ꓱ Ftool

Tutorial for the creation of a bridge model with static loads and live load trains, and visualization of results

Version 4.01
June 2024
http://www.ftool.com.br

This tutorial:
https://www.tecgraf.puc-rio.br/ftool/downloads/tutorialloadtrain.zip
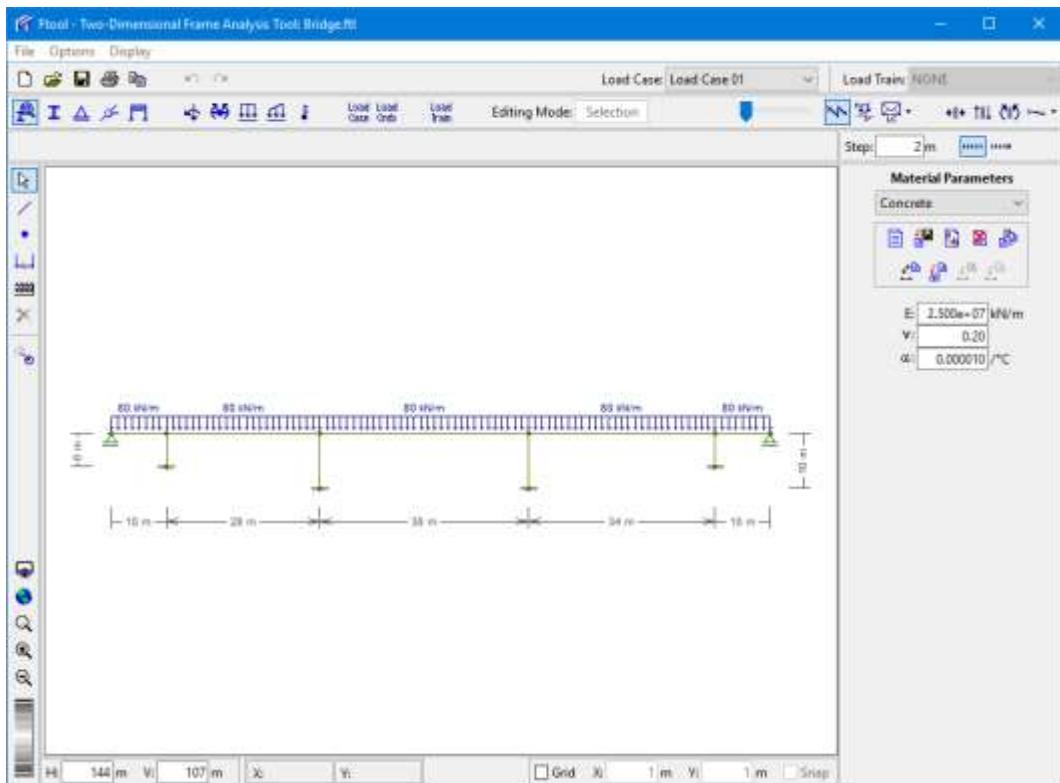
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Create a file for the bridge model (command "Save as... ")

Specification of units and number formatting
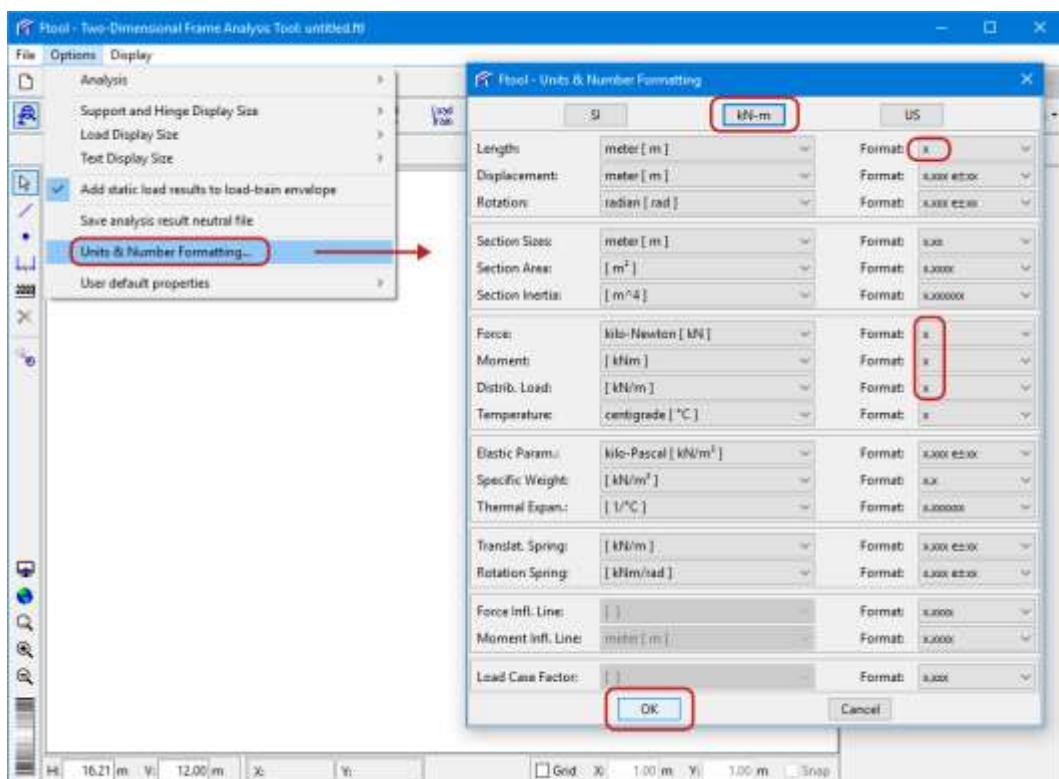
Insertion of bridge beam in keyboard mode
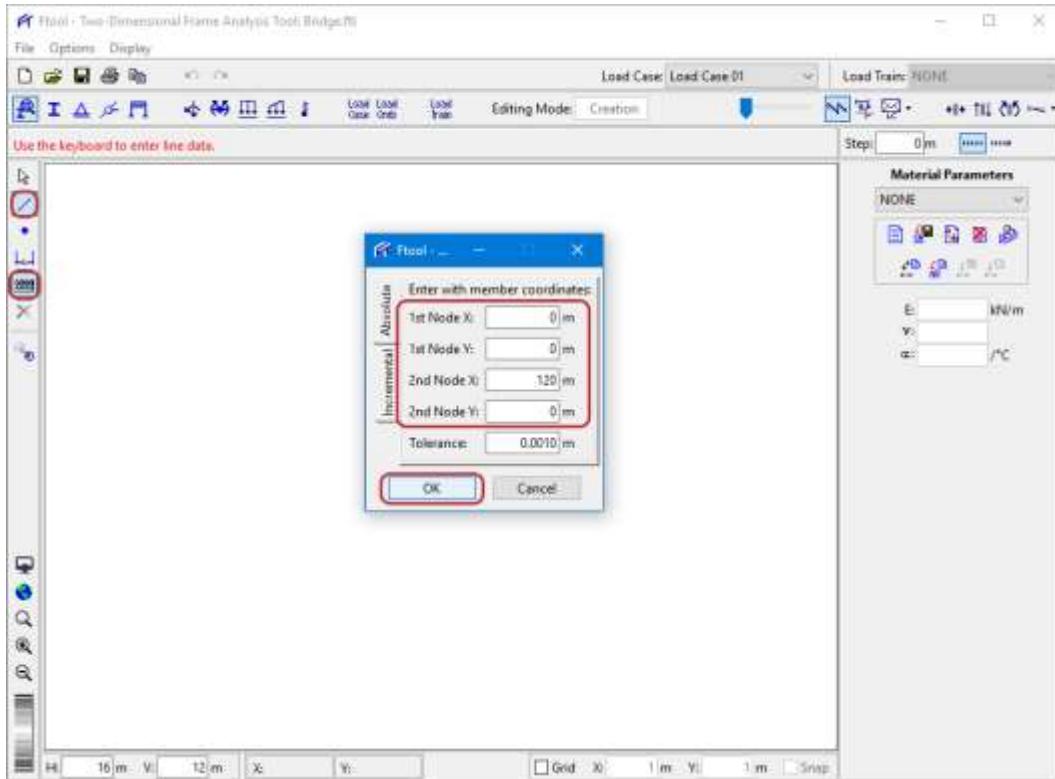
Cancel member insertion to fit model image on screen
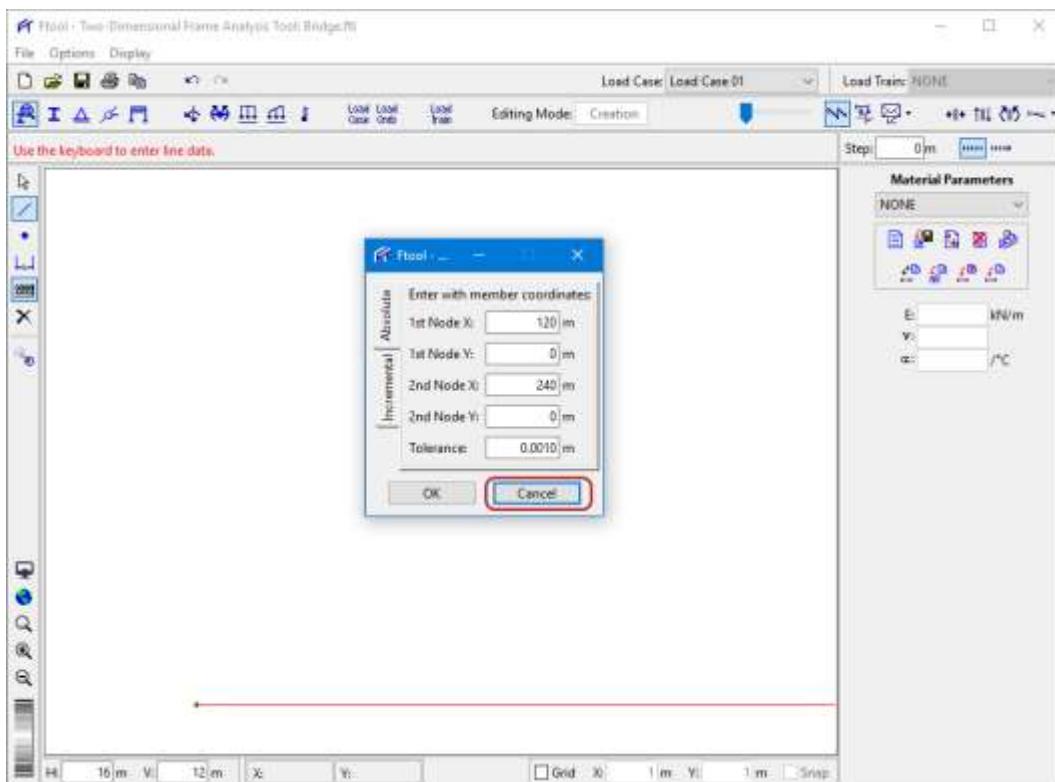
