

**CNA**

March 2022

**January 3-4, 2022, Winter Weather Event and  
I-95 Incident**

**Virginia Interagency After-Action Report**

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This report was prepared by:

CNA Team: Joel Silverman, Heather Marshall, Zoe Dutton, and Dawn Thomas

CNA  
3003 Washington Blvd.  
Arlington, VA 22201

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**Approved by:**

**March 2022**

A handwritten signature in black ink, appearing to read "Dawn Thomas". The signature is written in a cursive style with a horizontal line extending from the end.

Dawn Thomas, Director  
Center for Critical Incident Analysis  
CNA Institute for Public Research

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## Introduction

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The Virginia Department of Emergency Management (VDEM), Virginia Department of Transportation (VDOT), and Virginia State Police (VSP) asked CNA to develop an after-action report (AAR) for the January 3–4, 2022, winter weather event including the Interstate 95 (I-95) incident. First, we must clarify what an AAR is *not*. It is not an investigation or a search for a person or entity upon which to lay blame. After almost 80 years of analyzing critical incidents for the U.S. Navy and for local, state, and federal government agencies, CNA has learned that responses to multi-faceted and multi-layered incidents are, in a word, *complex*. In our collective experience, we have never seen an example when one moment—or one person—was solely responsible for what happened during the response to an incident. Without exception, we have found that negative cascading effects during response operations stem from multiple issues with plans, procedures, policies, and preparedness (including training and exercises), not from the actions of individuals or even one organization.

Equally important is what this AAR *is*. This report is an analysis of VDOT, VSP, and VDEM decision-making and actions in response to the winter weather storm on January 3, 2022, and the impacts those decisions and actions had on the I-95 corridor. We sought to better understand what happened, why it happened, and what could be done next time to mitigate the impact of long-term closures, especially during severe weather. We developed this analysis using response documentation (such as situation reports, weather reports, and real-time planning documents), news articles and social media, transportation data, a literature review of similar incidents nationwide, and an extensive interview process (see Appendices B and C). A unique aspect of our methodology is the development of a detailed event reconstruction. The reconstruction is valuable because it gives an unbiased, high-level perspective of what happened, which is often unclear to those entrenched in performing their specific job functions during the incident. It also ensures that our analysis is fact-based and not dependent solely on what participants or responders think happened.

After this introduction, we provide a reconstruction of the facts and figures surrounding the traffic incident on January 3–4, 2022 (shown in a figure and then described in more detail). This report then addresses the following key questions that have emerged for the public and for the state agencies that are striving to do better:

- How did road conditions get so bad?
- Why couldn't VDOT keep up with snow removal?
- Why didn't VDOT close the highway sooner?
- Why didn't state agency leadership understand how bad I-95 conditions were getting?
- Why didn't VDOT open the I-95 express lanes to traffic?
- Why didn't state agencies provide direct assistance to stranded motorists?
- Why didn't anyone tell people not to travel on I-95, or report how bad the traffic was?

## Incident Reconstruction

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Figure 1 (on the next page) provides a timeline of key events and actions taken before and during the January 3–4, 2022, snowstorm, which is accompanied by a more detailed narrative of the reconstruction of the events that occurred.

### New Year's Day holiday weekend (January 1 – 2)

The weather on the New Year's Day holiday weekend featured rain across much of the commonwealth, with near record-high temperatures in some areas. However, beginning early on Sunday, January 2, National Weather Service (NWS) forecasts indicated that the rain would transition to snow on January 3, with moderate snowfall amounts across the commonwealth. VDOT, supplemented with a private weather forecasting service (DTN Weather), planned for larger snowfall amounts and, importantly, a high snowfall rate of 1–1.5 inches per hour with intervals of snowfall up to 2 inches per hour. Early on January 3, the updated NWS forecast showed increasing snowfall totals across Central Virginia, indicating a high of 4–6 total inches (with a 10 percent chance of significantly more snow), with the potential for a snowfall rate of 1.5–to–3 inches per hour in some areas.

To inform as many Virginia residents as possible about the upcoming winter weather, VDEM, VDOT, and VSP utilized multiple communication methods, including interviews on television and radio as well as social media updates on Twitter and Facebook. VDOT Communications Division and district public information officers (PIOs) initiated storm-related public messaging with social media posts on Saturday morning (January 1). At 10:00 a.m. the next day (Sunday, January 2), VDOT hosted a statewide conference call, which included announcements from VDOT districts that they were increasing their mobilization levels. After the call, the VDOT Communications Division, with support from VDEM and local governments, increased public messaging efforts to include additional statewide press releases and social media posts. VSP Public Relations also issued a statewide press release about the pending storm, began posting weather and traffic advisories and travel tips on social media, and amplifying the messaging and social media posts from VDOT and VDEM.

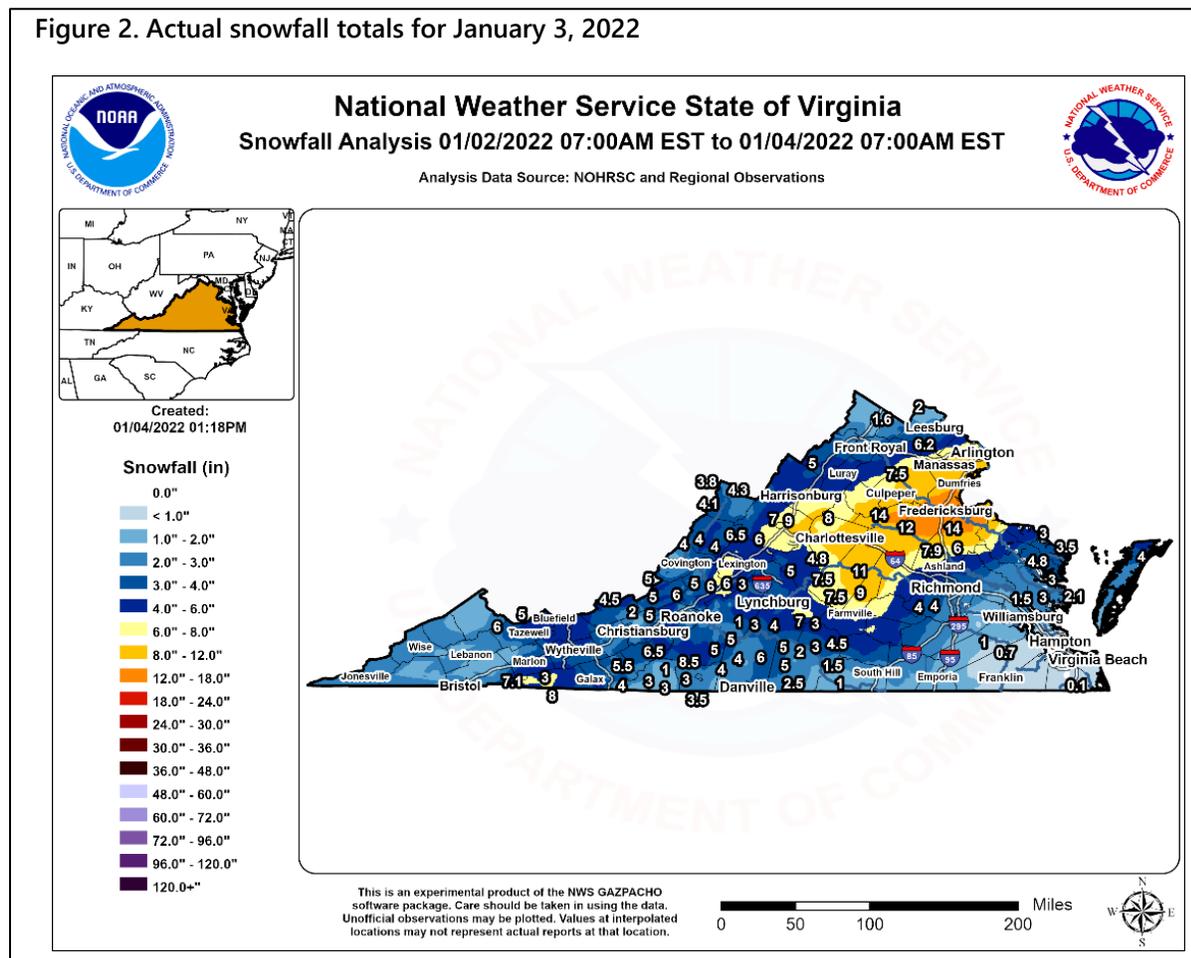


## January 3

The weather conditions on Monday, January 3 were especially challenging. Rain fell from 1:00 a.m. until around 5:30 a.m., while temperatures dropped from 46 degrees at 1:00 a.m. to 36 degrees at 5:00 a.m. At that point, snow began falling around the region, eventually totaling 8.5 inches in areas around Washington, DC, and 10.8–14.6 inches across Spotsylvania County, Stafford County, and the City of Fredericksburg.<sup>1</sup> Figure 2 shows the final snow amounts, which were well above weather forecasts.<sup>2</sup>

At approximately 6:00 a.m., when snow began accumulating on the roadway, plowing operations began. VDOT districts opened their Snow Rooms to coordinate and manage snowplow operations. VDOT Central Office opened its Virtual situation room (SitRoom) to support collaboration between Operations, Maintenance, and Communications Divisions and to respond to any requests from the districts.

Figure 2. Actual snowfall totals for January 3, 2022



<sup>1</sup> NOAA's National Weather Service, NWSChat, <https://nwschat.weather.gov/p.php?pid=202201040106-KLWX-NOUS41-PNSLWX>.

<sup>2</sup> National Weather Service, "Summary of January 3, 2022 Heavy Snow, Wind, and Coastal Flooding," Jan. 4, 2022, <https://www.weather.gov/akq/jan3-2022SnowStorm>.

Several early morning traffic incidents occurred, including one just before 4:00 a.m. on I-95 South at mile marker (MM) 143 and another at 6:00 a.m. on I-95 South at MM 135. By midmorning, there were incidents involving tractor trailers (some of which jackknifed blocking multiple lanes of traffic) occurring in northbound and southbound lanes. In Maryland, I-95 North past the Woodrow Wilson Bridge became temporarily impassible at 10:00 a.m. as conditions worsened. Traffic congestion stemming from MD-210 backed up into Virginia through the morning, causing stoppages and then heavy congestion throughout the afternoon. Snowfall rates increased dramatically during the storm, with reports that it approached three inches per hour in the Fredericksburg District, and snowplow operations struggled to keep up due to incidents on the road hindering snow removal. The snowfall intensity further exacerbated the difficulty of getting incidents cleared and motorists moving.

