PRODUCT DATA SHEET

Bentley
*Advancing* Infrastructure

CONNECT Edition

# LEAP® Bridge Concrete

## Integrated Analysis and Design of Concrete Bridges

LEAP Bridge Concrete is a powerful modeling and analysis solution for small to medium concrete bridges of all types: precast, cast-in-place, reinforced, and post-tensioned. This comprehensive bridge application offers a synthesis of geometric modeling, substructure and superstructure analysis and design, and load rating in a single, information-rich environment. Intelligent data management, computational modeling, and automated drawing production revolutionize the bridge delivery process.

### Integrated Modeling and Documentation Workflows

The CONNECT Edition provides a common environment for comprehensive project delivery and connects users, projects, and your enterprise. With the CONNECT Edition, you now have a personal portal to access learning, communities, and project information. Your project teams can review project details and status, and gain visibility into project performance with the new project portal. Your project team may also wish to take advantage of the new ProjectWise® Connection Services including Project Performance Dashboards, Issues Resolution, and Scenario Services.

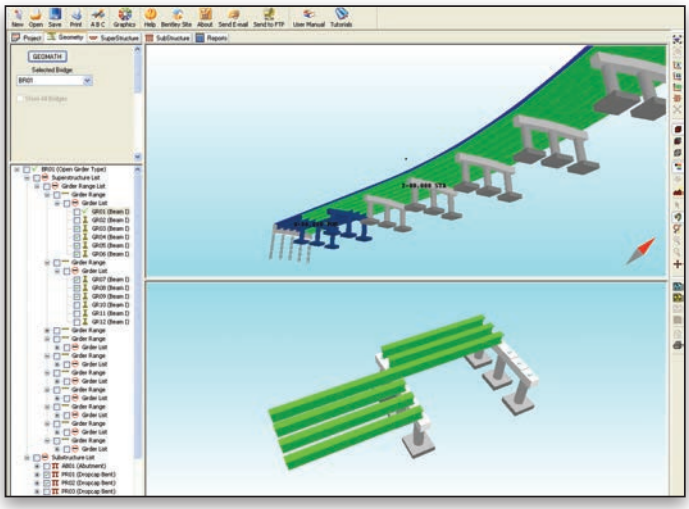
### All-in-One Bridge Application Accelerates Performance

Innovative analysis, design, and load-rating functionality come together in one advanced environment in LEAP Bridge Concrete. The direct exchange of project information – including bridge geometry, materials, loads, prestressing strand pattern, and shear reinforcement – helps users improve decision making for design and construction while connecting and enhancing workflow processes.

From a single interface, users tap into the full power of:

- Computational bridge layout and design
- Analysis, design, and load rating for post-tensioned (PT) and reinforced concrete box girder, T-beam, and slab bridges
- Analysis, design, and load rating for simple- and multi-span precast and prestressed concrete bridges
- Analysis and design of reinforced concrete abutments, piers, and foundations

The resulting information provides a rich data asset for as-built documentation, maintenance, and operations. When combined with Bentley software for user collaboration and project data management, LEAP Bridge Concrete becomes an ideal solution for professional bridge organizations, construction teams, maintenance and inspection crews, and bridge owner-operators. The software easily handles the vast majority of the bridges built today, making it the choice of bridge professionals worldwide.



*Use the integrated suite of LEAP modules via one GUI.*

### Design-to-Spec Ensures Code Compliance

LEAP Bridge Concrete automates design-to-specification for U.S., Canada, or India bridge design codes to ensure compliance with mandated practices. The software is delivered for the user's choice of international design codes:

