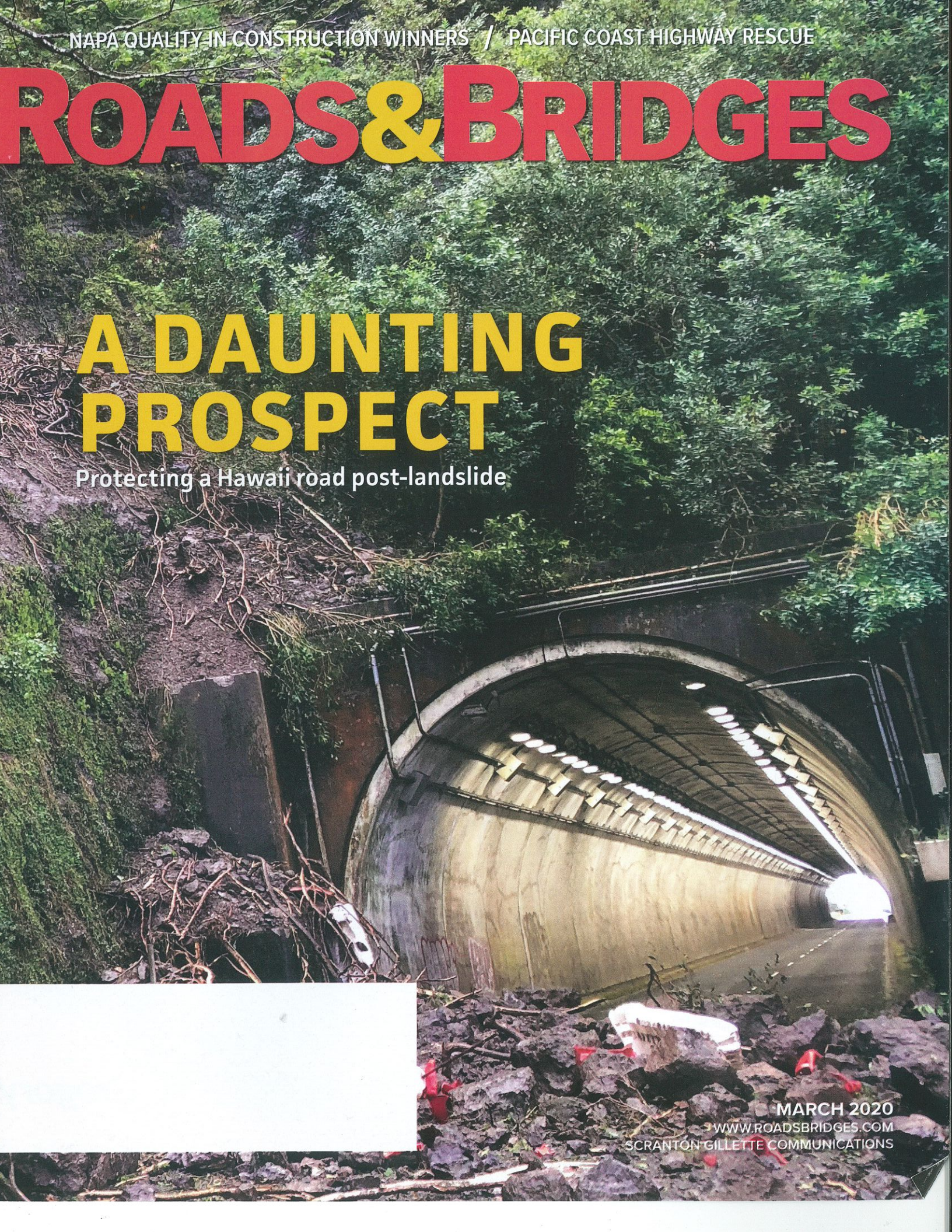


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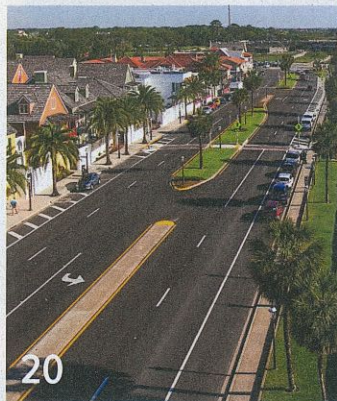
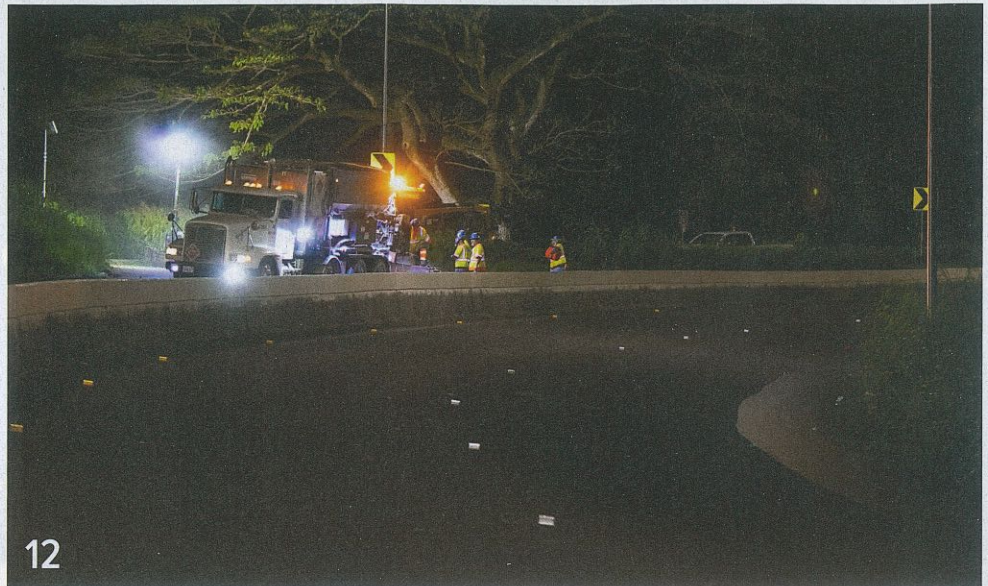
