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pipeline in summer 2020, the YVWD will distribute potable water to the development for irrigation purposes.

The district's WRF includes an integrated fixed-film activated sludge process followed by microfiltration and disinfection by means of ultraviolet light. In 2014, the district added a reverse-osmosis (RO) unit to treat a portion of the WRF's effluent in order to comply with strict requirements for reducing total dissolved solids levels in its discharges to the environment.

With the RO system in place, the YVWD realized that it had "crossed a threshold" in terms of what could be done with the highly treated effluent from the facility, says Joe Zoba, the district's general manager. "There was a lot of community acceptance and understanding of how safe that membrane barrier really is," Zoba says. "That was a game changer." Against this backdrop, using recycled water for irrigation "starts to make a lot sense," he says.

Currently, about half the effluent from the WRF enters the district's recycled water distribution system, and the rest is discharged to a local creek. The facility produces on average 2–4 mgd of recycled water, depending on the season; demand is higher in summer and lower in winter.

For its part, the district is planning to expand its RO capabilities in order to treat the WRF's full 8 mgd capacity. This additional capacity will be needed as more homes are built in Summerwind Trails and other areas served by the YVWD. As potable water use increases, more wastewater will flow to the WRF, which in turn will produce more recycled water. Eventually, the district could engage in direct potable reuse after 2022, when California is expected to issue regulations for the practice. However, the YVWD would not rely on direct potable reuse unless absolutely necessary, Zoba says. "It wouldn't be our go-to for day-to-day operations," he notes. "It would be more of a fallback operation."

In the meantime, the YVWD is also developing an aquifer storage and reuse

program that will entail recharging two local groundwater basins with excess recycled water that has undergone RO treatment. When needed, the stored water can be retrieved and returned to the district's drinking water facility for treatment. "That will be important for us," Zoba says.

The Summerwind Trails developer owns the rights to approximately 1,400 acre-ft/yr from the groundwater basin beneath the planned community. These rights are being transferred to the YVWD in exchange for the district serving the entire project's water supply requirements. "That is more than sufficient for the indoor potable water use" anticipated within the development, Zoba says. As a result, the large new residential community will not "squeeze" water sources already relied on by ex-

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isting local residents and businesses, he notes.

The YVWD's growing reliance on recycled water is just the latest effort by the district to diversify its water sources and become better prepared to handle drought and other untoward events. During the 1990s, the YVWD relied almost exclusively on groundwater for its drinking water supply. In 2002, the district connected to California's State Water Project, gaining access to imported water and enabling reduced groundwater pumping operations. Even with the recent drought that plagued much of California, the levels of the groundwater basin on which the district relies are at "historic highs," Zoba says.

—JAY LANDERS

STRUCTURAL SAFETY

CROSS Program Models U.S. Structural Safety Reporting on Confidential U.K. System

A CONFIDENTIAL system for reporting issues and incidents regarding structural safety—and for learning the lessons from such reports—has been launched in the United States by ASCE's Structural Engineering Institute (SEI). The system, known as CROSS-US (for Confidential Reporting on Structural Safety-United States), was modeled after a similar program in the United Kingdom, CROSS-UK. The website-based CROSS-US system went into operation July 1 and can be accessed at cross-us.org.

As the CROSS-US website explains, reports about structural safety "are welcome from anyone involved in the building, bridge, and civil engineering industry, including structural engineers, civil engineers, designers, contractors, clients, inspectors, maintenance and operation teams, project managers, local authorities, statutory authorities, and government." In addition, anyone with "an interest in structural safety" can also submit a report.