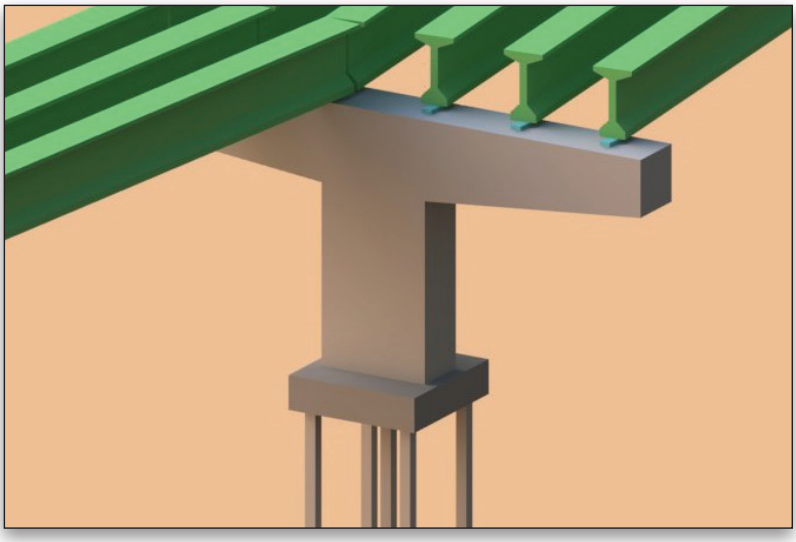
- American Association of State and Highway Transportation Officials (AASHTO) specifications:
  - » AASHTO Standard (LFD: Load Factor Design)
  - » AASHTO LRFD (Load Resistance Factor Design)
  - » AASHTO LFR (Load Factor Rating)
  - » AASHTO LRFR (Load & Resistance Factor Rating)
- Canadian Highway Bridge Design Code (CHBDC) specifications
- Indian Road Congress (IRC) bridge design specifications

The system has the flexibility to mix and match design and rating methodologies for verification. For example, users of the U.S. version can switch between LFD/LFR and LRFD/LRFR specifications.

### Data Reuse Saves Time and Reduces Errors

Reuse of data helps users improve productivity as it eliminates the initial time wasted on data entry and reduces operator error – particularly as design modifications are made and changes need to propagate throughout the entire bridge structure. Engineering professionals are able to focus on complex engineering issues and perform more analyses and code checks to refine their designs.

*Used by more than 1,800 bridge engineers worldwide, LEAP is developed by engineering professionals with expert knowledge of code specifications and design methodologies.*



*Use powerful visualization features to visually verify bridge models.*

Users can define detailed alignment, profile, and cross-section information or directly obtain civil data from OpenRoads. Import of roadway information and ground data from LandXML files is also available.

### ABC Wizard Speeds Bridge Definition

The Automated Bridge Creator (ABC) wizard helps users quickly define superstructure and substructure geometry and specify material properties. The software automatically generates full bridge models, enabling users to focus on analysis and design procedures. Users can define the superstructure as prestressed girders, cast-in-place (CIP) reinforced and PT box girders, T-beams, or slabs. The substructure can be integral, drop-cap, tapered, inverted-T pier cap, or hammerhead type piers, with spread, pile, drilled shaft, or well foundation (India version) footings.

### 2D/3D Visualization Enhances Model Verification

Powerful visualization capabilities enable users to rapidly verify modeling input as they work. The bridge is viewed in profile, elevation, and cross-section views. Solid and transparent viewing options aid in the exploration of areas with complex geometry. The software also produces 2D views of superstructure and substructure components, with dimensions, which can be saved in DGN or DXF formats for production of preliminary drawings.

The 3D Viewer lets users view superstructure and substructure in 3D detail – down to the reinforcement design. Longitudinal reinforcement, shear reinforcement, and PT-Tendons are shown for box girder bridges. Prestressing strands, deck longitudinal, and transverse reinforcement and stirrups are shown for precast girder bridges.

Flexural and shear reinforcement in cap, all reinforcement in columns, and flexural and temperature/shrinkage reinforcement in footings are shown for substructure elements. Users can specify the construction sequence and view a time-lapse construction animation.

