

DISASTER RESISTANCE THROUGH MITIGATION

Successes in North Carolina

(An Interim Report)



Sweeny Water Treatment Plant, City of Wilmington: Project Impact Community



HURRICANE FLOYD

FEMA-1292-DR-NC
MITIGATION DIVISION

Success Story Project Report

Background

The State of North Carolina historically has been impacted by hurricanes since prior to the 1950's. The first named hurricanes were Carol and Hazel in 1954 and have been followed by seemingly increasing incidence since that time. During the nineteen nineties, the state has suffered through a major superstorm (1993) and hurricanes Bertha (1996), Fran (1996), Bonnie (1998) and now Dennis and Floyd in 1999. Experiences from these storms have caused the citizens of North Carolina continuing and increasing personal and economic losses.



("The Little House That Survived All" Carolina Beach, North Carolina)

On September 15, 1999, Hurricane Floyd began to threaten the coast of the State of North Carolina and made landfall on the morning of September 16th, near Cape Fear, as a Category II storm. The amount of rain from Floyd, combined with rains previously received from Hurricane Dennis, caused record flooding along most rivers and streams in central and eastern North Carolina. This record amount of rainfall exceeded the previously worst North Carolina flood disaster (November 4-6, 1977).

A Presidential disaster declaration was made for sixty-six counties of the State of North Carolina on September 16, 1999.

Recent occurrences of storms and hurricanes within North Carolina have created a significant human and economic impact on communities in the state. . A typical cycle of disaster/damage/response/recovery has been in effect. To truly break this cycle, communities must be educated on mitigation measures that can be implemented in order to avoid repetitive damage and reduce the human and economic costs. The unfortunate combination of severe flooding and wind damage as a result of both Hurricanes Dennis and Floyd has provided the opportunity to identify and document mitigation successes. Additionally, New Hanover County (a Project Impact site) will be able to analyze the effectiveness of becoming a Disaster Resistant Community.

Team Strategy

The Success Story Project Team was created under the auspices of the Deputy FCO for Mitigation, Todd Davison. The purpose of the project is to demonstrate, by using a quantitative analysis approach, that the concept of disaster resistant community is effective and to document the direct and indirect benefits of applied mitigation solutions. Site visits will be conducted in partnership with the State Hazard Mitigation Office and the regional Project Impact Coordinator.

This interim report will include work to date that includes visits to New Hanover County, City of Southport and several individual residences located throughout the eastern counties of the state.

Staff of both the Mitigation Division and Public Information Office joined forces to conduct site visits. Selection of sites and interview candidates was determined from recommendations from the New Hanover Project Impact Coordinator, FEMA Region IV Project Impact Coordinator, North Carolina Department of Crime Control and Public Safety Project Impact Coordinator, Hazard Mitigation Counselors, Community Relations Field Officers and FEMA Public Information liaison. Information was captured using a customized field questionnaire for interviews and photographs were taken to provide further documentation.

The stories that have been collected to date have been used a variety of ways and by several FEMA divisions. Stories about relocation, retrofitting, floodproofing and elevation have been submitted to the FEMA Mitigation Success Story web page. Elevation of private residences, permanent structure and mobile homes, have been featured in the third issue of Recovery Times. Detail photographs of non-structural mitigation have been used for pamphlets, exhibits and posted on the FEMA web page. FEMA headquarters Project Impact offices are using the stories as part of their Disaster Lessons Learned features.

Mitigation Successes

Project Impact Partner Community

Carolina Beach, located in New Hanover County, is an island community that has taken positive steps towards mitigating the impact of natural disasters on its local economy. Carolina Beach Lake serves as a drainage basin for more than 500 acres of the island's waterways. To reduce or avoid the impact of flooding that occurs with the excess water hurricanes bring, temporary pumps were installed in Carolina Beach Lake. The idea, by lowering the level of the lake down to within six inches of the bottom, minimal flooding would occur. This would in turn reduce (mitigate) the impact flooding would have on local businesses.

The outcome was successful during both Hurricane Dennis and Hurricane Floyd. Minimal flooding occurred. At least two businesses avoided damages and municipal assets were saved as well. The combination of structural elevation as well as lowering the level of the lake clearly demonstrated the benefit of preventative measures taken before the disaster. The city plans to purchase and install a permanent pump to provide protection in the future.

The City of Carolina Beach is also an active member of the Project Impact partnership of New Hanover County since it began in 1997. A number of changes have occurred as a result of the initiative. Police and Fire Building, critical services, have been relocated outside of the floodplain. The old Police and Fire Building has been demolished and the departments have been temporarily relocated until the new facility construction is completed. In addition, as of April 1, 1999, residents have received a 15% premium discount on their national flood insurance premiums. The town's discount can be attributed to improved education and awareness; improved "freeboard regulation" which requires structures to be elevated 2 feet above the base flood elevation.

Other examples of how Carolina Beach incorporated hazard mitigation into its plans included, the purchase of generators in advance of the storm to return power quickly to critical buildings. The City also elevated utilities in the marina, saving thousands in repair costs. Finally, the city bid debris-removal contracts in advance.

A Hazard Mitigation Plan for the city has been adopted.



(Carolina Beach, North Carolina)

Mobile Home Elevation

When Mr. & Mrs. Pruden purchased one and one-half acres of land in Craven County, they intended to place a mobile home on the property for their residence. They were told they would have to elevate their home to keep it from flooding since they are just down the street from the Neuse River.

Knowing they were in a potentially hazardous location, the Prudens decided to properly elevate their mobile home rather than use dirt fill, as had been suggested.

