Hurricane Charley - Executive summary

Hurricane Charley

Nature's Force vs. Structural Strength

Charlotte County, Florida
August 13, 2004

Institute for Business & Home Safety®

Introduction

The devastation left behind by Hurricane Andrew when it struck the State of Florida in 1992 fueled the beginning of a process to reevaluate the building code standards in place and the enforcement of these standards. In 1995, coastal areas of the State of Florida, including Charlotte County, began to use and enforce high wind design provisions for residential housing. A key element in that process was the adoption of the SBCCI's Standard for Hurricane Resistant Construction SSTD-10 as a prescriptive alternative to engineered design of housing. A major emphasis of SSTD-10 and engineering based design was the development of continuous load paths to ensure that all loads were directed to the foundations. The move to formal consideration of high wind design and the use of SSTD-10 as an alternative was accompanied by significant training and education of builders and building officials. The first full year where high wind standards were in place and used in Charlotte County was 1996.

Toward the end of the 1990's the State of Florida began moving towards adoption and enforcement of a statewide building code. The first edition was the Florida Building Code 2001, which was adopted in mid year 2002. Once again, the adoption of this code was accompanied by extensive education and training, including a requirement that all licensed engineers, architects and contractors take a course on the new building code. This code had been in place for about two years when the 2004 hurricane season reached its peak.

In 2004, homes constructed to these new standards as well as older construction methods were put to the test as four major hurricanes attacked the State of Florida from both coastlines in a six week period between August 13th and September 28th, 2004. This study focuses on Hurricane Charley, the first of these storms, and assesses the relationships between building codes and damage. Specifically, the study seeks to determine whether and by how much the new building codes resulted in a lower claim rate per policy, less interior damage, and lower claim severity. One insurance member of the Institute for Business & Home Safety (IBHS) shared their claim experience in Charlotte County, FL with IBHS and has allowed IBHS to share the results of the data analysis through this report.

Claim Frequency

In this study, hurricane claim frequency is measured as the percentage of policies that resulted in a claim. The insurance company that contributed data to this study insured 5,636 policies in Charlotte County when Hurricane Charley made landfall in 2004. Of these policies, approximately 80% were written for homes that were constructed before the implementation of modern engineering based design in 1996. The remainder of the policies was written for homes constructed under the SBCCI high wind requirements or the 2001 Florida Building Code.

Hurricane Charley resulted in 2,102 reported claims in Charlotte County for this insurance company. On average, 37% of all insured policies resulted in a claim. But, when the claim frequency was calculated by year of construction, results in Figure 1 show that there was a significant reduction in claims when homes were constructed after 1996. Note that the analysis suggests that it took about a year before significant reductions in claims occurred. Claim frequency for homes built under these standards beginning in 1996 *(red)* are compared to those homes constructed before this standard were implemented *(blue)*. Figure 2 reveals that on average, claim frequency was reduced by 60% for homes constructed under the newer building codes.

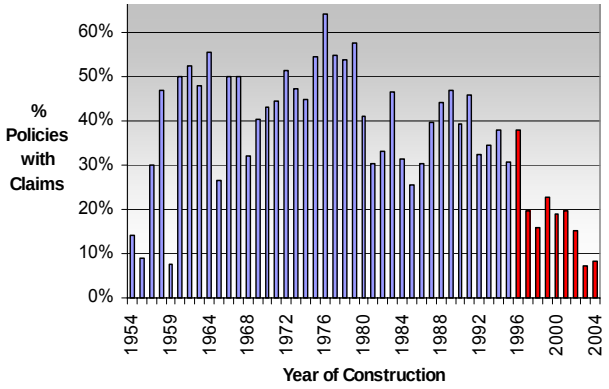

Figure 1: Claim Frequency by Year of Construction

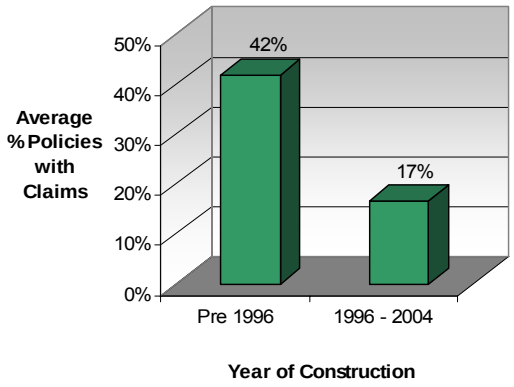

Figure 2: Average Claim Frequency by Building Code Category

Claim Severity

Hurricane claim severity is calculated in this study by dividing the total cost of damage, including the policy deductible, by the total square footage of the home to obtain an average cost of damage per square foot. This eliminates any claim severity variances that may result from homes of different sizes. Of the 2,102 claims incurred, 84% of these claims resulted in homes with a known square footage. These claims were used in the claim severity analyses.

