

BuildingTcl

Real-Time Graphical & Scripting User Interface for OpenSees

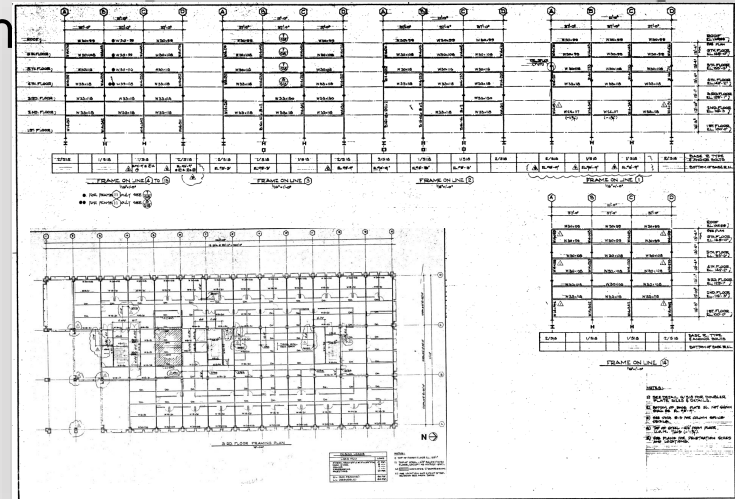
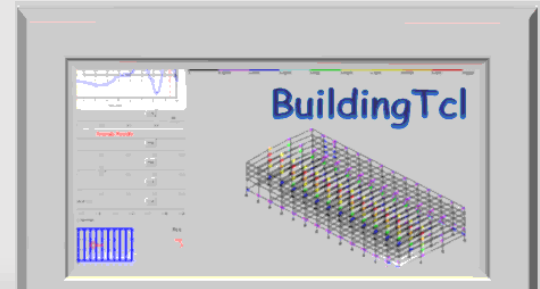
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Earthquake and Structural Engineering Consultant



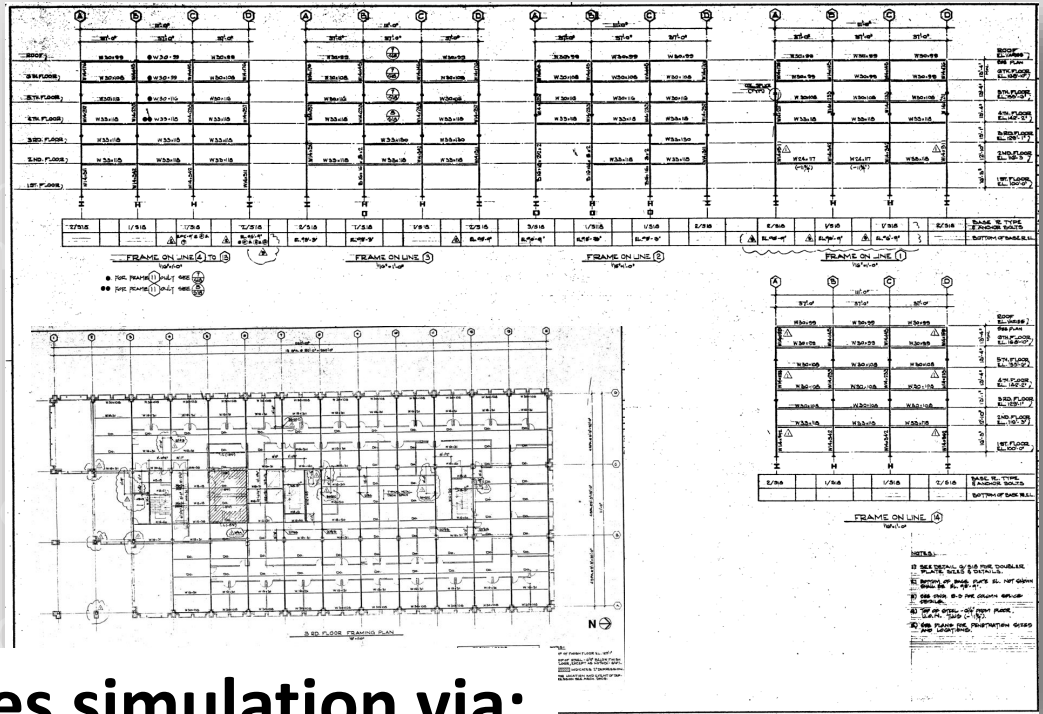
BuildingTcl: a Real-Time Scripting and Graphical User Interface for OpenSees