Fit image of model on screen
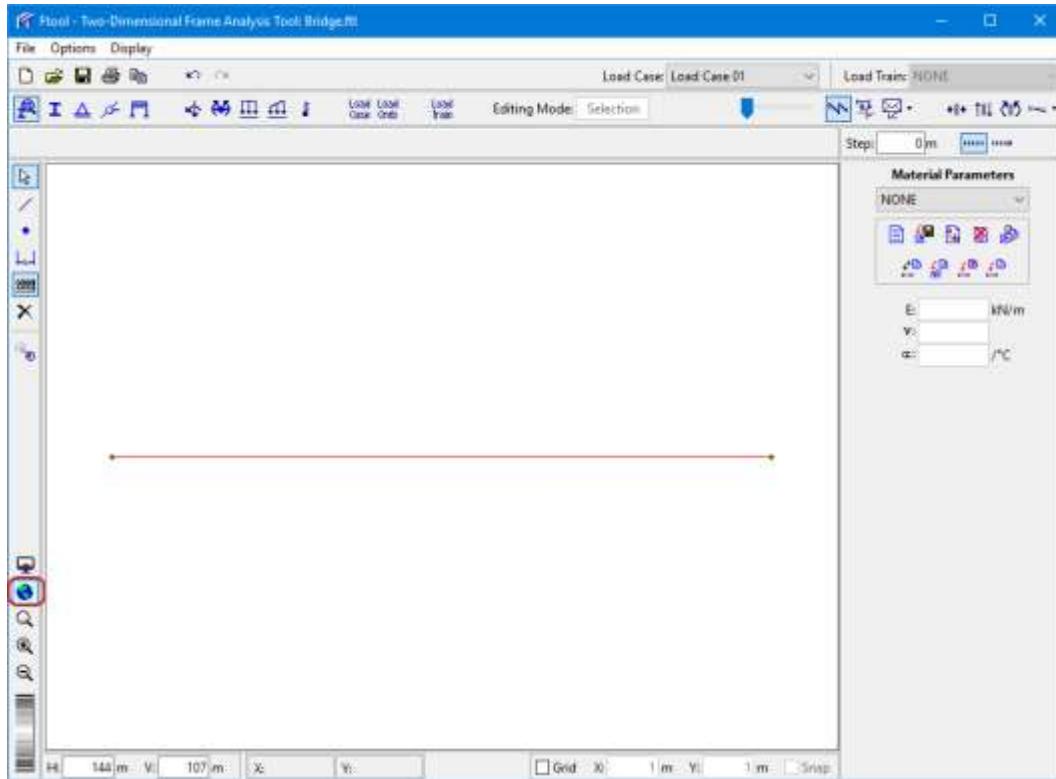
Insertion of first bridge column in keyboard mode
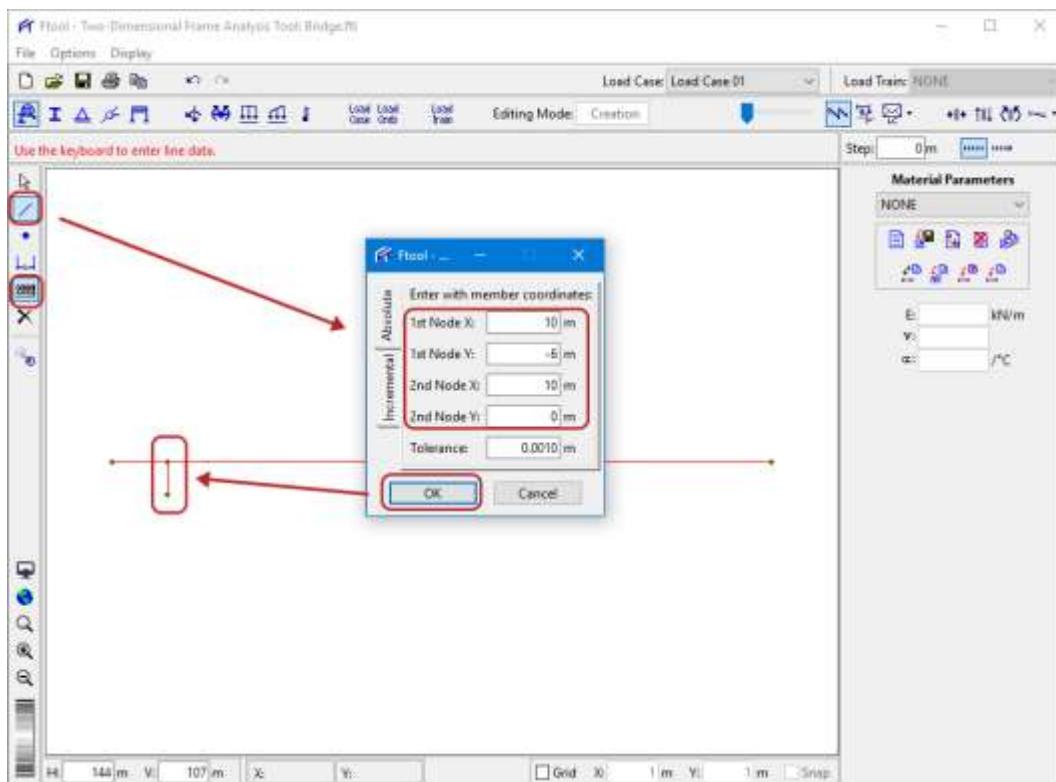
Insertion of second bridge column in keyboard mode
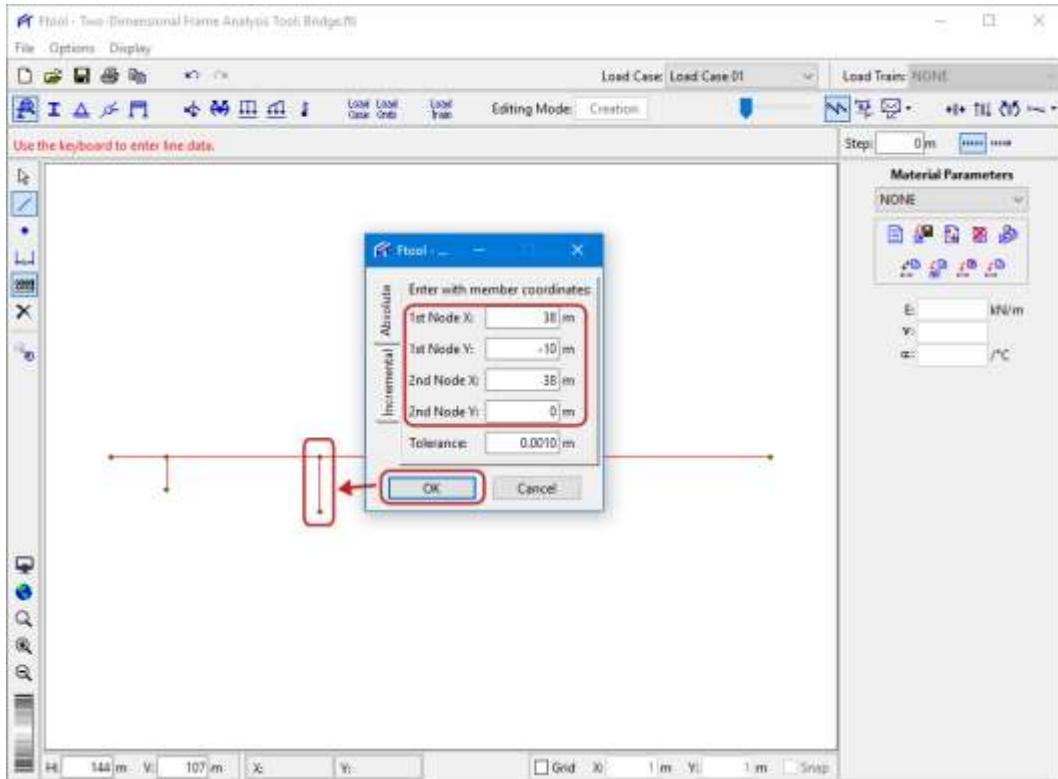
Insertion of third bridge column in keyboard mode
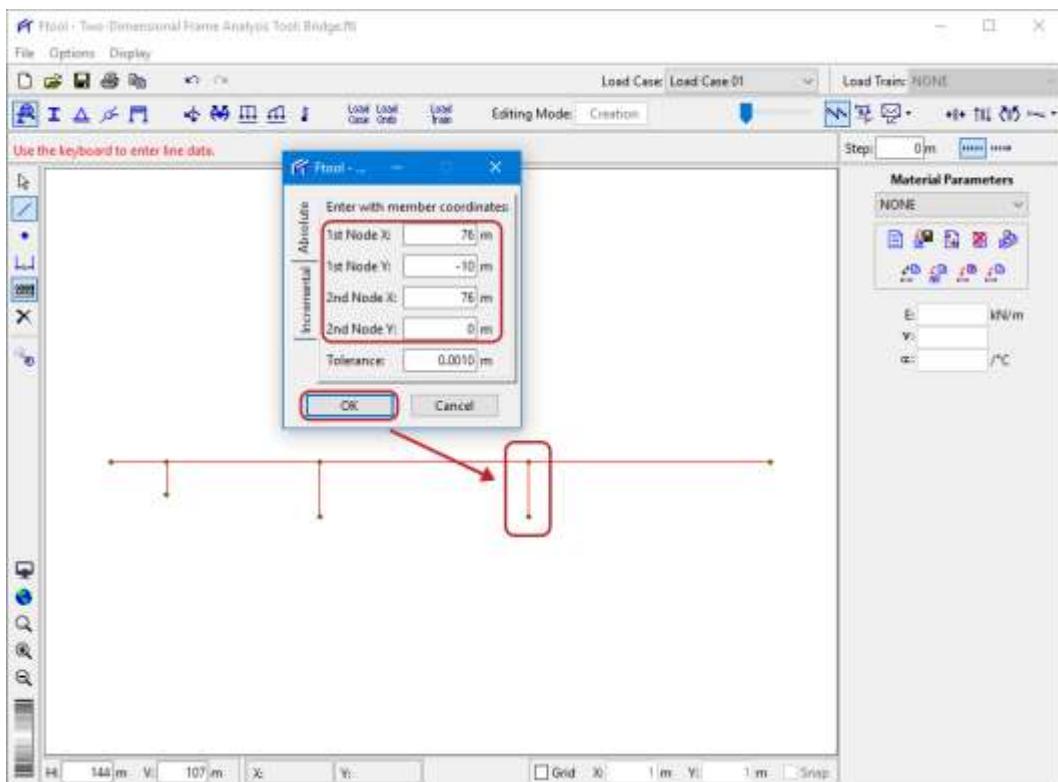
Insertion of fourth bridge column in keyboard mode
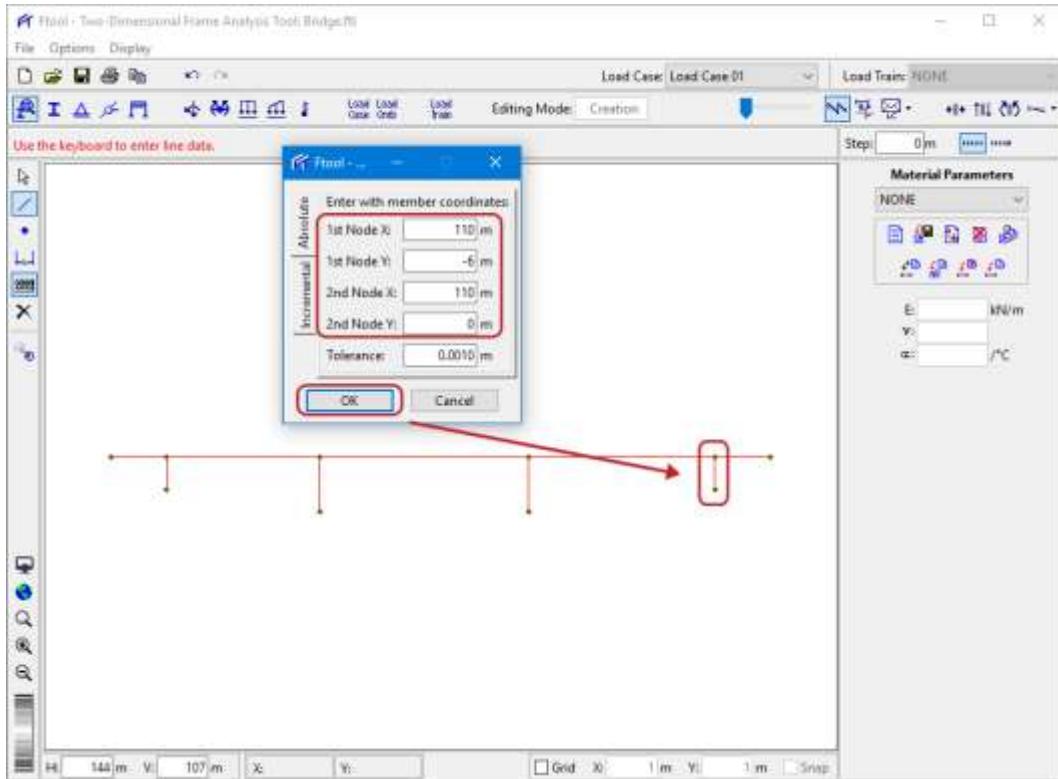
Cancel insertion of members
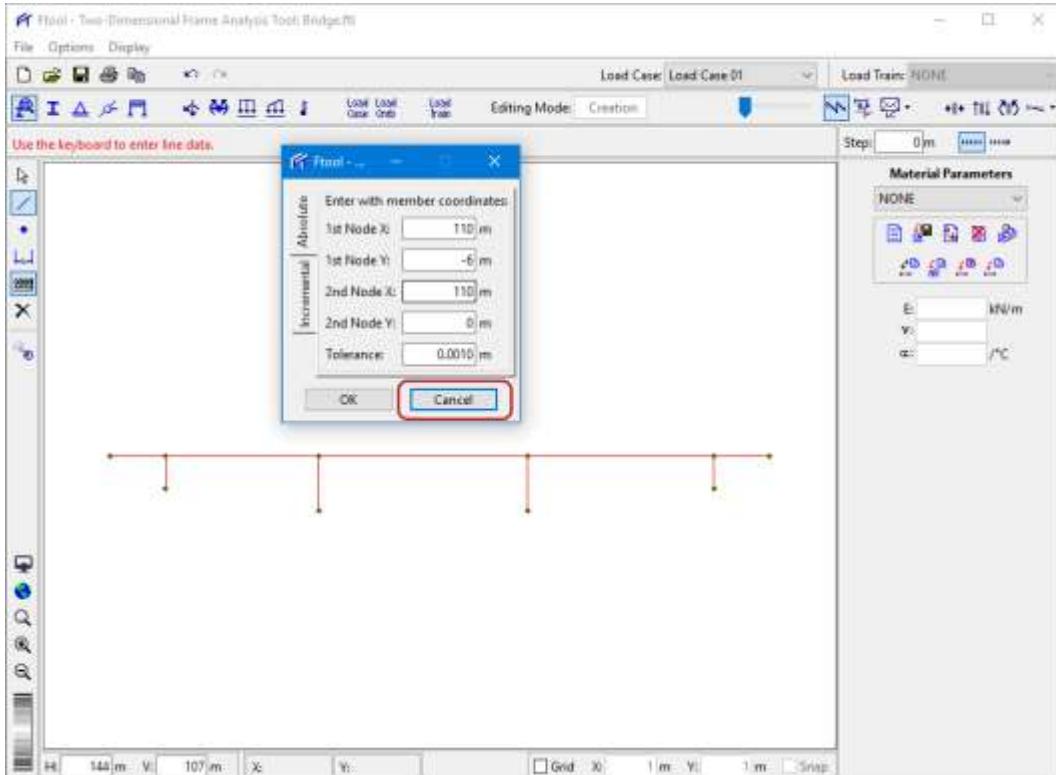
Leave keyboard mode and select area for zooming in
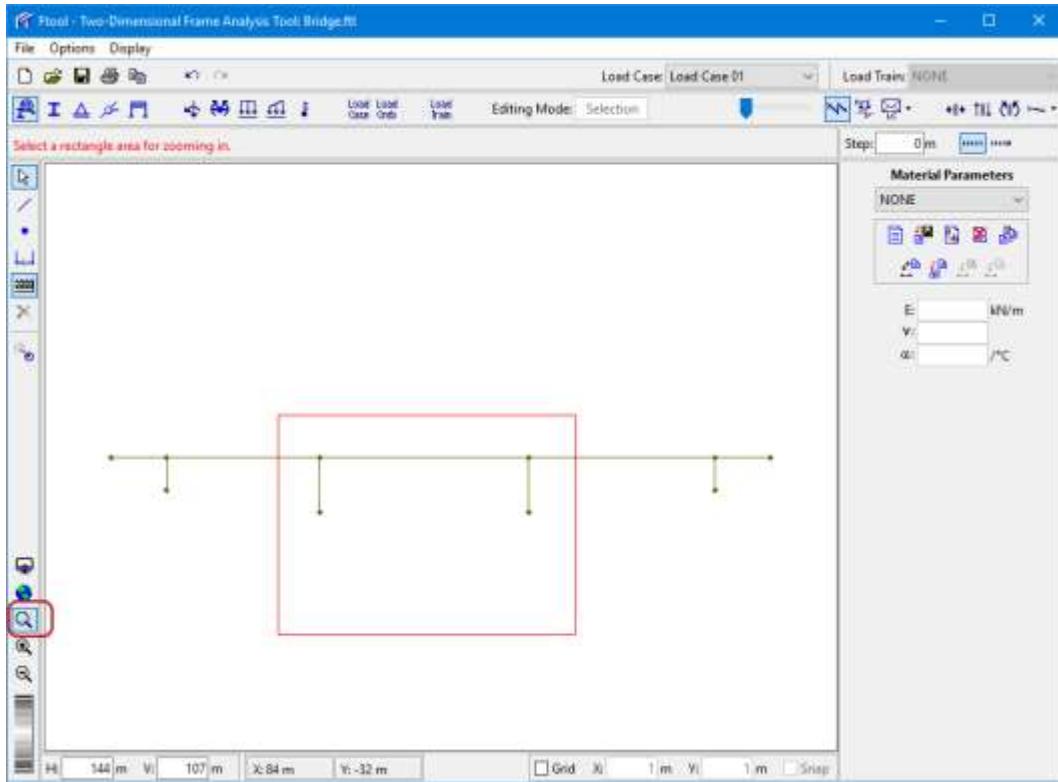
Mouse clicks for insertion of dimension line at bridge central span
