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The First Four Minutes

A Timeline of Portland's Upcoming Cataclysmic Quake

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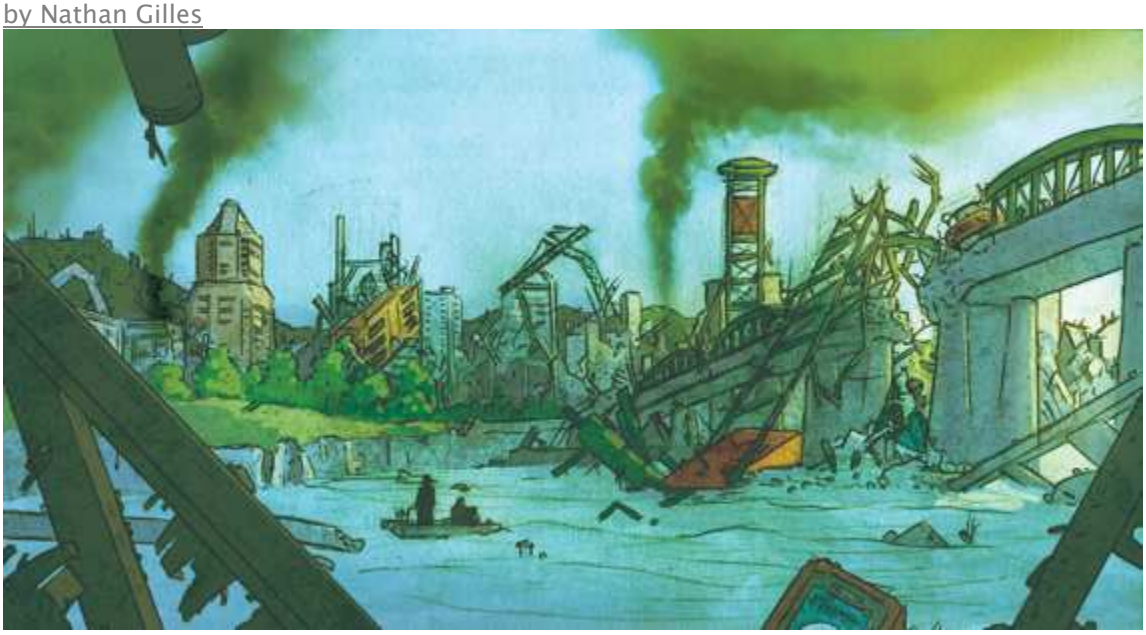

SUNDAY, MARCH 11, marked the one-year anniversary of the earthquake and tsunami that devastated Japan. For many Oregonians, this was our wake-up call. We learned there's a good chance that in the next 50 years the Pacific Northwest will be hit by an equally large quake. Even more sobering, we learned that, unlike the Japanese, we are woefully unprepared for our catastrophe. If the "Big One" were to happen tomorrow, nearly all of the Portland's bridges would be heavily damaged (and potentially useless), the power is expected to be out for weeks if not months, telecommunications networks won't work, the state could lose nearly all of its liquid fuel supply chain, water and sewer systems would be wrecked, and thousands could die. While it's impossible to know exactly what our killer quake will look like, after talking with numerous scientists, engineers, and emergency planners, we think we have a pretty good idea. Our scenario—a 9.0 earthquake very similar to the one that occurred in Japan—is fictitious, but make no mistake, fellow Portlander: This could happen to you.

Minute Zero

It's 9:30 am on a sunny Thursday morning in late May. Because of the nice weather, you have decided to get off the bus early and walk along the riverfront just before heading into work in your downtown office. And it's a good thing, too. This decision will save your life. You are standing in Waterfront Park when the first wave zooms past you like a phantom. Fifteen seconds later, slower, more powerful seismic waves wash in from the Oregon coast in an undulating pattern. That's when you notice the shaking.

Just off the coast, pressure that has amassed between the region's tectonic plates for more than 300 years has hit its breaking point. The entire coastline, from Northern California to Vancouver Island, is now riding the energetic deluge of a 9.0 earthquake that will last for just four minutes, but the effects of which will be felt in the Northwest for decades to come.

From your spot in Waterfront Park, as you attempt to stay upright on the rippling ground, you watch as Portland crumbles.

10 Seconds Since the Shaking Started

You hear a deep rumbling all around you. Car alarms go off everywhere.