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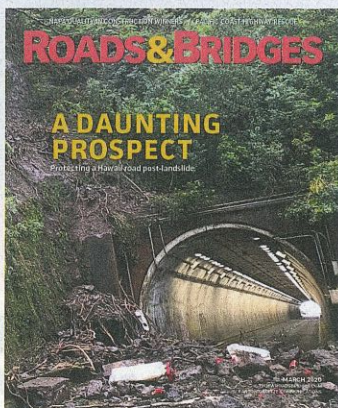
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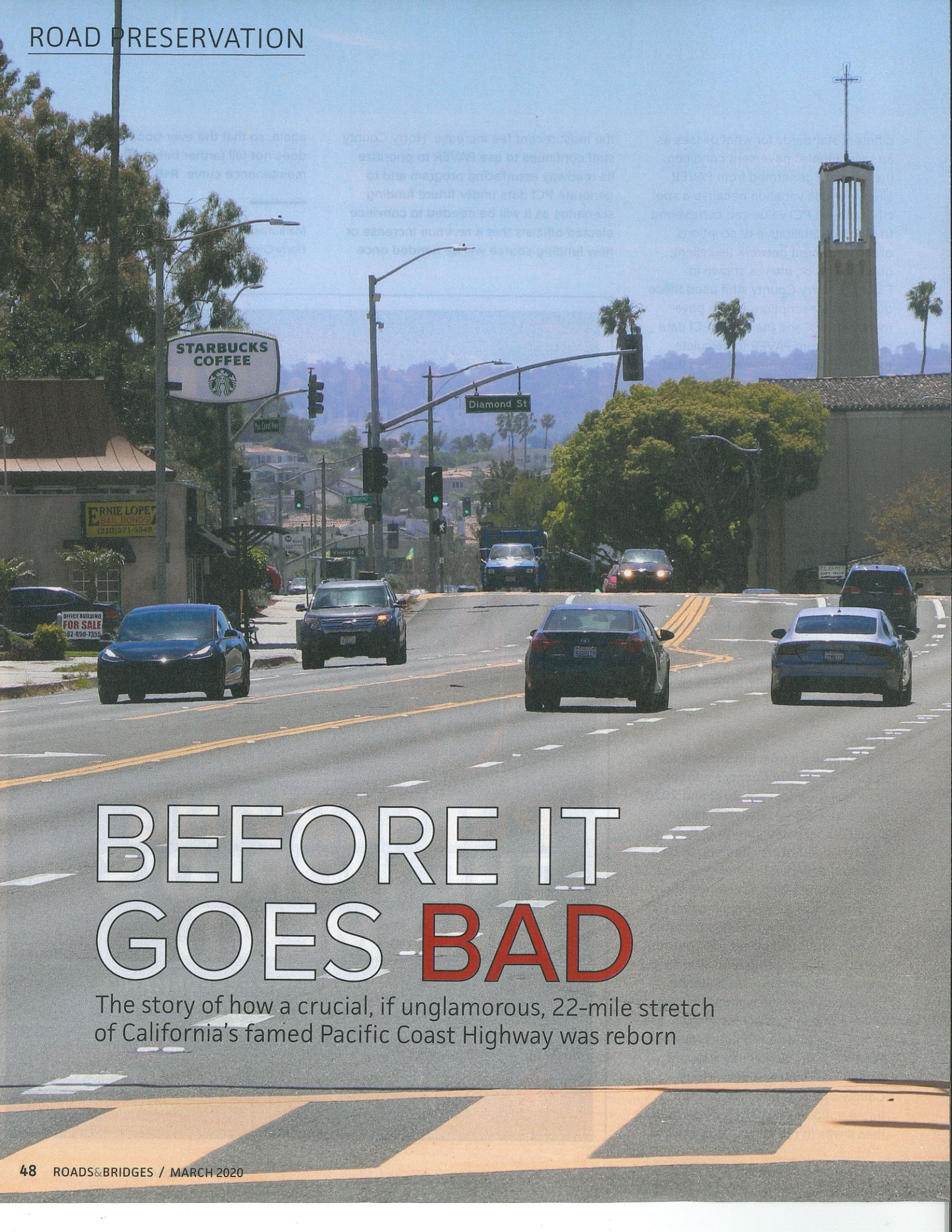