As the snowfall abated around 3:15 p.m. in the Fredericksburg and Northern Virginia regions, traffic was moving on I-95, albeit slowly. Through the late afternoon, VDOT and VSP were employing multiple tactics to keep traffic moving, including blocking select ramps leading onto I-95, calling in additional tow trucks, sending snowplows (accompanying by VSP troopers) against traffic, and pulling cars to nearby commuter lots to reduce towing cycle times (rather than towing them to normal locations further away). However, major incidents occurred Monday evening at approximately 5:30 p.m., crippling the Fredericksburg area by blocking all lanes of traffic on I-95 North at mile marker 133 and I-95 South at Exit 126. Figure 3 illustrates some major incidents that occurred around the Fredericksburg area with corresponding mile markers to demonstrate the severity and frequency of the incidents.<sup>3</sup>

Away from I-95, the effects of the storm were felt throughout the commonwealth. Due to the heavy, wet snowfall, as well as the heavy rain that preceded the snow, many more trees than anticipated were falling and blocking roadways. For example, in Louisa and Goochland Counties, officials observed that tree damage was comparable to that which occurred during Hurricane Isabel.<sup>4</sup> VDOT Culpeper District doubled their cut-and-toss emergency tree crews to try to keep up with the damage so that snowplows could continue to remove the snow. Additionally, power lines came down, leaving about 400,000 Dominion Energy customers without power.<sup>5</sup> The downed trees and power lines blocked portions of I-64, reducing much of the road to single-lane traffic from Exit 124 through Goochland County.<sup>6</sup>

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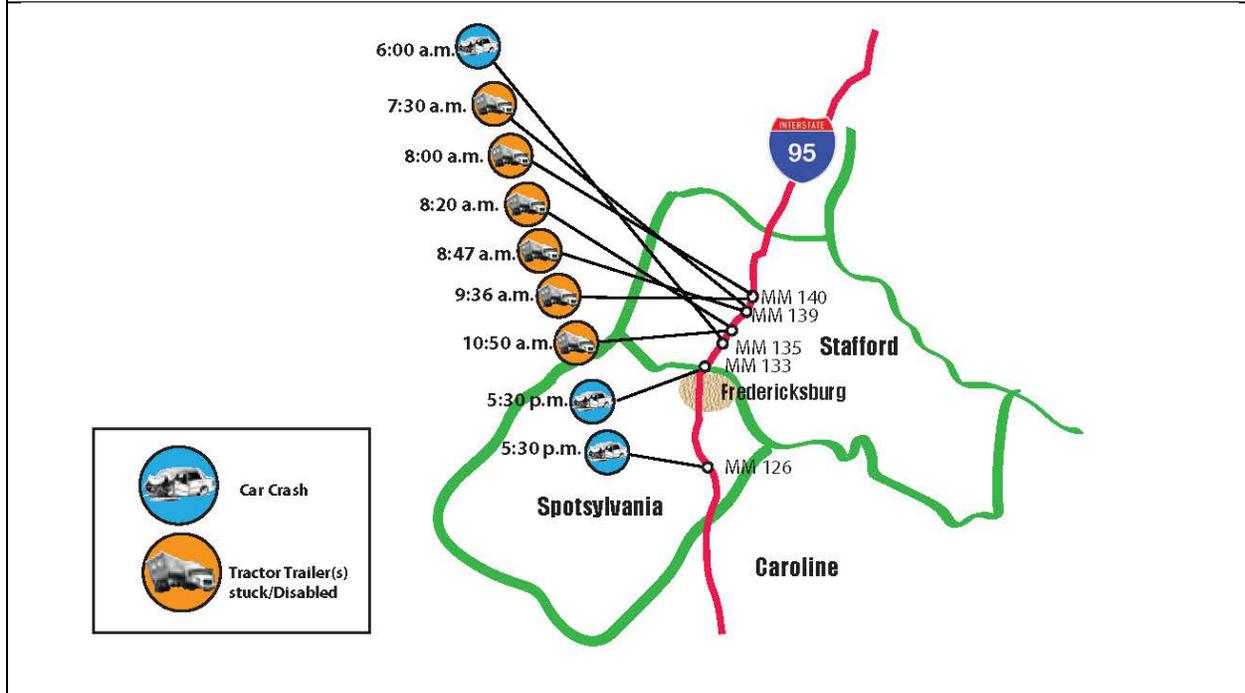
<sup>3</sup> This is not an exhaustive list of incidents; because power outages occurred throughout the region, accounting of vehicle accidents and other incidents was limited.

<sup>4</sup> <https://www.weather.gov/akq/jan3-2022SnowStorm>.

<sup>5</sup> Source: Dominion Energy

<sup>6</sup> [https://www.virginiadot.org/VDOT/Travel/Travel\\_Alerts/Culpeper/asset\\_upload\\_file951\\_178652.pdf](https://www.virginiadot.org/VDOT/Travel/Travel_Alerts/Culpeper/asset_upload_file951_178652.pdf)

Figure 3. Times and locations of major January 3 traffic incidents in the Fredericksburg area (list is not all-inclusive)<sup>7</sup>



Meanwhile, VSP responded to multiple disabled vehicles and incidents in all divisions across the commonwealth (see Table 1) and specifically, along I-95, VSP responded to at least 67 crashes and 159 disabled vehicles.<sup>8</sup>

Table 1. VSP record of disabled vehicles and accidents across the commonwealth on January 3

Virginia State Police Divisions	Disabled Vehicles	Traffic Accidents
<b>Division 1</b>	178	280
<b>Division 2</b>	71	32
<b>Division 3</b>	130	118
<b>Division 4</b>	80	55
<b>Division 5</b>	21	111
<b>Division 6</b>	133	124
<b>Division 7</b>	206	113
<b>TOTALS</b>	819	833

<sup>7</sup> Sources for this graphic include VSP Division 2 and VDOT Fredericksburg District timelines. Note: VSP Division 2 Communications Center and many VDOT cameras went down during the late in the morning of January 3, limiting the accounting of vehicle crashes during this time.

<sup>8</sup> The loss of power at the Division 2 Communications Center knocked out the CAD system for about four hours. VSP moved communications to its mobile command post and had phones and the STARS radio operational in about 30 minutes after the power went out, but CAD was not restored until generator power came back on at 2:30 p.m. As a result, the totals for Division 2 in Table 1 are likely lower than the actual number of calls for service.

Throughout the day, the VDOT Communications Division and district PIOs, VSP Public Relations, and VDEM shared information with the public with increased regularity as conditions deteriorated. In order to reach drivers who watched morning news, VDOT and VSP media interviews began at 5 a.m. and continued throughout the day. News releases were also issued ahead of the start of commute traffic. By midmorning and throughout the afternoon, VDOT and VSP social media messaging increased, including direct messaging with affected drivers. Social media messaging included real-time images of snow-covered roads from traffic cameras along the I-95 corridor and warned residents, and motorists in general, to avoid travel due to dangerous road conditions.

“Snow-clearing operations may be impacted by crashes and downed trees on major roadways.”

—VDOT Central Office Communications Division press release, January 3, 3:15 p.m.

“Travel remains hazardous through commonwealth.”

—VDOT Central Office Communications Division press release, January 3, 3:15 p.m.

VSP issued three separate statewide press releases with traffic crash and disabled vehicle data, as well as persistent messaging to monitor VDOT’s 5-1-1 communications channels for road condition updates. Additionally, the VDOT Customer

“I-95 traffic in Fredericksburg area remains stopped for incidents. Travelers should continue to avoid I-95 in the Fredericksburg area; VDOT is working to reach scene to clear incidents and reopen lanes, but no reopening time is available.”

—VDOT Fredericksburg District social media post, January 3, 3:25 p.m.

Service Center was receiving frequent phone calls from people stopped in traffic, asking for reopening times and saying that they had not seen a snowplow. Ultimately, the VDOT Customer Service Center fielded over 20,000 calls on January 3 and 4, a five-fold increase from the previous week.<sup>9</sup>

Meanwhile, VDOT Regional Traffic Operations Centers (TOCs) updated interstate variable message signs to communicate with motorists (see Appendix D for a full list of these messages). Messages were changed or updated as weather, road, and traffic conditions changed.

## January 4

As nighttime set in on Monday, January 3, sub-freezing temperatures turned the wet, packed snow on I-95, which had accumulated from the incidents that precluded plowing, into ice. This further limited the movement of motorists and severely hampered snow removal response. Additionally, regular duty and heavy-duty wreckers stopped responding to calls on the interstate. Consequently, the queue continued to build and by 3:00 a.m., clusters of disabled cars and tractor trailers were intermittently scattered along a 40 mile stretch of I-95 (from MM 148 to MM 110) in both directions

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<sup>9</sup> VDOT Customer Service Center interactive voice response data provided by VDOT.

of the highway with an additional blockage further north on I-95 around MM 165. Meanwhile, alternate routes remained impassable. In response, VDOT and VSP leadership adjusted their strategy, closing sections of I-95 to prevent more motorists from entering the queue and pulling immobile cars off the interstate so that snowplows and graders could clear the highway. Officials from VDOT, VDEM, and VSP convened a virtual meeting at 5:00 a.m. to strategize, and at 5:30 a.m., VDEM hosted a call with locality emergency managers in affected localities to inform them of the situation and request their assistance. At 8:00 a.m., VDOT officials formally closed access to I-95 between MM 104 and 152 northbound and between MM 152 and 136 southbound. Local police and VSP initiated a joint effort with VDOT to close on-ramps and detour traffic (for example: VSP, VDOT, and Fairfax County and Prince William County Police Departments worked together to detour southbound traffic onto Route 1 at exit 166A until crews could clear sections of the lanes) while communications personnel from all agencies began working together to draft press releases on the updated closure. Concurrently, localities were beginning efforts to open shelters and warming centers for residents without heat or power.

At 9:14 a.m. on January 4, at the request of VDOT, VDEM sent a Wireless Emergency Alert (WEA) directed to motorists stuck on I-95: “I-95 Drivers: State & locals coming ASAP with supplies & to move you. [www.virginiadot.org](http://www.virginiadot.org).” VDEM initiated an email chain with representation from the Governor’s Office, VDEM, VDOT, VSP, the Virginia National Guard, Dominion Energy, and affected locality PIOs to assist in developing media talking points. VDOT, VSP, VDEM and the Governor’s Office hosted joint media calls at 11:30 a.m. and 4:00 p.m. and state agencies continued to issue press releases and post updates to social media outlets throughout the day.

On Tuesday, January 4, leadership from VDOT and VSP conducted a helicopter flyover to gain larger scale situational awareness. They gained perspective on the extent of the backup that educated tactical approaches to the closure, snow removal, and vehicle removal operation. Efforts to clear the highway continued throughout the afternoon. Calls from stranded drivers to the district office tapered off and ceased altogether at approximately 3:30 p.m. as the last trapped motorists were evacuated from I-95. The highway reopened at 7:30 p.m.

## Discussion and Analysis

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This section provides answers to the following key questions for the public and for state agencies that are striving to do better:

- How did road conditions get so bad?
- Why couldn't VDOT keep up with snow removal?
- Why didn't VDOT close the highway sooner?
- Why didn't state agency leadership understand how bad the I-95 conditions were getting?
- Why didn't VDOT open the I-95 express lanes to traffic?
- Why didn't state agencies provide direct assistance to stranded motorists?
- Why didn't anyone tell people not to travel on I-95, or report how bad the traffic was?

### How did road conditions get so bad?

As noted in the reconstruction, VDOT districts reported that the snowfall rate on Monday, January 3 approached 3 inches per hour for several hours in some areas, which is classified as blizzard conditions in VDOT snow plans, and challenges all snow removal capabilities to clear the roads. However, snow removal was not the only challenge. Numerous cascading challenges complicated the snow removal operations; and as a result, sections of I-95 became impassible. Figure 4 (on the next page) summarizes these challenges, and we provide additional context below.