This area on the Neuse River had never experienced as much wide spread flooding or devastation before Hurricane Floyd. When Hurricane Floyd struck, the eye of the hurricane passed right over the Pruden's home. They stayed and rode out the storm. Mrs. Pruden said she and her husband just got out of bed and prayed till it passed!

The Prudens used simple elevation techniques to secure their mobile home. They built a foundation of cement blocks four feet high and used metal strapping with railroad ties around the bottom to secure the foundation. Finally, they strapped their mobile home to the foundation, securing the entire structure. When the rains came, the Prudens went outside and tightened the straps around the bottom to make sure it wouldn't move. Space under the mobile home was utilized to store and secure loose items like lawn furniture and bicycles.



Elevation saved the home and contents from serious flood damage. The extra strapping of the entire structure saved it from the strong winds. Both measures increased the life safety of the occupants.

There are true direct and indirect cost benefits in the action taken by these homeowners. The estimated property value of \$30,000 has been maintained if not increased due to the fact that the home withstood Floyd's fury. Their investment for materials to elevate and secure their home is approximately \$1,500. Additionally, replacement costs of rebuilding

or relocation and loss of contents have been avoided. Indirect costs avoided include probable search and rescue, time and labor for salvaging and replacing lost personal property, and severe stress for the family.

The Pruden’s extra precaution to secure bicycles, lawn furniture and other seasonal items, not only saved these items but prevented them from becoming hazards to people and structures.

Benefits

The property value has been estimated at \$30,000. The cost of materials used to elevate and secure the mobile home is approximately \$1,500.

Direct	In-Direct
\$30,000 property value maintained	Physical and Mental Health Care Costs
Costs of rebuilding or relocation avoided	Search & Rescue
\$1,500 <i>one time</i> expense for elevation and securing.	Displacement of family
Preserving of contents & personal treasures	Potential loss of employment



(Basic elevation using concrete blocks, it worked!)

Small Business/Oceanfront Hotel

“Darlings By the Sea”, is a five unit hotel located on the oceanfront of Kure Beach, N.C.. The hotel was built in 1998 and enjoys high year round occupancy. The owners, Kip and Maureen Darling, own two properties on Kure Beach. Their first property, the Dockside Resort, they have owned and operated for 13 years. During that time, the resort has been through several hurricanes. Hurricanes Fran and Bonnie damaged the property and resulted in insurance payoffs of \$187,000 and \$220,000 respectively. Between two major Hurricanes, Fran and Dennis, the Darlings built “Darlings by the Sea”. Ninety days after opening, Hurricane Bonnie tested their new construction and the building sustained \$22,000 in damages. Because of their experiences they build their new facility to be wind and flood resistant.

After surviving the furies of so many hurricanes and experiencing repetitive structural and business losses as a result, the owners realized that they had to make a serious decision. Kure Beach is a beautiful location for a resort hotel, however, the threat of hurricanes was a reality that had to be faced. The decision was made to build a new hotel at the same location, but to build it stronger and safer.

Preserving the beach is essential for the success of the business. The Darlings participated in a beach renourishment project following earlier hurricanes and have maintained that community activity. They have a commitment to contribute their time and resources as necessary to ensure the beauty and safety of the environment.

The building project for the new hotel began in 1998. Design was done in house and the drawings were submitted to a structural engineer to be designed to local wind and flood hazard code requirements. Pilings were placed 10 – 15 ft. deep. Trenches were dug between all pilings insuring the ground to be pervious so it will hold water and prevent run off that would result in flooding. The structure was built following a continuous load path, in other words, all separate components of the building (roof, side walls and foundation) tied together to resist separation by strong winds. There are shear walls throughout as well as other construction features that strengthen the building.

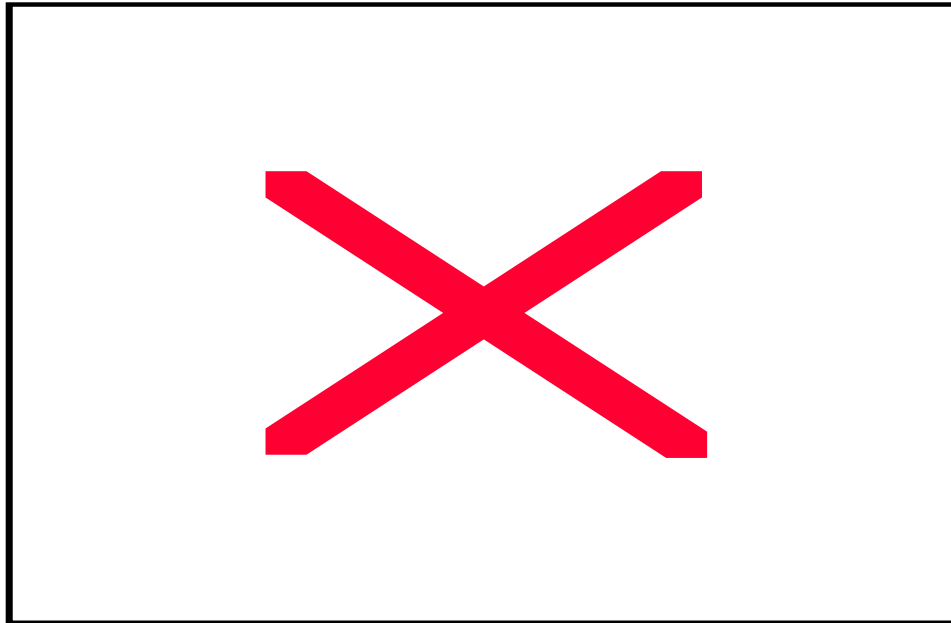
An extra investment was made in window materials, installation and protection. Window glass of DP-50 strength, enough to sustain 110 mile per hour winds, was used and encased with sealed framing and hurricane shutter brackets. The windows do not open which prevents water damage.



