

# 2021 OPERATIONS PERFORMANCE



Freeway Operations and Special Facilities Performance



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## Division Administrator's Letter

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### RELIABLE AND RESILIENT TRANSPORTATION

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Greetings all,

Calendar year 2021 experienced traffic volumes return to pre-COVID level and in some cases exceeded that level. The increase in traffic volumes was not consistent across the Commonwealth. This situation has created new challenges and opportunities to manage mobility.

In 2021, the department completed analysis on all interstate corridors to identify data driven solutions to improve mobility. The analysis considers changing traffic patterns and emerging solutions. These analyses are often referred to as the Corridor Improvement Program (CIP). Upon agreeing on the strategies in a CIP study, the Operations program obtained funding and began implementing the strategies. We are pleased that all of the freeway operations strategies for the I-81 Corridor are implemented. Strategies for the I-95 are either implemented or being designed. We have expanded various safety service patrol routes on I-95. The department is now constructing a variable speed limit system on I-95 northbound near Fredericksburg and additional camera coverage of this vital corridor is also being designed. A towing and recovery incentive program (TRIP) is available in many areas of the Commonwealth to improve the clearance time for complex crashes involving commercial vehicles. In the attachment, many metrics in our performance measurement program are showing the improvements in responding and clearing incidents from implementing these improvements.

The resiliency and sustainability of the Commonwealth's transportation system has become an increasingly important priority. Our performance measurement program now includes additional metrics including weather events to assess the impact of climate change and mitigation strategies. Our performance measurement program also now presents information regarding the reliability of our operations transportation technologies to help our field teams continue to provide consistent services.

In 2022, we will continue to implement more operations strategies. We continue to look forward to seeing the results of these activities to provide a reliable and resilient transportation system.

**Ali Farhangi**

VDOT Operations Division Administrator

# Statewide

## Summary Interstate Highway Performance for 2021

Measure	Vehicle Hours of Delay on Interstates							Lynchburg	
	Interstate								
	Bristol	Salem	Richmond	Hampton Roads	Frederick..	Culpeper	Staunton		Northern Virginia
All Reported Incidents	120K	329K	571K	1,554K	1,383K	47K	333K	3,269K	No Interstates in Lynchburg
	3,640	8,342	24,234	15,442	8,833	4,483	12,085	26,937	
All Reported Incidents	2,748	6,452	20,370	13,486	6,751	3,249	10,562	24,457	No Interstates in Lynchburg
	19	17	20	21	26	10	11	32	
Scene Clearance Time (minutes)	87	162	1,362	752	241	59	234	1,371	No Interstates in Lynchburg
	702	1,519	4,971	8,635	2,079	1,390	2,293	6,473	
Potential Secondary Crash Incidents	486	817	3,648	7,549	951	374	1,157	5,141	No Interstates in Lynchburg
	38	46	42	19	39	40	46	41	
Roadway Clearance Time (minutes)	36%	35%	40%	62%	40%	37%	33%	38%	No Interstates in Lynchburg
	target: 38%	target: 33%	target: 42%	target: 59%	target: 45%	target: 31%	target: 30%	target: 49%	
Lane Impacting Incidents Cleared in < 30 minutes	88%	83%	86%	94%	87%	89%	83%	89%	No Interstates in Lynchburg
	target: 81%	target: 81%	target: 86%	target: 94%	target: 86%	target: 87%	target: 81%	target: 90%	
Lane Impacting Incidents Cleared in < 90 minutes	88%	83%	86%	94%	87%	89%	83%	89%	No Interstates in Lynchburg
	target: 81%	target: 81%	target: 86%	target: 94%	target: 86%	target: 87%	target: 81%	target: 90%	

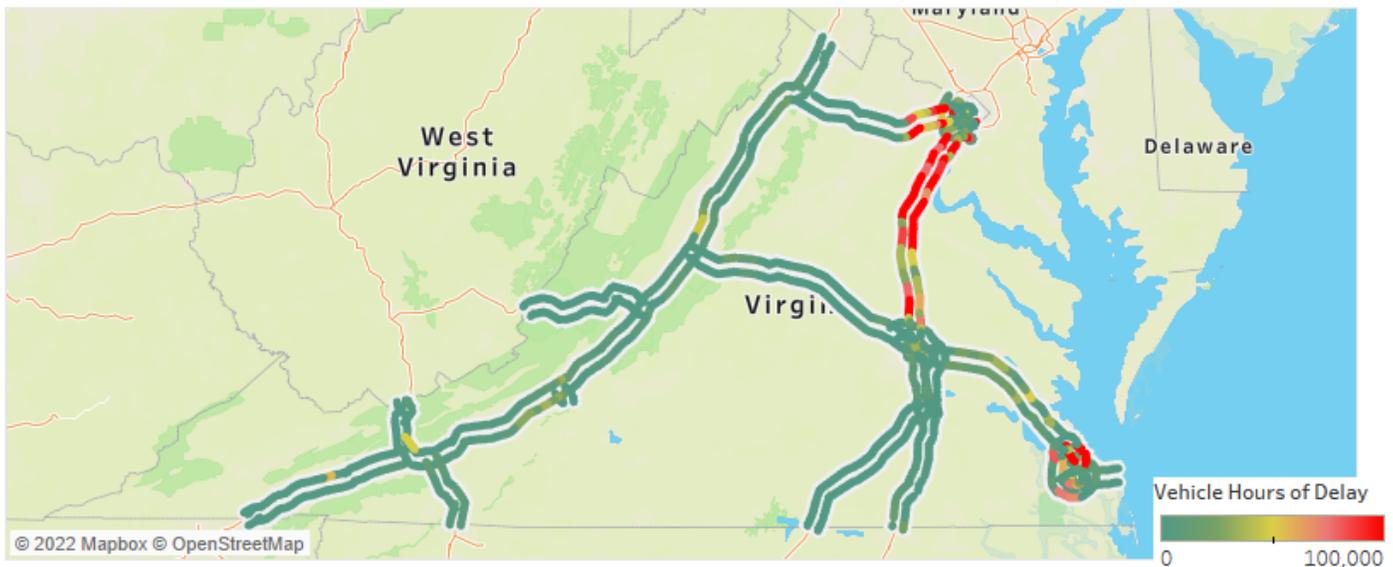


## Statewide Summary

This report compares performance of Interstate Highways from 2020 to 2021

Measure		Target	2020	2021
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed		↘	7,606K	15,787K
ALL INCIDENTS	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	91,716	105,472
	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	76,643	88,082
	Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	21	22
	Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	1,900	2,368
LANE IMPACTING INCIDENTS	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	23,664	28,396
	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	16,134	20,124
	Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	37	33
	Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	N/A	43%	47%
	Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	N/A	89%	89%

### Congestion in 2021

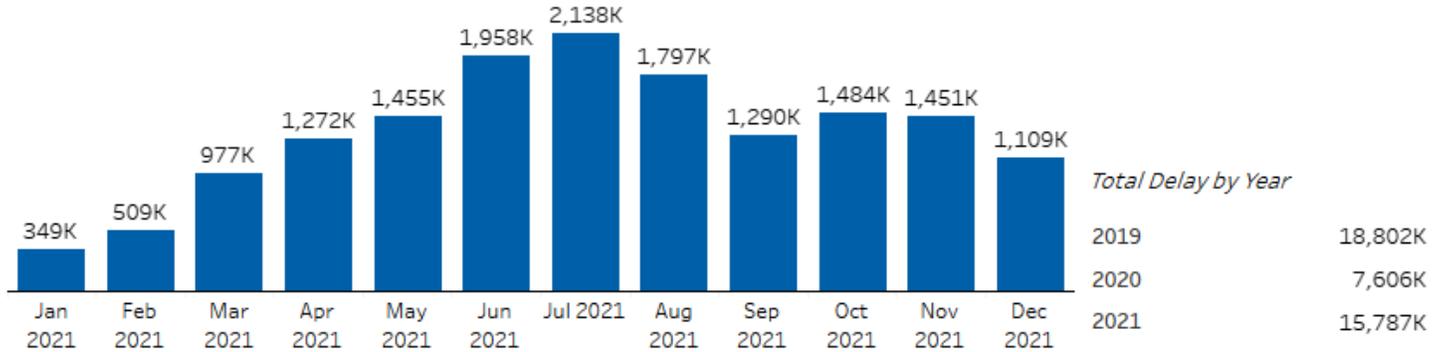




## Congestion Overview

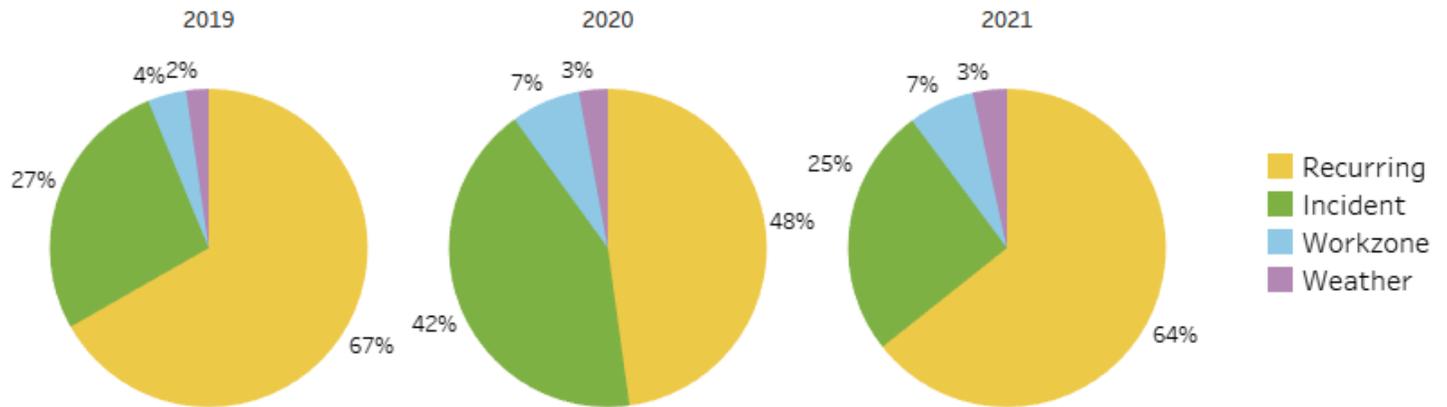
### Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

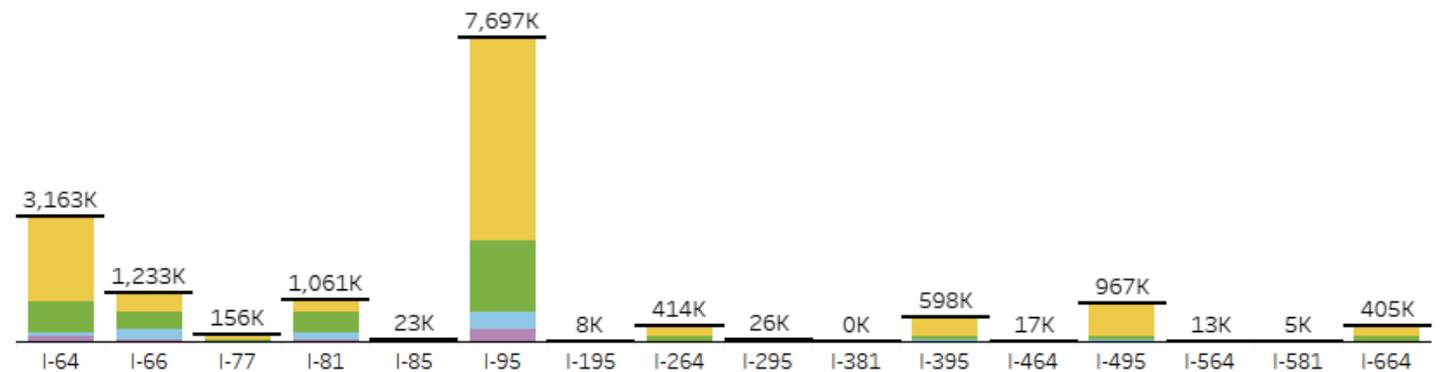


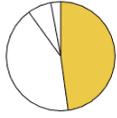
### Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



### Delay by Cause & Interstate in 2021





### Recurring Congestion

Recurring Congestion occurs when there are capacity issues most often during peak travel hours. Recurring congestion is difficult to manage. However, VDOT can adjust roadway capacity by using managed lanes like HOV or hard shoulders. VDOT measures managed lane performance to adjust these programs.

### Managed Lanes

Summary as of December 31, 2021. Facilities > 3 miles considered.

Facility Type	Facilities	Centerline Miles (2021)
<b>High Occupancy Vehicle Lanes</b>	I-66 Exit 40 to Exit 64	22
	I-264 Exit 10 to Exit 18	8
	I-64 Exit 255 to Exit 264	10
	I-64 Exit 285 to Exit 290	6
	VA 267 Dulles Toll Road	10
<b>High Occupancy Toll Lanes</b>	I-495 Express Lanes	14
	I-95 Reversible Express Lanes	29
	I-395 Reversible Express Lanes	9
	I-64 Reversible Express Lanes	7.5
	I-66 Inside the Beltway	10
<b>Part Time/Dynamic Hard-Shoulder Usage</b>	I-66	6.5
	I-264	3.5

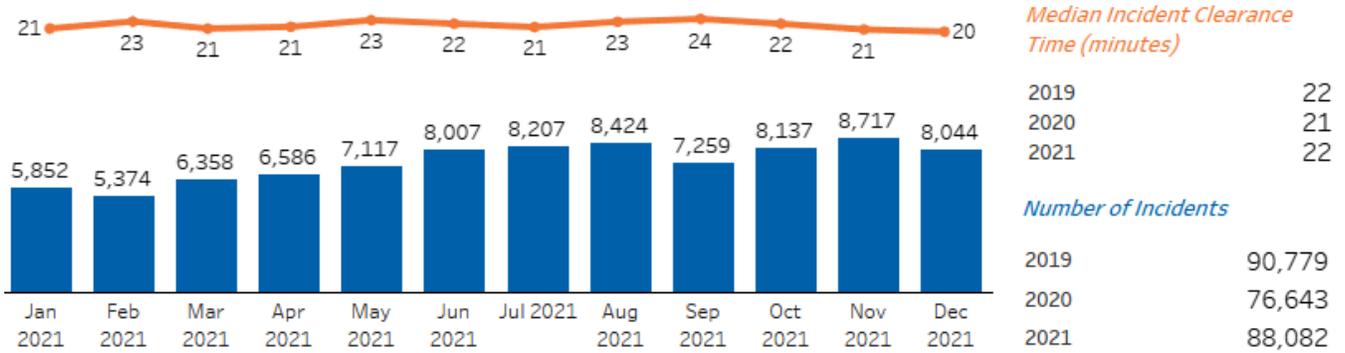


### Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

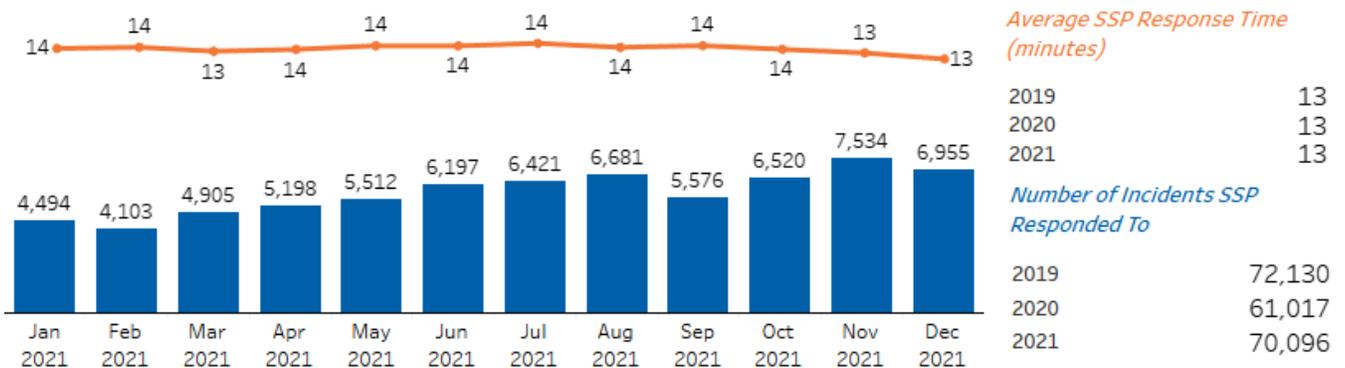
### Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measured for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measured for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

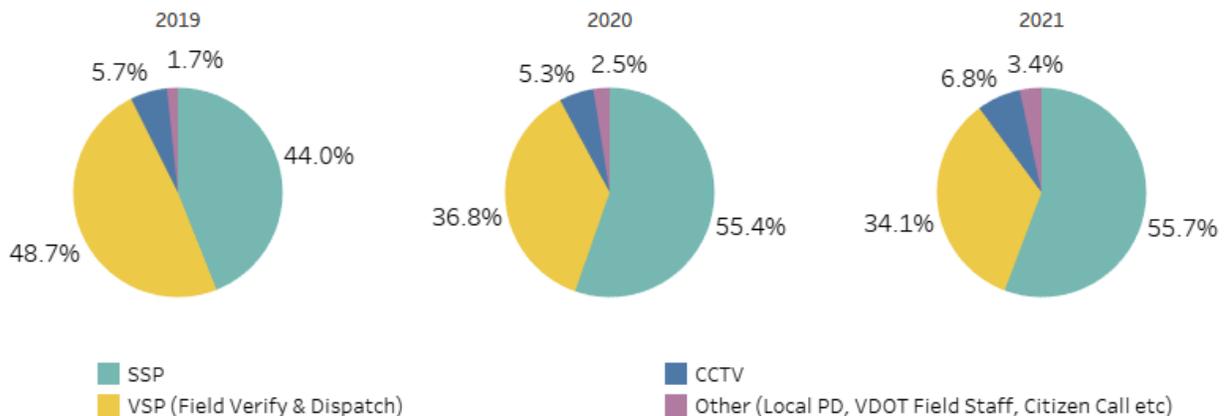


### Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)



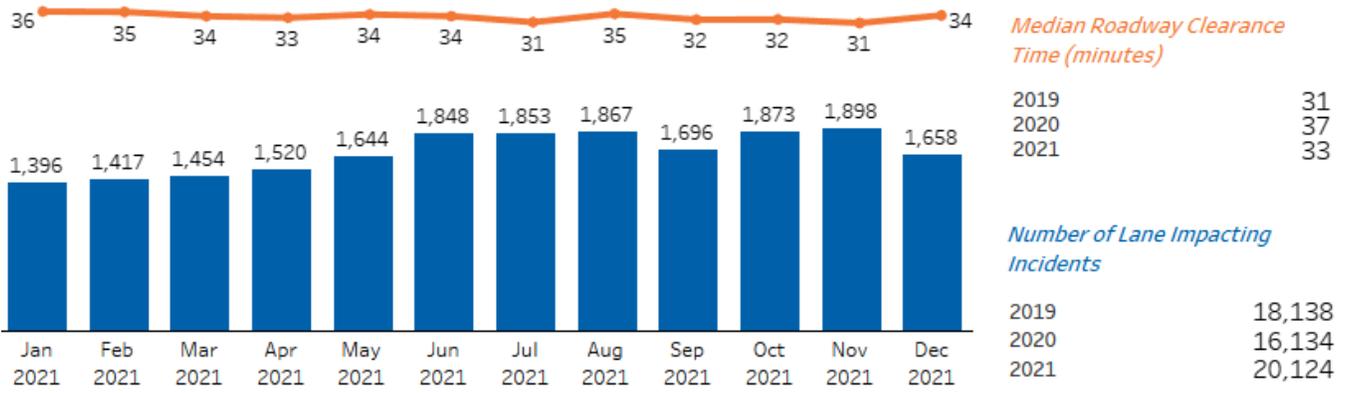
### All Incidents by Detection Source





### Lane Impacting Incidents & Roadway Clearance Time

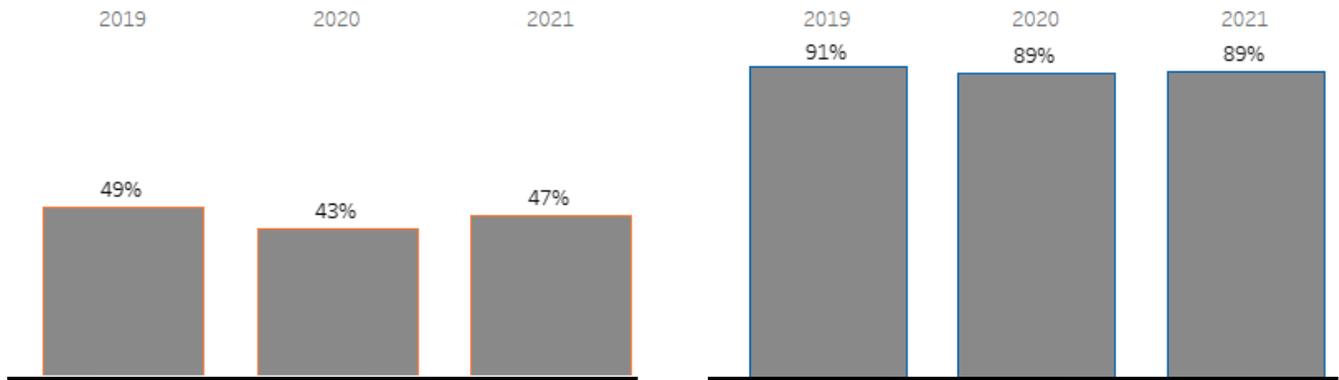
Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.



