)

Primary Activity/Project:
Flood Control

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

TURN AROUND DON'T DROWN
A PUBLIC AWARENESS CAMPAIGN

State-wide,
Texas

Tom Green County, TX – NOAA'S National Weather Service (NWS) reports that 80 percent of flood-related deaths in South Texas occur as a result of people driving through low-water crossings, walking along the banks of flooded areas, or playing in floodwaters.

Hector Guerrero, a native of Austin, Texas and Warning Coordination Meteorologist for the NWS forecast office in San Angelo, Texas, decided to address the alarming concern. Working in conjunction with his NWS colleagues and partners, he launched the campaign: "TURN AROUND, DON'T DROWN."

People underestimate the force and power of water. Six inches of fast-moving flood water can knock over an adult, and it takes only two feet of rushing water to float most vehicles. More than half of all flood fatalities result from automobiles being swept downstream.

The Turn Around, Don't Drown (TADD) campaign was launched on May 22, 2003, with a news conference at NWS Southern Region Headquarters located in Fort Worth, Texas. The partners included the NWS, Federal Alliance for Safe Homes (FLASH), and the Texas Division of Emergency Management. Informational material, posters, and bumper stickers were provided, along with a demonstration of a new TADD web page. In an effort to reach as many people as possible, Guerrero and his TADD partners held conference calls with representatives from NWS regions across the country to coordinate a nationwide campaign.

In May 2005, through a grant provided by the Allstate Foundation, FLASH, NWS, and Southwestern Insurance Service (SWS), the foundation expanded the Turn Around, Don't Drown campaign in Texas. They targeted the major cities collectively known as flashflood alley – Dallas, Houston, San Antonio and Austin. The cities had alarming flood-related fatalities. Outdoor billboards driving home the flood safety message have been erected in them. The city of San Antonio has placed bumper stickers displaying the slogan on all police, fire, and city vehicles. The message has also been spread through the local media via public service announcements (PSA), distribution of bumper stickers by the Texas Floodplain Management Association, animated presentations, and informative FLASH flood safety flash cards. In 2005 NOAA designated a week in March as Flood Safety Awareness Week.

According to records from the National Climatic Data Center, from January 2007 to July 2007, Texans have experienced more than 900 flooding events, more than doubling the ten-year average of 450 events per year. Over 2,100 flash flood warnings have been issued for the year; again more than double the 10-year average of 903. The number of flooding incidents has increased in the state of Texas, but flood-related fatalities have slightly declined across the U.S.

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Education/Outreach/Public Awareness

Primary Funding:
Cooperating Technical Partners (CTP)

FLOODPLAIN MANAGEMENT
A JOB TO BE TAKEN SERIOUSLY

Bee County, Texas

Bee County, TX - When Dennis DeWitt assumed the role of floodplain administrator for Bee County, he had no idea what duties were attached to the position. He had not been on the job a year when he faced a rude awakening. There was a flood and his response to local residents affected by it was lacking.

Immediately following a flood in 2000, he received a call from a representative of the Governor's Division of Emergency Management. DeWitt identified himself, as floodplain manager, with much confidence. When questioned regarding the issuance of permits to residents in the process of re-building his response was, "I don't know what you are talking about." At that moment he knew he had to become a fast learner.

DeWitt learned that floodplain management involves both corrective and preventative measures for reducing flood damage. He researched information on zoning requirements, building codes, and special-purpose floodplain ordinances. He familiarized himself with the role of the National Flood Insurance Program (NFIP) and its floodplain management requirements. He could discuss the Increase Cost of Compliance (ICC) and the Community Assistance Program (CAP) relative to the NFIP.

DeWitt revisited his role. He drafted a series of forms, flyers, and letters. "When we started having problems with flooding I went to the newspaper with this form, which is printed on water-resistant paper. It specifically tells residents what they need to do in a flood event and who they need to contact," De Witt said. The form is given to residents or left on their door.