**First, the changing weather.** The January 3 winter storm turned out to be the largest snowfall in the area in the last six years; however, temperatures on Sunday, January 2 reached the mid-60s across the commonwealth. On Saturday, January 1, Washington, DC, set a record-high minimum temperature of 53 degrees Fahrenheit, surpassing the previous January record of 51 degrees from 1876, while Washington Dulles International Airport set a record-high low temperature of 56 degrees, surpassing the record of 50 degrees from 1966.<sup>10</sup> The warm weather may have lessened public attention to the numerous VDOT, VSP, and VDEM messages and travel warnings leading up to January 3 (see the section “Why didn't anyone tell people not to travel on I-95, or report how bad the traffic was?”). Additionally, almost 1.5 inches of rain fell between January 1 and 2, which prevented a critical mitigation measure (roadway pre-treatment<sup>11</sup>) and softened the ground. The latter became

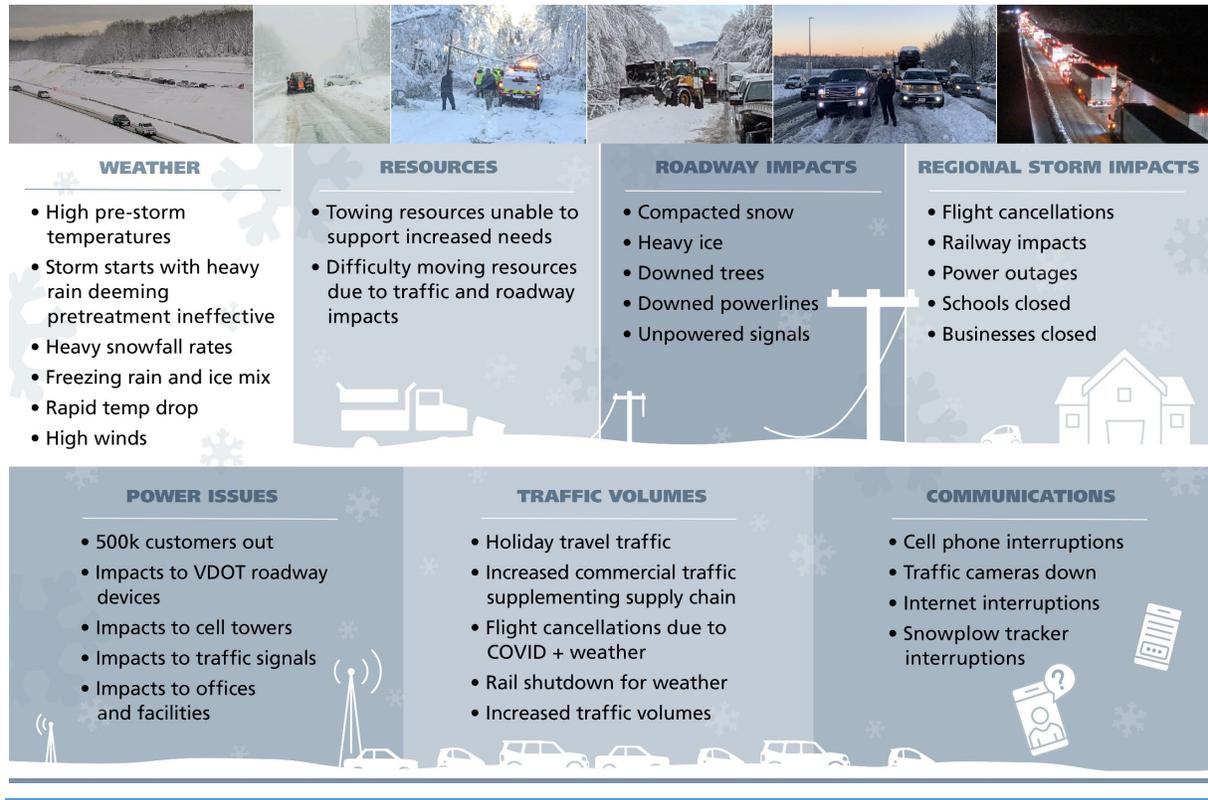
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<sup>10</sup> <https://www.washingtonpost.com/weather/2022/02/01/dc-january-recap-cold-snowy/>.

<sup>11</sup> Pre-treatment is an anti-icing technique where chemicals are applied to *dry* pavement up to 48 hours before a winter storm when pavement temperatures are above 20 degrees. This prevents a bond from forming between the pavement and the snow and ice after the storm starts [VDOT Culpeper District Reference Manual].

*At a glance...*

**Figure 4. Ongoing challenges related to the weather, resource gaps, roadway impacts, regional storm impacts, power, traffic volume, and communications.**



especially important because the heavy snow falling at high hourly rates weighed down trees in saturated soil, causing more tree fall (including on major roadways) than historically occurs in snow events.

**Second, the traffic volume.** Over the New Year’s Day holiday weekend, staffing issues due to the COVID-19 Omicron variant resulted in hundreds of flight cancellations across the US, including 200 flight departure and arrival cancellations at the three National Capital Region airports on Sunday, January 2. Then, on Monday, January 3, storm-related ground stops added to the COVID-19 issues, resulting in additional cancellations (both departures and arrivals), including 744 at Ronald Reagan Washington National Airport, 300 at Baltimore/Washington International Thurgood Marshall Airport, and 219 at Washington Dulles International Airport.<sup>12</sup> As a result, travelers coming back from winter breaks took to the roads in force, with many out-of-state travelers joining Virginians on

<sup>12</sup> All flight cancellation information from [aspm.faa.gov](https://aspm.faa.gov)

road. As a result, the traffic volumes on I-95 around Fredericksburg on January 2 into early January 3 (before the snow) were on average 65 percent higher than on the same days in 2019.<sup>13</sup>

In addition to the heavier-than-normal traffic, the overall number of tractor trailers on Virginia interstates has increased almost 30 percent since 2019 for two reasons, both related to COVID-19.<sup>14</sup> First, supply-chain issues have led to increased just-in-time trucking, requiring more trucks on the road at a time to push available commodities to where they are needed. Second, the trucking industry has taken advantage of COVID-19's effect on regular commuter traffic patterns by spreading out their hours of travel throughout the morning, with a truck traffic peak now closer to 2:00 p.m.<sup>15</sup>

**Third, highway conditions and topography.** Anyone who drives in the National Capital Region understands that traffic in and around Fredericksburg is predictably unpredictable. In that area during rush hours, expected commute times can nearly double based on traffic alone (discounting other delay variables such as incidents and construction).<sup>16</sup> In 2017, a cloud-based traffic analysis tool (from INRIX) confirmed the negative reputation of this area, with study results noting that I-95 in Fredericksburg has the worst traffic hotspot in the United States.<sup>17</sup> In addition to the volume of traffic, the area has steep, long hills (climbing northbound) that frequently slow down trucks. Multiple work zone barriers block shoulders, which affected snow removal by reducing the shoulder areas where snow could otherwise be pushed.

## Why couldn't VDOT keep up with snow removal?

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### *At a glance...*

- *VDOT districts were appropriately mobilized based on the weather forecast.*
  - *Snowplow operations gradually fell behind as conditions worsened and downed trees and power lines blocked roadways.*
  - *Wreckers stopped responding to the interstate when day-shift drivers timed out of their eligibility and trucking companies would not send additional resources to gridlocked areas.*
- 

VDOT snow response plans are based on five mobilization levels: I–V, with I requiring the least resources and V requiring the most. To account for difference in local impacts, these levels are set by individual districts and residencies (Table 2) rather than the Central Office. The levels prescribe staffing and equipment mobilization numbers, assign snowplow routes for both VDOT and contractor

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<sup>13</sup> VDOT Probe/INRIX data

<sup>14</sup> VDOT Probe/INRIX data

<sup>15</sup> VDOT Probe/INRIX data

<sup>16</sup> <https://storymaps.arcgis.com/stories/c26b3662fa244e60a11fc7e64a10a716>

<sup>17</sup> <https://inrix.com/press-releases/us-hotspots/>. INRIX did a follow-on study in 2021 that showed an overall 65% decrease in congestion, but that change was attributed to COVID traffic patterns.

equipment, and prompt applicable response measures (such as pretreatment). As the weather forecast worsened significantly in the days before the snow event, VDOT districts updated their mobilization levels to match resource deployment to expected increasing impacts. By the time the storm hit, all but the three least-impacted Districts (Hampton Roads, Richmond, and Salem) were at Level IV mobilization.

**Table 2: VDOT mobilization numbers across districts**

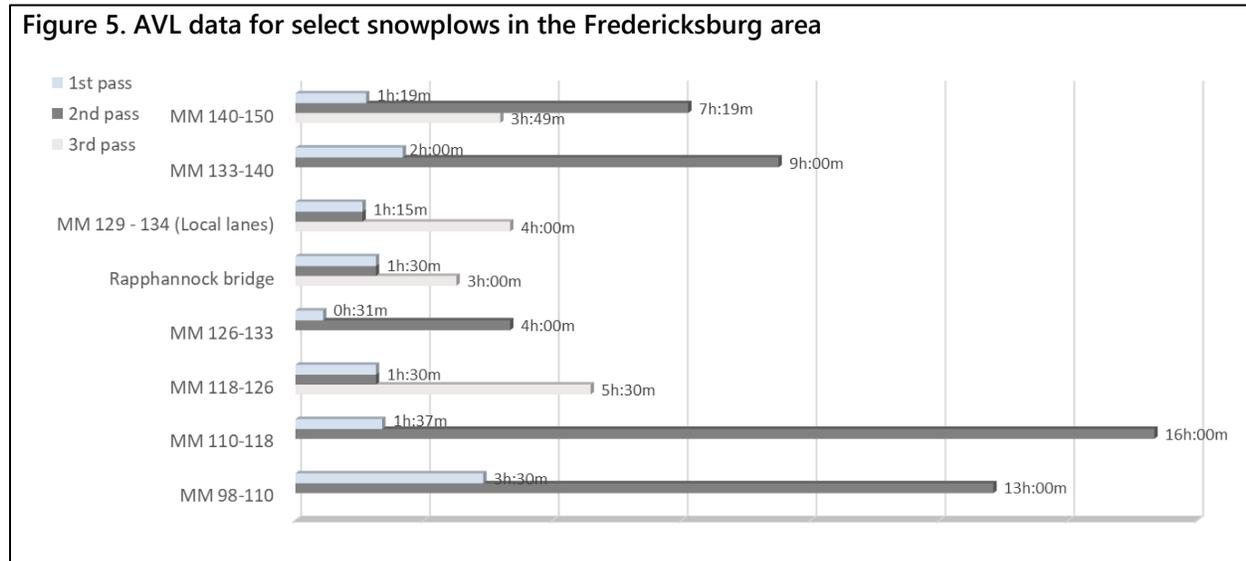
District	January 2 10 AM report Mobilization levels	January 3 10 AM report Mobilization levels	January 3 mobilized VDOT staff	January 3 mobilized VDOT and contractor equipment
Staunton	IV	IV	614	803
Bristol	III	IV	500	512
Culpeper	III	IV	426	574
Fredericksburg	III	IV	389	1,020
Hampton Roads	II	II	312	170
Lynchburg	II	III	370	354
NOVA	III	IV	467	2,737
Richmond	II	II	500	723
Salem	II (West), I (East)	III	400	380

All VDOT districts reported that before the storm, they were resourced according to their designated mobilization levels with no gaps, having both VDOT-owned vehicles and contracted snowplows and wreckers, and were ready to implement snowplow operations. Starting on Monday morning (January 3), VSP and VDOT worked together to address the high number of incidents (including several involving tractor trailers) that occurred on snow covered roads, clearing wrecks in two-to-four hours depending on the type of vehicle involved. However, as snowfall rates reached upwards of 3 inches per hour, VDOT (especially in the Fredericksburg District) slowly got behind in plowing and treating areas with stopped traffic. Additionally, plows and wreckers could not use shoulders as staging areas or to push snow, as many were blocked by work zone barriers and/or by motorists attempting to drive who had then gotten stuck. Tractor trailers with mechanical failures caused additional issues because their brakes and tires are often not suited to cold and slippery conditions. Between 7:30 a.m. and 10:50 a.m., numerous tractor trailers on a seven-mile stretch of I-95 were immobilized due to accidents (some having jackknifed across several lanes of highway) or mechanical failures (see Figure 4).<sup>18</sup>

VDOT’s *Maintenance Best Practice Manual* indicates that snow should be removed before it is compacted by motorists; however, the rate of snowfall combined with the volume of traffic on the road meant the snow was packed down quickly. Throughout the day on Monday, January 3, snowplowing operations (including support from VDOT Roadway Monitors, state troopers, and wreckers) were slowed while snowplows took longer and longer to complete their assigned routes

<sup>18</sup> There was a rumor that trucks were using the left-hand lanes throughout the event. Analysis of traffic data did not prove this conjecture, however, so we do not address it in this report.

(see Figure 5). On the morning of Monday, January 3, the Fredericksburg District reported that the most severe delays occurred between mile markers 98 and 118. For example, snowplows responsible for mile markers 110 to 118 completed their first pass in just over 1.5 hours and their second pass in 16 hours, and then could not complete a third pass.



Throughout the day on Monday, January 3, falling branches, downed power lines, and trees also impeded snow removal efforts across the commonwealth, with several VDOT districts reporting serious impacts on primary and secondary roads. Reports of downed trees (caused by the combination of heavy snow and high winds) began around 8:00 a.m. that Monday and continued throughout the morning. Cut-and-toss crews (some that were pre-staged and others that were on standby and mobilized based on need) responded but were soon overwhelmed by the sheer numbers of fallen trees, many entangled with power lines (VDOT cannot remove trees entangled with utility lines for safety reasons). More tree teams were called in, but they struggled to get to affected areas due to stopped traffic, which also delayed wreckers responding to disabled vehicles.

