

# ■ Virginia Crash Analysis Tool

User Manual for Virginia Agencies

<b>Version</b>	1.0 - Public Release
<b>Developed By</b>	Henrico County Traffic Engineering Division
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<b>Cost</b>	FREE for all Virginia agencies

A comprehensive, browser-based crash analysis system designed to help Virginia transportation agencies analyze crash data, identify high-risk locations, and develop data-driven safety countermeasures.

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# 1. Getting Started

## 1.1 System Requirements

The Virginia Crash Analysis Tool is a browser-based application that requires no installation. It works on any modern computer, tablet, or device with internet access.

Requirement	Details
Web Browser	Chrome, Firefox, Safari, or Edge (latest versions)
Internet	Required for initial load; analysis works offline
Screen Size	Minimum 1280x720 recommended
File Size	Can handle CSV files with millions of rows

## 1.2 Accessing the Tool

The tool is freely available to all Virginia agencies at:

■ <https://lnkd.in/epNUkpqY>

■ TIP: Bookmark this URL for quick access. No login or account required.

## 2. Data Preparation (REQUIRED)

■■ IMPORTANT: This is the most important section. Follow these steps carefully to prepare your crash data.

### 2.1 Download Crash Data from Virginia Roads

Virginia maintains a centralized crash database accessible through the Virginia Roads portal. Follow these steps to download your crash data:

Step 1	Go to the Virginia Roads Portal: <a href="https://lnkd.in/edhWtqh6">https://lnkd.in/edhWtqh6</a>
Step 2	Log in with your agency credentials (or create an account if needed)
Step 3	Navigate to the Crash Data Download section
Step 4	Select your desired date range (recommend 5 years for trend analysis)
Step 5	Download the data as a CSV file

### 2.2 Filter Data for Your Jurisdiction

The downloaded CSV contains crash data for the entire state. You must filter it to include only crashes within your jurisdiction. Open the CSV file in Microsoft Excel or Google Sheets and filter using these two key columns:

Column	Location	What to Filter
Physical Juris Name	Column BC	Select YOUR jurisdiction name
System	Column BG	Select 'Non-VDOT' for local roads

#### Filtering Steps in Excel:

1. Open the downloaded CSV file in Excel
2. Select the header row (Row 1)
3. Click 'Data' tab → 'Filter' to enable filters
4. Click the filter arrow on Column BC (Physical Juris Name)
5. Uncheck 'Select All', then check only your jurisdiction
6. Click the filter arrow on Column BG (System)
7. Select 'Non-VDOT' to focus on local roads (optional)

8. Copy the filtered data to a new workbook
9. Save as a NEW CSV file (e.g., 'YourCounty\_Crashes.csv')

■ TIP: Keep both VDOT and Non-VDOT roads if you want to analyze state routes within your jurisdiction.

## 2.3 Upload Your Filtered Data

Once you have filtered your crash data, upload it to the analysis tool:

Step 1	Open the Crash Analysis Tool: <a href="https://lnkd.in/epNUkppqY">https://lnkd.in/epNUkppqY</a>
Step 2	You'll see the 'Data' tab with an upload area
Step 3	Drag and drop your filtered CSV file, or click to browse
Step 4	Wait for processing (progress bar shows status)
Step 5	Once complete, navigate to Dashboard to begin analysis

### 3. Dashboard Overview

The Dashboard provides a high-level summary of your crash data with interactive visualizations.

#### 3.1 Key Performance Indicators (KPIs)

The top row displays critical safety metrics at a glance:

KPI	Description
Total Crashes	Total number of crash records in the filtered dataset
Fatal (K)	Number of crashes involving at least one fatality
Serious Injury (A)	Crashes with incapacitating injuries
Other Injury (B+C)	Minor and possible injury crashes combined
PDO (O)	Property Damage Only crashes
Total EPDO	Equivalent Property Damage Only score (weighted severity)
Pedestrian	Total crashes involving pedestrians
Bicycle	Total crashes involving bicyclists

■ TIP: Hover over the EPDO card to see a breakdown of how the score is calculated using VDOT's standard weights.

#### 3.2 Using Filters

The filter panel allows you to narrow your analysis. Available filters include:

- Year Range: Select start and end years
- Route/Corridor: Focus on a specific road
- Intersection Type: Filter by intersection vs. non-intersection
- Severity Checkboxes: Include/exclude specific severity levels

Click 'Apply' to update all visualizations, or 'Reset' to clear filters.

## 4. Interactive Map

The Map tab provides a geographic view of all crashes with clustering and heat map capabilities.

### 4.1 Map Navigation

Feature	Description
Pan	Click and drag to move around the map
Zoom	Use scroll wheel or +/- buttons
Clusters	Circles showing crash counts; click to zoom in
Heat Map	Toggle to see crash density patterns
Click Marker	View individual crash details

### 4.2 Filtering Crash Points

Use the filter chips above the map to show specific crash types:

- ☒ Fatal: Show only fatal crashes
- ☒ K+A: Show fatal and serious injury crashes
- ☒ Ped: Show pedestrian-involved crashes
- ☒ Bike: Show bicycle-involved crashes
- ☒ Intersection: Show intersection crashes only

### 4.3 Selecting Locations

Use the left panel to select specific routes or intersections for detailed analysis. Search by name or scroll through the list. Selected locations show crash statistics and allow you to generate focused reports.

