

The Cloud Helps Transportation Agency Keep Region Moving Despite Disruption

Innovative technology helps Elizabeth River Crossings improve resiliency, enable remote work and better serve customers despite COVID-19 challenges.



The safe operation of traffic networks and tollways is vital, no matter what occurs in the broader world. For the organizations that run and maintain those systems, COVID-19 was a harsh reminder of the importance of resiliency and flexibility.

Elizabeth River Crossings (ERC) is a private organization that operates under a 58-year public-private partnership with the Virginia Department of Transportation (VDOT). ERC runs and maintains the two tunnels connecting the cities of Norfolk and Portsmouth, the MLK Expressway, and approximately 51 miles of highway. On average, 105,000 vehicles travel through ERC facilities every day.

Years before COVID-19 emerged, ERC's legacy back-office and customer relationship management (CRM) applications experienced reliability and performance issues. Even more concerning, those systems were operated from primary and back-up data centers located only a mile apart in a coastal area prone to flooding. ERC managers recognized a need to improve both facility and system resiliency. This led organization leaders to launch an IT modernization journey that would ultimately better prepare them to manage the impacts of COVID-19.

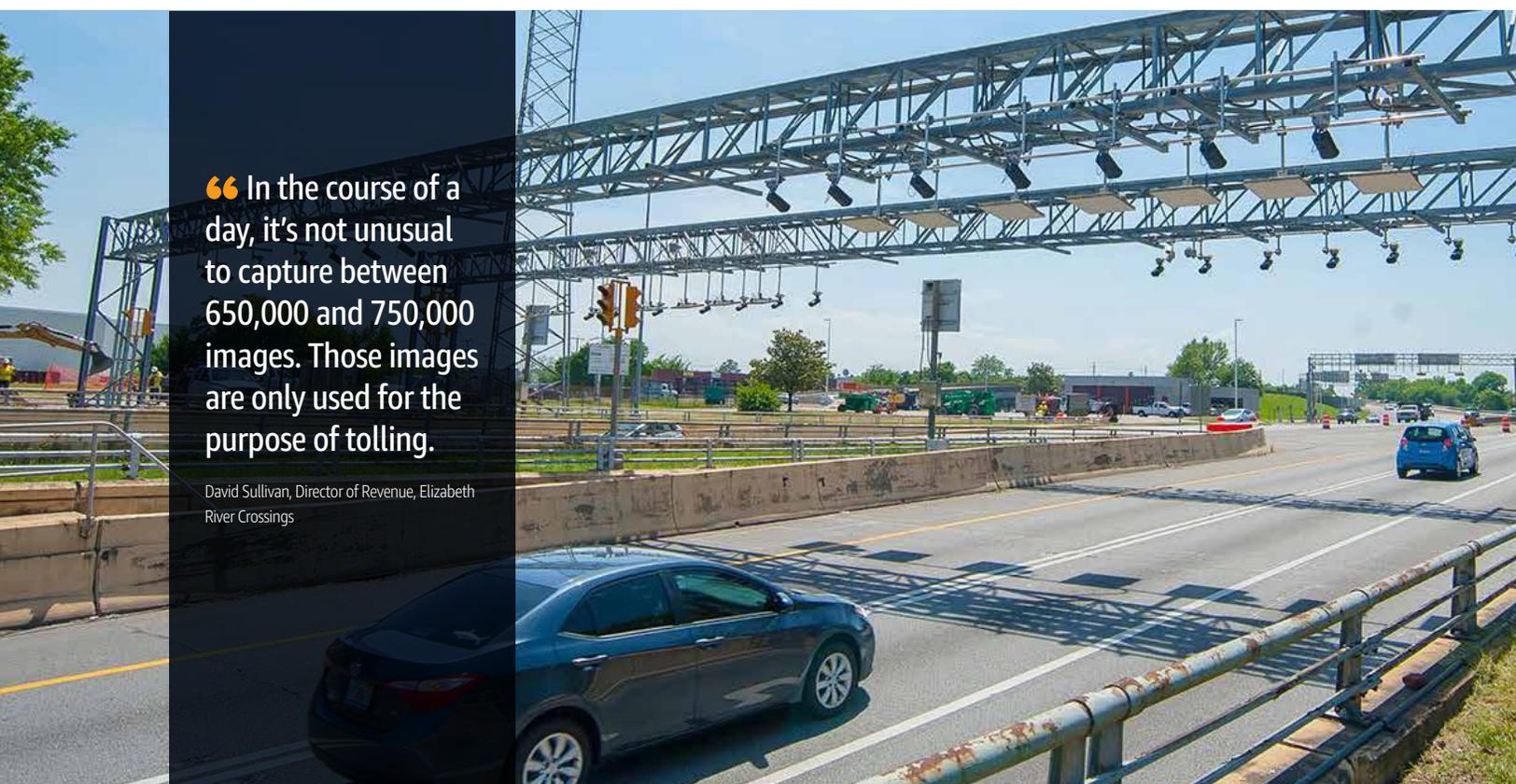
The Journey Toward Modernization

In 2018, ERC committed to replace its ailing legacy data center infrastructure and hardware working closely with its tolling support contractor Cognizant, an Amazon Web Services (AWS) partner. Part of ERC's contract with VDOT allows it to leverage the agency's cooperative procurement contracts, including the NASPO Value Point-AWS Cloud Solutions contract through SHI. Cognizant reviewed ERC's existing operations and recommended the organization migrate to AWS cloud. Modernizing its legacy infrastructure would allow ERC to avoid a costly hardware refresh, improve its resiliency and business continuity capabilities, and enable it to better serve the thousands of drivers who travel its tunnels daily.