(Windows with extra strength glass and hurricane brackets pre-mounted)

When storm threat reaches watch status, there is a pre-arranged contract for the installation of hurricane shutters. The finished look is attractive and in keeping with the overall exterior aesthetics.

“Darlings by the Sea” cost approximately \$1 million to build. Mr. Darling estimates the added expense to overbuild was just 6 to 8% over the project cost. “Immediately before or during a storm is no time to try to protect your property”, states Mr. Darling, “you need to take preventative measures ahead of time, then pack up your family and leave with the peace of mind that you have done all you can for your property.”



Benefits

Some of the in-direct benefits include a structure solidly built to ensure that it will resist storm damage, reduces the opportunity for flying debris which creates a danger to the surroundings, reduction of costs to the insurance companies, reduction of personal costs and helping to preserve tourism for the community.

Direct Benefits	In-Direct Benefits
Life safety during storms	Less opportunity for flying debris
One time investment for building improvements	Beach preservation
Reduction of insurance expenses & costs	Preserving tourism for the community effects the economic base
Reduction or elimination of clean-up & replacement costs	Minimal family disruption
Business continuity	Maintaining employment for staff

Voluntary Buyout

Just one day after Woodrow and Ethel Taylor completed a \$5,000 remodeling job on their \$45,000 home near Kinston, floodwaters from Hurricane Fran rushed in and ruined it. The couple rebuilt. But last year they gladly accepted a buyout offer and said goodbye to the house they shared for 40 years.

“It was one of the best decisions we made in 51 years of marriage,” said the Taylors, who both suffer from failing health. “We just couldn’t go through another flood.”

When the Neuse River rose and floods swamped Kinston in 1999 as a result of Hurricane Floyd, the couple and their new home remained high and dry just 12 miles away in La Grange. The Taylor family knew from later news reports that if their old house still stood, floodwaters “would have swallowed it whole.”



Eastern North Carolina

Voluntary buyout programs move people like the Taylors out of harm’s way. The North Carolina Emergency Management Division (NCEM) administers the program that gives property owners in high flood risk areas of the state the chance to sell their properties and move to a safer area.

The Federal Emergency Management Agency (FEMA) funds 75% of the buyout program, viewed as a long-term solution to recurrent flooding of low lying properties. Eligible applicants include government entities, nonprofit organizations and medical facilities, as well as rental property owners with full-time tenants and homeowners with primary residences located in certain flood-prone areas. The buyout offer does *not* include secondary homes.

NCEM limits this opportunity to properties that sustained substantial damage-up to and including destruction-and that lay within the 100-year floodplain. The relevant community will offer owners the pre-flood fair market value of their property, as determined by a licensed appraiser. Once a project earns approval, NCEM urges residents to relocate out of the floodplain. Any property owner may back out of the program without penalty at any point prior to closing. Afterward, the local government clears the land, which then becomes permanent public open space.

Although he holds no doubts about the selling price of his old residence or his need to move to higher ground, Taylor regrets leaving behind his new ceiling fans, custom patios and expensive carpet. “It was a waste,” he said, “but I understand.” Even though leaving behind these items represents some loss, the loss would have been much greater if the home had flooded as a result of Hurricane Floyd and the home plus contents were lost.

The Taylors count their blessings. “With good neighbors and the four grandkids still within easy driving distance of his high-sitting home, I’m grateful and satisfied” states Mr. Taylor.

Direct Benefits	In-Direct Benefits
One time buyout costs	One time adjustment to new location
Avoidance of future damages	Location close to family & friends
No future disruption of family	Physical and mental health care costs reduced or avoided
	Satisfied family that will support buyout and re-location
	Need for search & rescue services eliminated

Relocation

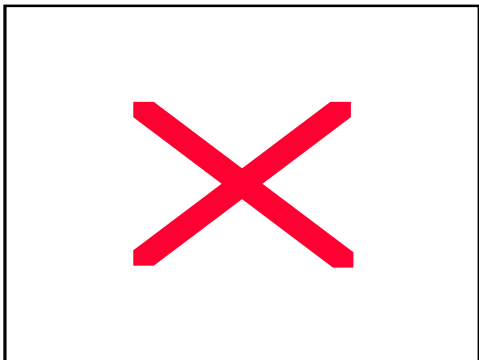
The home of Mr. Terry Williams is located in Garland, Sampson County, North Carolina. The Williams home had experienced two episodes of flooding due to hurricanes. In 1984 flood waters entered the house soaking duct work, all flooring and carpets as well as damaging utilities and appliances. The family was displaced from their home for two months. When Hurricane Fran soaked eastern North Carolina in 1996, the Williams house again had flood damage and the family was again displaced from their home for about two months.

In 1984, the Williams family repaired their home using combined funds from FEMA and their own savings. This amounted to \$28,000 from FEMA and \$5,000 personal savings. Again, in 1996 a combination of monies, \$25,000 from FEMA and \$7,500 personal savings were needed to repair the home. When the final repairs were completed, Mr. Williams requested the help of the Sampson County Commissioners to relocate his home out of the flood zone. The County awarded him monies from a combination of Community Development Block Grant and Hazard Mitigation Grant Program. In the spring of 1999 the Williams home was relocated 3 _ miles out of the flood zone. This home sustained no damage as a result of Hurricane Floyd. This home was originally located in a riverine flood plain area. The combined costs to repair the home (1984 & 1996) has been \$53,000 in FEMA funds and \$12,000 in personal savings for a grand total of \$65,000. The relocation costs were \$53,000.

