U.S. Department of Transportation
Federal Highway Administration

Travel Time Reliability Analysis Video Series

Source: Getty Images

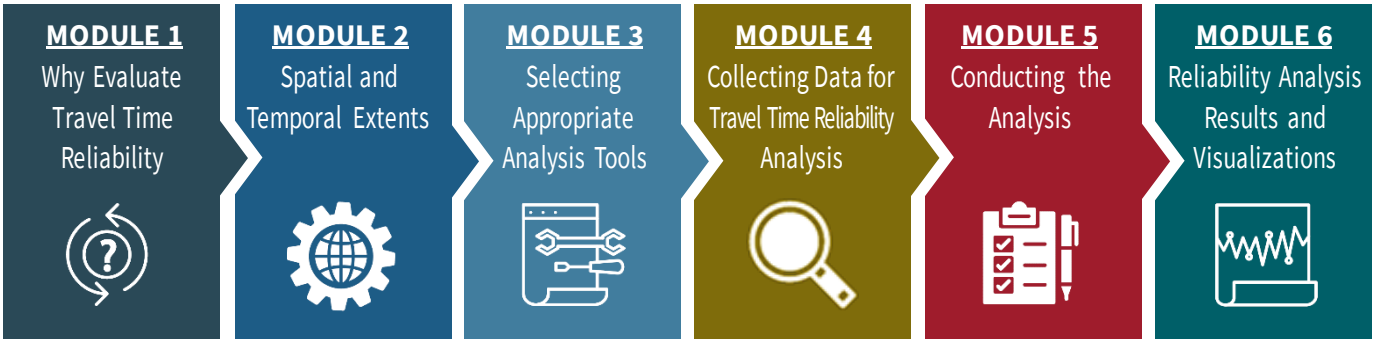
While there is a need to make the knowledge of travel time reliability analysis more widely available to practitioners, the time and resources of today's transportation professionals are already stretched. Training videos, particularly readily available web-based videos, are an increasingly preferred method of disseminating new technical information.

The emergence of travel time reliability evaluation has drastically enhanced the understanding of factors influencing transportation system performance and impacts to users. This analysis is frequently performed on historical data sets, **but how do you predict future reliability?** FHWA's reliability analysis video series introduces the essential concepts and technical steps to evaluate reliability for your next project:

- Are you looking for superior methods to conduct predictive analysis to evaluate transportation management or improvement alternatives?
- Have you encountered sub-optimal outcomes with traffic analyses approaches that do not take non-recurring factors, such as demand variability, crashes, incidents, weather, and other conditions, into account?
- Travelers and operators directly experience the range of conditions occurring on the transportation system, and rightly expect planners and engineers to take these into account. Do you find that not taking these factors into account prevents you from building credibility around traffic analysis approaches?
- Are you looking for ways to communicate the importance of reliability analysis to decision makers, management, staff, and other stakeholders?

This video series will introduce you to steps involved in performing a predictive reliability analysis and can serve as a tool to communicate the advantages of this approach to interested stakeholders.

An 8- to 10-minute video covers each of the six modules, as shown below.



Source: Federal Highway Administration

Figure 1. Graphic. Modules for Travel Time Reliability Analysis Video Series.

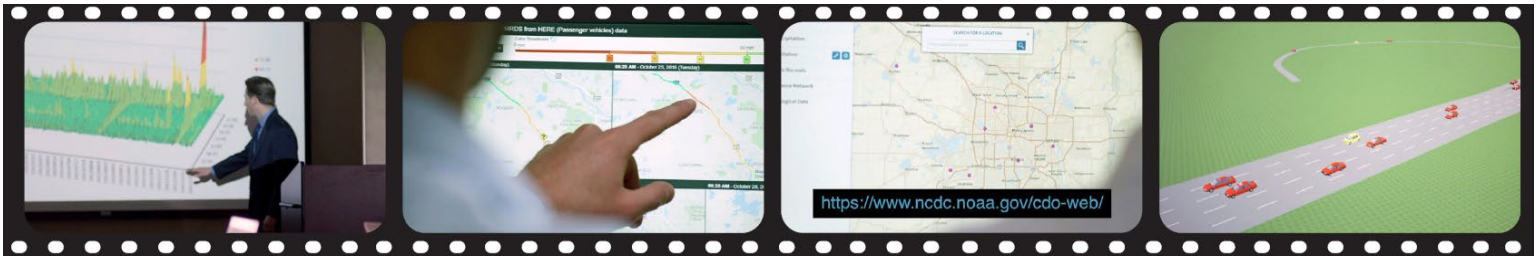


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Figure 2. Screenshots. Images from videos for Modules 1–4.