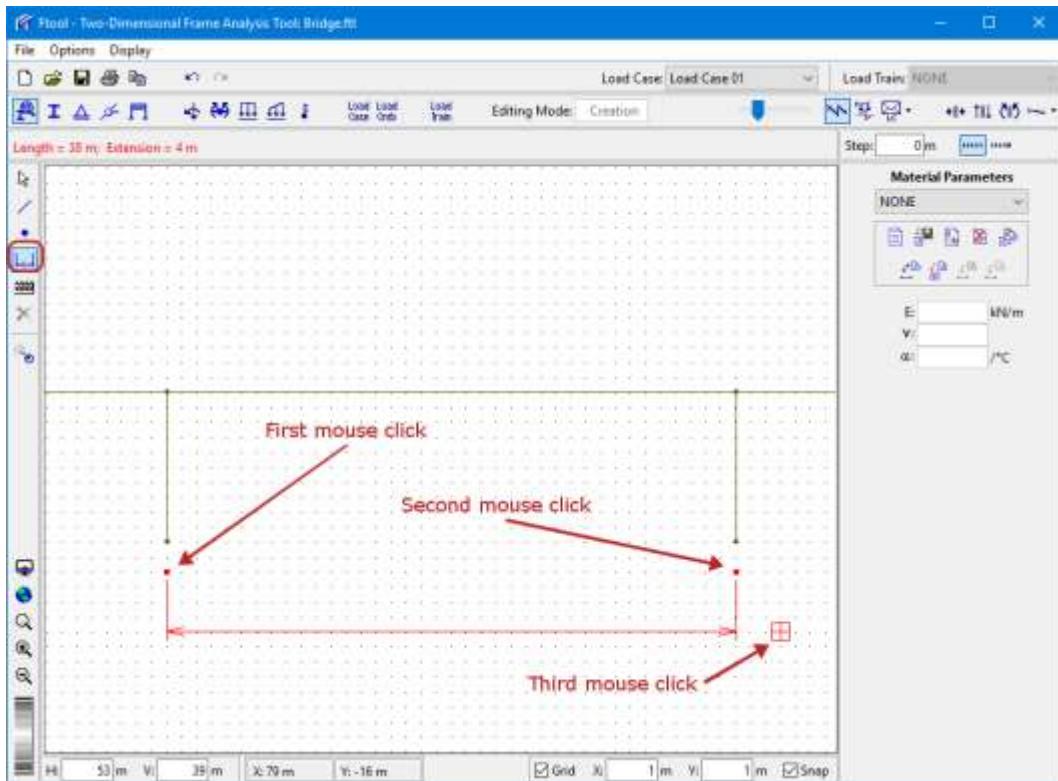
Dimension line at bridge central span
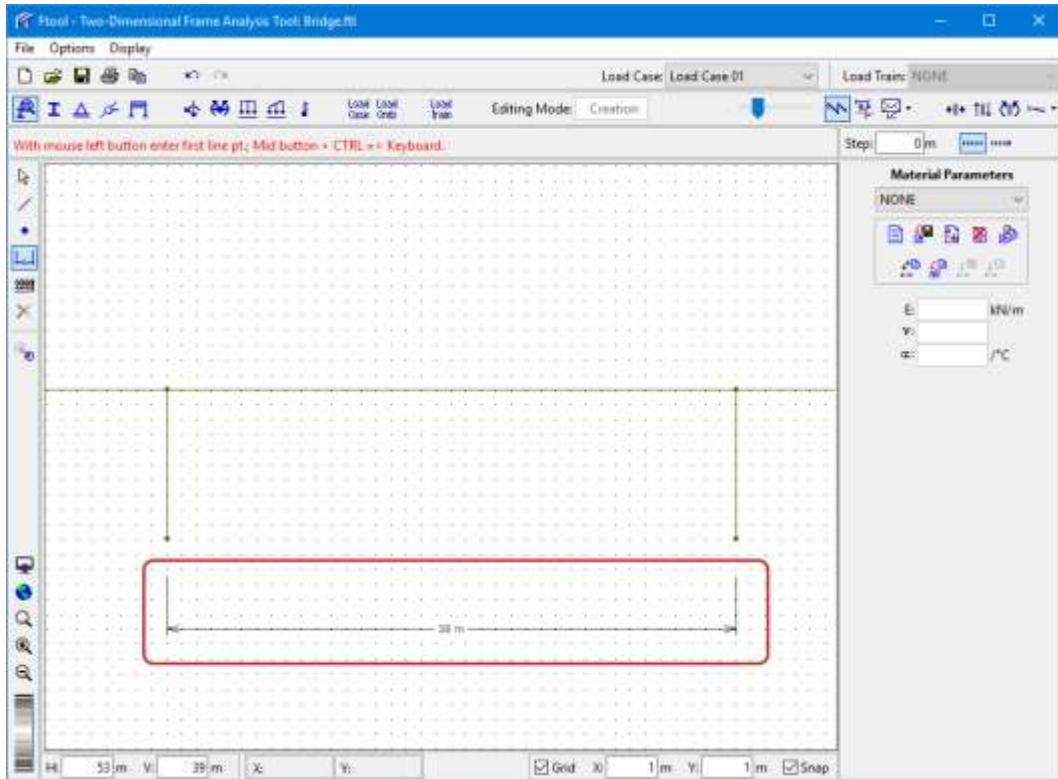
Insertion of other dimension lines
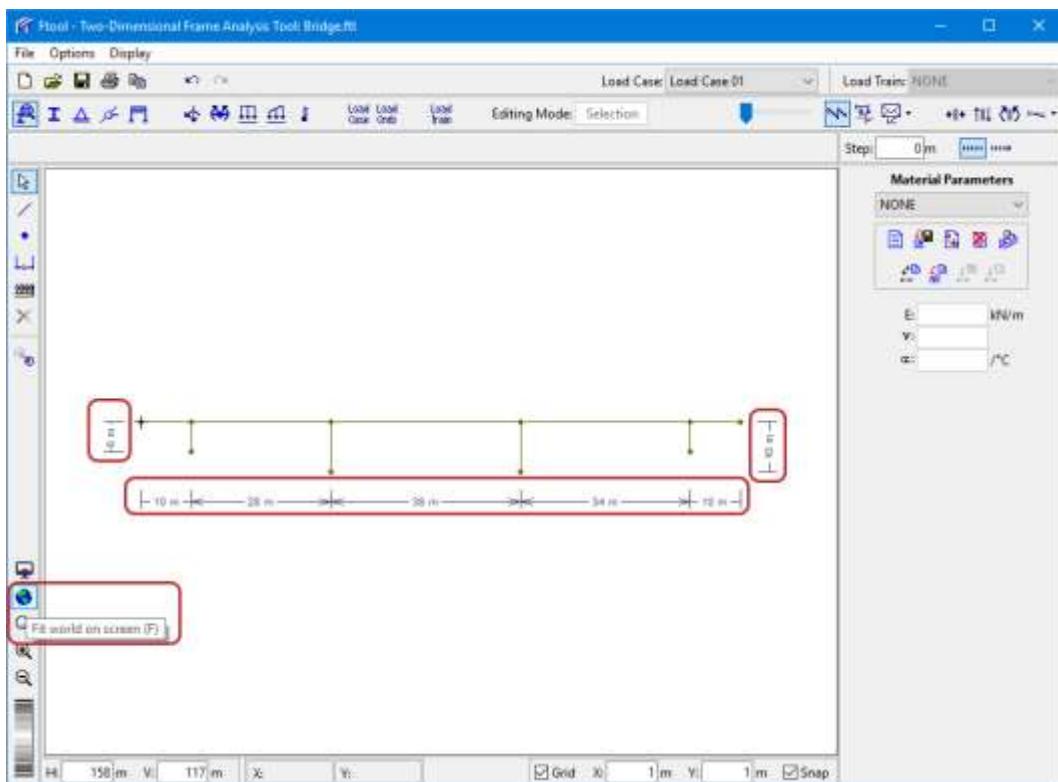
Turn off display of dimension lines to simplify image
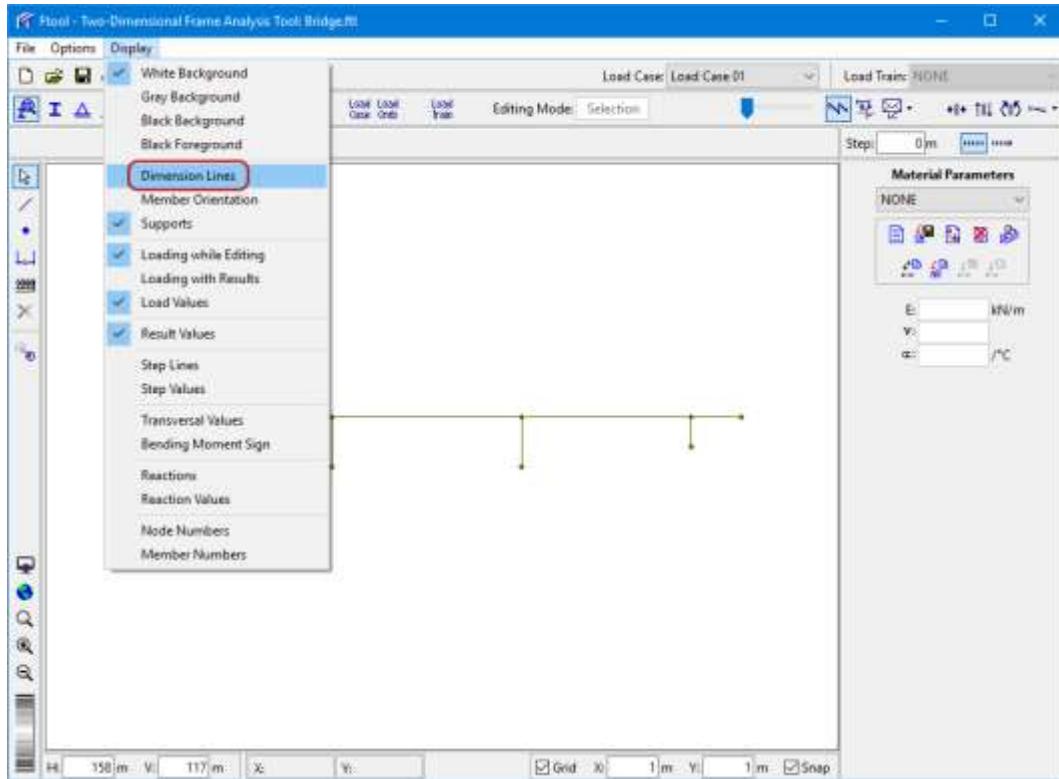
Creation of new material
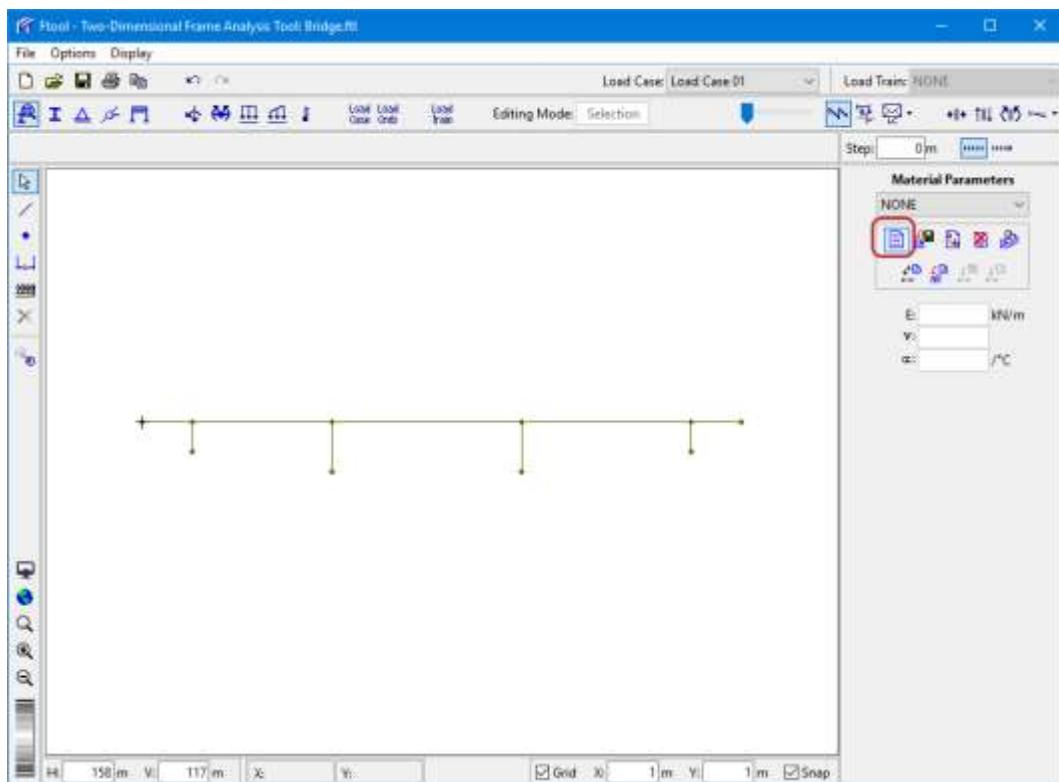
Selection of material type and name; and assignment to all members
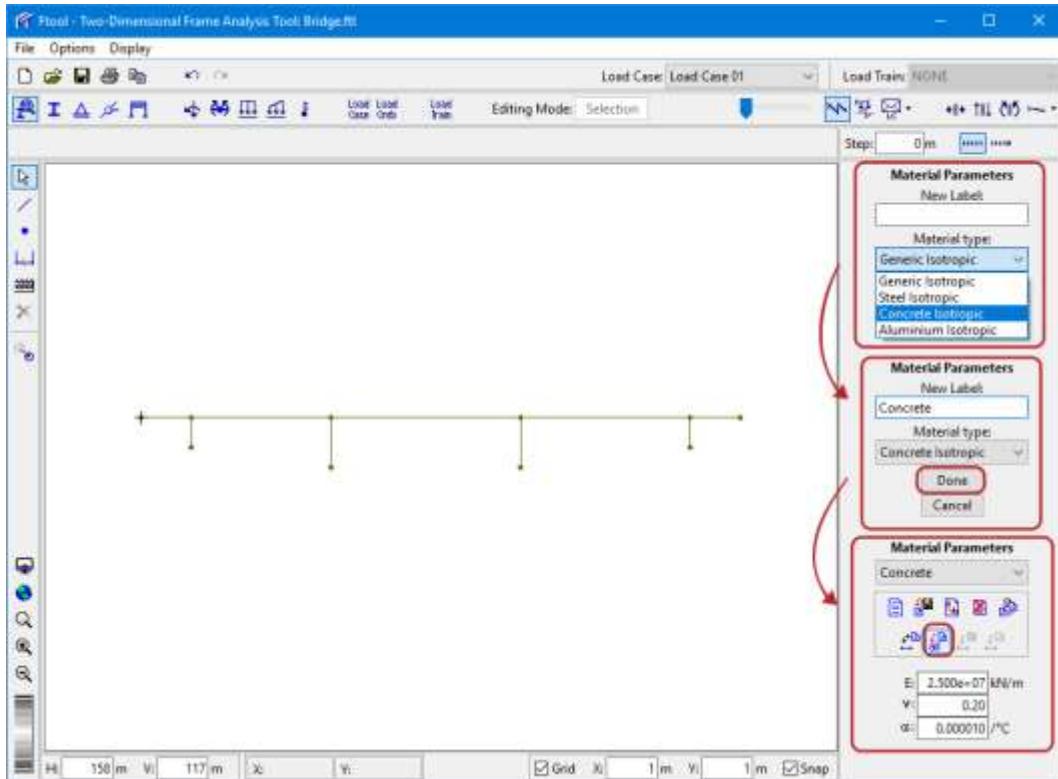
Creation of cross-section for bridge columns
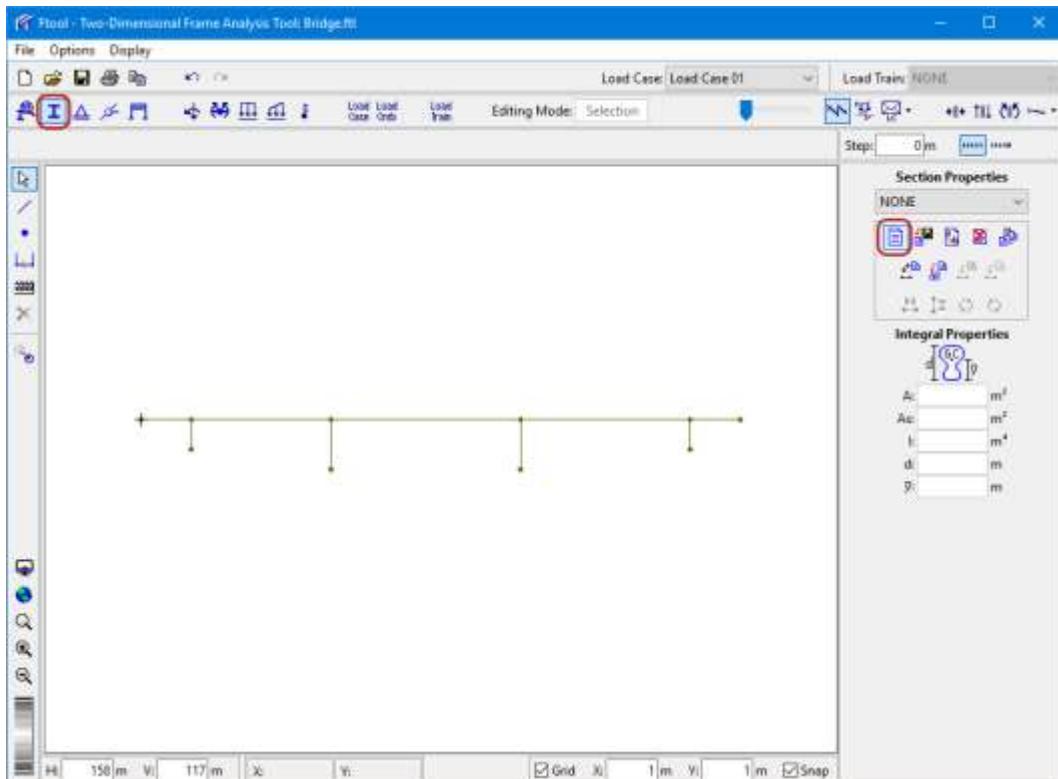
Select rectangular cross-section for the bridge columns
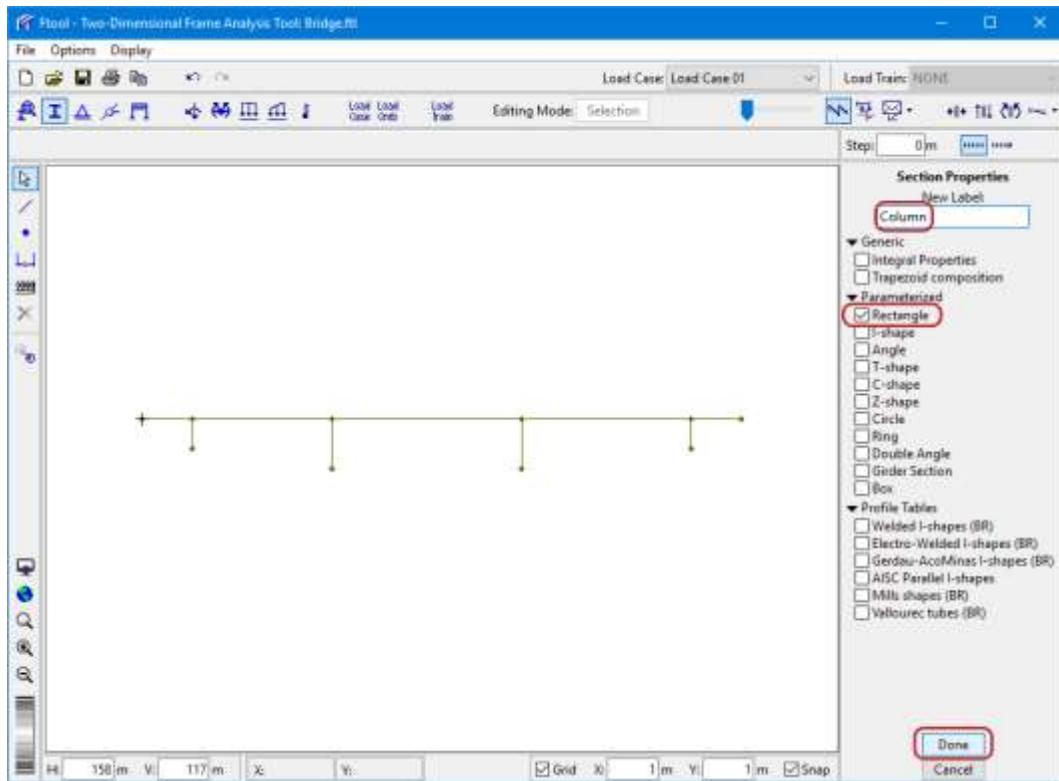
