Following the Fault

Dispatches from along the East Bay's geological time bomb

By Timothy Lesle

Mention California's natural disasters, and the first thing that comes to mind is the "Big One." California has had its share of earthquakes, but only one has made it into America's history books: the Great San Francisco Earthquake of 1906. That devastating temblor and the fire that followed destroyed the city by the bay, killed upwards of 3,000 people, and took its place as one of the most famous catastrophes in history.

As a result, the San Andreas is the best known of the faults that slice the coastal margin of California. But in the Bay Area, it isn't considered the most dangerous. That dubious honor goes to the Hayward Fault. The Hayward is the dark horse of California faults, far lesser known and, at about 45 miles in length, a mere fraction of the size of the gargantuan 800-mile San Andreas. But two million people live along the Hayward Fault and millions more in the region rely on the roads, railways, and water pipes that cross it.

In 1868, a major earthquake took place on the Hayward Fault — the original "Great San Francisco Earthquake" until the monstrous 1906 event. But there hasn't been a large quake on the Hayward since then, and in the meantime, the East Bay's infrastructure and population has grown and grown. But the longer an active fault like that goes without a significant quake, the more pressure builds up. It turns out the average interval between the last five large quakes on the Hayward fault is roughly 140 years. This October marks the 1868 quake's 140th anniversary.

This is not good news for Bay Area residents like me. I decided to learn more — and in the process, make this threat more real — by taking a closer look at the fault. Last fall, Phil Stoffer, a U.S. Geological Survey scientist, gave me a guided tour.

Downtown Hayward,
10:30 a.m.

A grand city hall sits in downtown Hayward. It's abandoned. Stoffer peered through one of its glass side doors and showed me one reason why: a crack whips across a ceiling and down a wall, an inch wide at some points. Hayward City Hall, built in 1930, is located directly on top of the Hayward fault. As one section of the ground beneath us slides past the other, the building is slowly pulled apart.

Although this building is unused, many others around it are not. Some geologists call the fault a "tectonic time bomb," but Stoffer expressed his estimation more bluntly: "It's scary as shit."

The Hayward fault runs as deep as seven miles underground, but it doesn't behave the same way at all depths. The sections of earth along the top three miles of the fault tend to move constantly, creeping past one another a few millimeters each year. Over decades, the fault has left behind signs of its movement like a set of seismic footprints. Stoffer followed the fault through Hayward: he walked past a straight sidewalk where half the cement squares were nudged an inch off track relative to the other half, around buildings with walls that bent like funhouse mirrors, over curbs and gutters that veered off course. But the real threat lies further below ground, beyond that three mile mark, where the blocks of earth on either side of the fault don't slide and get

stuck — this is where the stress for a big quake is building up.

Back on the surface, the tracks led us into a small sign shop. I asked the woman behind the counter, whose family had run the business for 18 years, what she thought of working directly above the fault. "It's a concern," she said, "but what are you going to do?"

Lake Temescal,
Oakland, Noon
Lake Temescal is at the northern end of a valley nestled among exclusive hillside neighborhoods that rise behind downtown Oakland. The fault runs beneath the valley, and contributed to its formation.

We found the lake, a light layer of fog still hanging over it, hemmed by trees and looking like an old Hudson River School painting. But we had no luck finding signs of active creep, as we had in Hayward.

The USGS has traced the Hayward fault's movement and put the results on Google Earth, where you can follow a series of bold red lines along much of its length. At Lake Temescal, the line peters out, replaced by a timid little thread, tracing where it probably is.

"It's a tough game to find creep movement," one USGS scientist told me. But finding that movement is important, because the rate at which the ground creeps on either side of the fault gives an indication of how much stress the fault is releasing. Some segments of the fault move faster than others, releasing more stress and affecting the amount of local damage during an earthquake.

Stoffer and I looked over the placid surface of the lake.

"This would be a good place to come after a major earthquake," Stoffer said as we returned to his car. "At least you'd have water."

The Claremont Resort and
Spa, Berkeley, 1:30 p.m.
Finding the fault as it ran past the shimmering white Claremont also proved difficult. That a force for destruction like the Hayward fault should run under one of the most exclusive and historic institutions in the Bay Area makes for a nice illustration of what's at stake.

But the destruction wrought by an earthquake will be widespread and affect the less affluent populations that live in the flatlands of the East Bay as well. In those areas, particularly near the edge of San Francisco Bay, the bedrock begins to give way to looser sediments and mud, which amplify shaking. A stark demonstration came in the 1989 earthquake, when the upper level of the 880 freeway in Oakland collapsed onto the lower level, crushing 42 people. The section that collapsed was built over bay mud.

At the Claremont, Stoffer didn't find much solid evidence of movement. In front of the entrance, he tested one of the valets on his seismic literacy and asked if he knew where the Hayward fault was located.

"Doesn't it run through Cal Stadium?" the valet answered.

Stoffer gestured past a pair of Mercedes sedans to a point about 50 yards from the Claremont's entrance. "It's right there!" he said. The valet smiled politely.

"It's classic," Stoffer told me soon after. "He works there and he doesn't even know."

Cal Stadium, 2:30 p.m.
It is notoriously difficult to find parking near the Berkeley campus, so Stoffer played his trump card with the lot attendant at Memorial Stadium.

"I'm a geologist," he said. The attendant shrugged and let us in.

We climbed to the topmost row of wooden bleachers at the stadium's southwest end. Behind the bleacher was a cement wall, the rim of the stadium. It was split into two pieces, leaving a vertical gap wider than a fist.

"That," Stoffer said, "is probably the most famous spot on the Hayward fault."

The gap is actually an expansion joint that the fault has capitalized on. Still, the thought that this massive stadium, all 73,000 seats of it, is being pulled apart is amazing. The possibility that it might be pulled apart another three feet in an instant verges on the incomprehensible. And the chances that this could happen during a sold-out home game seem astronomical — until I remember that the 1989 Loma Prieta earthquake struck just before a World Series game with packed bleachers at Candlestick Park.

The fault continues northwest past the campus, across Euclid in the Berkeley hills, along Arlington Road in Kensington. It continues further north until, at Point Pinole, it plunges under the water of the San Pablo Bay.

If the Big One hits the Hayward Fault, there will be impassible roads, interrupted water supplies, damaged transit systems, and ruined homes — including, quite possibly, Blake House, the official residence of the president of the University of California system, bound on two sides by traces of the fault and sitting in the middle of a known landslide zone.

While predictions are essentially a guessing game, a new analysis estimates property losses due to a repeat of the 1868 quake at $165 billion. That number accounts only for losses from shaking, and doesn't include possibilities like fires, looting, disrupted business, and lost wages. As for casualties, a top seismologist told me one expectation is for one in a thousand people to die. That suggests that out of two million people in the vicinity of the fault, two thousand might die.

But not today. Stoffer and I left Berkeley, the East Bay, the Hayward Fault, and headed toward the San Francisco Peninsula. As we approached the upper deck of the Bay Bridge — the one that collapsed so famously in 1989 — Stoffer said: "All right. Let's hope the Big One doesn't hit in the next five minutes." We drove over the bridge fast. B

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