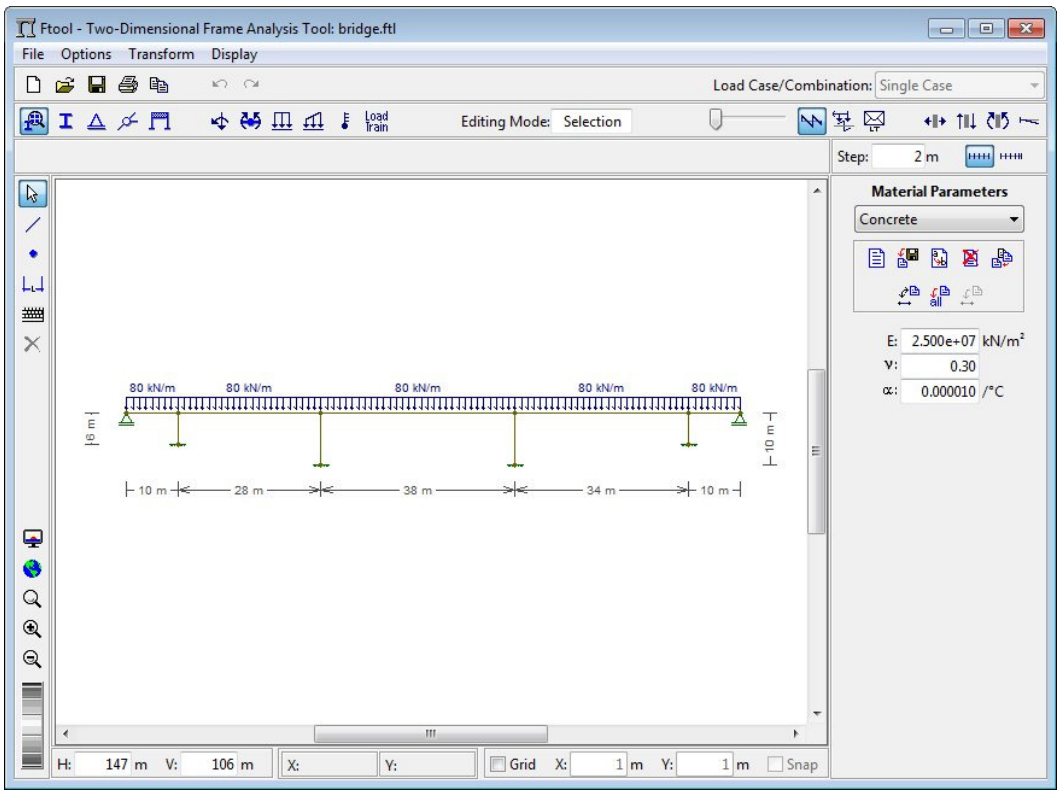
FTOOL

Tutorial for the creation of a bridge model with two load-trains, and visualization of critical load-train positions along influence lines and of internal force envelops

Educational Version 3.00
August 2012
http://www.tecgraf.puc-rio.br/ftool

This file:
http://www.tecgraf.puc-rio.br/ftp_pub/lfm/ftool300tutorialloadtrain.pdf

FTOOL model:
http://www.tecgraf.puc-rio.br/ftp_pub/lfm/ftool300bridge.ftl



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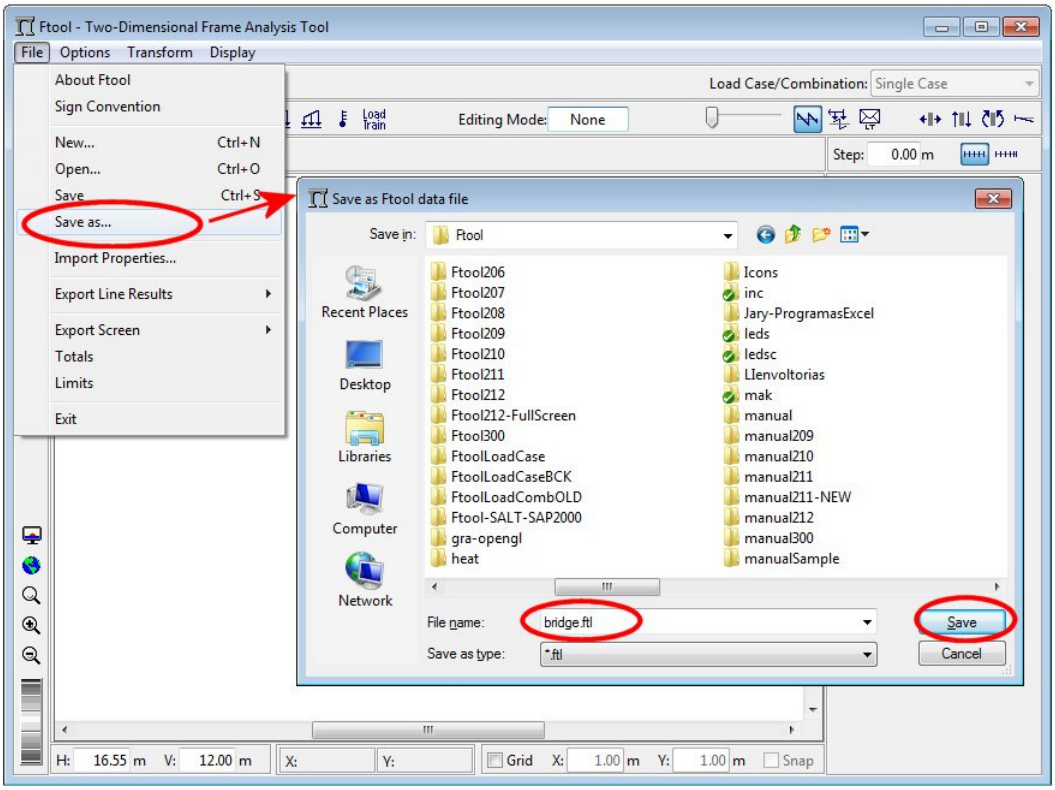
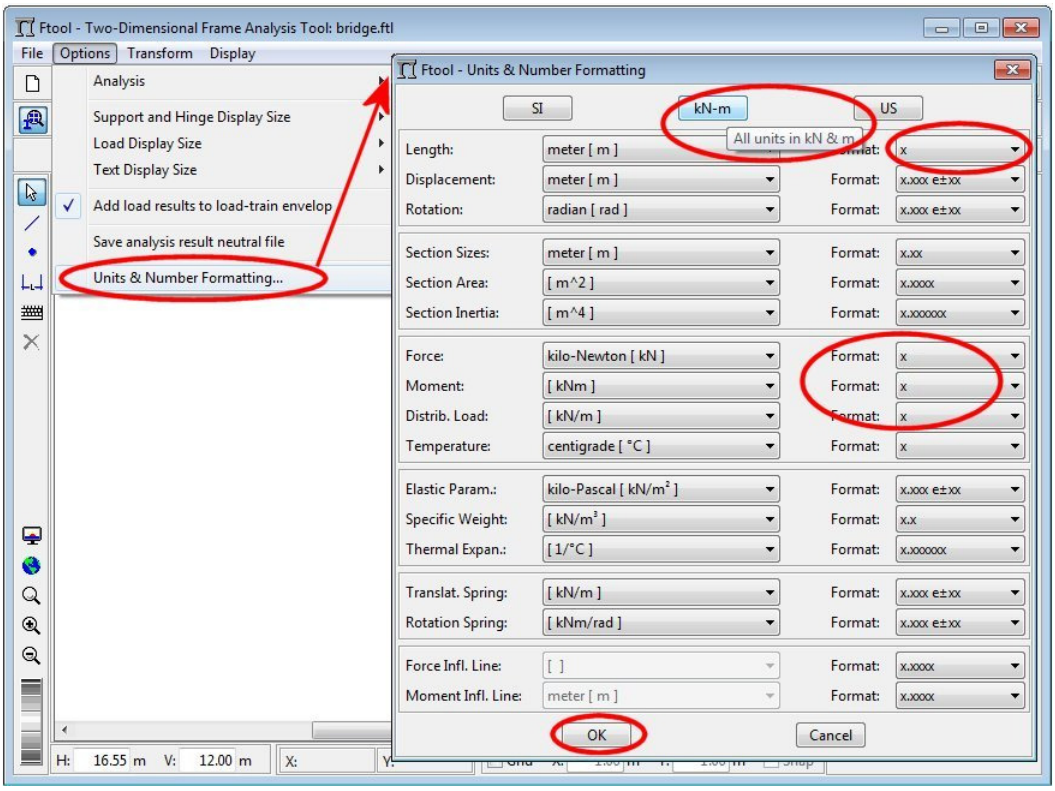
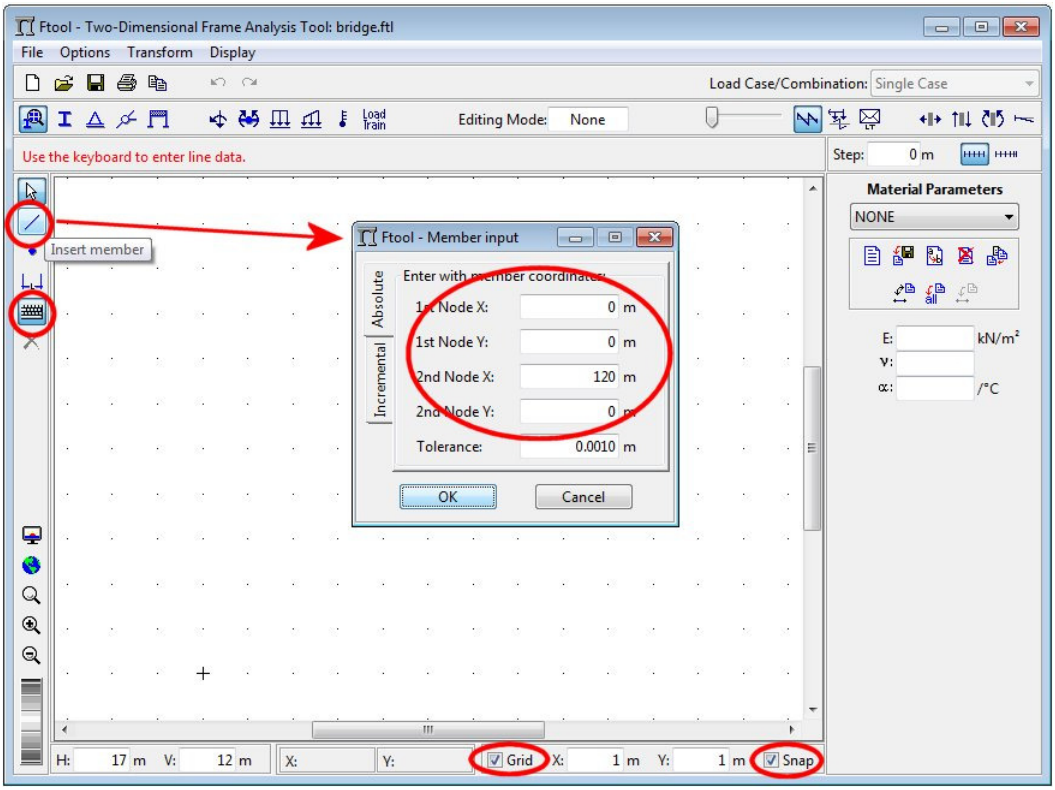
Create a file for the bridge model (command "Save as... ")



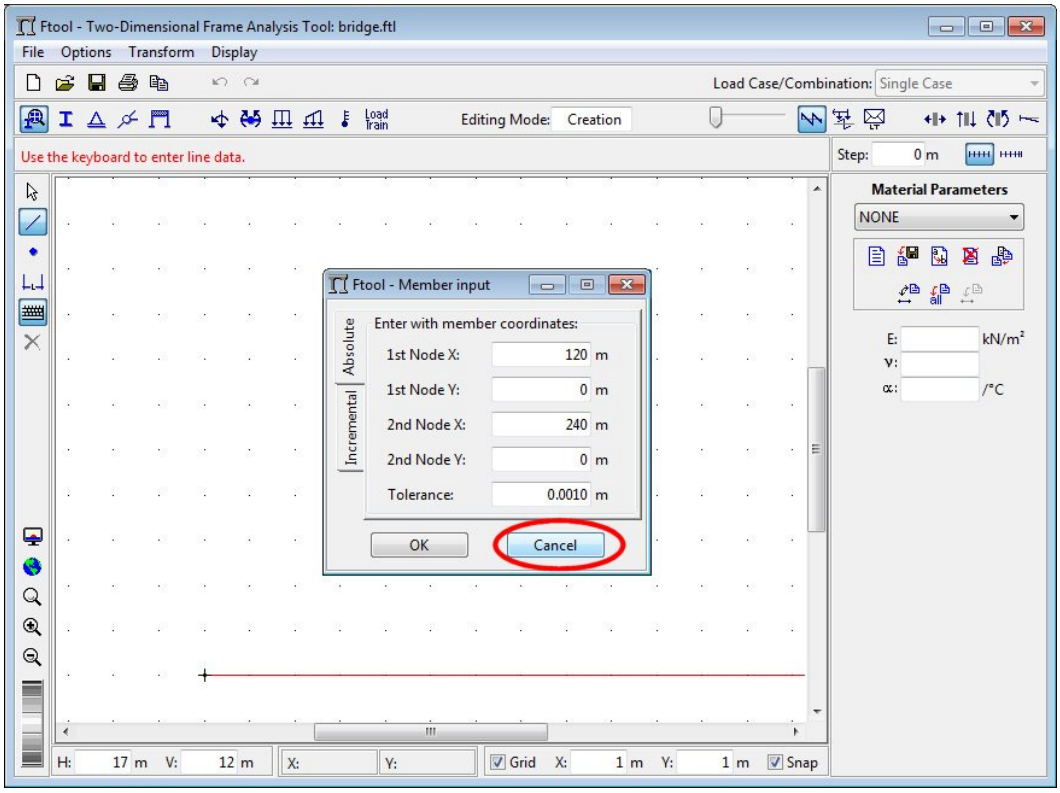
Specification of units and number formatting