The reports are submitted confidentially, and after all personal details or other information that could be used to identify the project, the product, or the people involved are deleted, they are reviewed by a panel of structural engineering experts. The goal of CROSS-US is not whistle-blowing, naming names, assigning blame, or starting legal actions, explains Andrew W. Herrmann, P.E., F.ASCE, Pres.12.ASCE, a principal emeritus at Hardesty & Hanover LLP, based in New York City. Instead, the system is designed to "give the engineering profession a chance to find out about these mistakes and learn from them," Herrmann notes. Given the state of litigation in the United States as well as restrictions imposed by insurers, "it's kind of hard sometimes to find out about failures, errors, near misses—they're really not publicized," says Herrmann, who helped establish the CROSS-US system. That system should "get this [information] out to people so we don't make the

REPORTS GATHERED WORLDWIDE FOR HUB DATABASE



same mistakes twice—or three times!” Herrmann stresses.

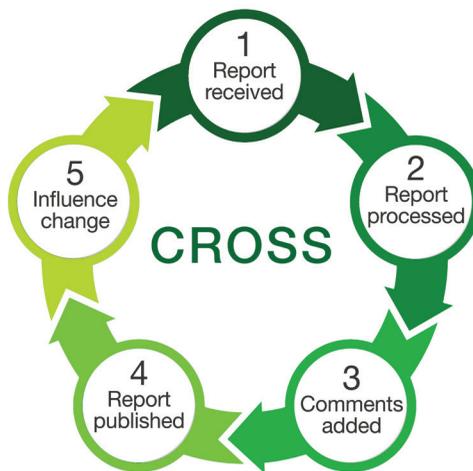
“Learning from failures has been a passion of mine for close to four decades now,” notes Glenn R. Bell, P.E., S.E., CEng, F.ASCE, FIStructE, a senior principal at Simpson Gumpertz & Heger, based in Waltham, Massachusetts, and the incoming president of SEI. Bell was in London a few years ago when he met Alastair Soane, Ph.D., CEng, FICE, FIStructE, the director of Structural-Safety, the nonprofit organization that formed CROSS-UK in 2005. CROSS-UK was itself based on the United States’ Aviation Safety Reporting System developed by the National Aeronautics and Space Administration (NASA). Learning that Soane wanted to expand the CROSS-UK system internationally, Bell formed a working group that included Herrmann and started exploring how to bring the confidential reporting system to the United States.

Describing the U.S. system as essentially a “clone” of the U.K.’s version, Bell notes that certain legal distinctions and differences in terminology between the countries had to be accommodated—the British use the word “fixings” for what American engineers call fastenings, for example. But otherwise the CROSS-UK approach was largely adopted intact.

When reports are submitted, Bell and Herrmann provide the first review, deleting any identifying information and, when necessary, seeking additional or corroborating details. While confi-

dential, the reports cannot be submitted anonymously. The CROSS-US leadership must be able to verify the accuracy of the submitted report, though the identifying details of the person who submitted the report—called the reporter—are later deleted. A CROSS-US panel of experts

HOW CROSS OPERATES



then reads the report and provides comments; the “deidentified” report itself and the panel’s aggregated comments will later be published online and/or in a planned quarterly newsletter, says Bell. Photographs, drawings, PDFs, and other attachments can be submitted with the initial report. If a series of reports is received on similar topics and a trend is detected, then an announcement known as an “alert” may be published.

The CROSS-US panel of experts includes representatives from a range of organizations and disciplines, including

government agencies, private industry, and academia. But Bell hopes the panel can eventually add members, especially people from the geotechnical field and certain federal agencies.

The topics of the reports can vary significantly, from problems detected during the design and construction phases of a project to the operation and ongoing maintenance phases, weather-related damage to a structure, or even issues concerning the appointment of consultants or contractors. “Small-scale events are important as they can be the precursors to more major failures,” notes the CROSS-US website. “No concern is too small to be reported and conversely nothing is too large.”

But the website stresses that reports should not focus on criminal activities, ongoing legal proceedings, personality conflicts, industrial relations disputes, or even occupational health and safety issues. Instead, the relevant police or regulatory bodies should be contacted about those issues.