Another form, the Development Permit Application, has to be completed for any structure being repaired, renovated or improved, if the cost equals or exceeds 50 percent or more of the value of the structure. It is also required for new construction. A multi-purpose form, each resident must list an emergency contact number and become familiar with the floodplain management information, which is included in the form. Flood map number, flood zone, and map date are listed.

Following an on-site visit, a Damage Determination letter is issued to residents affected by a flood. In it, Dewitt lists the percent of structural damage, base flood elevation for the location of the property, an estimated level of the present elevation of the home, zoning, map number, and re-building requirements. A statement regarding NFIP and ICC is also included.

Area residents and newcomers are encouraged to visit with DeWitt. He invites them into the map room and educates them on the location of their property, the base flood elevation (BFE), and discusses flood prevention measures. "I want them to know what they are getting themselves into. I don't try to tell them not to build or re-build in that location."

Trying times characterized the first six months of his new program. He was confronted with resistance from some of the local residents who did not welcome change. DeWitt acquainted them with the guidelines and followed up on compliance. As a result of his perseverance, his floodplain management strategy has proven effective.

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Education/Outreach/Public Awareness

Primary Funding:
Local Sources

Doing the Right Thing in Clifton, Texas

Bosque County, TX – Flood waters repeatedly inundated a small community causing extensive damage. In 1991, a record flood devastated the small town of Clifton, Texas. Some homes were totally destroyed and others required major renovation. The city sought measures to minimize the effects of future flooding by initiating buyouts as a mitigation practice.

In south central Bosque County, the town of Clifton is part of the hill country of Central Texas. With a population of approximately 3,500, the town supports light-industrial and agricultural-based employment. It is also a nesting place for the Bosque River.

“Flooding is no stranger to Clifton. I have seen that annually,” said Jimmy Burch, director of Public Works. “Recent flooding created an island around our old armory.” About the 2007 flood, he added, “Water was 12-18 inches deep. The little bridge was under water. Flood waters got up to the houses. If we had had 4-6 more inches we may have had a repeat of 1991.”

The Acquisition Project was initiated in August 1993 and completed in May 1995 at a cost of $226,252. Clifton received an $113,126 grant from the Federal Emergency Management Agency (FEMA) through its Hazard Mitigation Grant Program (HMGP). The funds were administered by the Governor’s Division of Emergency Management Agency. The project acquired 18 private real properties (structure and land) and 13 lots.

The HMGP paid 50 percent of the cost. On December 3, 1993, the President signed the Hazard Mitigation and Relocation Act of 1993, which significantly increased funding available for hazard mitigation grants under section 404 of the Stafford Act. Presently, HMGP pays 75 percent on approved projects that will prevent or reduce damage from storms and other natural hazards. These grants are made available for both public and private projects.

Property acquired with HMGP funds must be converted into open space and may not be built on in the future. The purpose is to remove people and their homes from harm’s way. Participation in acquisition projects is voluntary. Some choose not to participate because of sentimental attachment to their homes, while others welcome the opportunity.

The project created green space and a park. “We have tried to create parks in all of the acquired properties.The children are taking advantage of the green space for soccer games,” said Burch.

Bosque County, Texas

Quick Facts

Year:
1991

Sector:
Public/Private Partnership

Cost:
$226,252.00 (Actual)

Primary Activity/Project:
Acquisition/Buyouts

Primary Funding:
Hazard Mitigation Grant Program (HMGP)

HAZUS-MH Used for Risk Assessment and Hurricane Preparation

Harris County, TX - Harris County, Texas is the latest in a growing number of urban counties that has used HAZUS-MH for risk assessment and preparedness planning. In 2005, the county enlisted the support of a FEMA-authorized HAZUS vendor for flood and hurricane models to assess the risk to flood and hurricane hazards.

Harris County was in a unique position to initiate a Risk Assessment Program using HAZUS-MH in 2005. The Tropical Storm Alison Recovery Project (TSARP) provided up-to-date hydrologic and hydraulic data and new mapping tools. In addition, the County's unique relationship with the U.S. Army Corps of Engineers provided extensive economic and risk-assessment data from multiple completed and ongoing federal flood-reduction projects.

