

# CLOUD 101 for Transportation Agencies and Authorities

WHITEPAPER



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Cloud computing, the on-demand delivery of IT resources over the Internet, has emerged as a foundational tool for digital transformation in the public sector. Transportation is one area that stands to benefit from wider cloud implementation. Transportation agencies and authorities can turn to new cloud technologies to manage their networks as well as optimize operations, and many already have.

Transportation leaders with an eye on the future are working to develop and deploy strategies aimed at improving safety, reducing costs, improving operational resilience, and enhancing the customer experience. It's a transportation future that's exciting to JJ. Eden, executive director of the North Carolina Turnpike Authority (NCTA). A founder of the EZPass system, Eden has a track record of knowing where technology can make the biggest impact in the transportation sector.

"You have to be in the cloud," Eden says. "I don't mean your data in the cloud. I mean your platforms in the cloud."

Moving data and platforms to the cloud offers transportation organizations many benefits, but the migration process must be well planned and executed.

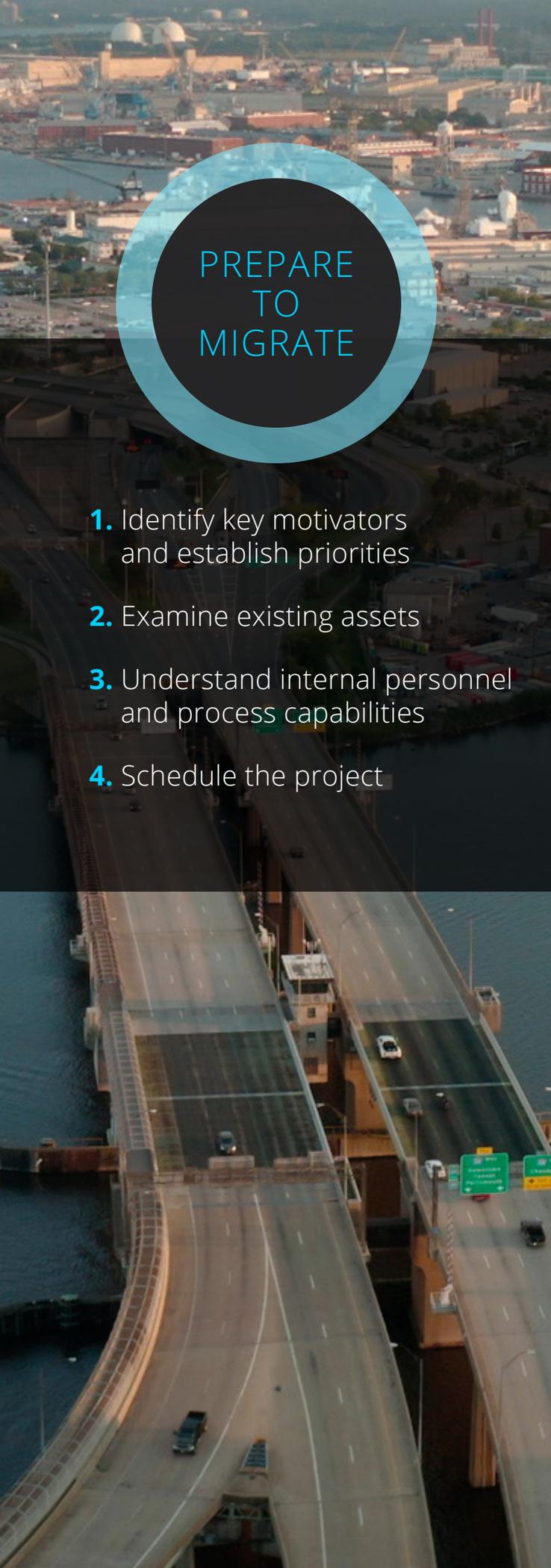
Founded in 2002, Eden's team at NCTA plans, develops, builds, and operates state toll roads such as the Triangle Expressway and the Monroe Expressway. Transportation leaders considering how best to plan and manage a successful cloud migration can learn the right steps to take from NCTA and its industry peers who are already implementing cloud strategies. These steps include preparing to migrate, launching when ready, reviewing and adjusting, and envisioning the future.

## PREPARE TO MIGRATE

A successful cloud migration begins by identifying the key motivators for the project and establishing priorities. Popular drivers include improved system reliability, the ability to scale services quickly, cost savings, pay-as-you-go offerings, and the ability to quickly deploy infrastructure. For NCTA, maturing cloud services for toll operations and growth in the underlying cloud-based technologies supporting connected vehicles and in-vehicle mobile payment systems drove cloud adoption.