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ON THE COVER
Photo courtesy of Hawaii DOT



BEFORE IT GOES **BAD**

The story of how a crucial, if unglamorous, 22-mile stretch of California's famed Pacific Coast Highway was reborn

By Jeff Roberts, Contributing Author

► **EVERY YEAR MILLIONS OF PEOPLE TRAVEL THE ICONIC HIGHWAY 1, ALSO KNOWN AS THE PACIFIC COAST HIGHWAY, STRETCHING ALONG THE WESTERN COASTLINE OF CALIFORNIA.**

The words “Pacific Coast Highway” or “PCH” are synonymous with one of the most beautiful stretches of highway ever constructed in the U.S. It opened in the late 1920s as part of the Roosevelt Highway, a 1,400-mile road that traced the West Coast. It was the first U.S. highway linking the Mexican and Canadian borders.

However, not all of the Pacific Coast Highway is surrounded by scenic ocean views and rising mountain landscapes. There is a less glamorous, but more frequently traveled 22-mile section of Highway 1 stretching through the heart of Los Angeles County from Seal Beach north all the way through Manhattan Beach. It serves as a major commercial artery as it winds its way up through the industrial port of Long Beach, the upscale Palos Verdes peninsula, and the Redondo Beach and Hermosa Beach communities.

This 22-mile stretch serves as a vital arterial roadway for Los Angeles County, carrying more than 70,000 vehicles per day, spanning to a width of 7-8 lanes, and consisting of more than 130 lane-miles of pavement surface. It services an incredibly diverse group of users and has tens of thousands of affected businesses within immediate proximity of its travel lanes. In addition to being a major commuter route, this section of Highway 1 serves as the primary conduit to local oil fields, as well as one of the largest industrial ports in the world, The Port of Long Beach, which employs more than 5,000 people locally. Annually, the port handles over 6 million container units, or 82 million metric tons of cargo, valued at approximately \$180 billion. Much of this freight is transported in and out of the port by thousands of tractor-trailer trucks that utilize the Highway 1 corridor 24 hours a day, seven days a week.

