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Tacoma officers who were acquitted in Ellis' death will leave department

By **PATRICK MALONE**
Seattle Times staff reporter

TACOMA — Three Tacoma police officers who were acquitted last month of killing Manuel Ellis reached settlements totaling \$1.5 million to walk away from their jobs after an internal investi-

gation largely cleared them of wrongdoing.

Officers Matthew Collins, Christopher Shane Burbank and Timothy Rankine had been on paid leave since June 2020. They've already collected about \$1.5 million in pay, received multiple raises

and accrued hundreds of hours of vacation time since they last worked, city payroll records show.

Collins, Burbank and Rankine will each receive \$500,000 settlements to leave their employment with the city of Tacoma, according to settlement documents dated

Jan. 11 that were released publicly on Tuesday. According to a city spokesperson, in addition to the settlement, they will be paid out for vacation time as well as 10% of their sick time. They'll also keep their pensions.

See > **OFFICERS, A7**

Worries of regional conflict intensify

MIDEAST | Red Sea attacks continue, even after massive U.S. strikes.

By **LOLITA C. BALDOR**
AND **JON GAMBRELL**
The Associated Press

WASHINGTON — A barrage of U.S., coalition and militant attacks in the Middle East over the last five days are compounding U.S. fears that Israel's war on Hamas in Gaza could expand, as massive military strikes failed to stall the assault on Red Sea shipping by Yemen-based Houthis.

Even as the U.S. and allies pummeled more than two dozen Iran-backed Houthi locations on Friday in retaliation for attacks on ships, the Houthis have continued their maritime assaults. And Tehran struck sites in Iraq and Syria, claiming to target an Israeli "spy headquarters," then followed that Tuesday with reported missile and drone attacks in Pakistan.

The chaotic wave of attacks and reprisals involving the United States, its allies and foes suggested not only that last week's assault had failed to deter the Houthis, but that the broader regional war that the U.S. has spent months trying to avoid was becoming closer to reality. And

DEAL would deliver medicine to hostages > A3
See > YEMEN, A5

Northwest innovators are mixing up and building with greener concrete



KEVIN CLARK / THE SEATTLE TIMES, 2023

Saul Hernandez controls the pour of C-Crete at Hubbard's Corner, a century-old brick building near Green Lake, in October. C-Crete excelled in strength tests on-site, said Don Davies, co-founder of green-construction consultancy Davies-Crooks Associates.

By **MIKE LINDBLOM**
Seattle Times staff reporter

PULLMAN — From a onetime speakeasy in North Seattle to a modern lab in the Palouse, inventors are testing recipes that make concrete less lethal to Earth's climate.

Most people understand that the world's 1.4 billion fossil-fueled cars and trucks spew carbon dioxide, trapping heat in the atmosphere. We're not so aware of the environmental toll of concrete in highway pavement, or within dams, pipes, towers, stadiums, garages and transit stations.

Concrete generates 8% of manmade carbon emissions. They're produced mainly by chemical reactions in the worldwide production of Portland cement, a dry compound containing limestone. Cement binds with water, sand and rock to form concrete.

"We are not going to solve the overall global warming problem without solving the concrete problem, and we do not have very long," said Phil Northcott, founder of C



KEVIN CLARK / THE SEATTLE TIMES, 2023

C-Crete inventor Rouzbeh Savary bills the material as "cement-free." It does not use CO₂-intensive kilned limestone.

Change Labs in Coquitlam, B.C., which models carbon dioxide emissions to help builders choose cleaner materials and methods.

Fortunately, most of the technology and ingenuity already exists, he said. What's missing is the business case for action.

Washington could become a proving ground, because of local products, continued

building construction and the state's voracious appetite for concrete.

Low-CO₂ products are appearing first in surface roads, sidewalks and buildings. Potentially, they could be used someday in bridge spans and columns that must withstand earthquakes. Sound Transit is embarking on the nation's largest rail transit expansion, requiring up to 62 miles of concrete beams, trackbeds and tunnels, as well as concrete parking structures.

Already, some concoctions are getting a tryout.