### Lane Impacting Incidents by Roadway Clearance Time

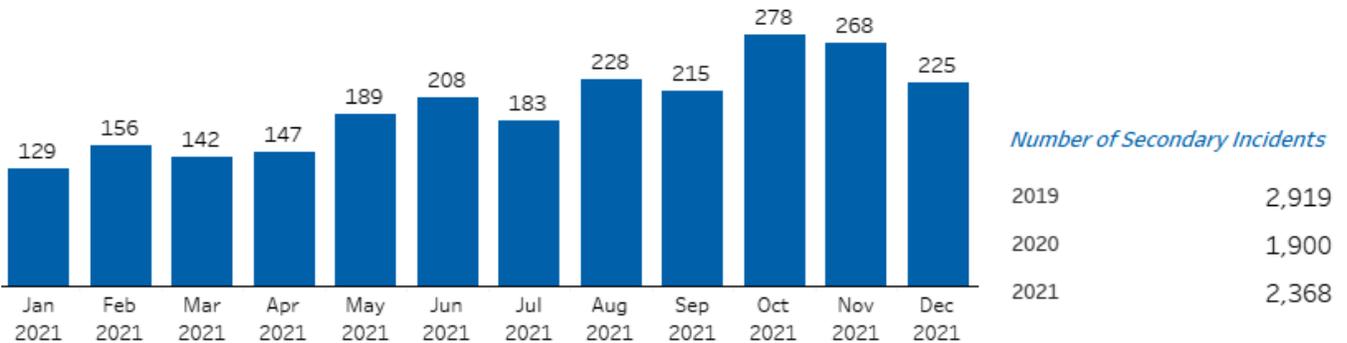
Lane Impacting Incidents Cleared in <30 minutes

Lane Impacting Incidents Cleared in <90 minutes



### Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





### Work Zones

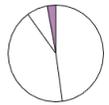
VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

#### Work Zones by District

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2020	2021	2020	2021
Bristol	832	924	19,912	23,638
Salem	1,221	1,472	24,958	31,676
Richmond	3,224	2,337	74,647	22,432
Hampton Roads	1,249	1,372	23,041	36,243
Fredericksburg	571	1,270	12,922	25,335
Culpeper	237	372	9,499	15,588
Staunton	1,013	1,337	39,544	48,386
Northern Virginia	5,522	5,030	80,104	62,923
<b>Grand Total</b>	<b>13,869</b>	<b>14,114</b>	<b>284,626</b>	<b>266,222</b>

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



### Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

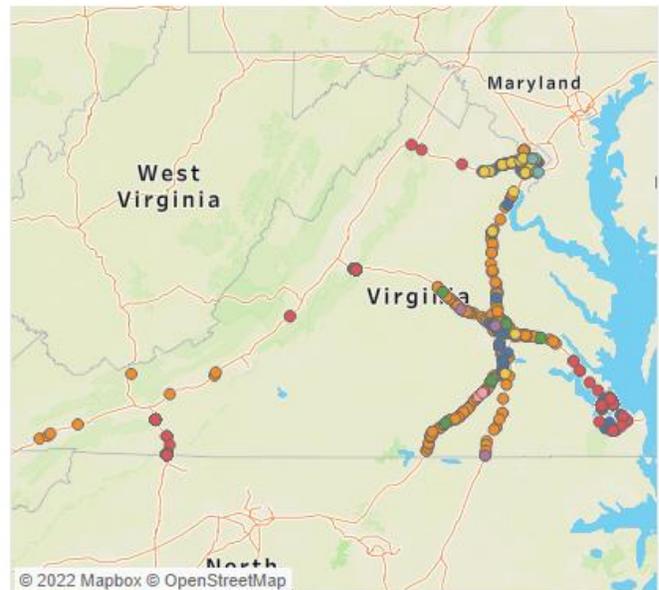
Short Term Weather Events

	2019	2020	2021
Debris	1	3	3
Flooding/High Water		1	
Fog	517	849	514
High Wind	224	433	497
Icy Conditions	21	25	28
Other		5	8
Power Line/Pole Down			3
Sinkhole		2	
Standing Water		2	
Standing Water (Ponding)	73	78	106
Tree Down	172	217	299

Long Term Weather Events (Road Condition) in Hour-Miles

Weather Ev..	Road Con..	2019	2020	2021
Flood	Advisory			-2
	Closed	50		
Snow/Ice	Closed	0	0	1
	Minor	65,973	21,088	62,327
	Moderate	14,841	10,997	29,814
	Severe		73	36
Storm	Advisory	0	0	35
	Closed	0	0	

Short Term Weather Events in 2021





### Operations Assets

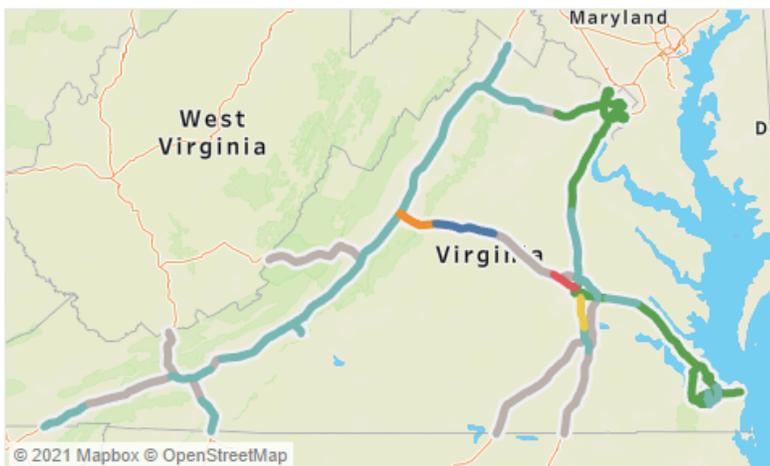
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

### ITS Assets Availability

Device Type	Number of Devices	% of Time Devices were Online
CCTV	1,024	94.7%
CCTV Portable	59	98.2%
CMS	464	96.1%
CMS Portable	104	86.9%

### Safety Service Patrol Coverage

Coverage as of December 31, 2021



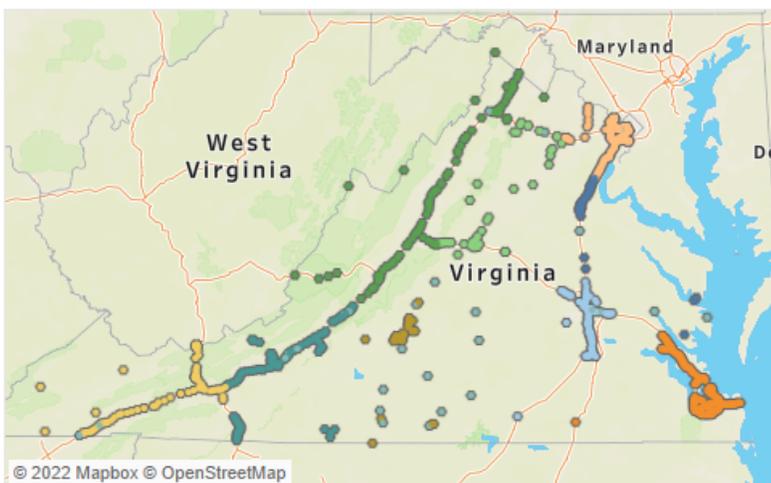
Interstates	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-64	140	53%	21,984	49%
I-66	66	88%	9,352	74%
I-77	19	32%	2,128	21%
I-81	268	82%	30,016	55%
I-85	0	0%	0	0%
I-95	120	67%	18,666	62%
I-295	15	28%	1,680	19%
I-495	22	100%	3,696	100%
Other	72	94%	12,040	93%
<b>Grand Total</b>	<b>722</b>	<b>64%</b>	<b>99,562</b>	<b>53%</b>

#### SSP Coverage Legend (Hours Per Day/Days Per Week)

- 12/5
- 12/7
- 14/5
- 14/5 & 16/2
- 16/7
- 24/7
- No SSP

### Camera Coverage

Cameras (CCTV) as of December 31, 2021



Interstates	Directional Miles of Camera Coverage	Estimated % Miles Covered by CCTV
I-64	216	41%
I-66	55	37%
I-77	58	49%
I-81	295	45%
I-85	14	10%
I-95	144	41%
I-295	7	7%
I-495	43	97%
Other	112	73%
<b>Grand Total</b>	<b>945</b>	<b>42%</b>

Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream assumed to be covered by each camera.

- Bristol
- Culpeper
- Fredericksburg
- Hampton Roads
- Lynchburg
- Northern Virginia
- Richmond
- Salem
- Staunton
- Other



### Special Facilities Operations

VDOT owns and operates tunnels, movable bridges, and auto-ferry systems across the state. Incidents which result in closures at any of these facilities can create significant bottlenecks as they provides limited transportation services at a unique geographic feature.

#### Tunnels

VaTraffic incidents and work zones for 2021

Facility	Type	Hours of Unplanned Lane Impacting Activities*	Hours of Planned Lane Impacting Activities**
I-64 Hampton Roads Bridge Tunnel	Underwater	611	726
I-664 Monitor Merrimac Memorial Bridge Tunnel	Underwater	274	449
I-264 Downtown Tunnel	Underwater	4	404
US 58 Midtown Tunnel	Underwater	3	372
I-77 Big Walker Mountain Tunnel	Mountain	32	295
I-77 East River Mountain Tunnel	Mountain	67	882

\*Unplanned activities includes tunnel stoppage due to dangerous cargo, over-height detection, farm equipment, debris, wide loads, state police activity, or other emergency maintenance.

\*\*Planned activities includes median/jersey wall repair/installation, paving operations, litter pickup operations, pothole patching operations, rumble strip installation, shoulder repairs, storm drain work, tunnel cleaning operations, and other planned maintenance. This does not include planned construction projects.

#### Movable Bridges

VaTraffic incidents and work zones for 2021

Facility	# Lifts	Hours Under Advisory for Weather	Hours of Unplanned Lane Impacting Activities*	Hours of Planned Lane Impacting Activities**
I-264 Berkley Bridge	850	0	27	2
I-664 High Rise Bridge	47	134	0	0
US 17 Coleman Bridge	104	717	0	0
VA 156 Benjamin Harrison Bridge	1038	4	0	1
VA 33 Eltham Bridge	27	0	0	0
US 17 James River Bridge	718	199	33	0
VA 223 Gwynn's Island	1214	0	0	0
VA 175 Chincoteague Bridge	283	n/a	n/a	n/a

\* Unplanned activities includes bridge stoppage due to activities such as dangerous cargo, over-height detection, farm equipment, debris, wide loads, state police activity, or other emergency maintenance.

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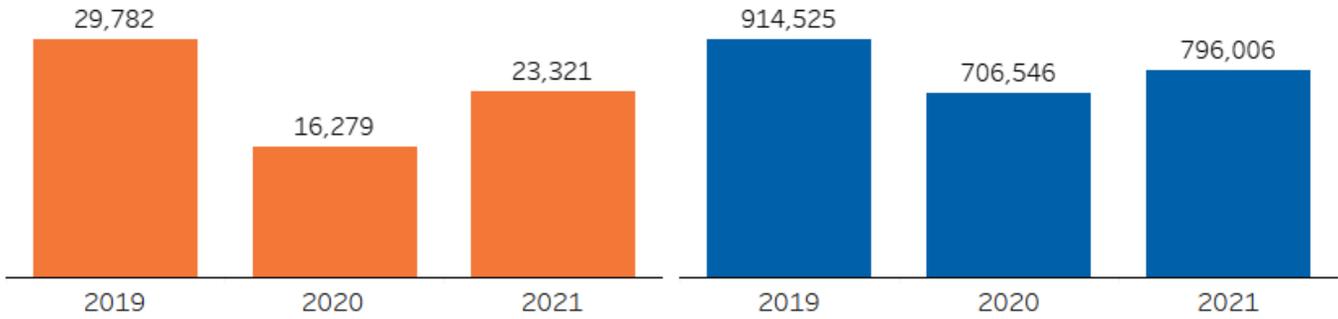


**Auto-Ferries**

VaTraffic incidents and work zones for 2021

*Jamestown-Scotland Ferry - Vehicles Left on Dock*

*Jamestown-Scotland Ferry - Total Traffic*



Facility	Hours under Advisory/Closure for Weather*	Hours Closed Due to Maintenance*
<b>Jamestown-Scotland Ferry</b>	24	233
<b>Merry Point Ferry</b>	0	0
<b>Sunny Bank Ferry</b>	0	0

\*Reported in VaTraffic



## Bristol District

This report compares performance of Interstate Highways from 2020 to 2021

Measure		Target	2020	2021	
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed		↓	120K	272K	
ALL INCIDENTS	All Roads All Reported Incidents Number of disabled vehicle and crash incidents	N/A	2,877	3,640	
	Interstates	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	2,104	2,748
		Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↓	18	19
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↓	46	41
LANE IMPACTING INCIDENTS	All Roads Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	627	702	
	Interstates	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	400	486
		Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↓	42	38
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	38%	35%	36%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	81%	82%	88%

### Congestion in 2021

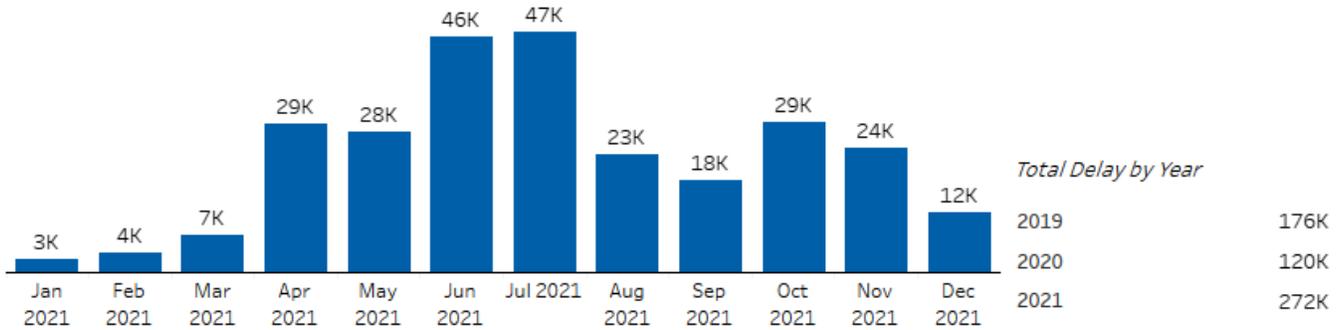




## Congestion Overview

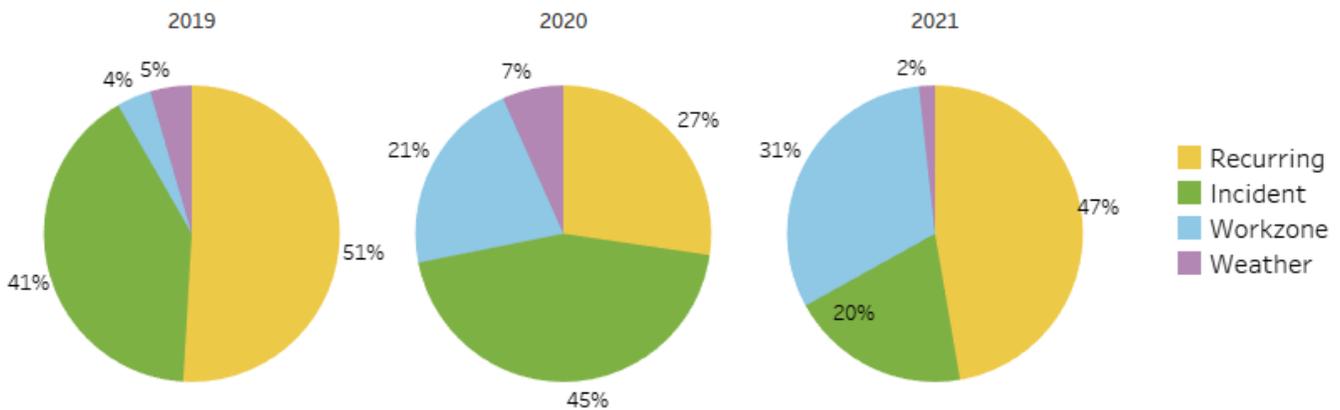
### Vehicle Hours of Delay

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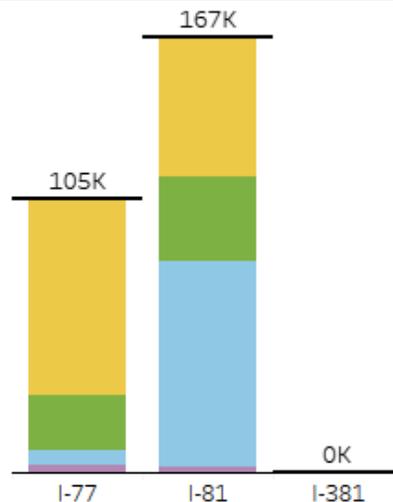


### Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



### Delay by Cause & Interstate in 2021



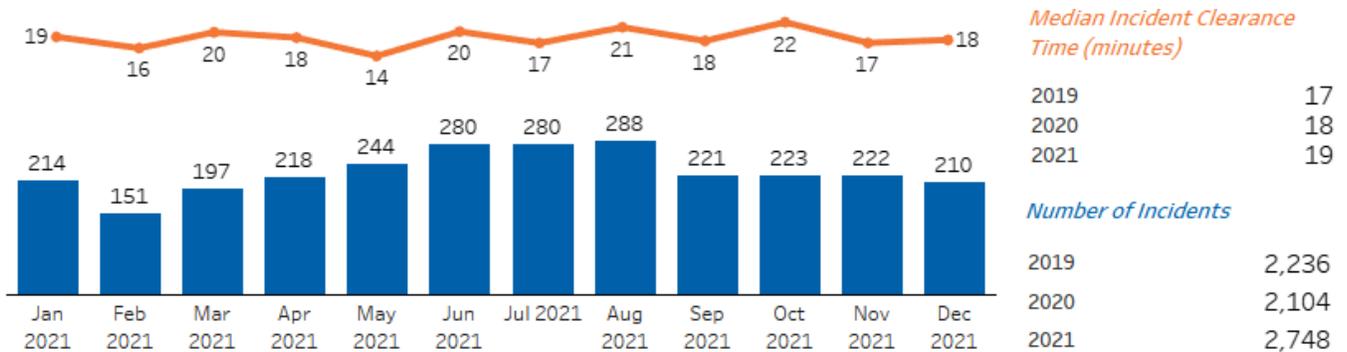


### Incidents

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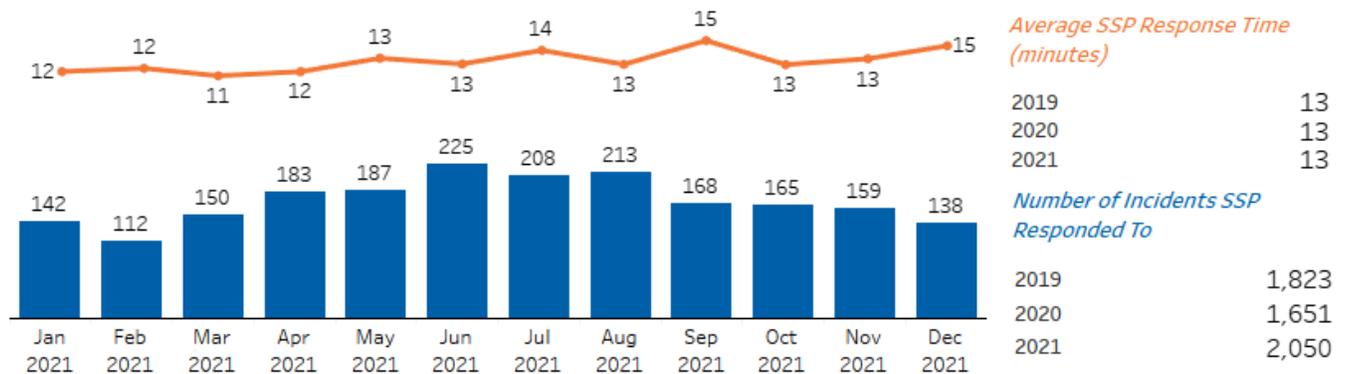
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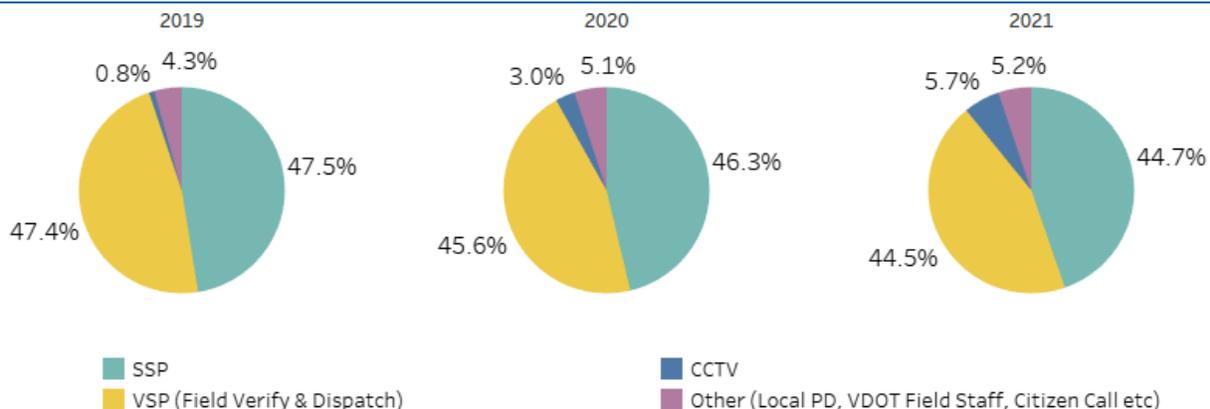


### Safety Service Patrol Incident Responses & Response Time

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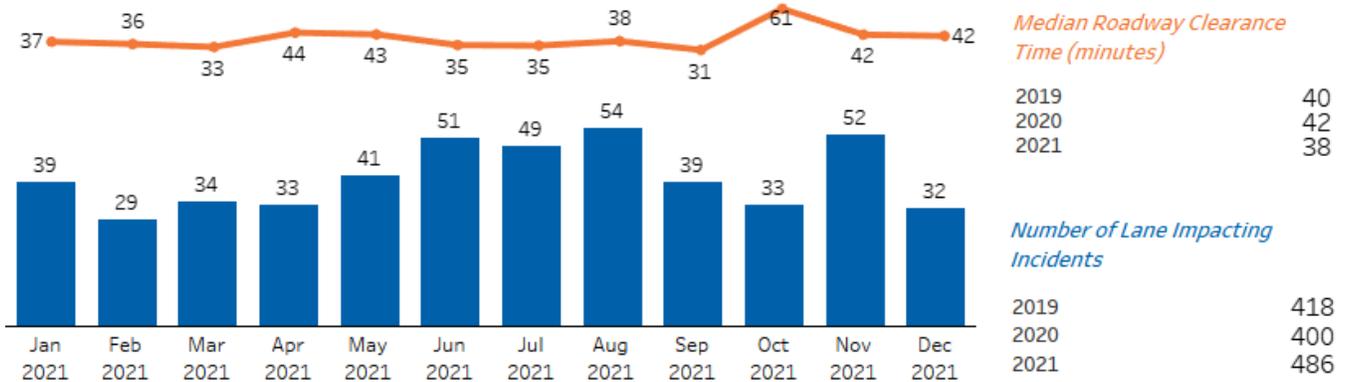
### All Incidents by Detection Source





### Lane Impacting Incidents & Roadway Clearance Time

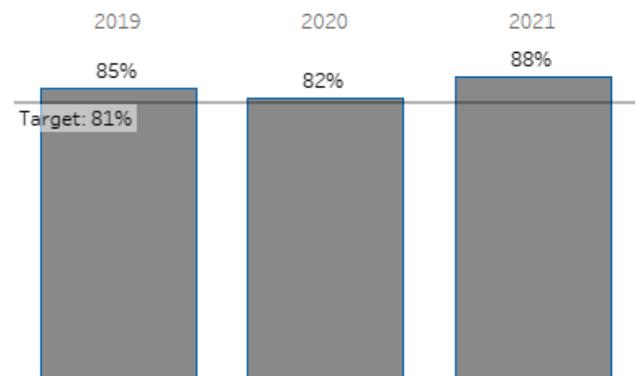
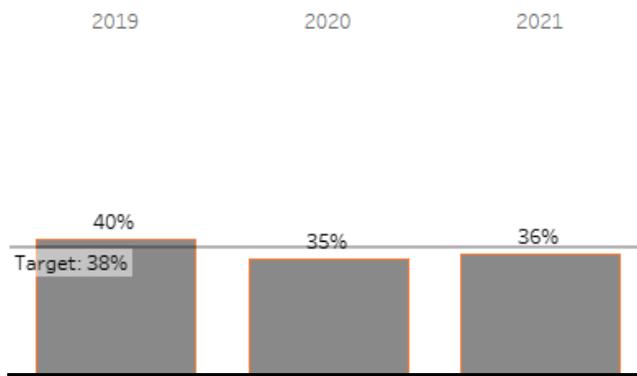
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### Lane Impacting Incidents by Roadway Clearance Time