By Monday evening, January 3, additional challenges led to a widespread traffic stoppage. First, vehicles moving slowly on an under-plowed road throughout the day packed the snow. As temperatures dropped, several inches of ice formed on the road, which required specialized equipment<sup>19</sup> to break up. Concurrently, regular duty and heavy-duty wreckers stopped responding to the interstate for two reasons:

- Day-shift drivers (who are regulated by large vehicle restrictions on shift lengths) timed out of their driving eligibility.<sup>20</sup>

<sup>19</sup> This equipment can include snowplows with a cutting edge, icebusters and/or scarifiers, and motor graders. Each require highly skilled operators, and in the case of the latter, risk permanent damage to the roadway.

<sup>20</sup> It is plausible that these restrictions could have been waived had there been an emergency declaration. See “Why didn’t state agencies provide direct assistance to stranded motorists?” for additional discussion.

- Trucking companies would not send additional wreckers and drivers to gridlocked areas that already contained several of their immobilized staff and equipment.

VDOT activated the Towing Recovery Incentive Program (TRIP) early in the morning on Tuesday, January 4 to fill the wrecker gaps. TRIP wreckers from outside of the Fredericksburg area were used throughout the day on January 4.<sup>21</sup>

However, identifying additional resources were only part of the problem. While VDOT districts could fulfill their mobilization requirements, COVID-19 impacts to contractor staffing meant that few extra resources were available in the area to surge when needed. Furthermore, when VDOT identified additional resources in less impacted areas, these resources could not easily get through the traffic to where they were needed. For example, five contract trucks sent by the VDOT Hampton Roads District to the Fredericksburg area during the day on Monday, January 3 were seriously delayed by traffic, and six trucks from the VDOT Northern Virginia (NOVA) District arrived late—and only after arranging for VSP escort and taking the express lanes (see the section “Why didn’t VDOT open the I-95 express lanes to traffic?”). That evening, VSP and VDOT made a joint decision to send snowplows against the normal traffic direction to get to the sites of the most extreme stoppages.

## Why didn’t VDOT close the highway sooner?

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### *At a glance...*

- *There were no viable alternate routes between Richmond and Washington D.C., as secondary roads were also impeded/unpassable/limited due to snow, fallen trees, and downed power lines.*
  - *Until late in the evening on Monday, January 3, traffic was still moving, and VSP and VDOT still considered keeping I-95 moving (no matter how slowly) their primary mission.*
- 

In theory, closing I-95 around Fredericksburg earlier on Monday, January 3 would have given snowplowing personnel and equipment access to the roadways and improved the snow removal process. However, with the information available prior to and during the day, VDOT and VSP did not consider closing this part of I-95 a realistic solution, because there were no viable alternate routes available. The primary and secondary roads that surround I-95 (such as I-64 and Routes US 1, US 3, US 301, and US 17) were all unpassable or barely passable at different times of the day due to car accidents, downed wires and trees, and snow-covered roads (see the orange and red roadways in Figure 6). For example, even as early as 8:00 a.m. on January 3, VDOT staff in the Culpeper District were not able to get home after coming off the night shift. In addition to the road conditions, many of the areas surrounding alternate routes were without power, and most businesses were unable to provide support to travelers even if they could get there.

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<sup>21</sup> TRIP is an incentive program that partners VDOT with heavy-duty towing and recovery companies to standardize their response to commercial vehicle accidents. See more on [VDOT’s website](#).

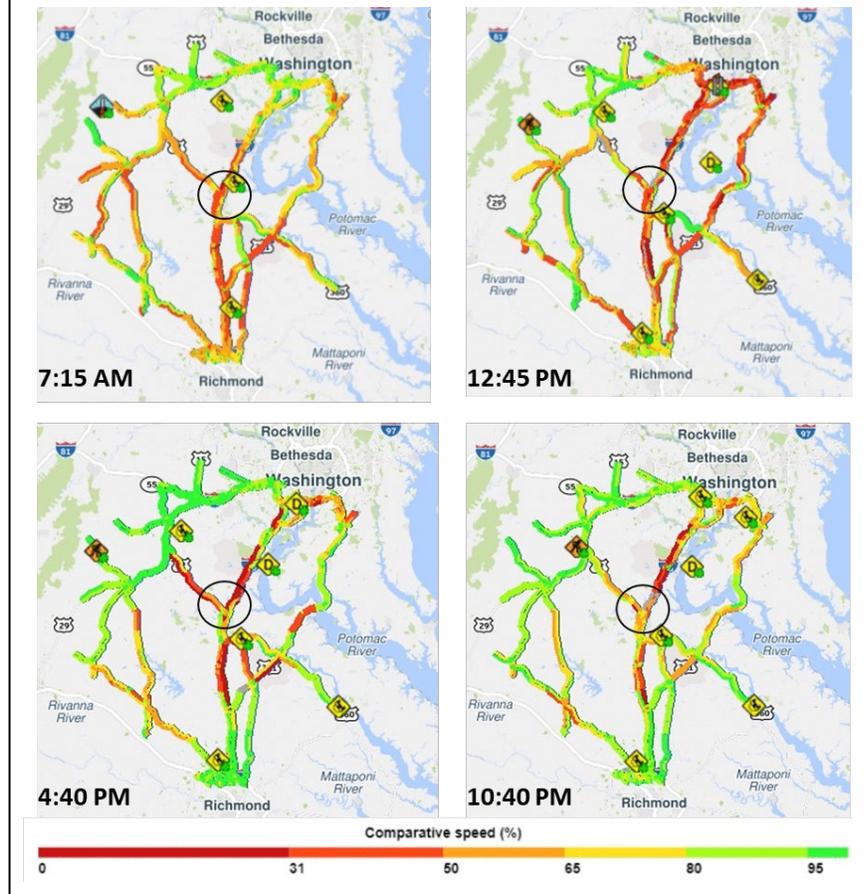
The question remains whether diverting traffic well before the congestion on I-95, or a closure to some types of traffic (such as tractor trailers), earlier during the day on January 3 might have positively affected outcomes. To avoid the worst areas on I-95 and take alternate routes, cars on I-95 North would have needed to be rerouted starting in Richmond (taking I-64 to I-81 to I-66 to the Beltway), and cars on I-95 South would have had to detour starting around the District of Columbia (doing the reverse). However, traffic flow on these alternate routes was also tenuous. For example, hundreds of trees were down on I-64 between 8:20 a.m. and 3:00 p.m., leaving one minimally passable lane between MM 124 and MM 147.

More importantly, VDOT and VSP did not consider enacting

an extensive closure during the day because travelers could still drive through one or more lanes (at very slow speeds) in small open segments between bottlenecks. These areas of movement and stoppage shifted throughout the day as accidents and stopped vehicles occurred and were cleared along the corridor, but traffic was slowly moving, and VDOT and VSP focused on keeping it that way rather than considering wide-reaching closure. Finally, while VDOT districts maintain detailed snow removal plans, they do not maintain plans for widespread interstate closure (or a closure for specific types of traffic such as tractor trailers), which would be a resource-intensive operation.

As weather conditions deteriorated into the evening on January 3, VDOT and VSP responders continued to respond to incidents on I-95, keeping lanes clear as best they could in accordance with VDOT's *Traffic Incident Management Manuals*. When accidents or conditions made an area impassable, VDOT and VSP closed small sections of I-95 to clear the obstruction and get traffic moving again. As long as VSP troopers and tow trucks were able to arrive at accident scenes, field supervisors considered the situation to be stable and did not push information to the contrary up to leadership. However, throughout these operations, those in the field could not see the extent of the growing queue due to a broader lack of situational awareness (as described in more detail in the next section,

Figure 6. Average I-95 and surrounding highway traffic speeds, January 3, 2022 (in the morning, early afternoon, late afternoon, and night)



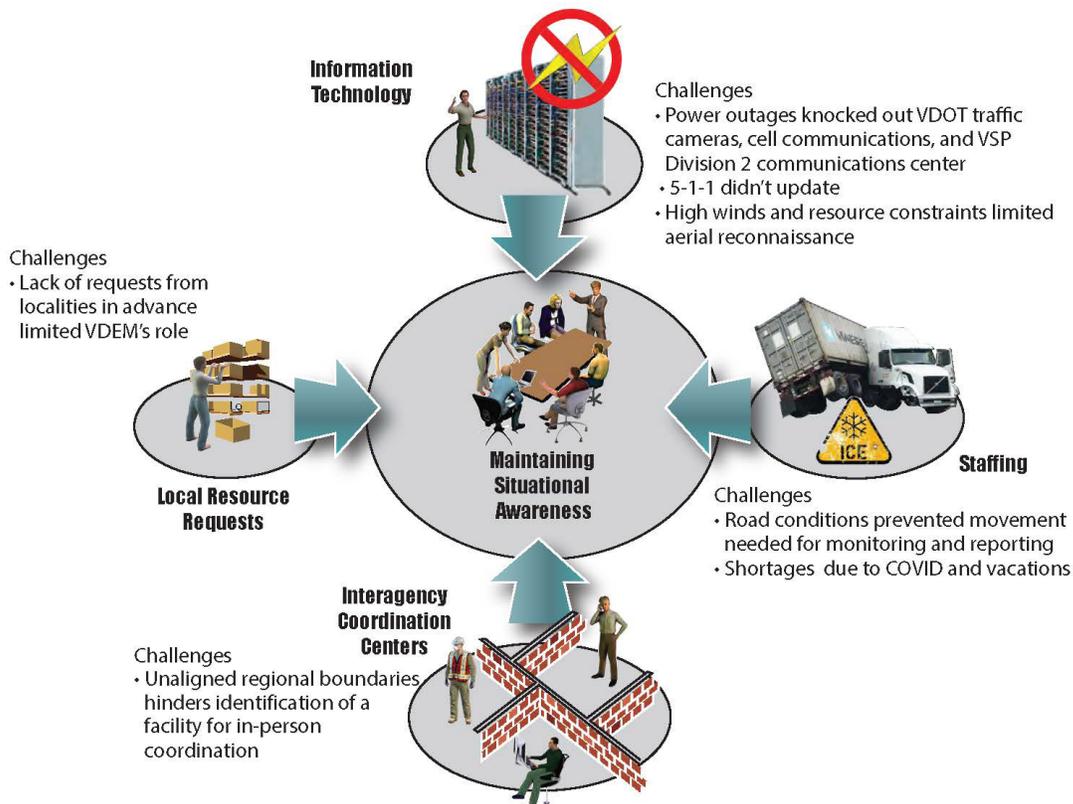
“Why didn’t state agency leadership understand how bad the I-95 conditions were getting?”). Once it became clear that the freezing temperatures turned slush into ice and wreckers stopped responding, field responders notified VSP and VDOT executive leadership asking for assistance. By 3:00 a.m. they decided that it was necessary to close I-95 to give responders space to clear the roads, and at 8:00 a.m. on January 4, they formally closed access to I-95 between MM 104 and MM 152 northbound and between MM 152 and MM 136 southbound.

## Why didn’t state agency leadership understand how bad the I-95 conditions were getting?

State agencies collectively lost situational awareness and could not verify the extent and locations of the blockages on I-95 as the queue built throughout the day and into the overnight hours. This loss occurred when traditional methods of information gathering broke down and alternatives methods were also unsuccessful. Figure 7 provides an overview of methods (and challenges to those methods) the state uses to build situational awareness around major roadways as well as a brief description.