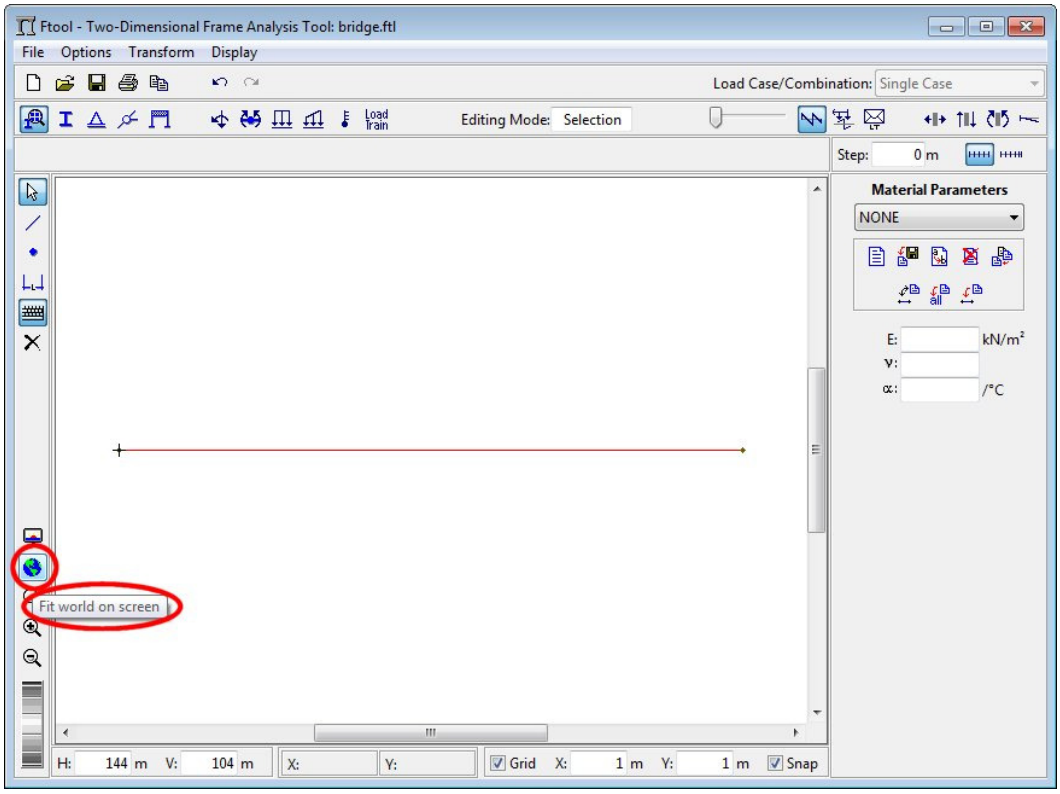
Insertion of bridge beam in keyboard mode



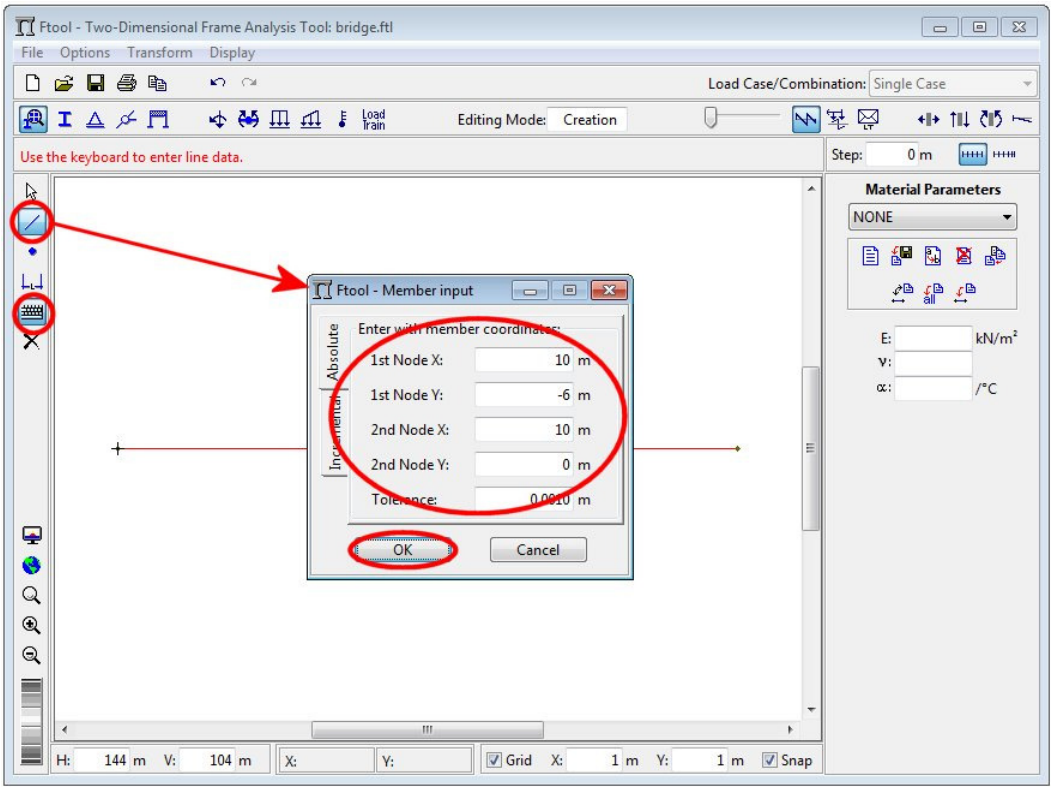
Cancel member insertion to fit model image on screen



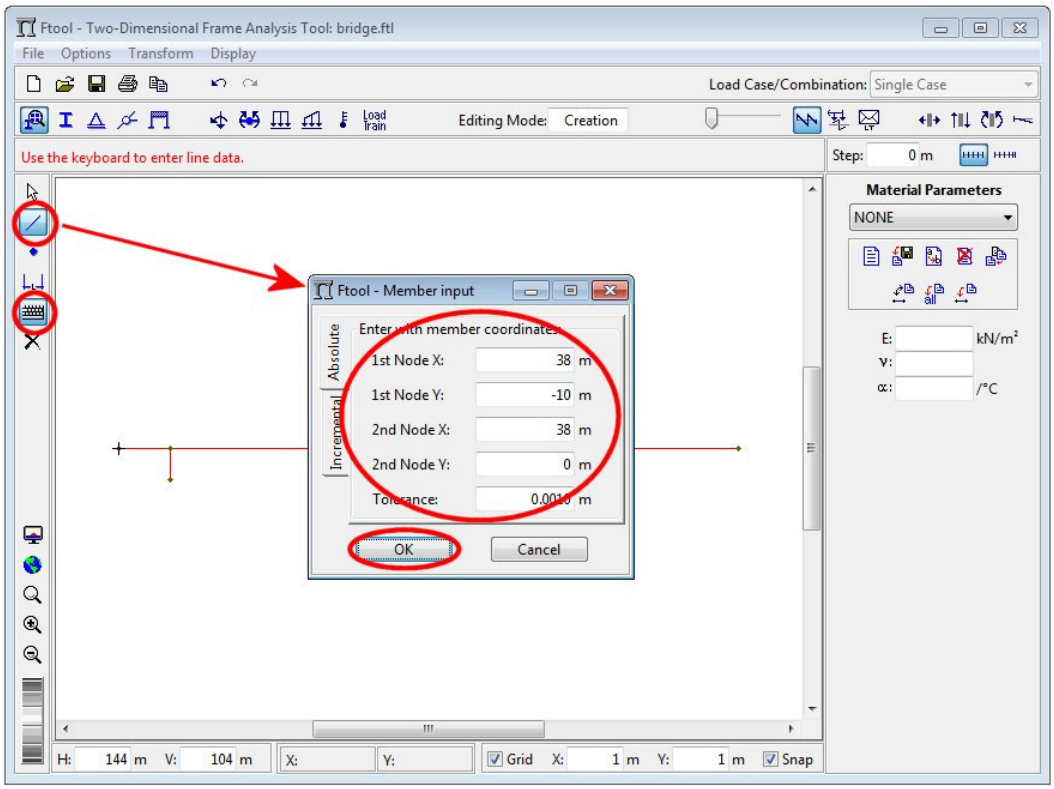
Fit image of model on screen



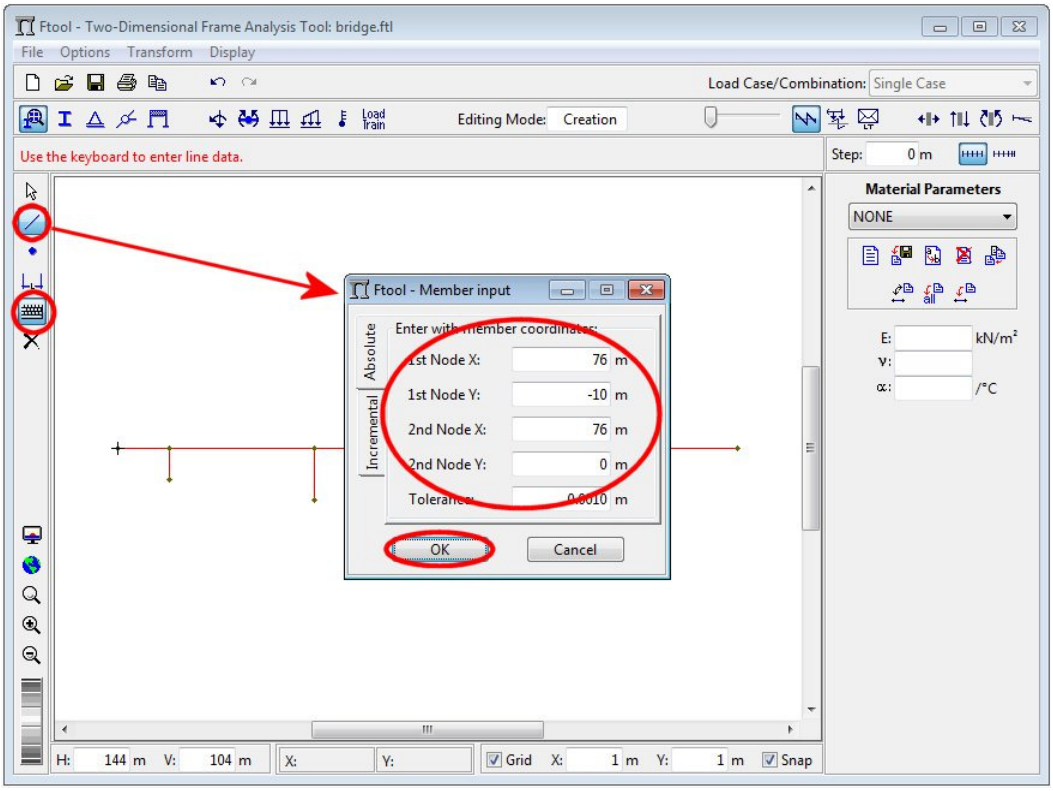
Insertion of first bridge column in keyboard mode



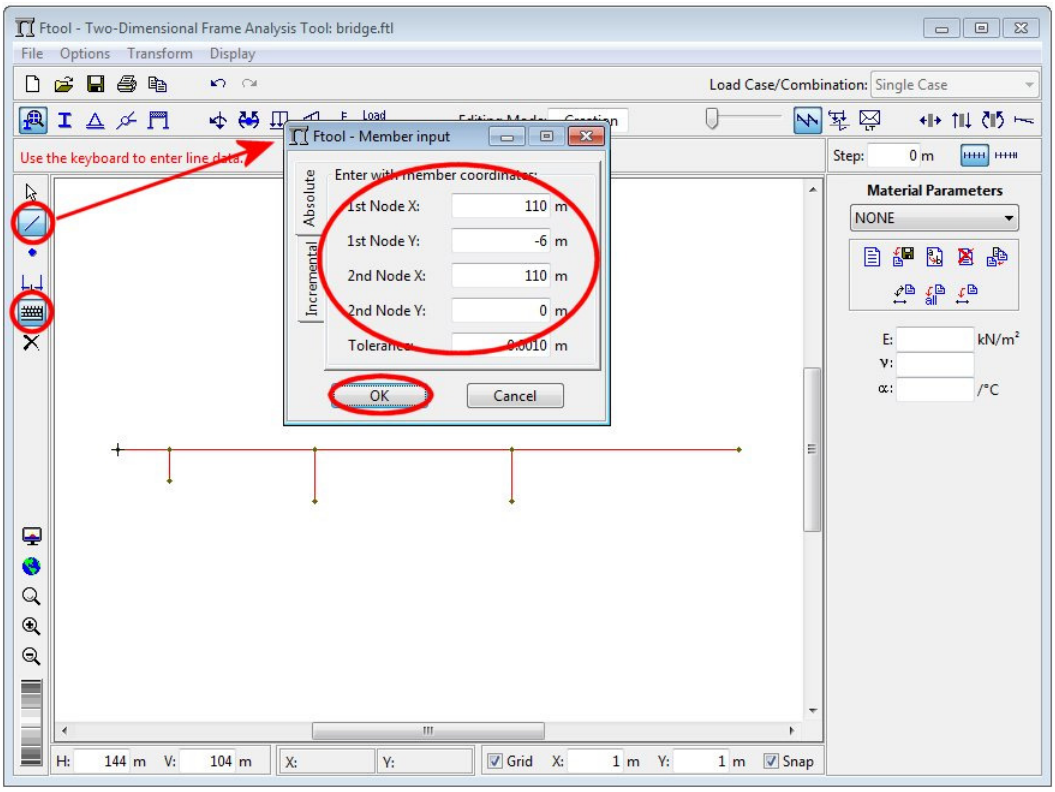
Insertion of second bridge column in keyboard mode



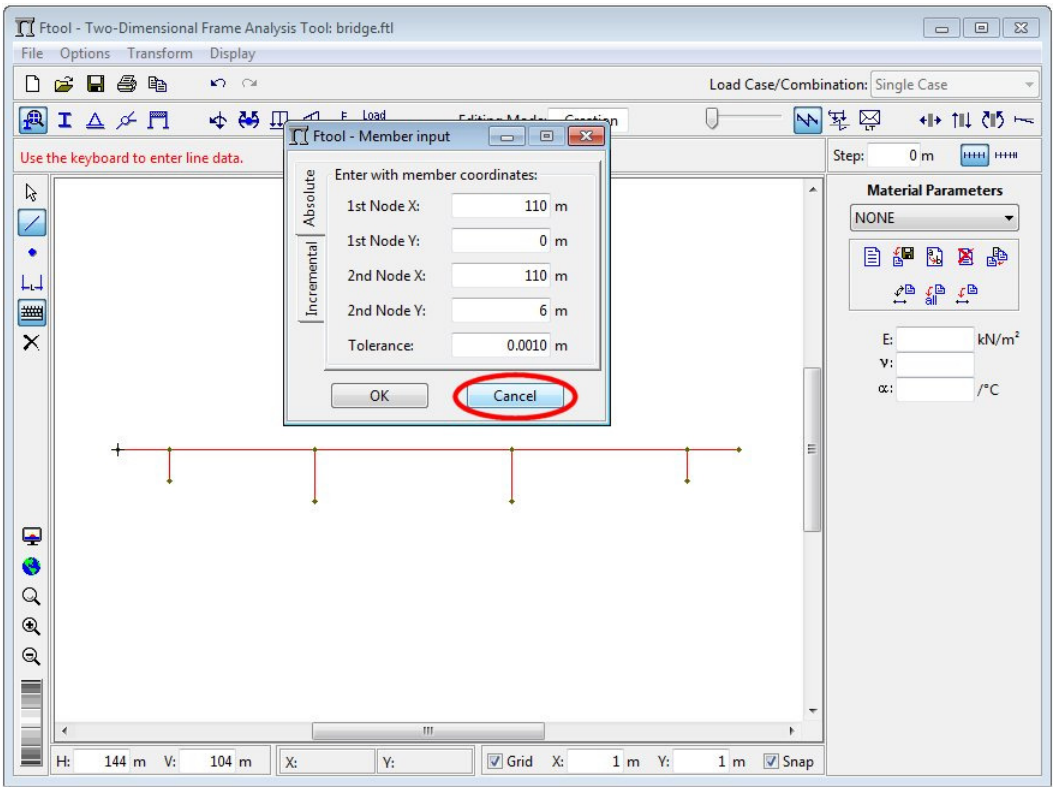
Insertion of third bridge column in keyboard mode



