Forensic Reporting 101

Executive Summary. In any formal forensic investigation, there's going to be some sort of report. Knowing how to write this report is important in construction and it's important if you're interested in a 2nd career. Also, it's fun.

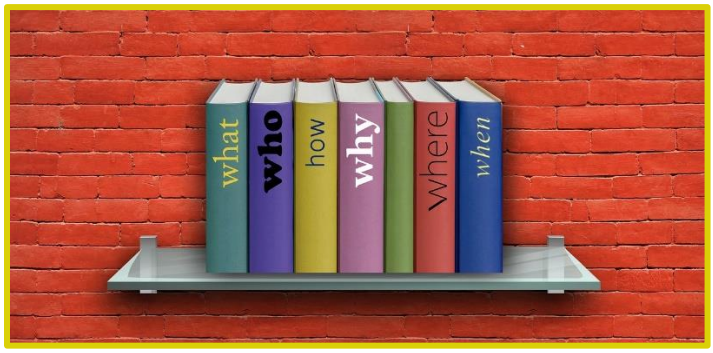
What is forensic engineering? From origin-and-cause.com, I found this great definition:

> *Forensic engineering is the investigation of property loss and injuries related to failure in materials, components, design and structures. These can be minor incidents…or catastrophic events, such as a bridge collapse.*

Great article on forensic engineering at Orgin-and-cause.com.

How does this relate to me? I'm in construction. Accidents are a part of construction, and most construction companies will conduct some sort of investigation after any accident. The first step is usually determining the causal factors and this will eventually end in some sort of conclusion. Of course, there's an in-between process here too.

What are the steps in generating a forensic report? As intimated in the previous paragraph, there is a forensic component in the research of a construction accident. To answer the question posed here though, let's drift over into the consulting world.



A common area of basic forensic work is in the insurance business. Your home experiences flood or wind damage and out comes the insurance adjuster. When things get a bit more complex they call in an engineer to either confirm or determine the cause of damage. This engineer's report is used by the insurance company to help drive a decision on payment, or not, of the homeowner's claim.

The engineer's report is comprised of the following sections (let's take a flood for example):

Scott Jennings, P.E., is the President of SJ Construction Consulting, LLC (808) 271-5150, sj@sjcivil.com. He is the former owner of a heavy/civil construction company and now provides cost estimating and training, litigation support, construction management, and efficiency advice to contractors. He is also the author of numerous construction children's books at www.amazon.com!

FORENSIC REPORT GUIDE FOR FLOOD DAMAGE	
Basic Information	Gathering basic information is primarily used to feed to the user (the insurance company). However, this information can be important to the engineering process as well. 1. Basic information – homeowner names, age of home, number of stories, basement (yes or no), crawlspace (yes or no), inches of rainfall, local topography, local water sources (ocean, river, et cetera), condition of home and yard, existence of gutters or not, and slope of grade adjacent to the home (slope away from the home is desirable to maintain a dry home and one in which water doesn't sit at the perimeter foundation and contribute to settlement or erosion). 2. Eyewitness account – in the case of home damage, this is the homeowner interview. Questions include who is being interviewed and their relation to the property, who was present at the flood event, the origin of the water, whether or not this event has happened before, if the water came in the house, the perceived velocity of the water, start/stop time of the event, and whether or not the home was evacuated. 3. Research data – in the case of a flood, what was the rain like that day compared to others? The insurance company will want to know if there was an actual extraordinary event that day. In the case of a construction accident, you may be looking into formwork data, harness data, equipment data, et cetera, to possibly put forward that a product failed.
Observations	Observations can be documented via written notes, audio recording, or photo reporting. The biggest thing to note about the photo report is the *absence* of commentary. When making observations, you're doing only that – just stating fact. This is not the place to opine or analyze.

Scott Jennings, P.E., is the President of SJ Construction Consulting, LLC (808) 271-5150, sj@sjcivil.com. He is the former owner of a heavy/civil construction company and now provides cost estimating and training, litigation support, construction management, and efficiency advice to contractors. He is also the author of numerous construction children's books at www.amazon.com!

