

## Episode 55

# Homes That Are Resistant to Extreme Weather (Hurricanes)

The show notes: [www.houseplanninghelp.com/55](http://www.houseplanninghelp.com/55)

**Intro:** Today's interview is all about resilience. If the weather patterns change where we live, are we going to be able to cope? We have seen this to a degree. We've had floods in the UK at the beginning of 2014, droughts in the California area. No doubt, all around the world, perhaps there have been more cases of extreme weather.

In this session we're going to be addressing a question from Frank Wiley about building in Florida, which is an area that's already prone to hurricanes. So I've got the help of Steve Mouzon from Original Green. He's going to be my guest today and helping me answer this question but I started by asking him how he became interested in environmentally conscious building.

**Steve:** Well I'm an architect by trade. I went to university back in the late 70s and early 80s but I've always had an interest in building things more sustainably. My mother had a health food store for many years beginning in the mid 1970s and she would have all of these wonderful speakers come in. Really revolutionary people for that point in time. Of course a lot of the things they talked about back then that sounded so crazy are kind of accepted wisdom now but anyhow it peaked my interest just a mid teen. Therefore when I went to school then that was an interest then as well. There were a number of years where you take a job once you get out and you do all you can but nobody wanted to hear about those things, about how you built sustainably in the early 1980s so I did the best I could. It's only been in more recent times that I've found more of an audience for that, in the last decade or so, and so it's been nice to get back to the things that I'd always wanted to do since the beginning of my career.

**Ben:** I thought it would be nice to have a chat with you, because I know that you are based in Florida, near Miami, is that correct?

**Steve:** Yes, I'm actually in . . . We live in the dead centre of South Beach at 10th and Meridian so it's a wonderful place to live and work.

Ben: And I had this question that came in. I'll read it to you now and I thought that we could actually focus this whole episode around it. So, good service to you, Frank Wiley! This was your question. You said: "Hi Ben, I know that in different parts of the country," he's talking about the US here, "different building practices work better than others and you have to take weather very seriously in some areas. My question is, what are some of the better ones for Florida that would create a tight envelope from the outside but yet are still hurricane resistant? I also want to keep in mind that termites can be a big problem in the State.

So can we start off, Steve, with just looking at weather almost. What are the most dangerous types of weather when we're thinking about buildings?

Steve: Well, where I come from originally is in North Alabama. That's kind of in the mid south and that area is known as hurricane, excuse me, tornado alley. We have a lot of tornadoes up there and you have just a few seconds to dive for cover sometimes if one is on the way. Down here there's not so many tornadoes but there's the hurricanes which are . . . At least with a hurricane you have maybe two or three days to get ready as opposed to just a few seconds. You're not in fear for your life necessarily but you definitely need to get ready. Now the interesting thing is with a tornado there's really not much you can do with the building unless you're building a concrete bunker to survive that. So it doesn't really have that much affect on architecture.

A hurricane is a very, very strong wind but it's not so strong that the building can't survive if it's designed right. What we find in this entire region - I call it the Caribbean Rim but it's actually bigger than just around the Caribbean, it also includes the Gulf Coast as well - but in the entire region architecture actually for hundreds of years has been profoundly influenced by being in a place that there can be hurricanes. The way that that worked, I think, say 100 or 200 years ago, if you were fortunate enough to survive a hurricane yourself but your house was unfortunate enough not to, then when you crawled out of the wreckage of your house and saw your neighbour's house that was still standing, you said: "I'm going to rebuild like that!" [Steve and Ben laugh.]

You know, and it was everything from the roof slopes to the actual eave details. Literally an overhang that is too big causes the beginning of the peeling back of the roof deck and when the roof deck is lost that's what the structural engineers call the diaphragm. So when that diaphragm action is lost then there's no support to the

top of the wall and the walls begin to cave in, and the entire building could be lost because of just an overhang being too big. So there's all sorts of little details like that.

Another example, there's a place in the Bahamas that I do a lot of work. It's called Schooner Bay. It's a new town. They've taken the old wisdom very seriously and when Hurricane Irene crossed Schooner Bay at her strongest point a couple of years ago with winds of 125 - 135 mph, and that's a severe hurricane, but when she crossed they did not lose one pane of glass because they did what the Bahamians have always done and that is they had solid board shutters and they just shut the shutters in advance of the hurricane. So the shutters took the beating from the wind, not the glass itself, and everything was fine.