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## PREPARE TO MIGRATE

1. Identify key motivators and establish priorities
2. Examine existing assets
3. Understand internal personnel and process capabilities
4. Schedule the project

Next, transportation authorities should closely examine their existing assets, advised Ashley Miller, Amazon Web Services' (AWS) senior solutions architect for the transportation sector. They should start by taking an inventory of all existing software applications, servers, databases, and their interdependencies.

Understanding internal personnel and process capabilities is equally important. [AWS](#) has an online survey called the [Cloud Adoption Readiness Tool](#) that can help determine if additional organizational work will help a cloud project run smoothly. The tool gauges an organization's existing staff capabilities, platform compatibility, operational preparedness, system security, and internal processes.

Scheduling the project is the final preparatory step. As migrations tend to be cumulative, Miller advised giving it ample time. How long the process takes really depends on the scope of the effort and the agency's experience. "In a large deployment, the process can take 18 to 24 months," Miller said.

That sort of timeframe doesn't bother Transportation Corridor Agencies (TCA) CEO Samuel Johnson. The California tolling agency has migrated several parts of its technology environment to the cloud. TCA was created in 1986 to improve regional mobility by using non-recourse toll revenue bonds to plan, finance, construct, and operate Orange County's public toll road system, comprising State Routes 73, 133, 241, and 261.

"I don't think this is an overnight type of thing as we are leveraging cloud services across the organization," Johnson said. When it comes to critical business systems, he would rather take the time to do the migration right in order to realize the operational efficiencies and strategic outcomes that drove TCA to launch the initiative. The agency has a performance-based contract with a transportation industry systems integrator developing and managing the migration of its customer service center.

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Of course nothing motivates like a deadline. This helped Virginia toll operator [Elizabeth River Crossings \(ERC\)](#) migrate from their on-premises databases to AWS in January 2019, just two and a half months after beginning the process.

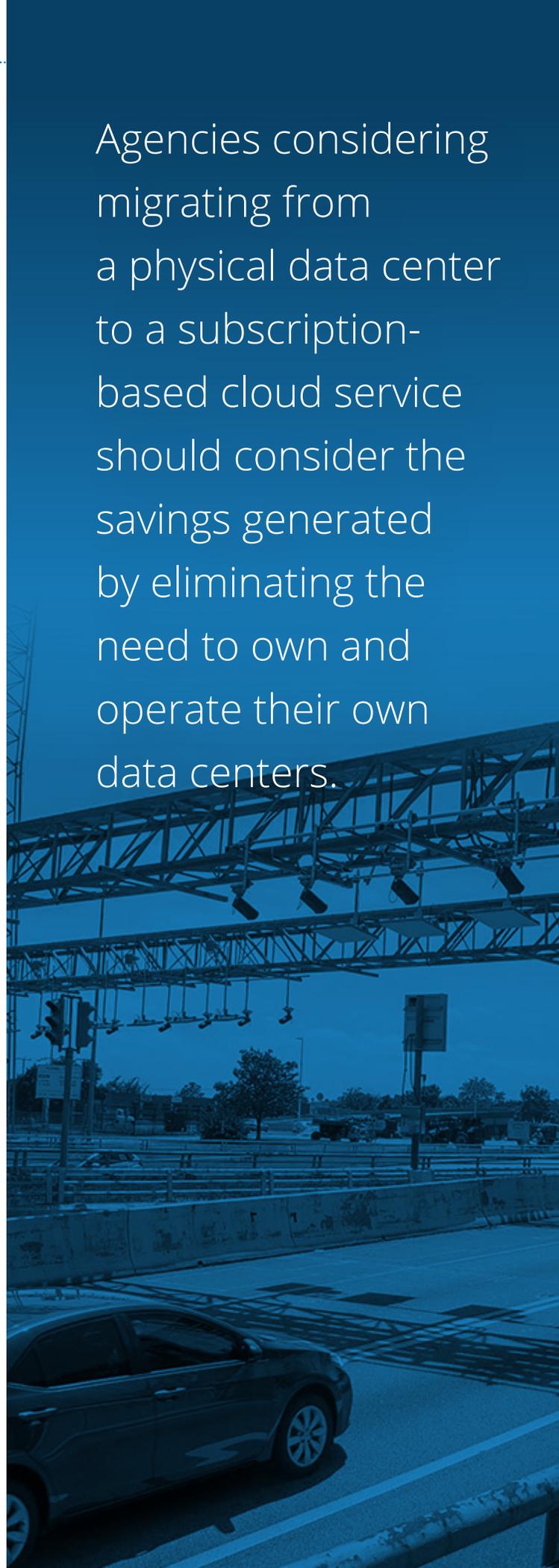
“One of the things that drove us to a deadline was our primary data center and our call center were in a building where the lease was expiring. We had to be out of the building,” said David C. Sullivan, ERC’s CEO. Created in 2012, ERC operates and manages four tunnels and 51 miles of roadway around Norfolk and Portsmouth, Virginia, under a 58-year concession from the Virginia Department of Transportation.