In 2017, Gov. Jerry Brown approved the SB-1 Transportation Funding Bill, which is scheduled to invest \$5.4 billion annually, or approximately \$54 billion over the next decade, to repair and maintain California’s roadways. The bill also calls for the creation of a “Road Maintenance and Rehabilitation Program” to address deferred maintenance on the state highway system as well as the local street and road system. The bill required the adoption of performance criteria to ensure the efficient use of funds

available for the program.

The California DOT (Caltrans) has decided to take a progressive approach of applying a pavement preservation strategy now, while a road is in relatively good shape, instead of letting the road deteriorate over time to the point that it would require more expensive rehabilitation efforts later—to wit: “Putting the right treatment on the right road at the right time.”

The contract to preserve this section of PCH was awarded to VSS International Inc. at \$5.6 million, making it one of the largest pavement preservation contracts ever awarded by Caltrans. The treatment chosen for this section of Highway 1 was a Type III slurry seal application, which due to its being coarser allows for a heavier application rate that will help address and correct more severe surface defects and improve skid resistance under very heavy traffic loads. What set this slurry seal apart from typical slurry seals was the requirement that the materials be placed at night during the cooler coastal conditions found adjacent to the Pacific Ocean. This was mainly due to the heavy daytime traffic loads on this stretch of highway. The nighttime requirement made it critical to formulate a high-performance emulsion, allowing the materials to set and cure quickly by the end of each nighttime shift, to allow opening for traffic prior to the start of the morning commute each day.

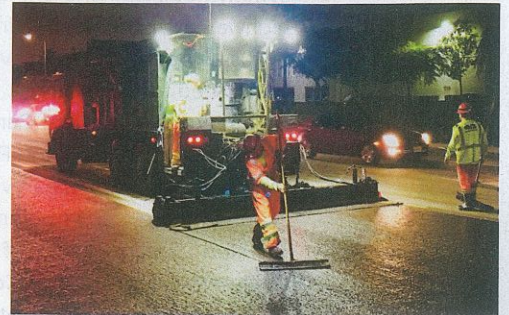
PREP STEPS

This section of Highway 1 exhibited oxidation, raveling, and cracking on the pavement surface, as well as isolated structural failures, which left untreated would allow moisture intrusion in the roadway. Over time, this would damage the structure of the asphalt and underlying base course. Since the proposed slurry seal application was adding no structural value to the roadway, it was crucial that many of these defects be addressed in advance. Therefore, prior to any construction activities on the project, there were a number of preparatory steps that had to be accomplished.

To ensure the safety of the construction team as well as the traveling public and pedestrian traffic, approximately 1,000 construction area signs were installed along with dozens of advance warning message boards to warn motorists and pedestrians that they were in an active construction zone. Additionally, all impacted residents and businesses received written advance notice of all activities

It is estimated that Caltrans saved taxpayers more than \$30 million by using a life-extending surface treatment.

ROAD PRESERVATION



The treatment chosen for this section of Highway 1 was a Type III slurry seal application, which due to its being coarser allows for a heavier application rate that will help address and correct more severe surface defects and improve skid resistance under very heavy traffic loads.

taking place on their roadway. Routine safety meetings were held to address the ever-changing conditions and challenges faced by the crews working on-site.

Potential environmental impacts also had to be evaluated and addressed. Drainage inlet protection systems were installed throughout the project. All exposed drains along the 45 miles of curb line were protected with Caltrans-approved materials to prevent the potential of any hazardous construction-related debris from finding its way into the city's drainage system, some of which flows directly into the nearby Pacific Ocean. As part of Caltrans' specifications and quality control, this project required a very detailed Water Pollution Control Plan, which required routine inspections at all drain inlet coverings to ensure that drains were not compromised at any point during the construction process.

SEAL TIME

All existing thermoplastic markings and legends were removed to ensure the new slurry seal would properly adhere to the existing pavement. This required the removal of more than 500,000 lineal ft, or nearly 100 miles, of pavement markings, as well as removal of more than 36,000 reflective pavement markers.