### Unified Database Ensures Project Consistency and Accuracy

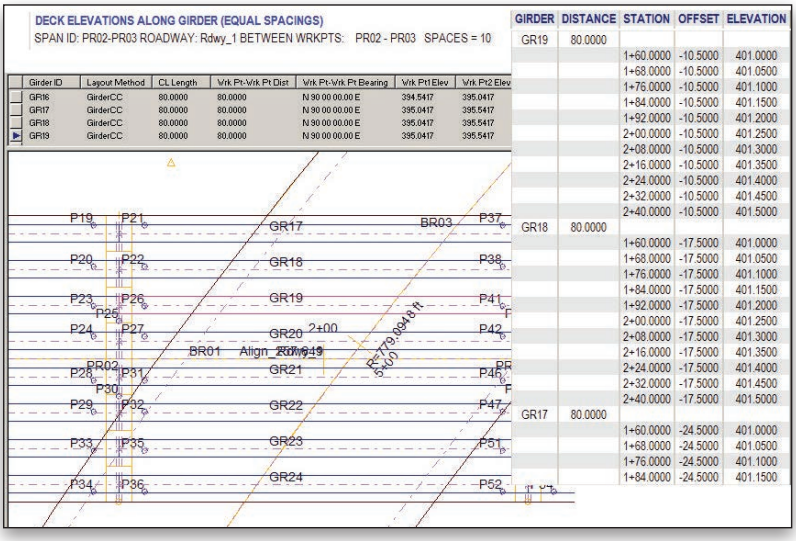
All project information is recorded and stored in a LEAP database. This unified database facilitates the software's computational design capabilities as well as the exchange of data with other bridge enabled applications. Changes to the design trigger updates throughout the project, eliminating the need to make multiple, time-consuming corrections to all project components.

### Integrated Design and Analysis Streamlines Workflow

LEAP Bridge Concrete provides a unified environment for the design of superstructure and substructure. It delivers accurate and efficient solutions for pier and abutment design, automating layout, analysis, and design of integral/monolithic piers as well as stem wall or pile cap abutments. Results from superstructure analysis are taken directly to the substructure model.

*Bentley's integrated products enabled LADOTD to respond quickly during challenging conditions to design a safer bridge with increased capacity and a longer life span, all while keeping the project ahead of schedule and $53 million under budget.*

*– Arthur W. D'Andrea, Bridge Engineer Administrator, Louisiana Department of Transportation and Development*




*Calculate finished deck elevations at tenth points along girders.*

## Bridge and LandXML Compliance Offers Direct Data Exchange

LEAP Bridge Concrete directly communicates with other Bentley solutions, including MicroStation®, OpenRoads, OpenBridge Modeler, and more. In addition, LEAP Bridge Concrete is LandXML registered and certified, enabling users to directly exchange information such as horizontal alignments, vertical alignments, cross sections, and roadways with other applications that support LandXML.

## Project Information Management Protects Data Assets

LEAP Bridge Concrete can be a data command center for your bridge projects. Reciprocal data exchange provides not only a seamless mechanism for information modeling, but also ensures the reuse and preservation of critical bridge information.

## Drawing and Reporting Tools Automate Deliverables Production

A drawing tab automates the generation of drawings based on the final designs created. Drawings can be generated in MicroStation DGN format. User options are also provided for specifying border templates and symbology – commonly defined as *.dgnlib by most U.S. state departments of transportation.

Report generation options make easy work of publishing project information. Reports can be printed, saved as HTML files, or exported to spreadsheets.

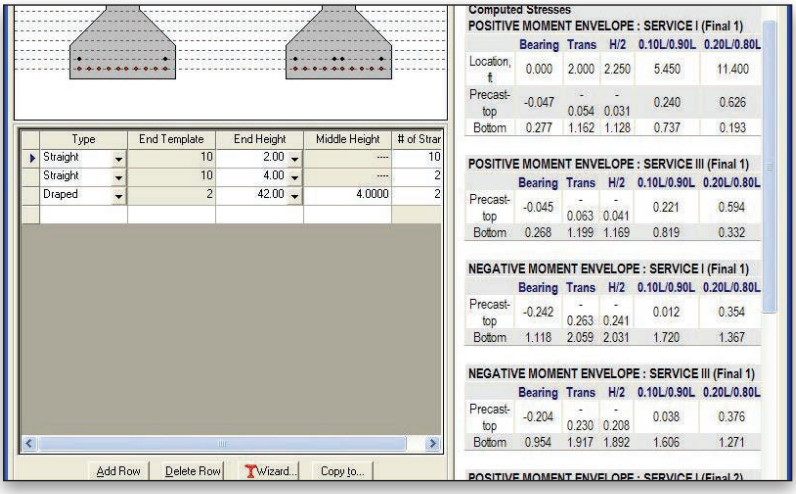
## AASHTOWare Integration Boosts Project Startup

LEAP Bridge Concrete is integrated with the AASHTO BRIDGEWare database to ensure easy reuse of information and eliminate data entry that can take precious time.