Of course today in the States, what people will commonly is they will put things that look like shutters on a building but they actually don't shut! [Ben laughs.] They are just decorative things that are stuck on. I tell them, I say: "If you want to do that we should call this thing by its proper name." If it's something that only screws on the wall and does nothing rather than shuts, it is not a shutter, it's a screw-on do-nothing. So how many screw-on do-nothings do you want on this building? [Steve and Ben laugh.] Normally the answer is zero but the fact of the matter is there's all sorts of things like that, like the shutters and like the roof slopes, the eaves overhangs and all this that actually go into survival from the storm versus having a building that would be demolished. So it really is fascinating to look back and actually see that . . .

Now today, for example, all the hurricane experts will say a roof where the slope is in the sweet spot of between an 8 and 12, and a 9 and 12, that's not so steep that it fails an overturning but not so shallow that it fails an uplift. So it's kind of a sweet spot but long before there were hurricane experts the old folks knew that, again just from looking at what survived and what didn't, and so, so much of the wisdom of how to survive in a hurricane is actually wisdom that's been around for a very long time. We've just been ignoring it in recent years.

Ben: Do other parts of America have different weather to deal with because we're talking about a big area? So you've got the hurricanes down there, how far up do they go?

Steve: You know, once they get inland about 100 to 150 miles they taper off. Really when you get to 200 miles in normally they've tapered off

to where they're just a tropical storm or something like that and so it's just a big wind. It's not something that will destroy a building.

The problem that we have here is that everything that we've done in recent times, in terms of building sustainably . . . In the States we have something that is called the US Green Building Council and they're the sponsor of the LEED standard that you may have heard something of, and the problem with LEED, and I actually sat on one of the committees for, I guess it was most of a year until they finally kicked me off because, not because I disagreed with them, they're very nice people but just simply because I could be at enough of the conference calls . . . Anyhow so I've actually tried to help with this a little bit but the problem with any of the standards, like the LEED standard, is that it's exactly the same standard applying to something on Cape Cod and on the Gulf Coast. I probably don't have to tell you that when you have a country that's that big with that many different climatic regions, what is supremely sustainable on Cape Cod looks ridiculous in the Gulf and vice versa.

Actually the question you ask about sealing up, a moment ago, is a very good question in the northern two thirds of the US but really what we find when you get down here into the Caribbean Rim, really what a building needs to do is not so much seal up tight as it does need to open up and breathe. We don't have any standards that even contemplate that question, which is a real pity. We're actually, a couple of partners and myself, in a company called Studio Sky, we're in the process right now of building some stuff in this part of the world but literally where the buildings have no insulation at all. They have these louvered walls, and louvered windows and doors that for almost all of the year they open up and you let the breeze blow through. So it's a completely different solution than you would use in Connecticut or Montana or something like that.

Then you get into the, say for example, the Pacific coast and you have an entirely different climate there. You get into the desert Southwest and you get something that's not so different from the Sahara! [Steve laughs.] The US really has a lot of different zones and so the idea of having any one solution that works in all of those zones, it just doesn't make good sense.

Ben: This weather that we've been talking about, has it changed at all or did our ancestors face exactly the same issues and we've just got to get used to it? Perhaps we're doing something that's too fancy and we're not thinking about what might be coming our way.

Steve: Well, you know, interestingly enough when I moved down to South Beach a little over 10 years ago I'd never heard the term tidal flooding. I didn't know what that meant. Now almost every time we have a full moon or a new moon we have water in the streets here - not every time but most times and even when there's been no rain. So basically what it amounts to is that the sea level is literally getting up in the streets, so the sea level rise is definitely an issue and you're beginning to be able to see where things are warmer. Basically we have these, in the US, climatic belts that are intended to guide you as to what plants to plant in particular regions and basically everything has moved about one climatic zone northward in the last 30 years or so. There's clearly change going on.

Ben: I totally agree. Well, going back to houses and concentrating on that for a moment. I don't know whether to bring in some more world examples but I think we'll just concentrate on Florida for now. What does that mean on the houses that you design day by day? Are people coming to you and demanding that things are more resilient or is it case of we'll deal with it when it arrives?

Steve: You know we find ourselves . . . I say ourselves, I'm talking about myself and my partners and also a larger group of colleagues known over here as the new urbanists. I don't know whether you've heard of that term?

Ben: I have.

Steve: Okay, but we find ourselves, in most cases we're going to the developers and to the customers and we're saying: "Here, you should think about building in a more resilient way." In other words they're not coming to us asking for that. We're going to them and saying: "You should think of this," and then they do. To us it's just simply being responsible but here's another way of thinking about it if you want to look at it in a crass commercial way. That is to say that if you are responsible at some point in time the market is going to realise that hey, this is a better product than what those other guys are selling, we need to buy some of this.