## 5. Hot Spot Analysis

The Hot Spots tab identifies high-crash locations that may benefit from safety improvements.

### 5.1 Identifying High-Crash Locations

Configure your analysis using these settings:

Setting	Purpose	Recommended
Min Crashes	Minimum crashes to be considered	5-10
Top N	Number of locations to display	25
Sort By	Ranking method	EPDO Score
Group By	Location grouping	Route Name or Node

### 5.2 Understanding EPDO Scores

EPDO (Equivalent Property Damage Only) weights crashes by severity to prioritize locations with more serious crashes. The tool uses VDOT's standard weights:

Severity	Description	Weight
K	Fatal	462
A	Serious Injury	62
B	Minor Injury	12
C	Possible Injury	5
O	Property Damage Only	1

■ TIP: EPDO helps identify locations where a few severe crashes may be more critical than many minor ones.



## 6. Analysis Tools

### 6.1 Yearly Analysis (Analysis Tab)

Review year-over-year trends including total crashes, severity breakdown, and pedestrian/bicycle trends. Key charts include day-of-week distribution, monthly patterns, and functional class analysis.

### 6.2 Intersection Analysis (Intersections Tab)

Analyze crashes occurring at intersections including traffic control type effectiveness, collision type patterns, and comparison with non-intersection crashes.

### 6.3 Pedestrian & Bicycle Analysis (Ped/Bike Tab)

Dedicated analysis for vulnerable road users including injury severity breakdown, light condition analysis, contributing factors, and top crash locations for pedestrians and bicyclists.

■■ IMPORTANT: The Ped/Bike tab shows PEOPLE injured, not crash counts. One crash may involve multiple people.

## 7. Search & Filter

Use the Search tab to find specific crashes or create custom datasets. Search by text, year, severity, or pedestrian/bicycle involvement. Results can be exported to CSV for further analysis.

## 8. Report Generation

### 8.1 Available Report Types

Report Type	Best Used For
Corridor/Segment Analysis	Analyzing a specific road or route
Intersection Analysis	Focusing on a particular intersection
System-Wide Summary	Overall jurisdiction safety assessment
Safety Performance Report	Grant applications, safety plans
Pedestrian/Bicycle Report	VRU-focused safety analysis
Trend Analysis Report	Year-over-year comparisons

### 8.2 Exporting Reports

After generating a report, you can print it, download as PDF, or copy the text to paste into other documents. Reports include key findings, statistics, charts, and recommendations.

## 9. AI Analyst (Optional)

The AI Analyst tab provides intelligent analysis and recommendations. This feature requires a free API key from Google.

### 9.1 Getting a Free API Key

Step 1	Go to Google AI Studio: <a href="https://aistudio.google.com/api-keys">https://aistudio.google.com/api-keys</a>
Step 2	Sign in with your Google account
Step 3	Click 'Create API Key' and copy the key
Step 4	In the Crash Analysis Tool, go to AI Analyst tab
Step 5	Select 'Google Gemini 2.0' from the dropdown
Step 6	Paste your API key and check 'Save key'

■ TIP: Google offers free API usage for Gemini. You can also use OpenAI or Claude if you have those API keys.

## 9.2 Using the AI Assistant

Once configured, you can ask questions like:

- "What are the main crash patterns?"
- "Which locations need safety improvements?"
- "Analyze pedestrian crash risk factors"
- "Compare day vs night crashes"
- "Generate safety recommendations"

You can also upload images (crash scenes, intersections) for visual analysis.

## 10. Tips & Best Practices

### ✓ Use 5+ years of data

More data provides better trend analysis and statistical significance.

### ✓ Save your session

Click 'Save' in the header to store your analysis for later.

### ✓ Start with the Dashboard

Get a big-picture view before diving into specific analyses.

### ✓ Use EPDO for prioritization

EPDO helps identify locations with severe crash history.

### ✓ Export frequently

Download reports and CSV files for offline use and presentations.

### ✓ Check pedestrian/bike trends

VRU crashes often indicate infrastructure needs.

### ✓ Filter by severity for grant applications

Focus on K+A crashes for HSIP funding.

## 11. Troubleshooting

Problem	Solution
CSV won't upload	Ensure file is saved as CSV (not Excel format). Check file size.
No data showing	Verify your CSV contains the required column headers from Virginia Roads.
Map is blank	Check that your data includes X/Y coordinate columns.
Charts not loading	Try refreshing the page. Ensure JavaScript is enabled.
AI not responding	Verify your API key is correct. Check your internet connection.
PDF export fails	Try printing to PDF instead. Some browsers block PDF generation.

Questions or feedback?  
Contact: Henrico County Traffic Engineering Division  
Tool URL: <https://lnkd.in/epNUkpqY>