In Phase I of the Harris County Risk Assessment Project, a basic HAZUS-MH Level-1 analysis using the Hurricane Wind and Flood modules was run for the entire county to familiarize personnel with the program and provide a useful product that could be immediately used. In order to evaluate the program for a Level-2 analysis, a pilot watershed was selected and HAZUS-MH was populated with high-quality data specific to the watershed.

On September 21, 2005, the Harris County Office of Emergency Management (OEM) tasked the FEMA-authorized vendor to provide technical support in estimating potential losses from Hurricane Rita, using HAZUS-MH.

The hurricane approached on an erratic path, first threatening landfall far to the west, then changing course so that its track was closer to Harris County. Local government officials activated emergency preparedness protocols. By Wednesday, September 21, 2005, predictions placed Galveston and Houston directly in the path of the hurricane.

Harris County was spared a direct hit from Hurricane Rita. The storm did, however, give county personnel the opportunity to test their hurricane preparedness protocols and to evaluate planning and implementation of emergency response activities. The FEMA-authorized HAZUS vendor assisted the Harris County Office of Emergency Management (OEM) in applying HAZUS-MH predictive tools to the event.

Several conclusions can be drawn from the analyses performed during the Harris County Risk Assessment Program, including the HAZUS-MH software package can be successfully applied to a large urban county; a Level-2 analysis using local data to supplement the default national data does improve the results of the analysis; near real-time reporting of hurricane events is possible with the HAZUS-MH hurricane module by using NWS advisory bulletins; HAZUS-MH provided much greater detail regarding wind speed distribution throughout the County than was available through the normal news and information services.

Harris County, Texas

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
HAZUS-MH

Primary Funding:
Other FEMA funds/ US Department of Homeland Security

ICC FUNDS AID ELEVATION PROJECT near the Aransas River

Bee County, TX - In 1996, Jason and Alice Dickenson purchased an old, 1,800 square-foot wood-frame home in the unincorporated town of Skidmore, Texas. They were unaware of the zoning, building restrictions, community ordinances, and the need for homeowners insurance.

On Aug. 30, 2001 the Aransas River topped its banks and more than four feet of water poured into their home. “We could tell that the water was rising. We grabbed whatever we could and got out of harm’s way. The water just seem to pick everything up and set it down some place else,” Alice said.

Their home was insured for the amount of the mortgage. The Dickenson’s learned that they lived in a community participating in the National Flood Insurance Program (NFIP). NFIP makes available flood insurance and requires communities adopt a minimum local floodplain management ordinance that regulates new and substantially improved development in identified flood hazard areas.

In addition to building coverage, NFIP policyholders with substantially damaged homes (cost of repair more than 50 percent of its pre-flood value) are eligible for Increased Cost of Compliance (ICC) benefits. ICC coverage provides up to $30,000 to elevate, demolish, or relocate the home, protecting it from future flood damage. The coverage is included under all regular NFIP policies issued or renewed after June 1, 1997. To their surprise, they were covered.

The Dickenson’s decided to rebuild in the same location and vowed they would be ready for the next flood. They met with the county’s floodplain manager, who gave them sound advice: elevate. The base flood elevation in their community is 123.5 feet above sea level. They decided to build a Jim Walter “Lakeside” Home on pilings.

“Building codes specifically said that we had to build above the floodplain if we wanted to stay out here,” stated Mrs. Dickenson. “The pilings are 15 feet tall. Jim Walter normally quotes 6 feet. We used our ICC funds to defray the cost of the elevation. We wanted to stay within the guidelines.”

On June 18, 2007 the Aransas River again crested, spilling on to their property. The Dickenson’s watched as it slowly crept on the lawn, but knew there wasn’t a need to panic. Their new home sitting on pilings gave them a feeling of security.

