



**Interstate Operations and Enhancement
Program (IOEP) Tool Guidebook**
www.vdotplanning.com/ioep

Version 2024.01

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Background

The Interstate Operations and Enhancement Program (IOEP) is designed to enhance safety, reliability, and traffic flow along Virginia's interstate corridors by funding and implementing both operational and capital improvements.

Historically, the analysis workflows for the IOEP were developed by an external contractor, requiring Virginia Department of Transportation (VDOT) planners to follow complex, manual processes in Microsoft Excel. Even with an 8-hour training session, it typically took planners about two weeks to complete an analysis for a selected interstate route. This reliance on Excel and manual effort increased the potential for bias or inconsistency, particularly in more advanced analyses.

To improve this process, VDOT's Transportation and Mobility Planning Division (TMPD) has proposed developing a web-based application, the IOEP Tool, with the following goals:

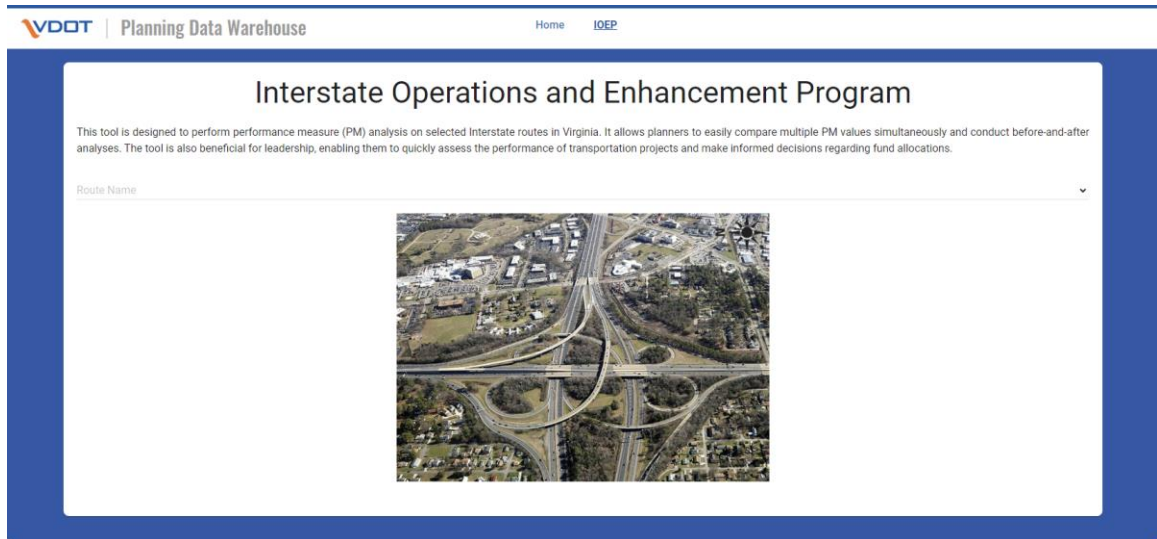
- Providing an intuitive map interface to explore and query geo-referenced data (e.g., interstate highways, crash reports, and travel delays) across multiple datasets.
- Facilitating quicker and more efficient IOEP analyses, with exportable results.
- Automating workflows to ensure the IOEP database is regularly updated.
- Enabling access from any location, making the tool widely usable.
- Supporting better decision-making and collaboration with planning partners to advance projects via the SMART portal.

This tool is expected to significantly streamline the process and reduce the manual workload.