- Objectives:
 - Generate numerical-simulation input in a manner consistent with architectural/structural drawings
 - Interchangeable User Interface: scripting and graphical
 - Programmable input file via Tcl script commands
 - Direct integration with OpenSees – run OpenSees real-time
 - Create a database of all structure and simulation data
 - Maintain flexibility and power of OpenSees while keeping it simple
 - Be able to run on a number of platforms, just as OpenSees can



BuildingTcl

- Objectives:
 - Generate numerical-simulation consistent with architectural/structural
 - Interchangeable User and graphical
 - Programmable input file commands
 - Direct integration with



Interactive OpenSees simulation via:

- **Scripting Interface**
- **Graphical User Interface**

Interchangeable

OpenSees File

Features

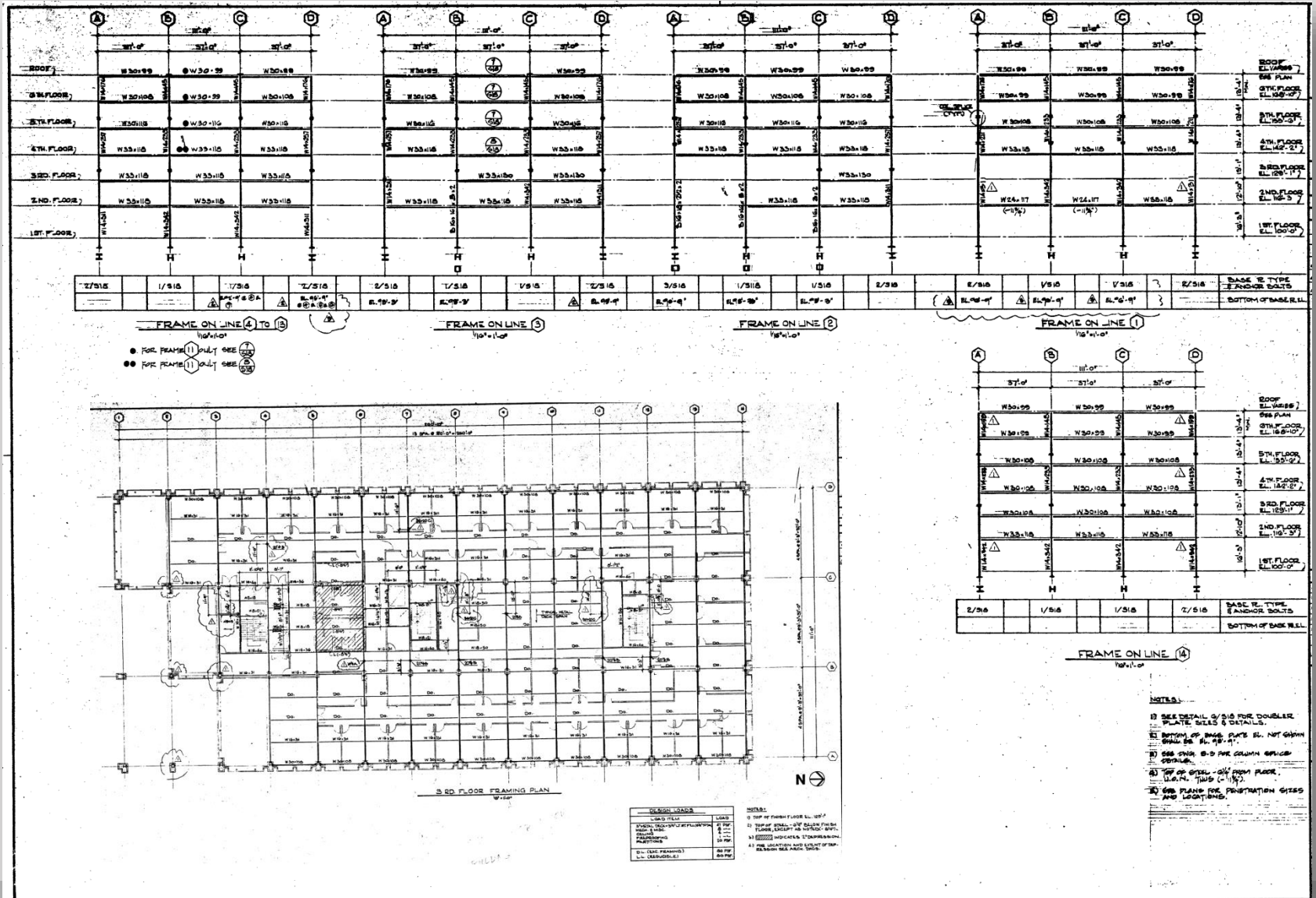
BuildingTcl:

