



ASCE 2019 Hawaii Report Card

Aviation: C-
Coastal Areas: C-
Dams: D
Drinking Water: D+
Energy: C-
Roads: D+
Schools: D+
Solid Waste: C
Stormwater: D-
Wastewater: D+

Flooding in Mapunapuna
PHOTO COURTESY CHARLES FLETCHER

Service Life of Hawaii's Infrastructure Waning?

Experts weigh in on problems and solutions facing the Islands' roads, bridges, dams and more

BY PRISCILLA PÉREZ BILLIG

Aging and failing. Old and inadequate. Mediocre and poor. Infrastructure experts use these words to sum up the current condition of structures and facilities that keep Hawaii operating. They also offer solutions they see to make Hawaii run better.

A 2019 report card offered by the American Society of Civil Engineers (ASCE), representing more than 150,000 civil engineers nationwide, graded Hawaii's infrastructure at D+.

"Overall, Hawaii's infrastructure is in poor to fair condition," ASCE Hawaii Section President Dayna Nemoto-Shima says in a June interview. "Most of Hawaii's infrastructure was built decades ago and is reaching



Dayna Nemoto-Shima

the end of its service life. The average American household loses \$3,300 a year, or \$275 a month, in disposable income due to poor infrastructure."

Most state-regulated dams were constructed as part of irrigation systems during the rise of the sugarcane industry. Many are nearly 100 years old. Hawaii's bridges are, on average, 60 years old—significantly older than the national average of 43 years old, she adds.

Nemoto-Shima says age, lack of funding and sea-level rise are all placing stress on the state's infrastructure.

"Lack of funding results in reduced preventative maintenance, backlogs in repairs and deferred capital projects," she says. "Due to inadequate funding, it has been difficult to effectively maintain and improve Hawaii's infrastructure systems to keep up with increasing usage and rapidly changing lifestyles."

Pressure on existing operations will

only increase, Nemoto-Shima says.

"As population, economic growth and development increase, the strain on Hawaii's infrastructure will continue to escalate, with many of its infrastructure systems struggling to stay in operable condition. Water main breaks, flood water damage, loss of property from coastal erosion and beach and park closures from brown water advisories are all results of deteriorating infrastructure," she says.

To find an answer, ASCE supports an "all options on the table" approach, Nemoto-Shima adds.

"Continued strategic and comprehensive planning, prioritization of limited resources and robust funding to support necessary maintenance, repairs and improvements are needed," she says. "New approaches, materials and technologies are needed to modernize and extend the life of the existing infrastructure, expedite repairs and replacements and ensure it is more resilient to quickly recover and reduce impacts from significant weather and other hazard events."

Rising Tides

Sea level has risen about eight inches since the 19th century and has had an enormous impact all around Hawaii and, in fact, around the world.

“We know the roads running up the Windward side of Oahu, the road to Lahaina and roads on every island are being undermined and at certain times of the year they are being overwashed



Charles Fletcher

by waves and high tides,” says Charles Fletcher, associate dean for academic affairs at the University of Hawaii School of Ocean and Earth Science and Technology and chairperson of the Honolulu Climate Change Commission.

“We’re in a very difficult situation that is getting worse. Our coastal roads are only one of many forms of human assets and infrastructure and aspects of our community that we need to reimagine in a different world where we either live with water or retreat from the coastline so we can avoid the problem.”

Fletcher adds that projections for future sea level rise indicate 12 inches by 2050, and a little over three feet by the end of the century—a global average.

“Hawaii is going to see more sea level rise than the global average. We are



A section of Kamehameha Highway collapsed last year in Hauula due to wave runup.

PHOTO COURTESY HDOT HIGHWAYS

projected to see over four feet of rise by the end of the century, at a minimum.”

The single largest component of today’s sea level rise—about 38 percent—is thermal expansion of the ocean, Fletcher says. “That is happening because the ocean is absorbing heat from the air. For the ocean to come into equilibrium with the air temperature will take over a thousand years.

“So we are looking at essentially a permanent sea level rise,” he says, “unless we are able to pull carbon



Work continues on the Kapalama Container Terminal, Hawaii’s largest modernization project. PHOTO COURTESY HDOT HARBORS

dioxide out of the air to levels below the Industrial Revolution.”

Fletcher suggests that to pull carbon dioxide out of the atmosphere a network designed for that job should be implemented.

“Not only have we not taken a step down that road, but we are deforesting parts of the planet which do that job for us,” he says. “We are eliminating an extremely important partner in negating climate change and that is the forests. Over the last decade the Amazon rainforest released more greenhouse gases than it absorbed because of drought, wildfires and logging.”

Wicked Weather

Panos Prevedouros, UH professor of transportation engineering, says Hawaii’s infrastructure has not aged well in a wet and corrosive environment, and is currently insufficient for over 1 million residents and the additional load from tourism. He says power is his biggest concern.