Bee County, Texas

Quick Facts

Year:
2001

Sector:
Private

Cost:
Amount Not Available

Primary Activity/Project:
Elevation, Structural

Primary Funding:
National Flood Insurance Program (NFIP)

Living on the River and Loving It

Parker County, Texas

Weatherford, TX - Larry and Jenanne Thompson have returned home following several flooding events to find their home virtually unscathed by the creeping waters of the Brazos River. Past experience with flooding guided them in the right direction with regard to the building process.

The 1,670 square foot, wood frame hosue they call home is elevated 12 feet, one inch above the original slab-on-grade foundation and rests on an open wooden column system. The cost of the project was estimated at $70,000. It was secured through homeowner financing.

On June 18, 2007 water from the Brazos River crept upon the land of Horseshoe Bend. According to the local floodplain of their Weatherford home administrator, the flood gauge was documented at 27.5 feet, approximately 2.5 feet over flood stage.

After the water receded, the Thompson's returned home to assess the damage. Debris from the river had once more been swept into the area beneath their home. The living area, on the other hand, was high and dry.

At the house next door, a small wood frame house resting on cinder blocks, more than four feet of water had flooded the home. The neighbor was a newcomer to the community.

Quick Facts

Sector:
Private

Cost:
$70,000.00 (Estimated)

Primary Activity/Project:
Elevation, Structural

Primary Funding:
Homeowner

Lower Colorado River Authority
State of Texas

State-wide,
Texas

The State of Texas -- How can communities maintain accurate, up-to-date flood hazard data? That is the quest of FEMA and the Lower Colorado River Authority (LCRA) in their Cooperative Technical Partner (CTP) agreemen. Two pilot projects to produce digital maps in Central Texas have demonstrated how the CTP program can help communities without technical expertise to participate in the digital map conversion process.

Under the CTP agreement, the LCRA is helping to craft a process for maintaining the currency and accuracy of flood hazard data. The LCRA and its partners have used cost-effective GIS technology for FEMA Digital Floodplain Insurance Rate Map (DFIRM) production during pilot projects in two communities, Lago Vista and Meadowlakes, located on lakes formed from the lower Colorado River in central Texas.

In the first year of the CTP, the LCRA assessed the mapping needs for Lago Vista and developed a six-panel draft DFIRM. Paper maps were converted into digital flood data. The digital data were fitted onto a new orthophoto base map. The Special Flood Hazard Area (SFHA) was redelineated with updated topographic data. The resulting data was used to produce new preliminary FIRMs.

During both pilot projects, the LCRA has tested FEMA's DFIRM specifications, developed a production process and defined quality assurance/quality control procedures for DFIRM production. The LCRA was able to provide DFIRM base data for the Colorado River's 500-year floodplain corridor based on a recently completed Contour Mapping Project. However, other DFIRM layers come in a variety of formats, projections, datums and accuracy levels. Additional processing in a Geographic Information System (GIS) is required to incorporate the data into a FEMA DFIRM. With the development of cost-effective production strategies to convert the data, minor challenges encountered during the conversion procedures were overcome. This information will assist FEMA in further refining newly-developed DFIRM production procedures.

The LCRA, in cooperation with the University of Texas Center for Research in Water Resources (CRWR), invented a DFIRM "quilting" process during the pilot project to include more accurate aerial photos into the Digital Orthophoto Quarter Quadrangle (DOQQ) base maps. This quilting process reduces the file size of the base map data by about 42,000 KB per panel. Quilting substantially reduces FEMA storage requirements for base map data.

In an extended project, the automated DOQQ quilting process would be used to produce a seamless base map for each county. Base map panels would be enhanced with the new aerial photography and 2-foot contour information from LCRA's Contour Mapping Project.

Political boundaries also would be included as a base map layer. Developing such community political boundaries has proved to be the most complex and time-consuming activity of base map production. As the DFIRM project progresses, the floodplain coalition will help obtain and update the political boundary GIS data layers. Communities will then have the opportunity to play a proactive role in the digital conversion process and to take charge of floodplain mapping in their area.