Specify rectangular cross-section parameters and apply to bridge columns
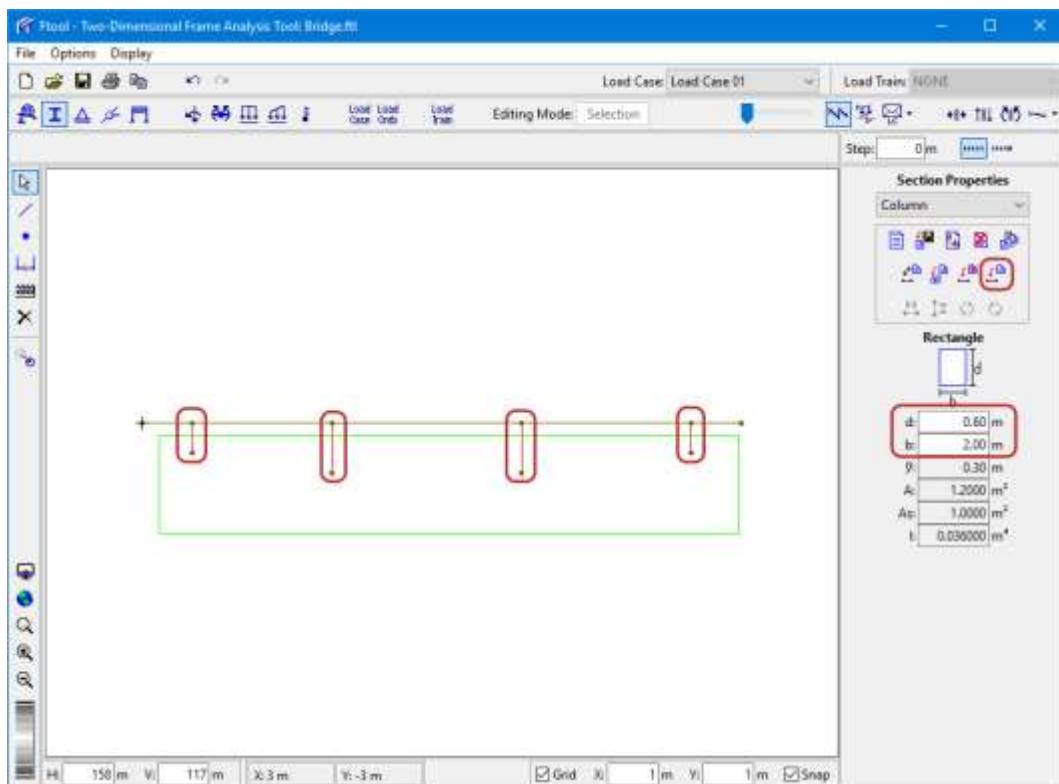
Creation of cross-section for bridge beam members
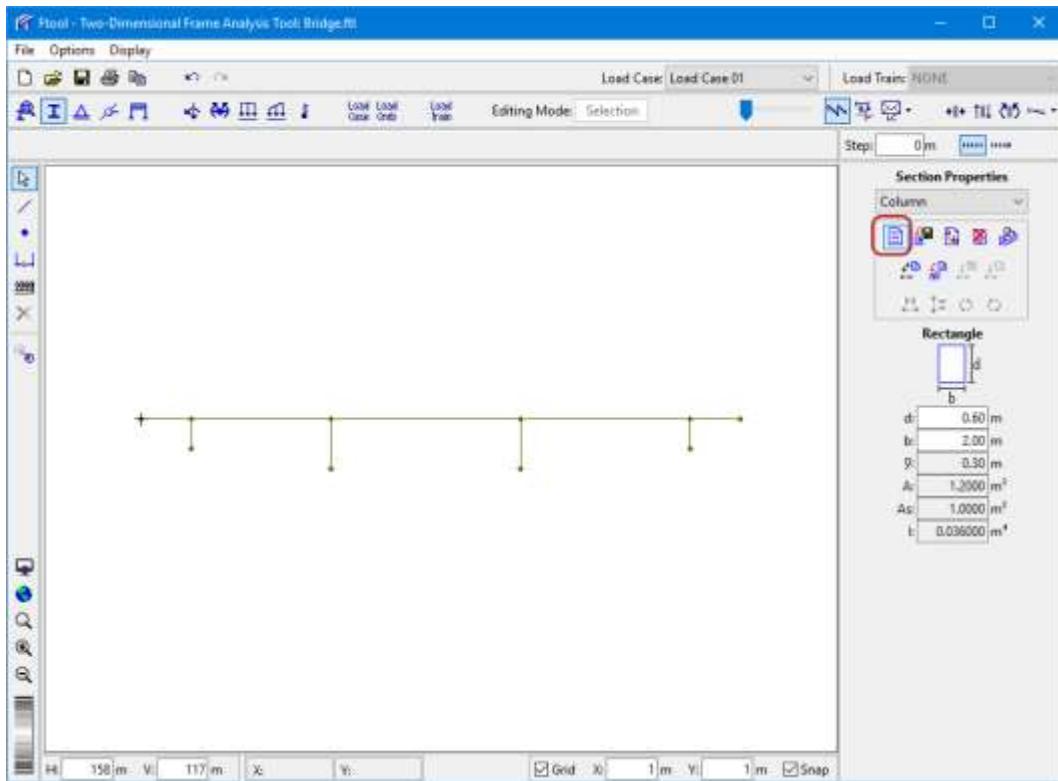
Select type and name of cross-section for bridge beam members
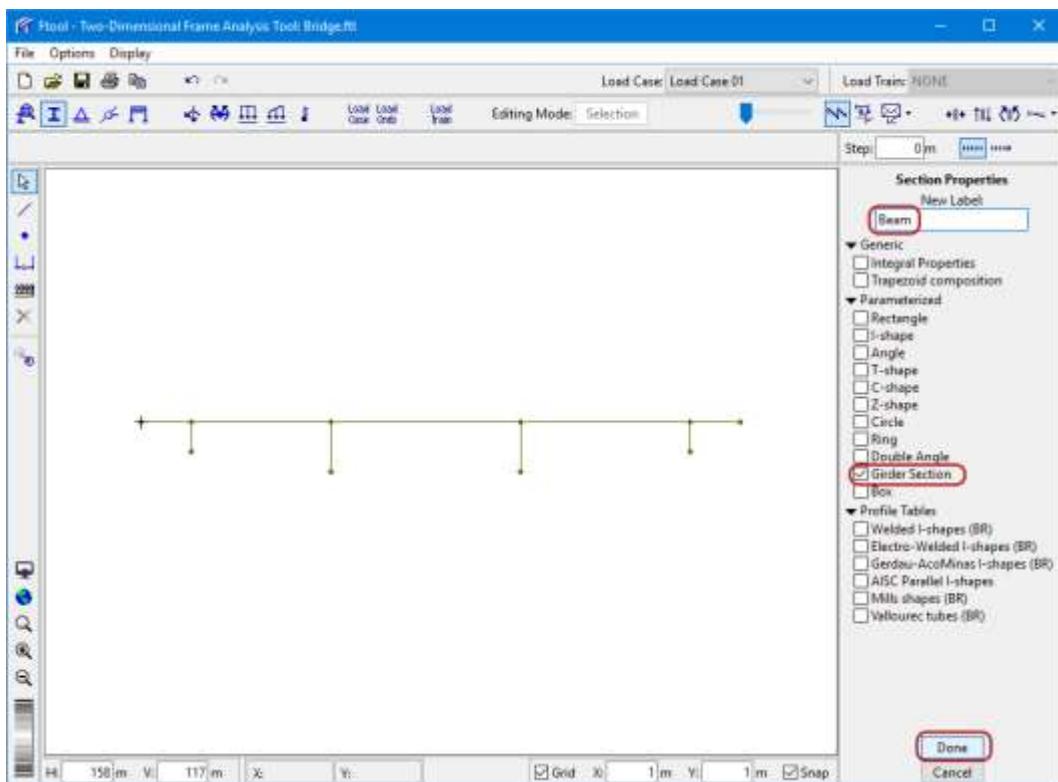
Specify cross-section parameters and apply to bridge beam members
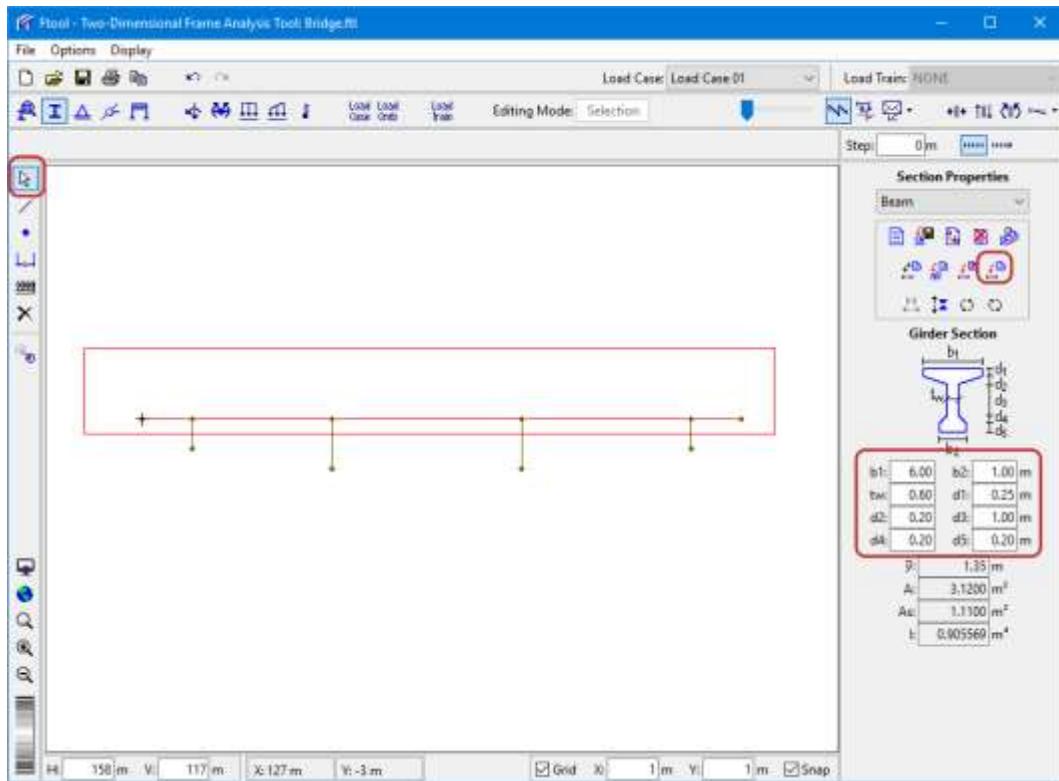
Definition of fixed support and assignment to inferior nodes
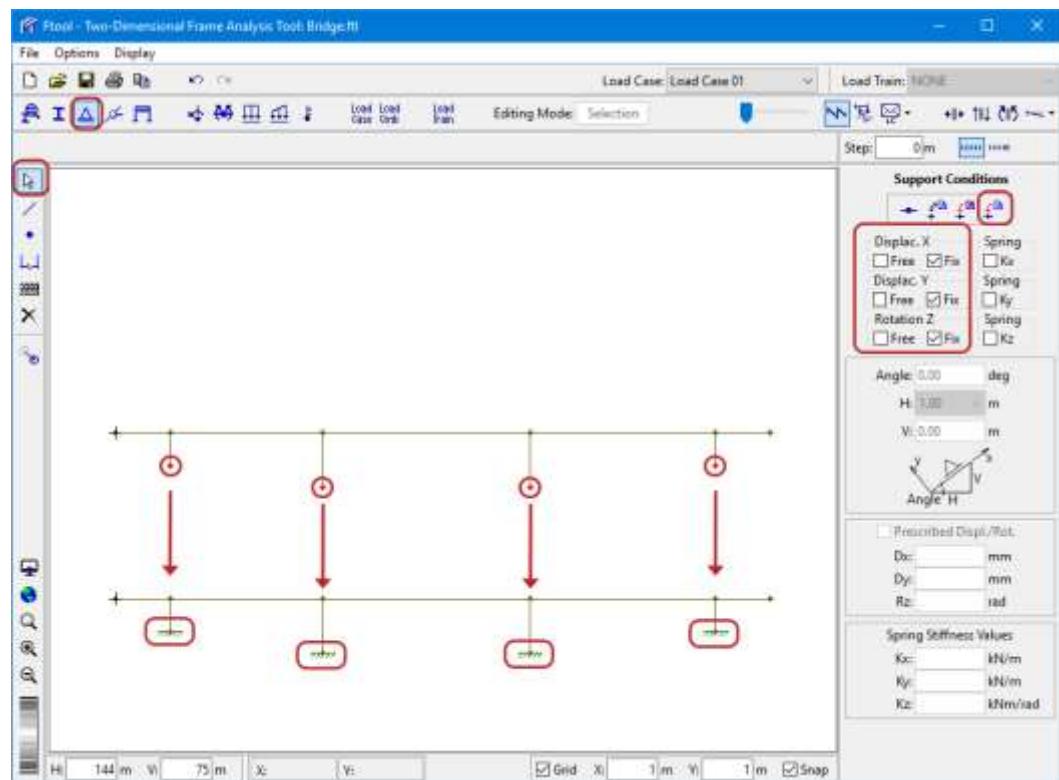
Definition of simple support and assignment to beam end nodes
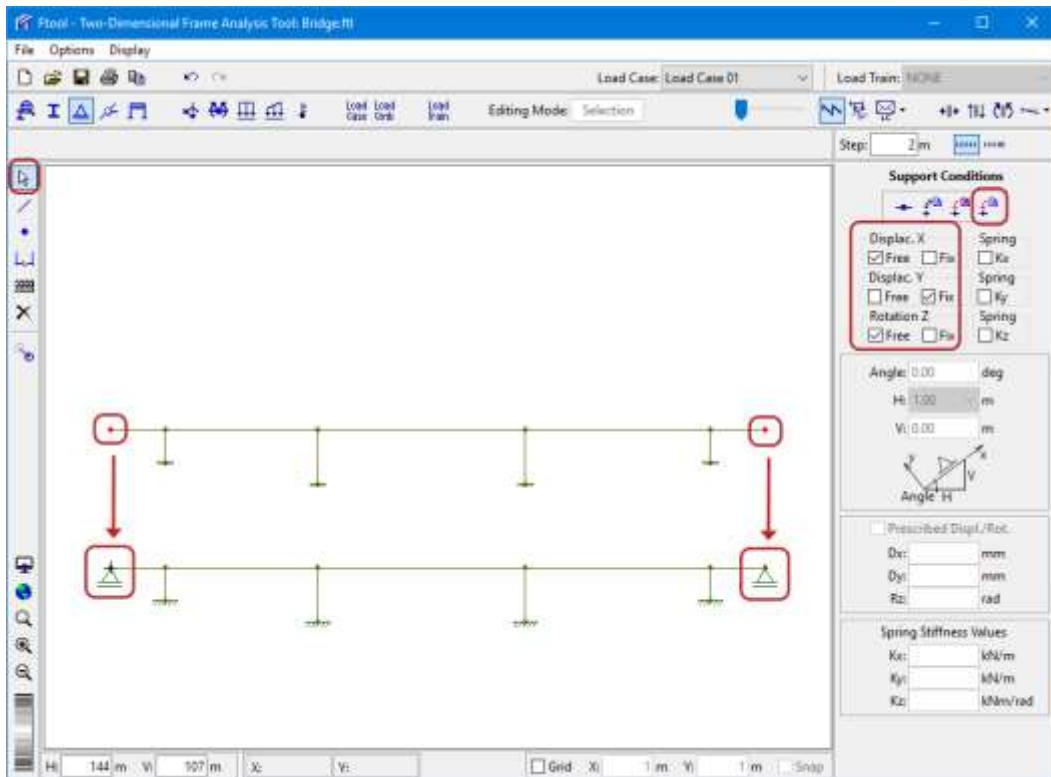
Creation of uniformly distributed load (dead load) for bridge beam