Getting Started

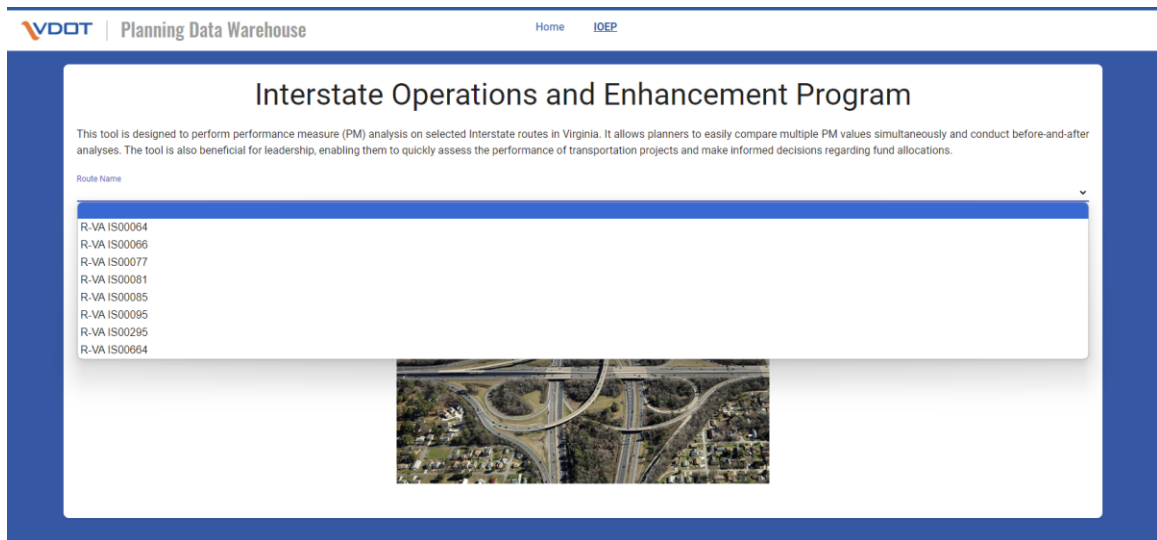
How to conduct an Interstate Operations and Enhancement Program (IOEP) analysis?

Step 1. Visit the IOEP Tool Homepage, <https://vdotplanning.com/ioep>.



The screenshot shows the homepage of the IOEP tool. At the top, there is a navigation bar with the VDOT logo and the text "Planning Data Warehouse". To the right of the navigation bar are links for "Home" and "IOEP". The main content area has a title "Interstate Operations and Enhancement Program" and a brief description: "This tool is designed to perform performance measure (PM) analysis on selected Interstate routes in Virginia. It allows planners to easily compare multiple PM values simultaneously and conduct before-and-after analyses. The tool is also beneficial for leadership, enabling them to quickly assess the performance of transportation projects and make informed decisions regarding fund allocations." Below the description is a "Route Name" dropdown menu. A large aerial photograph of a complex highway interchange is displayed in the center of the page.

Step 2. Select an Interstate Route. (e.g., R-VA IS00064)



This screenshot shows the same IOEP tool homepage as the previous one, but with the "Route Name" dropdown menu open. The dropdown menu displays a list of route identifiers: R-VA IS00064, R-VA IS00066, R-VA IS00077, R-VA IS00081, R-VA IS00085, R-VA IS00095, R-VA IS00295, and R-VA IS00664. The route "R-VA IS00064" is highlighted in blue. The rest of the page, including the title, description, and the highway interchange image, remains the same.

Step 3. Select a Performance Measure under “Config Analysis” panel. (e.g., EPDO)

The screenshot shows the VDOT Planning Data Warehouse interface. At the top, there's a header with the VDOT logo and 'Planning Data Warehouse'. Below that, there's a navigation bar with 'Home' and 'IOEP'. The main content area is titled 'Route Name: R-VA IS00064' and 'Milepost: from: 0 to 301'. The 'CONFIG ANALYSIS' panel is active, and the 'Configuration' section is expanded. A dropdown menu for 'Select Performance Measure' is open, showing options: EPDO, EPDO Rate, PHD, and IPHD. Below the dropdown is a satellite map of a road area. There are buttons for 'TOGGLE CHART' and 'DOWNLOAD'.