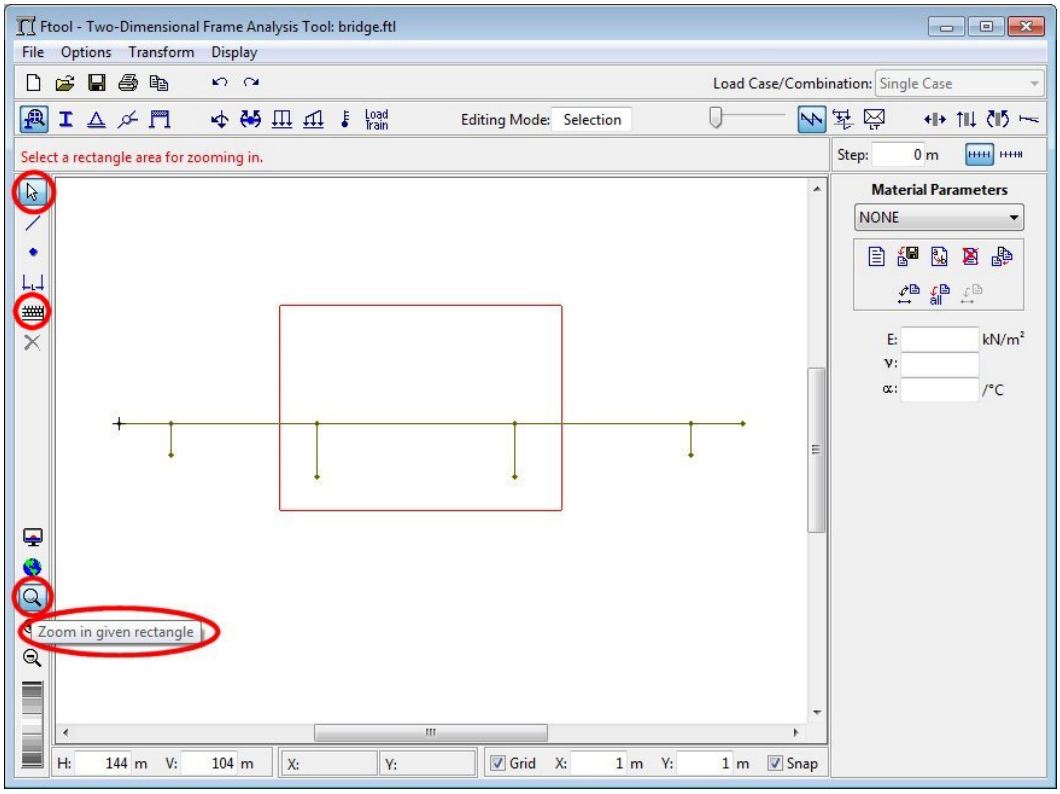
Insertion of fourth bridge column in keyboard mode



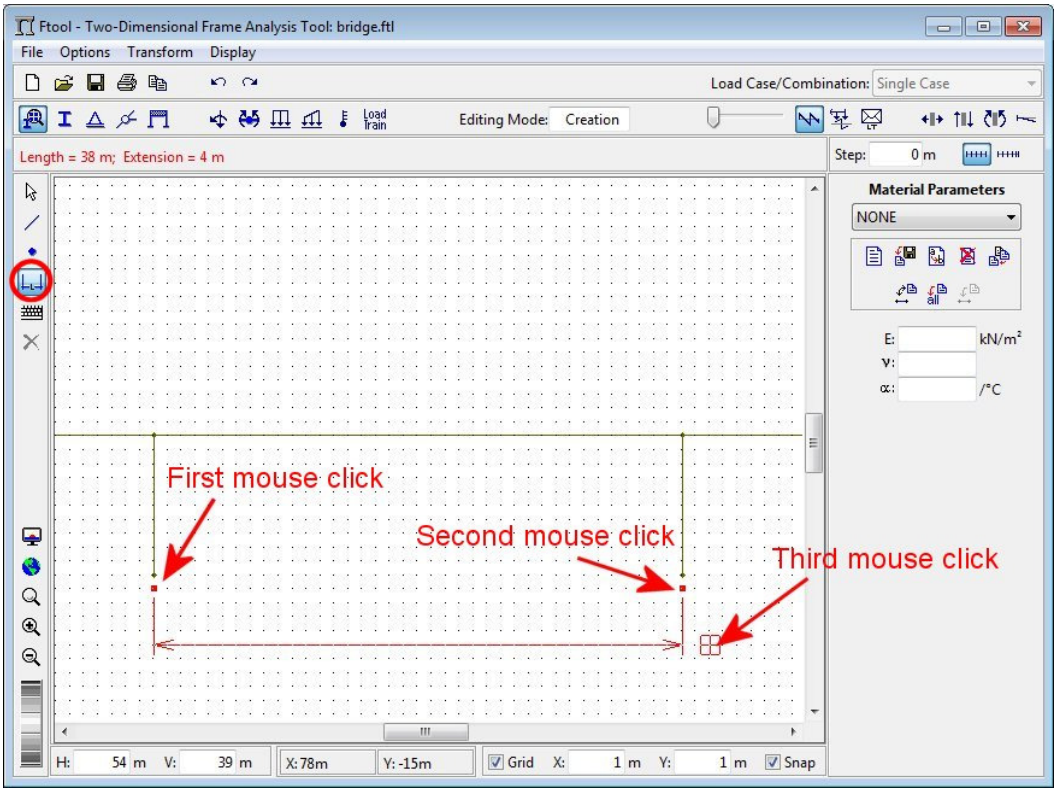
Cancel insertion of members



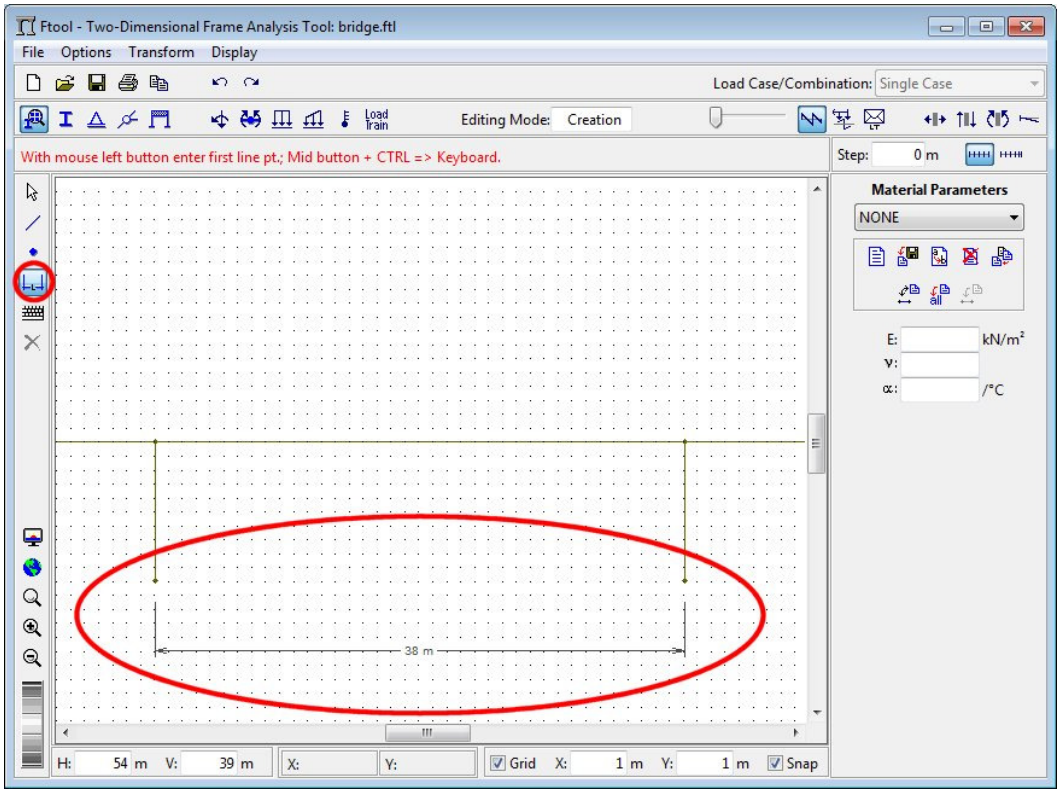
Leave keyboard mode and select area for zooming in



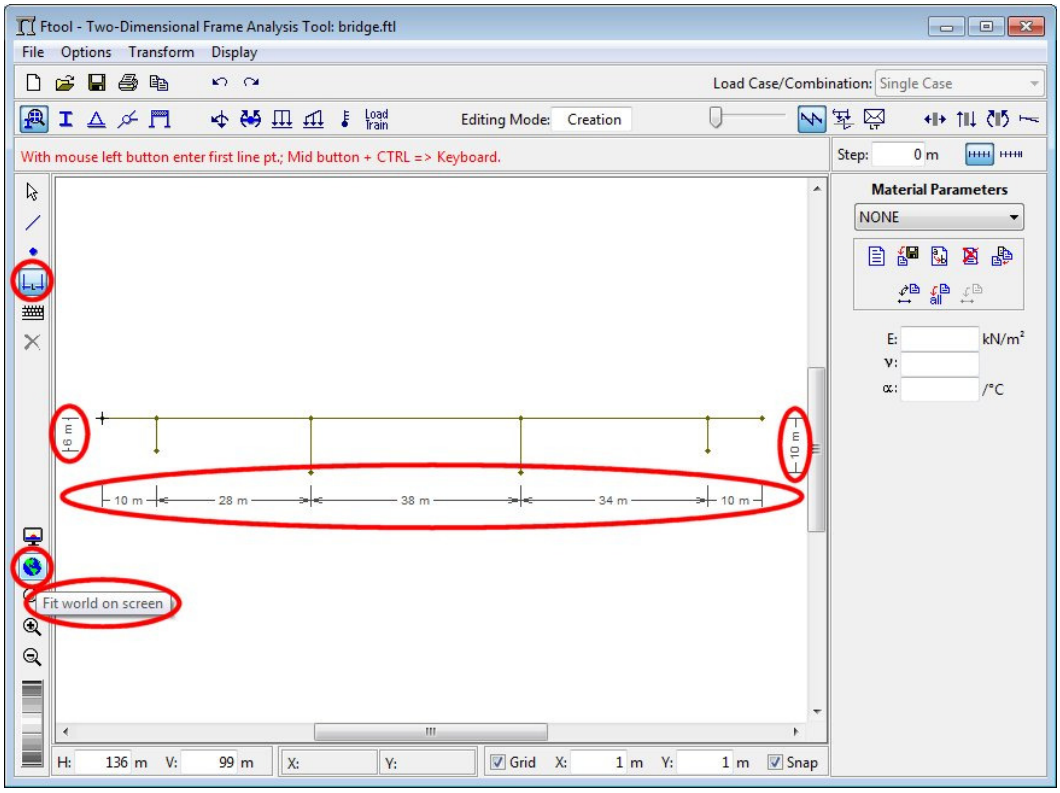
Mouse clicks for insertion of dimension line at bridge central span



