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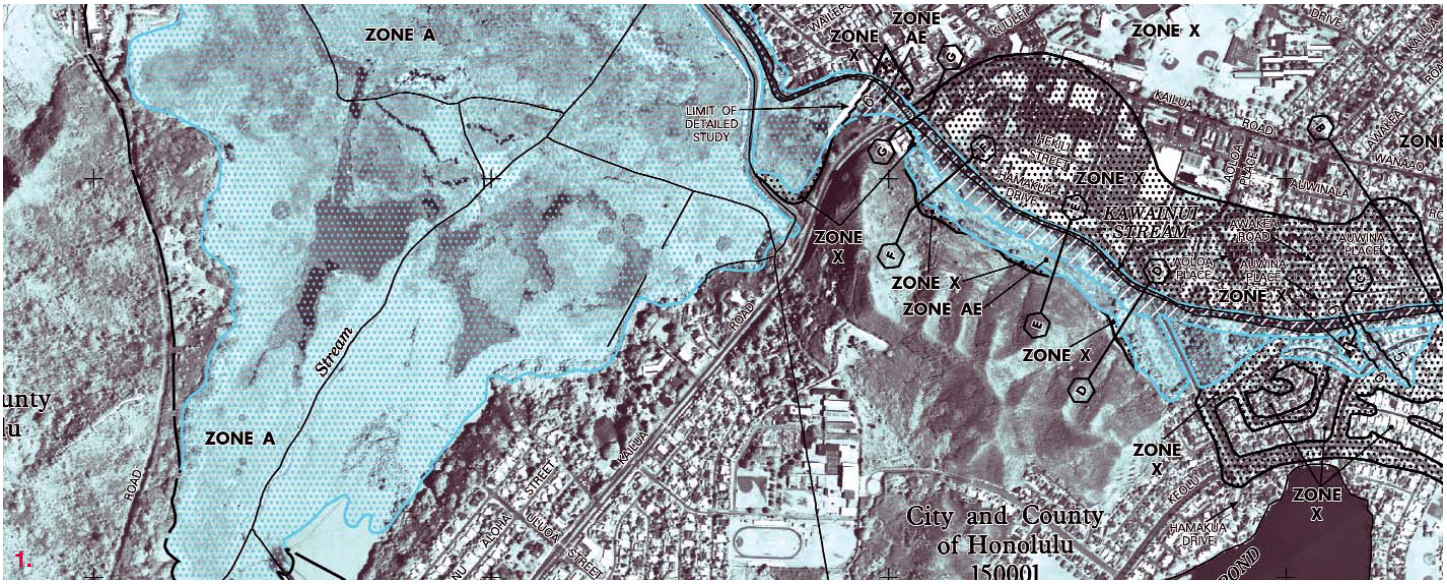

FEMA Flood Maps Go High Tech

Ever since Mesopotamian civilizations engineered high, earthen walls to prevent flooding some 6,000 years ago, humankind has been concerned with the science of hydrology. The significance of the science is no different today, as increasing numbers of people live in flood plains or near streams. Today, hydrologic studies with regard to flooding are a concern of homeowners, developers, property insurance companies, counties, cities and the Federal Emergency Management Agency (FEMA). Since 1982, the R.M. Towill Corporation (RMTC) has performed many FEMA flood insurance studies in Hawai'i upon which these parties rely. (Before then, RMTC performed flood insurance studies as a consultant to the U.S. Army Corps of Engineers.) Ongoing digital map modernization work showing flood classifications of land is making it easy for anyone to access FEMA maps on the Internet. Read on to see how flood insurance studies may affect your real estate interests and how to access FEMA maps.


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1. Available online, a Digital Flood Insurance Rate Map (DFIRM) for the Kailua area shows flood zone areas of Kawainui Marsh and stream. **2.** Kawainui Stream, which has been studied by RMTC, as seen on the ground. **3.** Kawainui Marsh and Stream affects adjacent property.