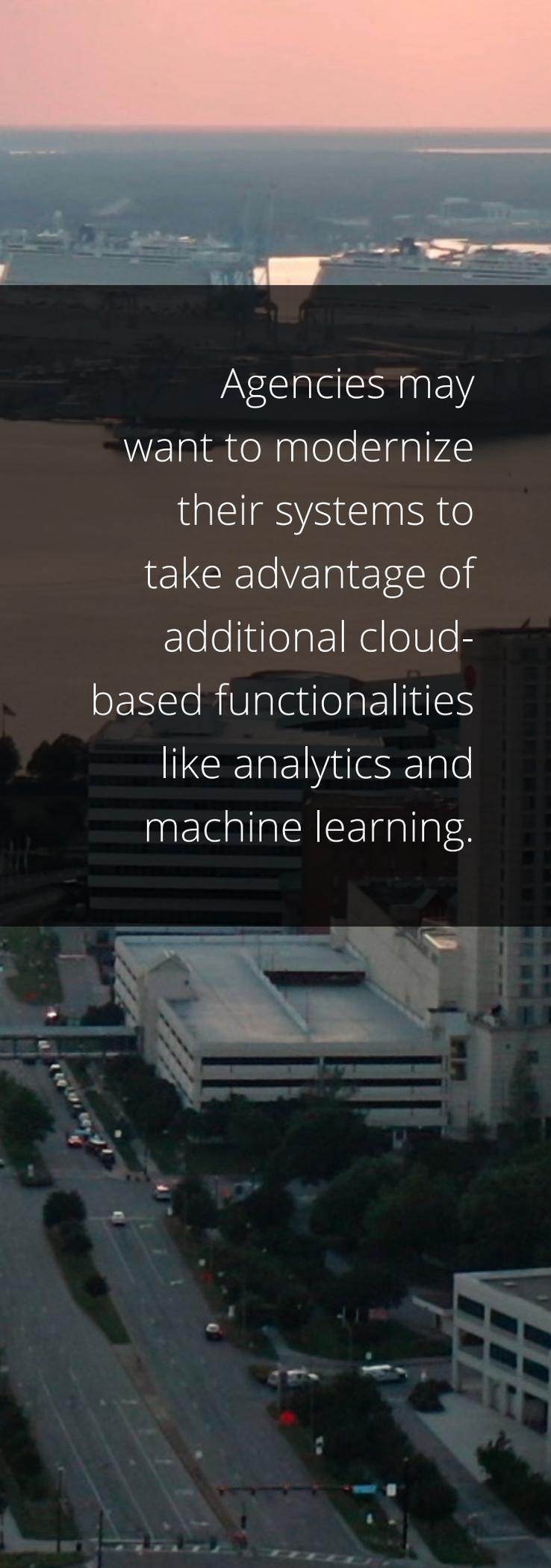
They made plans to relocate ERC’s call center, but the data center raised more questions as it was rapidly approaching its end of life. Replacing it would be a major capital expense and even a brand-new data center would tie ERC to additional ongoing expenses such as equipment maintenance, periodic system updates, and a new lease. Agencies considering migrating from a physical data center to a subscription-based cloud service should consider the savings generated by eliminating the need to own and operate their own data centers.

When reviewing the existing property, Sullivan’s team also discovered the primary data center was within a 100-year flood plain, which put its systems in a precarious position. To make matters worse, it turned out that the ERC’s backup data center, located just a mile away, was also within the 100-year flood plain.

From a logistics standpoint, ERC’s migration to the cloud eliminated the maintenance and operational costs associated with owning and securing physical infrastructure. ERC staff were able to spend less time crafting contingency plans for events like power outages or natural disasters.

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A project initially proposed to improve customer service and upgrade systems soon became part of the agency's plan to improve its disaster recovery strategy. Migrating to the cloud solved a time-sensitive real estate challenge, eliminated an immediate capital procurement requirement, and avoided a data security emergency, allowing the project to win stakeholder approval quickly and ERC leaders to begin their sprint towards project completion.

## LAUNCH WHEN READY

The first things ERC migrated to the cloud were legacy tolling back office applications supporting customer relationship management (CRM), billing, the website, and accounting. These are popular first migration choices. "They directly impact customer satisfaction, which is often a top motivator for moving to the cloud," Miller said. Later migrations might include the call center and systems that collect operational data.