Note: There are four types of performance measures used:

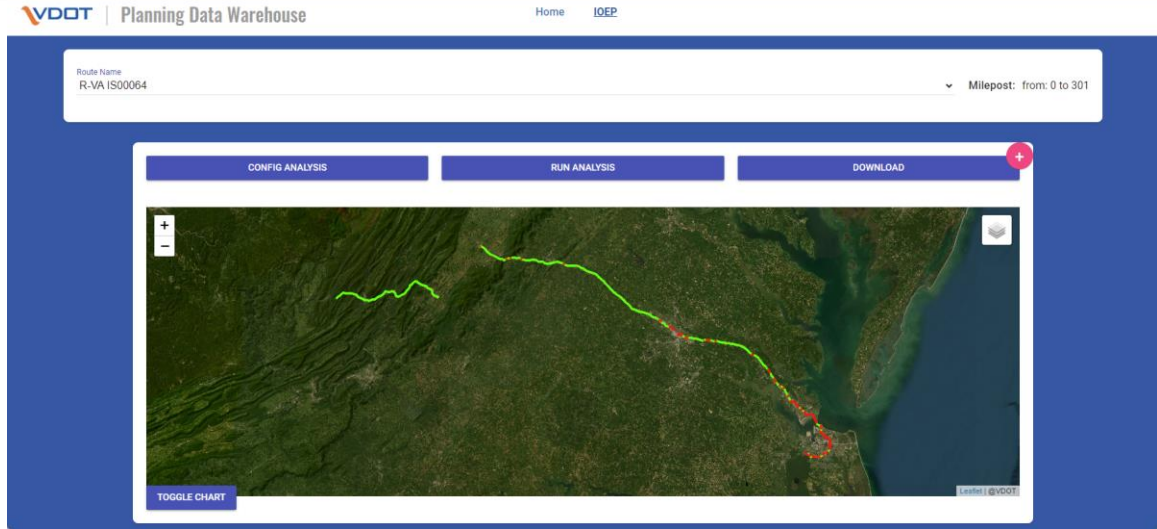
- **Equivalent Property Damage Only (EPDO):** Measures the severity of crashes by assigning weights to different types of crashes.
- **EPDO Rate:** The rate of EPDO per million vehicle miles traveled.
- **Person Hourly Delay (PHD):** The total delay experienced by people due to congestion, measured in person-hours.
- **Incident Person Hourly Delay (IPHD):** The delay caused specifically by incidents, such as accidents, measured in person-hours.

Step 4. Configure parameters including “From Year”, “To Year”, and “Factor Weight”.

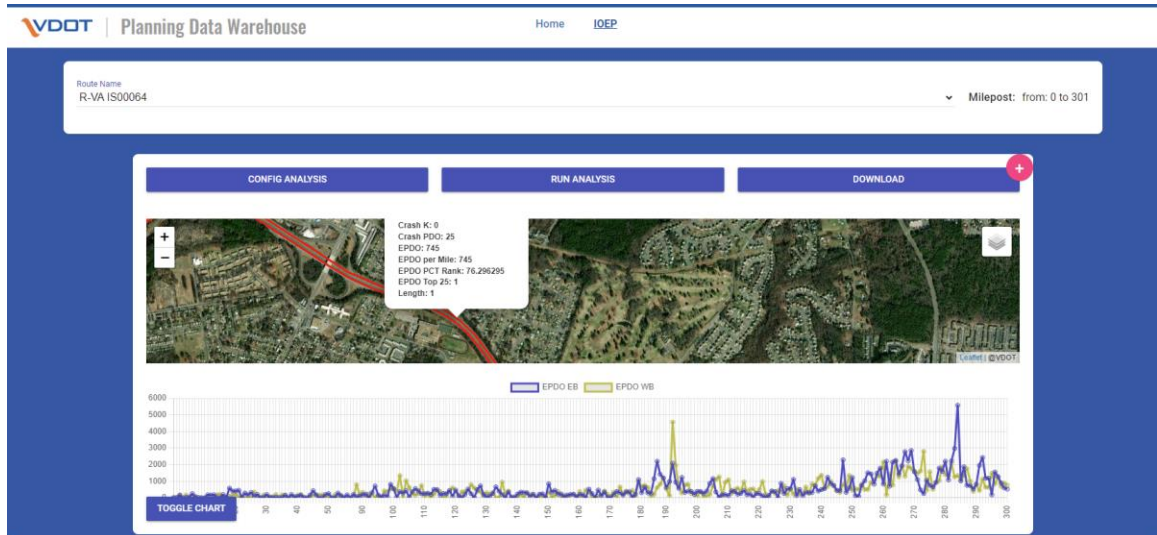
The screenshot shows the VDOT Planning Data Warehouse interface. At the top, there's a header with the VDOT logo and 'Planning Data Warehouse'. Below that, there's a navigation bar with 'Home' and 'IOEP'. The main content area is titled 'Route Name: R-VA IS00064' and 'Milepost: from: 0 to 301'. The 'CONFIG ANALYSIS' panel is active, and the 'Configuration' section is expanded. The 'Select Performance Measure' dropdown is set to 'EPDO'. The 'From Year' is set to 2018 and the 'To Year' is set to 2022. The 'Milepost' section has a button '+ Add another milepost range'. The 'Factor Weight' table is visible, showing weights for K, A, B, C, and PDO.