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Cooperative Technical Partner Activity

Primary Funding:
Cooperating Technical Partners (CTP)

Tropical Storm Allison Recovery Project: Map Modernization Outreach

State-wide,
Texas

The State of Texas - In June 2001, Tropical Storm Allison ravaged 31 counties in Texas, including Harris County. The storm caused $5 billion in damage in the City of Houston, the county seat of Harris County. Working under a Cooperating Technical Partner agreement, FEMA and the Harris County Flood Control District (HCFCD) conducted a flood studies leading to the remapping of 1,200 stream miles in 22 watersheds encompassing all 35 of the flooded communities. Because the individual community must adopt the new flood maps, a coordinated outreach plan involving all the affected communities was key the project's success.

The Tropical Storm Allison Recovery Project (TSARP) was created through the partnership of FEMA and the HCFCD. To generate community involvement in the project, the team invited all 35 communities to participate in the mapping process. The TSARP held frequent meetings. Communities also participated via advisory committees and stakeholder groups. In this way, effective two-way communication was achieved.

Outreach tools utilized by the Team included a TSARP web site for posting presentations, reports, educational resources and guidance documents; publications such as the "Off the Charts" report, which was distributed by the Houston Chronicle; community visits by the HCFCD Communication Department; the use of a public outreach consultant to lead media and public relations; clear, concise messages customized for specific audiences; the development of training courses for flood insurance agents; and presentations to civic organizations, real estate groups, homeowner associations, business and environmental groups throughout Harris County.

A TSARP poll of 500 citizens found that 82 percent supported the map update efforts, while only four percent opposed. Through a coordinated, integrated public outreach program, the TSARP Team was able to make people understand and support the idea that updated, more accurate maps will help the HCFCD reduce the risk and impact of future flooding.

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Education/Outreach/Public Awareness

Primary Funding:
Cooperating Technical Partners (CTP)

Hardened First Responder Facility Serves Smith County, Texas

Smith County, Texas

Tyler, TX - Smith County is located in east Texas, approximately 100 miles east of Dallas. It is largely rural, with only one metropolitan area, the City of Tyler. The Sheriff of Smith County and the Police Chief of the City of Tyler saw a need for a consolidated emergency operations and communications center that would serve the entire county. They believed this consolidation would reduce fragmentation and duplication of emergency services, and allow services to be provided in a more efficient and cost-effective manner.

In January 2003, the County begun construction of a state-of-the-art facility to serve as the centralized 911 communications dispatch and emergency operations center (EOC) for approximately 30 agencies (serving a population of approximately 175,000). Administrative staff moved into the new facility in November 2003. Dispatching from the facility began in January 2004.

Notable features of this 15,000-square-foot facility include a roof and exterior walls hardened to resist tornadic forces, a lobby designed to minimize blast effects, multiple security access levels, and an area specifically planned for press conferences, interviews, and other interaction with members of the media. The project architects consulted FEMA 361, "Design and Construction Guidance for Community Shelters," to determine the specific design loads that the new communications and emergency operations center would have to be able to withstand.

There are four key concepts that should be considered in the design of building systems for a critical facility. Backup systems should be provided, all points of access to the systems – including entry points, control panels, and maintenance access – should be located in secured areas, all systems should be protected from potential hazards, and all systems should be physically separated.

Smith County's EOC has an on-site emergency generator with the capacity to operate the entire facility and function independently from the normal electric service. The emergency generator is housed in a secured, reinforced concrete masonry mechanical yard covered with a steel screen designed to protect the generator from windborne debris impacts.

The facility was designed to be self-contained for two weeks at a time. It is equipped with enough cots and mattresses for 25 people, and is stocked with enough food to feed up to 50 people for two weeks. Washers and dryers are also available on site, as well as showers and separate dressing rooms.