Cream-colored walls at the Seattle Storm's future practice facility in Interbay contain granulated slag from steel-mill furnaces, as do the landmark Amazon Spheres downtown, as a means to use less Portland cement. Natural minerals bind basement foundations at a 112-year-old brick building near Green Lake. A Microsoft data center in Central Washington contains algae as a substitute for limestone.

"I'd argue that Seattle is the most innova-

See > **CONCRETE, A6**

Climate act repeal effort closer to making ballot in November

By **CONRAD SWANSON**
Seattle Times climate reporter

Organizers of an effort to repeal the 2021 Climate Commitment Act collected enough signatures to move forward toward the November ballot, the Secretary of State's Office announced Tuesday, checking another box for the Republican-backed measure.

The act, Washington's landmark climate change policy, requires the state's top polluters to pay for their greenhouse gas emissions by buying allowances at quarterly auctions, which began last year. So far the auctions have raised an estimated \$1.8 billion.

The repeal effort, Initiative 2117, will now go to the state Legislature, which could adopt it into law, unlikely for a statehouse with a Democratic majority. Otherwise the General Assembly could propose an alternative ballot measure to appear alongside 2117 or allow the repeal effort to appear by itself on the November ballot.

See > **REPEAL, A10**

New coach takes over Husky football team in rebuild mode

WELCOME | Days after playing for national championship, UW sees major roster turnover.

By **MIKE VOREL**
Seattle Times staff reporter

Eight days after Washington played for a national championship, Jedd Fisch took over a different Huskies team.

At 10:59 a.m. Tuesday, the 47-year-old Fisch followed UW president Ana Mari Cauce and athletic director Troy Dannen to a make-shift stage inside Husky Stadium,

through a path of cheerleaders with waving pom-poms and a booming marching band. He sat facing Lake

Washington, which glistened underneath an overcast Seattle sky, as well as the east end zone — where a video board declared in bold white type:

WELCOME, JEDD FISCH
Washington's welcome party consisted of dozens of alums

See > **FISCH, A16**



JENNIFER BUCHANAN / THE SEATTLE TIMES

Jedd Fisch, new University of Washington head football coach, speaks during a news conference Tuesday at Husky Stadium in Seattle.

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FROM THE FRONT PAGE

< Concrete

FROM A1

Concrete market that there is, and there's some pretty cool stuff going on," Rob Shogren, regional technical director for Lafarge's giant cement works in South Seattle, told an industry forum. Lafarge operates a laboratory here and produces reduced-carbon mixtures.

Washington State University scientists even say they've invented a "carbon-negative" cement in which fine-grain black biochar, made from plants, captures carbon from the air.

Washington accounts for about two-thousandths of global greenhouse gas pollution.

Time is critical. "Life on planet Earth is under siege. We are now in an uncharted territory," warned a recent report, co-authored by Oregon State University scientists. Earth's atmosphere has heated 2 degrees Fahrenheit since the Industrial Revolution, on course to surpass 2.7 degrees, reported the Intergovernmental Panel on Climate Change.

Concrete jungle

Since the early 1800s, modern builders have relied mainly on Portland cement, named after a stony isle in the English Channel, that inventors found to be stronger than brick mortar for many purposes. Annual cement production totals 4.2 billion tons, or nearly 1,000 pounds per human.

Limestone (calcium carbonate) and clay are crushed and heated to 2,700 degrees. A chemical reaction releases carbon dioxide, while more emissions result from firing the kiln with natural gas, oil or coal. This combustion produces gray, calcium-rich pebbles called clinker, ground alongside gypsum into powdery cement.

Can something cleaner do the job?

These days, inventors are thinking about the Roman Empire, which built the Colosseum, domed Pantheon and dock pilings using volcanic pumices called pozzolans, that harden in H₂O without releasing CO₂.

New natural and synthetic pozzolans are competing for attention, and research grants. A common pozzolan this century is fly ash, a by-product of coal combustion, but supplies are dwindling in North America.

Cougar Gray

WSU is experimenting with biochar, an organic fertilizer discovered by ancient farmers in Africa and the Amazon basin who heated wood and plant debris. It's available from hundreds of suppliers for agricultural use, to add into soil, said professor Xianming Shi. In concrete, it can capture and store carbon from the air, he said.