- High-level scripting tool
- Generate building-model data
 - Materials
 - Sections
 - Element Types
 - Analysis Models
 - Loads (Gravity & Lateral)
 - Load Combinations
 - Models
 - Elevations
 - Grids
 - 3D Frames
- Generate analysis-model data
- Generate loading and load-combination data
- Generate OpenSees model of building
- Perform OpenSees numerical simulations
- Post-Process OpenSees recorder output into formatted data
- Generate OpenSees input files

Viewer:

- Graphical User Interface (GUI) for BuildingTcl
- generate and/or visualize ALL BuildingTcl input graphically
- Save ALL input into BuildingTcl script
- Perform numerical simulations using OpenSees interactively
- Visualize OpenSees simulation real-time
- Visualize simulation results interactively
- Export simulation results

Drawings: Elevations & Plans

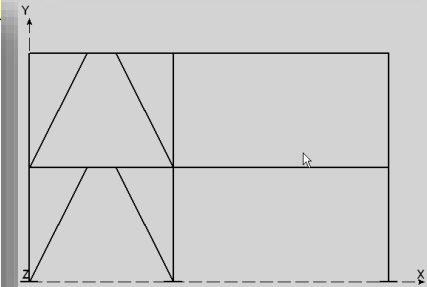


Model Input

Elevation

```

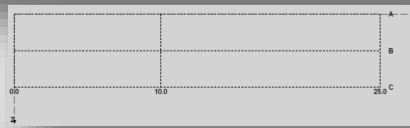
addModelData ModelLabel RCTestFrame2Story2BayBbraced
addModelData ModelDescription "RC MRF, 2-Story, 2-Bay"
addModelData ModelTypeLabel Elevation
addModelData -Geometry Height 16*\$ft StoryRange "1 2"
addModelData -Geometry Width 20*\$ft Bay 1
addModelData -Geometry Width 30*\$ft Bay 2
addModelData -Columns SectionLabel 30x30RCRectangularFiber ColumnLineRange "1 3" StoryRange "1 2" Orient Rotated
addModelData -Beams SectionLabel 30x60RCRectangularFiber BayRange "1 2" FloorRange "2 3"
addModelData -ChevronBraces SectionLabel W12x16 BayRange "1 1" Story "1 2" Eccentricity 4.*\$ft
addModelData SupportBC fix
addModelData OutOfPlaneSupportBC pin
addModelData RigidFloor Off
addModelData JointOffsetsSwitch on
addModelData TributaryWidth 5.*\$ft
addModelData -GravityLoad LoadLabel DL1 FloorRange "2 3" DistributedLoad 100.*\$psf
addModelData -GravityLoad LoadLabel LL1 FloorRange "2 3" DistributedLoad 74.*\$psf
addModel
    
```