“Our base-load plants are old and located in inundation zones. Tsunamis, hurricanes, other storms, sea level rise and renewable mandates are major threats to reliable power generation. The rail and added electric vehicles will further stress power production and grid reliability,” Prevedouros says.

“On the positive side, our airports and harbors are in better operational shape, and under substantial upgrading.”

Considering the challenges to fixing infrastructure problems in Hawaii, Prevedouros says there is a “lack of

quality data, lack of know-how, lack of risk assessments, lack of understanding cost-effectiveness and lack of leadership in both government and industry.”

His criticism is even harsher for the Honolulu Authority for Rapid Transportation (HART) as a remedy for transportation congestion. He points out that until a couple of years ago, the airport viaduct was full of dangerous cracks with a lot of rain and salty air leading to concrete deterioration.

“The rail guideway, which is a mix of concrete and reinforced and pretensioned steel, will have major issues of spalling and rusting a couple of decades in the future, as well as several of our older concrete buildings, particularly beachfront hotels,” Prevedouros says.

“HART was a bad idea at \$4.6 billion. At over \$12 billion, it is infrastructural suicide. The taxpayer funding of this project could have helped make Oahu far more energy-resilient



Panos Prevedouros

TRIP, a national transportation research nonprofit, rates:

- Oahu interstate system’s pavement condition: No. 1, worst in the nation
- Rate of congestion: 9th worst in the nation
- Rural roads: 32 percent in poor condition
- Rural bridges: 9 percent poor/structurally deficient condition, the 17th highest rate in the nation

and infrastructurally secure. HART will be useless in terms of traffic congestion relief and environmental benefits, even if the city's pie-in-the-sky 2008 ridership forecasts come true ... in 2031."

Finding the Funds

Andy Boyd, GPRM Prestress president, says he sees deferred maintenance—across the board, whether state or counties—as infrastructure's biggest problem.

"There will never be enough money," Boyd says. "Coordination between entities, particularly on Oahu, seems to be a challenge."

Peter Savio, owner of Solar Power Solutions, says we may be looking at the symptoms of the problem, not the problem.



Peter Savio

"The problem is not infrastructure," he says, "but a failure of responsible leadership, a failure of proper planning. Our political leadership has failed us."

Joshua Magno, director of programs for the Pacific Resource Partnership, which represents the Hawaii Regional Council of Carpenters and more than 240 contractors, says Hawaii state and counties have worked to make investments to improve infrastructure across the state, but it has been challeng-

ing to fund major improvements.

"While there have been small strides in minor road repairs and repatching, major infrastructure projects like the state Airport Modernization Project, the Ala Wai and rail have been delayed and struggle with funding or community opposition," Magno says.

He says the government, federal, state and county, should continue to support developments and projects

that provide affordable homes and rentals in communities across the state.

"Another key component of that," he adds, "is to also support the infrastructure that goes along with housing development—sewer capacity, utilities, broadband internet."

A core piece of President Biden's American Jobs Plan, the INVEST in America Act, has passed in the House and heads for the Senate (as of publication). The \$715 billion bill would fund transportation and water infrastructure.

The bill calls for spending \$343 billion on bridges, roads and safety over five years. It represents a 54 percent increase in current funding and would focus on fixing existing roads and bridges. The bill includes:

- \$14.5 billion to reduce carbon pollution and for mitigation and resiliency, including use of green construction materials,
- \$4 billion to install electric-vehicle charging stations, and
- \$3 billion to reconnect communities split by highways.

The bill also calls for \$168 billion for water and sewer infrastructure, \$109 billion for public transit and \$95 billion for passenger and freight rail.

Honolulu has identified over \$5 billion in infrastructure needs, Kauai requires \$174 million for current deficiencies and future needs and Maui needs \$310 million over the next 20 years for source development and transmission improvements, according to the ASCE. 🏠

ASCE-suggested tools that can help with decision-making include:

- **Asset management systems and infrastructure master plans.** Delivers routine and reliable data on inventory and condition of assets to help develop a clear picture of where the available funding is needed most.
- **Life cycle cost analyses.** Determines the total cost of infrastructure for its expected useful life to help make more informed decisions and improve long-term performance. Analyses include not only the initial costs to design and build a project, but also the costs for ongoing operation and maintenance, and end-of-life decommissioning.
- **Provide a holistic, consistent and consensus-based framework for assessing sustainability, resiliency and equity in civil infrastructure.** Robust asset management programs, infrastructure master plans and life-cycle analyses can help ensure that limited dollars are spent efficiently on multi-benefit projects.



Joshua Magno



Overwash during the 2016 El Niño event
PHOTO COURTESY STEVE BUSINGER