Unfortunately, Hurricane Floyd completely destroyed Mr. Williams mother’s home which was in the same flood zone area. “Judging from the water in my mother-in-law’s home, I would have had at least 4 to 5 feet of water in my house if it had not been moved!” states Mr. Williams. He is now working to help his Mother move from the flood plain.

Benefits : A direct benefit, shown below, is elimination of Search & Rescue Services

Direct	In-Direct
\$65,000 damage repair costs ('84 & '96) 53,000 relocation cost ('99) Cost to benefit ratio = 1:2	Displacement of family
Elimination of further damage expenses	Preservation of personal property
Elimination of repetitive loss	Savings to insurance company



Storm Water Management

The City of Southport is a beach community located in the “down East” area of North Carolina, about 45 minutes south of Wilmington where Cape Fear meets the Atlantic Ocean. The economy base for the city is dependant on tourism, service and a growing retirement community.

The city is in an A-zone, based on the National Flood Insurance Program mapping system. Building permits are strictly enforced for compliance with the FEMA ordinances. Several areas of Southport flooded after Hurricane Fran due to a failing storm water drainage system. Several homes were damaged because of standing water which was several feet deep. In some areas, the streets were flooded and many sections washed away. The repetitive flooding and continued need to repair damages prompted the City Council to take action immediately following Hurricane Floyd.

The impact of Hurricane Floyd on the City of Southport, while not devastating, created enough storm water drainage to again tax the systems in place. The City Council and City Manager are working together to obtain funding for a new storm water management system. Their plan includes contracting with a design-engineering firm for a new storm water management and drainage system. Currently, the firm is in the design process.

“We (the community) funded this project through the Powell Bill because we didn’t want to wait for FEMA money” stated Rob Gandy, City Manager. The Powell Bill (State Street-Aid Allocation Law, Chapter 136-41.1 through 136-41.3) is part of the General Statutes of North Carolina. Purposes for which Powell Bill funds can be used include improvements or new construction of local municipal Powell Bill streets as defined in the statute. The city of Southport is using the eligibility requirement I., A., 4 – Construction of necessary storm drainage for protection of streets. The completed project will be a new storm water management system.

There is an obvious commitment on the part of the city leadership to reduce recurrent damage to the streets, provide a safer environment for their residents and preserve the economy base for the community. The pro-active work to seek funding sources beyond FEMA grant programs is an example of that commitment.

Benefits

When completed, the new system will manage storm water runoff resulting from another Hurricane Fran or Floyd event. The improved drainage will keep streets and homes from flooding, eliminate health and safety hazards, avoid the costs of repetitive damage repair and create a more sustainable community. The estimated cost of the project is \$150,000. Costs avoided have not been quantified, however, the projection is that they will be substantial.

New Hanover County: A PROJECT IMPACT Community

New Hanover, a small coastal county in southeastern North Carolina, is home to four incorporated municipalities. The four municipalities include City of Wilmington, Town of Carolina Beach, Town of Kure Beach and the Town of Wrightsville Beach. New Hanover County boasts a growing economy. With more than 1200 employees, county government is one of the largest local employers. Increasingly, New Hanover county is becoming a regional retail hub.

Tourism, the film industry, light manufacturing, the port, health care and education all contribute to the continued economic growth of the area.

The second smallest county in the State, with 94 miles of waterfront property, New Hanover is no stranger to nature's fury. Its geographical location has forced residents to endure powerful hurricanes and nor'easters. During the past two decades (1980 – 1990), nine powerful storms and hurricanes have slammed the county. In the wake of hurricanes Bertha and Fran, hurricane mitigation measures were put into action to minimize the damage the next time a hurricane roared through. A relative quiet Atlantic hurricane season was enjoyed in 1997, however, in 1998 hurricane Bonnie made landfall exactly where Fran did nearly two years before. This time, the result was different. As a result of the mitigation strategies implemented since the hurricanes of 1996, overall damage from Bonnie was less than would have occurred without the mitigation strategies in place.

County leaders and residents had taken action to prepare for and reduce the impact of the frequent storms and in 1997, New Hanover County/Wilmington was chosen as a pilot community to participate in *FEMA's Project Impact* initiative. Since becoming one of the seven pilot communities, the county has been working to become more disaster-resistant. A wide variety of projects have been undertaken which were proven to be beneficial following the severe testing received as a result of Hurricane Floyd in September of 1999. Significant elements which have contributed towards the success of disaster resistance in the county are the strong partnerships, county wide planning and educational and awareness programs.

This report will feature just a few of the notable successes that are contributing to the overall increasing disaster resistance of New Hanover County. While visiting the locations and conducting interviews, consistently two notable comments were made when participants were asked, "What has been the benefit to you of being a Project Impact Partner?" The reply was, "Motivation to implement mitigation in our/my service/company and motivation to increase and tighten up our plans". "We all benefit from the work that is done to increase safety and reduce damages, it's the right thing to do!"

The concepts of disaster resistant community have taken hold in New Hanover County and has produced measurable results to demonstrate cost benefit.