Plan

```

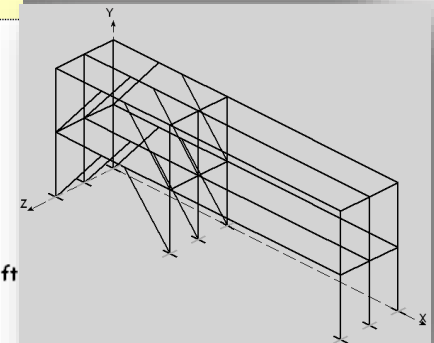
addModelData ModelLabel 2x2Floor
addModelData ModelDescription "1-Bay by 1-Bay Floor Plan"
addModelData ModelTypeLabel Plan
addModelData iVerticalGridLineLabel "0.0 10.0 25.0"
addModelData iHorizontalGridLineLabel "A B C"
addModelData -HorizontalBayWidth Bay 1 Width 20*\$ft
addModelData -HorizontalBayWidth Bay 2 Width 30*\$ft
addModelData -VerticalBayWidth BayRange "1 2" Width 5*\$ft
addModel
    
```



3D Frame

```

addModelData ModelLabel 3DBuildingFrameRC
addModelData ModelDescription "Let's try It"
addModelData ModelTypeLabel 3DFrame
addModelData PlanModelLabel 2x2Floor
addModelData RigidFloor Off
addModelData -addElevation ElevationModelLabel RCTestFrame2Story2BayA iGridLineLabel "0.0"
addModelData -addElevation ElevationModelLabel RCTestFrame2Story2BayA iGridLineLabel "10.0" TributaryWidth 12.5*\$ft
addModelData -addElevation ElevationModelLabel RCTestFrame2Story2BayA iGridLineLabel "25.0" TributaryWidth 7.5*\$ft
addModelData -addElevation ElevationModelLabel RCTestFrame2Story2BayBbraced iGridLineLabel "A C" TributaryWidth 2.5*\$ft
addModelData -addElevation ElevationModelLabel RCTestFrame2Story2BayBbraced iGridLineLabel "B" TributaryWidth 5.*\$ft
addModel
    
```



Material, Section & Element Type

```
# MATERIALS -----  
# Core Concrete (Default confinement effects)  
addMaterialData MaterialLabel 4ksiConfinedConcrete  
addMaterialData MaterialModelLabel ConfinedConcrete;  
addMaterialData Fc 4000.*$psi;  
addMaterial
```

```
# RC Column ElementType  
addElementTypeData ElementTypeLabel RCColumn;  
addElementTypeData ElementModelLabel beamWithHinges;  
addElementTypeData PlasticHingeLengthModelLabel Priestley96  
addElementTypeData TransformationType Linear  
addElementType ; # -----
```

```
# ELEMENT SECTION -----  
addSectionData SectionLabel 30x30RCRectFiber  
addSectionData SectionDescription "Square Rectangular RC Section"  
addSectionData SectionModelLabel RCRectFiber;  
addSectionData H 30*$in;  
addSectionData B 30*$in;  
addSectionData NBarBot 6; # number of bottom longitudinal  
addSectionData NBarTop 6; # number of top longitudinal  
addSectionData NBarInt 6; # total number of intermediate  
addSectionData BarSizeBot #9;  
addSectionData BarSizeTop #9;  
addSectionData BarSizeInt #9;  
addSectionData CoverBot 2.6*$in;  
addSectionData CoverTop 2.6*$in;  
addSectionData CoverInt 2.6*$in;  
addSectionData CoreMaterialLabel 4ksiConfinedConcrete;  
addSectionData CoverMaterialLabel 4ksiUnconfinedConcrete;  
addSectionData ReinforcementMaterialLabel 60ksiReinforcingSteel;  
addSection
```

Analysis Models

Gravity Analyses

```
addAnalysisModelData AnalysisModelLabel GravityAnalysis;  
addAnalysisModelData AnalysisTypeLabel LoadControl;  
addAnalysisModelData Tolerance 1e-8;  
addAnalysisModelData Nstep 12;  
addAnalysisModel;
```