The alchemy occurs in the PACCAR Environmental Technology Building, five minutes' walk from the creamery that makes Cougar Gold cheese.

Biochar has been tried before but it weakens cement, limiting proportions to 3%. Shi's team in Pullman devised a 30% mixture. Shi's team soaks biochar in wastewater from concrete-making for an hour, then heats it 11 hours at 140 degrees, causing beneficial calcium deposits to form. This "conditioning" of biochar adds strength, while recycling plentiful alkaline wastewater from concrete, or other industries, Shi said.

"You're basically using this carbon-negative material, to replace carbon-rich material," he said.

Inside the lab, students in white jumpsuits poured biochar-infused cement, gravel and water into a mixer, stabbed the slurry with a shovel, and poured it into molds.

That afternoon, the team fractured a set of 28-day-old sample bricks, using a standard pressing machine, and



KEN LAMBERT / THE SEATTLE TIMES

These massive concrete structures on the Seattle waterfront are being built with a locally produced concrete that emits 25% less carbon than older mixtures.

A recipe for carbon negative concrete

Washington State University scientists soak and bake their new concrete mixture, so biochar within the batch will capture carbon dioxide (CO₂).

How concrete is made

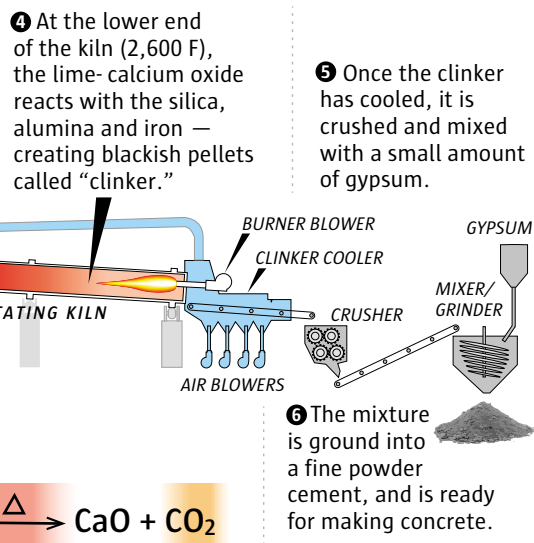
Concrete requires mixing cement (a binder) with sand and gravel in a specific ratio with some water.



Cement and CO₂

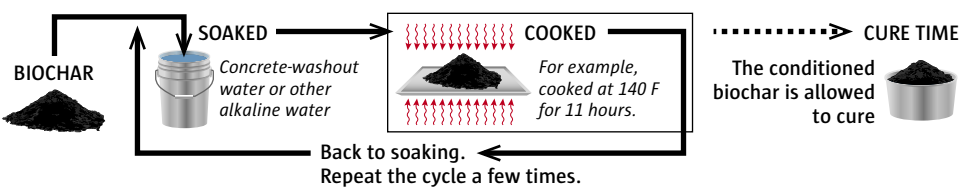
- Standard Portland cement is made by crushing and processing limestone (mainly CaCO₂), silica, alumina, and iron — creating chemical compounds.
- The compounds are ground and blended through either a wet or dry process.

- Once processed, the materials are run through a rotating kiln. Calcium carbonate is heated to 1,112-1,652 F. CO₂ is released as lime-calcium oxide (CaO) is formed.



Biochar: A CO₂ absorbing additive

Most biochar is made from plant trimmings, food processing residues and forestry cuttings. WSU is developing a method of repeat soaking and cooking to prepare biochar for use in concrete.

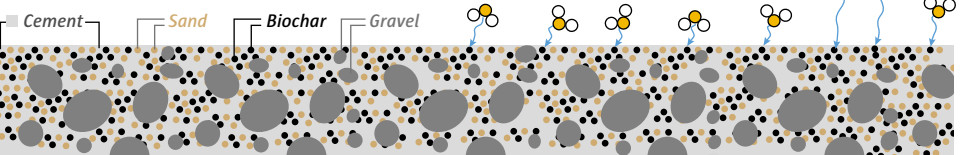


After the biochar has cured, it is added to the concrete mix.