Another important aspect of the launch is the mode of migration. A lift-and-shift migration involves an almost cut-and-paste of infrastructure and data from one location to another, with minimal changes. Often done when a migration must happen quickly, this type of migration immediately provides the additional security and disaster protection that comes from using cloud. Alternatively, agencies may want to modernize their systems to take advantage of additional cloud-based functionalities like analytics and machine learning.

Once the migration happens, a team is needed to manage the cloud account. The responsibility can be kept in-house or given to a third party. Additional internal staff often is not required, but additional training may be necessary. In Johnson's TCA offices, the prospect of a cloud migration initially stirred concerns regarding job security and if the migration would actually result in improved efficiency. Members of the IT team questioned what the project would mean for them, but became supportive as they

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realized the increased value they could provide the agency, Johnson said. They came to appreciate that the new cloud initiative allowed them to focus on more innovation instead of having to spend their time worrying about hardware capacity and ensuring basic systems functioned correctly.

Sullivan agrees, noting how the cloud helped simplify the way his team at ERC operates. “Systems are supposed to work. They’re not supposed to be what you agonize over. You want the business to focus on the business. Not the technology.”

## REVIEW AND ADJUST

Once a cloud migration is complete, the project needs to be continually monitored and managed. It’s important to test the migration and make sure that the system is configured to maximize reliability, durability, and uptime.

“It’s easier to build the resiliencies for these systems in the cloud. When you architect things correctly, you can eliminate single points of failure,” Miller said. And when it comes to testing, the cloud makes it easy to provision resources to quickly test multiple scenarios.

It’s also important to gather feedback from outside constituents and agency employees whose experience is impacted by the migration, said Phil Silver, who leads the AWS state and local government transportation practice. Their input may lead the agency to consider additional functionalities and improvements.

Stakeholders who signed off on the project will also want to see results. Consider measuring improved customer satisfaction, which could entail comparing customer service center call times, surveying travelers, and tracking billing errors.

Stakeholders evaluating a cloud migration also seek evidence of cost savings. When comparing on-premises systems with cloud-based options, it is important to consider the total cost of ownership.



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An on-premises data center requires investments in real estate, hardware such as servers and networking equipment, procurement expenses, electricity, maintenance, redundant (back-up) systems, and, every few years, hardware upgrades. With a cloud-based service, the undifferentiated heavy-lifting of maintaining all this goes away so agencies can focus on their core missions. With the pay-as-you-go model, agencies only pay for the services that they use.

The AWS cloud also delivers additional savings via real-time elasticity. Highways are built to accommodate traffic during rush hours, but end up with empty lanes during off-peak hours. The same is true with an on-premises data center. During slow periods a company is paying for idle computer cycles. Outsource these resources to the cloud, though, and the service expands to accommodate peak loads and contracts when less service is needed, reducing cost and providing availability.

Another way to measure success after cloud migration is to look at improvements in safety. Efficient communication with motorists is key to reducing traffic accidents, as is motivating driver behaviors to reduce traffic congestion. Monitoring signal performance and reporting traffic incidents in a timely manner can be optimized via cloud. This relationship between safety and data is expected to grow as vehicles become smarter and more data becomes available to agencies. For example, wrong-way drivers are a major challenge for tolling agencies, Eden said. Often, though, the agency doesn't learn about it unless the vehicle hits something. However, with emerging connected vehicle technology, a smart car could potentially warn the driver, other parties, and the tolling agency that the car was moving against traffic.

## ENVISION THE FUTURE

Innovative tolling agencies such as TCA, ERC, and NCTA are implementing AWS cloud-based solutions that add efficiency and agility to their

operations. Among the three, ERC is farthest along with its migration and is happy with the results. NCTA and TCA are close behind. For each, the cloud provides an important base on which to grow. As these organizations grow and expand, their cloud infrastructure grows with them.

The benefits realized by the tolling agencies discussed here can also be realized by [cities, states and other agencies and authorities](#) that look to become just as resilient. AWS cloud technology can help transportation leaders meet the primary goals of providing a safe service to travelers and optimizing existing infrastructure, while also ensuring data security and accommodating evolving end-user trends.

Navigating a successful cloud migration can be the springboard that launches a transportation organization into a future of efficiency, flexibility, and security. With cloud technology providing a key linchpin to their operations, such organizations will be well prepared for the technological and cultural changes coming to the transportation sector.

To find out more about how cloud technology can help modernize your organization, please visit the [AWS State & Local Government Transportation website](#). ■



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