



LEAP® RC-PIER® FOR REINFORCED CONCRETE SUBSTRUCTURE ANALYSIS AND DESIGN

LEAP RC-PIER is an integrated tool for the analysis and design of reinforced concrete bridge substructures and foundations according to the AASHTO Standard Load Factor Design (LFD) and Load and Resistance Factor Design (LRFD). This helps in smooth transition from LFD to LRFD. LEAP RC-PIER enables users to design abutments, multi-column piers, and hammerhead piers.

Offers an easy to use interface

LEAP RC-PIER project data entry convenient with a system of tabbed screens, dialog boxes, graphic buttons, and menus. Complete 3D design representations are created based on the parametric data entered, allowing users to quickly confirm the accuracy of the input.

Automatically generates loads

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. The loads can be input manually, through easy-to-use wizards, or can also be imported from other Bentley LEAP products.

Delivers an array of analysis capabilities

While LEAP RC-PIER creates a 3D model for visualization, it uses 2D FEM analysis calculating design forces for pier caps, columns, and footings. It also reports soil pressure values under footings and pile reactions. RC-PIER offers optional P-delta analysis to account for second order effects.

Analyze and design piers and abutments

Users can design piers and abutments including pier and pile caps, columns accounting for biaxial bending, and footings. The design can be performed according to AASHTO LFD, LRFD, or Working Stress methods. Users can apply the advanced Strut-and-Tie (STM) method of design to obtain optimized structures.

- Cap design: 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 may be considered in the pier cap design. Cap design can be done for center line of column values or at face of support values.

- Column design: Considers slenderness effects through P-delta analysis or moment magnification method. Generates P-M interaction diagrams. Users may also choose to compute the plastic hinging moments in columns.
- Footing design: 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 and fatigue checks.
- Abutment design: Offers Pile Cap Abutment and Step Wall Abutment either on piles or spread footing.

Generates and exports user-friendly reports

LEAP RC-PIER generates a number of comprehensive and detailed reports which can be exported to Microsoft Excel.

Supports 2D Views and export capabilities

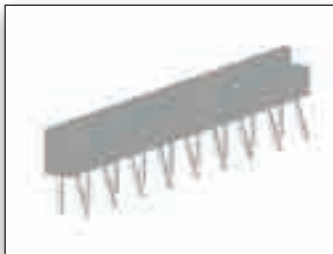
LEAP RC-PIER displays 2D plan and elevation views of the pier. Print and/or export views to DXF/DGN formats.

Conforms to Caltrans Amendments

The program offers an option to design according to the Caltrans Amendments. Major Caltrans Amendments include: Special STRENGTH II Limit State related to P5-P15 trucks, FATIGUE Limit State related to infinite fatigue life of concrete subjected to HL-93 fatigue truck. Program reports three highest capacity/demand ratios for column flexure. The program gives an option to define bundled reinforcement library.

Integrates concrete bridge design

When RC-PIER is invoked from within the LEAP® Bridge console, the user has access to fully-integrated bridge geometry, substructure, and superstructure analysis, design, and load rating capabilities. LEAP Bridge enables users to design an entire bridge project within one single application. Single instance of design data input in LEAP Bridge ensures accuracy eliminating entry errors and simplifies workflow.



Pile Cap Abutment with multiple rows of normal/battered piles: Users can define pile at any location as normal or battered. Program generates pile cap design and detailed pile reactions.



Define battered pile: Users can define the pile batter in the pile pattern dialog box.

SYSTEM REQUIREMENTS

Operating System

Windows XP Service Pack 2

Processor

GEenuineIntel, x86 Family 6 Model 23 Stepping 6, Speed 2,493 MHz

Physical Memory

2,047 Mb

Available Memory

1,535 Mb

Disk Space

109,661 Mb on Drive C:

ABOUT BENTLEY

Bentley Systems, Incorporated is the global leader dedicated to providing comprehensive software solutions for sustaining infrastructure. Architects, engineers, constructors, and owner-operators are indispensable in improving our world and our quality of life; the company's mission is to improve the performance of their projects and of the assets they design, build, and operate. Bentley sustains the infrastructure professions by helping to leverage information technology, learning, best practices, and global collaboration – and by promoting careers devoted to this crucial work.

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LEAP RC-PIER AT-A-GLANCE

Graphical User Interface

- User-friendly interface
- U.S. and metric (SI) Units
- Tabular and Dialog Input
- On-screen graphics (3D and 2D model)
- User-Defined Libraries
- Text and Graphical Report Formats
- Enhanced HTML Based Reports
- Export of Graphics to DXF and DGN

Layout and Design

- AASHTO Standard Specifications
- AASHTO LRFD
- State Specifications: California

Abutment design

- Pile Cap Abutment
- Stem Wall Abutment

Pier Types

- Multicolumn
- Hammerhead
- Integral

Structural Size

- Unlimited loads, bearing and piles

Cap Shapes

- Straight
- Tapered
- Variable
- Integral (Includes Box)

Column Types

- Circular
- Rectangular
- Rectangular Chamfered
- Rectangular Fillested
- Hexagonal
- Octagonal
- Parabolic and linear variation
- Drilled shaft connection

Footing Types

- Spread
- Piles (Normal or battered)
- Isolated
- Combined
- Strap

Load Libraries

- AASHTO Standard Loads
- LRFD Loads
- User - Definable
- Customizable
- 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

Design and Analysis

- P-Delta analysis
- Moment Magnification
- Strength/Service Load Design (LFD)
- Comprehensive cap design and check for flexure, shear, torsion, cracking and fatigue
- Comprehensive pile cap or spread footing design

- Strut and Tie modeling for hammerhead piers and footings
- Overturning check of pier about pier longitudinal and transverse axes
- Plastic hinging moment in column and design cap and footing.

Automatic Load Generation

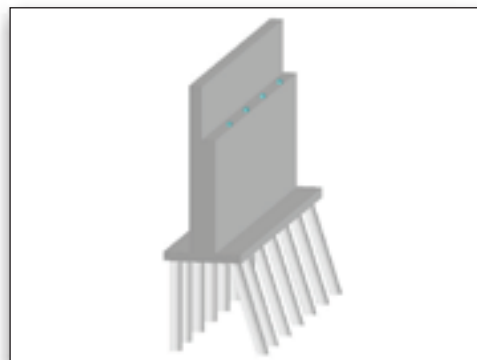
- Superstructure Dead loads
- Live loads for regular trucks, permit truck and mixed trucks
- Longitudinal/Braking loads
- Centrifugal load
- Wind loads
- Temperature Load from Superstructure
- Lateral Earth pressure load generation for abutments
- Seismic

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 Data to Spreadsheets



Stem Wall Abutment with spread/pile cap footing: Users can define backwall, stem wall, and footing properties. Footing can be spread footing or pile footing.



Variable Surcharge in Footing design: Users can define variable surcharge in both X & Z directions.