# One-Stop Bridge Data
New online tool combines multiple datasets for bridge performance analysis

In 2008 the Federal Highway Administration (FHWA) launched its largest and most robust bridge research endeavor, the Long-Term Bridge Performance (LTBP) Program, a 20-year study of U.S. bridges—our transportation network's most critical links.

The Center for Advanced Infrastructure and Transportation (CAIT) at Rutgers, the State University of New Jersey, was competitively selected as the primary university partner on LTBP and, for the last 8 years, has been working with FHWA to provide a detailed and timely picture of bridge performance.

Through this UTC-FHWA collaboration, CAIT created the LTBP Bridge Portal, a new web-based product that comprises bridge information mined from a wide range of datasets. Combined, these data encompass nearly every characteristic and biographic fact that can influence bridge performance: construction, design, age, dimensions, elevation, weather data, traffic data, weigh-in-motion data, maintenance/repair records, and more.
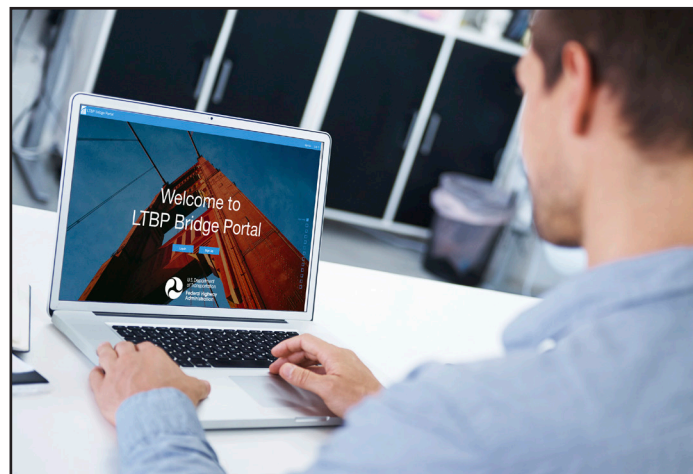
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The LTBP Bridge Portal is a very powerful tool with a deceptively simple, customizable user interface and options not available in any one dataset it draws from. In a single intuitive web environment, users can query the system via simple or advanced searches using built-in filters and get tailored, comprehensive answers at lightning speed. It even has a function that can calculate deterioration curves based on historical data.

Since the portal pulls from multiple resources, users get exhaustive query results and the ability to drill down to a micro level.
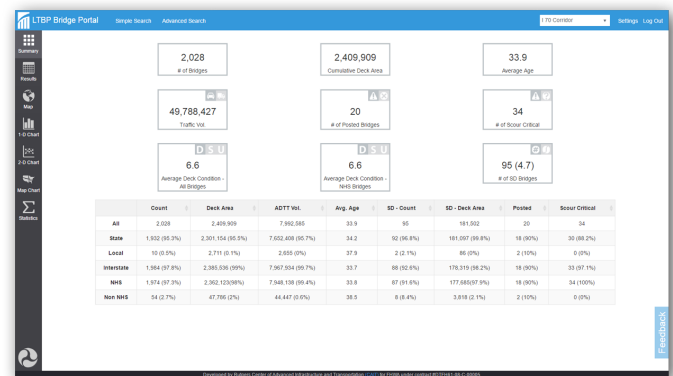
Enter a query using a wide range of built-in filters, and get tailored, comprehensive results in seconds.

Let's say you want to know how many bridges in Virginia, Maryland, and Delaware are at least 60 feet long, 25 years old or older, and have average daily traffic volumes greater than 5,000 vehicles. How many of those received a "poor" condition rating on at least 30 percent of the deck upon last inspection? How many are steel girder construction versus box girder? What is the inspection history for each bridge on I-95 in those three states?
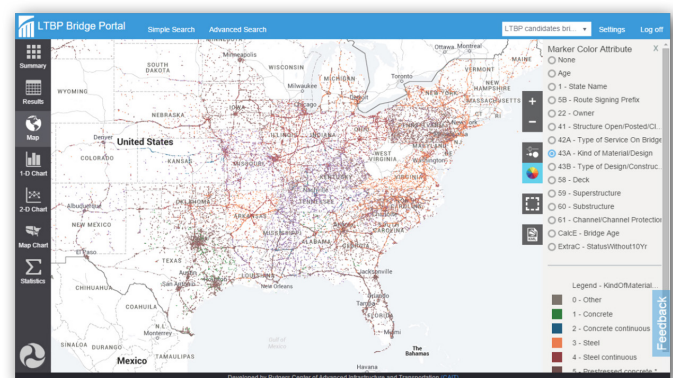

View results on a Google Maps interface, customize the color and size of the bridge markers according your chosen attributes, and select and zoom into specific regions.