The extended EOC stays often required of emergency workers, the urgency of emergency response, and the need to deal with injuries, loss of life, damage, and destruction, all place extreme pressure and stress on emergency managers and staff. Recognizing the effects of this difficult working environment, the Research and Planning Committee put high priority on keeping the staff as comfortable as possible during their stay at the EOC.

Quick Facts

Sector:
Public

Cost:
Amount Not Available

Primary Activity/Project:
Safe Rooms/Community Shelters

Primary Funding:
Local Sources

City of Deer Park Drainage System

Harris County, Texas

Deer Park, TX - Located in southeast Texas, the City of Deer Park is in close proximity to Galveston Bay and the Gulf of Mexico. The City's population is approximately 28,000 within 15 square miles of land comprised of residential, commercial, and industrial zones properties. Deer Park is subject to intense local thunderstorms, storms extending over periods of several days, as well as torrential rainfall associated with hurricanes and other tropical disturbances. Numerous episodes of flooding have severely impacted the city's drainage systems.

Since 1979, the City spent approximately $13 million on a variety of measures to alleviate flooding, such as concrete-lined channels; reworking of earth-lined channels; and overall improvements to the existing storm-sewer systems. Building restrictions are also stringently enforced to ensure flood protection measures are adhered to.

The City of Dear Park's flood management program provides its citizens with a future that promises minimum flood damage and losses.

Standard Homeowner's insurance policies do not cover flood damage. The National Flood Insurance Program makes Federally backed flood insurance available to homeowners, renters, and business owners in participating communities.

Quick Facts

Sector:
Public

Cost:
$13,000,000.00 (Estimated)

Primary Activity/Project:
Land Use/Planning

Primary Funding:
Local Sources

Harris County Flood Control Changes Made After Allison

Harris County, Texas

Harris County, TX - Tropical Storm Allison descended on southeast Texas in June of 2001 and dumped 37 inches of rain in 12 hours, claiming 23 lives. Portions of major highways were submerged, 30 counties affected, businesses were destroyed and 1,611 damaged, 155 schools sustained water damage and over 35,000 homes were affected by flooding. The Texas Medical Center campus and buildings sustained damages that are expected to exceed $2 billion. Tropical Storm Allison is now the flood of record for the Houston metropolitan area and Harris County.

Harris County is subject to frequent severe flooding from tropical storms and hurricanes. Historically, the county experienced 16 major floods from 1836 to 1936, some which caused deaths and flooded downtown Houston. In 1935, the Texas State Legislature established the Harris County Flood Control District (HCFCD) to have sole responsibility for the management of storm water and its results. Funding for the district is through a dedicated property tax.

The HCFCD has employed many structural mitigation measures such as channelization, detention facilities, bridge elevations and construction of levees and/or flood walls. Since 1994, the district has been aggressively pursuing acquisition and buyout as their major non-structural mitigation measure. Over the last 12 years the district has purchased 440 properties (vacant lots and houses) at a cost of $40 million. Their pro-active buyout program continues both during a federal declaration and between flooding periods. Their goal is to move people out of harms way and allow the land to return to a natural state. Their process has been fine tuned to a fast track approach and because it is on-going, the response time and potential for increased costs have been greatly reduced. Additionally, the district seeks partners to share in project costs. Active partners, for example, are the US Army Corps of Engineers (USACE), Texas Parks and Wildlife Department, FEMA Hazard Mitigation Grant Program (HMGP), City of Houston Parks and Recreation Department, and the Department of Housing and Urban Development (HUD).

Since its creation, the district has completed structural and non-structural flood control projects at a cost of approximately $4 billion. The boundaries of the district encompass 1,756 square miles, 22 watersheds and more than three million inhabitants, including the City of Houston which is the fourth largest city in the United States.

This same area was flooded by Allison; however, damages were significantly less. HCFCD was awarded HMGP money to buy out over 600 substantially damaged homes as a result of the storm.

Quick Facts

Sector:
Public

Cost:
$5,800,000.00 (Actual)

Primary Activity/Project:
Acquisition/Buyouts

Primary Funding:
Hazard Mitigation Grant Program (HMGP)