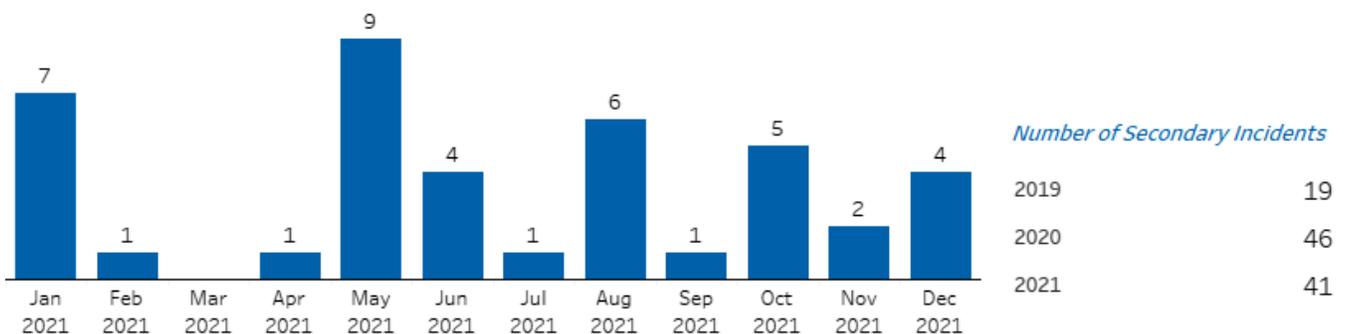
Lane Impacting Incidents Cleared in <30 minutes

Lane Impacting Incidents Cleared in <90 minutes



### Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





### Work Zones

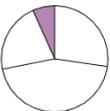
VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

### Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-77	103	201	2,590	4,719
I-81	393	627	10,628	15,168
I-381		4		25
<b>Grand Total</b>	<b>496</b>	<b>832</b>	<b>13,218</b>	<b>19,912</b>

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



### Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

#### Short Term Weather Events

	2019	2020	2021
Tree Down	2	2	5

#### Long Term Weather Events (Road Condition) in Hour-Miles

Weather Ev..	Road Con..	2019	2020	2021
Snow/Ice	Minor	3,542	7,554	9,327
	Moderate	247	777	2,555
Storm	Closed	0		

#### Short Term Weather Events in 2021



Tree Down



### Operations Assets

Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

### ITS Assets Availability – SWRO, 2021

Device Type	Number of Devices	% of Time Devices were Online
CCTV	240	96.5%
CCTV Portable	18	99.5%
CMS	95	98.6%
CMS Portable	26	94.1%

### Safety Service Patrol Coverage

Coverage as of December 31, 2021



Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered/Week	% Mile-Hours/Week
I-77	0	0%	0	0%
I-81	44	51%	4,256	29%
I-381	0	0%	0	0%
<b>Grand Total</b>	<b>44</b>	<b>36%</b>	<b>4,256</b>	<b>21%</b>

### Camera Coverage

Cameras (CCTV) as of December 31, 2021



Interstate	Directional Miles of Camera Coverage	Estimated % Miles Covered by CCTV
I-77	30	43%
I-81	73	43%
I-381	1	41%
<b>Grand Total</b>	<b>104</b>	<b>43%</b>

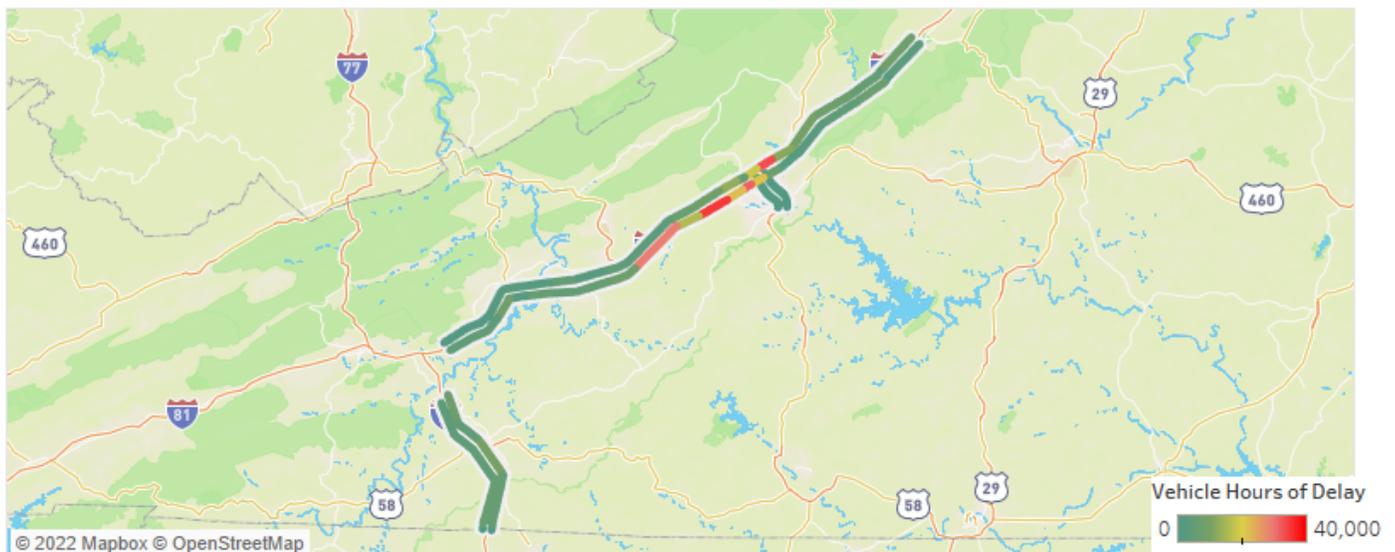
Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream is assumed to be covered by each camera.

## Salem District

This report compares performance of Interstate Highways from 2020 to 2021

Measure		Target	2020	2021
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed		↘	329K	448K
ALL INCIDENTS	All Roads All Reported Incidents Number of disabled vehicle and crash incidents	N/A	7,553	8,342
	Interstates All Reported Incidents Number of disabled vehicle and crash incidents	N/A	5,837	6,452
	Interstates Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	16	17
	Interstates Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	78	84
LANE IMPACTING INCIDENTS	All Roads Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	1,408	1,519
	Interstates Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	745	817
	Interstates Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	52	46
	Interstates Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	33%	26%	35%
	Interstates Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	81%	78%	83%

### Congestion in 2021

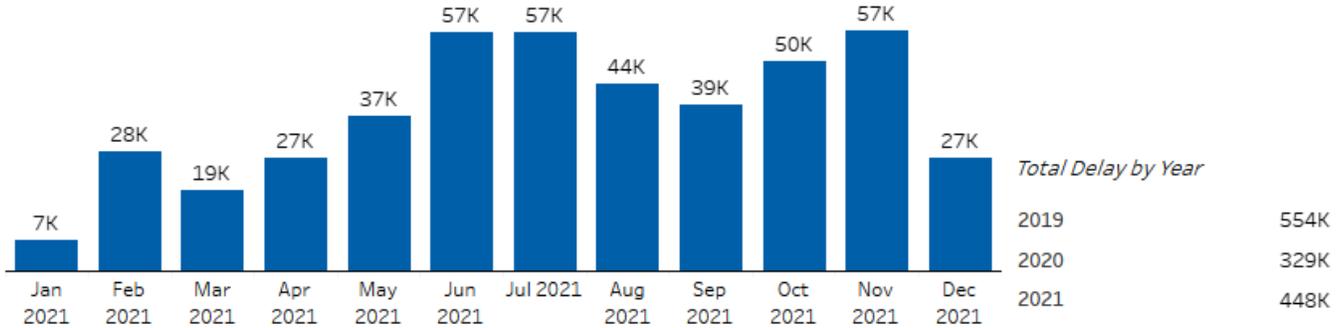




## Congestion Overview

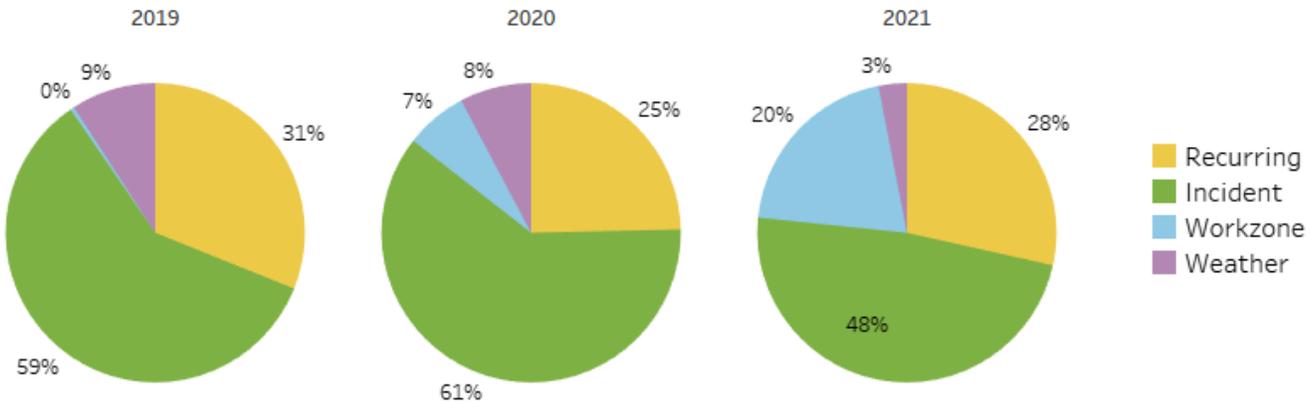
### Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

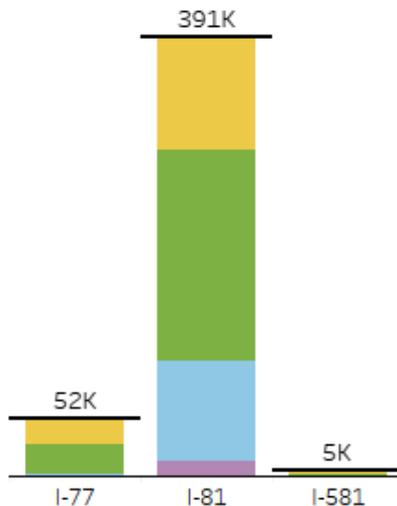


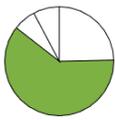
### Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



### Delay by Cause & Interstate in 2021



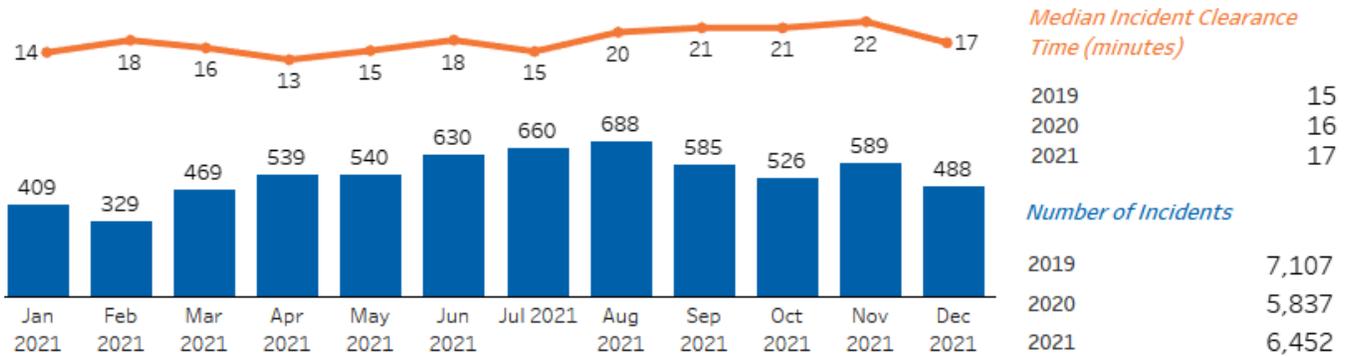


### Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

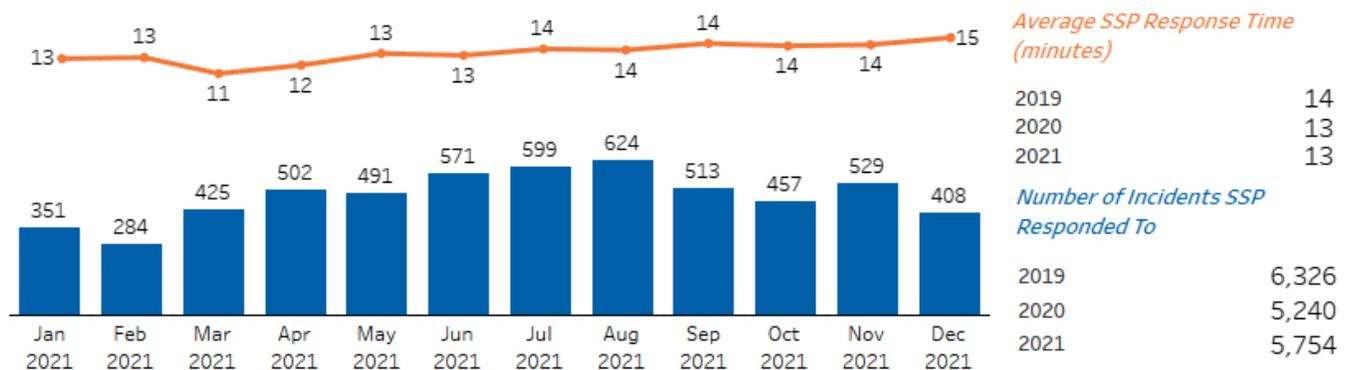
### Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measured for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measured for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

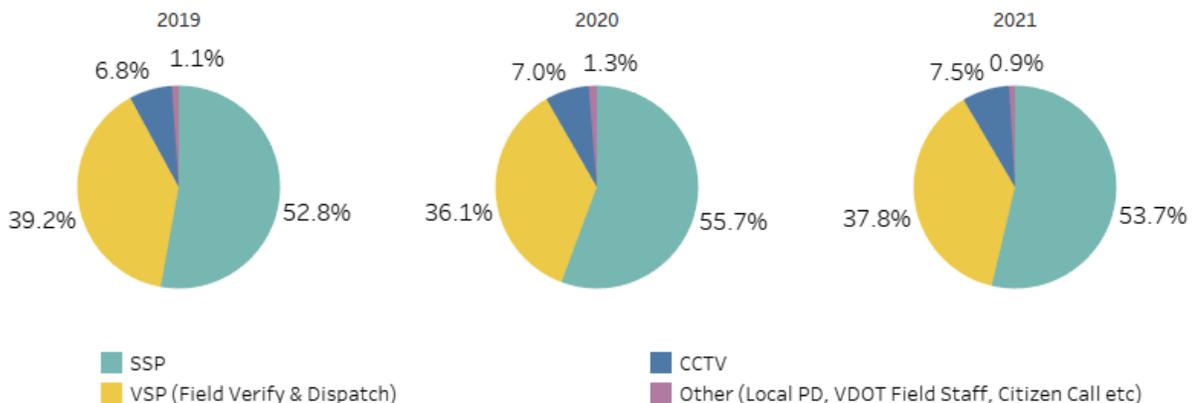


### Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)



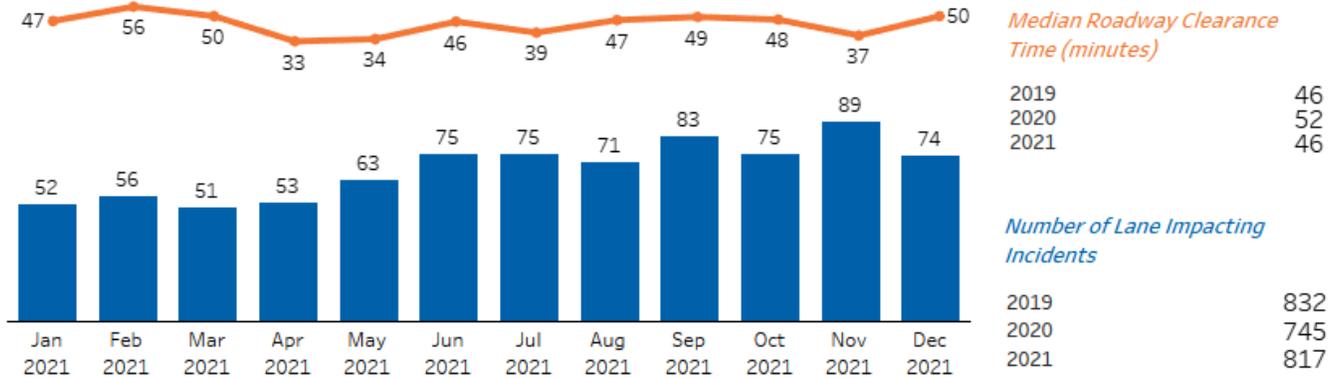
### All Incidents by Detection Source



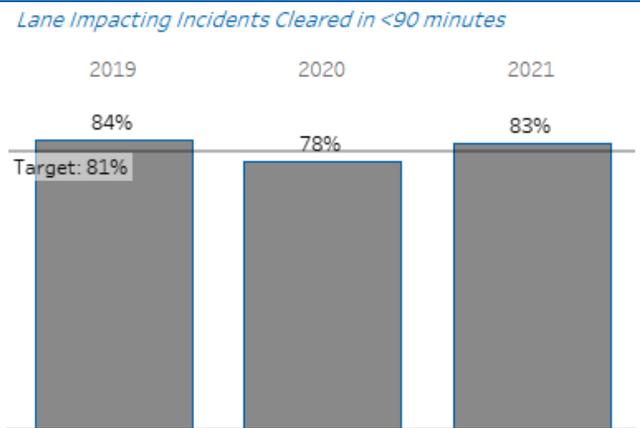
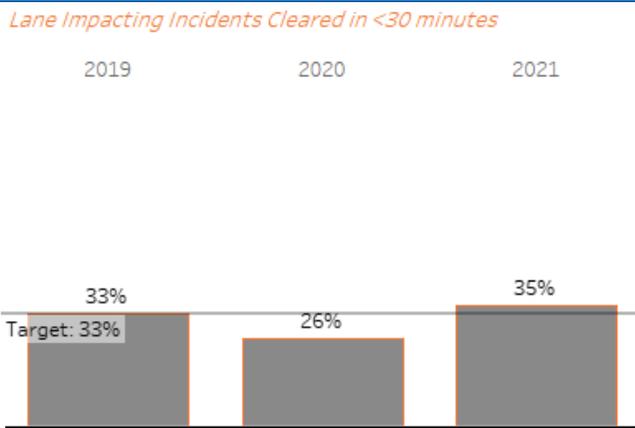


### Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

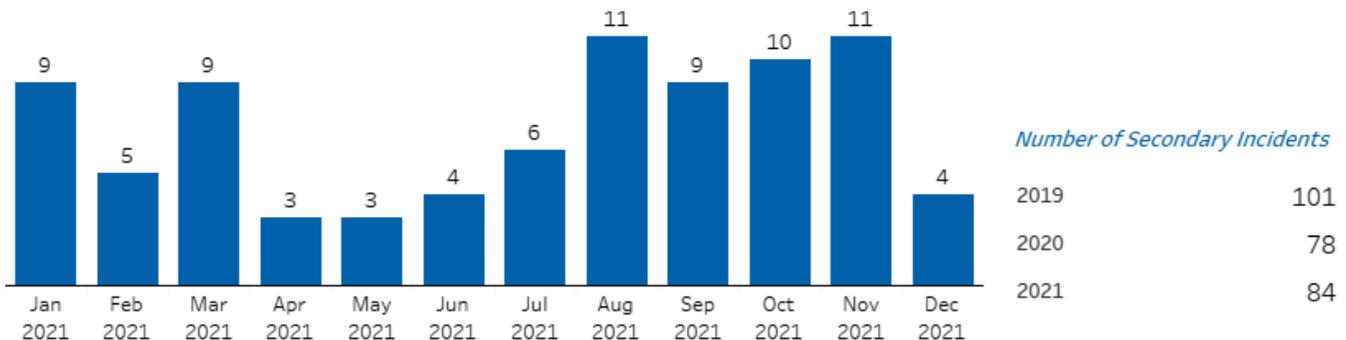


### Lane Impacting Incidents by Roadway Clearance Time



### Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





### Work Zones

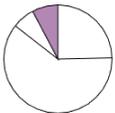
VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

### Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-77	55	79	800	1,947
I-81	528	1,102	8,536	22,229
I-581	65	40	936	781
<b>Grand Total</b>	<b>648</b>	<b>1,221</b>	<b>10,272</b>	<b>24,958</b>

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



### Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

#### Short Term Weather Events

	2019	2020	2021
Debris	1		
Fog	230	349	207
High Wind	156	251	391
Standing Water (Ponding)		2	
Tree Down	2	3	3

#### Short Term Weather Events in 2021



© 2022 Mapbox © OpenStreetMap

- Fog
- High Wind
- Tree Down

#### Long Term Weather Events (Road Condition) in Hour-Miles

Weather Ev..	Road Con..	2019	2020	2021
Snow/Ice	Minor	3,679	1,237	5,032
	Moderate	769	301	2,202



### Operations Assets

Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

### ITS Assets Availability - SWRO, 2021

Device Type	Number of Devices	% of Time Devices were Online
CCTV	240	96.5%
CCTV Portable	18	99.5%
CMS	95	98.6%
CMS Portable	26	94.1%

### Safety Service Patrol Coverage

Coverage as of December 31, 2021

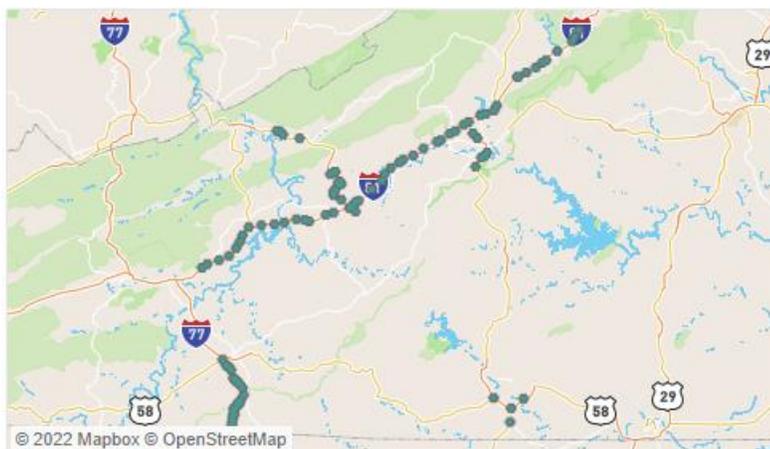


Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered/Week	% Mile-Hours/Week
I-77	19	79%	2,128	53%
I-81	74	83%	8,960	60%
I-581	6	100%	672	67%
<b>Grand Total</b>	<b>99</b>	<b>83%</b>	<b>11,760</b>	<b>59%</b>

SSP Coverage Legend (Hours Per Day/Days Per Week)  
■ 16/7    ■ No SSP

### Camera Coverage

Cameras (CCTV) as of December 31, 2021



Interstate	Directional Miles of Camera Coverage	Estimated % Miles Covered by CCTV
I-77	28	59%
I-81	93	52%
I-581	9	76%
<b>Grand Total</b>	<b>131</b>	<b>55%</b>

Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream is assumed to be covered by each camera.