So we think that on one hand it's responsible and on the other hand it's a good marketing strategy as well for putting out stuff that is demonstratively better than what people have been building for a long time.

Ben: Do we need to use special materials to make it resilient? I think we have actually pointed out you could have everything concrete and that might be the best way, but what are the techniques that are

going to make something withstand this very strong wind that only comes at certain times of the year?

Steve:

Well, you know the crazy thing, we did a lot of work . . . Well actually one of the founders of new urbanism is a fellow I've done a lot of work with for years, his name is Andrés Duany and he's actually being doing a lot of work in the UK recently, just for whatever it's worth, but the Saturday after Hurricane Katrina several years ago I went over to his office and we sat down and we came up with the idea of what we call the Katrina Cottages, these tiny little cottages that would let people get a foothold on their land again. Partly as a result of that and as a result of some other things as well we did a lot of work, all of us did, all of our colleagues on the Gulf Coast for years after Katrina and one thing that we noticed there was, for example, an old colonial house in New Orleans, it's called the Pitot House. All around the Pitot House there was a lot of devastation, houses that just had to be bulldozed, I mean literally almost within a stone's, well not quite a stone's throw but pretty close to it . . . But the Pitot House and many of the other old houses, you know, the old folks knew there were going to be floods and so what they did is they built the entire first floor out of masonry with stucco inside and out, so when the flood was coming, when the storm was coming, they would simply move all the furniture up to the main level, which was really the second level, and so after the floods receded they simply had to hose down the walls and move the furniture back down and they were fine. There was destruction all around them.

So actually that was not a new material, that was an ancient material, just stone and brick. I don't know if it's stone or brick because it was covered with stucco but just a masonry wall with a stucco finish and so in many cases it's not necessarily even the new materials.

As a matter of fact one big problem that we've had in recent times is that over the last or so we've had all these fantastically strong materials that has allowed us to build using very thin samples of each material because they are so strong but that means that there's not a lot of margin for error. We will engineer them to use absolutely no more material than what we need to, you know, to save on cost and so therefore if something is extraordinary then it can fail whereas the old stuff that used a whole lot of it, you know, a 16-inch thick masonry wall, that's far stronger than any regular wood frame wall that we would build today, for example. So actually in many cases the old stuff held up better than what the new stuff

did because it was not engineered just to the code but it was a whole lot stronger than that.

Ben: Sustainability is quite a difficult one to get your head around sometimes because you could use something that's really strong or perhaps you could design something that would almost fold away and you'd have to rebuild. What is the best strategy for where you are in Florida?

Steve: It depends on what you're talking about. One thing that we started to do here just very recently and that is to say that in a hurricane zone there ought to be a part of the house that is very strong, like made of masonry and that that's the part of the house where you can put everything in a storm, not necessarily on a second like what the people did in New Orleans but some masonry core that is very strong. The rest of the house is just kind of a framework. We call it a timber tent, meaning that it has a strong frame but the actual wall panels could blow out in a severe storm and you just replace the wall panels and then you're back in business. The idea is that all of the expensive things like, say, a kitchen cabinet and all that. That would be in the masonry core because you don't want to replace that and then the furniture you just stack in there.

So the answer is that there is no single answer for an entire building. It depends on which part of the building you are talking about because we feel like that it actually makes sense to have some parts of a building that's one way and some parts that are the other way so that you don't burden the entire building with having to be built out of masonry because that would get very expensive.

Ben: Let's briefly have a quick look around the world because I keep thinking back to the example of Typhoon Haiyan that happened last year and that was the biggest storm the world had ever seen. What do they do in that situation? Is there ever a call for abandoning an area, where it gets so silly that you just get wiped out, because I've visited that area and I know how often they get these storms. They do treat it and take it in their stride but can you see Florida ever . . . Are people just going to think, *this is crazy*, I'm going to move somewhere else? Mass relocation.

Steve: After the year of Katrina when there were like, I don't know, what, six or seven hurricanes that came through Florida that year, now Katrina came through Florida, it was barely a Category 1 so it wasn't a big storm but then we had, that was the year that we ran out of the alphabet and had to start all over again with an 'A' storm, you know, towards the end of the hurricane season. At that point in

time there were some people saying: "Hey, we want to move." A tiny fraction of 1% of the people in this state actually did move somewhere else but the problem is, like for example after Katrina, when the mayor floated the idea that maybe there's parts of New Orleans that should not be rebuilt. That idea survived for less than 24 hours. There was such a firestorm of people saying: "Oh no you don't! That's my home you're getting rid of," or whatever.