Pushover Analyses

```
addAnalysisModelData AnalysisModelLabel PushoverAnalysisVerySmallSteps  
addAnalysisModelData AnalysisTypeLabel DisplacementHistory  
addAnalysisModelData DisplacementIncrement 0.01*\$in  
addAnalysisModel # -----
```

```
addAnalysisModelData AnalysisModelLabel PushoverAnalysisSmallSteps  
addAnalysisModelData AnalysisTypeLabel DisplacementHistory  
addAnalysisModelData DisplacementIncrement 0.1*\$in  
addAnalysisModel # -----
```

Dynamic Analyses

```
addAnalysisModelData AnalysisModelLabel ShortDynamicTimeHistoryAnalysis;  
addAnalysisModelData AnalysisTypeLabel TimeHistory  
addAnalysisModelData Tolerance 1e-6;  
addAnalysisModelData DtAnalysis 0.1*\$sec  
addAnalysisModelData TmaxAnalysis 10*\$sec  
addAnalysisModel; # -----
```


Lateral Loads

```

addLoadData LoadLabel StaticPushover;      # STATIC PUSHOVER
addLoadData LoadTypeLabel LateralPushover; # options: LateralPushover, UniformEQ, UniformSine
addLoadData DMax 1.*\${in};                # maximum displacement
addLoadData ControlNodeFloor top;

```

```

addLoad
addLoadData LoadLabel StaticCyclic;        # STATIC REVERSED CYCLIC LOADING
addLoadData LoadTypeLabel LateralPushover;
addLoadData CycleType Full;               # full cycles. Options: Push, Full, Half
addLoadData DMax "0.005 0.01 0.05 0.075 0.1"; # List of peaks, set as a factor of
addLoadData DMaxFactor BuildingHeight;    # building height
addLoadData ControlNodeFloor top;

```

```

addLoadData LoadLabel EQ1;                # EQ TIME-HISTORY
addLoadData LoadTypeLabel UniformEQ;
addLoadData GMfactor \${g};               # ground-motion input-u
addLoadData GMdirectory "GMfiles";       # directory where ground
addLoadData FileType "PEER";             # ground-motion file type
addLoadData GMfilename "H-E12140.at2";   # ground-motion filename
addLoadData GMdirection X;               # lateral dof for ground m
addLoadData GMfactor 1.;                  # scaling of ground motion
addLoad

```

```

addLoadData LoadLabel EQ1Bidirect;        # EQ TIME-HISTORY
addLoadData LoadTypeLabel UniformEQ2D;
addLoadData GMfactor \${g};               # ground-motion input-u
addLoadData GMdirectory "GMfiles";       # directory where ground
addLoadData FileType "PEER";             # ground-motion file type
addLoadData GMfilenameX H-E01140.at2;    # ground-motion filename for input
addLoadData GMfilenameZ H-E01140.at2;    # ground-motion filename for input
addLoadData GMfactorX -15;                # scaling of ground motion for input
addLoadData GMfactorZ 10;                # scaling of ground motion for input
addLoad