K	A	B	C	PDO
160	160	20	10	1

Step 5. Click “Run Analysis,” and the analytic results will be displayed on the map.

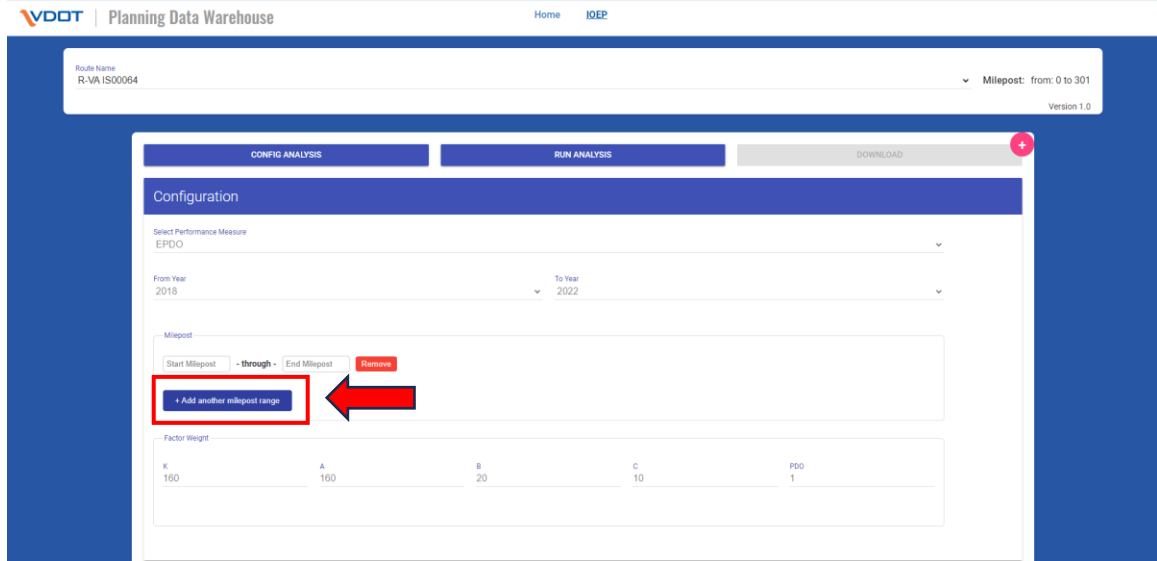


Step 6. Explore the analytic results: Click on any interstate segment to view performance measurement data. Then, press the “Toggle Chart” button to display detailed charts and analytics for that segment. Hover over any data point on the chart to see specific information about the selected measure.



How to select partial components?