North Carolina State Port Authority

The North Carolina Ports System combines modern facilities and services through four locations in North Carolina; State Port at Wilmington, State Port at Morehead City, Piedmont Triad Intermodal Terminal and Charlotte Intermodal Terminal. The combined operations provides over 80,000 jobs and nearly \$300 million in tax revenues statewide. Equally impressive is the fact that the operations of the State Ports are entirely self-supporting. This large shipping and distribution system is closest to the center of the southeastern U.S. market and provides entry into the continental U. S. for domestic and foreign import/export container and bulk cargo.

NCSPA clearly is a vital contributor to the state economy. The strategic location of both Wilmington and Morehead City harbors, while excellent for the business and economy, lie directly in the path of the many hurricanes that pound the coastline. Leadership of NCPSA determined to take pro-active action to protect their employees, business and customers.

Past hurricanes of the last four years, Bertha, Fran and Bonnie, all caused damage and delay at the NCSPA sites of Wilmington and Morehead City. The total damages of all the storms, including Dennis & Floyd, has been \$3.3 million. This amount includes business loss, employee down time and facility and equipment damage. An important in-direct loss was some lack of customer and public confidence because of the location of the sites in such a highly hurricane prone area.

“At the risk of ‘waking Murphy’ and his confounded law, North Carolina’s Ports have developed strategy to deal as best as possible with unpredictable turbulences – dedicated, professional employees and timely, targeted preparations”, states Erik Stromberg, Executive Director of NCSPA. In spite of winds clocked in excess of 100 mph, the ports of Morehead City and Wilmington opened for business only 24 hours after Hurricane Floyd’s direct hit. Utilizing time during the watch stage to protect ships and cargo has paid off. There was no major damage at either port facility.

The Port Authority has been a long time partner in the New Hanover County Project Impact work. “Involvement seemed like a very pro-active thing to be doing”, states Karen Fox, Director of Public Affairs for the port. Since becoming a partner, the changes in the Port Authority preparedness and mitigation have included:

- continual revision and up-date of their emergency/hurricane plans
- regularly scheduled meetings
- creating & establishing check lists and a Hurricane Team to work together to enhance storm preparations to facilitate clean up and start up after storms
- improved communications with outside agencies such as USGS and CP&L

Tightening up their plan has resulted in less time loss for shut down, beginning operations post storm and doing assessments for clean-up.

Cost savings and cost avoidance realized from:

- no ships diverted at Morehead city or Wilmington

- ❑ accommodated customers by handling cargo as late into storm preparations as possible and by facilitating early clean up to reopen for business as early as possible
- ❑ allowed employees time off before storm for personal preparations

As a result of past storms, “several million dollars” has been spent to repair the roof of the warehouse in Morehead City. Shingles were being blown off. Following Hurricane Floyd, a project funded with insurance money, \$20,000, is being implemented for new roofing. The wind resistant roof is being constructed with less space between shingles and using an increased amount of glue.

Cranes to move shipping containers are major pieces of equipment for the busy ports. A method has been developed to secure the cranes when there are hurricane winds which prevent them from toppling and being out of service.



(Cranes used to move cargo at NCSPA are secured to prevent toppling during strong winds.)

There was minimal damage to the facilities and less disruption of service due to Hurricane Floyd. NCSPA provided much assistance in Hurricane Floyd relief efforts. The property served as a staging area for American Red Cross trucks. Bottled water for National Guard and FEMA were stored in their warehouses. Coordination assistance was provided for donations to Salvation Army from the Georgia Ports Authority and truck transport for Salvation Army. Donations to relief efforts came from the corporate offices and employees.

Continuation of thorough advance preparations, maintaining active partnership within the community and Project Impact are the ongoing long term goals for the port towards continuing to become more disaster resistant.

Even though the ports were open for business, with all computer systems up and running, 24 hrs. after the storm, highway access was limited into Wilmington due to heavy flooding in the region. Leadership at NCSPA plans on actively participating in a transportation corridor study to improve local access for the ports as well as the community.

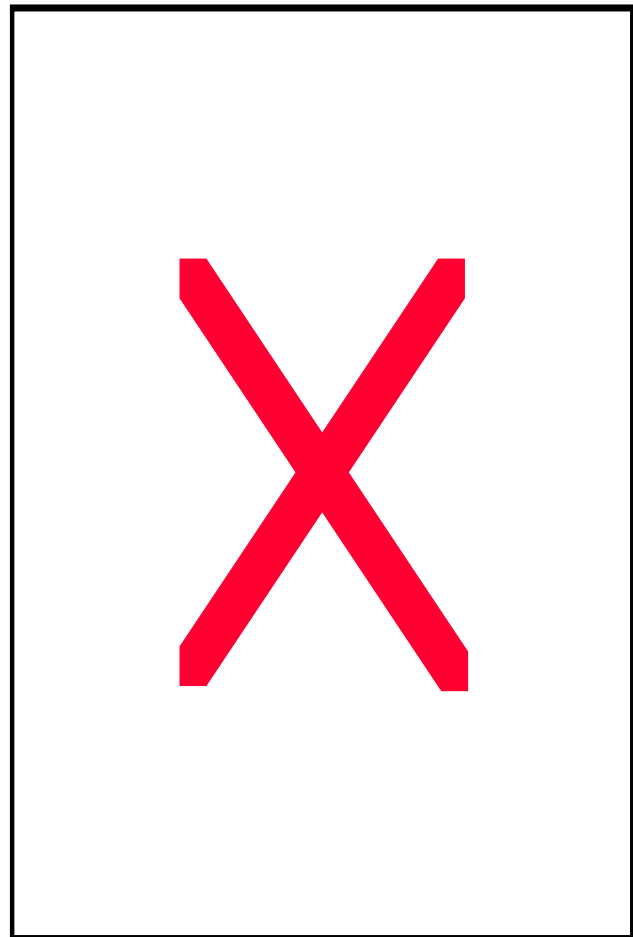
Benefits to the Port and its customers are obvious. Ensuring operations of the port facilities benefits employees, port business, the immediate community, state of North Carolina and the rest of the mid-Atlantic states. Shipping & distribution of cargo will remain efficient and costs of lost business as well as facility repairs will be avoided.