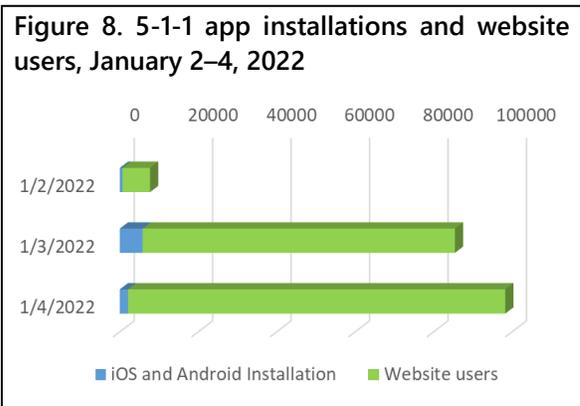
### At a glance...

**Figure 7. Methods to build situational awareness along the interstates, and challenges experienced on Monday, January 3**



**Information technology.** To build situational awareness on Virginia highways, VDOT and VSP rely on a series of technologies, many of which experienced challenges during this incident.

- Both VDOT and VSP rely on I-95 traffic cameras to build situational awareness daily. However, early on Monday, cameras in the Fredericksburg area stopped operating due to widespread power outages.
- The VSP Division 2 Communications Center lost power and experienced issues with their generator. As a result, they lost dispatch capabilities for 30 minutes and then operated from their mobile command unit, which limited the number of staff who could work on gathering and passing on situational awareness information.
- The VDOT Fredericksburg District experienced severe issues with communications caused by inoperable cell towers and widespread power outages that affected district facilities and staff working remotely.
- VDOT 5-1-1 provides real-time traffic information to the public. However, for four hours on Monday (between 7:30 and 11:30 a.m.), the system stopped updating.<sup>22</sup> Meanwhile, users were seeking information from 5-1-1, with dramatic increases in both app installations (on iOS and Android platforms) and website users (see Figure 8).



In response to the outages and technical difficulties, VDOT and VSP explored other options to gain an aerial view of the interstate on January 3. However, small drones were not an option due to high winds, and the closest VSP helicopter was dedicated for Med-Flight missions. If it was taken out of Med-Flight status, there would have been no way to fly a critically injured or ill person to a hospital, which may have been the only way to get someone quickly to a hospital given the extent of road closures due to downed trees and power lines.<sup>23</sup>

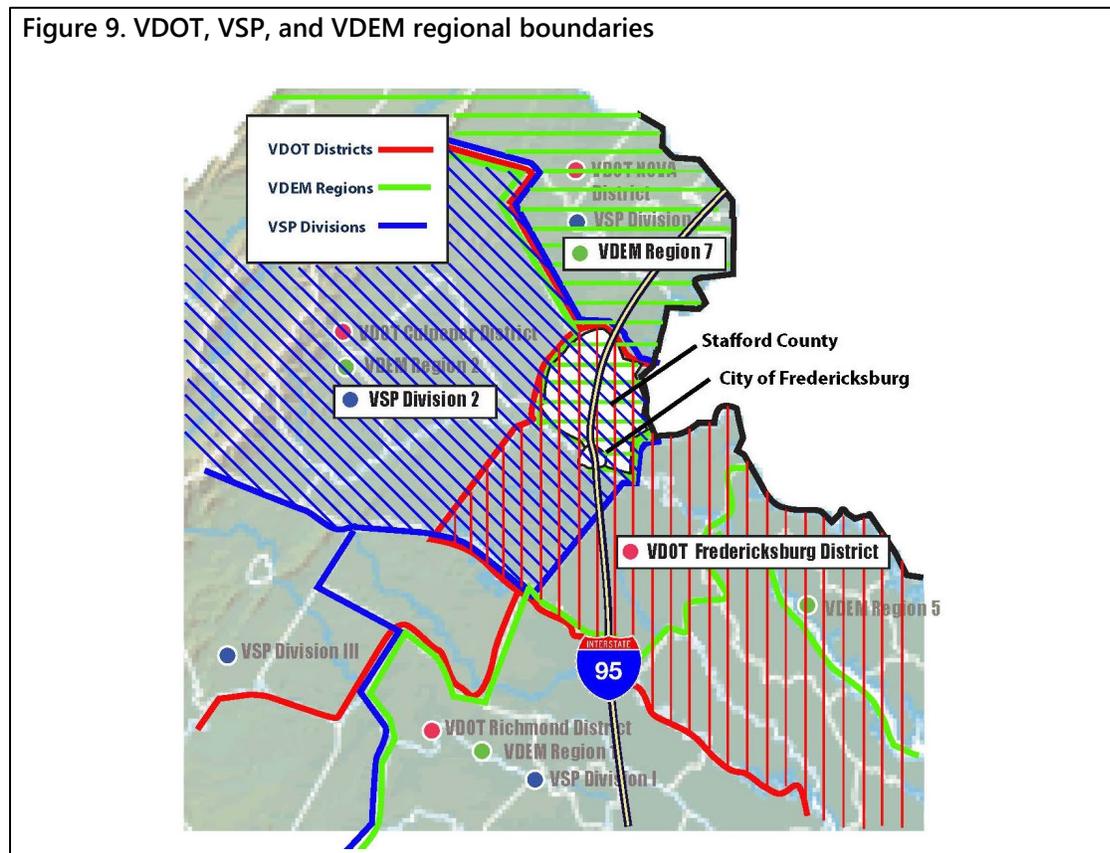
**Staffing.** In addition to technology, both VDOT and VSP rely on their headquarters, regional, and field-based personnel to help build a common operational picture. Field-based staff (e.g., VSP troopers and VDOT Safety Service Patrols and Traffic Monitors) report on road conditions to their respective district and regional headquarters. At each of the commonwealth’s five regional TOCs, staff aggregate information that comes in from VDOT safety service patrol crews, VDOT District monitors, and VSP teletypes from dispatch centers.

<sup>22</sup> TOC staff were providing information into VATraffic (from which 5-1-1 pulls data) at standard intervals, but the system updates did not include new inputs. The reported reason for the system failure was excessive load, which caused the system to crash as it tried to balance the load between the two major data centers.

<sup>23</sup> The next closest VSP helicopter was in Lynchburg and would have arrived after dark (when visibility is low). VSP and VDOT leadership were able to observe the extent of the queue via helicopter when it was light on Tuesday, January 4. Civil Air Patrol also provided aerial photos of I-95 as well as primary and secondary roads, but not until January 4.

Some VDOT Districts experienced shortages of field staff (including both Safety Service Patrols and Traffic Monitors) due to COVID-19 infections and exposure, roadway conditions preventing staff from reporting to work, and staff unavailability caused by the holiday weekend. VSP was also experiencing statewide staffing issues before the weather event, with vacancies across the department. While VDOT and VSP called in all available personnel and went to 12-hour shifts to mitigate any staffing shortages, field-based staff were busy responding to the hundreds of incidents and were unable to drive the interstate to gauge the extent of the queue. Given only the information observed at individual traffic accident locations, field supervisors considered the situation to be stable, and were not pushing information up to leadership. Compounding difficulties in the field, some VDOT TOCs also had staffing issues due to COVID-19 and vacations, and the extreme traffic and road conditions hindered staff from getting to the TOCs after shift changes.

**Interagency coordination centers.** In Northern Virginia, VDOT NOVA District, VSP Division 7, and VDEM Region 7 are essentially co-located (except Stafford County - see Figure 9). Further, headquarter facilities and the TOC are also located in close vicinity in Fairfax County. As such, the state agencies in that area have a long history of working in close collaboration, and the TOC became a natural location for interagency coordination as early as January 2.<sup>24</sup>



<sup>24</sup> VDEM Region 7 sent a liaison to the Northern TOC on January 4.

However, in Central Virginia, regional boundaries are less aligned, especially for the City of Fredericksburg, Spotsylvania County, and Stafford County (again, see Figure 9). For example, the City of Fredericksburg, Spotsylvania County, and Stafford County are part of VSP Division 2, which is headquartered in Culpeper. The City of Fredericksburg and Spotsylvania County are part of VDEM Region 2, which is also headquartered in Culpeper, while Stafford County is part of VDEM Region 7. However, the City of Fredericksburg, Spotsylvania County, and Stafford County are part of the VDOT Fredericksburg District, which extends south toward Richmond and east toward Hampton Roads. Finally, the VDOT Fredericksburg District is supported by two TOCs, the Northern Region TOC (exclusive to I-95 within Stafford and Spotsylvania Counties and the City of Fredericksburg) and the Central Region TOC.

To overcome this complicated alignment, agencies share mobilization and other pre-event plans. VSP also staffs Area Offices within each of their divisions to facilitate interagency coordination, even when the larger regional offices are not aligned.<sup>25</sup> Despite these efforts, the geographic unalignment hindered identification of a natural location for facilitating in-person interagency coordination in and around the Fredericksburg area. This was addressed on Tuesday, January 4 when VDOT staff joined VSP and local public safety agencies at the Stafford County Public Safety Center. In subsequent weather and special events (since the January 3-4, 2022, winter weather event) VSP, VDOT, and VDEM have actively worked to co-locate personnel to facilitate interagency coordination and information sharing.

**Local resource requests.** VDEM relies on state agencies to provide information and on localities to submit resource requests to develop situational awareness on incident impacts. To this end, VDEM was in direct contact with localities and state agencies prior to the winter storm and throughout the day on Monday, January 3.<sup>26</sup> VDEM also facilitated a statewide mission coordination call at 3:30 p.m. While state agencies indicated that signification delays on I-95 had been a problem all day, they did not report that they were exceeding their operational capacity. Additionally, only one local agency requested resources at this time (for an additional chainsaw crew for Fluvanna County), and there were no locally declared states of emergency.

Despite the challenges noted above, public information was coming into Virginia agencies through calls from stranded motorists into VDOT's Customer Service Center, VSP and local law enforcement 9-1-1 systems, and VDEM's Situational Assessment Unit. In addition, there was a great deal of social media posts referring to slow and stopped traffic. While VDOT, VSP, and VDEM were collecting information that could have helped them understand the severity of the traffic (e.g., the length of the queue) or of the rapidly deteriorating road conditions, there are no plans, procedures, or policies to guide how these organizations might validate and use these non-traditional data sources to quickly form a common operational picture. In turn, the information was not conveyed to agency leadership in real time.

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<sup>25</sup> VSP Division 2 Area 5 Office is located in Spotsylvania County, just south of the City of Fredericksburg.

<sup>26</sup> Late on Monday, January 3, at least one locality reported concerns to a VDEM region on the conditions on I-95, which were communicated to VDEM headquarters in a spot report.

When traffic came to a standstill around midnight, VSP and VDOT communicated up their chains, and senior leadership were made aware of the poor road conditions and inability to clear the queue; they made the decision to close I-95 to clear the queue and not allow more traffic to build. At 5:00 a.m., VDEM leadership were engaged and hosted an interagency coordination call to discuss the requirements and resources needed to close the interstate. At 5:30 a.m., VDEM hosted another call with locality emergency managers and public safety agencies to request their assistance to block exits and redirect traffic off I-95. Throughout the day on Tuesday, January 4, VDEM, VDOT, and VSP maintained close coordination and engaged with localities to assist motorists and gradually clear the road.

## Why didn't VDOT open the I-95 express lanes to traffic?

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### *At a glance...*

- *Express lanes were kept open to I-95 North traffic the morning of January 3 to alleviate northbound traffic.*
  - *VDOT and Transurban closed all express lanes later in the day to keep them available for first responders.*
- 

Express lanes, which terminate at MM 143, are available for use during exceptional circumstances. At the start of the winter weather on the morning of January 3, VDOT and its partner Transurban determined to keep the express lane stretching south to exit 143 open to traffic northbound on I-95 with the hope that it would help alleviate northbound traffic. As traffic conditions deteriorated throughout the morning and traffic began to slow in both the lanes and on shoulders, VSP and VDOT saw limited options for emergency travel. Allowing the public to use express lanes risked blocking them as well, so late in the afternoon of January 3, rather than transitioning the express lanes to southbound traffic, VDOT and Transurban decided to close all express lanes to the public. Doing so aligned with standard snow practices in the commonwealth to ensure that first responders can respond to an emergency occurring on the interstate, and so VDOT could turn plows around. As frustrating as it was for motorists to see an open and plowed lane nearby, the open lanes needed to remain closed so that VSP and VDOT had contingency planning options as they prepared for and responded to medical and other emergencies on I-95.