Claims from Hurricane Charley for pre-1996 homes resulted in an average loss of $24/sf. For an average 2,000sf home, this equates to an average loss of $48,000. Policyholders were responsible for approximately $2,600 on average through their hurricane deductible.

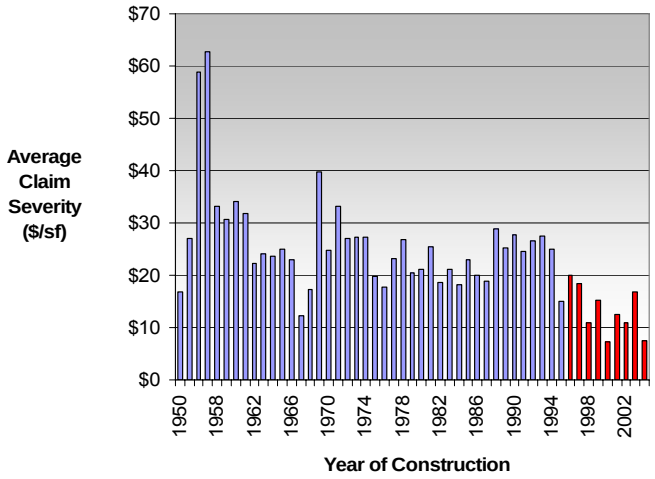

Figure 3: Average Claim Severity by Year of Construction

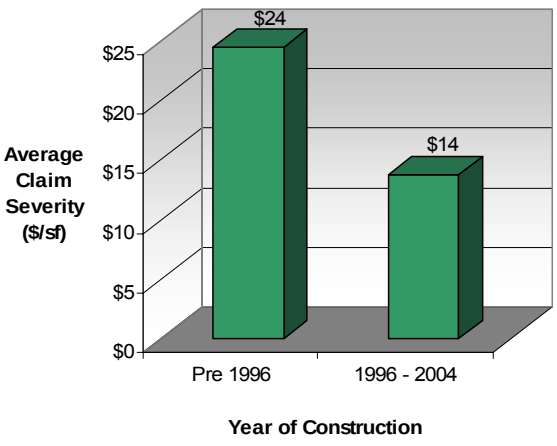

Figure 4: Average Claim Severity by Building Code Category

Figure 3 shows that when claim severity was analyzed by year of construction, there was a dramatic drop in the severity of a claim when homes were constructed after 1996 *(red)* as compared to those homes constructed before 1996 *(blue)*. The severity of a claim was reduced by 42% for homes built to the newer codes. This is displayed in Figure 4. Homes in this group resulted in an average loss of just $14/sf. For the average 2,000sf home, the loss was reduced to just $28,000 per claim.

Building Component Damage

A sample of 270 claims was reviewed through a manual process to determine which building components failed following Hurricane Charley. Results in Figure 5 show that roof damage was the most frequent source of damage, followed by damage to pool cages or screened porches, and soffits. Window and garage door damage occurred in approximately half of all claims.

In most cases, the frequency of component damage was reduced when claims occurred to homes constructed between 1996 and 2004. Garage doors were the most improved component, resulting in a 34% reduction in component damage frequency.

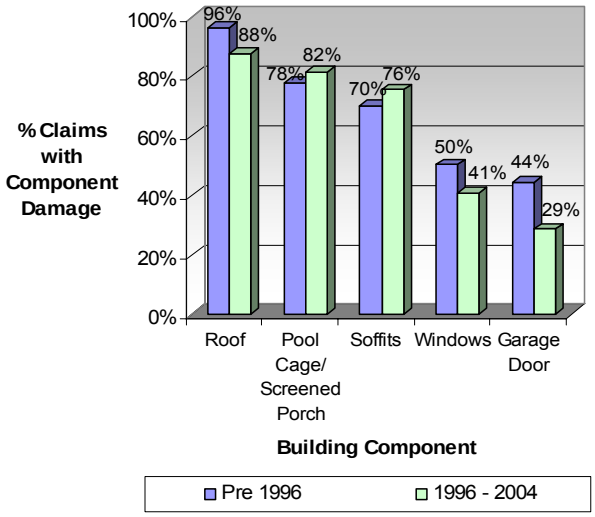

Figure 5: Frequency of Building Component Failure

Not only was there a reduction in damage frequency for these components, but there was a reduction in the severity of damage as well. Claims that resulted from homes built between 1996 and 2004 resulted in:

- 44% fewer total roof covering replacements compared to homes built before 1996. Instead, homes built between 1996 and 2004 most often required only partial roof covering replacements.