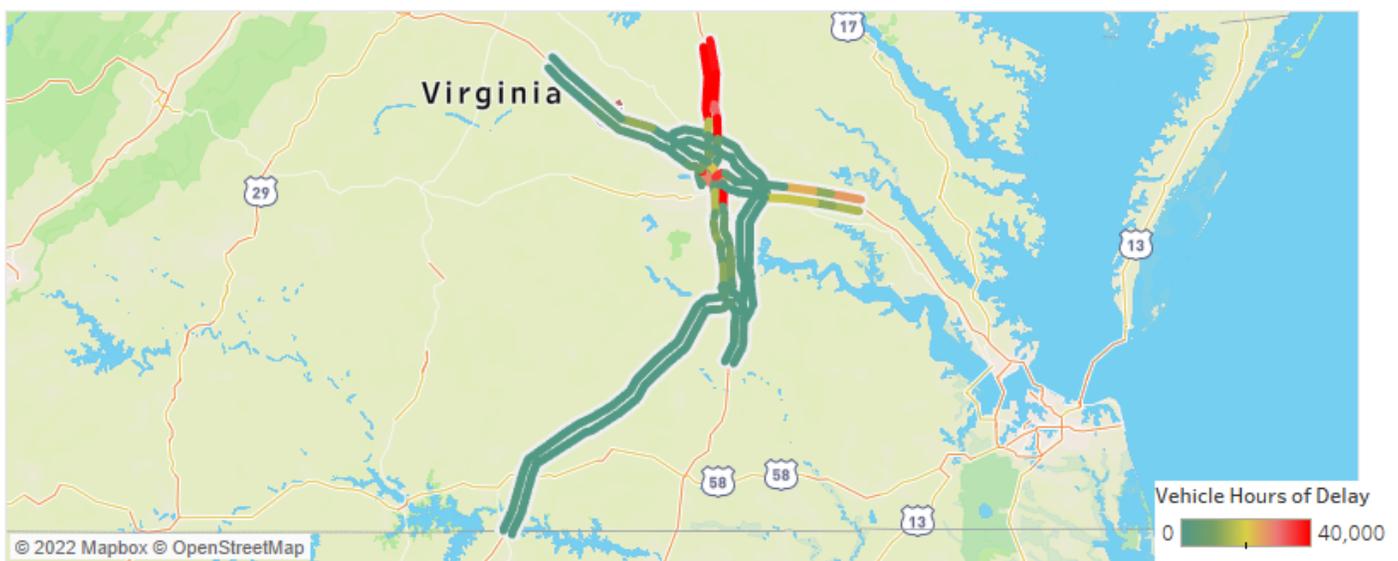


## Richmond District

This report compares performance of Interstate Highways from 2020 to 2021

Measure		Target	2020	2021
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed		↘	571K	1,314K
ALL INCIDENTS	Roads All All Reported Incidents Number of disabled vehicle and crash incidents	N/A	24,385	24,234
	Interstates All Reported Incidents Number of disabled vehicle and crash incidents	N/A	21,141	20,370
	Interstates Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	16	20
	Interstates Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	647	715
LANE IMPACTING INCIDENTS	Roads All Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	4,370	4,926
	Interstates Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	3,278	3,648
	Interstates Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	42	42
	Interstates Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	42%	39%	40%
	Interstates Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	86%	88%	86%

### Congestion in 2021

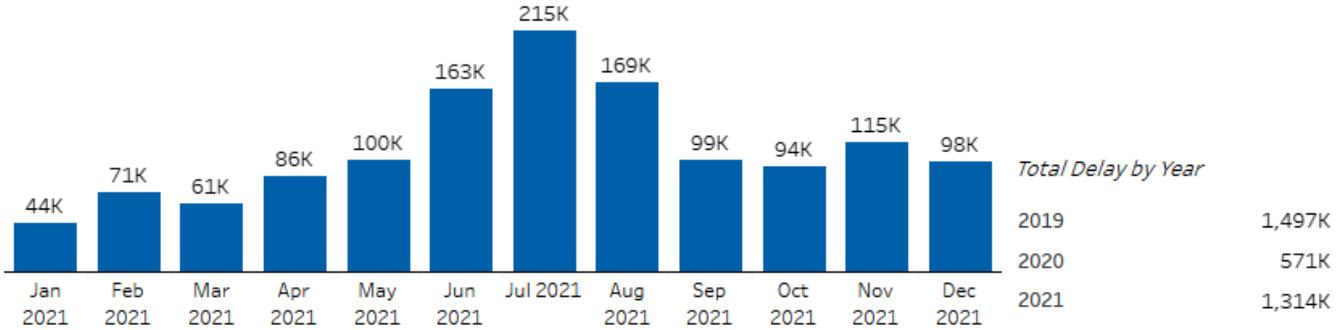




## Congestion Overview

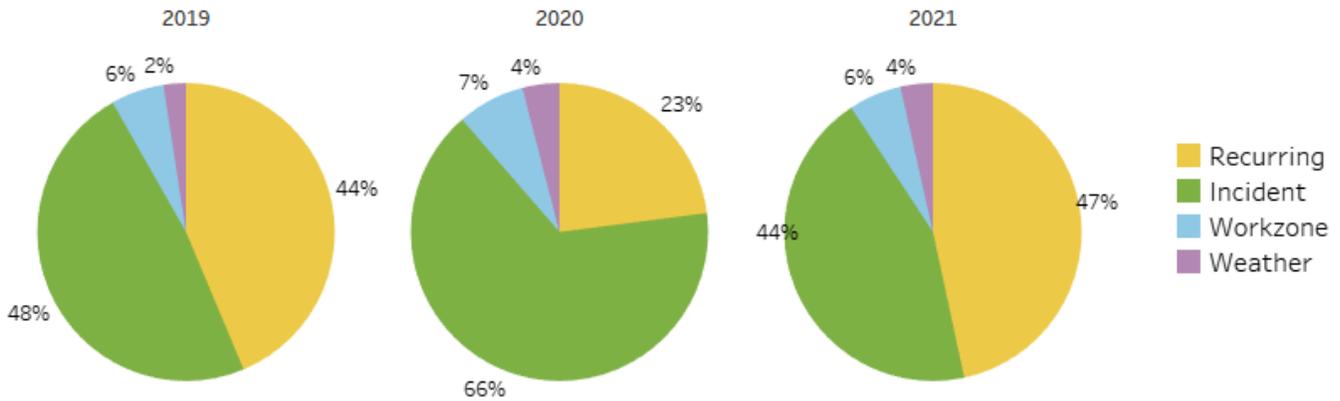
### Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

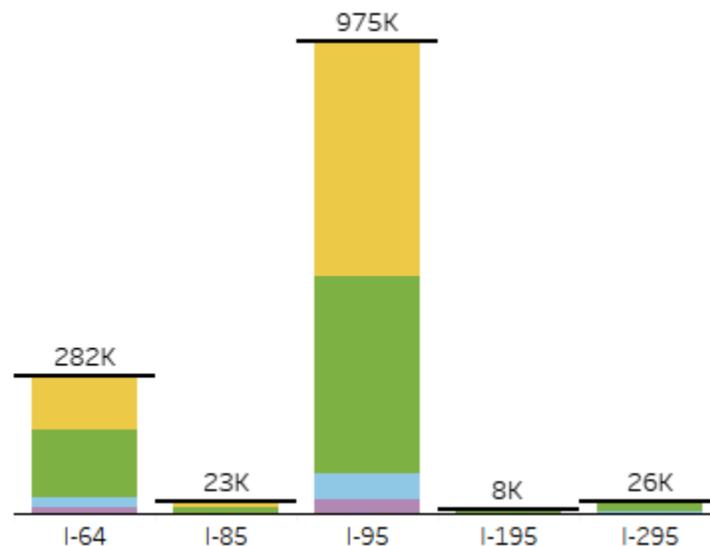


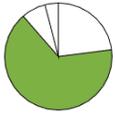
### Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



### Delay by Cause & Interstate in 2021





### Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

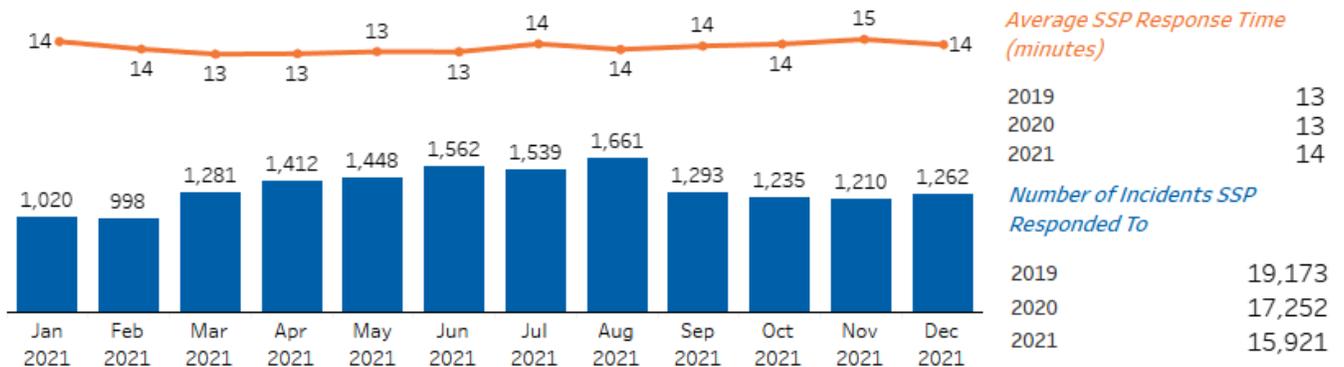
### Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measured for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measured for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

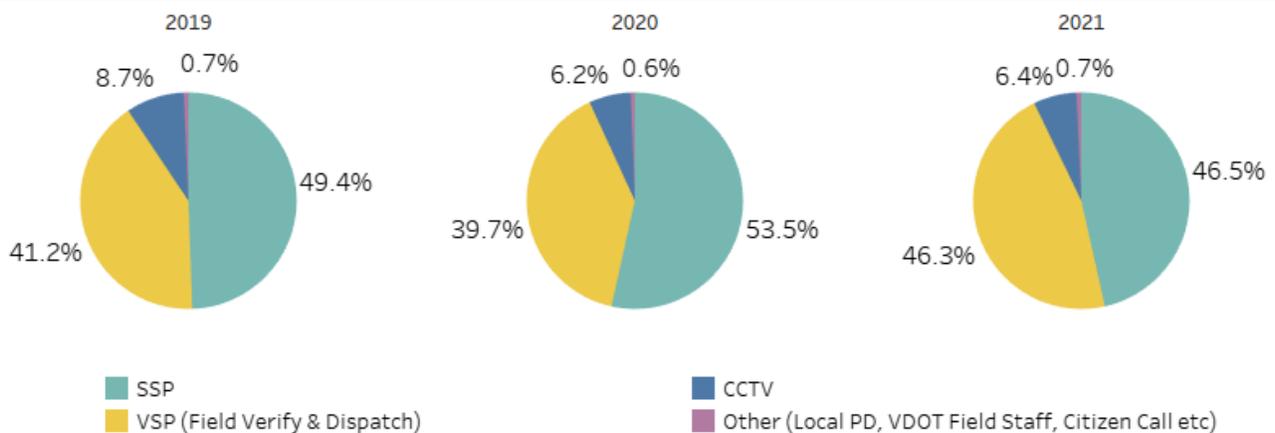


### Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on Scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)

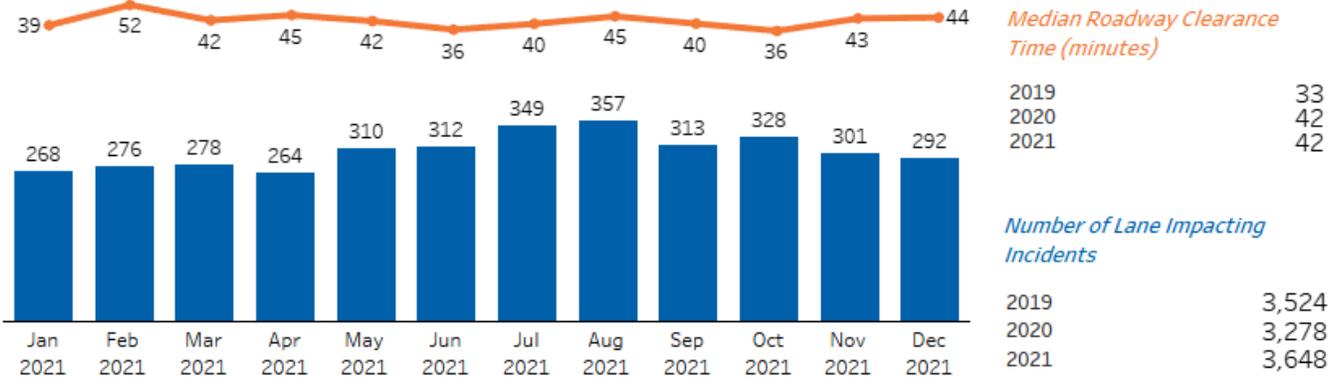


### All Incidents by Detection Source



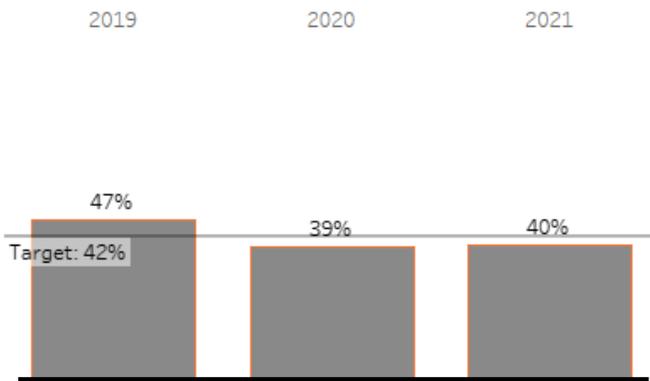
### Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

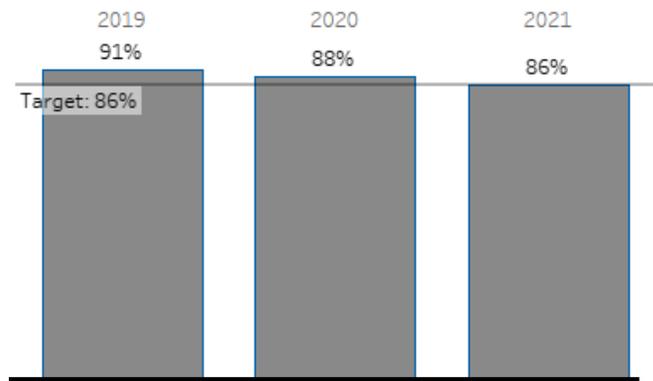


### Lane Impacting Incidents by Roadway Clearance Time

Lane Impacting Incidents Cleared in <30 minutes

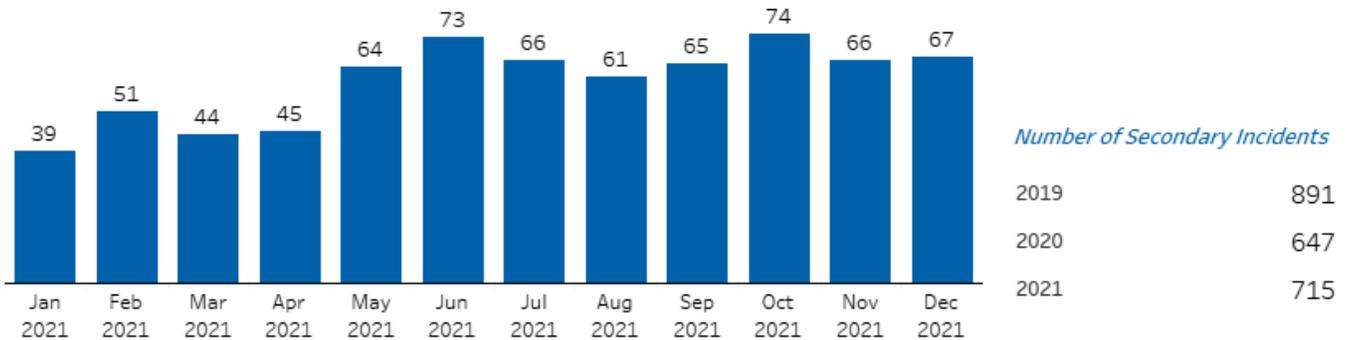


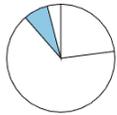
Lane Impacting Incidents Cleared in <90 minutes



### Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





### Work Zones

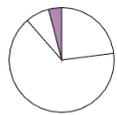
VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

### Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-64	789	879	24,879	17,967
I-85	257	398	9,965	22,913
I-95	684	660	10,816	12,646
I-195	282	56	6,529	562
I-295	747	1,226	16,027	20,559
<b>Grand Total</b>	<b>2,759</b>	<b>3,219</b>	<b>68,215</b>	<b>74,647</b>

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



### Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

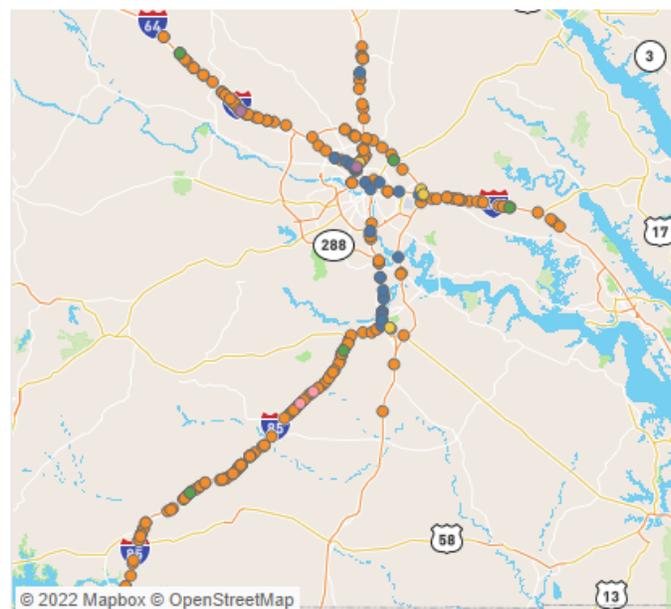
Short Term Weather Events

IncidentType with Other	2019	2020	2021
Debris		2	2
Fog	3	9	
High Wind		5	
Icy Conditions	7	14	4
Other		4	5
Power Line/Pole Down			3
Standing Water (Ponding)	28	23	34
Tree Down	121	158	235

Long Term Weather Events (Road Condition)

Weather Ev..	Road Con..	2019	2020	2021
Flood	Closed	50		
Snow/Ice	Minor	8,262	1,382	8,553
	Moderate		232	5,320

Short Term Weather Events in 2021





### Operations Assets

Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

### ITS Assets Availability - CRO, 2021

Device Type	Number of Devices	% of Time Devices were Online
CCTV	87	99.1%
CCTV Portable	1	90.4%
CMS	15	99.0%
CMS Portable	19	99.6%

### Safety Service Patrol Coverage

Coverage as of December 31, 2021



Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered/Week	% Mile-Hours/Week
I-64	32	46%	4,872	42%
I-85	0	0%	0	0%
I-95	40	62%	6,346	58%
I-195	4	100%	448	67%
I-295	15	28%	1,680	19%
Grand T..	91	35%	13,346	31%

SSP Coverage Legend (Hours Per Day/Days Per Week)

- 14/5
- 14/5 & 16/2
- 16/7
- 24/7
- No SSP

### Camera Coverage

Cameras (CCTV) as of December 31, 2021



Interstate	Directional Miles of Camera Coverage	Estimated % Miles Covered by CCTV
I-64	42	30%
I-85	14	10%
I-95	60	46%
I-195	0	0%
I-295	7	7%
Grand Total	123	24%

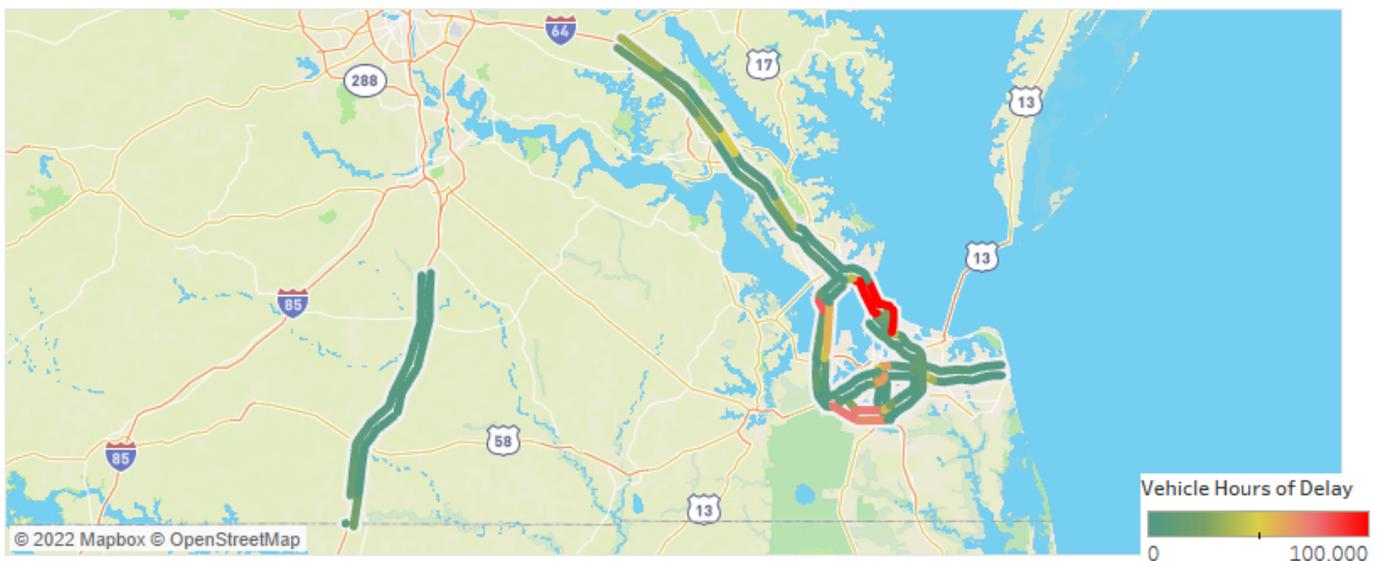
Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream is assumed to be covered by each camera.

# Hampton Roads District

This report compares performance of Interstate Highways from 2020 to 2021

Measure		Target	2020	2021
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed		↘	1,554K	3,747K
ALL INCIDENTS	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	8,839	15,442
	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	7,065	13,486
	Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	33	21
	Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	292	460
LANE IMPACTING INCIDENTS	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	6,245	8,594
	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	5,326	7,549
	Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	22	19
	Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	59%	58%	62%
	Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	94%	93%	94%

## Congestion in 2021



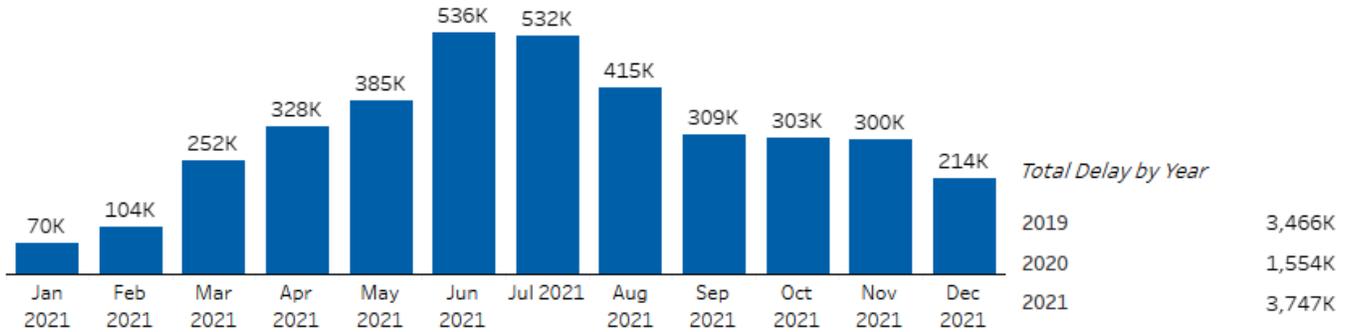
\*Eastern Region Operations was tied into the Statewide ATMS in October 2021. This accounts for the increase in the number of reported incidents.



