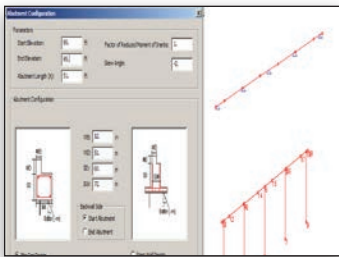




## LEAP® RC-PIER®

### Reinforced Concrete Substructure Analysis and Design

LEAP RC-PIER is an integrated application for the analysis and design of reinforced concrete bridge substructures and foundations. It enables users to design abutments, multi-column piers, and hammerhead piers. The program supports U.S., Canada, and India codes and specifications. Part of the LEAP Bridge Enterprise system, LEAP RC-PIER® integrates with LEAP GEOMATH®, LEAP CONBOX®, and LEAP CONSPAN® to provide a powerful bridge information modeling (Brim) solution.



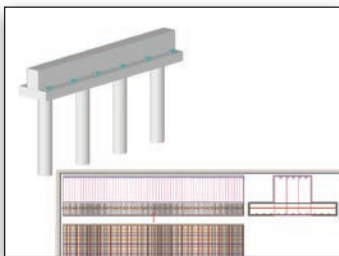
Analyze end bents as continuous beams or part of rigid frames.

#### Integrated Brim Solution Accelerates Concrete Bridge Design

LEAP RC-PIER is a specialized module of the industry-leading concrete bridge design solution, LEAP Bridge Enterprise. With this comprehensive system, bridge professionals are able to design the bridge in a whole-structure context, using a single, integrated application. Users enjoy synchronous access to bridge data and functionality – geometry, substructure, and superstructure analysis, design, and load rating.

#### Choose from Multiple Analysis Options

The 3D physical models created by LEAP RC-PIER show the applied loads. The software displays and uses a 2D finite-element analysis model to calculate design forces for pier caps, columns, and footings. RC-PIER reports soil pressure values under footings and pile reactions. Optional P-delta analysis computes second-order effects.



Design inverted tee caps.

#### Design-to-Spec Ensures Code Compliance

LEAP RC-PIER supports the following international bridge design codes to ensure compliance with mandated practices:

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

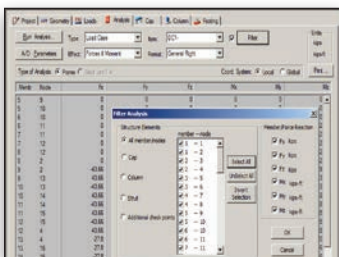
#### Pier and Abutment Design Optimizes Structures

Users can design piers and abutments including pier and pile caps, columns accounting for biaxial bending, and footings. Design can be performed according to country code. Users can apply the advanced strut-and-tie method (STM) of design to obtain optimized structures.

#### Easy Data Entry Streamlines 3D Design

LEAP RC-PIER facilitates project data entry via an intuitive interface of tabbed screens, dialog boxes, graphic buttons, and menus. The application provides immediate validation of parametric 3D physical modeling input, enabling users to quickly confirm model accuracy and instantly visualize modifications.

- Cap design: LEAP RC-PIER checks ultimate capacity for positive and negative moments and flags locations where capacities are exceeded. For shear and torsion design, it computes the required stirrup area. For seismic regions, plastic hinging moment in columns can be considered in the pier cap design. Cap design can be done for centerline of column values, at face of support values, and at a specified offset from the column centerline.



Generate detailed results of frame analysis.

#### Automatic Load Generation Enhances Analysis

LEAP RC-PIER automatically generates most loads, including live, dead, wind, longitudinal/braking, centrifugal, seismic, vessel collision, stream flow, buoyancy, ice, temperature, and shrinkage loads. Users can input loads manually, through easy-to-use wizards, or directly obtain loads from any of the other LEAP Bridge modules.

- Column design: For AASHTO LFD, LRFD, and Canadian CHBDC design codes LEAP RC-PIER considers slenderness effects through optional P-delta analysis or moment magnification method. It generates P-M interaction diagrams. Users may also choose to compute the plastic hinging moments in columns. For Indian IRC design code, the application considers cracked section analysis and checks stresses against the permissible values.
- Footing design: The application supports isolated, combined, and strap footings. The design of the footing includes calculation of pile forces and soil pressures, flexure design, checks for one-way/two-way shear and cracking.