## Why didn't state agencies provide direct assistance to stranded motorists?

State agencies explored the feasibility of providing direct assistance to stranded motorists. *Direct assistance* can have many meanings and may involve multiple state agencies; options that emerged included performing wellness checks, providing shelters and warming centers, and deploying the Virginia National Guard for support.

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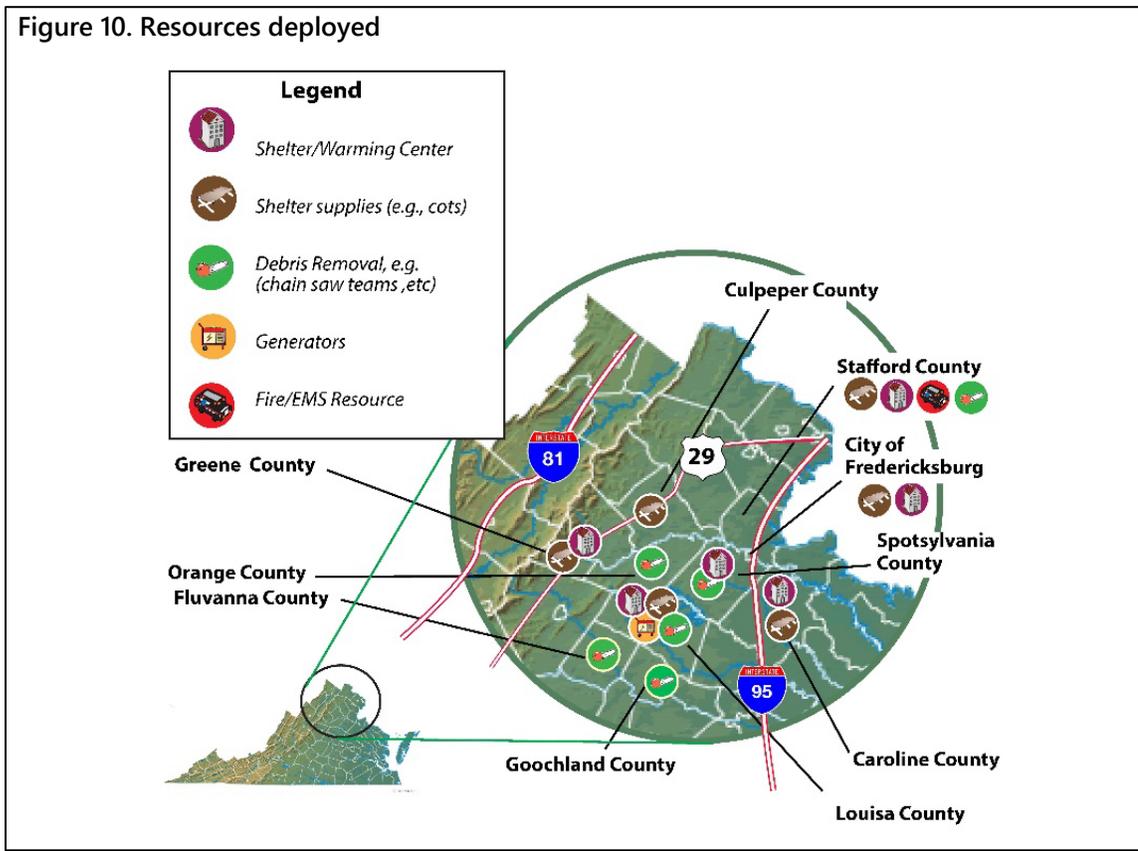
### *At a glance...*

- *VSP and VDOT personnel in the field did conduct wellness checks to the extent possible, but their primary mission was to get traffic moving.*
  - *Localities opened shelters and warming stations on Tuesday, January 4, but there was no way for immobile drivers to get to them until the interstate was cleared.*
  - *Virginia National Guard needs 12 – 24 hours to mobilize and deploy personnel, and therefore would not have been able to provide direct assistance to stranded motorists.*
- 

**Wellness checks:** A formal wellness check mission in this context would entail tasking a team of responders to personally check in with each car stuck in the queue. VDOT and VSP concluded that the best way to help the stranded motorists was to clear the incidents on the highway, remove the snow, and get traffic moving again. Enacting a formal wellness check mission would have shifted resources away from clearing incidents and removing snow, ultimately delaying the goal of getting the traffic moving. That said, both agencies encouraged their deployed personnel to provide support and engage with motorists to the extent possible. During the overnight hours, numerous VDOT staff and VSP troopers walked on the ice between cars to check in with motorists in between responding to incidents and clearing the road. Some distributed cold weather supplies they keep in their vehicles for their own personal preparedness. They were limited based on what they could carry in their arms, the amount of supplies they had in their vehicles, and the short distance their radios can travel from their cars before they are out of range.

**Sheltering:** On Tuesday, January 4, several localities across the commonwealth opened shelters and warming centers beginning in the afternoon and evening, primarily to provide support for residents without power or heat (see Figure 10). Although these shelters served an important function, they were not positioned to respond to the stranded motorists specifically. There was no feasible way to move motorists out of their vehicles and into shelters, which are in pre-designated locations not necessarily near I-95, with the traffic, weather conditions, and volume of people on the highway.

**Virginia National Guard:** As the extent of the situation on I-95 became clear on Tuesday, January 4, state officials explored the possibility of deploying the Virginia National Guard. However, the Virginia National Guard was not a viable option for providing direct support to motorists due to the following:



- With limited exceptions, the Virginia National Guard is not a quick reaction force. Standing procedures require 12–24 hours, as well as a formal or expected emergency declaration, before personnel can be on scene. However, based on the forecast preceding the storm it was expected to be a typical event that regional and local response agencies could handle on their own. Furthermore, based on the lack of pre-event resource requests from localities and information gathered from commonwealth-wide pre-storm coordination calls, there were no anticipated missions that required pre-staging Virginia National Guard personnel and resources. Consequently, VDEM and the Governor’s Office concluded the storm did not justify a pre-event emergency declaration.<sup>27</sup>
- Even if the Virginia National Guard had been activated during the storm, once the state agencies understood the extent of the backup (on January 3 or 4), the Virginia National Guard would have had little to no impact on the situation already in progress. Upon activation and prior to deployment, personnel would have needed to receive notice and travel to their duty station through the same roads that were impassable due to traffic, downed trees, or snow coverage. Those who made it to base would then have to go through check-in, the onboarding

<sup>27</sup> Governor Northam did issue executive order 83 on January 5, 2022, which declared a state of emergency for a subsequent winter storm and retroactively included the January 3, 2022, winter storm.

process, COVID-19 testing, and assignments—all of which take time. Finally, personnel would have needed to travel to their deployment site, again using roads in poor conditions. This process would take at least 24 hours without the compounding weather events, making it unlikely that the Virginia National Guard could have arrived on scene in time to support the response.<sup>28</sup>

## Why didn't anyone tell people not to travel on I-95, or report how bad the traffic was?

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### *At a glance...*

- *VDOT, VSP, and VDEM used a variety of methods to communicate information to the public before and during the winter storm.*
  - *Messaging at times lacked explicit instructions, and few messages took into consideration drivers' emotional well-being or perspectives.*
  - *The language used in the Wireless Emergency Alert sent shortly after 9:00 a.m. on Tuesday, January 4 was misleading which allowed it to be misinterpreted by the public.*
- 

During an emergency response, communication with the public becomes especially critical, and the events of early January were no exception. Over the weekend leading up to Monday, January 3, VDOT district PIOs and the Communications Division followed common practices for raising awareness of a winter storm, posting on social media, issuing press releases, and providing interviews to media outlets, including a Weather Channel interview on conditions and safety messaging.

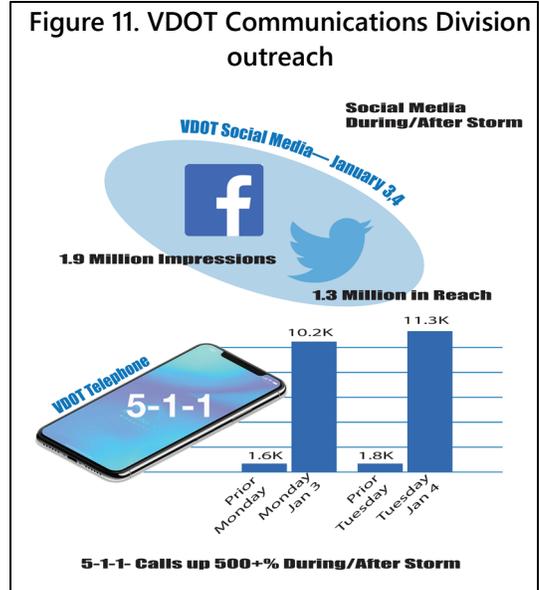
As the situation deteriorated on January 3, VDOT Communications Division social media played an increasingly major role (see Figure 11). District office PIOs also used Twitter to not only push out ongoing updates but also engage directly with residents through direct messages. During the incident, the VDOT Fredericksburg District Twitter account received over 150 direct messages, including over 90 on Monday, January 3. PIOs responded to most messages asking for more information in real time, interfacing directly with stranded drivers. VSP social media metrics also demonstrated tremendous audience reach.

Prior to the storm, state agency social media accounts warned residents to prepare for inclement weather and avoid unnecessary travel, and a VDOT Communications Division press release issued before the morning commute warned drivers to avoid travel if possible. However, most follow-on messaging in the late morning and early afternoon told the public what current conditions looked like rather than providing clear direction. Some examples from Monday, January 3 include:

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<sup>28</sup> The Virginia National Guard PIO supported interagency public communications efforts beginning on Tuesday, January 4.

- 6:45 a. m. Virginia Department of Motor Vehicles (DMV) Twitter (and retweeted by VDOT Communications Division and Fredericksburg District) “Staying off the road when it’s slick is the safest move, but if you have to travel this morning please #StayAlert and #DriveSafe.”<sup>29</sup>
- 7:27 a.m. VDOT NOVA District Twitter “The snow will soon start coming down at a heavier rate. You 🌨️ will not 🌨️ see bare pavement. We have ~2,400 trucks out in NOVA right now--more soon for 🏠. Pls be patient & stay off the roads.”
- 3:15 p.m. VDOT Communications Division Twitter “INTERSTATE 95: VDOT has more than 50 trucks deployed along I-95 in the Fredericksburg area, with 30+ more on the way. VDOT + towing crews continue to work reach the scene of these incidents to remove the trucks, plow travel lanes, and treat the road.”<sup>30</sup>
- 12:26 p.m. VSP Public Relations Facebook “The snow is collecting too fast for even #VSP troopers to keep their vehicles clear as they respond to hundreds of crashes & stuck vehicles! #VSP troopers are up to 559 traffic crashed & 522 disabled/stuck vehicles across #virginia since 12:01 AM today (1/3/22). Please continue to delay your travel...for your safety & the safety of first responders & Virginia Department of Transportation crews.



However, this more passive approach relies on the public to access, read, and interpret information and to make decisions about their own travel. Furthermore, during the evening and through the night of January 3–4, few messages took into consideration drivers’ emotional well-being or perspective, and several Virginia residents impacted by the storm told media they felt abandoned. This is a critical component of crisis communications, which is intended to elicit a specific response from the public (such as reassurance about the positive measures being taken) in addition to raising awareness and providing knowledge. Instead, the response of many stranded drivers was frustration. One particular cause of frustration was the misleading language of the incident-related WEA sent by VDEM, on behalf of VDOT shortly after 9:00 a.m. on January 4 (see Figure 12).<sup>31</sup>

**Figure 12. Text of the WEA issued at 9:14 AM on Tuesday, January 4, 2022**

*I-95 Drivers: State & locals coming ASAP with supplies & to move you. [www.virginiadot.org](http://www.virginiadot.org)*

<sup>29</sup> <https://twitter.com/VirginiaDMV/status/1477969249792626689?s=20&t=IBGZL1TuTZx7nr25txxtLA;>

<sup>30</sup> <https://twitter.com/VaDOTFRED/status/1478106887585505283?s=20&t=qvFUCPdJmTPSuRSlj9U80g>

<sup>31</sup> Prince William County also sent a WEA on Tuesday, January 4 at 11:21 a.m., directed to drivers on I-95 southbound in Prince William County with instructions to exit the interstate prior to MM 148.