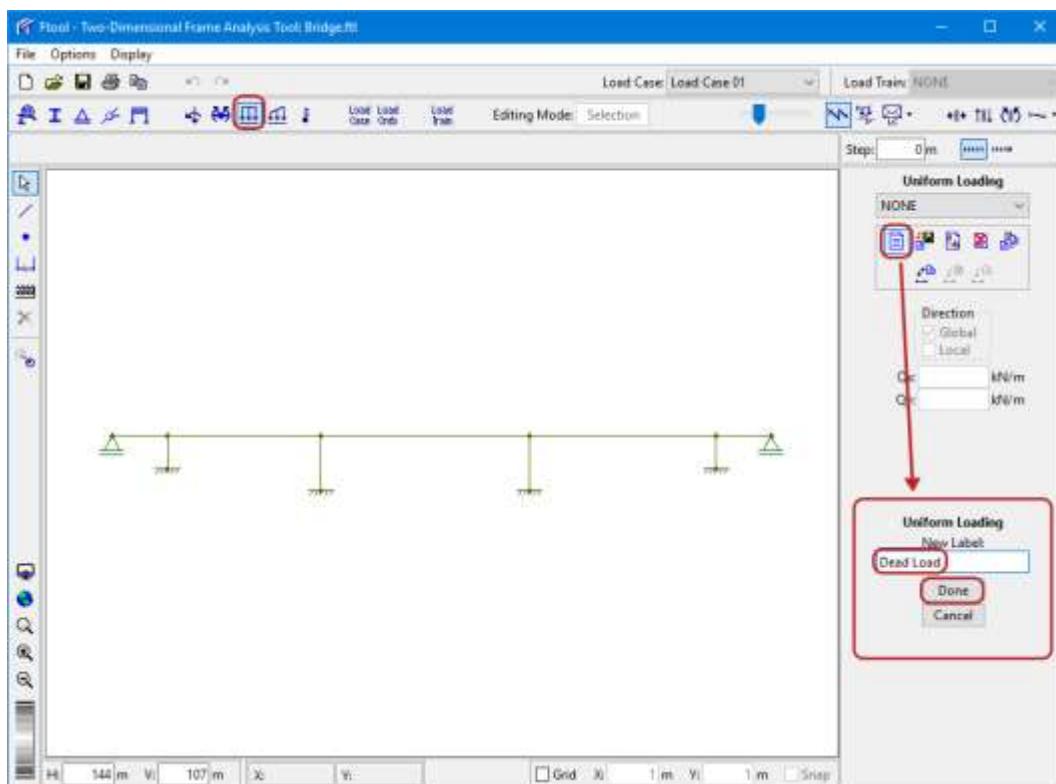
Definition of dead load value and assignment to beam members
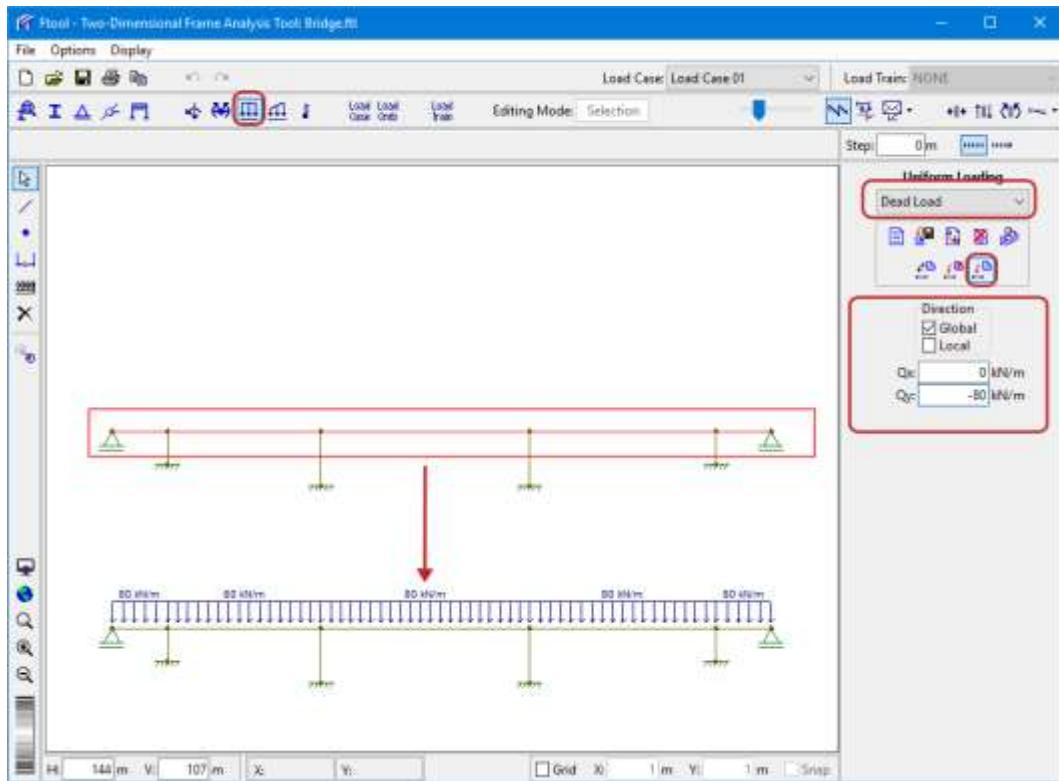
Select small display size for supports
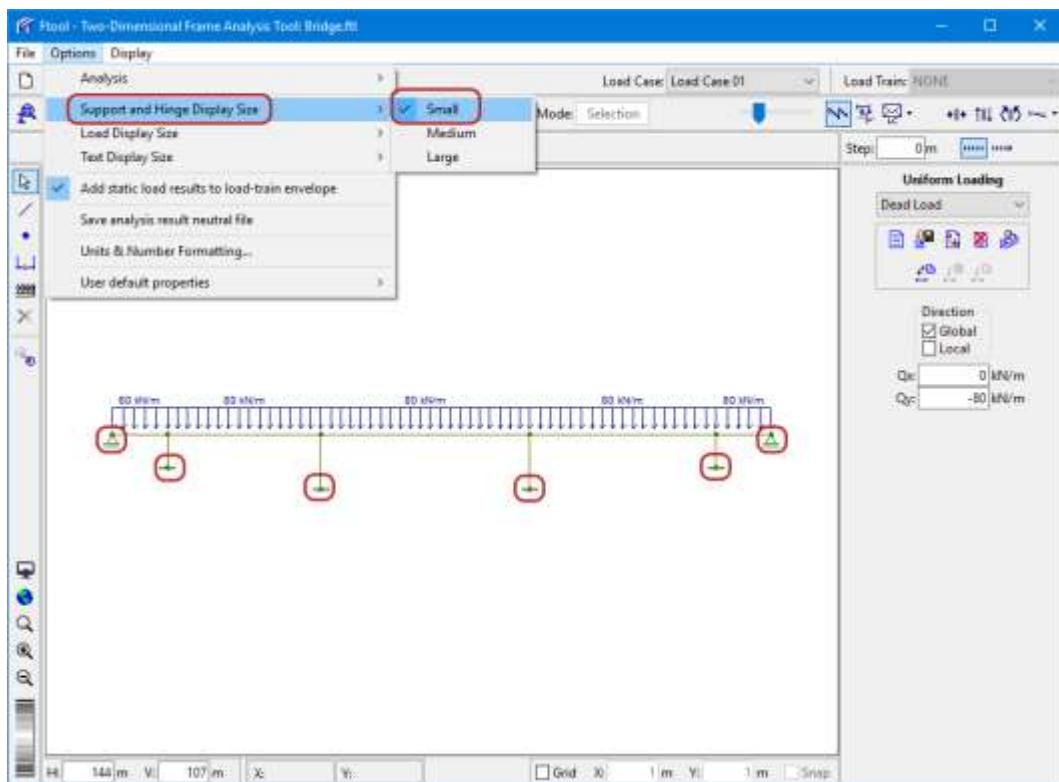
Select small display size for loads
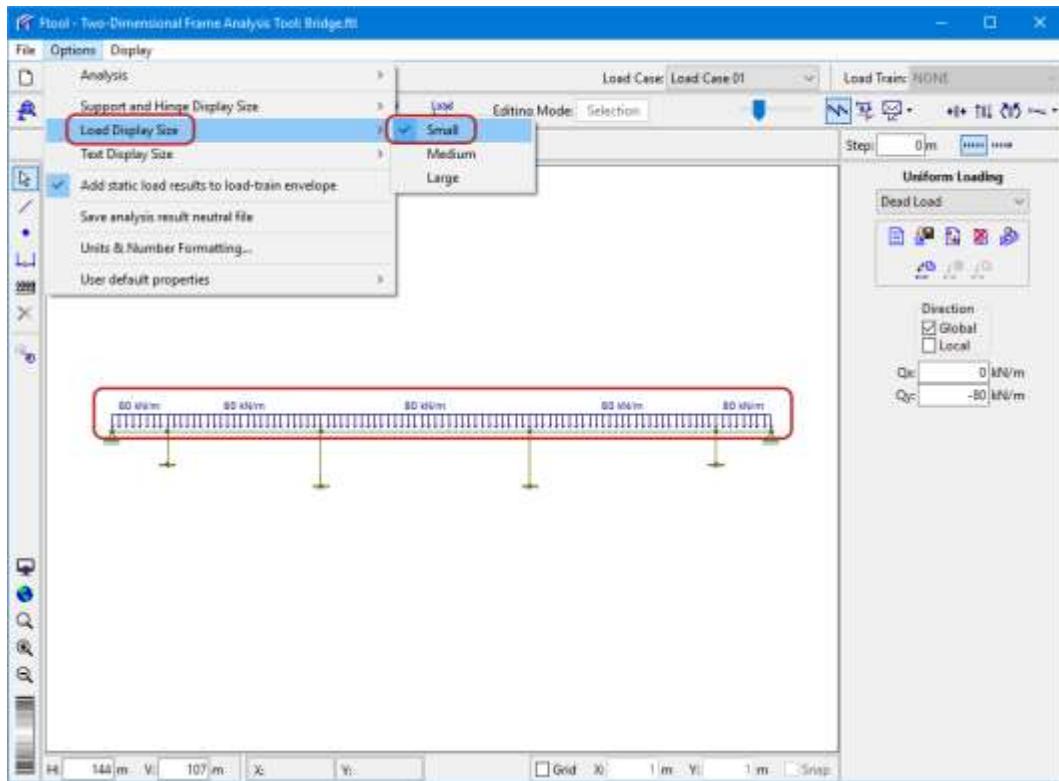
Specification of two vehicle live loads (load-trains)

Highway design load-train (vehicle live load): extension = 8 m

Live load (population of small vehicles):   **Impact coefficient:** 1.0
  Exterior: q_{ext} = 12 kN/m
  Interior: q_{int} = 4 kN/m
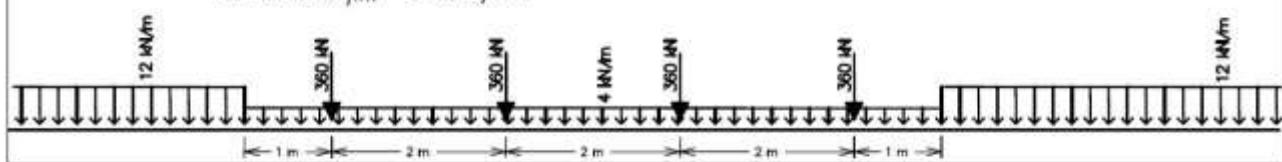
Rail road design load-train: extension = bridge length