Next, a crack sealing treatment employing rubberized recycled tires was applied to ensure any significant cracks were sealed to slow their reemergence through the slurry application. VSS also removed and replaced the existing asphalt to a depth of 3 in. at locations where base failures had deteriorated the pavement beyond the point where the slurry seal alone could address the distress.

Detailed planning and precise execution were key to success on this project, as Caltrans specifications required adherence to more than 30 different lane closure charts. A detailed traffic control plan allowed for variable lane closure timeframes at different locations depending on directional needs of the local commutes. Amazingly, this project had more than 600 side streets and 70 signalized intersections to manage, most of which required the use of local law enforcement to ensure safe operations. The Traffic Control Plan for this project required a minimum of five to six full-time personnel at all times, during all shifts, to ensure that crews and the traveling public were safe during construction operations.

Construction on this project required the use of five different staging locations. Due to the dense population in the area, significant steps had to be taken to comply with local ordinances for noise, odor, and fugitive dust, while making sure adequate security was in place to protect all equipment and materials from the ever-present threat of theft and vandalism.

Overall, the project required the placement of more than 13,000 tons of Type III aggregate and 1,500 tons of quick-setting emulsion for the slurry seal system. Once these materials were imported to the staging areas, they were loaded on Macropaver truck-mounted units and transported to the jobsite for application. Each unit transported slurry aggregates, along with adequate emulsion and water, to ensure uninterrupted operations during mixing and placement through the machine's pug mill and specially designed slurry box, which were equipped with hydraulic augers for optimum material distribution and mat texture.

ROAD PRESERVATION



The 22-mile stretch of the Pacific Coast Highway serves as a vital arterial roadway for Los Angeles County, carrying more than 70,000 vehicles per day, spanning to a width of 7-8 lanes and consisting of more than 130 lane-miles of pavement surface. It services a diverse group of users and has tens of thousands of businesses within immediate proximity of its travel lanes.

SAFETY FIRST

During the seal application, safety was again the highest priority to ensure that all workers were protected from local traffic throughout the shift and at all times the traveling public had clear direction on where they needed to travel. Every worker was provided with personal protective equipment, including high-visibility suits for maximum reflectivity. The site was equipped with adequate lighting sources to keep workers visible to the traveling public, which resulted in zero lost-time accidents.

Once the slurry seal was placed and cured, the entire roadway area was swept clean to avoid future vulnerabilities, and all pavement markings were reinstalled to insure safe driving conditions. Each night, a striping contractor immediately followed behind the slurry crew and began laying out and striping the new surface. The roadway received approximately 690,000 linear ft of new 6-in. thermoplastic traffic striping material. As an added safety feature, the striping was enhanced for wet night visibility.

A STANDING SUCCESS

Together, Caltrans and VSS International partnered to provide a finished product of the highest quality. It is estimated that Caltrans saved taxpayers more than \$30 million by using a life-extending surface treatment now when the pavement was in better shape than waiting until the pavement deteriorated to the degree that more invasive work was needed. This decision also eliminated the need to change the existing grade elevations or adjust the utilities

located in the roadway.

An additional benefit was a reduction in energy and materials consumption required to complete the work. The Type III slurry seal required only 13,000 tons of virgin aggregate materials, while a 2-in. mill-and-fill approach would have required approximately 100,000 tons of hot mix, which would have consumed over 90,000 tons of virgin aggregate materials. This significant reduction in materials reduced the fuel, energy, and congestion associated with what would have been 8,000 truckloads going in and out of the site.

The slurry seal alternative required much less energy than hot-mix production; the 1,500 tons produced for this project only required 975 tons of liquid asphalt binder, whereas 100,000 tons of hot-mix asphalt would have consumed over 4,500 tons of binder. As the seal was placed at ambient temperatures, there were almost zero emissions.

The project was a huge success for everyone, providing for a longer pavement life, a smoother ride, a more aesthetically pleasing road, and enhanced safety features, at a manageable cost and a reduced dependence on natural resources. Though ocean views and picturesque landscapes are not a part of this section of the Pacific Coast Highway, travelers nonetheless have a beauty that runs deep—a highly engineered, lasting stretch of roadway that provides a safer, smoother ride, which translates to peace of mind. **R&B**

Roberts is with VSS International Inc.