## Congestion Overview

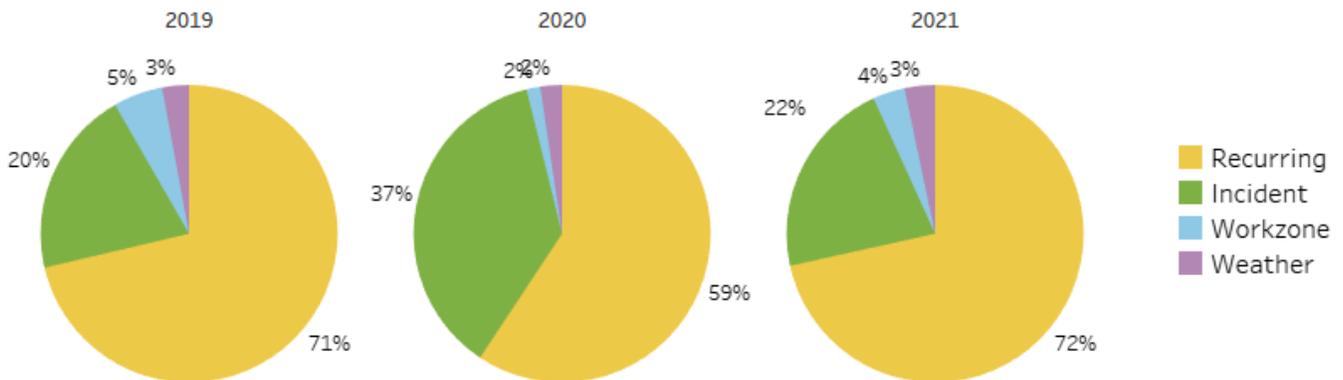
### Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

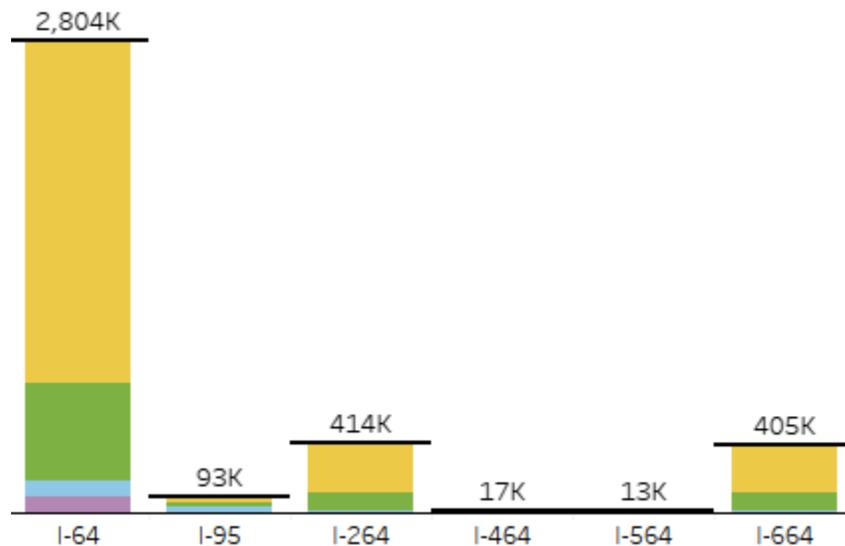


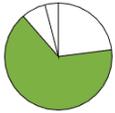
### Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates includes incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



### Delay by Cause & Interstate in 2021



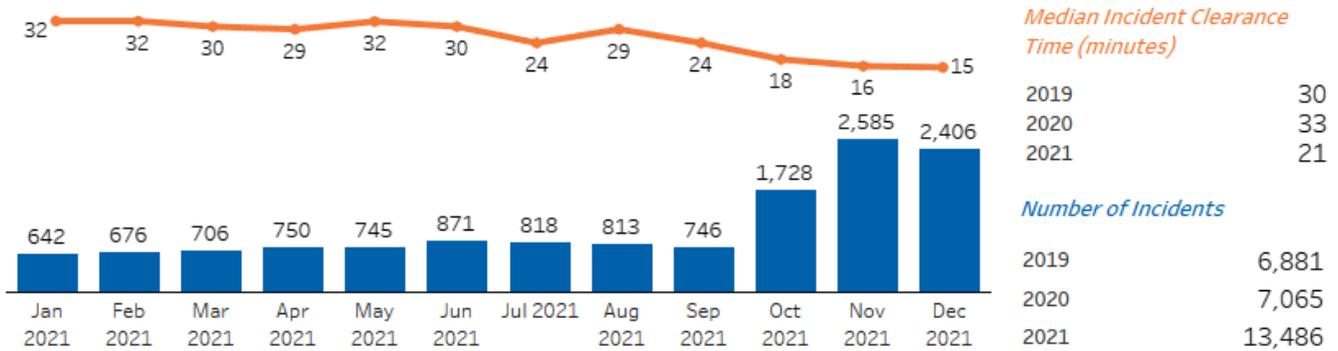


### Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

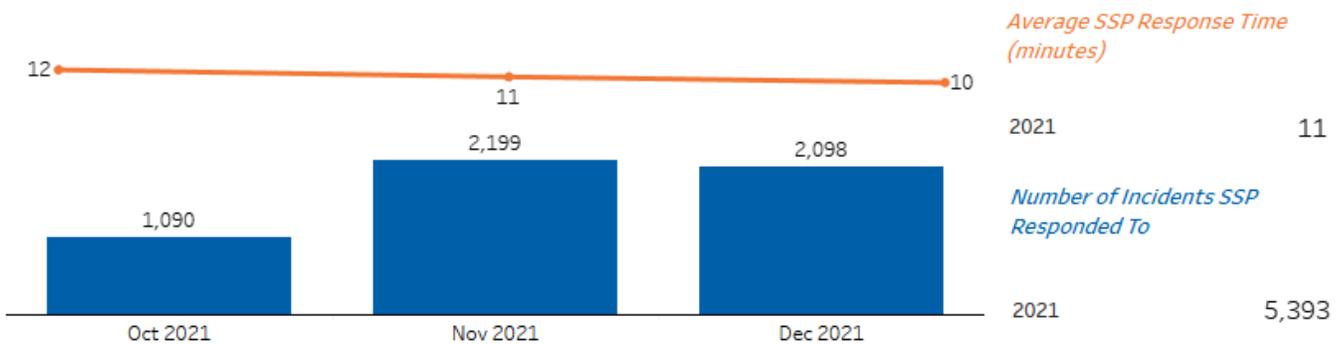
### Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measures for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measures for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

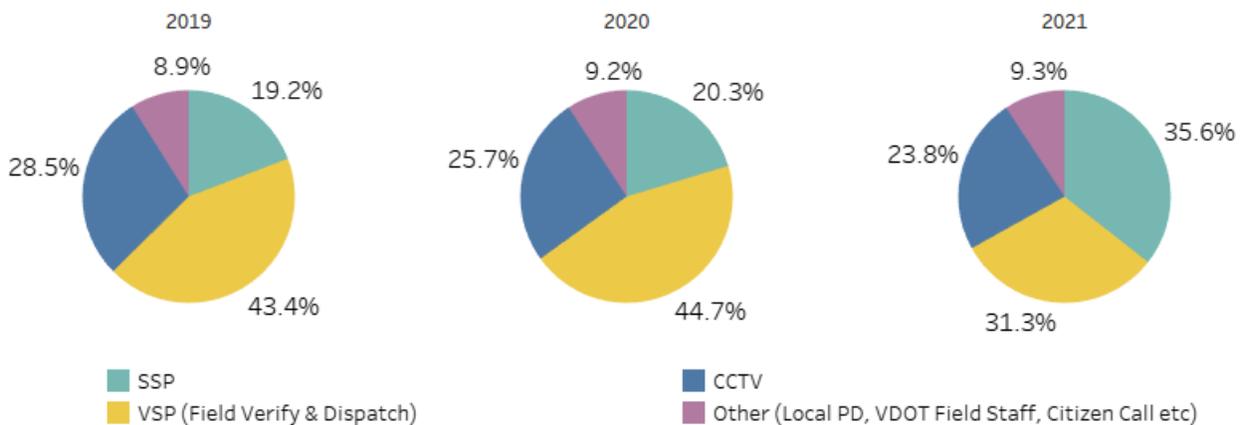


### Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on Scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)



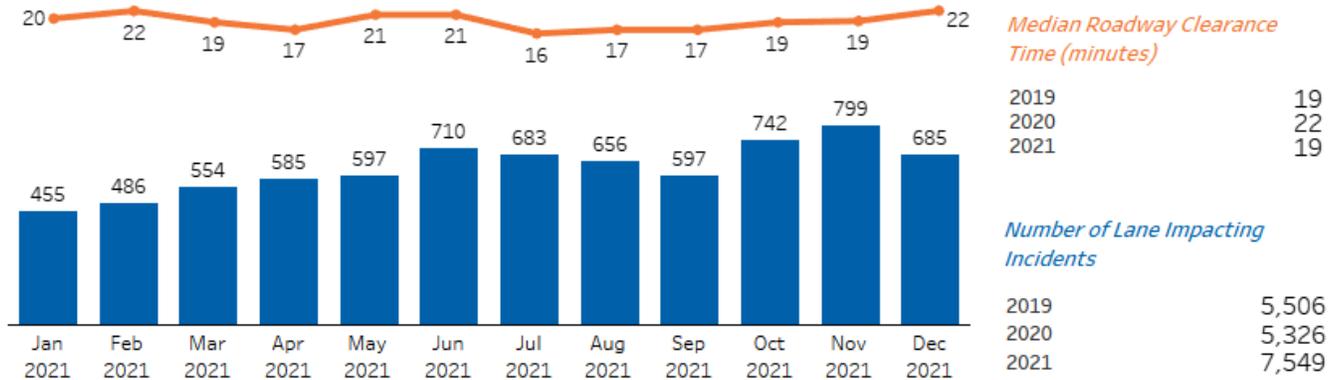
### All Incidents by Detection Source



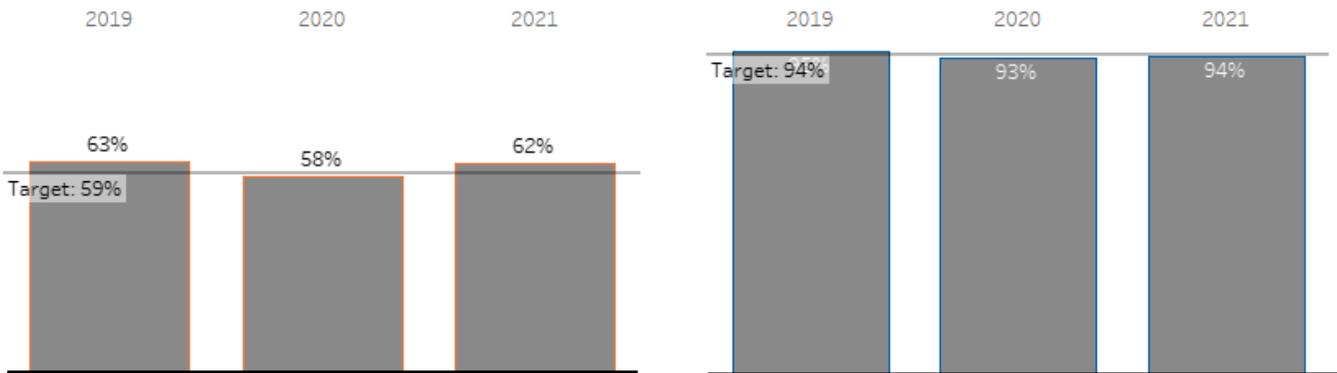


### Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

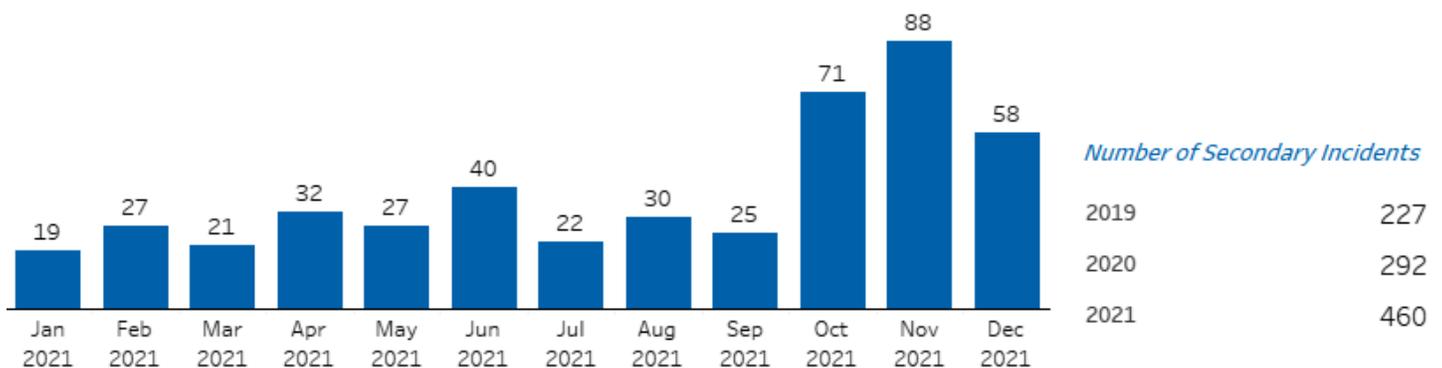


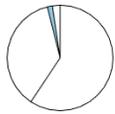
### Lane Impacting Incidents by Roadway Clearance Time



### Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





### Work Zones

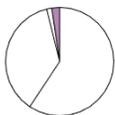
VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

### Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-64	729	637	23,092	13,966
I-66	59	176	689	2,477
I-95	324	105	24,769	2,972
I-264	233	271	2,630	3,140
I-464	8	31	120	144
I-564	29	29	226	342
Grand Total	1,382	1,249	51,525	23,041

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



### Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

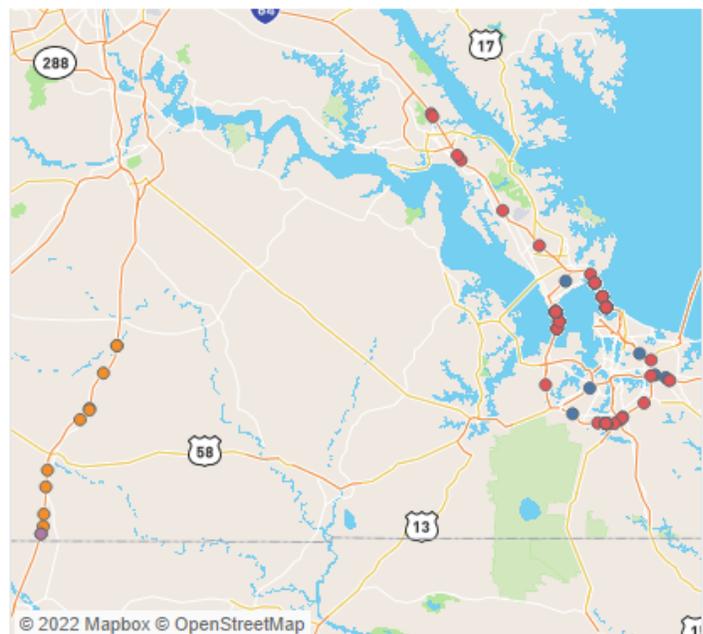
#### Short Term Weather Events

	2019	2020	2021
Debris			1
Fog	54	163	98
High Wind	49	58	46
Icy Conditions		3	4
Other		1	2
Sinkhole		2	
Standing Water		1	
Standing Water (Ponding)	16	20	7
Tree Down	17	29	11

#### Long Term Weather Events (Road Condition) in Hour-Miles

Weather Ev..	Road Con..	2020	2021
Snow/Ice	Closed		1
	Minor	752	632
	Moderate		18

#### Short Term Weather Events in 2021





### Operations Assets

Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

### ITS Assets Availability - ERO, 2021

CCTV	293	92.2%
CCTV Portable	1	100.0%
CMS	201	90.4%
CMS Portable	6	100.0%

### Safety Service Patrol Coverage

Coverage as of December 31, 2021



Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-64	79	100%	13,272	100%
I-95	0	0%	0	0%
I-264	22	88%	4,200	100%
I-464	6	100%	1,008	100%
I-564	3	100%	504	100%
I-664	21	100%	3,528	100%
Grand T..	131	78%	22,512	80%

SSP Coverage Legend (Hours Per Day/Days Per Week)

- 16/7
- 24/7
- No SSP

### Camera Coverage

Cameras (CCTV) as of December 31, 2021



Interstate	Directional Miles of Camera Coverage	Estimated % Miles Covered by CCTV
I-64	111	70%
I-95	2	3%
I-264	45	90%
I-464	10	84%
I-564	4	73%
I-664	28	67%
Grand Total	200	60%



# Fredericksburg District

This report compares performance of Interstate Highways from 2020 to 2021

Measure		Target	2020	2021
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed		⬇️	1,383K	3,302K
ALL INCIDENTS	Roads All All Reported Incidents Number of disabled vehicle and crash incidents	N/A	7,170	8,833
	Interstates All Reported Incidents Number of disabled vehicle and crash incidents	N/A	5,605	6,751
	Interstates Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	⬇️	22	26
	Interstates Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	⬇️	117	124
LANE IMPACTING INCIDENTS	Roads All Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	1,598	2,060
	Interstates Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	727	951
	Interstates Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	⬇️	44	39
	Interstates Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	45%	35%	40%
	Interstates Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	86%	85%	87%

## Congestion in 2021

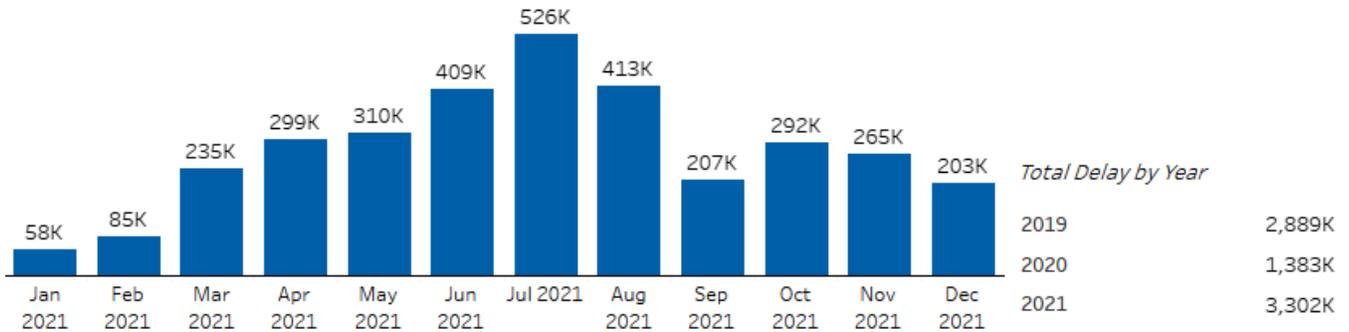




## Congestion Overview

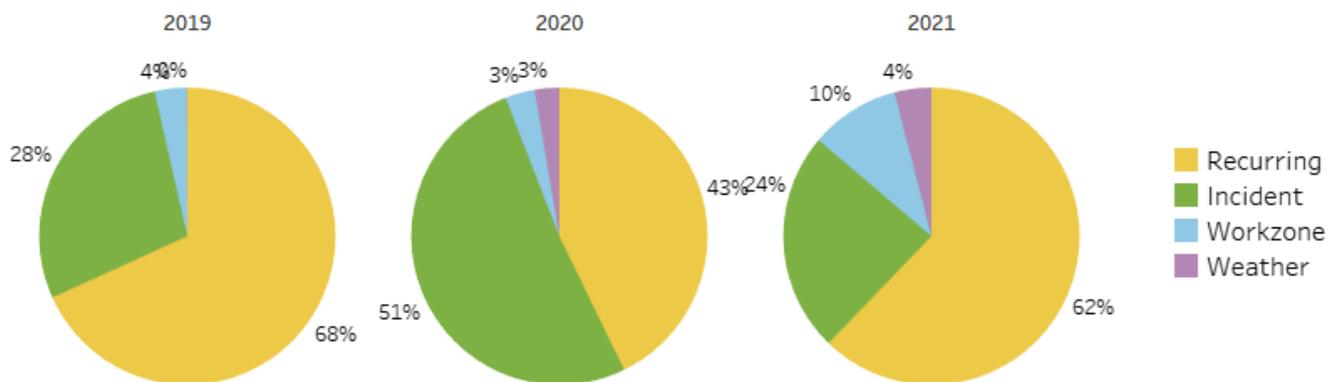
### Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.