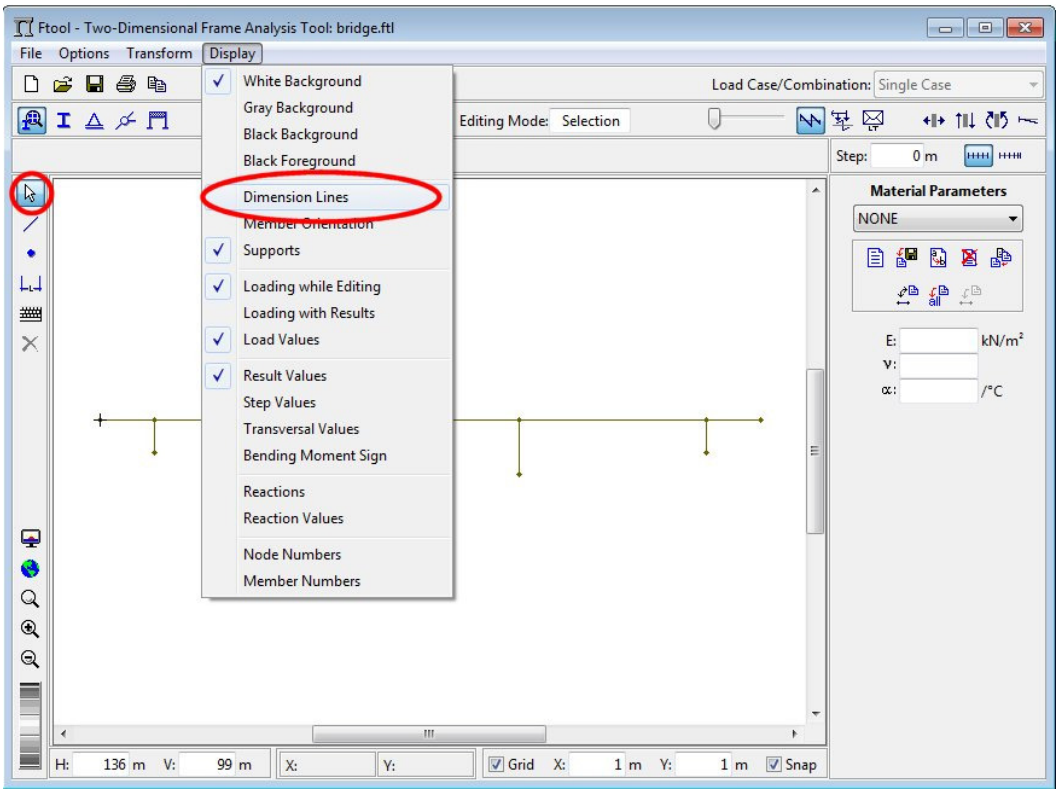
Dimension line at bridge central span



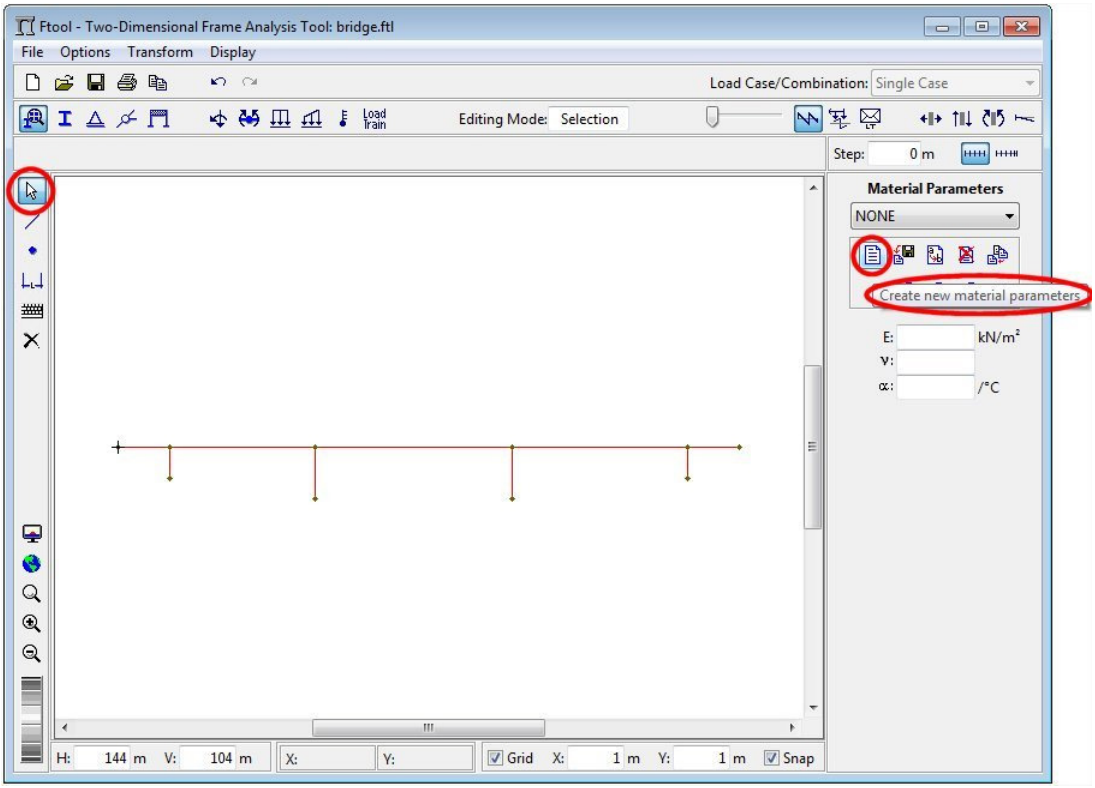
Insertion of other dimension lines



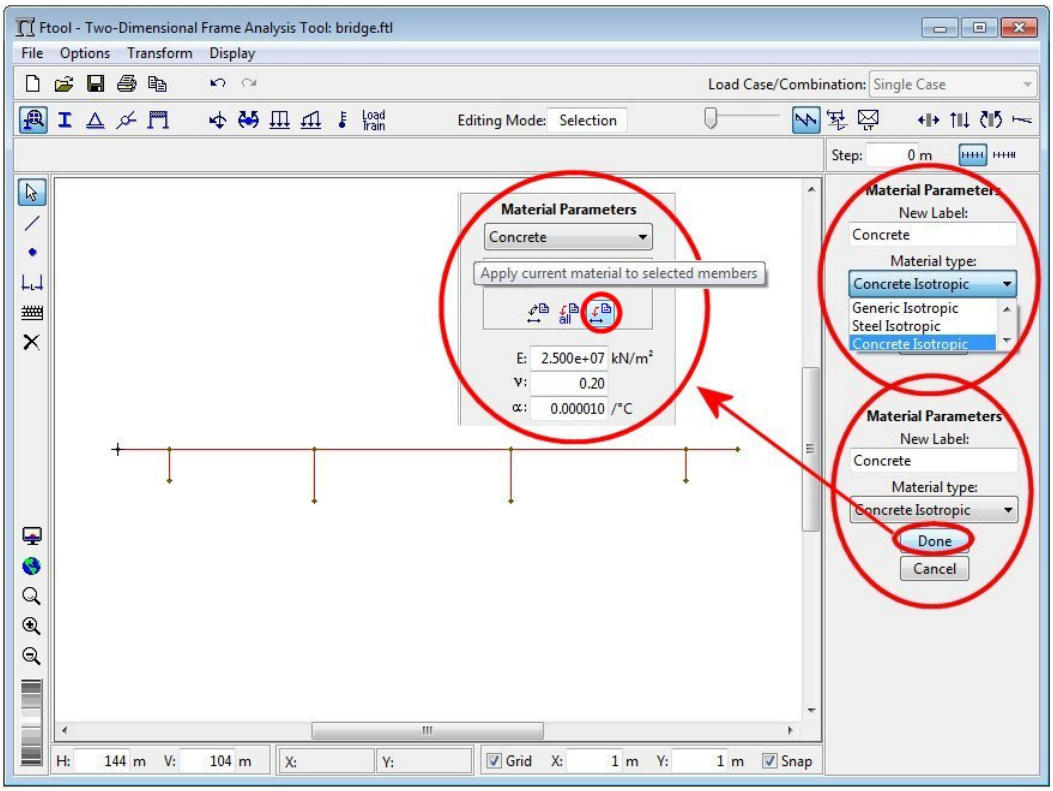
Turn off display of dimension lines to simplify image



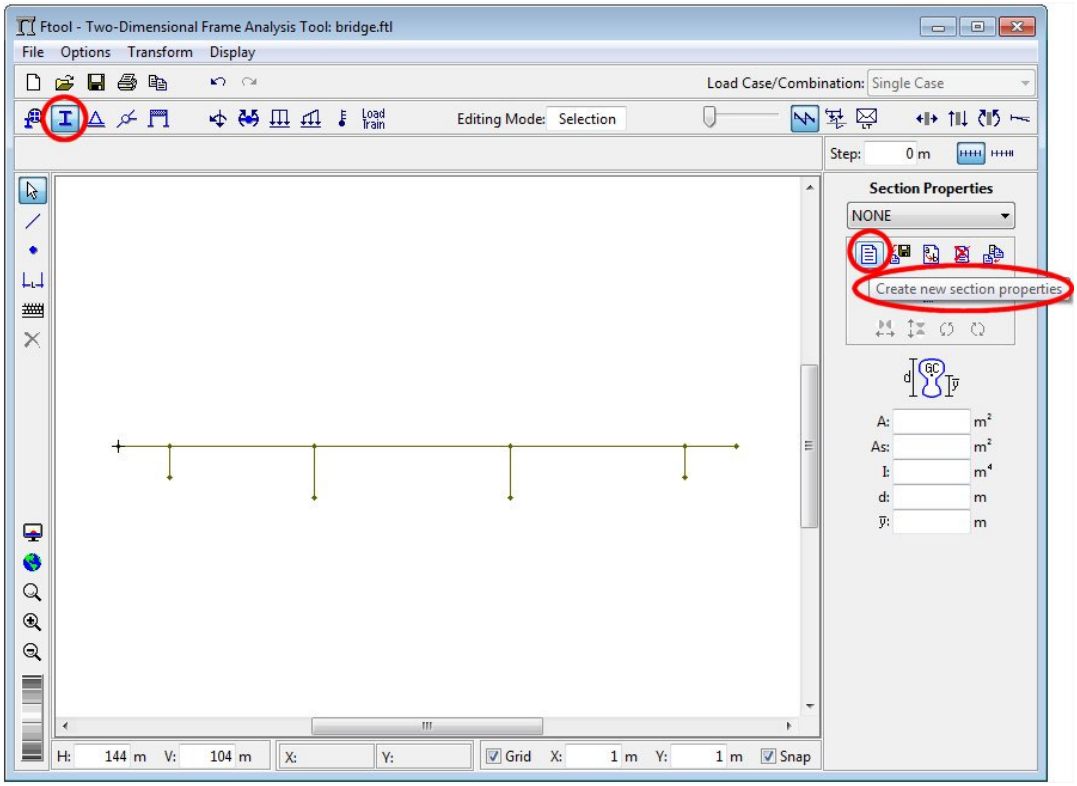
Creation of new material



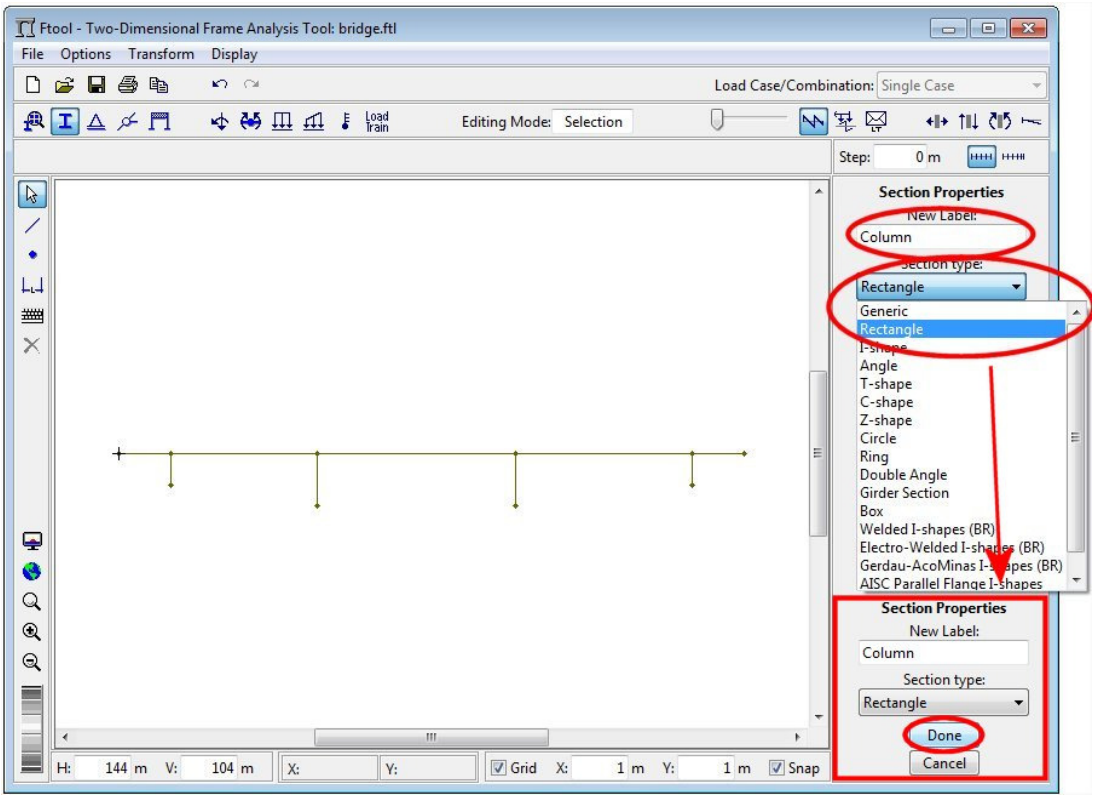
Selection of material type and name; and assignment to all members



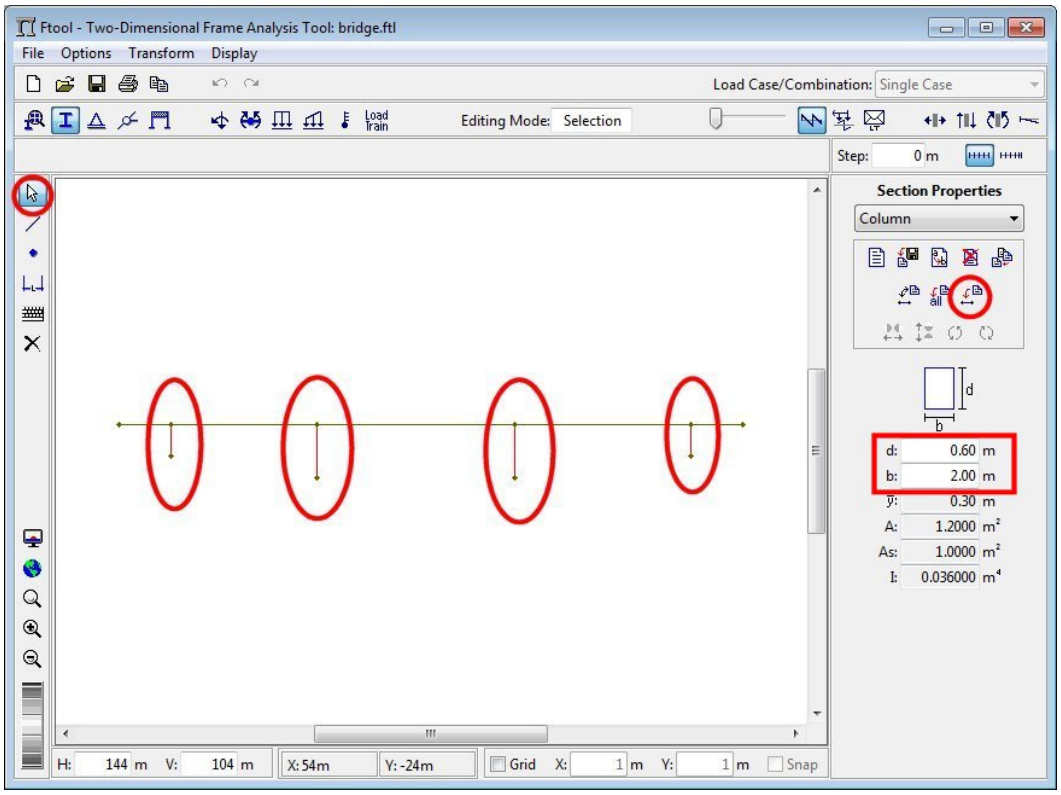
Creation of cross-section for bridge columns



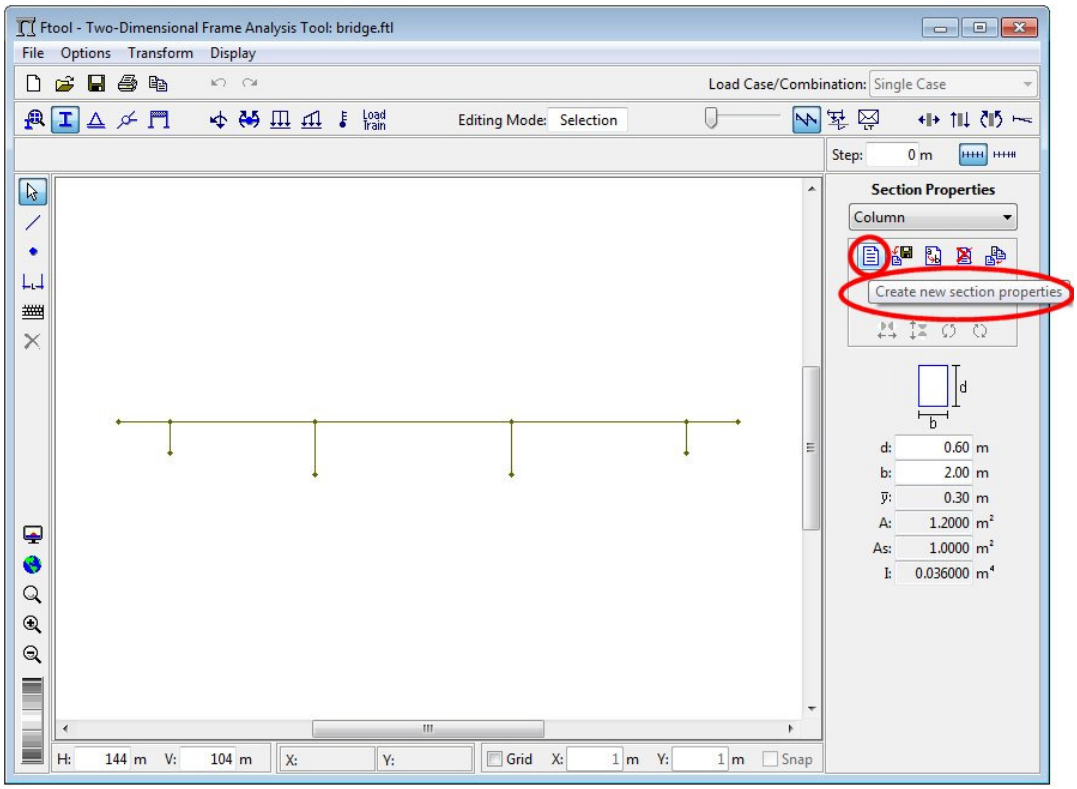
Select rectangular cross-section for the bridge columns