Looking down, you see cracks form in the pavement. Across the city, garden walls of stone and stacked brick collapse. The city's wood-frame houses—most of which will hold up in the quake—lose many of their chimneys. In this way, Portlanders luck out. If the tectonic rupture had come in the winter, when the chimneys were in use, those wood-frame houses would have burned.

20 Seconds

The electricity goes out. It will stay out for the next two months. Portland hospitals immediately switch to back-up power, as does the airport.

45 Seconds

Unsecured eaves, parapets, and other decorative features start falling from buildings. You watch as an overhang cripples a woman huddling underneath it for protection.

One Minute

The rumbling sound has cascaded into a deafening, cacophonous white noise of alarms, collapsing buildings, and screams.

During the next two minutes, as the shaking continues, Portland's most brittle buildings, including many historic structures, are severely damaged or destroyed. In the weeks that follow, your fellow Portlanders will tell you engineers had warned that these un-reinforced buildings are "killers" in major quakes. Today, they live up to their reputation. All across the city, un-reinforced masonry buildings shed their outer walls onto streets and sidewalks; passersby are badly hurt, some are killed. In the buildings themselves, one in five people die.

Many un-reinforced concrete and cinderblock buildings are also reduced to rubble. Across the river several Southeast Portland warehouses cave in. A cloud of concrete-and- brick dust engulfs the city. You cover your mouth, using your shirt as a makeshift mask.

Two Minutes

Unbeknownst to you, on hillsides—still highly saturated from the winter rains—landslides begin, taking houses and their foundations with them. Roads are buried. Portland's West Hills are the worst hit.

Across town, teachers evacuate students from structurally deficient schools. The drills they have performed dozens of times save many, as do the schools' seismic upgrades. But not all the children are so lucky. Many are injured and some die when their schools buckle and fall down. Children who do survive wait outside on playgrounds, where teachers and administrators will work for weeks to reunite them with their families.

As the powerful quake continues to pummel the city, the intense energy begins to resonate in Portland's steel-frame high-rises, transforming them into oversized tuning forks. You watch as the tops of these buildings sway back and forth; the effect is mesmerizing. The same phenomenon also strikes the city's bridges.

The first to go are the bridges' on- and off-ramps. As seismic engineers observed in Chile's 2010 earthquake, the tops of overpasses wobble off their columns. They drop in sections, stacking on one another like fallen dominos. In the next two minutes, following Oregon Department of Transportation's (ODOT) predictions, almost all of Portland's concrete ramps and

raised highways are dangerously weakened or fall down from the shaking. The Fremont Bridge—which holds its own against the incoming seismic forces—nonetheless loses its ramps to the earth's convulsions. Sections tumble onto a Portland Bureau of Transportation building. Drivers smart enough to stop in the middle of the bridge are stranded.

In the Willamette Valley, fallen overpasses riddle I-5, blocking aid to the city from the south. In Portland, you watch raised sections of I-5 give way and crash to the ground.

Three Minutes

Portland's iconic bridges—St. Johns, Broadway, Steel, Burnside, Morrison, Hawthorne, Ross Island, and Sellwood—are all damaged or destroyed.

Inside steel cages high atop the Hawthorne, the Steel, and the I-5 Bridge to Vancouver, massive counterweights used to raise the bridges start to swing uncontrollably. Moments later, the incredible force tears the structures apart. From where you stand, you watch the Hawthorne Bridge succumb to this fate.

Having undergone severe stress to its anemic foundation, the St. Johns Bridge isn't useable again for years.

The Ross Island Bridge completely collapses, plummeting into the Willamette along with a number of unfortunate morning commuters. The Sellwood and its daily users come to the same end.

Only the Sauvie Island and Marquam Bridges hold firm against the seismic storm.

Morrison and Burnside are both heavily battered when the harbor wall they rest on bursts in sections and plunges into the river.

You watch as water seeps from the park's grass, collecting in pools. You think it must be a broken water main, but then you notice what look like miniature volcanoes made of sand forming all around you. What you are seeing is a phenomenon called liquefaction, which not only forces ground water and sand to the surface, but also makes once-solid sediment behave like quicksand. In the ground just below you, liquefaction is placing intense pressure on Portland's aging harbor wall, which here and there begins to bulge, crack, and tumble into the

Willamette River. As this happens both the Morrison and even the seismically retrofitted Burnside are ruined, while half a mile away, the Broadway Bridge's foundations are enveloped by the liquefying ground. Inspectors from Multnomah County will later declare the bridges dangerous and unusable.