1. Select the “Config Analysis” panel and click “+Add another milepost range” button.



VDOT | Planning Data Warehouse Home IOEP

Route Name: R-VA IS00064 Milepost: from: 0 to 301 Version 1.0

CONFIG ANALYSIS RUN ANALYSIS DOWNLOAD

Configuration

Select Performance Measure: EPDO

From Year: 2018 To Year: 2022

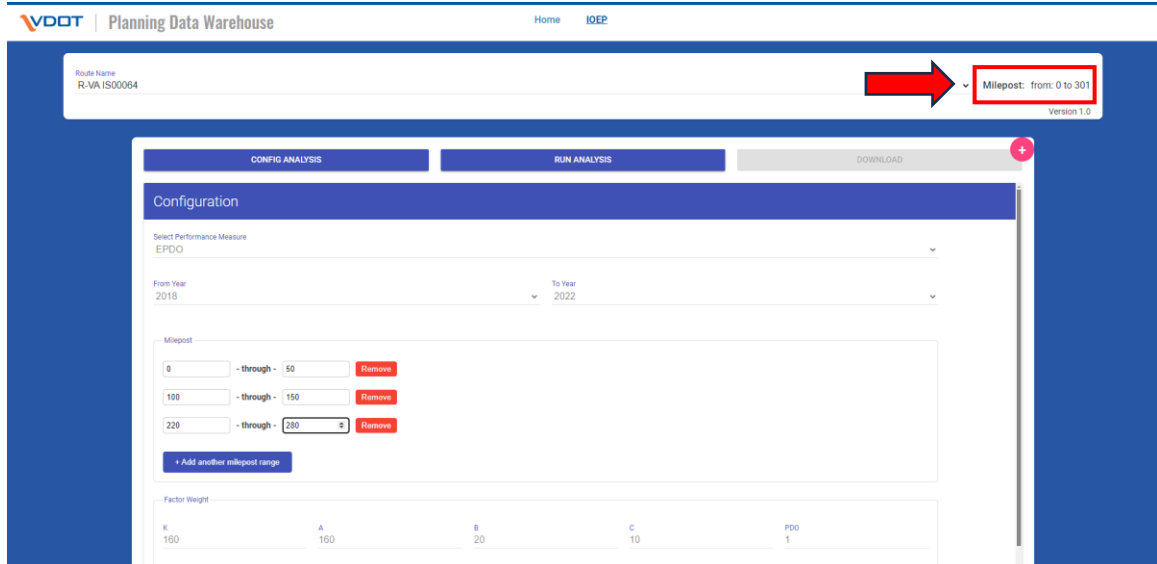
Milepost: Start Milepost - through - End Milepost Remove