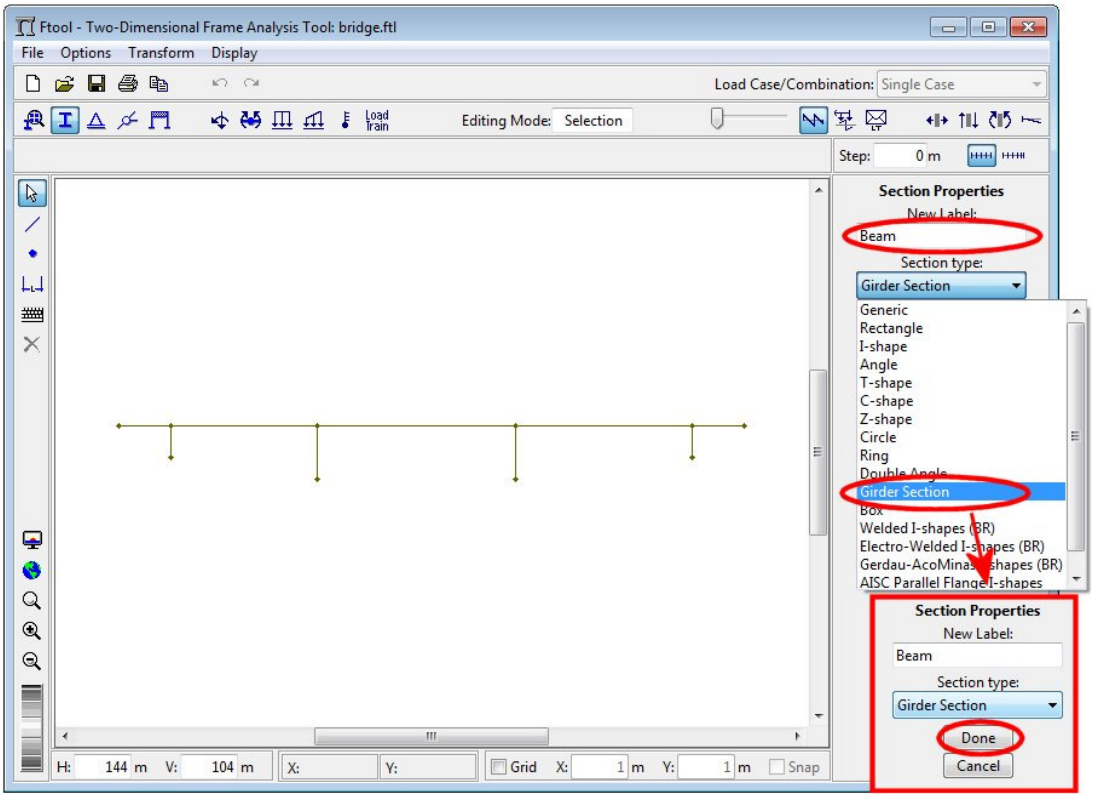
Specify rectangular cross-section parameters and apply to bridge columns



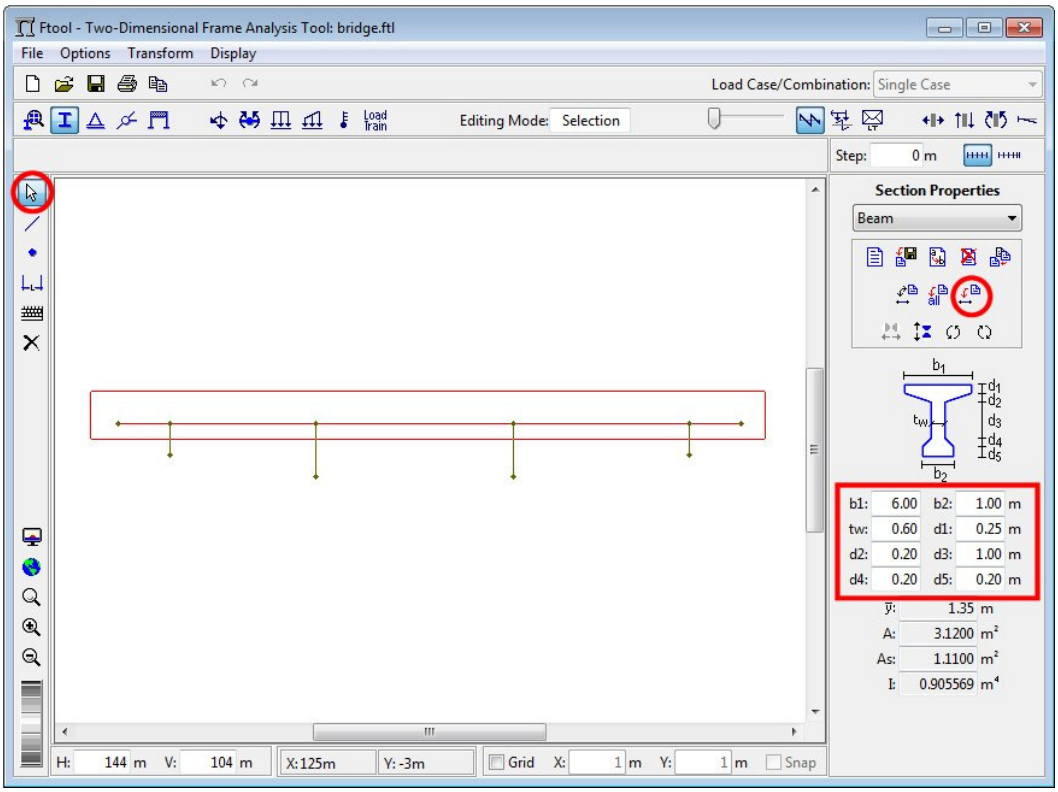
Creation of cross-section for bridge beam members



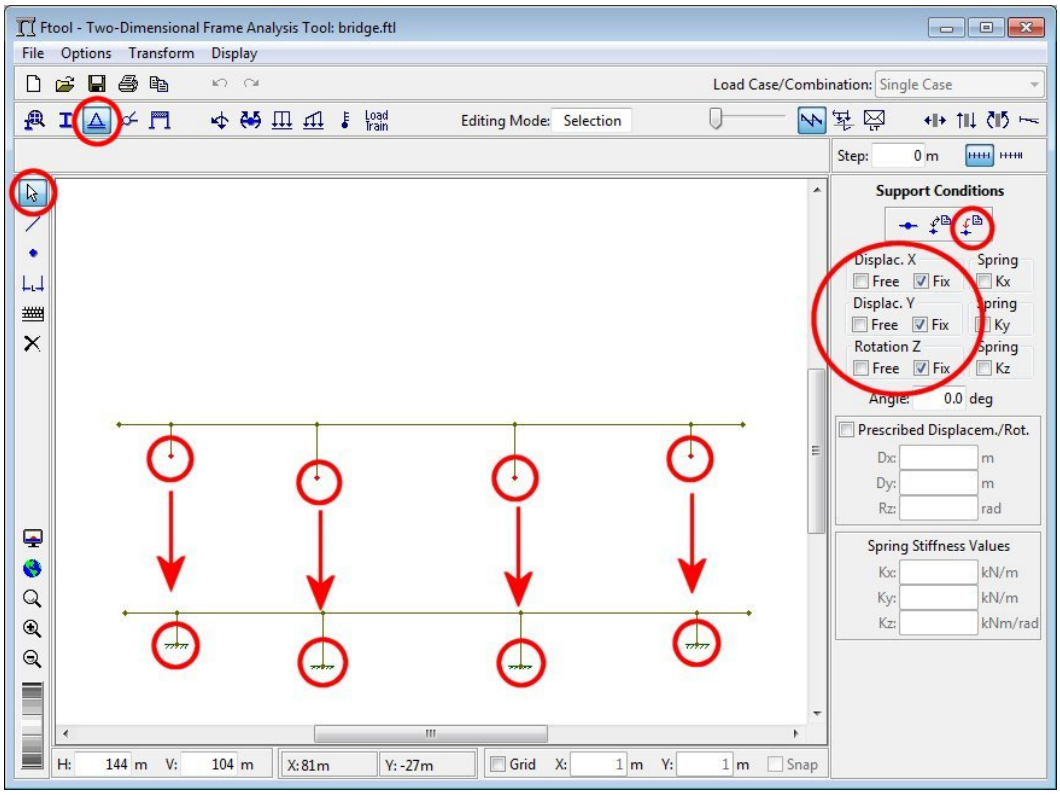
Select type and name of cross-section for bridge beam members



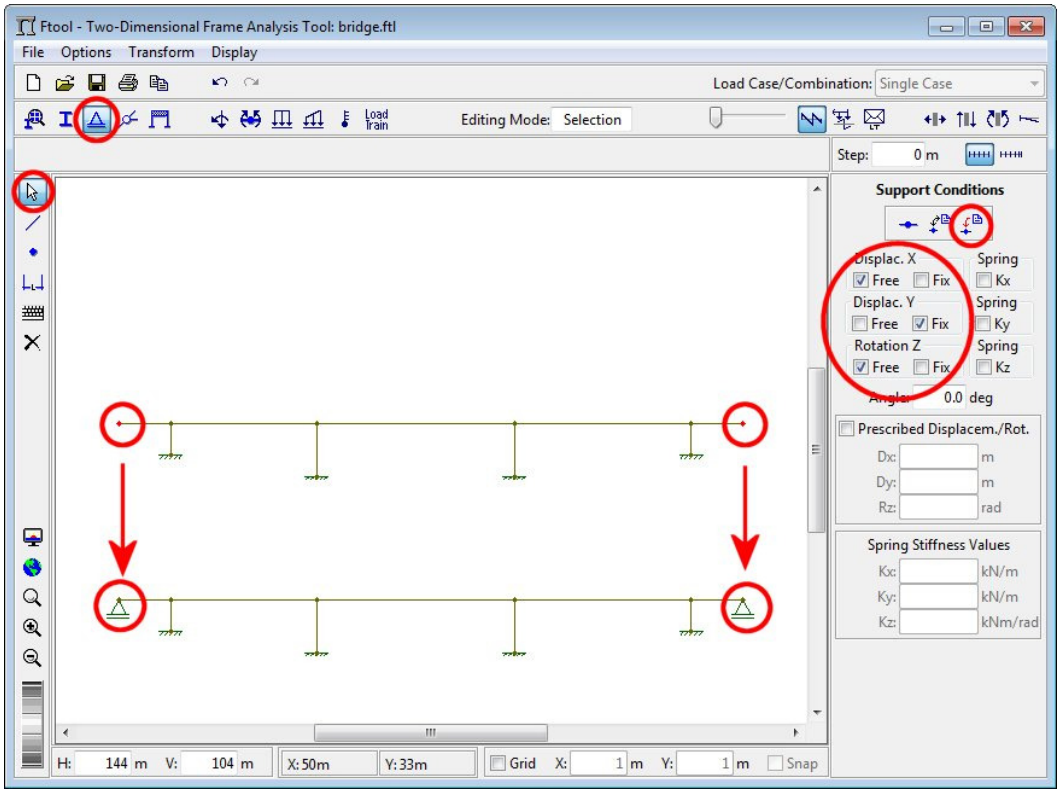
Specify cross-section parameters and apply to bridge beam members



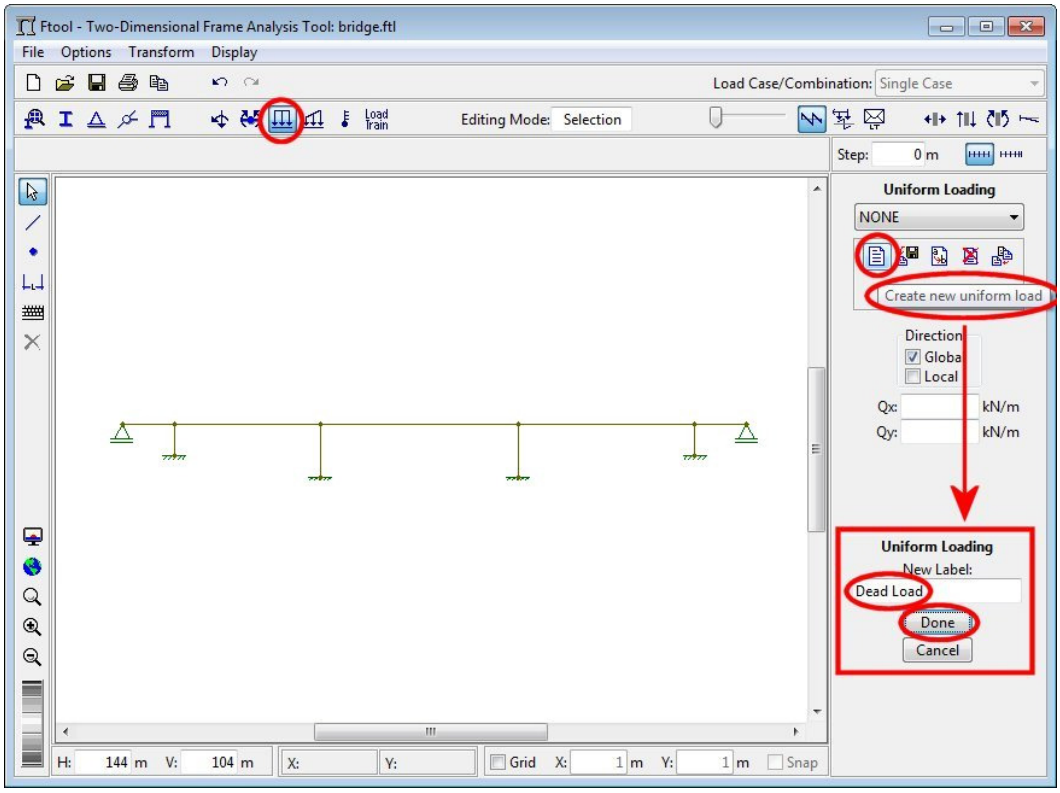
Definition of fixed support and assignment to inferior nodes



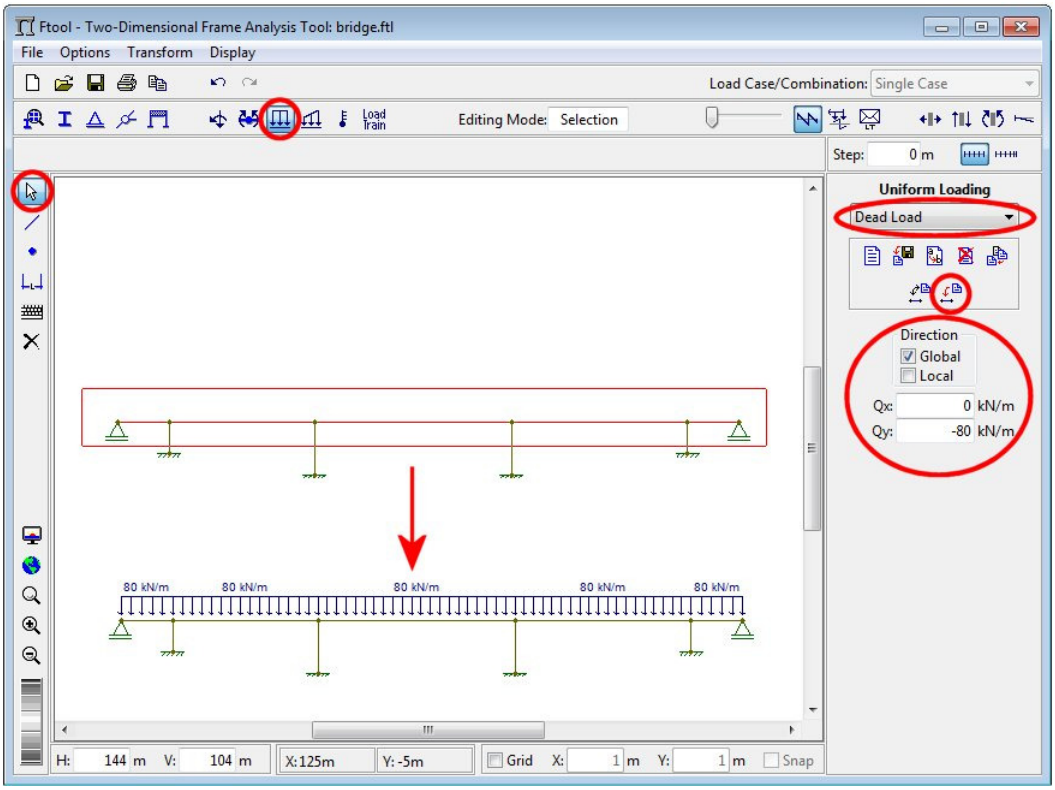
Definition of simple support and assignment to beam end nodes