For the CROSS-UK organization, 14 years of submitted reports have produced a track record that can be instructive for those involved in the new United States version. “In the early days,” says Soane, “some of the reports were about fairly minor matters.” Over time, however, the system has attracted reports about major events—structural collapses, for instance—or concerns that something *might* go wrong. Reports about potential problems are a critical part of the process, Soane notes, because publishing information on such a report might prevent a similar incident from occurring.

To date, the CROSS-UK system has collected some 800 reports in its overall database—called the Hub—and published roughly 450 of them in its quarterly newsletter, Soane says. Of those totals, roughly one-third involved structures during their design phase, another third focused on structures during construction, and the final third covered existing structures. The majority of people who submit reports are structural engineers, Soane adds, and often they are also “quite senior people within the industry.” This can include “a board director who’s found something within

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their own company, sorted it out internally, but also wants to report it so it's more widely known for the benefit of the profession and the benefit of the public," Soane explains.

The CROSS-UK system was an outgrowth of an earlier system known as the Standing Committee on Structural Safety (SCOSS), which dates to 1976. Unlike CROSS-UK, however, SCOSS does not seek out new information that had not been previously reported, Soane explains. Both SCOSS and CROSS-UK are sponsored by the United Kingdom's Institution of Structural Engineers, the Institution of Civil Engineers, and the Health and Safety Executive, a government body.

A May 2019 review of the work of SCOSS and CROSS-UK during the period of January 2017 to December 2018 outlined the impacts of the two organizations, including the influence they have had on various professional organizations in the United Kingdom as well as the owners and operators of various infrastructure. In particular, CROSS-UK case studies are widely disseminated, and other safety reporting systems have been modeled on the CROSS-UK approach, the review found. Starting in 2020, the Institution of Structural Engineers will also "strongly" recommend that its members study CROSS-UK and SCOSS reports as part of their continuing professional development as well as demonstrate that they are using CROSS-UK and SCOSS reports as part of their personal development plans, Soane notes.

In addition to the new CROSS-US, the CROSS system has also expanded to Australia, Germany, and southern Africa.

To prepare for the launch of the CROSS-US system, Bell and Herrmann practiced on simulated reports with a CROSS-UK staff person. In the first weeks after the system went live in the United States, the American team received some initial reports that "fell outside the structural scope" of what the organization is prepared to address, says Bell. For example, one report dealt with visibility issues for a transportation system but did not involve anything structural. But more recently the organization has received reports that "are on target—we'll work with those," Bell says. True to the CROSS-US promise of confidentiality, however, he would not discuss any details.

—ROBERT L. REID



Park Celebrates Mobility

The design of the Mullin Automotive Park in Oxfordshire, England, United Kingdom, has cleared the first round of vetting, known as outline planning permission, by the West Oxfordshire District Council. The project, designed by London-based Foster + Partners, features a museum and cultural destination dedicated to automobiles. A brownfield site—namely a disused airfield—would be rehabilitated as part of the project, which also seeks to embrace and celebrate green spaces and the countryside. The automotive park was inspired by the design of English country estates and includes a collection of buildings arranged in a crescent within a landscaped setting, similar to many rural homes in the United Kingdom. The main buildings would be accessed by a series of curving roads that can also be used to "exercise" the cars in the collection as part of their maintenance. A small number of buildings, including a ticket office and cafe, would be located at the entrance of the site and would be within walking dis-

tance of the park's main buildings within the grounds. A central museum located on the crescent would host an open-ended collection of cars, focusing on the changing face of mobility from the past through the present and into the future, according to material distributed by Foster + Partners. The site would also host 28 lodging options, nestled beneath the tree line, for car enthusiasts. A portion of these would be adjacent to the museum, along the curve of the crescent, while the remainder would be located elsewhere within the grounds, according to the March 11 report by the head of planning and strategic housing for the West Oxfordshire District Council. Parking, car repair and servicing, and corporate entertainment facilities would also be located within the grounds. The buildings would be oriented to maximize thermal performance, and passive and renewable technologies would be used to minimize on-site energy consumption, according to Foster + Partners. With the approval of the design's concept, a more detailed design scheme will be developed.