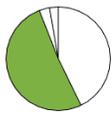
### Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



### Delay by Cause & Interstate in 2021



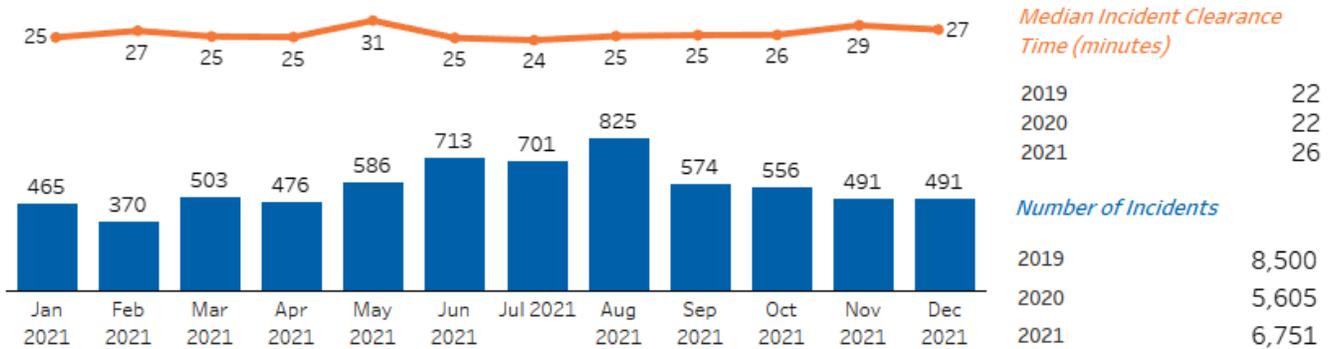


### Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

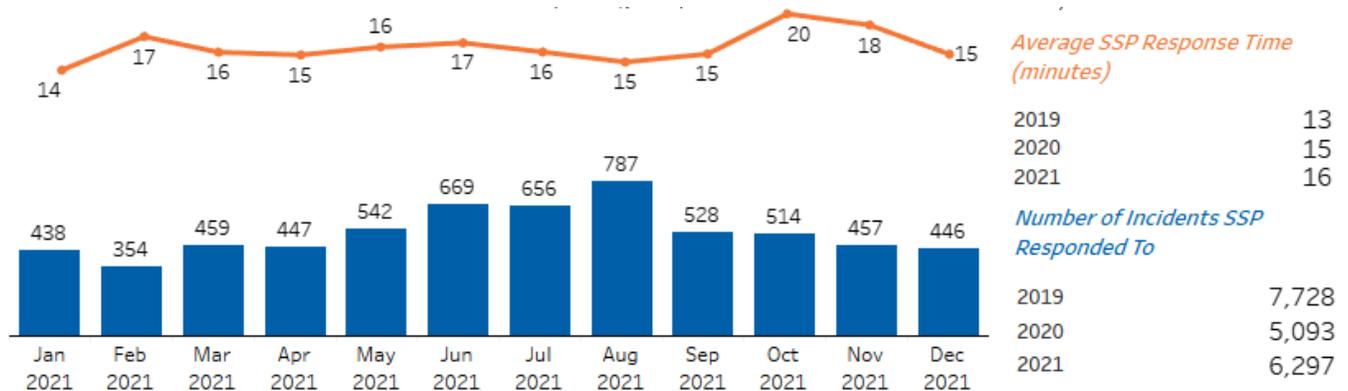
### Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measured for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measured for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

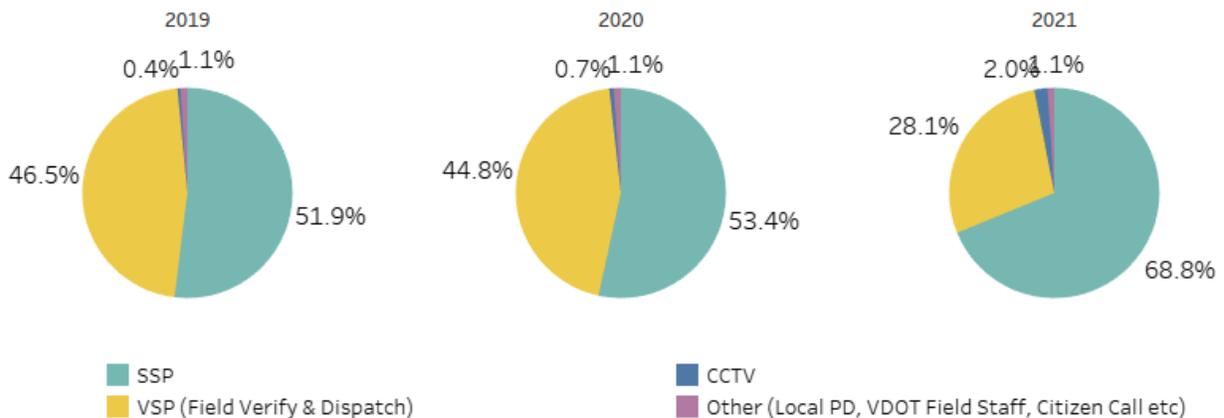


### Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)



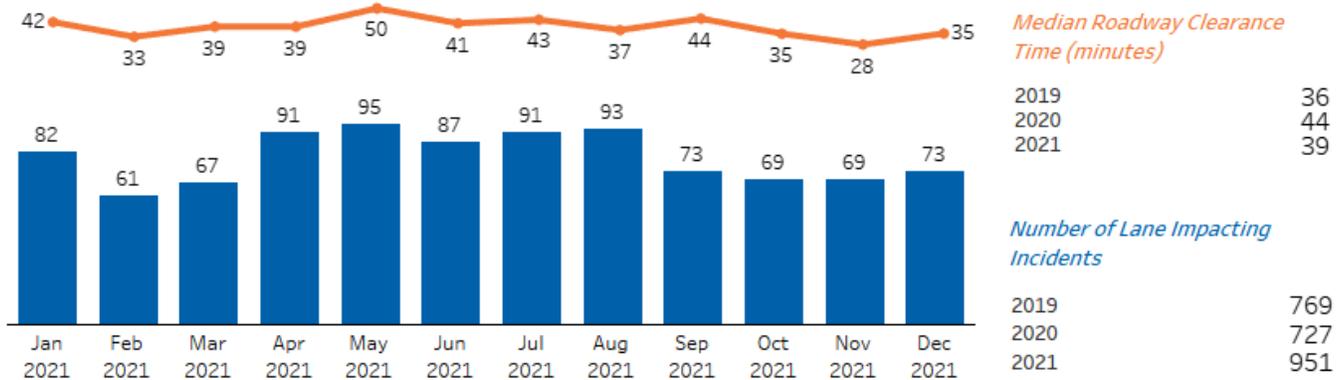
### All Incidents by Detection Source



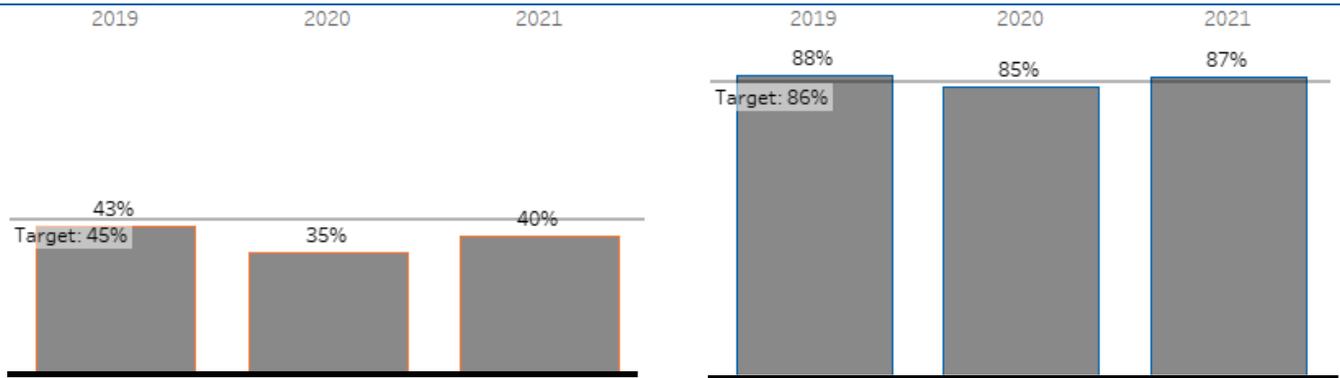


### Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

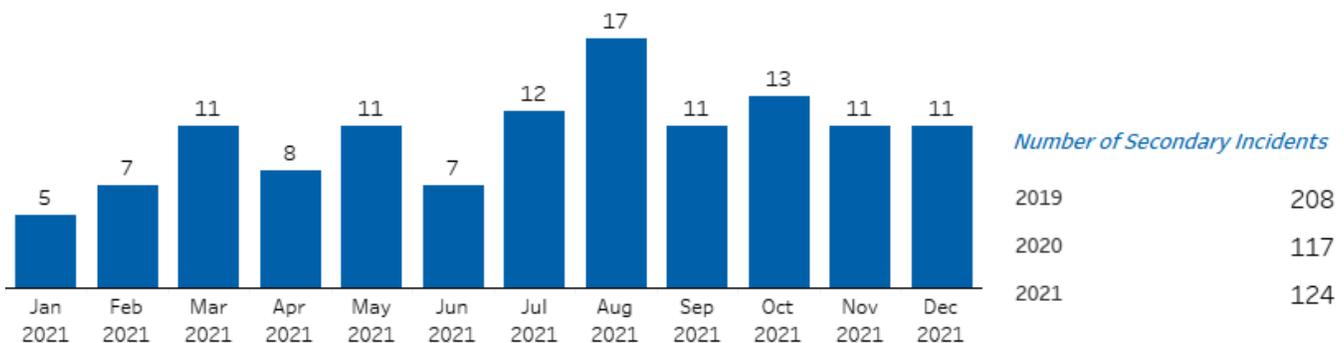


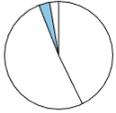
### Lane Impacting Incidents by Roadway Clearance Time



### Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





### Work Zones

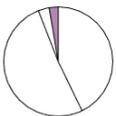
VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

#### Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-95	416	571	6,606	12,922
<b>Grand Total</b>	<b>416</b>	<b>571</b>	<b>6,606</b>	<b>12,922</b>

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



### Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

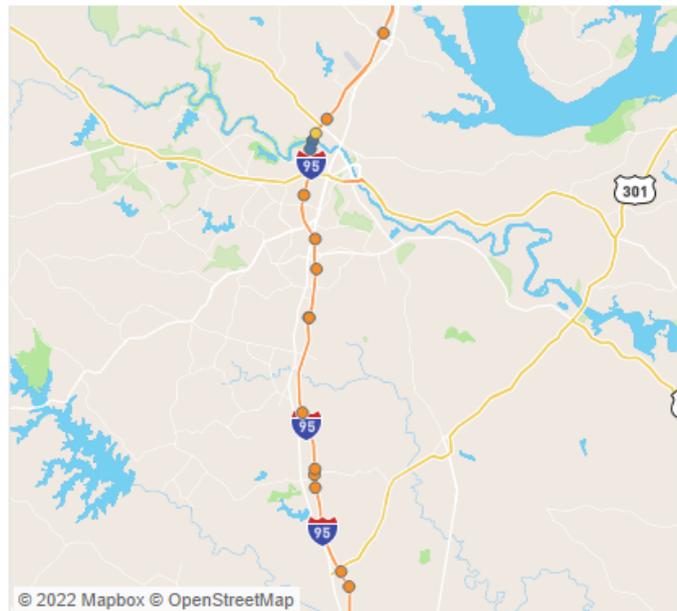
Short Term Weather Events

	2019	2020	2021
Flooding/High Water		1	
Fog		1	
Icy Conditions	2	1	1
Standing Water (Ponding)	2	2	4
Tree Down	10	10	13

Long Term Weather Events (Road Condition) in Hour-Miles

Weather Ev..	Road Con..	2019	2020	2021
Snow/Ice	Minor	3,000	0	1,893
	Moderate	1,121		716
	Severe		73	

Short Term Weather Events in 2021



© 2022 Mapbox © OpenStreetMap

- Icy Conditions
- Standing Water (Ponding)
- Tree Down



### Operations Assets

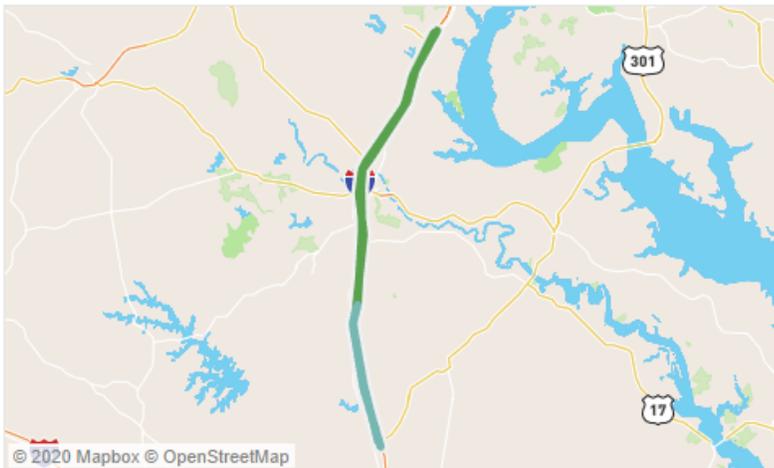
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

### ITS Assets Availability - CRO, 2021

Device Type	Number of Devices	% of Time Devices were Online
CCTV	87	99.1%
CCTV Portable	1	90.4%
CMS	15	99.0%
CMS Portable	19	99.6%

### Safety Service Patrol Coverage

Coverage as of December 31, 2021



Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-95	50	100%	7,280	87%
<b>Grand Total</b>	<b>50</b>	<b>100%</b>	<b>7,280</b>	<b>87%</b>

SSP Coverage Legend (Hours Per Day/Days Per Week)

- 16/7
- 24/7

### Camera Coverage

Cameras (CCTV) as of December 31, 2021



Interstate	Directional Miles of Camera Coverage	Estimated % Miles Covered by CCTV
I-95	34	34%
<b>Grand Total</b>	<b>34</b>	<b>34%</b>

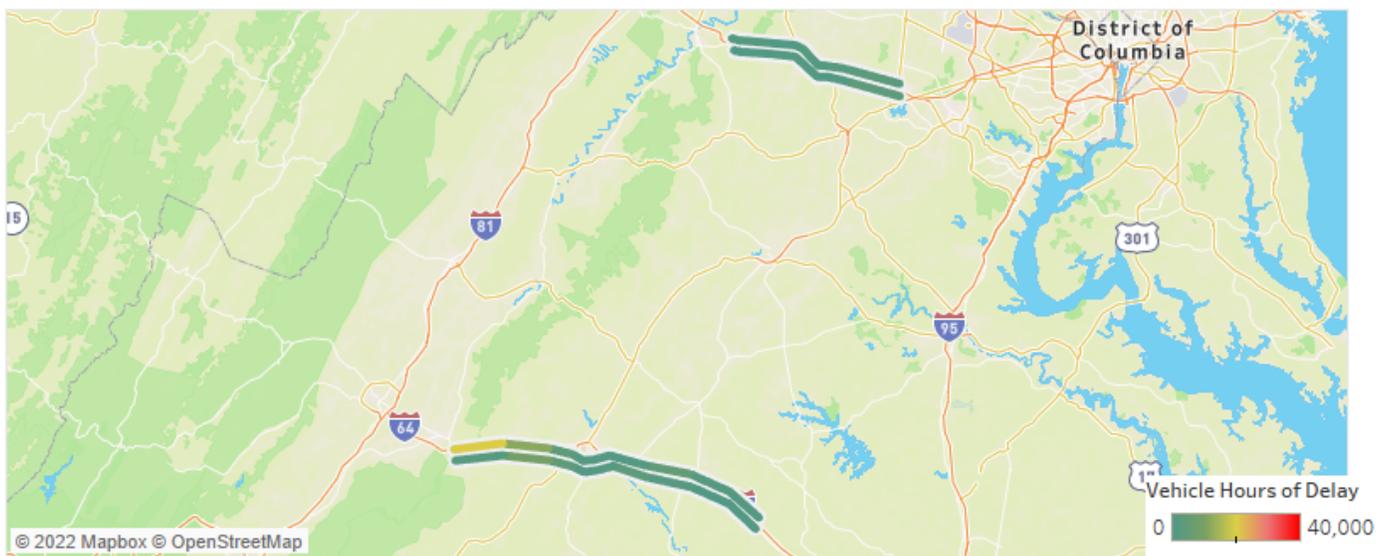
Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream is assumed to be covered by each camera.

## Culpeper District

This report compares performance of Interstate Highways from 2020 to 2021

Measure		Target	2020	2021
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed		↘	47K	82K
ALL INCIDENTS	All Roads All Reported Incidents Number of disabled vehicle and crash incidents	N/A	4,360	4,483
	Interstates All Reported Incidents Number of disabled vehicle and crash incidents	N/A	3,099	3,249
	Interstates Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	10	10
	Interstates Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	20	39
LANE IMPACTING INCIDENTS	All Roads Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	1,350	1,378
	Interstates Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	342	374
	Interstates Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	40	40
	Interstates Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	31%	37%	37%
	Interstates Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	87%	92%	89%

### Congestion in 2021

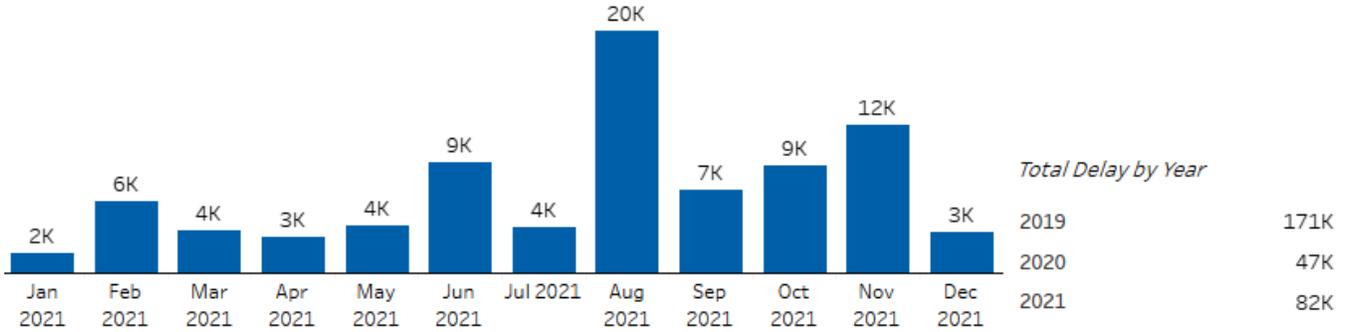




## Congestion Overview

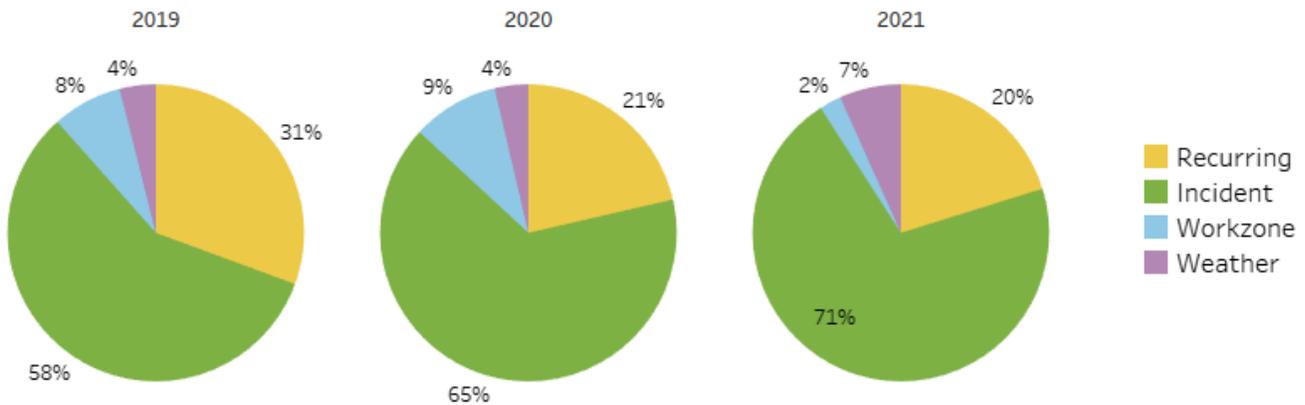
### Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

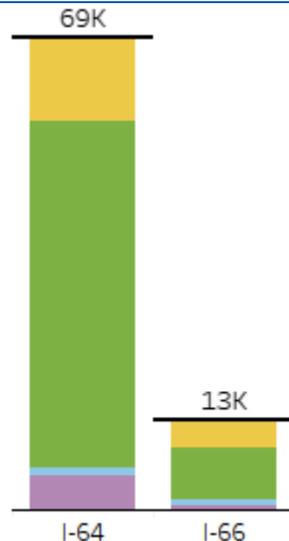


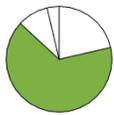
### Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



### Delay by Cause & Interstate in 2021



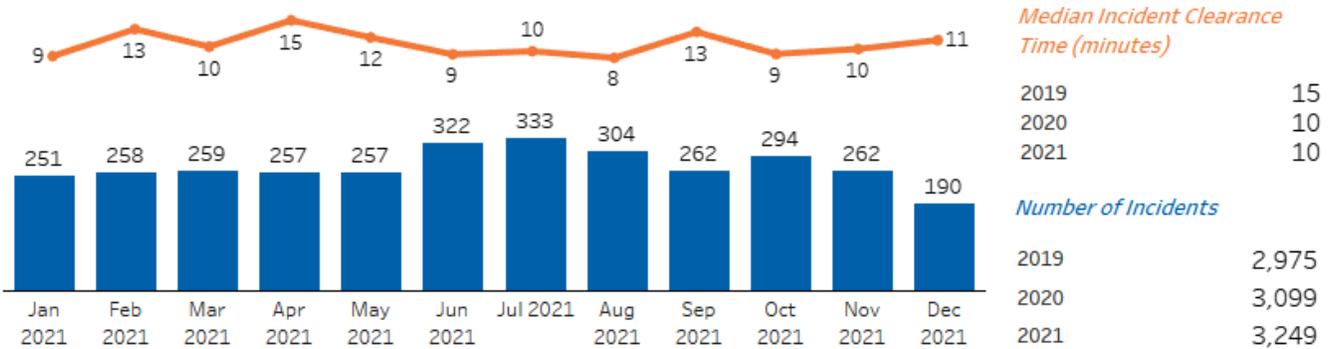


### Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

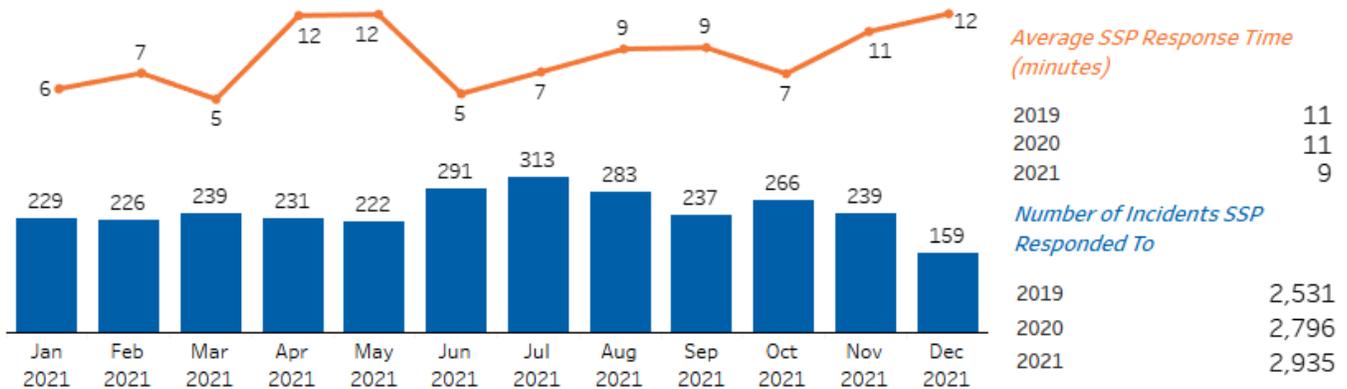
### Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measured for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measured for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

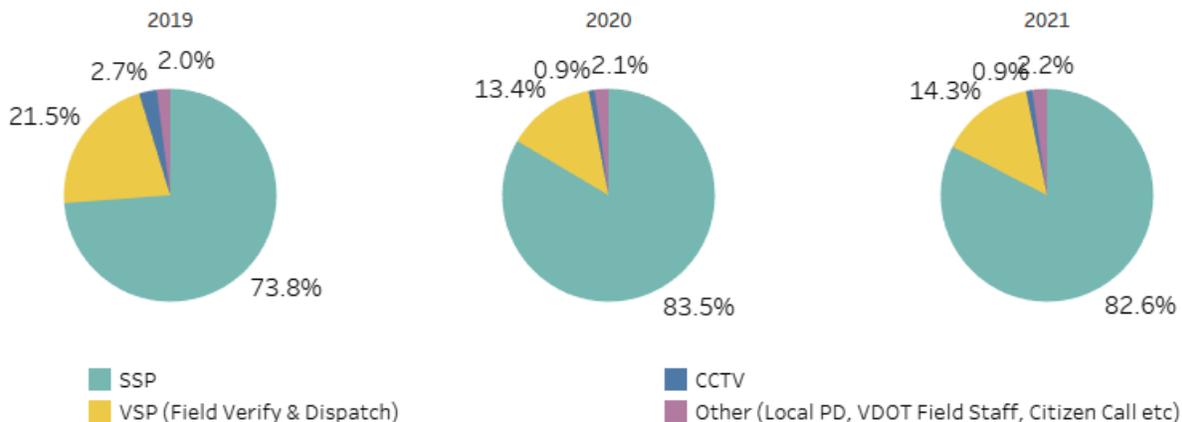


### Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)