Module 1 – Why Evaluate Travel Time Reliability

This module emphasizes how reliability analysis is critical to help improve overall transportation system performance. Analysis based on averages may produce optimistic outcomes rarely observed in the field. Module 1 will introduce you to the:

- Need for observing a range of travel times.
- Effects of reliability on travelers and operators.
- Common reliability measures and visualizations.
- Ramifications of reliability analysis.

Reliability principles are demonstrated through a case study along I–94 in Minnesota, where reliability analysis helped to build consensus about the full range of existing conditions impacting this freeway corridor.

"Variability in travel time affects how much extra time a traveler needs to allow to make their flight or get to a job interview."

Module 2 – Spatial and Temporal Extents

The second video module begins the analysis process, summarizing how you can observe conditions in the study area of your project. The characteristics to observe include spatial features, operations conditions, and time scale. The video will demonstrate how you can:

- Begin the analysis process.
- Observe conditions in the study area of your project.
- Set analysis boundaries including where to study, what data to collect, and the time the analysis:
  - *Is this a spot location or corridor?*
  - *How long does analysis have to endure to capture impacts?*
  - *What factors impact travel times?*

To assist in this exercise, many tools are available to visualize reliability performance. This video provides a real-world example from the I–66 part-time shoulder use strategy. In this example, study data demonstrates the critical locations and time periods for this strategy that drastically improved conditions during mid-day and afternoon periods.

"From the monitoring, we draw initial conclusions about what subarea of the network to study, what kind of data to collect, and what timeframe that data will represent."

"Coupling traffic simulation with travel time reliability provides decision makers with a detailed assessment of performance."

Module 3 – Selecting the Appropriate Analysis Tool

This module proceeds into the nuts and bolts of selecting an analysis tool for your reliability analysis. It contextualizes the considerations you'll need to make, including:

- Defining the appropriate level of detail.
- Aligning the goals of the study with the tool capabilities.
- Understanding the range of tools from sketch-planning to microsimulation.

One of the key considerations in tool selection is how data intensive the analysis will be. This is an important trade-off, as more data-demanding tool types will provide more detailed results.

Finally, the module relates tools to their outputs and demonstrates how they can be used to develop reliability performance measures and visualizations.

Module 4 – Collecting Data for Travel Time Reliability Analysis

With system observations and tool selection in place, the fourth module delves into the data collection stage of reliability analysis. This module will enable you to:

- Identify data suitable for analysis.
- Locate and collect different data components.
- Assure data is sufficient quality for the analysis.

This video underscores that the principal data element for reliability analysis is travel time data. This data, along with other elements, should be managed at the disaggregate level. This preserves the minor variations in performance that impact system performance and user experience.

"The principal data element for reliability analyses: vehicle travel times, the basis for all reliability measures."

This module also explores the influence factors that impact travel times. These include variability of demand, along with other non-recurring conditions data, including weather, crash, incidents, road work, and special events.

Finally, the module outlines data quality characteristics, including sample size, measurement accuracy, small segment lengths, and data availability.

Module 5 – Conducting the Analysis

The fifth module looks into the activities involved in conducting an analysis discusses data entry, verification, calibration, validation. This indispensable period encompasses the activities between data collection and presentation.

The video:

- Outlines the main principles behind data entry for traffic analysis tools.
- Provides definitions and benefits of model verification, calibration, and validation stages.
- Illustrates several model types in more detail, showing key steps for creating the model. For different tool types, this process ranges from filling out a form to several weeks of data cleaning and organization.
- Discusses scenario analysis which allows you to tell the model which conditions to evaluate.

What differentiates reliability analysis from traditional traffic analysis is the inclusion of various scenarios to capture the variety of conditions that can impact performance.

Pilot examples from Phoenix, AZ and Portland, OR bring the analysis process to life.

"One of the key considerations in tool selection is how data intensive the analysis will be."

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Figure 3. Screenshots. Images from videos for Modules 5–6.

Module 6 – Reliability Analysis Results and Visualizations

The final video module inspires you to fully utilize the results of your analysis by effectively communicating findings to your audience. Decision-makers need to know how an investment will perform under a wide variety of conditions. This module demonstrates how you can:

- Process large amounts of output data.
- Produce various performance measures and visualizations and understand usefulness of each.
- Anticipate which presentation methods will be most effective based on your project, alternatives, and audience.

"The final step in the process is summarizing and presenting results so they can be communicated to your audience."

This module highlights a range of communication strategies. Visualizations show several dimensions of reliability, which can help individuals absorb the range of conditions and serve as a diagnostic tool. Charts and graphs summarize results along a few dimensions and help in comparing the performance of different alternatives. Finally, statistical indices summarize a few key data points from the travel time distribution and help travelers and operators plan.

Effectively presenting your analysis results will ensure the best available information assists decision-makers and makes the most of your reliability analysis.

For more information, please contact:

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