Barnes & Noble Booksellers

Barnes & Noble bookstore in Wilmington is in a 2,300 sq.ft. space which is part of the University Central Mall. This mall was built in 1996 and houses several retail businesses.

In 1997, a hurricane preparedness program was initiated by Debbie Pratt, Community Relations Manager. As a result of the success of the program, the Wilmington Barnes & Noble store was visited by FEMA Director James Lee Witt who invited Ms. Pratt and her store to become Project Impact partners.

A Children's Awareness Task Force was established and is spearheaded by Barnes & Noble Booksellers. This Task Force has hosted several hurricane preparedness seminars, children's activities including story telling, and goes into schools to educate students on disaster preparedness. "Customers know they can come here for any hurricane information" said Ms. Pratt, "we have a new hurricane tip for each month".

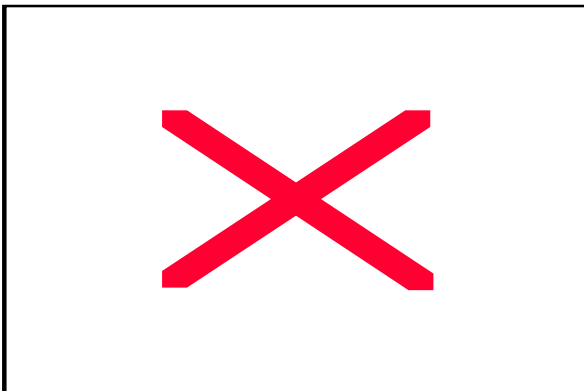


Unfortunately, there were flood waters that entered the store as a result of Hurricane Floyd. Damage was extensive with 18” of water in some areas of the store which ruined floors, paneling, most all furniture, countless bookshelves and hundreds of books. The store was closed since September 15 until early November. During this closure all of the employees retained their employment and assisted with clean-up and restocking. The actual cost of the damages and lost business were not available.

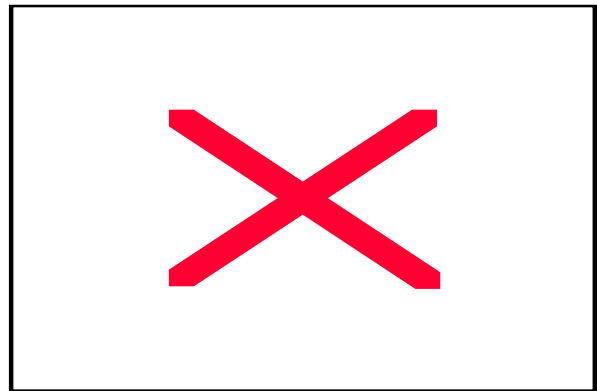
Ms. Pratt is currently requesting improvements for the store which will mitigate the damages that occur from wind and flooding. They have experienced damage from three hurricanes, Bertha, Fran and most recently Floyd. Carpeting has had to be replaced each time. Following Floyd, rather than re-installing carpet in the flooded areas, tile and indoor/outdoor carpeting was used. This will minimize time for clean up and repairs. Even though computers were not damaged, they will be placed up off of the floor and out of harm’s way. Presently, the store has plywood covers for the windows during storm conditions. These have not been effective. Hurricane shutters and other more effective measures have been requested from the corporation offices. Additionally, since the store shares space with other retailers that have experienced flooding, discussions are being held with the property manager for improved prevention measures. All of the furniture salvageable from the floods has been donated to and restored by Habitat for Humanity. All salvaged books have been sanitized and donated to area schools.

Long range benefits for this community are the on-going efforts of Debbie Pratt and her staff to continue their hurricane programs as well as doing educational and outreach programs in partnership with the Wrightsville Beach Elementary School.

Even though there has been minimal mitigation done to the structure, programs developed and hosted by the Barnes & Noble staff are on-going and contribute to the creation of a Disaster Resistant Community in New Hanover County.



(Books packed and ready for distribution to local schools)



(This location shares space in a mall)

Wrightsville Beach Elementary School

Wrightsville Beach Elementary School is a public school for grade levels k – 6. They have joined with the Wilmington Barnes & Nobel store as Project Impact partners. Together they have developed programs to educate and raise awareness of students and parents regarding disaster preparedness and hazard reduction.

When Hurricane Fran hit Wrightsville Beach, the school had four feet of water throughout the building. Losses included materials, supplies, equipment and furnishings. Also there was significant cost for clean-up. The school was displaced to a church for 5 _ months.