  Train car loads: **Impact coefficient:** 1.0
  Full car: q = 12 kN/m
  Empty car: q' = 2 kN/m
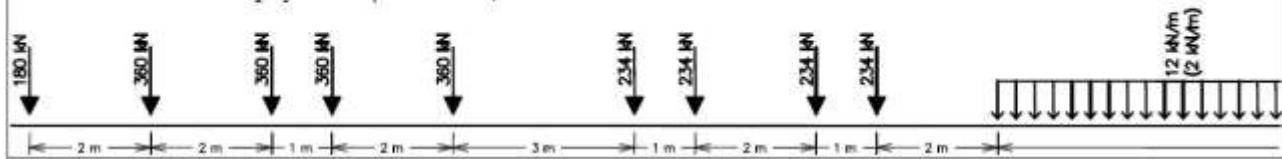
Creation of highway load-train with four axes
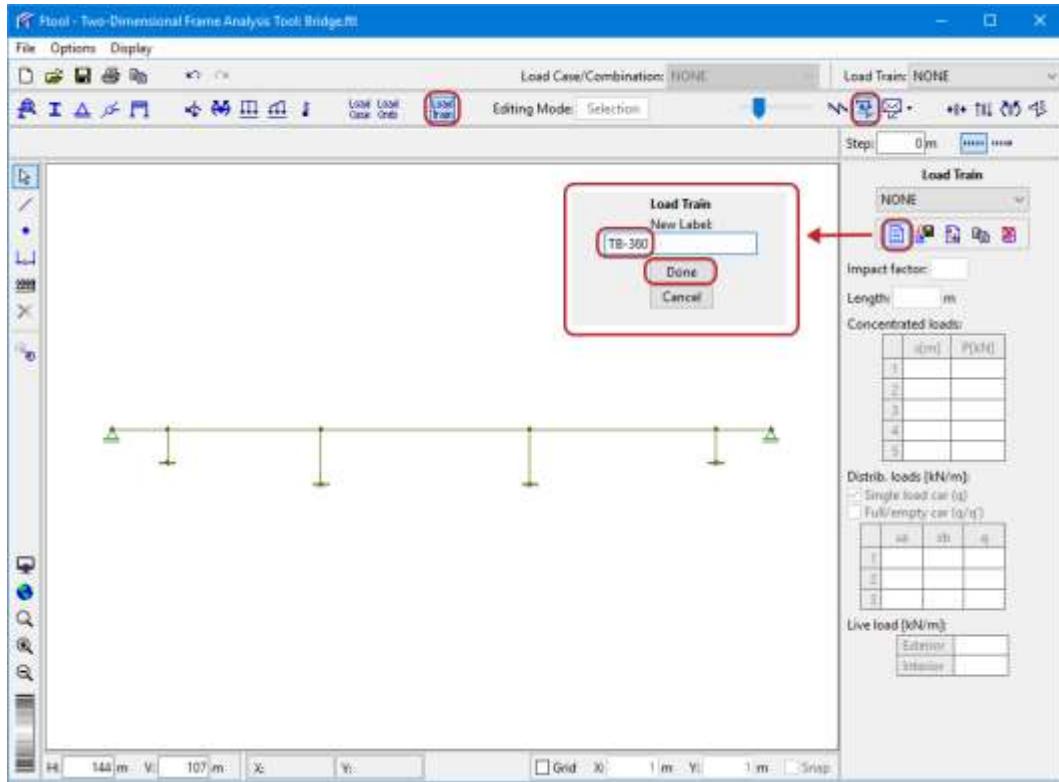
Specification of highway load-train length, values of concentrated forces, and values of interior and exterior live loads (population of small vehicles)
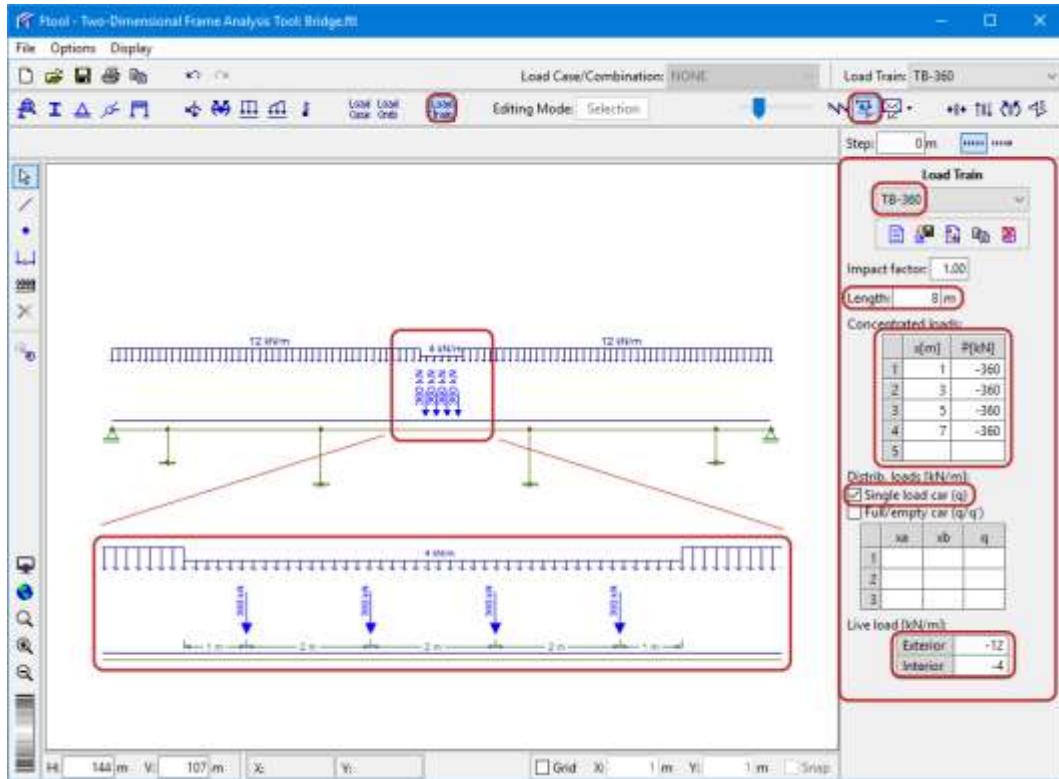
Creation of railroad load-train
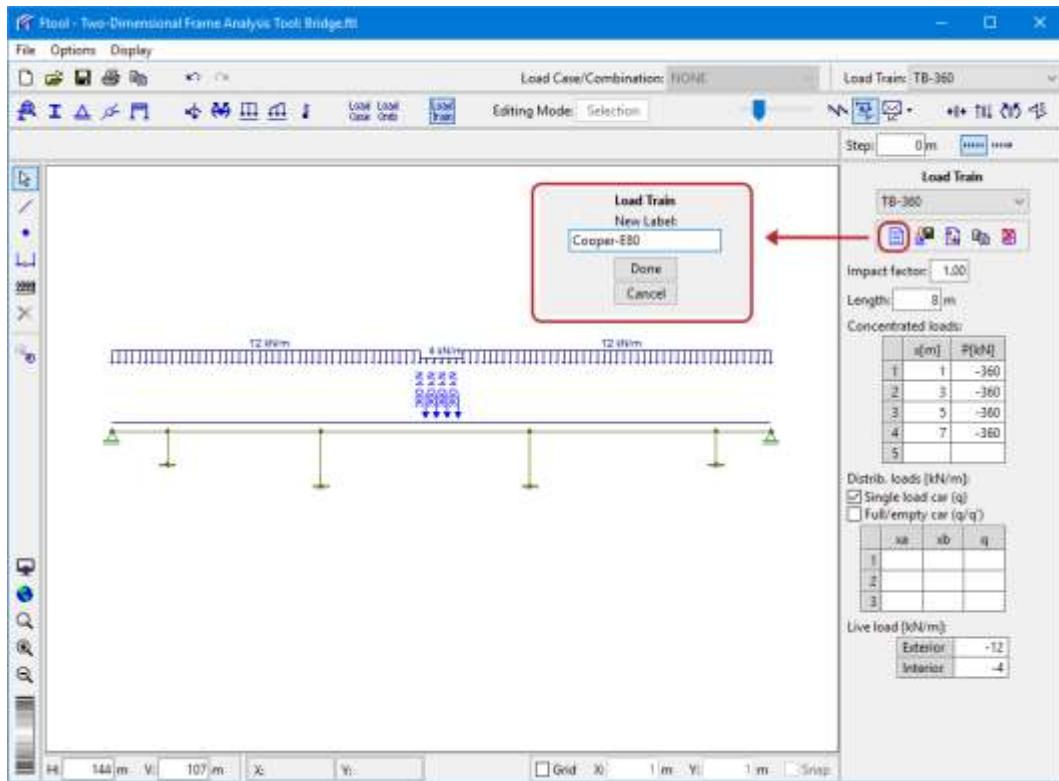
Specification of railroad load-train length, values of concentrated forces, and values of full and empty car distributed loads
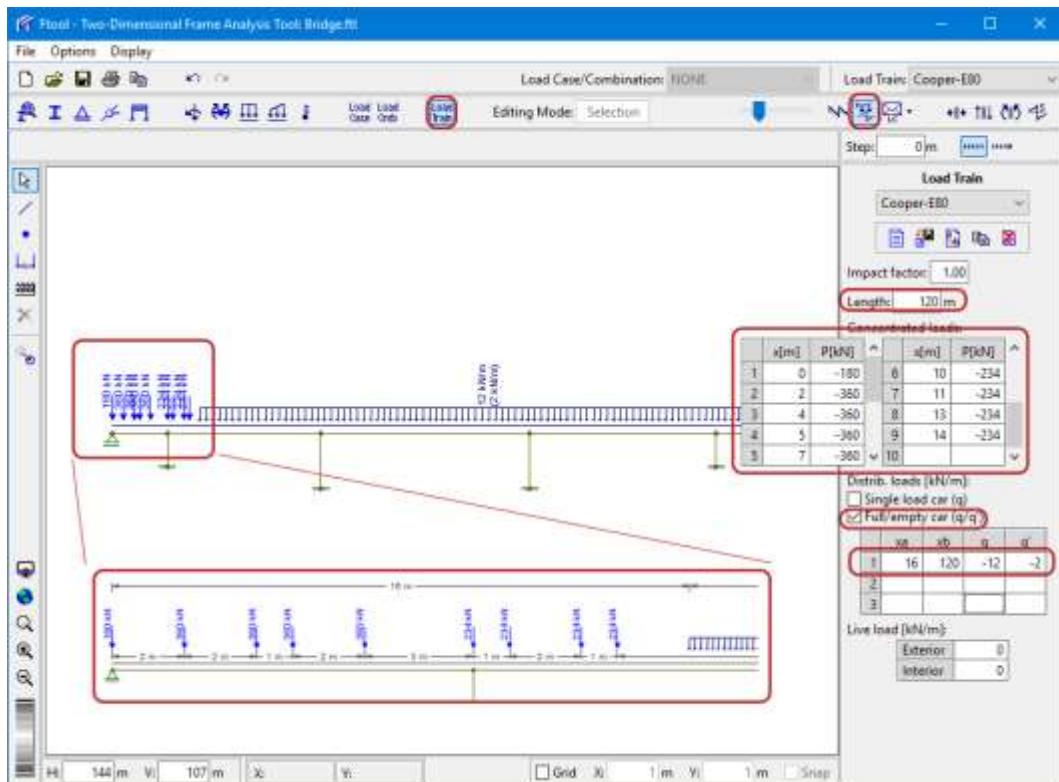