Stranded drivers mistakenly interpreted the alert to mean that emergency workers would soon be coming car-to-car on I-95. When they did not, many took to social media to vent their frustration.

Finally, it is important to note that much of the public messaging was aimed at Virginia drivers. Given the number of flight delays and cancelations, however, many out-of-state drivers were on Virginia's stretch of I-95. Prior to the snow and as the traffic queue built, VDOT, VSP, and VDEM may have missed opportunities to coordinate with other partner agencies (e.g., airport authorities) and neighboring states.

## Conclusion

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This report would not be complete without answering one final question: ***“What should Virginia do to improve outcomes from this type of incident in the future?”***

**Understanding the challenges.** Changes in commodity delivery and supply chains have certainly increased the volume of tractor-trailer traffic on interstates, and I-95 is no exception. Virginia should consider analyzing the increased tractor trailer traffic on interstates and the impacts of these changing patterns (as well as factors such as populations changes, emerging technologies, changes in climate, increasing numbers of alternative fuel vehicles, and the ability to process vast amounts of data) on traffic flow and volume to ensure that agencies are able to adjust staffing and resources for changing conditions during snow removal. Agencies should then update staffing and mobilization plans and contracts accordingly.

**Planning for large-scale closures during winter events.** VDOT and VSP handle serious incidents on Virginia roadways with (unfortunate) regularity. Though they have a wealth of experience and demonstrate strong coordination and collaboration, these smaller incident responses do not prepare the state for a large-scale highway response, such as the one needed on January 3. As noted in the previous section, changing conditions dictate the need for plans that speak to the possibility of long-term, extended closures of commonwealth interstates during winter weather. Existing plans (e.g., *VDOT Interstate Detour Plan*) that address specific incidents and hazards will need to be reviewed, expanded, and integrated across hazards and agencies.<sup>32</sup> These improved plans—which will also need to be trained to and exercised long before incidents occur—should include the following:

- Essential elements of information (e.g., length of highway affected, duration of expected stoppage, number of lanes open, roadway conditions, time of day, weather) that trigger deliberations on response escalation.
- A concept of operations for how closures will work, including the multiple simultaneous activities involved. This includes interagency training on the concept of operations and developed plans.
- The roles, responsibilities, resources, and tactics (such as sending snow plows against the normal flow of traffic) required to keep the road passable and if conditions warrant, close highway segments, including state and local agencies that will support each activity.
- A communications plan that includes options for multimedia approaches, coordination with other agencies (e.g., airport authorities) and states, and plans for state, local, and interagency coordination.

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<sup>32</sup> VDOT, VSP, and VDEM have already collaborated to update plans and procedures to address extended disruption to travel on limited access highways. These plans address communicating the current situation to motorists as well as the possibility of a multi-agency response.

**Getting and maintaining situational awareness.** Despite the staff shortages, VDOT and VSP were prepared to respond to the winter weather with resources as appropriate to the forecast, but the actual snowfall amount and rate presented as a much more significant event. Even so, resource gaps were not the sole cause of the difficulties encountered during the response. In the Fredericksburg area, the combination of heavy traffic, high snowfall rates, downed trees and powerlines, a lack of tow trucks and wreckers, and extreme temperature changes severely hampered snowplow operations, and was compounded by a loss of situational awareness about the extent of the queue building on I-95. With greater situational awareness of the incident across the state, VDOT and VSP could have sooner employed targeted measures, such as blocking ramps leading onto I-95, calling in additional towing resources, sending snowplows against traffic, and pulling cars to nearby commuter lots to reduce towing cycle times (rather than towing them to normal locations further away). Consequently, state agencies should consider developing additional sources to gain information during an emergency to build situational awareness. For example, using social media direct messaging and the WEA, responders could have asked motorists to report to 2-1-1 where they were and how long it had been since they moved. Twitter, which may identify at least an approximate area of Tweets, can also help build a picture of where people are stalled. Even though responders often question the validation process for crowd-sourced information, employing these newer methods of information gathering allows greater freedom from traditional technology (such as cameras) and provides secondary and tertiary options when they fail. Additionally, VDOT, VSP, and VDEM can continue to build upon the successful interagency coordination efforts and co-location of personnel achieved in the winter and special events that have occurred since the January 3-4 winter weather event. Identifying primary and secondary facilities for doing so along the I-95 corridor may more quickly support this in-person coordination.

**Messaging with the public.** There is no doubt that VDOT and VSP communicated to the public before and during the incident, and VDEM amplified their messages throughout. However, Virginia agencies will likely need to adjust to the public's new expectations for receiving and interpreting information. Response organizations can no longer expect the public to seek out information from sources such as press releases, interviews, 5-1-1, and social media posts. Furthermore, highway signs and cones, may prove to be ineffective as they can be ignored or driven around. VDOT, VSP and VDEM need to consider more direct, personal ways to communicate with the public. For example, the issuance of the WEA on Tuesday, January 4 was generally considered to be a positive, valuable tool for providing direct instructions and information to those stuck on the highway. State officials should become more proactive with direct messaging to the public.<sup>33</sup> Crisis communications training will also help state officials craft messages that provide clear direction and reassurance with empathy, and that encourage the public to act in a way that is helpful to the response. Additionally, the public bears some responsibility to stay informed about road conditions and traffic during snowstorms, and should implement an informed decision-making process before choosing to take to the roadways. If

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<sup>33</sup> While the WEA should be reserved for emergency communications, VDOT is exploring additional technology to support direct messaging to general motorists and commercial vehicles.

the public does decide to attempt a drive during winter weather, they should be prepared (e.g., packing food, water, and blankets) in case they get stuck for an extended period.

Now that this emergency has passed, the winter storm should be viewed as an opportunity to learn and improve. VDOT, VSP, and VDEM will continue to work with CNA to identify any additional challenges and develop operationally focused recommendations for improvement planning.

## Appendix A: Acronyms and Abbreviations

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AAR	after-action report
DMV	Department of Motor Vehicles
I-	Interstate
MM	Mile marker
NWS	National Weather Service
PIO	Public Information Officer
SitRoom	Situation Room
TOC	Traffic Operations Center (VDOT)
TRIP	Towing Recovery Incentive Program
VDEM	Virginia Department of Emergency Management
VDOT	Virginia Department of Transportation
VDSS	Virginia Department of Social Services
VEST	Virginia Emergency Support Team
VSP	Virginia State Police
WEA	Wireless Emergency Alert

## Appendix B: Methods

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To develop this AAR, CNA examined a wide variety of input from VDOT, VSP, and VDEM and other state agencies. Our approach included the following techniques:

- Reviewing open-source reports, news articles, and press releases.
- Reviewing documentation developed during the activation, including spot reports and situation reports, dashboards, press releases and social media posts, and hotwash notes.
- Holding hotwashes with selected VDOT districts and the VDOT Central Office. Representatives from the Northern and Central TOCs also participated:
  - Culpeper
  - NOVA
  - Fredericksburg
  - Richmond
- Discussions with key personnel from VDEM, VSP, and VDOT, including:
  - VSP Divisions 2 and 7 and the Bureau of Field Operations
  - VDEM Regions 1, 2, and 7 and the VEST Bureau and Response Programs Division
  - VDOT traffic data analysts
- Discussions with Virginia Department of Social Services and the Virginia National Guard
- Discussions with senior executive leadership from VDEM, VSP, and VDOT

## Appendix C: Other Extended Traffic Incidents during Snow Storms

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The January 3-4 winter weather event is not the first time that extended traffic stoppages have occurred during snowstorms in Virginia; similar events most recently occurred along I-81 in December 2018 and around the Springfield Interchange in December 2008.

- A snowstorm on December 9–10, 2018, resulted in as much as 2 feet of snow in areas of Virginia and created dangerous travel conditions across the state. The snow fell at a rate of 2 inches per hour and combined with sleet and freezing rain, which complicated the snow removal.<sup>34</sup> The resulting icy roadway conditions caused a 20-mile traffic backup on I-81 Northbound. The 18-hour traffic jam began in Abingdon as tractor trailers and cars crashed at Exit 19, although throughout the day.<sup>35</sup> According to VSP, over 1,000 accidents occurred overnight from December 9 into the morning of the 10, and 1,500 calls were made about disabled vehicles across the state, many along I-81.<sup>36</sup> The traffic stretched across state borders and into Tennessee, where traffic was then diverted to other routes. The VDOT AAR noted several challenges, including the limited number of cameras along this stretch of the interstate, which limited situational awareness, a lack of viable alternate routes to divert traffic, and stalled vehicles in regions with sharp inclines prevented snow removal from shoulders. Items highlighted in the AAR include the use of wreckers to clear accidents, communications between districts and the central office, and coordination between VSP and VDOT. Suggestions for improvement included increasing public communication, better utilizing the Incident Command System, and employing more equipment for paved surfaces with inclines among others.<sup>37</sup>
- On February 12, 2008, the Springfield Interchange in Northern Virginia was shut down due to an ice storm. While only a tenth of an inch of ice was on the road, the rapid change in temperature left motorists stuck in traffic for seven to eight hours.<sup>38</sup> In response, VDOT conducted a review on the event and developed a 13-point action plan to prevent another

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<sup>34</sup> VDOT, After-Action Report on I-81 Congestion Event in Bristol, Mar. 14, 2019.

<sup>35</sup> Joe Tennis and David McGee, “What Happened to Create a 20-Mile Traffic Backup on Interstate-81 on Sunday,” *Bristol Herald Courier*, Dec. 10, 2018, [https://heraldcourier.com/news/what-happened-to-create-a-20-mile-traffic-backup-on-interstate-81-on-sunday/article\\_71ca2ea1-1dfc-56b2-a1ad-87ec1d674e3a.html](https://heraldcourier.com/news/what-happened-to-create-a-20-mile-traffic-backup-on-interstate-81-on-sunday/article_71ca2ea1-1dfc-56b2-a1ad-87ec1d674e3a.html), accessed Feb. 25, 2022.

<sup>36</sup> WHSV Newsroom, “State Troopers Respond to over 1,000 Crashes amid December Snow,” WHSV 3, Dec. 10, 2018, <https://www.wHSV.com/content/news/State-troopers-respond-to-over-1000-crashes-amid-December-snow-502364151.html>, accessed Feb. 25, 2022.

<sup>37</sup> VDOT, After-Action Report on I-81 Congestion Event in Bristol, Mar. 14, 2019.

<sup>38</sup> Eric M. Weiss and Michael Laris, “Chaos on the Springfield Interchange,” *Washington Post*, Feb. 14, 2008, <https://www.washingtonpost.com/wp-dyn/content/article/2008/02/13/AR2008021303464.html?sid=ST2008021400097>, accessed Feb. 25, 2022.

such incident from happening. Their actions included establishing an emergency response team from the districts and Central Office for planning, performing a comprehensive review of anti-icing techniques and technology best practices, improving the command and control structure and implementing duty officers, developing new contracts for road weather information to improve data, developing the VATraffic internal tracking system to improve information sharing, and developing a comprehensive training program to educate front-line maintenance supervisors on best practices for snow and ice removal and other emergencies. VDOT also trained over 150 front-line supervisors and key emergency response managers.<sup>39</sup>

Other areas of the US have also experienced similar stoppages in recent years. For example:

- In February 2011, Chicago, Illinois, received 21.1 inches of snow in the Groundhog Day Blizzard. As snow fall rates exceeded 4 inches an hour in some areas, the city of Chicago was brought to a halt.<sup>40</sup> On February 2, 2011, Lake Shore Drive, part of US Highway 41 along Lake Michigan, became inundated with traffic that stranded 900 cars and busses in blizzard conditions for 12 hours. The city continued to deploy plows and service trucks throughout the event, but as blizzard conditions intensified and night fell, more accidents occurred and blocked more lanes, preventing any movement. As the cars stopped moving, the snow accumulation caused cars to become immobilized. Lake Shore Drive was closed just before 8:00 p.m. on February 2 so that efforts could focus on getting the people stuck in cars and busses off the highway.<sup>41</sup> Emergency workers checked on cars while plows and wreckers removed snow, and individuals were brought to nearby warming shelters. The AAR suggested areas for improvement, such as “develop a coordinated LSD Operational Plan that includes clearly identified triggers for a systematic shut down.”<sup>42</sup>
- Atlanta, Georgia, also faced a significant traffic standstill in January 2014 due to the Gulf Coast Winter Storm. Although only 2 inches of snow fell across the city on January 28, a sudden northward track moved the storm unexpectedly towards the city causing extensive gridlock with traffic stalled on Interstate 285 for 12 hours.<sup>43</sup> While the National Guard worked with

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<sup>39</sup> Jimmy White et al., “VDOT’s 2008-2009 Winter Weather Preparedness,” VDOT, Nov. 19, 2008, accessed Feb. 25, 2022.