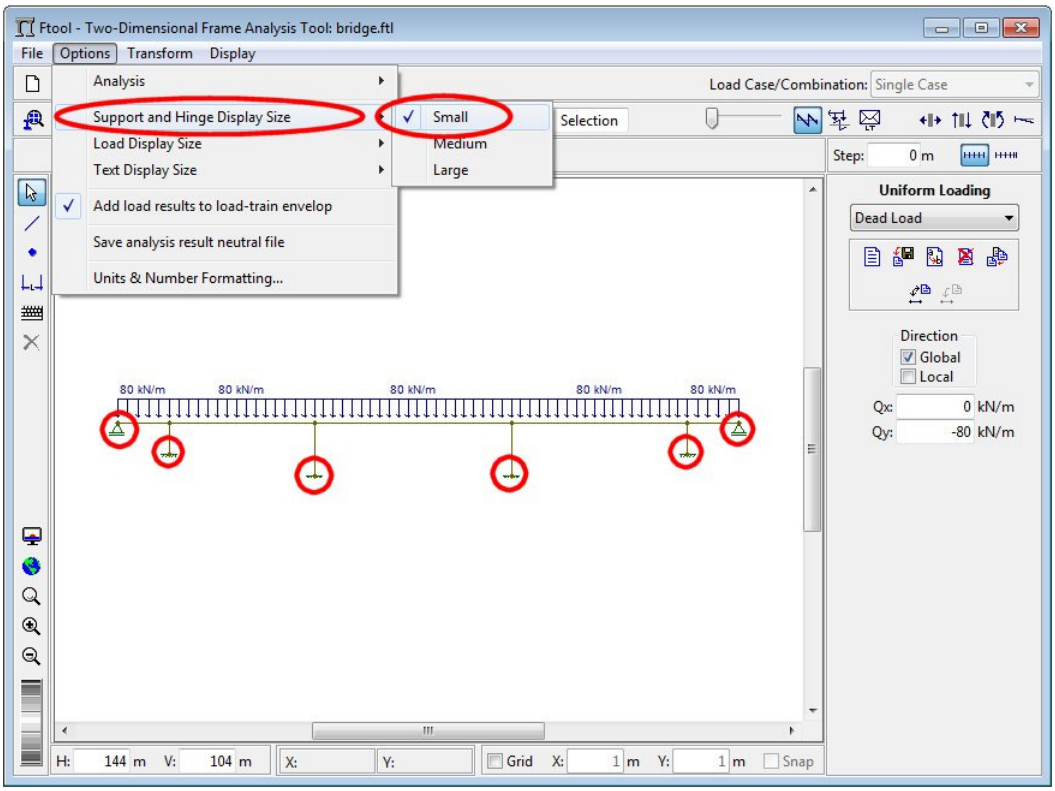
Creation of uniformly distributed load (dead load) for bridge beam



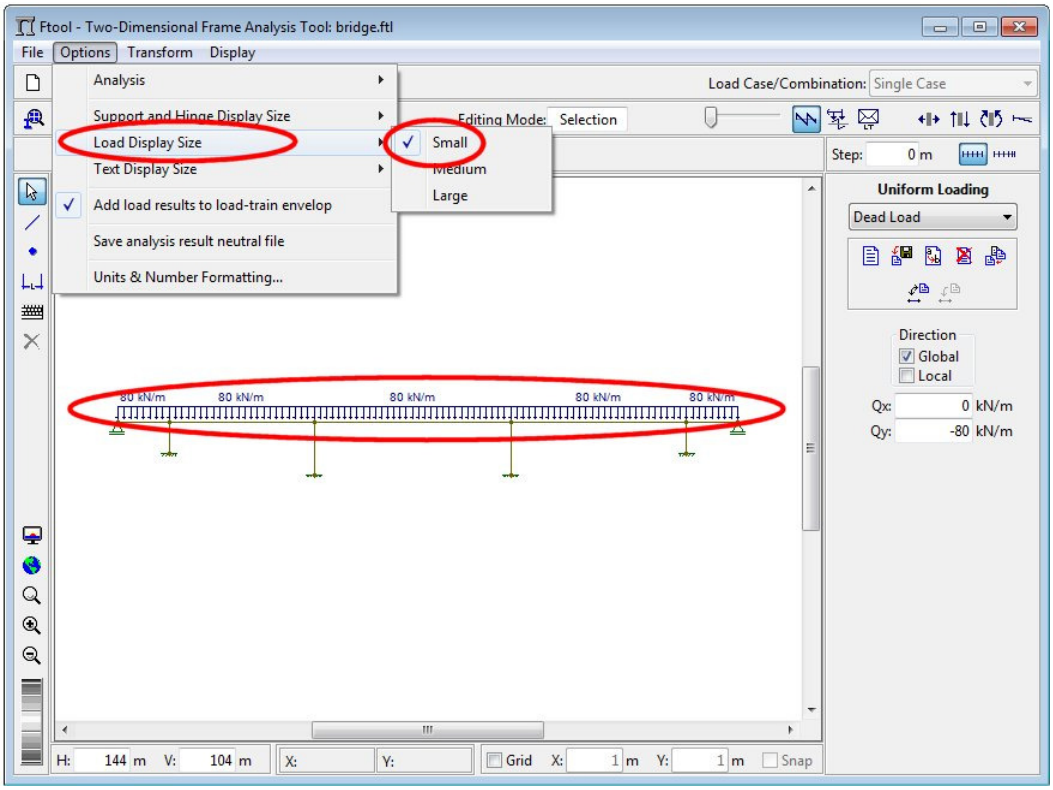
Definition of dead load value and assignment to beam members



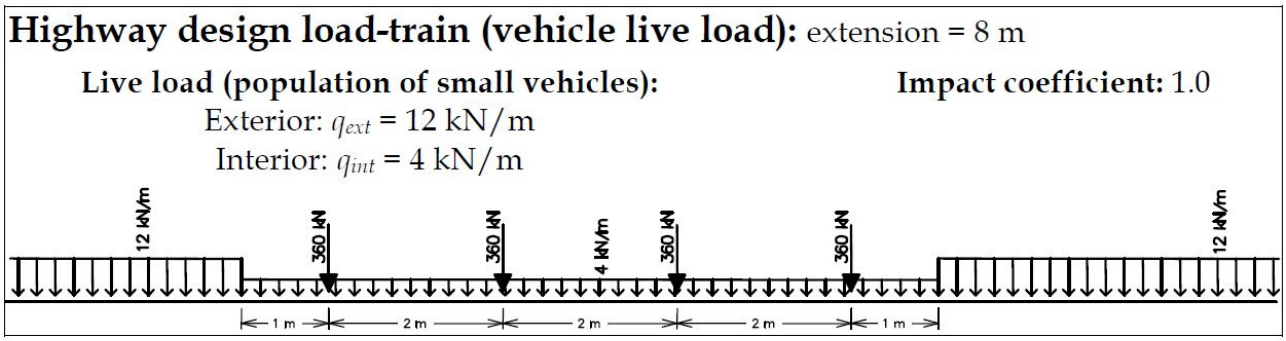
Select small display size for supports

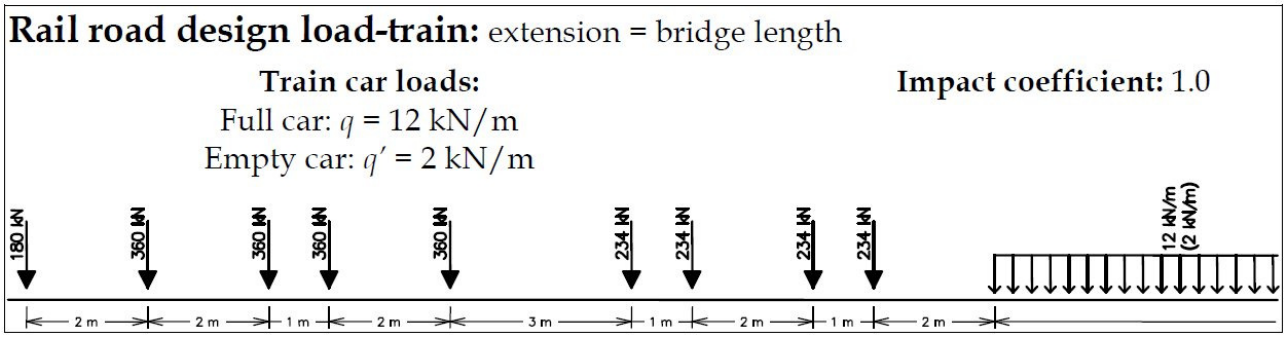


Select small display size for loads

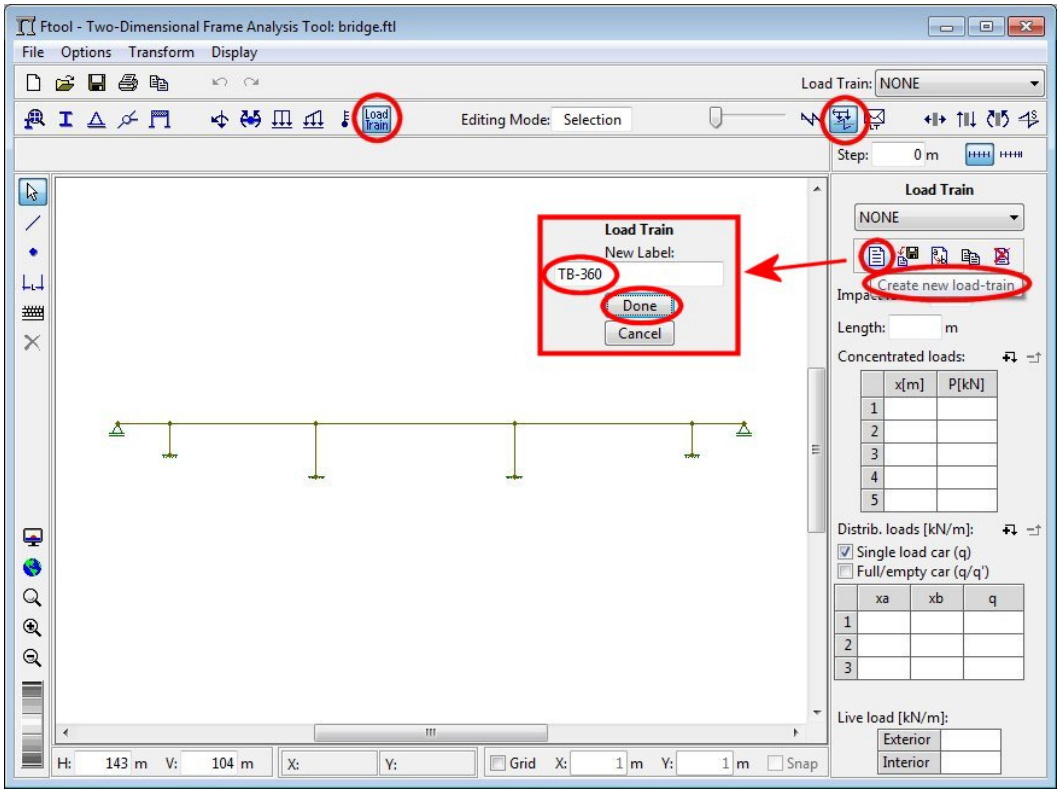


Specification of two vehicle live loads (load-trains)