Select result visualization step (2 m) and set transversal display of result values
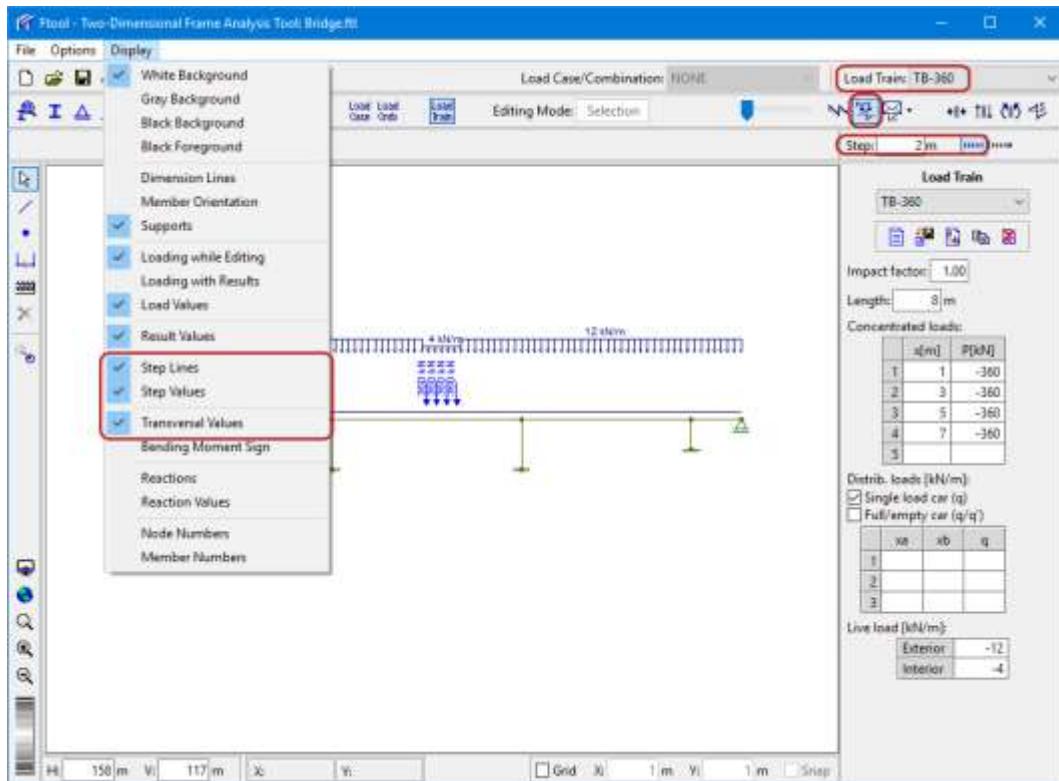
## Select cross-section for visualization of shear force influence line result
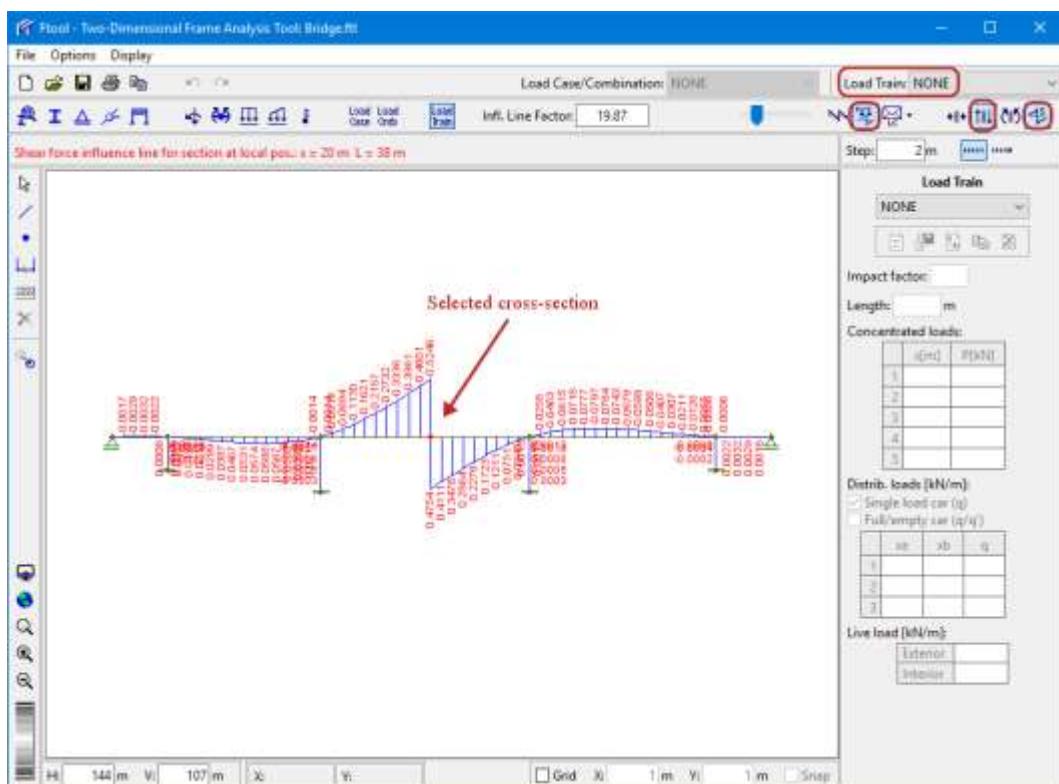
Visualization of shear force influence line result and critical positions (that cause minimum and maximum) of highway load-train
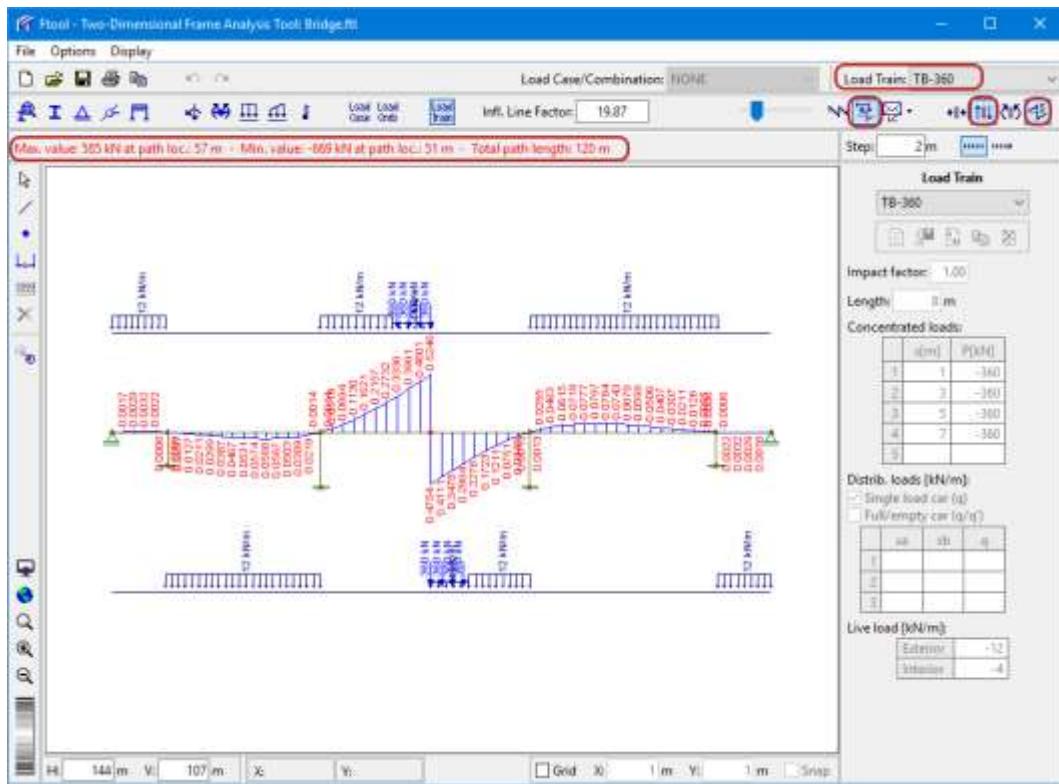

Visualization of bending moment influence line result and critical positions (that cause minimum and maximum) of highway load-train
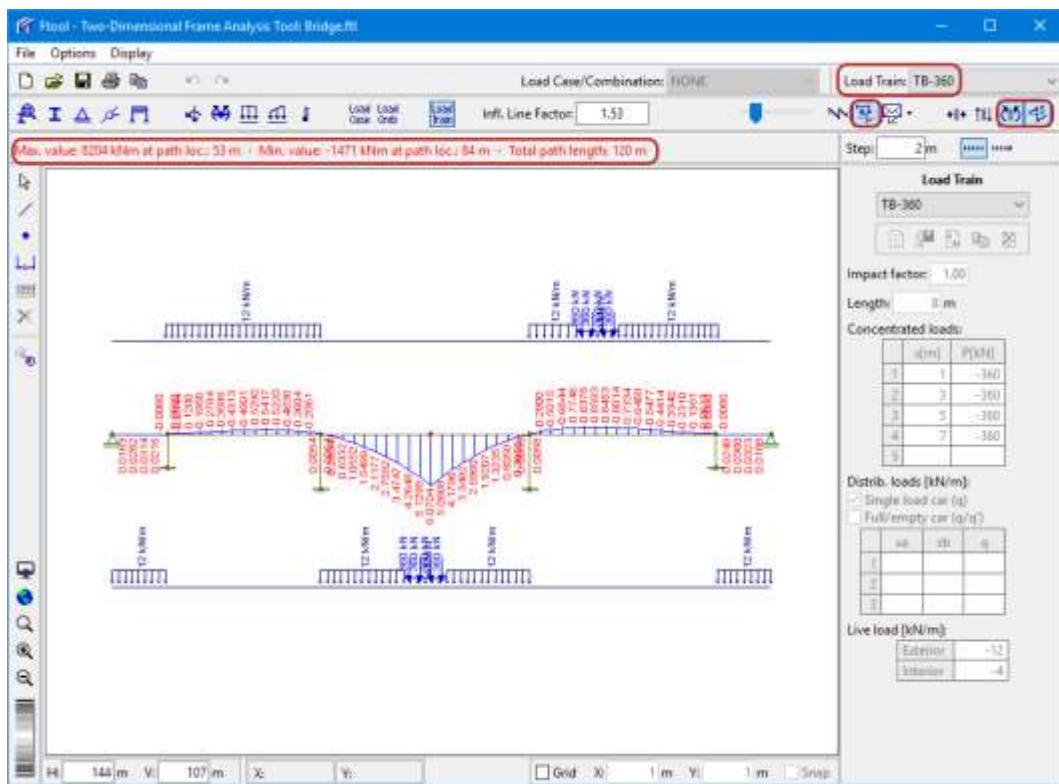
Visualization of axial force influence line result and critical positions (that cause minimum and maximum) of railroad load-train