In other parts of the city, liquefaction is forcing up not only groundwater, but also sewer and water pipes. Small ponds form in Portland's streets, while in Old Town, what's left of the Shanghai Tunnels fill with raw sewage.

The most catastrophic effects of liquefaction happen north of you, just past the Fremont Bridge in the seven-mile stretch that forms Portland's Northwest industrial section. There, aging docks as well as a vulnerable pipeline are used to import almost all of Oregon's liquid fuel and natural gas. Massive tanks holding the precious supply sink into the ground. The pipeline, which carries gasoline, diesel, and jet fuel from Puget Sound, crumples like tinfoil while several docks descend into the river.

In the same area are a series of high-voltage transmission towers including some that carry electricity from Bonneville Dam. One by one they are knocked off balance and crash to the ground.

North of town, Portland International Airport has gone into emergency mode. The Federal Aviation Administration has closed both the Portland and Seattle airports. The airwaves fill with chatter as air-traffic controllers redirect incoming flights to airports as far away as Denver and San Francisco. Out-going flights are grounded on the cracking runway.

Four Minutes

The shaking stops. All around you hear the eerie sound of buildings creaking and cracking as they settle.

Immediately following the earthquake, you try to call your partner on your cell phone. It doesn't work. The building housing the fiber optics that run the city's phone traffic has collapsed. People hoping to rely on satellite phones find the network jammed from increased demand. In the following weeks, services will come back online, but they will be reserved for emergency personnel. It will be three weeks before you make another call.

Unable to reach friends and family by phone, Portlanders rush to their cars and bikes. Men and women in orange reflecting vests, who are setting out traffic cones, stop them at the city's bridges. Following emergency protocol, the employees from Multnomah County and ODOT close the bridges for spot inspections. With the majority of the city's bridges either in the Willamette or barred from use, the mass exodus soon turns into a mass traffic jam. Hours later, frustrated drivers abandon their vehicles. In the coming weeks, bikes will be the best way to get around.

18 Minutes

Oregon's coastal communities are being slammed by a tsunami. The towns of Seaside, Newport, and Astoria are hit hard by the deadly 30-foot wave. Residents and vacationing Portlanders who didn't make it to high ground are dragged into the Pacific Ocean to drown. Also carried out to sea is a building housing the fiber optic hub that carries phone and internet traffic to Asia and New Zealand. The tsunami reaches Portland six hours later, a mere ripple of what demolished the coast. Only houseboat residents notice.

30 Minutes

The ground is shaking again. Measuring at magnitude 8.0, the first aftershock feels like another earthquake, and your heart starts to race. You panic, thinking to yourself: Is it happening again? Already pummeled and frail, buildings are hit for the second time. Many that were standing now capitulate to the beating and come down. The aftershocks continue in the hours, days, and months ahead of you. Every time you feel them, your pulse quickens, but the aftershocks become fewer, more spaced out, and less intense as time goes on.

40 Minutes

In Salem, the Oregon Office of Emergency Management is being turned into a control room for coordinating relief efforts for the entire state. With conventional communications down, authorities and first responders turn to ham radios.

One Hour

Governor John Kitzhaber declares all of Western Oregon a natural disaster area. The governor of Washington, Chris Gregoire, does the same for her state. The Federal Emergency Management

Agency (FEMA) follows soon after, declaring the entire 600-mile stretch of the tectonic region you learn is called the Cascadia subduction zone—virtually all of the Pacific Northwest—a natural disaster area.

Throughout Portland, firefighters—who have been able to do their job because city officials had the forethought to fortify the majority of their stations—are overwhelmed, rushing to put out fires only to discover water pressure is spotty due to cracked and broken pipes. However, the water system, with its multiple redundancies, proves to be fairly resilient. Relying on gravity-fed water from the Bull Run River Reservoir, firefighters have just enough pressure to put out many blazes in the low-lying sections of the city. West Hills residents however, who rely on electric pumps (which do have back-up power), but whose roads have already been blocked by landslides, watch as their homes burn.