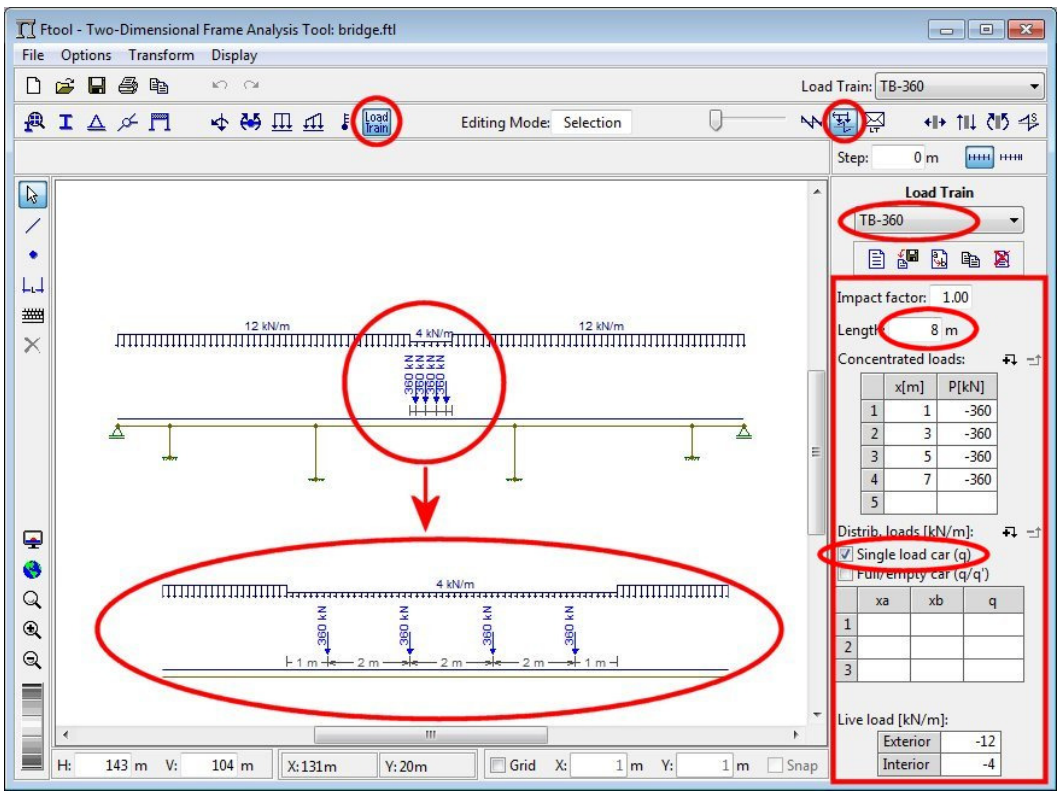




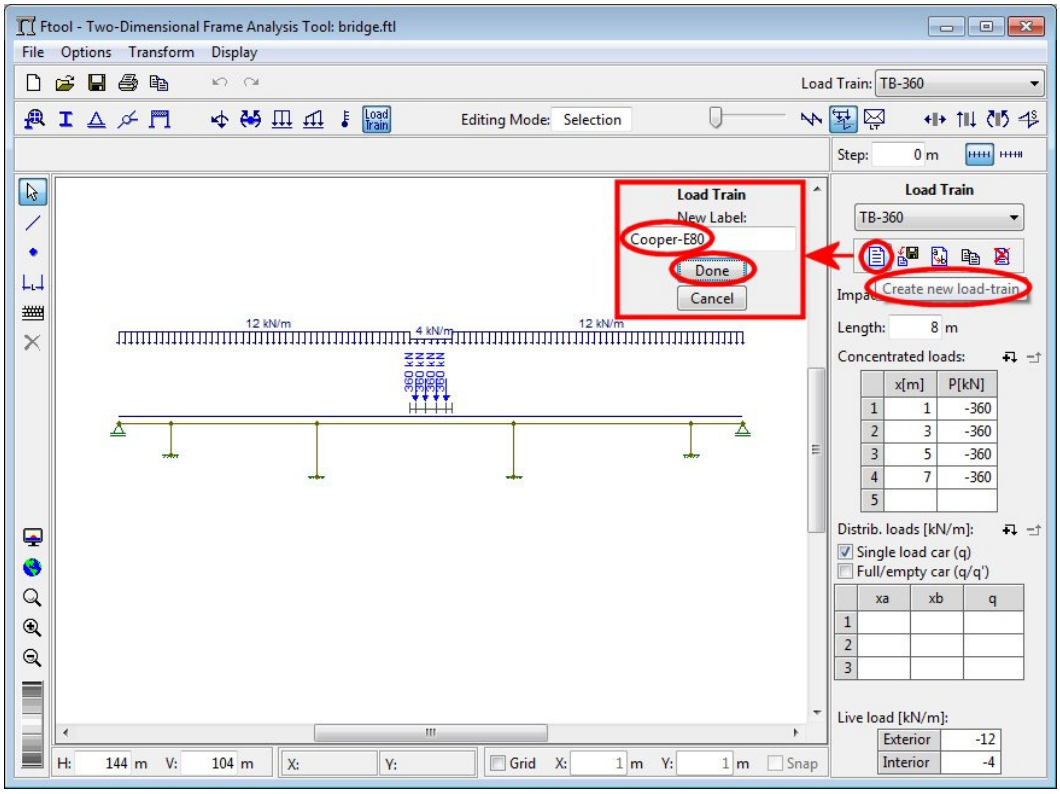
Creation of highway load-train with four axes



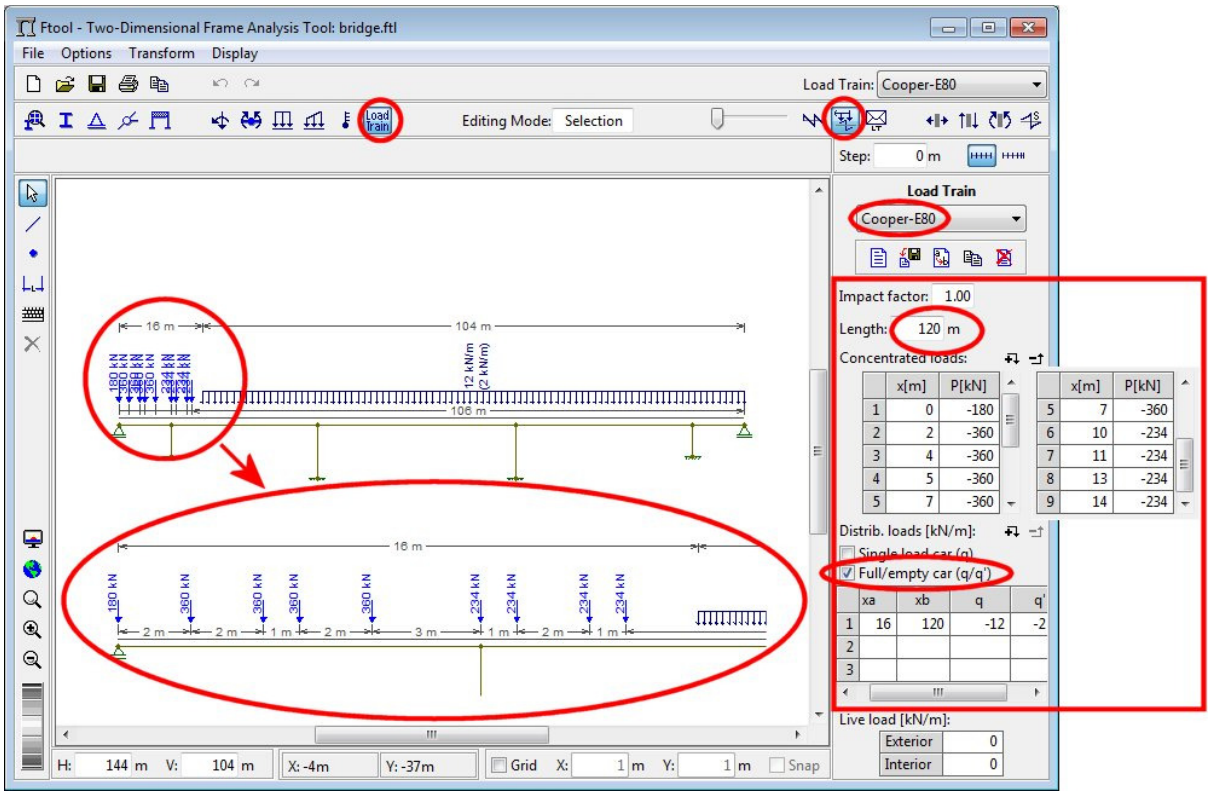
Specification of highway load-train length, values of concentrated forces, and values of interior and exterior live loads (population of small vehicles)



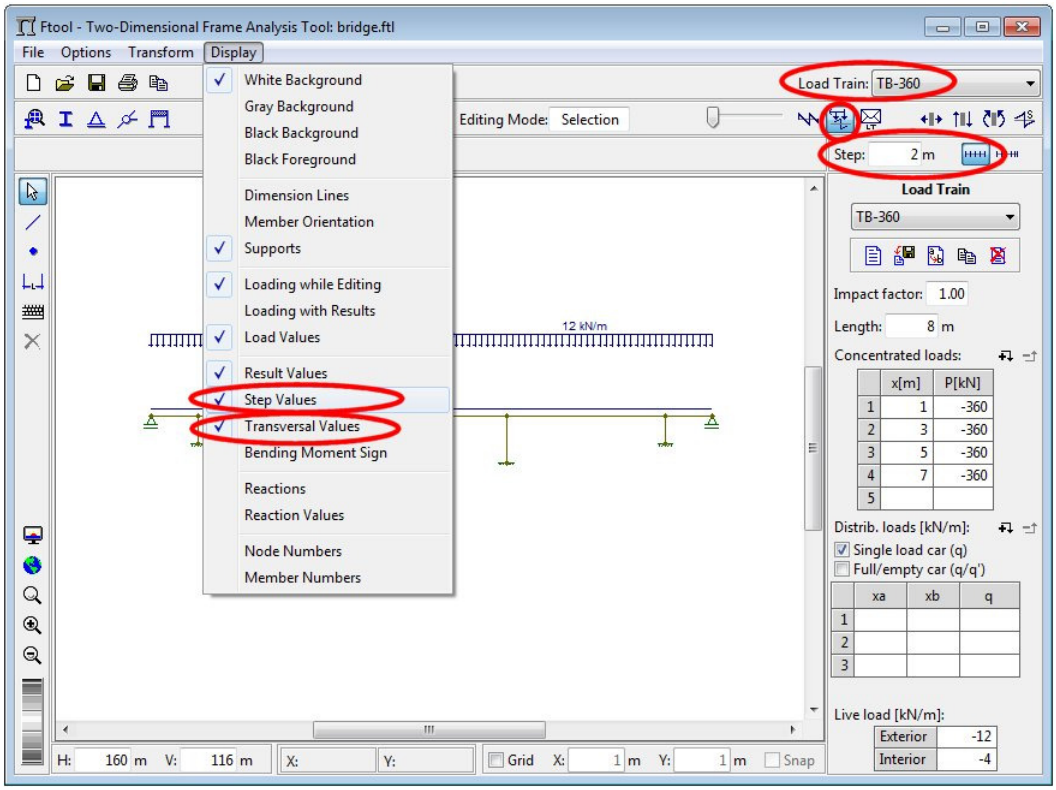
Creation of railroad load-train



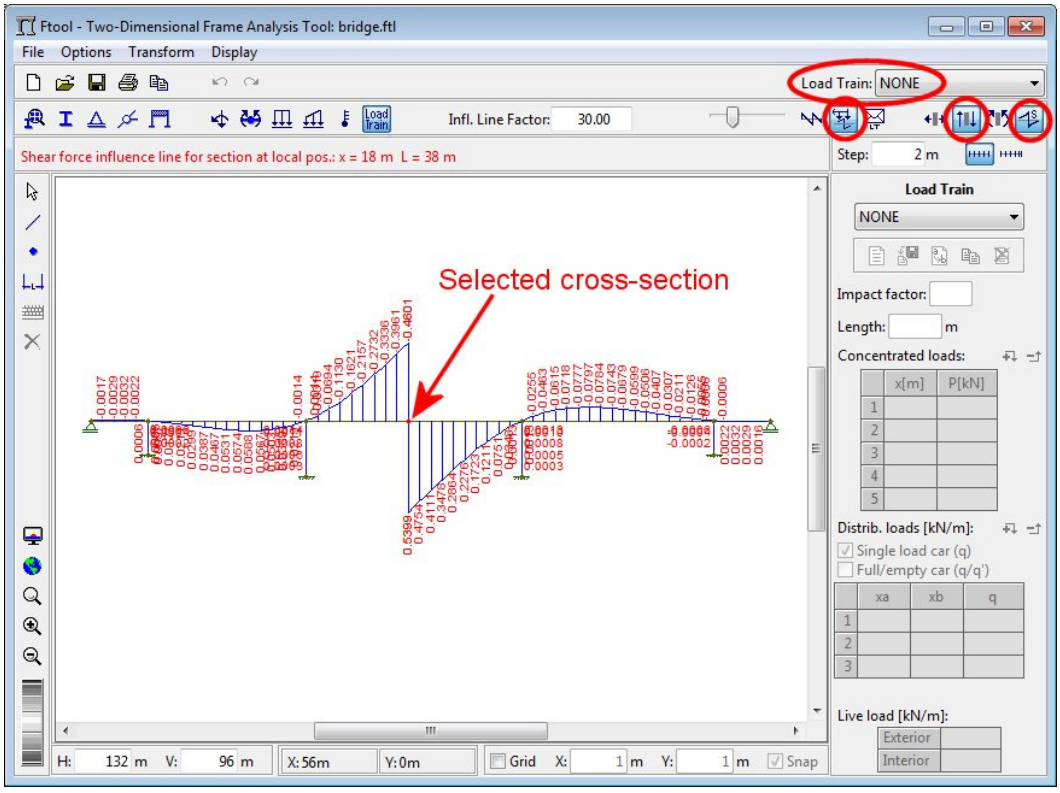
Specification of railroad load-train length, values of concentrated forces, and values of full and empty car distributed loads



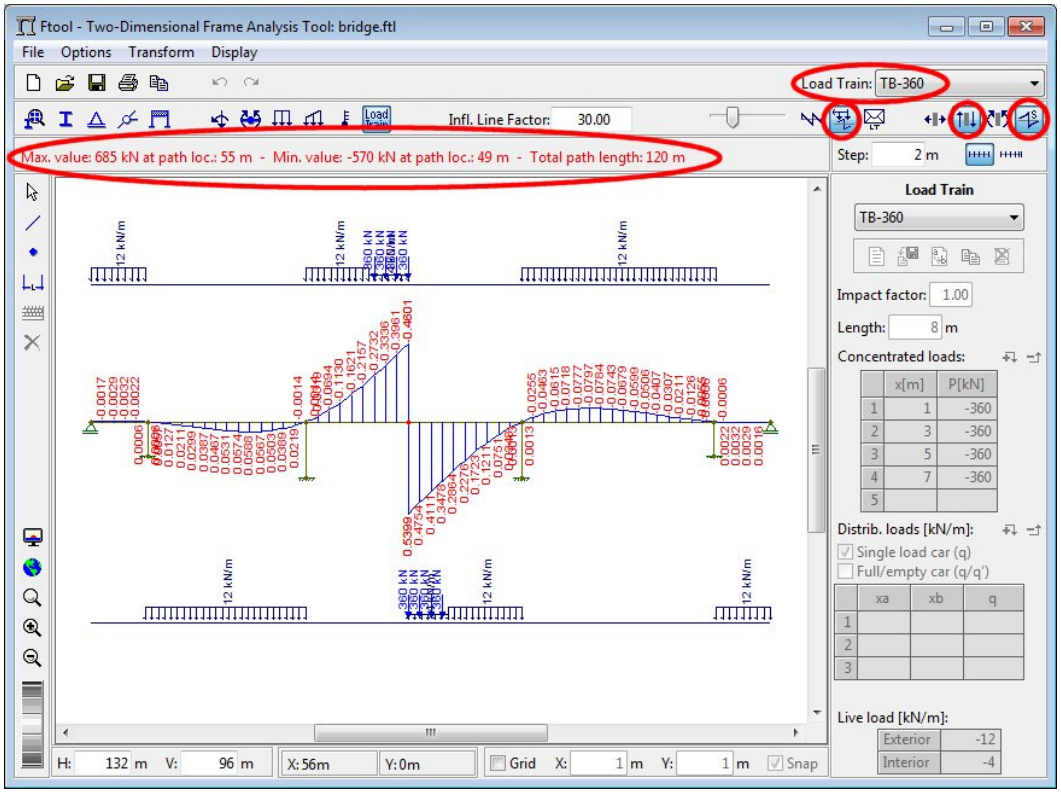
Select result visualization step (2 m) and set transversal display of result values



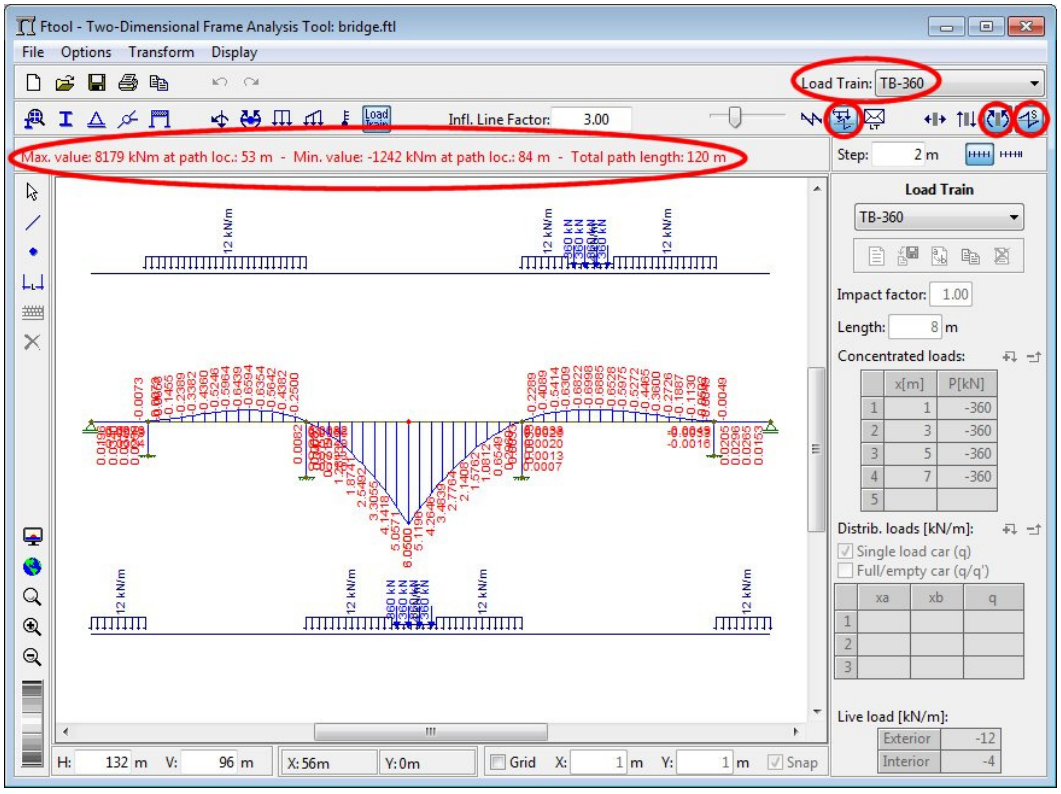
Select cross-section for visualization of shear force influence line result