The Basis for Flood Insurance, Building Permits

If you own property in a flood plain or near a stream and want to build a house, refinance one or renovate, there are two reasons FEMA's Flood Insurance Rate Maps (FIRMs) are important, RMTC Hydrologist James Yamamoto, PE, relates. First, banks and mortgage companies want to know if a property in question is in a flood plain. If it is, then flood insurance is required. Flood insurance rates are determined by FIRMs. Secondly, if a property is in a flood plain, the base flood elevation determined by a flood study, preferably a detailed one prepared by FEMA, is required to obtain a building permit. A flood study allows the governing county to determine how high the "finished floor" of a structure should be built.

(Continued on back.)

FEMA Flood Maps (Continued)

In certain areas, no study has been conducted, or the area may be classified as Zone A, which means the area is in a flood zone, but the flood hazard has not been clearly defined. Zone A areas trigger higher insurance premiums because of the unknowns. Counties want detailed flood studies done in unstudied and Zone A areas. They ask the State to petition FEMA to do studies. FEMA, in turn, hires engineering companies like RMTC to perform the flood studies.

Currently, a RMTC/URS joint venture (involving RMTC, URS, Dewberry, TerraPoint, Airborne1 and Sea Engineering) provides flood study data development and mapping for Hawai'i, Guam, American Samoa, the Commonwealth of Northern Mariana Islands and Pacific Trust Territories using hydrologic methods recommended by FEMA, the U.S. Army Corps of Engineers, the local government and recognized local experts.


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4. RMTC studied Hagåtña Swamp in Hagåtña, Guam
5. Nu'uanu Stream has also been studied by RMTC for FEMA insurance maps.

The most extensive flood insurance studies in Hawai'i by RMTC covered 23 streams on O'ahu. To perform such a study, hydrologists estimate how much storm water runoff there will be in a 100-year and a 500-year flood. Flood studies often use RMTC's resources in photogrammetry, a measurement technology which uses two or more photographic images to determine three-dimensional coordinates to create topographic maps and surveying, which, in turn, provide detailed measurements of streams and bridges. Once the amount of water from a 100-year and 500-year flood is determined, engineers use standard hydraulic methods approved by FEMA to determine the width of the flood plain and flood elevations.

FIRMs Go Digital

Digital Flood Insurance Rate Maps, or DFIRMs, are making maps accessible to everyone. FEMA is currently working on a Map Modernization initiative. DFIRMs combine detailed satellite images with flood zone information. Like FIRMs, DFIRMs are used to calculate insurance premiums and establish flood risk zones and base flood elevations to mitigate against potential flood damage to properties. "Before, you really had to hunt for a specific map


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[and request it from the State]," says Yamamoto. "Now, you just type in your street in FEMA's Map Service Center webpage." RMTC/URS Joint Venture Partners Dewberry and URS are creating DFIRM maps for FEMA with RMTC assistance. One possible glitch to the digital maps is changing street names. "The Commonwealth of Northern Mariana Islands called and said, 'your maps are completely wrong—all the street names are wrong,'" related Yamamoto of the DFIRMs created for the tiny islands. "When we went there, we found out that [the winner of their gubernatorial election] gets to change all the street names after the election."

To access FEMA maps, visit *www.fema.gov* and select "maps" in their search engine located on the bottom left. Then, click on "Find a flood map online" to go to the Map Service Center, where you can enter an address. The site allows you to download a "FIRMette," or small version of a map at no cost (see photo, page 1). According to FEMA's website, a FIRMette has the same legal status as a full sized map.

But in spite of the advances in technology, an important part of hydrologic studies is still on the ground and done physically by hydrologists, just as the Mesopotamians must have done it millennia ago. RMTC's Yamamoto would agree that the human element—using the on-site observations of a hydrologist—is indispensable, and surely makes the work performed at RMTC unique beyond the purely technical. "You want to become familiar with the streams you are studying," says Yamamoto, who has personally done a lot of footwork. "You walk the streams."

808 842 1133 www.rmtowill.com
R. M. Towill Corporation
420 Waiakamilo Road Suite 411 Honolulu Hawaii 96817-4941

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