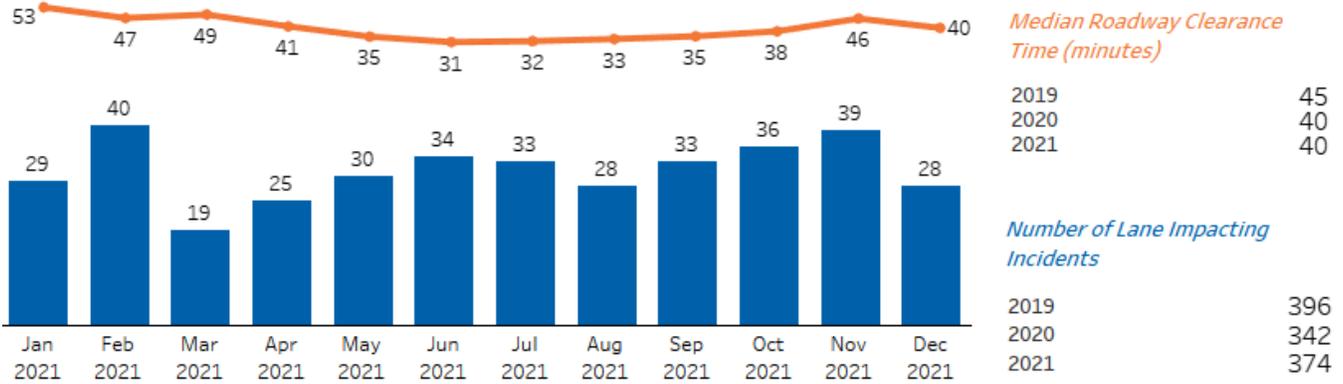
### All Incidents by Detection Source



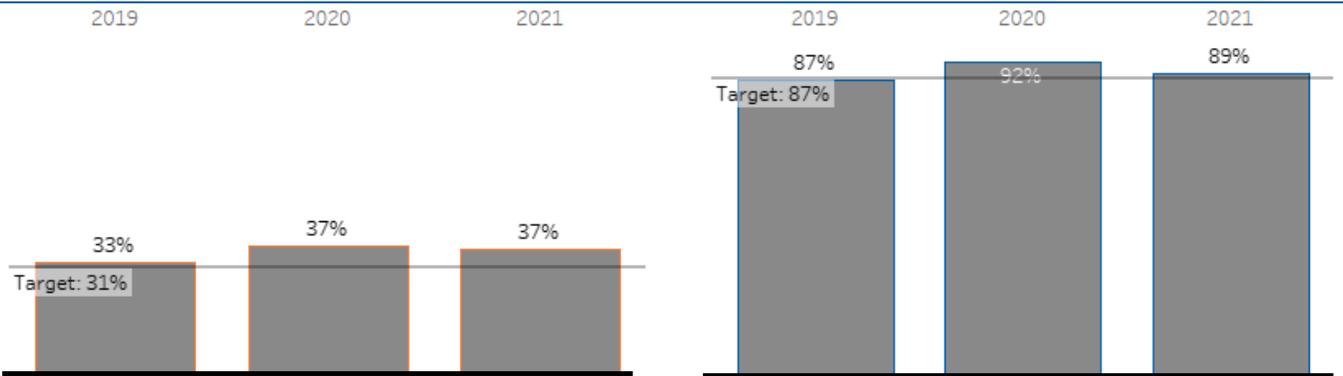


### Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

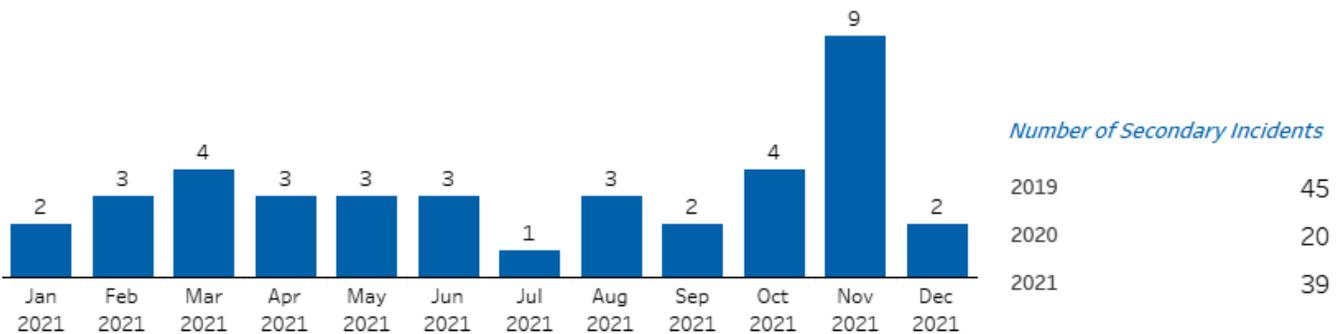


### Lane Impacting Incidents by Roadway Clearance Time



### Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





### Work Zones

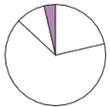
VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

### Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-64	109	104	3,005	3,818
I-66	62	133	1,119	5,681
<b>Grand Total</b>	<b>171</b>	<b>237</b>	<b>4,125</b>	<b>9,499</b>

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



### Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

	2019	2020	2021
Fog		10	1
High Wind	4	34	
Tree Down		1	

Long Term Weather Events (Road Condition) in Hour-Miles

Weather Ev..	Road Con..	2019	2020	2021
Snow/Ice	Minor	5,477	864	4,406
	Moderate	769	476	2,551
	Severe			36

Short Term Weather Events in 2021





### Operations Assets

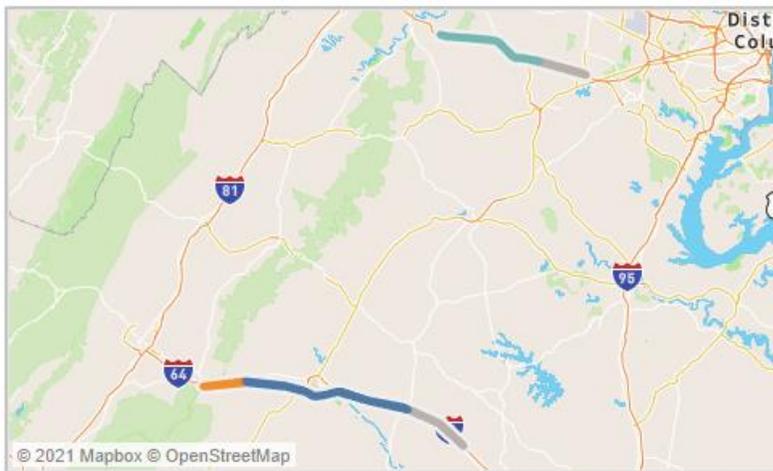
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

### ITS Assets Availability - NWRO, 2021

Device Type	Number of Devices	% of Time Devices were Online
CCTV	124	98.8%
CCTV Portable	18	96.7%
CMS	32	94.9%
CMS Portable	38	95.5%

### Safety Service Patrol Coverage

Coverage as of December 31, 2021



SSP Coverage Legend (Hours Per Day/Days Per Week)  
 ■ 12/5 ■ 12/7 ■ 16/7 ■ No SSP

Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered/Week	% Mile-Hours/Week
I-64	29	59%	2,412	29%
I-66	18	67%	2,016	44%
<b>Grand Total</b>	<b>47</b>	<b>62%</b>	<b>4,428</b>	<b>35%</b>

### Camera Coverage

Cameras (CCTV) as of December 31, 2021



Interstate	Directional Miles of Camera Coverage	Estimated % Miles Covered by CCTV
I-64	44	45%
I-66	19	34%
<b>Grand Total</b>	<b>62</b>	<b>41%</b>

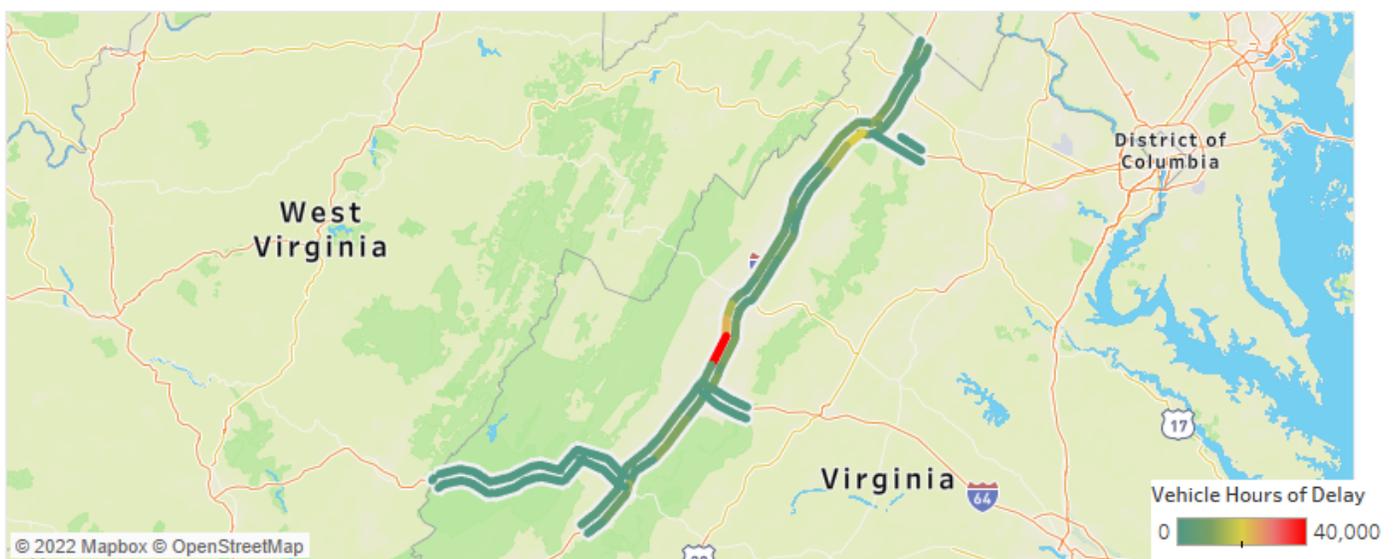
Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream is assumed to be covered by each camera.

## Staunton District

This report compares performance of Interstate Highways from 2020 to 2021

Measure		Target	2020	2021	
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed		↘	333K	520K	
ALL INCIDENTS	All Roads All Reported Incidents Number of disabled vehicle and crash incidents	N/A	10,910	12,085	
	Interstates	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	9,413	10,562
		Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	12	11
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	112	122
LANE IMPACTING INCIDENTS	All Roads Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	2,156	2,277	
	Interstates	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	1,035	1,157
		Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	48	46
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	30%	30%	33%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	81%	81%	83%

### Congestion in 2021

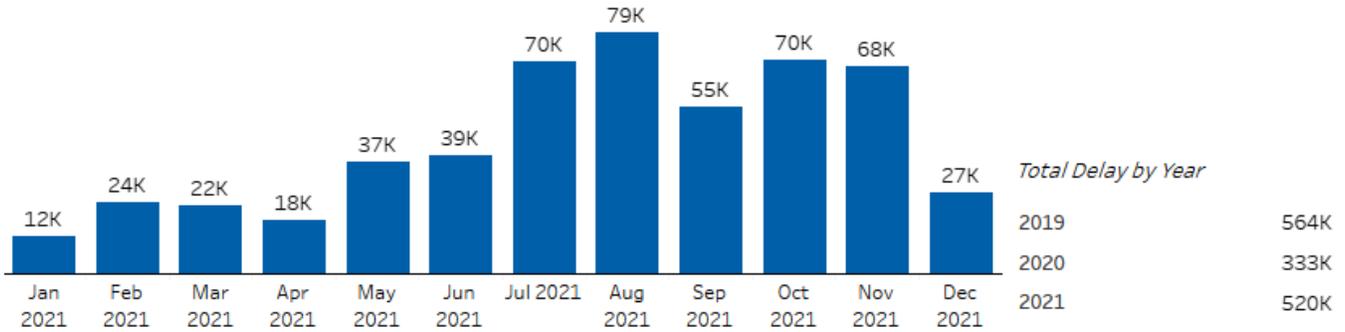




## Congestion Overview

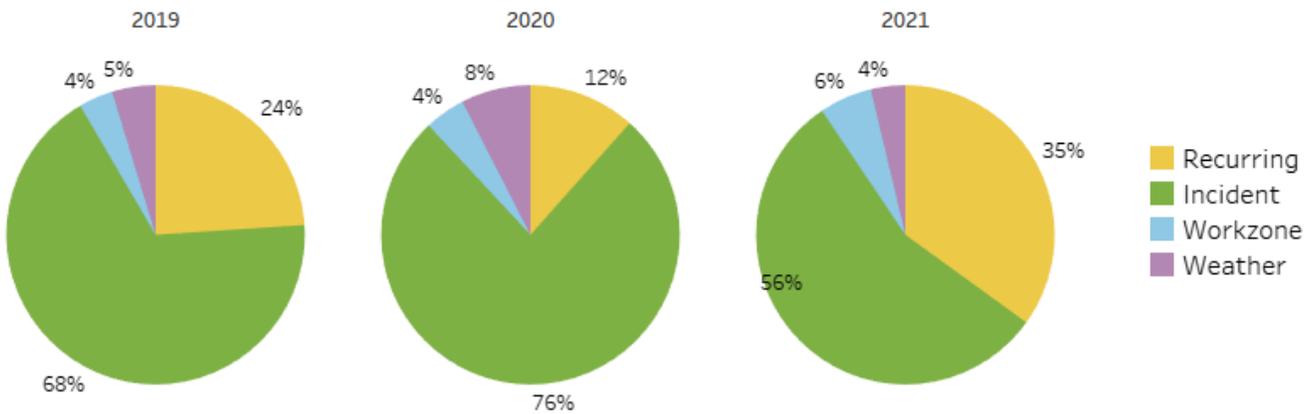
### Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

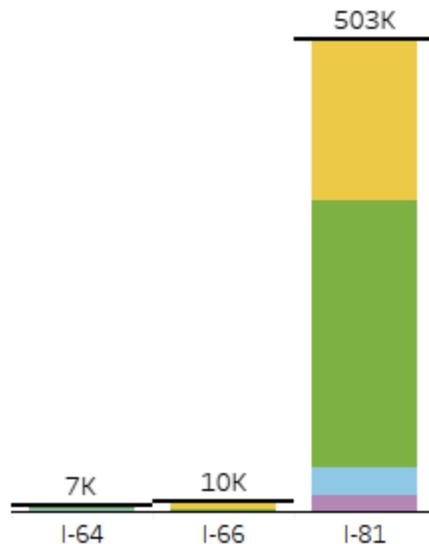


### Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



### Delay by Cause & Interstate in 2021



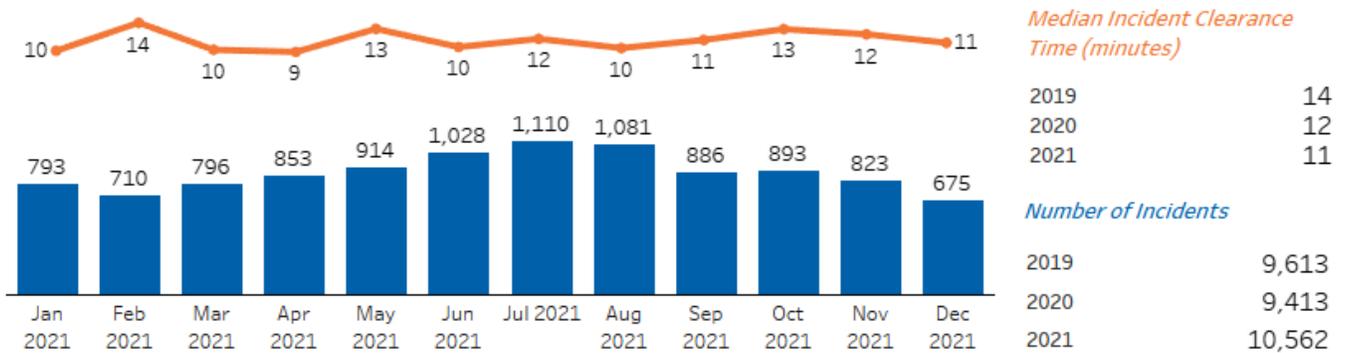


### Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

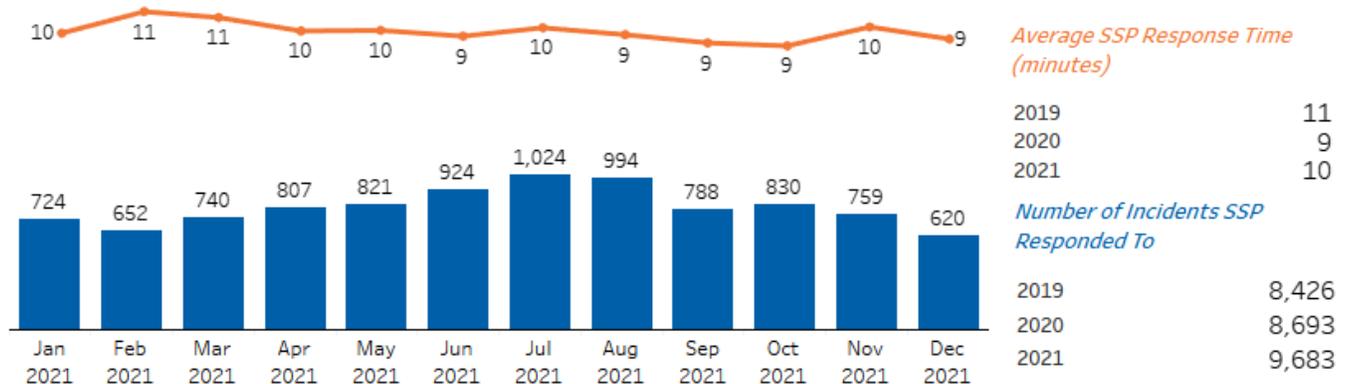
### Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measured for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measured for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

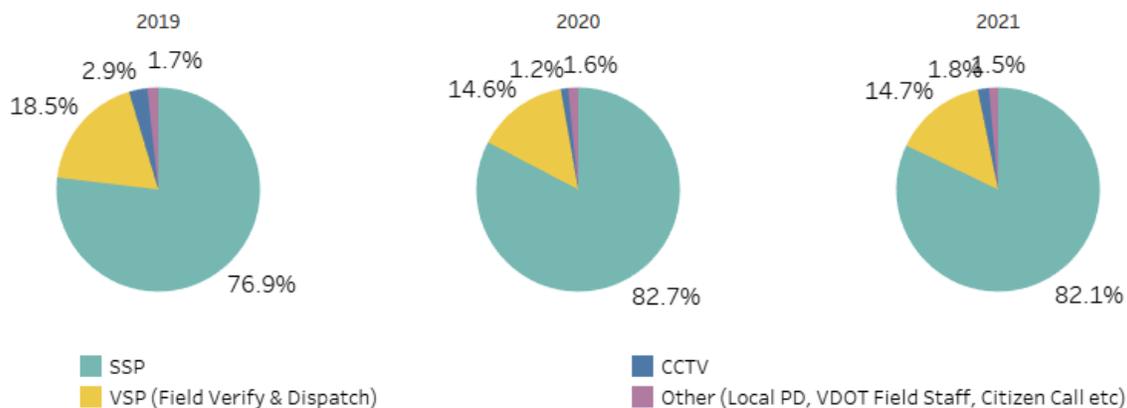


### Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)



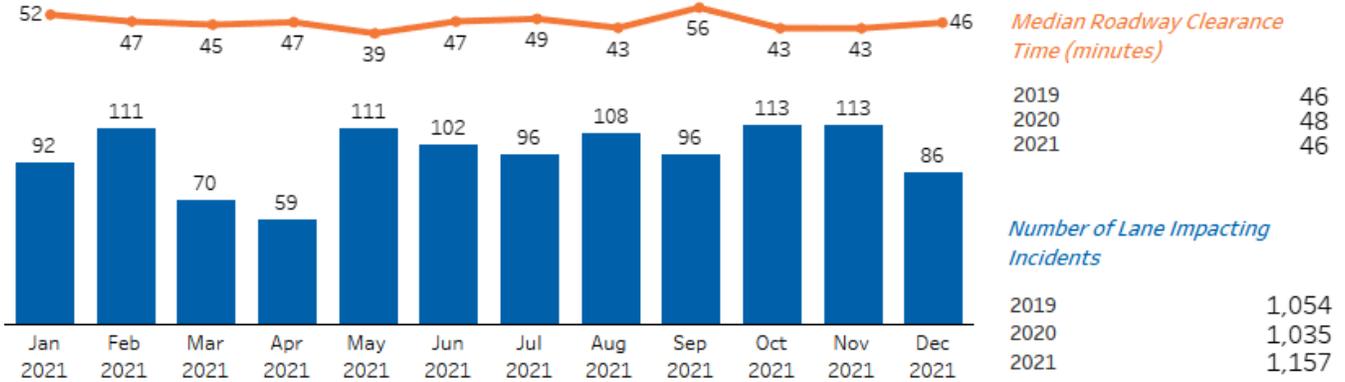
### All Incidents by Detection Source





### Lane Impacting Incidents & Roadway Clearance Time

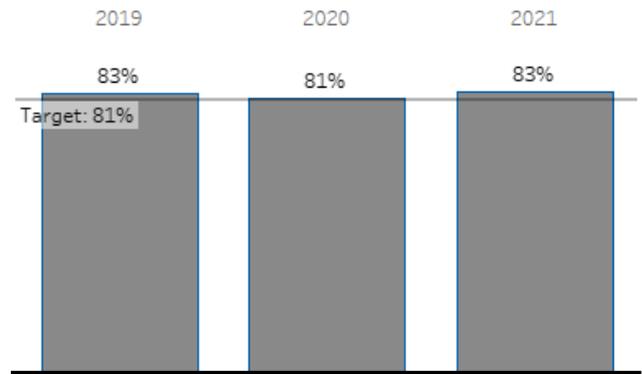
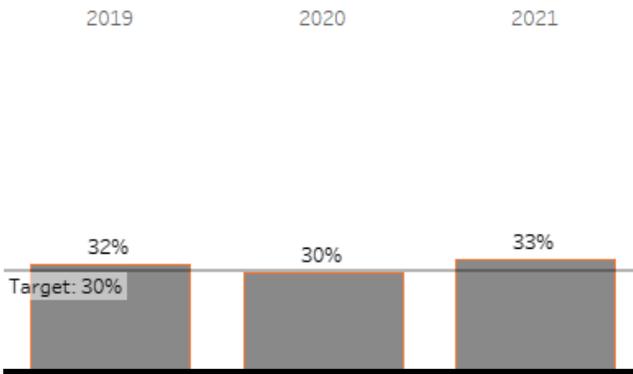
Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.