A concrete mix containing 15% to 30% of alkaline conditioned biochar will:

- Reduce the CO₂ released because the mixture contains less Portland cement.
- Absorb and store CO₂ from the air while the concrete cures over 28 days and then more slowly over 30 years.



Source: Xianming Shi and Li Zhipeng, WSU-Pullman scientists. Reporting by MIKE LINDBLOM, graphic by MARK NOWLIN / THE SEATTLE TIMES

logged the data in a black book.

Sample bricks withstood 660 pounds per square inch lateral force before they broke, and 5,000 psi compression, which meets worldwide standards for roads and buildings, said Shi, a chemist who heads WSU's civil engineering department.

WSU plans to build an experimental road with support from the Spokane Tribe of Indians and state Department of Commerce in 2025. Workers will pour three pavement slabs using biochar mixes, and a control slab with conventional concrete, Shi said. The city of Pullman has agreed to host "low-risk" biochar concrete tests on public sidewalks, parking lots or streets.

Green Lake, green building

In Seattle, new C-Crete, billed as "cement-free," was poured this fall into a brick building called Hubbard's Corner, constructed in 1912 next to Green Lake. Along with alumina and silica, C-Crete features natural pozzolans or steel slag, instead of CO₂-intensive kilned limestone, said inventor Rouzbeh Savary.



MIKE LINDBLOM / THE SEATTLE TIMES

Fine-grained biochar, an ancient fertilizer made by heating plant debris with low oxygen, is being repurposed as a carbon-lowering ingredient of cement at Washington State University.

Crews sprayed the soggy mix and rushed to smooth the surface, while sidestepping an abandoned coal furnace, in the basement where people drank booze downstairs during Prohibition. Masons described wet C-Crete as slipperier and grainier than standard concrete.

The C-Crete excelled in strength tests on-site, with-

standing up to 7,000 psi, said Don Davies, co-founder of Davies-Crooks Associates, a green-construction consultancy, with his wife, Joan Crooks. Eventually, C-Crete will excel in girders and columns that require high seismic strength and steel tensioning, he predicted, after the product is refined and proven in simpler

construction.

"We have to walk before we can run, and this project is the ideal situation to do just that," said Davies, former president of Seattle-based structural engineering company Magnusson Klemencic Associates.

A different shipment of C-Crete, poured into three housing foundations in the Magnolia neighborhood, crumbled in places, so Savary paid for replacement concrete.

He said later that some C-Crete mixed on-site was too watery. This issue will be solved by mixing it in a batch plant, where proportions can be precisely measured, like at Hubbard's Corner, he said. Between both Seattle sites, "five out of six of our pours were extremely good," he said.

Greg Avedesian, developer of the Magnolia homesites, said he's willing to try C-Crete again for a single unit after it succeeds elsewhere. "There's more learning needed on this stuff," he said. "I am for the product, still."

Another blend, Seattle-based Greener Concrete, substitutes zeolite from volcanic sediments, displacing half the Portland cement. Zeolite is mined from soils in the Mojave Desert, where ancient oceans deposited shells and crustaceans, a source of calcium. The crystalline, pozzolanic compound requires no heat treatment, which saves energy, said co-founder Dan Uhm. "Basically, you're talking about Roman concrete," Uhm said.

University of Washington scientist Brandon Lou has been mixing and crushing small cubes of zeolite concrete in the UW Materials Science & Engineering lab. Magnified 7,000 times, the cross-sections reveal a molecular garden, where crystals of calcium hydroxide grow into what looks like six-sided armor plates.

A zeolite mix with C-Crete was poured last fall to build a storage yard at Hubbard's Corner, and Western Interlock manufactured 3,800 zeolite paving stones in Oregon, for uses such as patios.

Northwest experts say the main hurdles are supply chains and startup costs to make new cements in industrial-size quantities. And the risk-aversion of civil engineers, especially in transportation, to be first adopters.

"What we are finding is, that nobody truly cares about lower-CO₂ concrete or concrete products, unless it is cheaper," Uhm added.