<sup>40</sup> National Oceanic and Atmospheric Administration, *Summary of February 1-3 2011 Central and Eastern US Winter Storm*, Christopher Hedge, [https://www.wpc.ncep.noaa.gov/winter\\_storm\\_summaries/event\\_reviews/2011/Feb1-3\\_Central\\_Eastern\\_Winterstorm.pdf](https://www.wpc.ncep.noaa.gov/winter_storm_summaries/event_reviews/2011/Feb1-3_Central_Eastern_Winterstorm.pdf), accessed Feb. 16, 2022.

<sup>41</sup> “Lake Shore Drive a Disaster; Drivers Stuck for Hours,” CBS Chicago, Feb. 2, 2011, <https://chicago.cbslocal.com/2011/02/01/officials-shut-down-lake-shore-drive/>, accessed Feb. 16, 2022.

<sup>42</sup> The City of Chicago Emergency Management and Communications, Chicago Police, Chicago Fire Department, *February 2011 Blizzard After Action Report / Improvement Recommendations*, June 20, 2011, [https://www.chicago.gov/content/dam/city/depts/oemc/general/PDF/June\\_2011\\_FINAL\\_February\\_Blizzard\\_AAR.pdf](https://www.chicago.gov/content/dam/city/depts/oemc/general/PDF/June_2011_FINAL_February_Blizzard_AAR.pdf), accessed Feb. 16, 2022.

<sup>43</sup> Kim Severson, “Atlanta Officials Gamble on Storm and Lose, and Others Pay the Price,” *New York Times*, Jan. 29, 2011, <https://www.nytimes.com/2014/01/30/us/ice-storm-southern-united-states.html>, accessed Feb. 16, 2022.

plows and wreckers to move accidents and get traffic moving again, first responders conducted checks on those stuck in their cars.<sup>44</sup>

- In January 2016, a blizzard impacted travel across multiple states in the Mid-Atlantic and Northeast regions. The storm lasted from January 22 until January 24. With plenty of forewarning, 11 governors and the mayor of Washington, DC, all issued state of emergency declarations prior to the storm's arrival. In Kentucky, multiple incidents caused 12 miles of Interstate 75 to be shut down while drivers were stranded for 16 hours over 35 miles.<sup>45</sup> State police along with National Guard reportedly went from car to car to conduct wellness checks and remove people from the road.<sup>46</sup> In Pennsylvania, 500 vehicles became stranded for 24 hours along the Pennsylvania Turnpike. Emergency responders working with the National Guard worked to clear the roadway and brought food and fuel to get vehicles moving once again.<sup>47</sup> Officials noted that cars were kept on the Turnpike rather than moved off because the conditions on the secondary roads were worse. After the incident, a review posed 22 recommendations about how to avoid a similar event in the future, including updating the emergency playbook used by Turnpike workers to be operationalized and incorporating more social media communications into their system.<sup>48</sup>

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<sup>44</sup> Jacque Wilson and Matt Smith, "Two Inches of Chaos: What Atlanta's Leaders Were Doing while the Snow Fell," CNN, Feb. 1, 2014, <https://www.cnn.com/interactive/2014/02/us/georgia-snow-timeline>, accessed Feb. 17, 2022 and Jason Hanna, "East Cost Buried in Snow Storm; New York Traffic Comes to a Halt," CNN, Jan. 24, 2016, <https://www.cnn.com/2016/01/23/us/weather-winter-snowstorm/>, accessed Feb. 17, 2022.

<sup>45</sup> Greg Kocher, "Bevin Declares Emergency, Activates National Guard as Snow Buries Much of Kentucky," *Lexington Herald Leader*, Jan. 23, 2016, <https://www.kentucky.com/news/local/counties/fayette-county/article56019145.html>, accessed Feb. 17, 2022.

<sup>46</sup> Pamela Engel, "There was Utter Chaos on a Kentucky Interstate, and Drivers Were Stranded Overnight," *Business Insider*, Jan. 23, 2016, <https://www.businessinsider.com.au/thousands-stranded-on-interstate-75-in-kentucky-2016-1>, accessed Feb. 17, 2022.

<sup>47</sup> Luis Cruz, "No Major Injuries Reported in Massive Traffic Backup on PA Turnpike," ABC News 27, Jan. 24, 2016, <https://www.abc27.com/news/no-major-injuries-reported-in-massive-traffic-backup-on-pa-turnpike/>, accessed Feb. 17, 2022.

<sup>48</sup> Ed Blazine, "Turnpike Makes Changes after Snowstorm Stranded Motorists in January," *Pittsburg Post Gazette*, Dec. 11, 2016, <https://www.post-gazette.com/news/transportation/2016/12/11/Turnpike-makes-changes-after-snowstorm-stranded-motorists-in-january/stories/201612110044>, accessed Feb. 17, 2022.

## Appendix D: TOC Variable Message Board Updates

The following table shows the messaging on VDOT variable message boards on January 3 and 4 across the Commonwealth.

Date	Time	Message	Mile Marker and Route
January 3	a.m. / p.m.	ICE 2 MILES AHEAD EXIT RAMP NARROWS	NRO
January 3	a.m. / p.m.	ICY CONDITIONS EXIT 152 B USE CAUTION	NRO
January 3	a.m. / p.m.	AVOID TRAVEL TO MD VIA WWB USE ALT AL BRIDGE	NRO
January 3	3:00 a.m.	WINTER STORM WARNING TUNE TO LOCAL MEDIA FOR INFO	CRO and NWRO
January 3	3:00 a.m.	BRIDGES FREEZE BEFORE ROADWAYS USE CAUTION	CRO and NWRO
January 3	3:00 a.m.	SNOW / ICE CONDITIONS REDUCE SPEED	CRO and NWRO
January 3	6:20 a.m.	SEVERE STORM WARNING USE CAUTION	NRO
January 3	6:30 a.m.	SNOW ADVISORY USE CAUTION	NRO
January 3	10:51 a.m.	INCIDENT MM 136 ALL LANES BLOCKED	NRO: I-95S (MM 153.8)
January 3	12:19 a.m.	ICY CONDITIONS BRIDGES, RAMPS AND OVERPASSES	ERO
January 3	1:00 p.m.	SNOW PLOWS AT WORK USE CAUTION	CRO
January 3	1:12 p.m.	SNOW / ICE CONDITIONS REDUCE SPEED	CRO/NRO
January 3	1:12 p.m.	ICY CONDITIONS USE CAUTION	CRO/NRO
January 3	1:12 p.m.	ICY ROAD CONDITIONS SLOW DOWN	CRO/NRO
January 3	1:22 p.m.	INCIDENT MM 139 ALL LANES BLOCKED	CRO: I-95N (MM 86.3)
January 3	1:23 p.m.	INCIDENT I-95N MM139 ALL LANES BLOCKED USE ALTERNATE ROUTE	CRO: 1-295N (MM 39.6)
January 3	1:22 p.m.	INCIDENT MILE MARKER 139 ALL LANES BLKD	CRO: I-95N (MM 100)

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January 3	1:23 p.m.	INCIDENT MILE MAKER 139 ALL LANES BLKD USE ALTERNATE ROUTE	CRO: I-95N (MM 100)
January 3	1:22 p.m.	INCIDENT MM 139 ALL LANES BLOCKED	CRO: I-95N (MM 106)
January 3	2:13 p.m.	INCIDENT MILE MAKER 136 ALL LANES BLKD USE ALTERNATE ROUTE	CRO: I-95N (MM 100)
January 3	2:13 p.m.	INCIDENT MM 136 ALL LANES BLOCKED	CRO: I-95N (MM 106)
January 3	6:49 p.m.	INCIDENT I-95N MM 136 ALL LANES BLKD USE ALTERNATE ROUTE	CRO: I-295N (MM 39.6)
January 3	7:40 p.m.	INCIDENT MM 136 ALL LANES BLOCKED	NRO: I-95S (MM 153.8)
January 3	8:00 p.m.	**message warning of major delays north of Richmond**	CRO: I-95N (MM 106 and MM 86.3); I-295N (MM 39.6)
January 3	8:03 p.m.	INCIDENT MM 136 ALL LANES BLOCKED	CRO: I-95N (MM 86.3)
January 3	8:08 p.m.	MAJOR DELAYS I-64 W USE ALT ROUTE	CRO: I-295N (MM 52.1)
January 4	4:29 a.m.	I-95 NORTH OF RICHMOND CLOSED USE I-64 WEST TO I-81 NORTH AS ALT ROUTE	CRO: I-95N (MM 66.1, MM 59.3, MM 46.1, and MM 41.9); I-85N (MM 60.3); I-64W (MM 194.3 and MM 207); I-64E (MM 182); I-295N (MM 39.6);
January 4	5:24 a.m.	AVOID TRAVEL TO I-95S USE ALT ROUTE	NRO: I-495 (MM 55.6); I-395S (MM 1)
January 4	5:24 a.m.	EXPECT MAJOR DELAYS USE ALT ROUTE	NRO: I-95S (MM 158.7); I-95S (MM 153.8)
January 4	6:27 a.m.	I-95 SB CLOSED EXPECT MAJOR DELAYS USE ALTERNATE ROUTE	NWRO: I-66E (MM 26.8)
January 4	7:00 a.m.	I-95 CLOSED NORTH OF RICHMOND	ERO: I-64W (MM 235.8, MM 239.4, MM 260, and MM 262.79); I-664N (MM 14.1 and MM 15.9)
January 4	7:09 a.m.	I-95 CLOSED NORTH OF RICHMOND USE ALT ROUTE	NWRO: I-64E (MM 97); I-81 (MM 216); I-81S (MM 224)
January 4	7:11 a.m.	AVOID TRAVEL TO I-95S USE ALT ROUTE	NRO: I-395S (MM 2.2); I-495S (MM 44.6, MM 46, MM 47.8, MM 49.4, MM 55.3, and MM 55.6)

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January 4	9:41 a.m.	AVOID TRAVEL TO I-95S USE ALT ROUTE	NRO: Route 642E (MM 3.9); Route 784 (MM 6.3); Route 7100N (MM 2); Route 7900E (MM 1.5); Route 7900W (MM 2.7); Route 3000 (MM 14.2)
January 4	3:27 p.m.	MM 156 ALL LNS CLOSED USE ALT ROUTE	NRO: 1-95S (MM158.7)
January 4	5:55 p.m.	MM 152 ALL LNS CLOSED USE ALT ROUTE	NRO: 1-95S (MM153.8)
January 4	7:33 p.m.	I-95 NORTH OF RICHMOND OPEN ICY CONDITIONS SLOW DOWN	CRO: I-95N (MM 66.1, MM 59.3); I-95N (MM 46.1 and MM 41.9); I-85N (MM 60.3); I-64W (MM 194.3 and MM 207); I-64E (MM 182)
January 4	7:41 p.m.	I-95 NORTH OF RICHMOND OPEN ICY CONDITIONS SLOW DOWN	CRO: I-295N (MM 39.6)

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