### Lane Impacting Incidents by Roadway Clearance Time

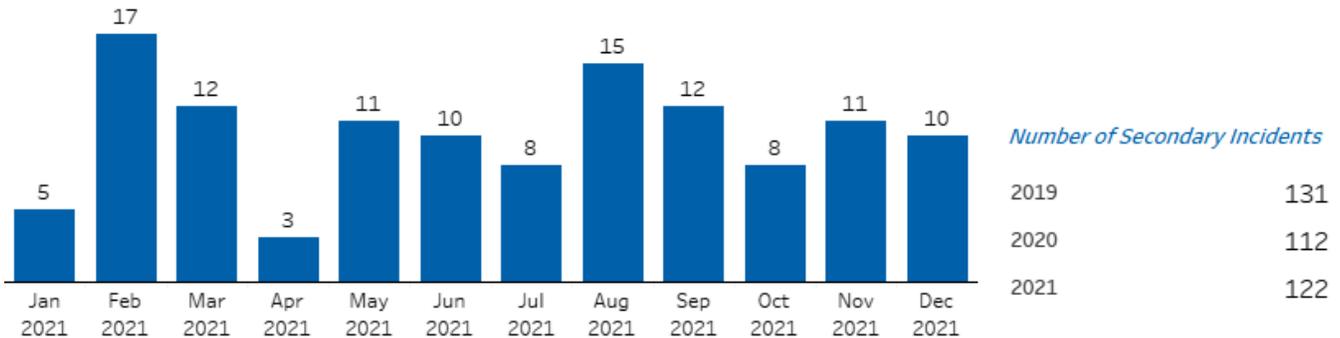
Lane Impacting Incidents Cleared in <30 minutes

Lane Impacting Incidents Cleared in <90 minutes



### Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





### Work Zones

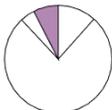
VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

### Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-64	141	162	8,065	16,926
I-66	13	35	112	1,338
I-81	1,163	816	35,380	21,280
<b>Grand Total</b>	<b>1,317</b>	<b>1,013</b>	<b>43,556</b>	<b>39,544</b>

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



### Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

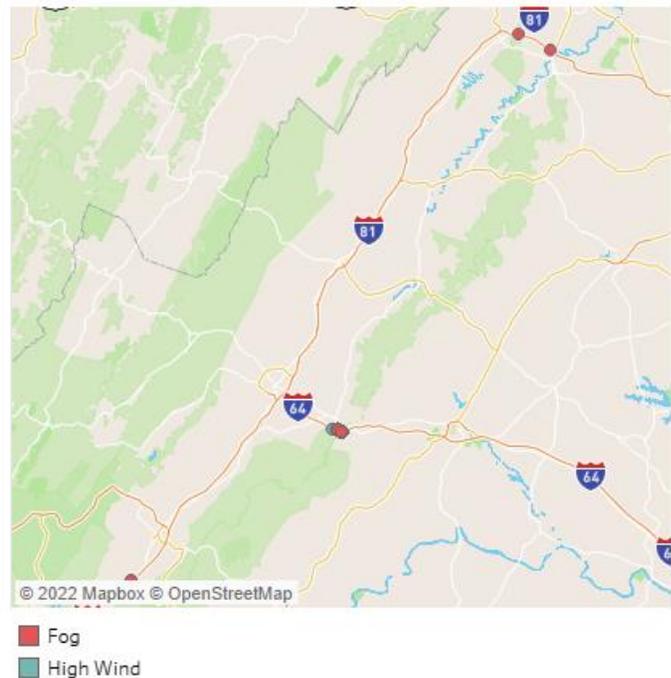
Short Term Weather Events

	2019	2020	2021
Fog	230	317	208
High Wind	15	85	58
Icy Conditions	1		

Long Term Weather Events (Road Condition) in Hour-Miles

Weather Ev..	Road Con..	2019	2020	2021
Snow/Ice	Closed	0		
	Minor	38,045	9,269	32,436
	Moderate	11,342	9,246	16,451

Short Term Weather Events in 2021





### Operations Assets

Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

### ITS Assets Availability - NWRO, 2021

Device Type	Number of Devices	% of Time Devices were Online
CCTV	124	98.8%
CCTV Portable	18	96.7%
CMS	32	94.9%
CMS Portable	38	95.5%

### Safety Service Patrol Coverage

Coverage as of December 31, 2021



Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered/Week	% Mile-Hours/Week
I-64	0	0%	1,008	9%
I-66	13	100%	1,456	67%
I-81	150	100%	16,800	67%
<b>Grand Total</b>	<b>163</b>	<b>71%</b>	<b>19,264</b>	<b>50%</b>

SSP Coverage Legend (Hours Per Day/Days Per Week)  
■ 12/7    ■ 16/7    ■ No SSP

### Camera Coverage

Cameras (CCTV) as of December 31, 2021



Interstate	Directional Miles of Camera Coverage	Estimated % Miles Covered by CCTV
I-64	20	14%
I-66	6	23%
I-81	129	43%
<b>Grand Total</b>	<b>154</b>	<b>33%</b>

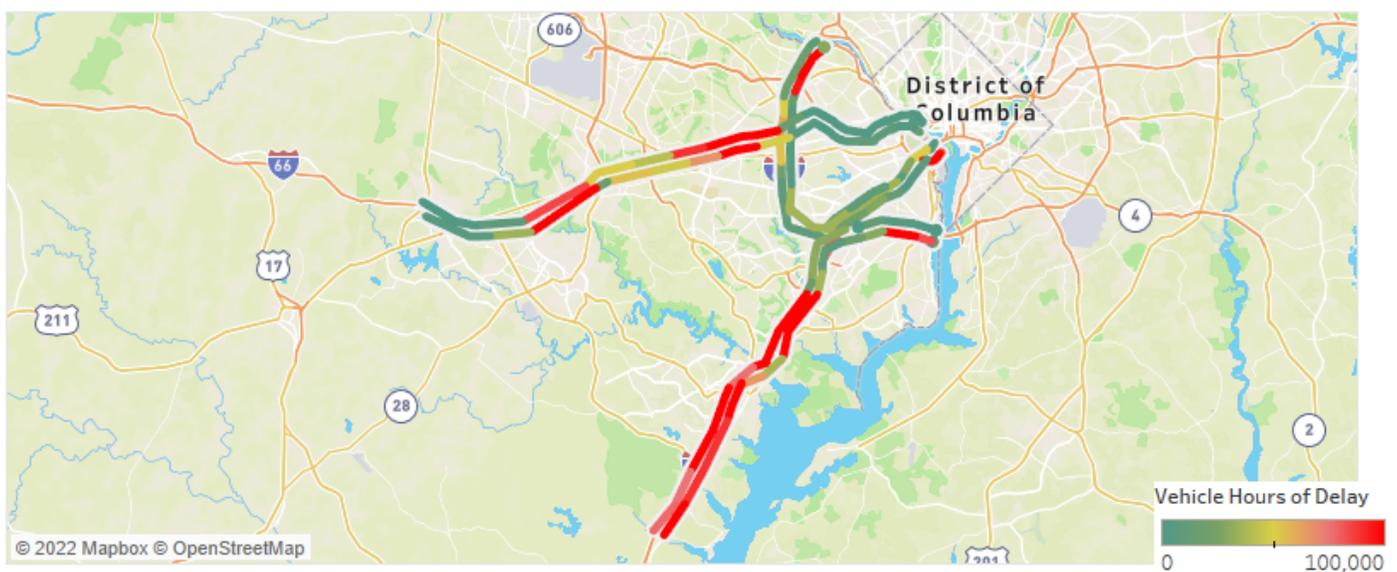
Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream is assumed to be covered by each camera.

# Northern Virginia District

This report compares performance of Interstate Highways from 2020 to 2021

Measure		Target	2020	2021	
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed		↘	3,269K	6,102K	
ALL INCIDENTS	Roads All All Reported Incidents Number of disabled vehicle and crash incidents	N/A	24,310	26,937	
	Interstates All Reported Incidents Number of disabled vehicle and crash incidents	N/A	22,377	24,457	
		Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	31	32
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	588	783
LANE IMPACTING INCIDENTS	Roads All Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	5,440	6,429	
	Interstates Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	4,281	5,141	
		Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	41	41
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	49%	36%	38%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	90%	89%	89%

## Congestion in 2021

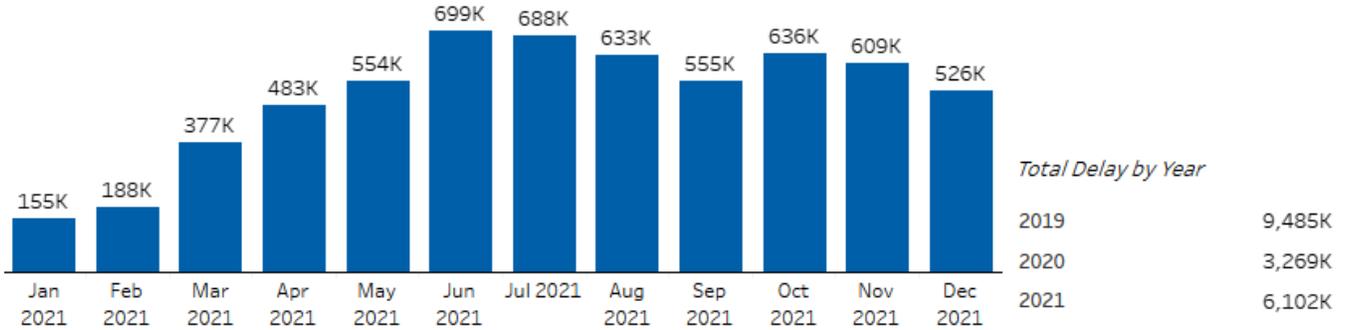




## Congestion Overview

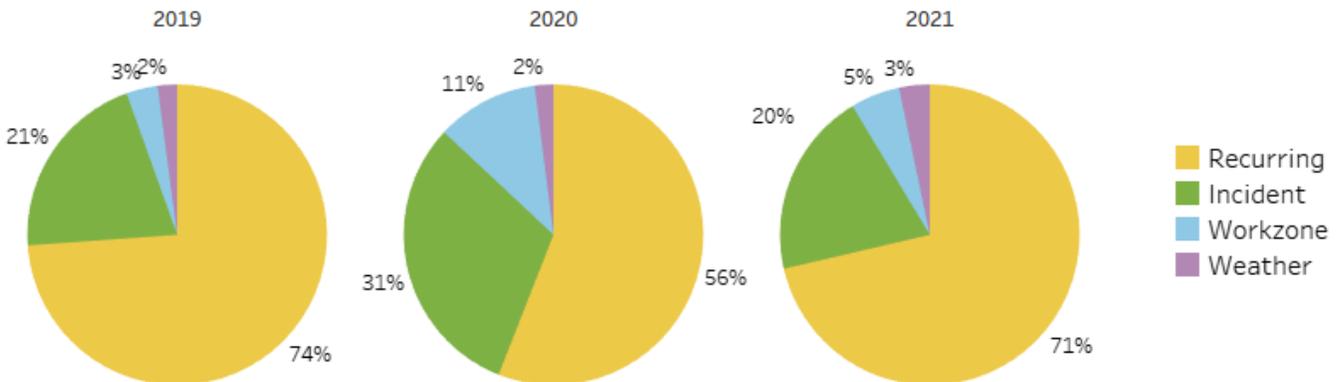
### Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

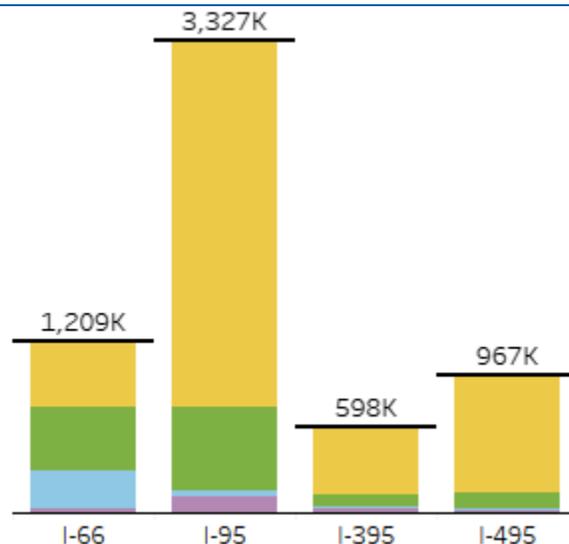


### Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks to due high volume or geometric constraints. Sources of non-recurring congestion on interstates includes incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



### Delay by Cause & Interstate in 2021



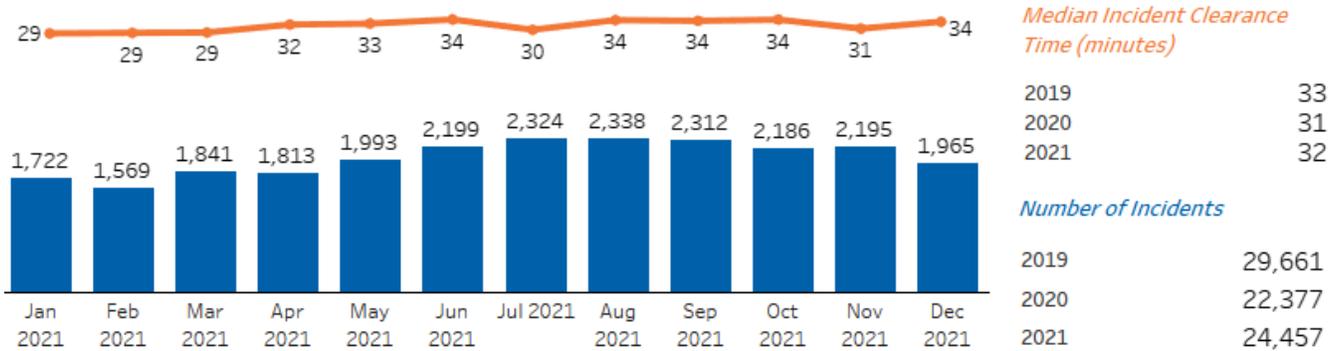


### Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

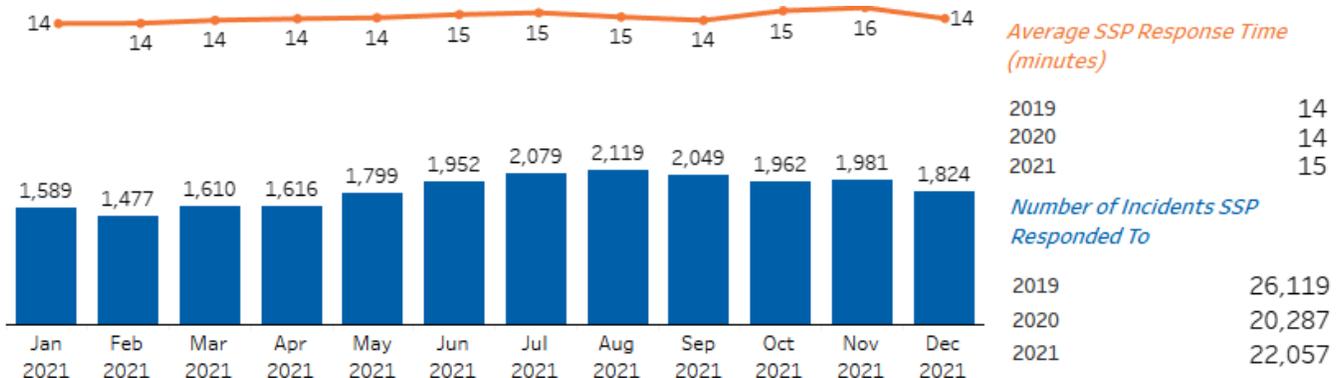
### Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measured for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measured for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

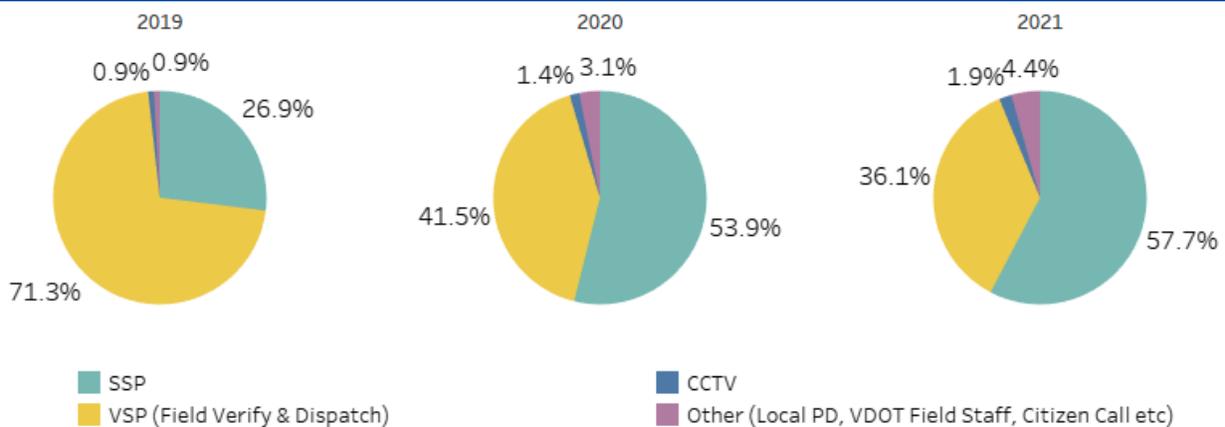


### Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)



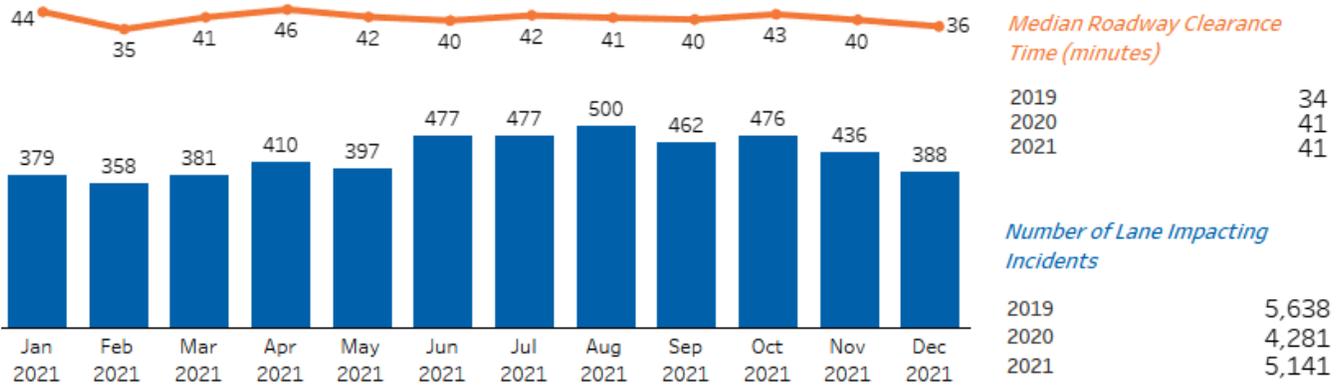
### All Incidents by Detection Source





### Lane Impacting Incidents & Roadway Clearance Time

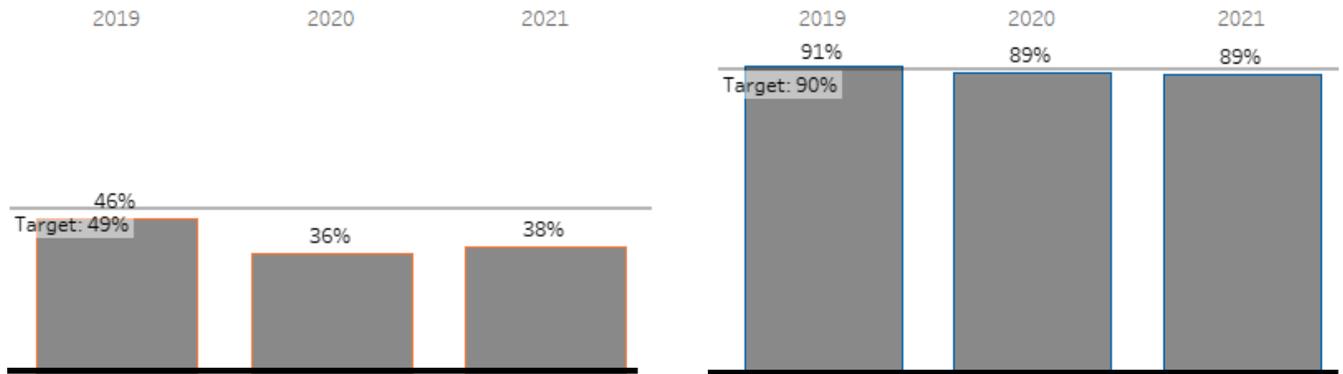
Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.



### Lane Impacting Incidents by Roadway Clearance Time

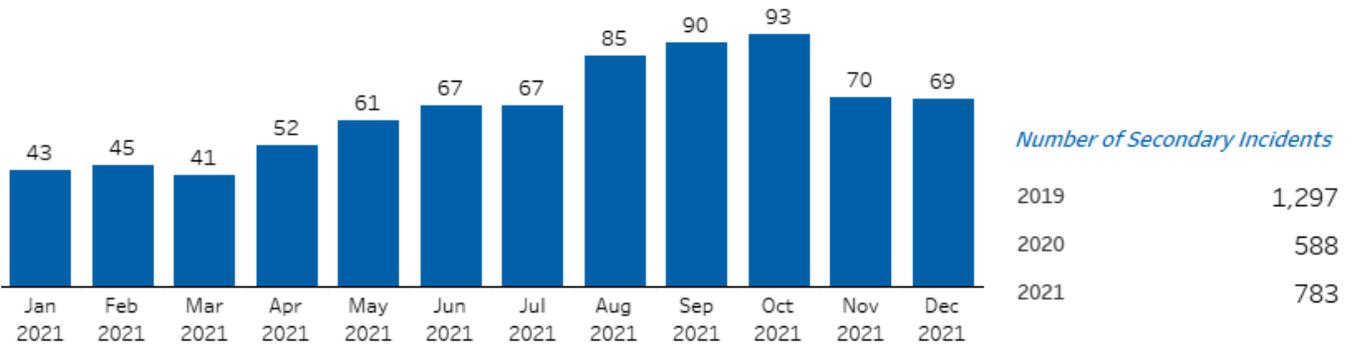
Lane Impacting Incidents Cleared in <30 minutes

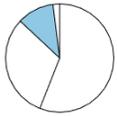
Lane Impacting Incidents Cleared in <90 minutes



### Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





### Work Zones

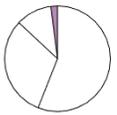
VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

### Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-66	2,853	4,134	41,611	59,726
I-95	276	321	3,800	5,847
I-395	2,054	593	36,756	10,013
I-4965	426	473	3,690	4,516
<b>Grand Total</b>	<b>5,609</b>	<b>5,521</b>	<b>85,856</b>	<b>80,102</b>

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



### Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

	2019	2020	2021
Debris		1	
High Wind			2
Icy Conditions	11	7	19
Other			1
Standing Water		1	
Standing Water (Ponding)	27	31	61
Tree Down	20	14	32

Long Term Weather Events (Road Condition) in Hour-Miles

Weather Ev..	Road Con..	2019	2020	2021
Flood	Advisory			-2
Snow/Ice	Closed		0	
	Minor	3,968	29	48
	Moderate	360	197	
Storm	Advisory	0	0	35
	Closed	0	0	

Short Term Weather Events in 2021





### Operations Assets

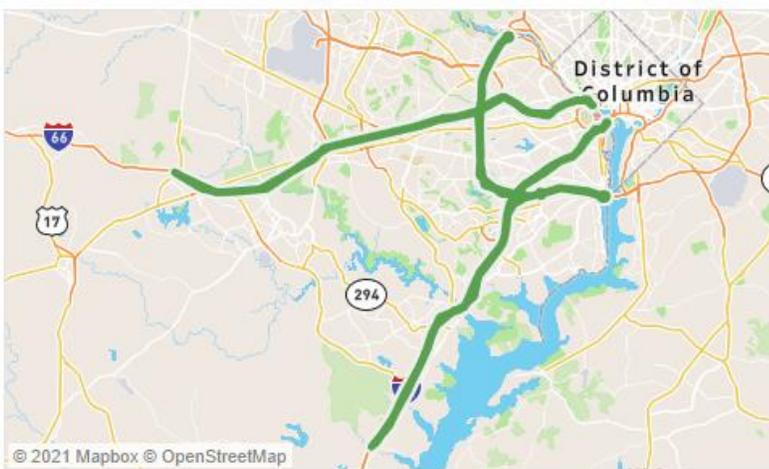
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

### ITS Assets Availability - NRO, 2021

Device Type	Number of Devices	% of Time Devices were Online
CCTV	280	92.6%
CCTV Portable	21	97.8%
CMS	121	97.6%
CMS Portable	15	97.8%

### Safety Service Patrol Coverage

Coverage as of December 31, 2021



Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered/Week	% Mile-Hours/Week
I-66	35	100%	5,880	100%
I-95	30	100%	5,040	100%
I-395	10	100%	1,680	100%
I-495	22	100%	3,696	
<b>Grand Total</b>	<b>97</b>	<b>100%</b>	<b>16,296</b>	

SSP Coverage Legend (Hours Per Day/Days Per Week)  
■ 24/7

### Camera Coverage

Cameras (CCTV) as of December 31, 2021



Interstate <sup>1</sup>	Directional Miles of Camera Coverage	Estimated % Miles Covered by CCTV
I-66	31	44%
I-95	49	82%
I-395	15	73%
I-495	43	97%
<b>Grand Total</b>	<b>137</b>	<b>71%</b>

Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream is assumed to be covered by each camera.