UW's Carbon Leadership Forum has devised a calculator, co-sponsored by major employers, to help builders choose cleaner materials and methods.

Storm of innovation

Some Seattle landmarks already contain low-carbon blends.

Slag-filled concrete is so bright, at the Storm's site in Interbay, the team won't apply paint. "When you get a sunny day, this wall is blinding. You've got to put sunglasses on," said Sarah Carlson, project manager for Sellen construction, watching more truckloads arrive from Stoneway Concrete.

As long ago as 2013, Stoneway poured a cleaner concrete, containing a 50% slag cement, in the giant Highway 99 tunnel south portal, said Greg McKinnon, general manager of Stoneway.

Then the Amazon Spheres in 2018 averted 80% of CO₂ emissions, touted worldwide by Swiss giant Holcim, which supplied the concrete from its Lafarge plant on the Duwamish River.

The Elliott Bay seawall replaced three-fourths of the usual Portland cement with slag, fly ash and microsilica, McKinnon said.

The Seattle Aquarium expansion and new Alaskan Way — "practically everything you see on the waterfront," he said — contain Type 1L, which replaces

some clinker with straight limestone powder, lowering emissions one-quarter. It's accepted by 48 states, and commonly used by the Washington State Department of Transportation, he said.

Many inventors large and small hope to accomplish more than a one-fourth carbon reduction.

Oregon startup Solid Carbon is redirecting processed sewage, to form a biocharlike ingredient replacing sand. The concrete does contain Portland cement, but biosolids compensate by absorbing CO₂. That strategy, to capture carbon in admixtures, differs from WSU's quest to imbue biochar with binding properties.

Solid Carbon supplied three Habitat for Humanity houses in Gig Harbor, and Remy Wines in Dayton, Ore., among others. "We're going 100 miles an hour, and if we had more material, we'd be selling it," CEO John Mead said.

Worldwide, the most promising product is limestone-calcined clay cement, said UW/Carbon Leadership Forum senior researcher Jordan Palmeri. A soft white clay called kaolin, traditional in ceramics and paper, is cooked to 1,400 degrees. The reddish residue binds to powdered limestone, so makers can replace half the carbon-emitting clinker.

That benefit, along with non-fossil fuels, leaner concrete structures and reuse of buildings, could slash emissions 75%, Swiss scientist Karen Scrivener told the Rocky Mountain Institute, a clean-energy think tank.

"What's important is to act now. It's no good to wait for some miracle solution that comes along in 50 to 100 years time, because by that time, we've already got a lot of global warming," said Scrivener, who is leading international adoption of calcined-clay concretes, especially by India.

To succeed, low-carbon concrete technologies must be doable on a global scale, said Northcott, the expert from C Change in British Columbia. The best strategy is to rebuild cement-factory kilns, to pipe their carbon dioxide waste directly into the ground, he said. It's doable in regions near oil wells, but not Puget Sound, he said.

Natural pozzolans, mined in bulk, also show the potential to create widespread environmental improvements, he said. Northcott is less bullish on ingredients like biochar, which require extra production steps, and may be limited to niche uses.

"If the right technologies are deployed and scaled, concrete emissions could fall by a factor of 10," he said. New inventions do create a risk of "greenwashing," where advocates push wasteful projects or ineffective materials, he said. "There are many ways to hose ourselves."

UW's Palmeri emphasized: "If we didn't have as much demand for concrete, we would also be solving the problem, more effectively."

Counting carbon

Even though Sound Transit has advertised clean, electrically powered light rail since 1995, experts there have only recently turned attention to the carbon emissions to build its own projects.

Builders at the Puyallup Station Park-and-Ride garage reduced CO₂ nearly one-fourth at no extra expense, using Type 1L, as in the aquarium and other local projects. Sound Transit will require garage builders at Auburn and Sumner to reduce carbon 35%, and is looking for incentives to perform even better, sustainability director Amy Shatzkin said.

Denis Martynowych, senior sustainability planner and designer, said parking structures were a prudent place to start. "A parking garage has about eight different mixes, while a Link [light rail] extension has 20-plus