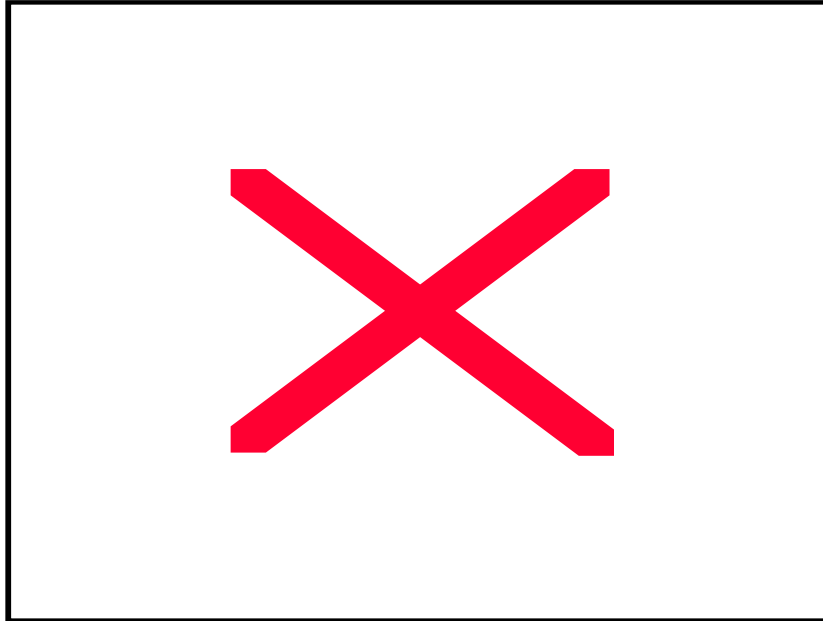
This school is located in a very vulnerable area. Because of this, they have had several hurricane experiences and have implemented many changes. Their plan involves staff, PTA members and school maintenance personnel. When notification is received for beach evacuation, action is taken to totally evacuate the building. The PTA calling system is activated and designated members automatically report to the school to assist with the evacuation. Major equipment such as computers, copy machines and teachers roll out file cabinets are removed from the building. All library books are packed and teaching materials are packed in readily available totes. When the building was evacuated for Hurricane Floyd, notification was received at 2:45pm and the building was empty at 6:00pm. “This was a record for us”, states Ms. Rumley, Principal.

Some flood water entered the building from Hurricane Floyd. Carpets were damaged and a minimal amount of teaching materials were contaminated. Tile has been installed to replace the damaged carpet. This will save the cost of cleaning, sanitizing and new carpet. The maintenance department is installing locking wheels on all non-stationary shelving units and creating custom fit covers for the open shelves. This will eliminate the time and materials necessary to pack the books. The shelves can easily be moved out of harms way with the books in place.

There was notable difference in the impact on the school from Hurricane’s Fran and Floyd. As a result of the pre-planning and early evacuation, the amount of water that entered the building did little damage. Removal of equipment, materials and supplies as an automatic action reduces or eliminates the cost of replacement, time lost of the school year and displacement of the school function. Additionally, should it be necessary, the building will remain available as a temporary shelter.

Ms. Rumley was enthusiastic about the continued and on-going changes in the school preparedness and response plans. She attributes this to the close involvement with Project Impact partners and working together. Communications between the local emergency management department and the school staff have improved significantly. They are allowed quick access back onto the island following a storm to check the school. This allows them to remove standing water quickly and lessen contamination. The partnership created pass cards which identifies essential school personnel and authorizes access.

Another creative program that the elementary school has partnered with is the “Rockin’ Chair Players”. The group of volunteer senior citizens performs interactive plays with natural hazard themes. As of this writing, they have performed for over 7,500 citizens.



(Rockin’ Chair Players performing “Thar She Blows!” at Wrightsville Beach Elementary School)

The New Hanover County School board is overseeing a large-scale project funded by the Project Impact grant and a \$1.8million bond issue to improve the disaster resistance of local school facilities. Nine school buildings, which are used as emergency shelters, have been evaluated by an engineering consulting firm. Recommendations resulting from the study include mitigation measures to be taken at three elementary schools. The project is completed and measures will be taken. As a result of the Project Impact partnership and evaluation project, many additional measures will be taken in the new construction of schools. Examples of measures included are electrical transfer switches, designated safe areas, reduced glass usage, planned landscaping with no trees close to the building and hardened structures for roof decks on auditoriums.

Sweeney Water Treatment Facility

The Sweeney Water Treatment Facility is a surface water treatment plant serving the City of Wilmington, population of about 75,000 citizens. This 25 million gallon per day (MGD) plant consists of two facilities operating simultaneous and parallel to one another. One commonly known as the “south plant” is a conventional 15 MGD facility utilizing the clarification of raw resource water received from the pre-raw water ozone contractors. The “north plant” is a 10 MGD facility utilizing solids contact-upflow clarification of coagulated water following primary ozonation of the raw water source. The back-up system for the plant is two 1250 KW generators powered by caterpillar diesel engines.

Prior to Hurricane Fran, the Sweeney Water Treatment Plant capability was just a 15 MGD supply with no back-up system. This presented severe service delivery problems to their customers.

A major \$26 million project of plant upgrade and expansion was undertaken, funded by city municipal bonds and has been completed. The project included a new generator room which houses two 1250 KW generators and a 22,000 gallon diesel fuel storage tank. These generators provide the ability for the plant to be 100% operational for 2 – 3 days should the city power fail. The system is tested at full load on a regular schedule and there is a contract for preventative maintenance to ensure top performance. The emergency response plan for the plant includes a gradual reduction in service, prioritized to critical facilities and services, should the city power failure continue beyond four days.