Cognizant began migrating ERC's on-premises databases to AWS in November 2018 and cut over to the new system two and a half months later, in January 2019.

"We saw immediate improvements in system uptime and performance," says David Sullivan, director of revenue at ERC.

Soon after, ERC shut down its on-premises data center, which occupied leased space. This enabled immediate cost



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savings. More importantly, ERC greatly improved its resiliency with a primary and secondary instance in Northern Virginia and a disaster recovery instance in Ohio.

"Moving to the cloud mitigated the primary threat to our data centers, which was storms and flooding," says Sullivan. "That threat was instantly just gone."

Encouraged by those results, ERC's next goal was to upgrade its website. The organization's existing website didn't work well with dynamic information and wasn't mobile friendly. Cognizant and AWS deployed a new cloud-based website for ERC that enabled services the organization couldn't previously offer, allowing customers to pay bills, register for account management and file disputes online.

Once the organization's new website was up and running, ERC leaders focused on upgrading its roadside tolling system. Virginia is part of the Northeast E-Z Pass system. About 80 percent of tolls are paid with an E-Z Pass. The remaining 20 percent are "pay by plate tolls," which require ERC to take between six and 10 photos of each vehicle's front and rear license plates as it passes through a toll area, look the license plate up and send the vehicle owner a bill.

"In the course of a day, it's not unusual to capture between 650,000 and 750,000 images," says Sullivan. "Those images are only used for the purpose of tolling. Once a customer's account is paid, we are required to purge that data. We do a lot of processing against those images, and it's a lot of data. Over the year we see about 37 million trips and anywhere from six to 10 JPEGs per trip."

Initially those images were processed in ERC's local data center. But ERC's existing infrastructure often couldn't complete batch processing those images within the necessary windows, creating routine performance issues.

In 2019, ERC migrated the image processing system to AWS. The images are now captured, stored and processed in the cloud.

"All of the processing problems went away instantly," says Sullivan. "We now have access to more sheer processing power. If we need more capability, we're able to spin it up. When we're done and we don't need that capacity, we can spin it down. No longer having to be concerned with sizing

BY THE NUMBERS:

ERC Post-Migration Savings on Annual Software/OS Refresh

Cost: \$250K

Infrastructure Refresh
Cost Avoidance: \$500K

Annual Infrastructure
Maintenance Cost Reduction: \$200K

our infrastructure and worrying about the time that takes is a game changer."

Going Serverless

ERC is now entering the last major step in its digital transformation. The organization is working with Cognizant to develop a serverless, fully cloud-based back office that will enable comprehensive modernization across the organization.

"The serverless architecture will allow us to integrate all our standard business functions in the cloud," says Sullivan. "Essentially we will go from a monolithic application to modular applications. From an IT management standpoint, that's where you want to be. It no longer requires five years of planning to implement a solution."

ERC plans to complete migration to the new back office by the second quarter of 2021. The use of serverless architecture is expected to drive development costs down, while a pay-as-you-go model will further reduce expenses. ERC will also have more flexibility to add incremental features, access to better reporting capabilities, improved overall availability across its mission-critical databases, and the ability to scale easily and quickly as needs or demands change.

Improving COVID Response

With a more modern infrastructure to work with, ERC is transforming its call center as well by implementing Amazon Connect cloud-based contact center, to make handling calls easier for ERC employees. Previously, ERC call center representatives had to go through multiple steps to manage the approximately 1,000 calls they receive each day.

“With the old system there were a lot of places to look for transactions and data, so it took a while for representatives to find and review data and to make sure they were providing accurate information,” says Sullivan.

The cloud also made it easier to maintain those services when COVID-19 forced call center employees to work from home.

“Having everything in AWS made that a lot easier because in the cloud it doesn’t matter where you are; you can access the system with the appropriate VPN tools and security,” says Sullivan.

It’s also enabling self-service capabilities that will take some of the pressure off call center employees and allow them to spend more time with customers that need in-depth assistance.

“The new system is going to revolutionize the way our call center employees interact with customers,” says Sullivan. “It will allow them to deal with customers more quickly and succinctly. It will also open a path for us to add chat and other customer service channels we don’t have today. A lot of customers want self-service. In the past it might have taken years for us to adjust to that demand. Now it will take months or even weeks to take advantage of those options.”

That agility will be especially important going forward as new transportation-related technologies such as autonomous vehicles



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or vehicle-integrated toll passes emerge, or if another situation like COVID-19 should occur.

“We now have flexibility that our legacy systems couldn’t provide, so we can adjust as needed and know we can keep our operations up and running,” says Sullivan. “If something like COVID-19 should happen again in the future, it will be an easier transition.”

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