All across the city, first responders are overwhelmed. Communications are down and scores of residents are trapped in buildings. Many responders choose to check on their own families first. For the better part of the next three days, you and your fellow Portlanders are on your own. Helped out by those nearest to them, city residents flood Portland hospitals. Cut off from your home and partner in Southeast, but uninjured, you walk to the nearest grocery store where you fight others for bottled water and dried food. (You think about swimming across the Willamette, but the piles of wreckage clogging the river change your mind).

Two Hours

With supplies in hand, you head back to the waterfront.

Three Days

The Portland Bureau of Emergency Management, which together with the Red Cross is coordinating relief efforts in town, has turned Portland's parks into relief camps. In Waterfront Park, the Red Cross has set up large tents, and some citizens have brought their own. (You've stolen your tent and supplies from a nearby camping store.) You're watching walking-wounded and worn-out Portlanders—and it looks like Occupy Portland gone horribly awry. In the park, the city and the Red Cross have set up counseling services for the bereaved. Elsewhere city officials and the Multnomah County medical examiner search for suitable places to put the growing pile of corpses. (A 1999 study by the Oregon Department of Geology and Mineral

Industries estimates 186 deaths in Multnomah County alone. The study's author, Yumei Wang, says this number underestimates what the actual death count will be).

Food and water have been brought in. Unfortunately the water is just for drinking—not for bathing. Needless to say the park carries the smell of over-ripe humans... yourself included. And there is another pungent odor. There are some porta-potties in the park, but you and your fellow Portlanders, like the New Zealanders who survived the 2011 Christchurch earthquake, have learned to keep two buckets nearby, one for piss and one filled with sawdust for shit. You learned the hard way that you should cover the second bucket.

Four Days

The National Guard and FEMA arrive with relief. The Guard sets up inflatable bridges to transport emergency vehicles over the Willamette. City officials—who have been working with barge operators and the captain of the *Portland Spirit* to shuttle emergency crews across the river—now use these boats to transport citizens.

Six Days

You make it back to Southeast, only to find your apartment building is in ruins. You walk several miles to a friend's place where, luckily, you are reunited with your partner.

Two Weeks

ODOT has successfully removed most of the debris from the I-5 corridor, opening the road to relief efforts.

Two Months

Following earlier predictions by the Bonneville Power Administration (BPA), electricity is finally back. Having the lights on again allows you to avoid that nagging question: Why am I still here? You have watched many of your friends and family leave the city. The economy has shut down, and finding work is nearly impossible. But for some reason you stay. In the decades to come, you help Portland slowly rebuild from what will be known as the greatest natural disaster in American history.

Post Mortem

At this point you probably want to know what exactly happens next—how long it will take Portland to recover, and how many will die. Unfortunately, we just don't know. And we aren't going to speculate. But the general consensus is that given the age of the city's homes and businesses (and accompanying infrastructure) many won't hold up in a 9.0 earthquake. The speculation we've done is all based on estimations from bureaus and oversight agencies. For instance, we used estimates by BPA's Leon Kempner to determine when the power will go out and when it might come back. But here's the thing: Most agencies have made their own assumptions. BPA's model assumes roads will be immediately usable, which contradicts ODOT's assumption that I-5 will need to be cleared. What it all means is this: Our grim tale assumes the best possible response to a terrible situation. When the Big One hits, we might not be so lucky.

Sources:

Yumei Wang (Oregon Department of Geology and Mineral Industries), Allison Pyrch (Shannon & Wilson), Kent Yu (Oregon Seismic Safety Policy Advisory Commission), Dave Thompson and Bruce Johnson (ODOT), Mike Pullen (Multnomah County Communications Office), Rick Carter and J.R. Gonzalez (Oregon Public Utility Commission), Leon Kempner (BPA), Lt. Damon Simmons (Portland Fire Department), David Shaff (Portland Water Bureau), Carmen Merlo (Portland Bureau of Emergency Management), Jennifer Chamberlain (Oregon Emergency Management), James Roddey (Oregon Red Cross), Harry Yeh and Pat Corcoran (Oregon State University), Mike Fergus (Federal Aviation Administration), Matt Shelby (Portland Public Schools), Mike Kubler (Providence Medical Center), Mary Fetsch (TriMet), Aaron Hunt (Union Pacific), Carol McCreary (PHLUSH).

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