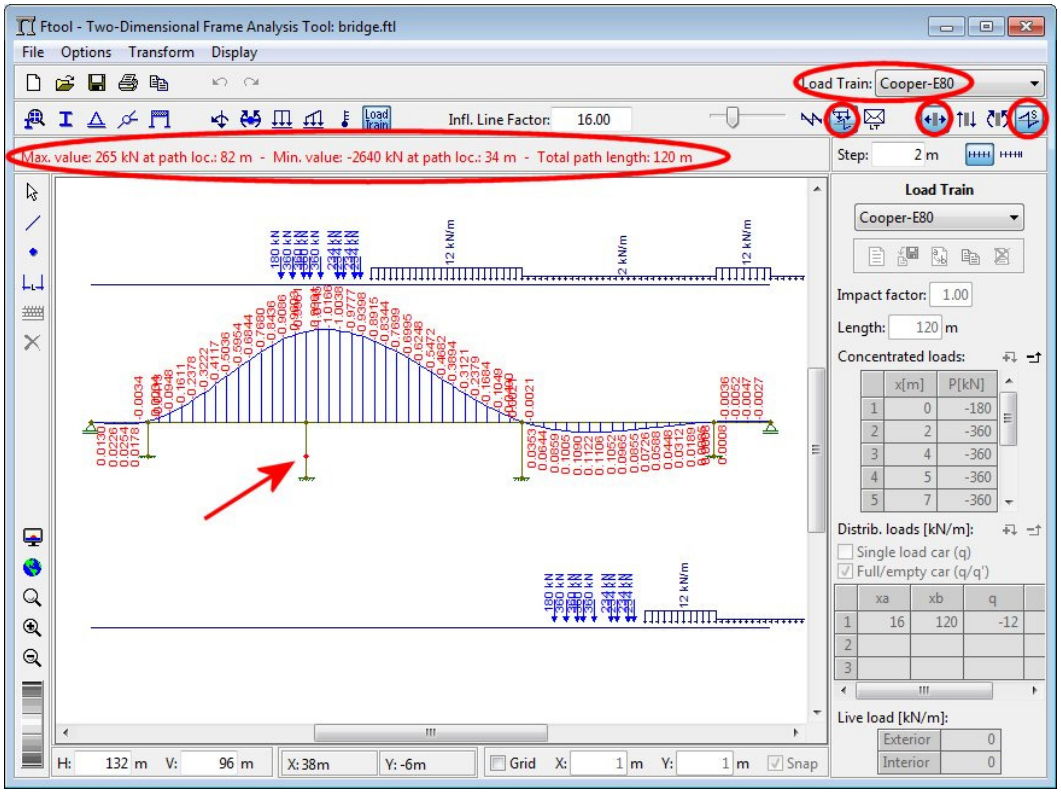
Visualization of shear force influence line result and critical positions (that cause minimum and maximum) of highway load-train



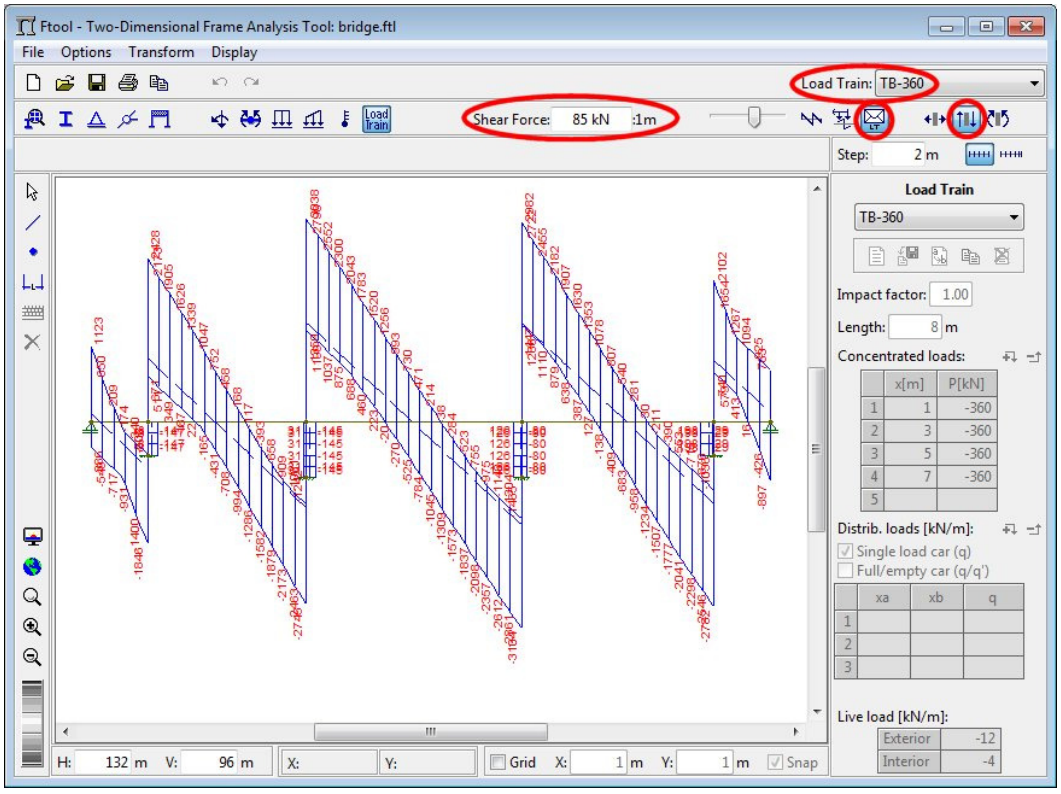
Visualization of bending moment influence line result and critical positions (that cause minimum and maximum) of highway load-train



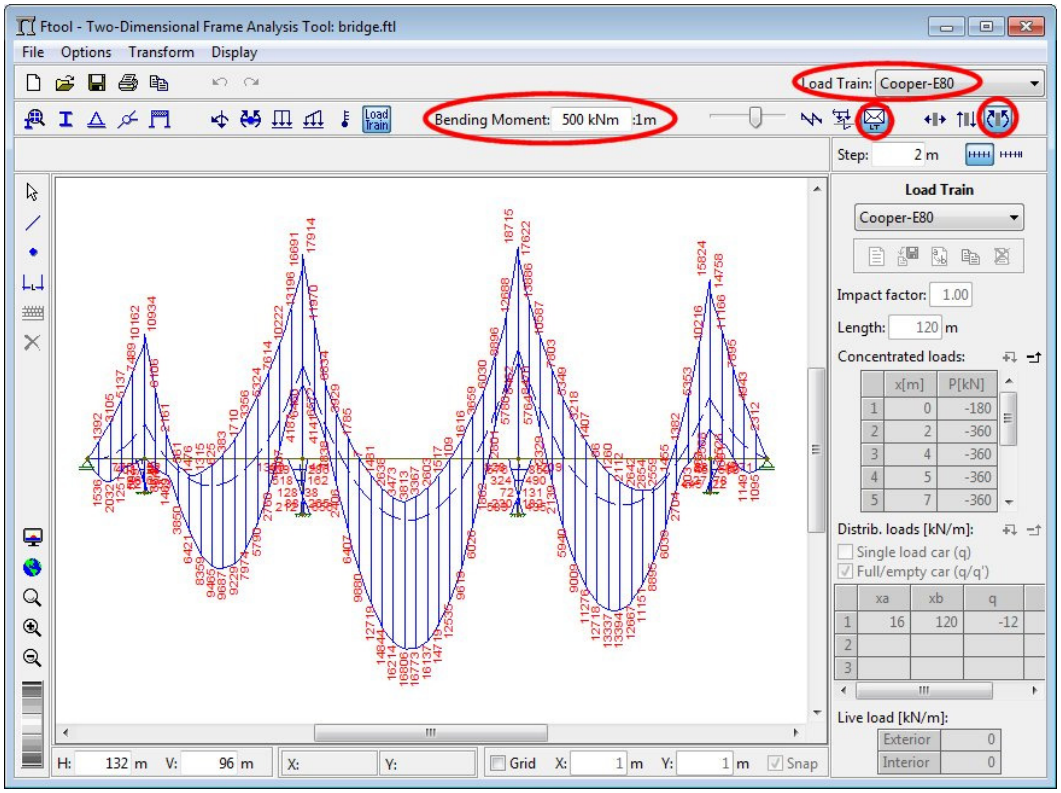
Visualization of axial force influence line result and critical positions (that cause minimum and maximum) of railroad load-train



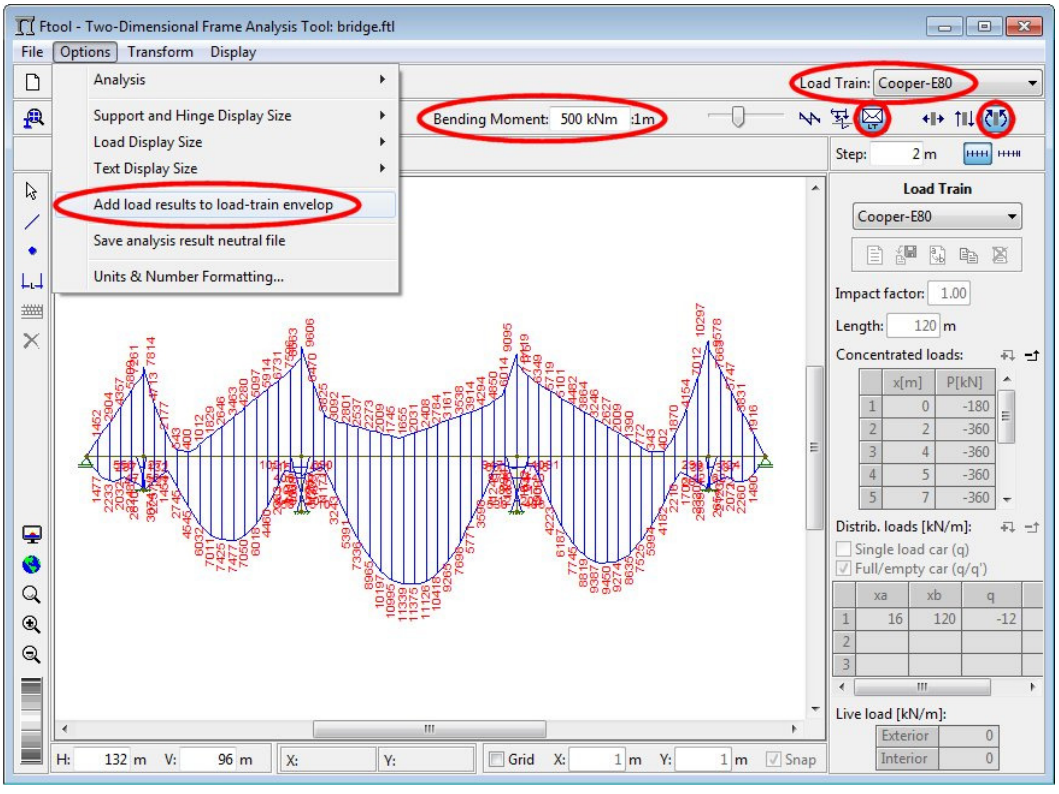
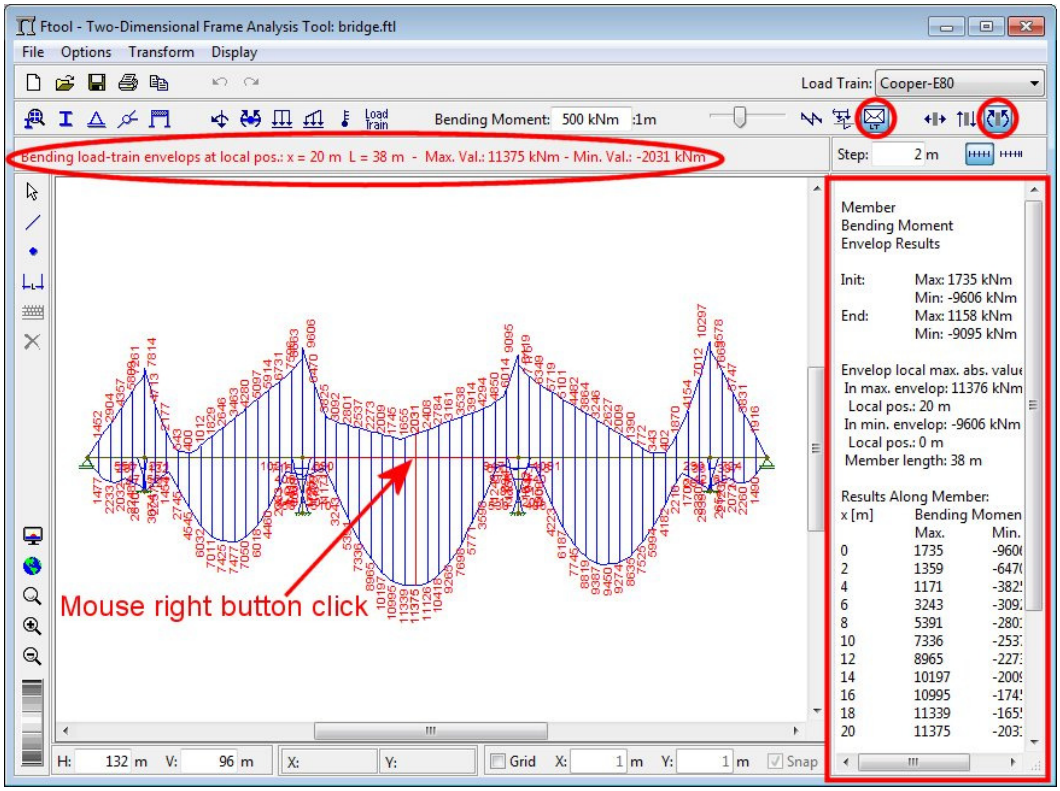
Visualization of shear force envelops for highway load-train (including effect of permanent load)



Visualization of bending moment envelops for railroad load-train (including effect of permanent load)



Visualization of bending moment envelops for railroad load-train (excluding effect of permanent load)



Consulting step results values along central beam member of bending moment envelops for railroad load-train (excluding effect of permanent load)