## A Synthesis of Planning, Engineering, Design, and Construction

With the integrated process of LEAP Bridge Concrete, users synergistically develop a precise bridge data model that improves overall project accuracy and consistency. The results provide important information that proves to be a useful asset, not just for the design phase but also for the life of the bridge. This synthesis of bridge information development can carry through all the project phases, from conception to detailed design, design to fabrication and manufacturing, and construction to operations. Enable any person requiring information about a given bridge to access and reuse information relevant to his or her purpose during the lifecycle of the infrastructure. For example, a structural detailer can access rebar information, a bridge modeler can extract key design measurements, and a road design engineer can access the exact geometry and position of the bridge deck from accurate as-built information.

Moreover, bridge owners can access historical trending, traffic analysis, and cost information along with physical models of the infrastructure for capital project planning.




*Automatically create strand patterns and analyze stresses.*

## System Requirements

**Processor**
Intel® Pentium®-based or AMD Athlon®-based processor 2.0 GHz or greater

**Operating System**
Windows 10 (64-bit), Windows 8 (64-bit)

**Memory**
8 GB minimum, 32 GB recommended

**Disk Space**
10 GB minimum free disk space

**Video**
1GB of video RAM or higher recommended

## Find out about Bentley at: www.bentley.com

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# LEAP® Bridge Concrete At-A-Glance

### Ease of Use
- Intelligent graphical user interface
- U.S. customary and metric (SI) units
- Comprehensive 3D bridge models
- 2D views, with dimensions
- Graphical feedback of input data
- Customizable libraries
- Text and graphical report formats
- Automated bridge creation (ABC wizard)

### Intelligent Concrete Design
- Precast, prestressed girder
- CIP and PT box girder
- CIP and PT T-beam
- CIP and PT slab
- Multi-column piers
- Hammerhead piers
- Drop-cap piers
- Integral piers
- Stem wall and pile cap abutments
- Spread and combined footings, raked and straight piles, drilled shafts
- CIP and PT I-beam, sloped abutment, sloped footing, and well foundation (IRC)

### Structural Analysis Options
- Strut-and-tie modeling (U.S. version)
- Single girder or whole-width analysis
- Prestress loss calculation by code equations
- Thermal load analysis
- Prestress loss calculation by time-dependent specs (LFD and LRFD; CHBDC)
- Live load distribution factors (LFD and LRFD; CHBDC)
- Live loading and load combinations (LFD and LRFD; CHBDC; IRC)
- Multimode response spectrum analysis for seismic design

### Design Code Checks and Load Rating
- AASHTO Standard
- AASHTO LRFD
- U.S. States: Florida and California
- CHBDC
- IRC
- AASHTO LFR and LRFR load-rating checks

### Powerful Modeling and Visualization Tools
- Solid and transparent views of reinforcement
- Multi-bridge capabilities
- Roadway information and ground data import
- 2D and 3D viewing: full bridge and individual components
- Ground and relative location of roadway and bridge
- Construction animation

### Versatile Reporting Options
- Reports on full bridge or its components
- Copy/Paste to Microsoft Word
- Options to print preview or save in HTML formats
- Export to Microsoft Excel
- Customization with company logo and information
- Detailed design reports (LRFD, IRC)

### Automated Drawing Generation
- DGN and DWG drawings
- Plan and elevation drawings
- Bridge framing plans
- Precast, prestressed concrete girders
- Piers

### Integration with Other Software
- Direct data exchange with MicroStation, OpenRoads, OpenBridge Modeler, and more
- AASHTO BRIDGEWare database
- File formats: DGN, DXF, XML, and LandXML

**For more information, visit:**
**www.bentley.com/LEAP**

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