Even if you know where to look, sifting through multiple databases or spreadsheets to extract all the information you want could take hours. Comparing/contrasting bridge

attributes and locations, analyzing individual bridges, or seeing patterns within the results would be an arduous task. In the end you still wouldn't have a good picture of the query results or a good way to communicate them.

Data visualization is where the portal really outshines any other bridge performance tool available.
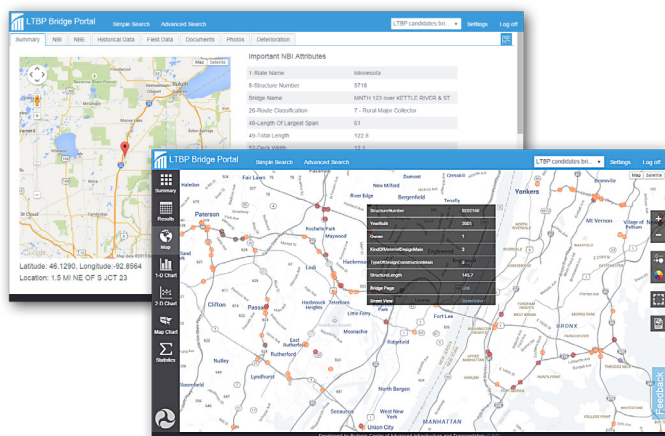
Click on any bridge marker to see a data page for that specific bridge with links to NBI information and Google street view, or a pop up window with key stats.

Query results can be displayed in 1-D or 2-D charts and graphs, as map graphs, or in a GIS interface that superimposes the data on Google Maps. Users can then apply region selection tools and customizable markers to see "data within the data" and even zoom in to street views and photos of the bridge where available.
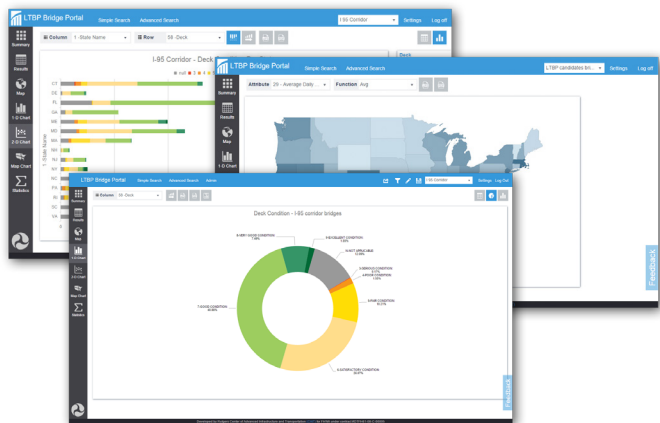
Display search results in a variety of chart formats and export to Excel or PDF, or export map view as a KML (Google Earth) file.

The system lets users export results as Excel, PDF, or KML (Google Earth) files as well as save queries to access or edit later. A built-in web tour outlines all of the portal's features and how to use them.

The portal is a powerful research tool for exploring bridge performance on many levels. It can provide insight and knowledge that support data-driven decisions relating to life-cycle costs, preservation, and safety of our Nation's highway transportation assets.

The LTBP Bridge Portal will evolve over time to incorporate more datasets, new features, and expanded functions. Planned development includes apps for Apple iOS and Android, life-cycle cost modeling, performance comparison functions, and advanced deterioration modeling.

For access to the LTBP Bridge portal

- Public users go to https://fhwaapps.fhwa.dot.gov and follow the sign up procedure.

- State employees go to https://fhwaapps.fhwa.dot.gov. (ORC credentials required.)

- Federal employees go to https://fhwaapps.fhwa.dot. gov. (PIV card or UPACS credentials required.)

The LTBP Bridge Portal currently includes these major datasets, which are updated and expanded regularly.

- **National Bridge Inventory (NBI)** historical data from 1992 to 2015, updated annually.

- **National Bridge Element (NBE) data** for some states. (Starting in 2015, most states will submit NBE data to FHWA, and it will subsequently be added to the portal.)

- **LTBP Program inspection and field data.** This typically includes data from nondestructive evaluation testing, visual inspections, load ratings, and material sampling. This dataset will grow as the program progresses.

- **LTBP legacy data mining.** This comprises a wealth of information, including data extracted from bridge plans, inspection and maintenance reports, and construction and preservation cost records.

All images provided courtesy of Rutgers CAIT.

About This Project

The LTBP Bridge Portal was developed at CAIT in partnership with FHWA's Long-Term Bridge Performance Program. CAIT director Ali Maher is principal investigator on the contract. Hooman Parvadeh, CAIT LTBP program manager, led the team that created the LTBP Bridge Portal online tool. Ayush Jain was the lead developer. From FHWA Turner-Fairbank Highway Research Center, Hamid Ghasemi and Robert Zobel are the program leader and program coordinator, respectively.