+ Add another milepost range

Factor Weight

K	A	B	C	PDO
100	100	20	10	1

2. Enter the milepost intervals to be included. Note: highlighted milepost ranges can be referenced.



VDOT | Planning Data Warehouse Home IOEP

Route Name: R-VA IS00064 Milepost: from: 0 to 301 Version 1.0

CONFIG ANALYSIS RUN ANALYSIS DOWNLOAD

Configuration

Select Performance Measure: EPDO

From Year: 2018 To Year: 2022

Milepost: 0 - through - 50 Remove

100 - through - 150 Remove

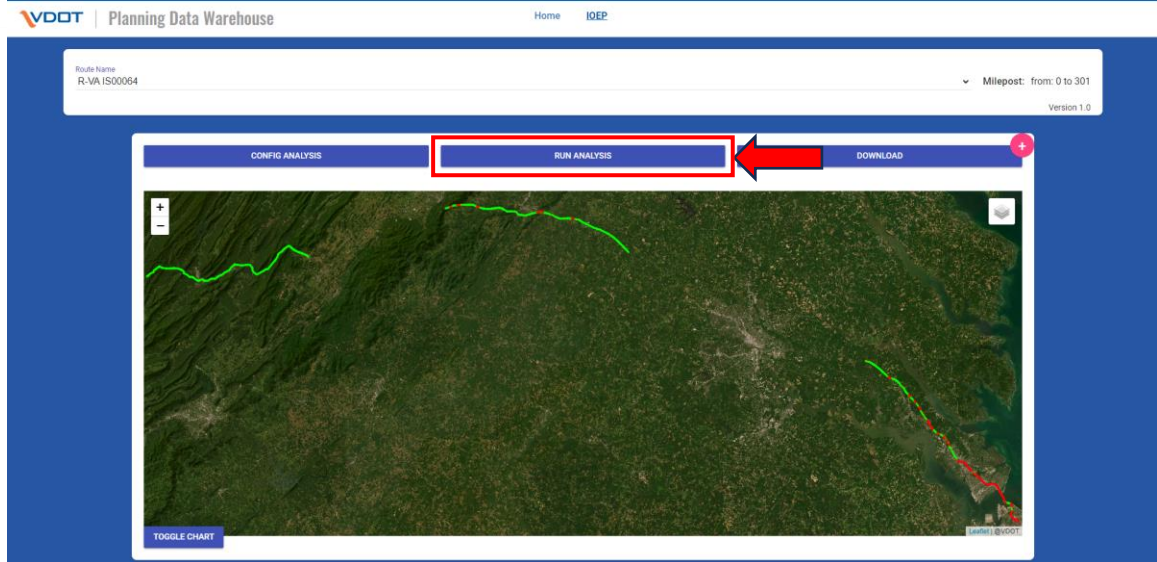
220 - through - 250 Remove

+ Add another milepost range

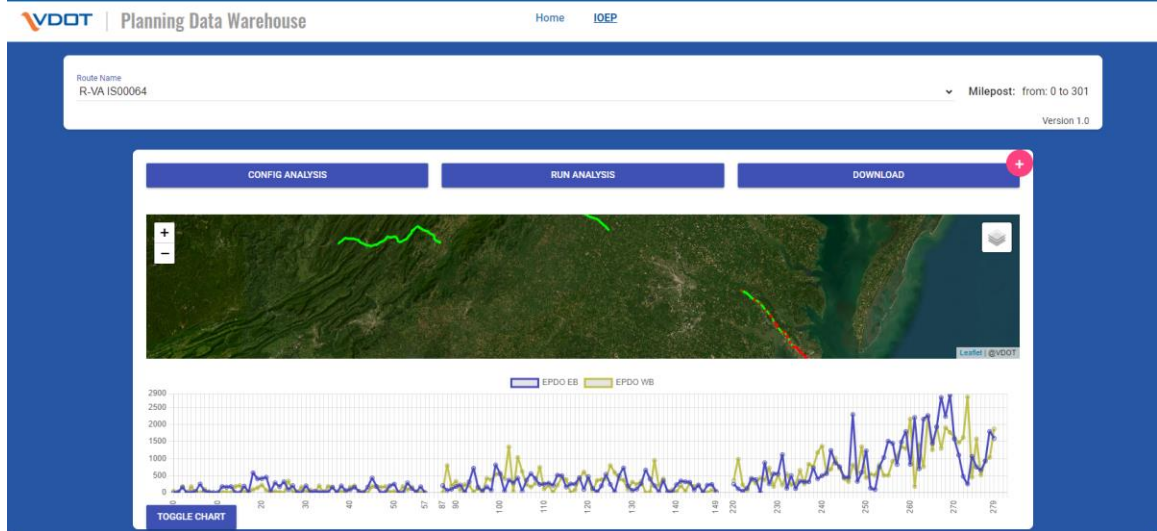
Factor Weight

K	A	B	C	PDO
100	100	20	10	1

- Click “Run Analysis,” and the analytic results will be displayed on the map.



- Explore the analytic results: Click on any interstate segment to view performance measurement data. Then, press the “Toggle Chart” button to display detailed charts and analytics for that segment. Hover over any data point on the chart to see specific information about the selected measure.