Upgrades and additions to the Sweeney Water Facility are to:

- ❑ facilitate future population growth and annexation of the Wilmington-New Hanover County area
- ❑ to meet present and future Safe Drinking Water Act (SDWA) regulations such as the Enhanced Surface Water Treatment Rule (ESWTR)
- ❑ to improve the water quality dealing with both esthetics and consumer confidence at the tap

When a storm is predicted in the Wilmington area, all staff are put on alert. They go home the day before the storm to ensure the safety of their families then report to the plant for 24 hr. duty. An existing training room becomes a dormitory and personnel are assigned to six hour shifts during watch and warning stages.

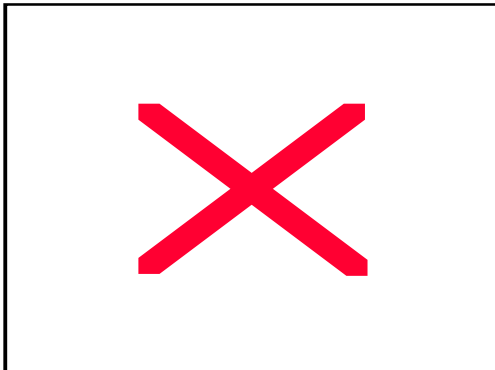
The new plans and systems exceeded performance expectations following both Hurricane Fran and Hurricane Floyd. Had the old system been in place and failed, it would have been catastrophic. Thousands of people would have been without drinking water and without water to flush out raw sewage. Investing in these upgrades to a critical lifeline facility greatly reduces the potential for health and environmental costs.

Participation as a Project Impact partner acknowledges the importance of the water treatment plant to the community. Clearly, this critical service must be maintained and uninterrupted service during a disaster significantly reduces resultant costs to the city.

Additional Mitigation Measures in New Hanover County

- ❑ Residential structures have been elevated on pilings to eliminate storm surge flooding on Carolina, Kure and Wrightsville Beaches.
- ❑ An ordinance requiring Liquid Petroleum gas tanks to be strapped and secured in beach communities has been enacted and enforced. This eliminates the threat of substantial risks and potential hazards during flooding from floating tanks.
- ❑ The building of public-private partnerships has greatly enhanced educational outreach programs in the community. Programs have been established to address the special needs population, children, seniors and non-English speaking citizens.
- ❑ Working in partnership with the Latin community in disaster education, a Spanish Disaster Hotline has been installed to provide vital information to the Spanish speaking population before, during and after a disaster. This system has been successfully utilized and ensures that the Spanish speaking population is warned, informed and knows where shelters are located. One shelter alone was housed by over 85% Spanish speaking citizens.
- ❑ The 1999 Project Impact Hurricane Preparedness Expo held in June '99 was the largest expo of its type and a great success. An estimated 6,000 people attended. The event hosted over 90 exhibitors, dozens of how-to workshops, 8 major sponsors and 12 media sponsors. Over \$16,000 was raised for non-profit agencies to utilize in disaster preparedness and mitigation initiatives.
- ❑ Promotion for business and industry to develop and implement disaster plans for their business and employees has been successful. In addition, several Project Impact business and industry partners donated equipment and supplies to improve shelter facilities and emergency response resources.

There are many other programs, partnerships and innovative plans that are currently in place or in development that continue to provide motivation towards preparedness and mitigation. New Hanover County is indeed highly vulnerable to repeated natural disasters. This in itself is enough for the county leadership to endorse actions, however, the recent improvements are directly attributable to the participation in Project Impact and the leadership of the county Project Impact Coordinator, Ms. Debbie Reed. “The secret to Project Impact is to find partners who have passion”, states Ms. Reed. She is successful in finding those partners and New Hanover County has proven that by working together, a community can become disaster resistant.



Bill Manley, Code Enforcement Supervisor, Wrightsville Beach, meets with FEMA Success Story Project team members. “I’m a retrofit nut!”, states Mr. Manley proudly. The number of substantially damaged homes in the city are consistently reducing due to the strict building code enforcement practices. Wrightsville Beach, represented by Mr. Manley, are active partners in Project Impact.

Summary and Conclusions

Mitigation, however applied, works! This has been proven over and over again by the all too frequent “tests” that have occurred in North Carolina. There is clear evidence that can be, has been and will continue to be quantified as well as the in-direct benefits identified and documented.

Several factors have emerged that are essential for truly creating a disaster resistant and sustainable community. Those that are demonstrating success in North Carolina are;

- ❑ Planning at all levels. The Hazard Mitigation Planning Initiative spearheaded by the North Carolina State Department of Emergency Management will ensure that preparedness and prevention becomes enculturated throughout the state. Businesses, public and non-profit organizations and industry have already experienced the direct benefit of planning in reducing cost both to life safety and structures.
- ❑ Partnerships. As demonstrated by New Hanover County, partnerships foster the stimulation and provide the motivation for a win-win solution to reducing cost and reaping benefits. Sharing of resources and reducing duplication of work are one of the less known in-direct benefits.
- ❑ Public Education and Outreach. Programs to reach the general public, special needs populations, youth and children are on-going and many being used as models for other communities.
- ❑ Active recruitment for individuals and businesses and organizations that are visionary as well as pro-active to join in the efforts of promoting disaster resistant communities. Finding the “passion”!
- ❑ Marketing success. Documenting, sharing and publicizing success, whether antidotal, detailed studies or word of mouth. Whatever works to educate and raise awareness for the necessity and benefits for effective mitigation.

Changes through mitigation have proven to be beneficial to all involved. Quality of life is maintained and the economic base of a community is preserved. The work to maintain or introduce disaster resistance to individuals or a community is on-going and must be kept alive.

Those individuals and communities that have been pro-active are to be congratulated.