Then he said: "Well that was just a trial balloon. I just wanted to see what you thought and now I know." So I think that it's going to be such a difficult thing to say, sorry you can't come back, that that probably won't happen in most places.

Even at South Beach right now we're talking about what do we do for the next 30 years and we realise that probably we're going to have to build some levies, because there will come a time when a good bit of South Beach will actually be underwater. But there's enough real estate value here that the levies are a whole lot cheaper than everyone abandoning the property that they own here. So I think what we're going to find is that rather than full-scale abandonment you're going to see a lot of adaptation to the new conditions. That's the more likely path, adaptation as opposed to just abandonment.

Ben: Are we doing anything that could be seen as silly? Not specifically in that situation but any 'no go' houses that are just wasting time and money because they're not set up for it or on the whole are they quite good standard?

Steve: You know, here's the problem. The standards that we have . . . Now I'll preface what I'm about to say with this and that is that on the Mississippi Gulf Coast, for example, there were some of the communities there that did not have building codes prior to Katrina and so that was one thing, there were no standards per se. Even the standards we did have, if you built to those standards then Katrina was such an out of the realm of possibility event. Nobody even imagined it before it happened, that had you built completely to code then you still would have been wiped out. So that's what we're going to start seeing, I think, is more and more situations that are simply out of the realm of imagination until they happen and then it's like: "Whoa, how did that come about!" It's one of those things that you literally cannot anticipate so I'm afraid that that's what we're going to be up against more than just simply things are a little bit out, it'll be events that are a whole lot out.

Ben: Well, let's just go right back to where we started off, which was Frank's question. He wanted to know whether there are some better ways to create a tight envelope from the outside yet still hurricane resistant. Is there any more help you can give him or are you saying that on the whole you wouldn't need a tight envelope if you were in Florida anyway?

Steve: Actually yes and no. That is that we do feel like part of the house needs a really tight envelope and that is that masonry core. And I will say this, when you get further south than Orlando, for example, building in masonry is kind of the normal way of building anyways. As a matter of fact if you price a house built out of concrete block here versus one in say the Mid-South, like where I came from originally, North Alabama, it will be a whole lot more expensive than it would be here because they're not used to building that way there whereas it's just normal here. So the main thing that you would do .

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Let me jump around on you a bit. There's a place that we do a fair amount of work called Alyse Beach, that's A-L-Y-S in case anyone is looking it up. It's on the Florida Panhandle. That was a classic example, like we were talking about earlier, of us going to the town father and saying: "Hey, you should consider building in a stronger way," and so they were actually the first place in the US that was built to what is known here as a fortified standard. It's still concrete block construction, the walls are, but what they do is they reinforce that block a whole lot stronger than what they would do here in Miami. So it becomes extraordinarily strong to a hurricane wind. There they also actually use concrete shingles for the roof. I say shingles, it's actually slabs of concrete, kind of like what you would see in Bermuda. It looks very much like a Bermudian roof and so it's an extremely strong building that you would have there.

There's some things like that that you can do that increase the strength incrementally over what's already been built, but the main thing to build sustainably here is actually to have most of the house that can actually open up and breathe. That's what we're not doing at all here right now that we should be doing, simply because if you think about it, say for example here in Miami, in the 10 years I've been here it's never gotten up above 93 degrees Fahrenheit and the human comfort range, they say it's 68 - 78 degrees Fahrenheit. I should have the Centigrade conversion. [Ben laughs.] I don't know off the top of my head. So basically it's only 15 degrees Fahrenheit above what's known as the comfort range and you could get 10 degrees of comfort just simply by putting on a ceiling fan. It's not like we're that much out of the range to the high side. As a matter of

fact, one of the most important things that you can do to be more sustainable is to have a series of great outdoor rooms where you entice people outdoors. Our side garden here at our condo, we've finally got it pretty well built out into like a dinner garden and a living garden and so forth, to where I'll actually go out there and spend a lot of time working outdoors. I'll draw outdoors. When you spend time outdoors you get acclimatised with the local environment so when you return indoors you actually don't need to put on the equipment for most of the year. I could probably live here for pretty much all year long without putting on the A/C. Now my wife puts it on sometimes because she likes it a little better than I do but we literally could live almost all year long without it. So the idea of sealing everything up tight, you know, just like a hermetically sealed envelope is just an idea that makes perfect sense further north but actually doesn't make sense here. You don't need to do that here for just the temperature. You only need that part of the house is really strong for the storm but that's a very different need and so you should approach it in a different way.

Ben: Well Steve, it has been really good to have a chat with you and I thank you for all of that information that you've given us today.

Steve: Delighted to talk to you, Ben.