FORENSIC REPORT GUIDE FOR FLOOD DAMAGE	
	If you see a downed fence, you take a photo and say GOOD: "Fence observed to be knocked over and facing south towards the Pacific Ocean." This is not the place to jump into evaluation. In other words, do not use the observations section of your report to say BAD: "Fence shown here to be downed from heavy rain/floodwater and is pointing in a direction away from the water source, the Patuxent River."
Evaluation	What was on the tip of your tongue above, is now what comes out in this section. Each of these, say, photos you took above now get a professional evaluation attached to them. You may connect photos to events in the following ways: 1. General damage – fences, grasses, bushes, trees, playground slides – are any or all of these damaged? Are they pointing in the same direction which may corroborate a source of water? Are sticks or other debris consistently wrapped around one side of the home, perhaps the river side where river came over the bank into the property? Is observed damage due to water velocity and scour, or due to debris striking the home, or has settlement occurred due to improper compaction under the footing? 2. House movement – is the house racked, where one side of the home used to be shaped like a large rectangle in elevation, is now in the shape of a parallelogram? Are footings suspended in air because they were washed out? 3. Gutters and grade – are there gutters that, over time, had directed water to downspouts? Is the grade sloping away from the house to protect it? Were there splashblocks to suppress the

Scott Jennings, P.E., is the President of SJ Construction Consulting, LLC (808) 271-5150, sj@sjcivil.com. He is the former owner of a heavy/civil construction company and now provides cost estimating and training, litigation support, construction management, and efficiency advice to contractors. He is also the author of numerous construction children's books at www.amazon.com!

FORENSIC REPORT GUIDE FOR FLOOD DAMAGE	
	force and velocity of the water from these downspouts which then, in turn, could have prevented soil erosion? 4. Other observations – are there wood-framed members which have separated from each other, sticking doors, cracks in paneling, water lines 3' up the wall in the bedroom, or large volumes of dirt missing from the backyard? This is the place where you tie your observations to a failure mechanism. For example, "The girder was not twisted or displaced and there were no recent fractures with bright exposed wood." The "bright exposed wood" is a tell. Bright wood tells the engineer that this this failure is recent (because the wood has not had a chance to age/oxidize or collect spider webs, et cetera). This same analysis is used in assessing cracks – are the cracks dirty, are the cracks rounded or sharp? There are a lot of little things that can tell a story or corroborate a failure theory.
Conclusions	The conclusion section is the bottom line and the first place the client looks. This section ties together all of the hard work done above into bulleted answers or a paragraph or two. It may look something like this: *Based upon the Company's investigation, the available evidence, and the engineer's education, training, and experience, the following conclusions have been reached within a reasonable degree of engineering certainty:* • *The underside of the complex was inundated to nearly its full depth with water which entered with significant velocity.* • *Damage to the complex caused by the subject flood event included scouring of soil, leaning posts, and unlevel piers.* • *There was no structural damage to the complex as a result of the subject flood.*

Scott Jennings, P.E., is the President of SJ Construction Consulting, LLC (808) 271-5150, sj@sjcivil.com. He is the former owner of a heavy/civil construction company and now provides cost estimating and training, litigation support, construction management, and efficiency advice to contractors. He is also the author of numerous construction children's books at www.amazon.com!

My story. I mentioned in the executive summary above, that there was a "2nd career" option here. Although I took a class on forensic engineering in graduate school, I really learned the trade from the years which followed a random phone call I received about 7 years ago.

Since I took that call I've done forensic insurance work in flood, earthquake, and wind in Texas, Florida, California, and Hawaii. And as I've said in other articles, I just think it's very shortsighted for some of my construction readers to obtain that civil engineering degree and not pursue the P.E. license. To me this area of engineering is enjoyable and challenging, and in the case of servicing my client, it can only be done if you're licensed.

Work safe!

Scott Jennings, P.E., is the President of SJ Construction Consulting, LLC (808) 271-5150, sj@sjcivil.com. He is the former owner of a heavy/civil construction company and now provides cost estimating and training, litigation support, construction management, and efficiency advice to contractors. He is also the author of numerous construction children's books at www.amazon.com!