- 38% fewer homes had window glass and/or frame damage compared to homes built before 1996. Instead, homes built between 1996 and 2004 had a higher frequency of window screen damage only.

- 32% fewer total garage door replacements compared to homes built before 1996. Instead, the majority of homes built between 1996 and 2004 required only minor garage door repairs, such as track adjustments or dent repairs from debris impact.

Two components that did not show a reduction in damage frequency as a result of the newer building code requirements are soffits and pool cages or screened porches.

The percentage of total soffit failures, as opposed to a partial soffit failure, was reduced in homes constructed between 1996 and 2004, but the fact that soffit failures were still so prominent was a cause for concern. This led to a modification in the Florida Building Code in December of 2006 that requires soffits be designed for the adjacent wall pressures and installed in accordance with the manufacturer's specifications. It is anticipated that these building code modifications will reduce soffit losses in future storms where homes are built to this standard.

Pool cages and screened porches were considered "exterior attachments" in this study and were the third most costly failure according to the results in Figure 6. The average cost to replace a pool cage was more than $7,000 and the average cost to replace a screened porch was more than $4,200 when a total replacement was required. It is estimated that 90% of the homes with pool cages in Charlotte County experienced some level of damage during Hurricane Charley.[1]

Interior Damage and Additional Living Expenses

The failure of many building components and particularly those that protect the building envelope, such as the roof, windows, and garage doors, can result in substantial damage to the interior of the home. In fact, interior damage was the second most severe loss source following roof damage. This can be viewed in Figure 6. The severity of interior damage can lead to subsequent additional living expenses (ALE) if the homeowner is required to evacuate their home during the damage repair process. This study revealed that homes constructed between 1996 and 2004 had 34% fewer claims with interior damage, and additional living expenses were only necessary for less than one month if they were required at all. By contrast, 20% of all claims resulting from homes constructed before 1996 required additional living expenses and 11% of these claims required additional living expenses for one month or more. This can be seen in Figure 7.

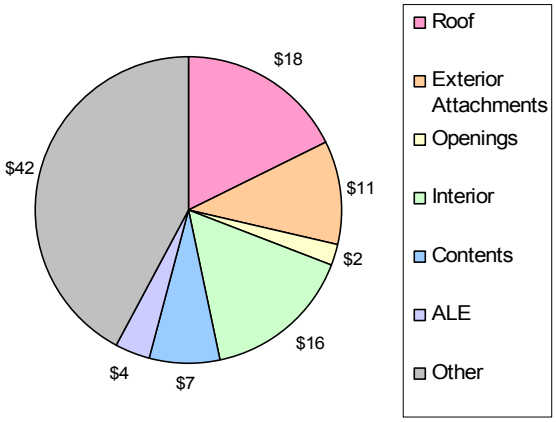

Figure 6: Loss Cost Distribution

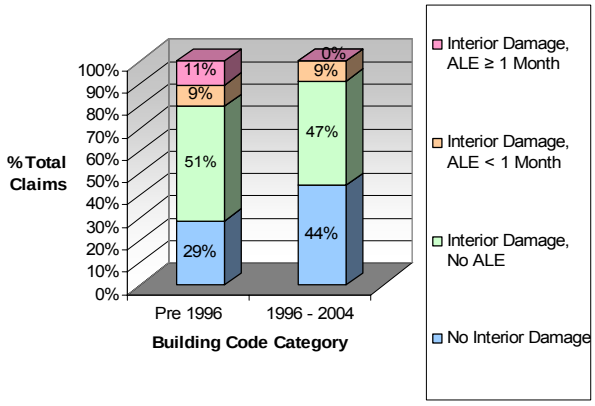

Figure 7: Frequency of Interior Damage and ALE by Building Code Category

Summary

Results from this study show that the enforcement of modern engineering design based building codes made a positive impact on the performance of residential homes during Hurricane Charley in 2004. The frequency of claims was reduced by 60% and the claim was 42% less severe when a loss did occur, for homes built after the adoption of the modern codes.

In most cases, homes built after the adoption of these new standards resulted in a decrease in the frequency and severity of damage to various building components. Furthermore, based on the analysis of additional living expense records, it is concluded that the new building code requirements allowed homeowners to return to their home more quickly and likely reduced the disruption of their day to day lives.

[1] *This estimate is based on data from the Charlotte County Tax Assessor Database. A 500 record sample revealed that nearly all homes with pools had pool cages. The tax assessor database was used to determine which homes with claims had pools.*

This study also showed that building codes are an evolving process and there is always room for improved construction practices. Even though there was significant improvement in residential construction performance overall, the performance of components such as pool cages or screened porches and soffits still need to be addressed. Identifying weaknesses in the codes can lead to better construction techniques and reduced losses for future events.