## System Requirements

### Software

Microsoft .NET Framework 3.5 or higher

### Processor

1 GHz 32-bit (x86) or higher

### Operating System

Microsoft Windows 7, Windows XP

### Memory

1 GB recommended

### Disk Space

500 MB

### Input Device

Mouse

Find out about Bentley at: [www.bentley.com](http://www.bentley.com)

### Contact Bentley

1-800-BENTLEY (1-800-236-8539)  
Outside the US +1 610-458-5000

### Global Office Listings

[www.bentley.com/contact](http://www.bentley.com/contact)

- Abutment design: LEAP RC-PIER offers pile-cap abutment and stem wall abutment design, either on piles or spread footings. For pile cap, it offers the option to analyze pile cap as a continuous beam supported by piles or a plane frame consisting of pile cap beam and piles as columns.

## Caltrans Amendments Option Ensures Design Conformance

LEAP RC-PIER lets users design according to the Caltrans Amendments. Major Caltrans Amendments include Special STRENGTH II Limit State related to P5-P15 trucks, and FATIGUE Limit State related to infinite fatigue life of concrete.

## LEAP RC-PIER At-A-Glance

### Ease of Use

- Intelligent graphical user interface
- U.S. customary and metric (SI) units
- Tabular and dialog input
- Onscreen graphics (2D and 3D model)
- Graphical Representation of Loads
- Customizable libraries
- Text and graphical report formats
- Enhanced HTML-based reports
- Export of graphics to DXF and DGN formats

### Design and Code Checking

- AASHTO Standard (LFD)
- AASHTO LRFD
- U.S. state: California
- CHBDC
- IRC

### Abutment Design

- Pile-cap abutment
- Stem-wall abutment

### Pier Types

- Multi-column
- Hammerhead
- Integral

### Cap Shapes

- Straight
- Tapered
- Variable
- Stepped
- Inverted-T (AASHTO LRFD)
- Integral (includes Box)

### Column Types

- Circular
- Rectangular
- Rectangular chamfered
- Rectangular filleted
- Hexagonal
- Octagonal
- Parabolic and linear variation
- Drilled shaft connection

### Footing Types

- Spread
- Piles (normal or battered)
- Isolated
- Combined
- Strap
- Well foundation (India)

### Load Libraries

- AASHTO Standard (LFD)
- AASHTO LRFD
- CHBDC
- IRC
- User-defined and customizable libraries
- Special seismic groups

### Column Reinforcement

- Rectangular pattern
- Circular pattern
- Intersecting hoops
- General pattern
- Vertical or face parallel bars

### Load Types

- Dead and live load
- Wind on structure and live load
- Braking/longitudinal force
- Centrifugal force
- Rib shortening
- Shrinkage
- Temperature
- Seismic

### Rebar Library

- AASHTO
- CHBDC
- IRC
- User-defined and customizable libraries

### Design and Analysis

- P-delta analysis
- Moment magnification
- Strength limit states design
- Service limit state design
- Comprehensive pile cap or spread footing design
- Comprehensive cap design and check for flexure, shear, torsion, cracking and fatigue

The program reports the three highest capacity/demand ratios for column flexure. It also provides an option to define a bundled reinforcement library.

## Viewing and Publishing Options Provide Flexibility

LEAP RC-PIER displays 2D plan and elevation views of the pier and offers flexible drawing and reporting tools. Users can print and/or export views to DXF and DGN formats. The program generates a number of comprehensive detailed reports that can be exported to Microsoft Excel.

- Strut-and-tie modeling for hammerhead piers and footings (LRFD)
- Overturning check of pier about pier longitudinal and transverse axes
- Plastic hinging moment in column and design cap and footing
- Stress calculations based on cracked section behavior

### Automatic Load Generation

- Superstructure dead loads
- Live loads for regular trucks, permit trucks, and mixed trucks
- Longitudinal/braking loads
- Centrifugal load
- Wind loads
- Temperature load from superstructure
- Lateral earth pressure load generation for abutments
- Seismic

### Pile Group Library

- Grid-based patterns
- Any number of grid lines
- Piles specifiable on any of the grid crossings
- Piles by location (X,Y coordinates)
- Batter for each pile

### User-Specifiable Parameters

- Pier skew angle
- Optional intermediate strut
- Cracked section
- Material properties
- Code-specific analysis/design parameters
- Springs at bottom of columns
- User- customizable diagrams
- Analysis results plot diagrams
- Export of data to spreadsheets

For more information, visit:  
[www.bentley.com/LEAP](http://www.bentley.com/LEAP)