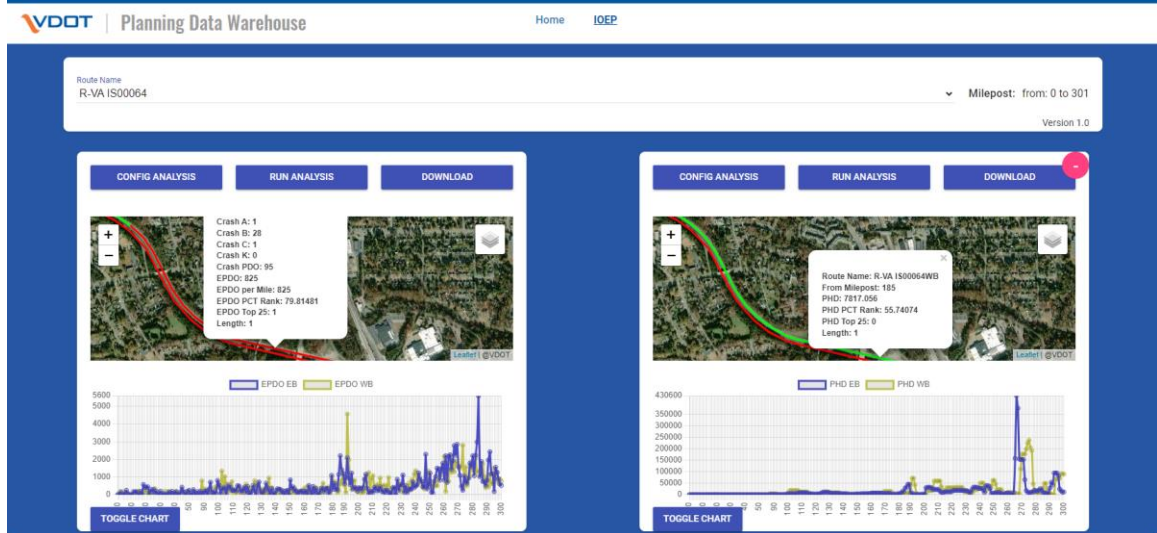


How to use Twin-Map function?

1. Click the “+” button (highlighted).



2. Follow steps 3-6 for the second map. Users may select different performance measures or choose different years for comparison.



Note:

Twin maps are connected by sharing a common boundary.

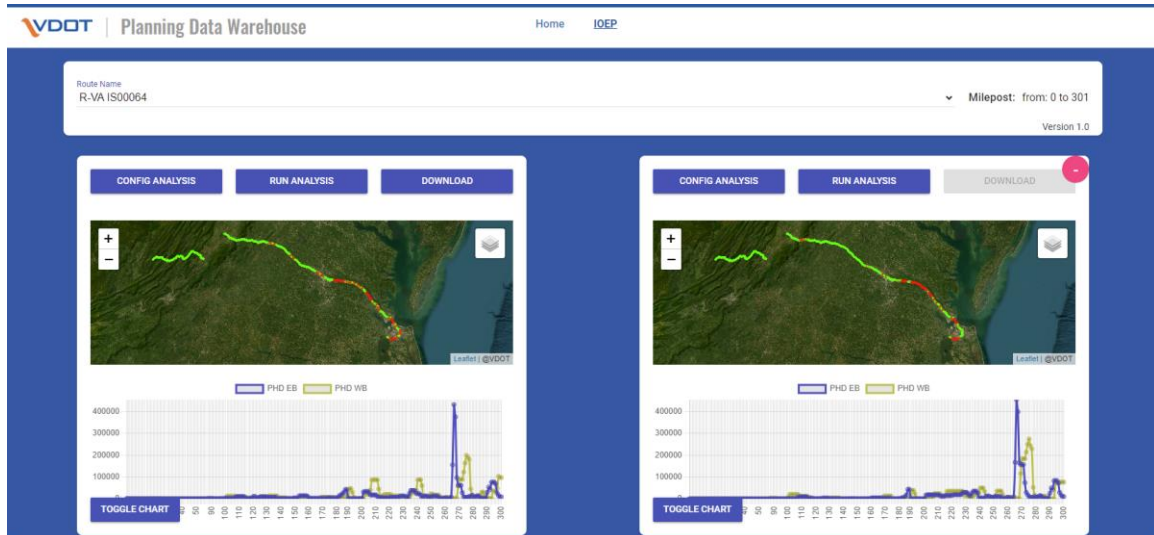
Currently, two maps are available, with more map features planned for future releases.

How to conduct before-after analysis?

1. Follow Step 3~6 for the first map (e.g., I64, PHD, 2019~2019) and Step 3~6 for the second map (e.g., I64, PHD, 2021~2021).

The screenshot shows the 'Planning Data Warehouse' interface. At the top, the route name is 'R-VA IS00064' and the milepost range is 'from: 0 to 301'. Below this, there are two side-by-side configuration panels. Each panel has three buttons: 'CONFIG ANALYSIS', 'RUN ANALYSIS', and 'DOWNLOAD'. The left panel is configured for the year 2019, with 'PHD' selected as the performance measure. The right panel is configured for the year 2021, also with 'PHD' selected. Both panels have a 'Milepost' field and a '+ Add another milepost range' button. At the bottom of each panel, there is a 'TOGGLE CHART' button and a small map preview.

2. Click "Run Analysis" button for both maps.



Note: The charts displayed for both maps share the same y-axis limits for consistency in comparison.

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