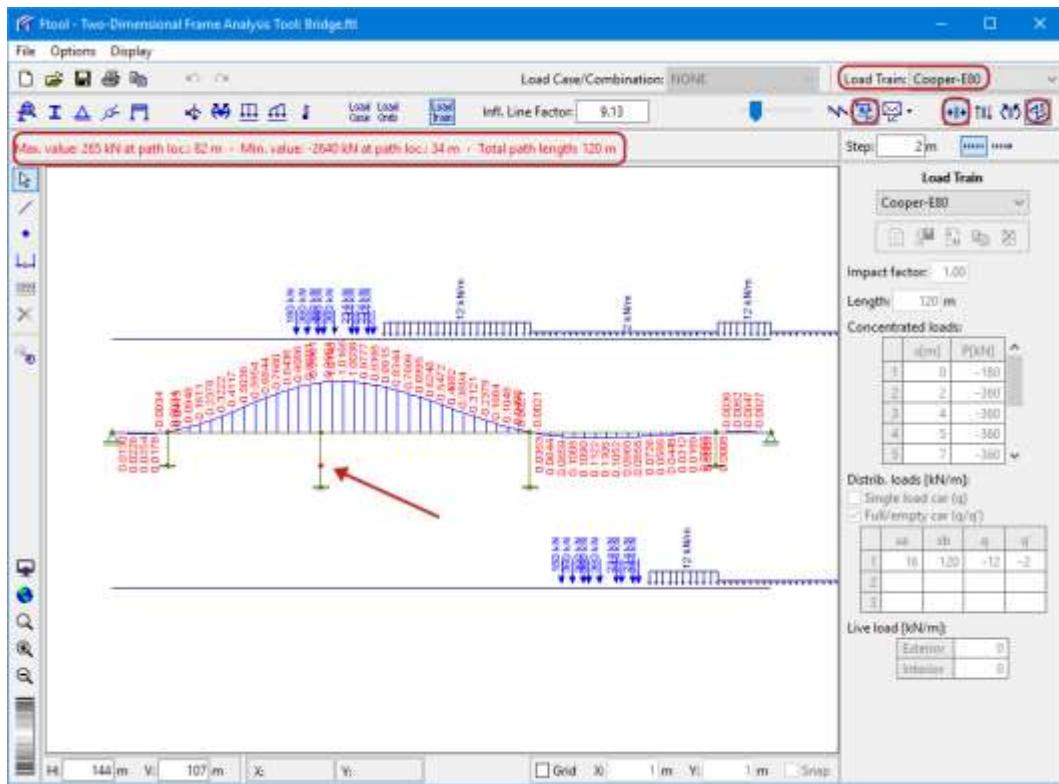

Visualization of shear force envelopes for highway load-train (including effect of permanent load)
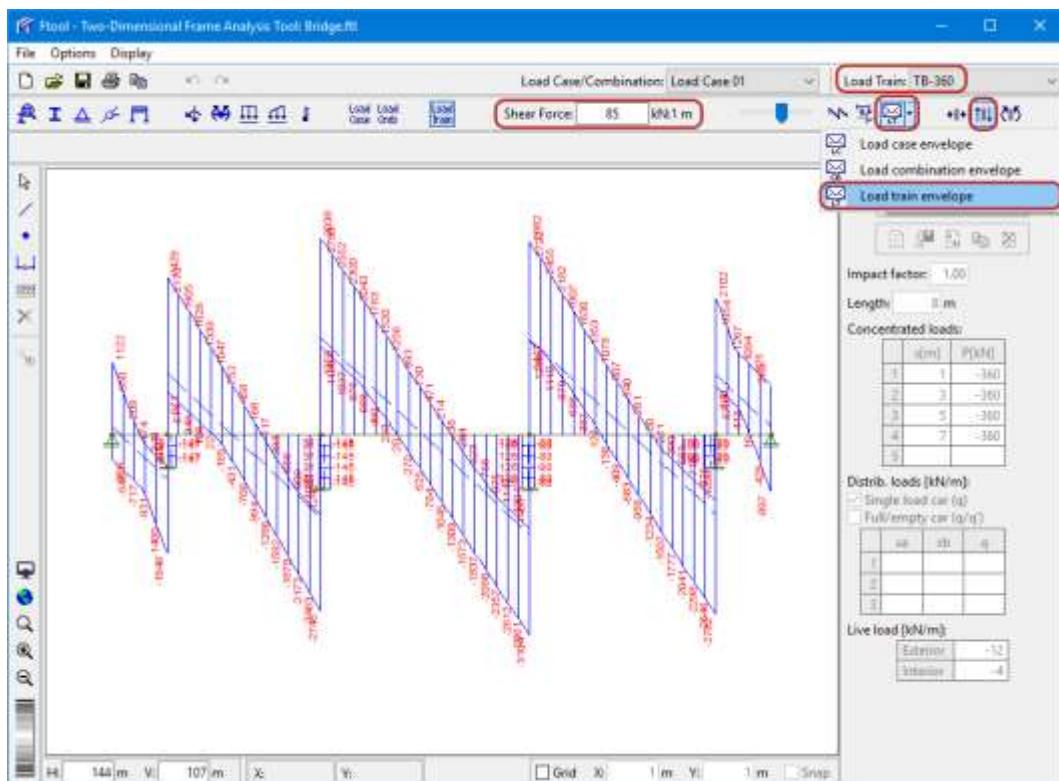
Visualization of bending moment envelopes for railroad load-train (including effect of permanent load)
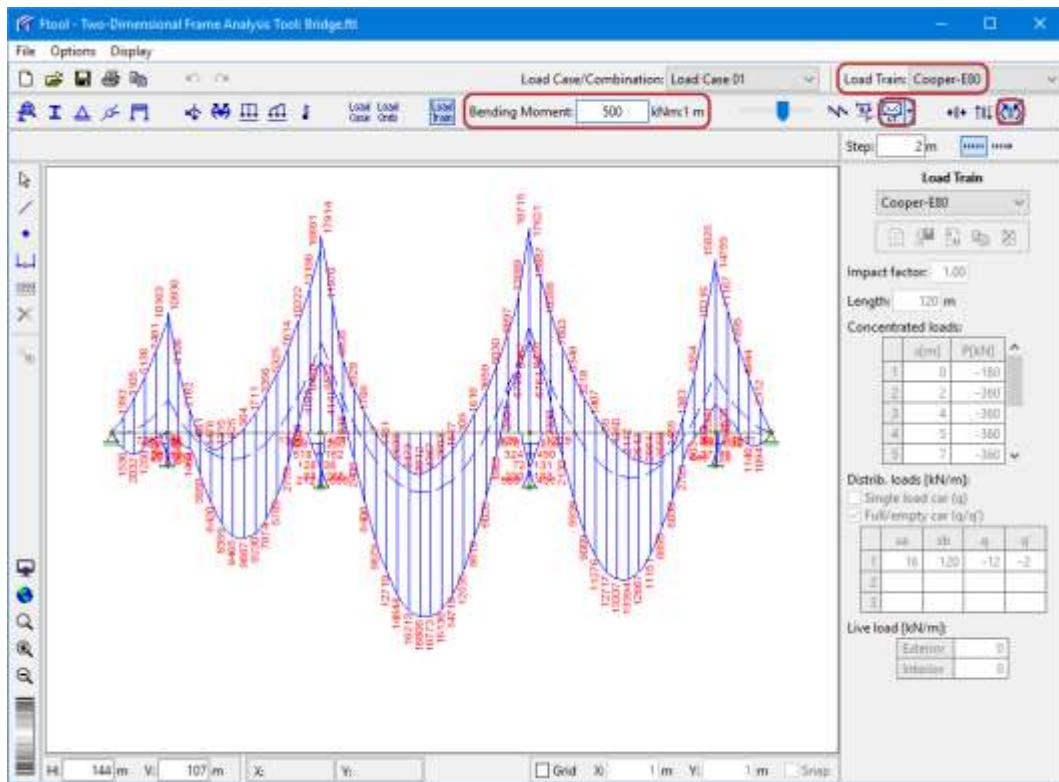
Visualization of bending moment envelopes for railroad load-train (excluding effect of permanent load)
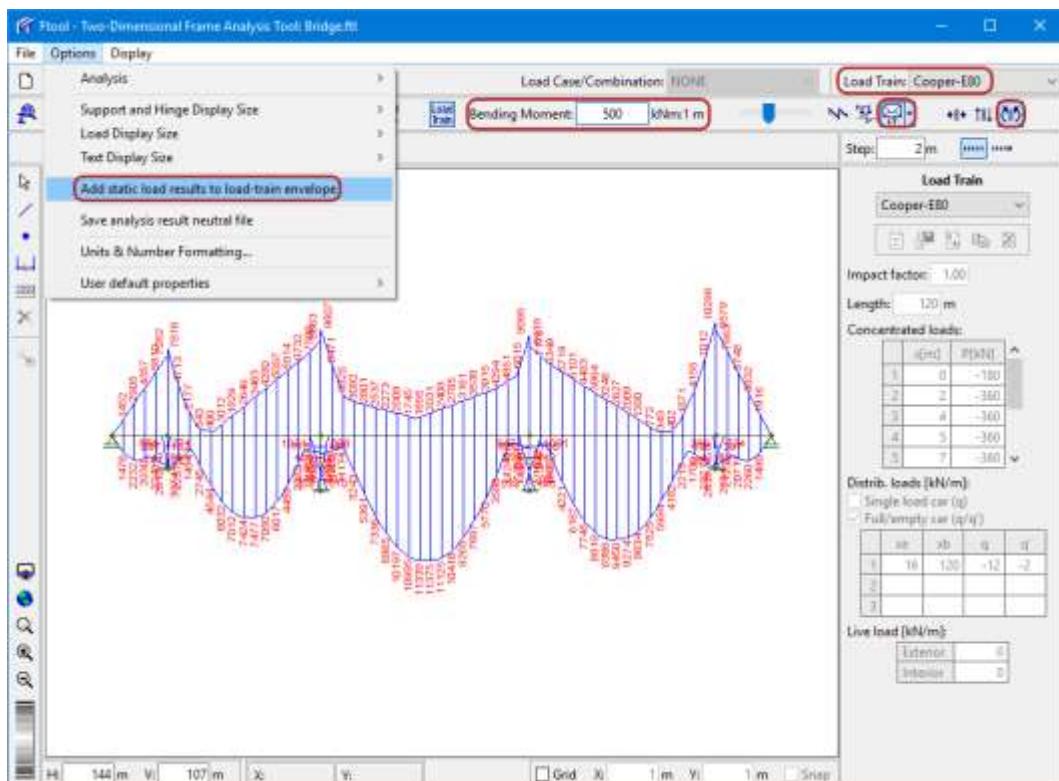
Consulting step results values along central beam member of bending moment envelopes for railroad load-train (excluding effect of permanent load)

Click with the right mouse button