```

NOTE: Gravity Loads are defined within the model

Pushover LoadCombinations

STATIC PUSHOVER LOAD COMBINATIONS -----

```
addLoadCombinationData LoadCombinationLabel ReallyShortStaticPushover
addLoadCombinationData LoadCombinationDescription "This is my favorite one!!!"
addLoadCombinationData -GravityLoad LoadLabel DL1
addLoadCombinationData -GravityLoad LoadLabel DL2
addLoadCombinationData -LateralLoad LoadLabel StaticPushover DMax 0.02*\$in
addLoadCombination
```

```
addLoadCombinationData LoadCombinationLabel InterestingStaticPushover
addLoadCombinationData LoadCombinationDescription "This is my favorite one!!!"
addLoadCombinationData -GravityLoad LoadLabel DL1
addLoadCombinationData -GravityLoad LoadLabel DL2
addLoadCombinationData -LateralLoad LoadLabel StaticPushover DMax 0.1*\$in DMaxFactor 1.
addLoadCombinationData -LateralLoad LoadLabel StaticPushover DMax 1.9*\$in DMaxFactor 1. \
    DisplacementIncrement 0.25
addLoadCombinationData -LateralLoad LoadLabel StaticPushover DMax 10*\$in DMaxFactor 1. \
    DisplacementIncrement 0.5
addLoadCombination
```

```
addLoadCombinationData LoadCombinationLabel PushToTenPercentDriftZ
addLoadCombinationData LoadCombinationDescription "This is my favorite one!!!"
addLoadCombinationData -GravityLoad LoadLabel DL1
addLoadCombinationData -GravityLoad LoadLabel DL2
addLoadCombinationData -GravityLoad AnalysisModelLabel GravityAnalysis
addLoadCombinationData -LateralLoad LoadLabel StaticPushover AnalysisModelLabel PushoverAnalysisLargeSteps\
    LateralDirection Z DMax 0.1 DMaxFactor BuildingHeight
addLoadCombination
```

EQ Load Combinations

DYNAMIC LOAD COMBINATIONS -----

```
addLoadCombinationData LoadCombinationLabel DesignEQ1
addLoadCombinationData -GravityLoad LoadLabel DL1 LoadFactor 0.9
addLoadCombinationData -GravityLoad LoadLabel DL2 LoadFactor 0.9
addLoadCombinationData -LateralLoad LoadLabel EQ1
addLoadCombination
```

addLoadCombinationData LoadCombinationLabel MaxEQ1shorter

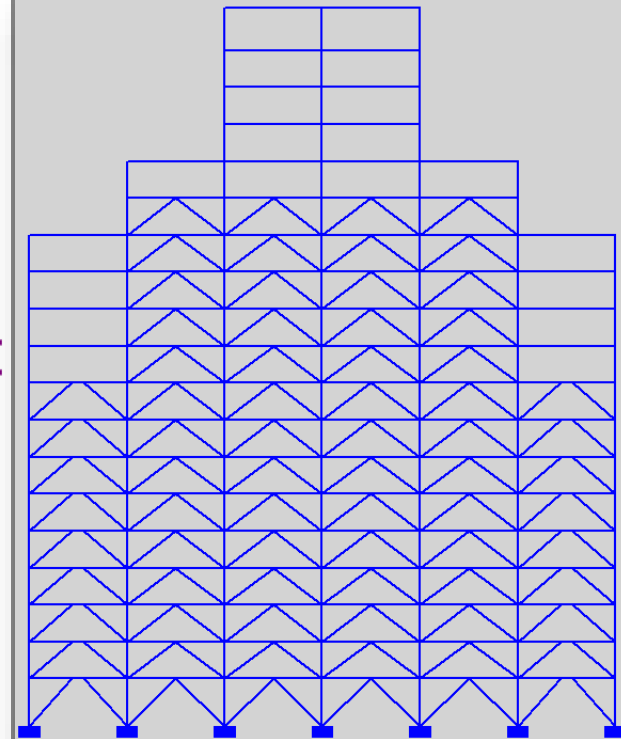
```
addLoadCombinationData -GravityLoad LoadLabel DL1 LoadFactor 1.
addLoadCombinationData -LateralLoad LoadLabel EQ1 AnalysisModelLabel ShortDynamicTimeHistoryAnalysis LoadFactor 3
addLoadCombination
```

addLoadCombinationData LoadCombinationLabel MaxEQ2bidirect10sec

```
addLoadCombinationData -GravityLoad LoadLabel DL1 LoadFactor 0.9
addLoadCombinationData -LateralLoad LoadLabel EQ2 GMfilenameX H-E01140.at2 GMfilenameZ H-E12140.at2 \
    TmaxAnalysis 10.*\ $sec
addLoadCombination
```

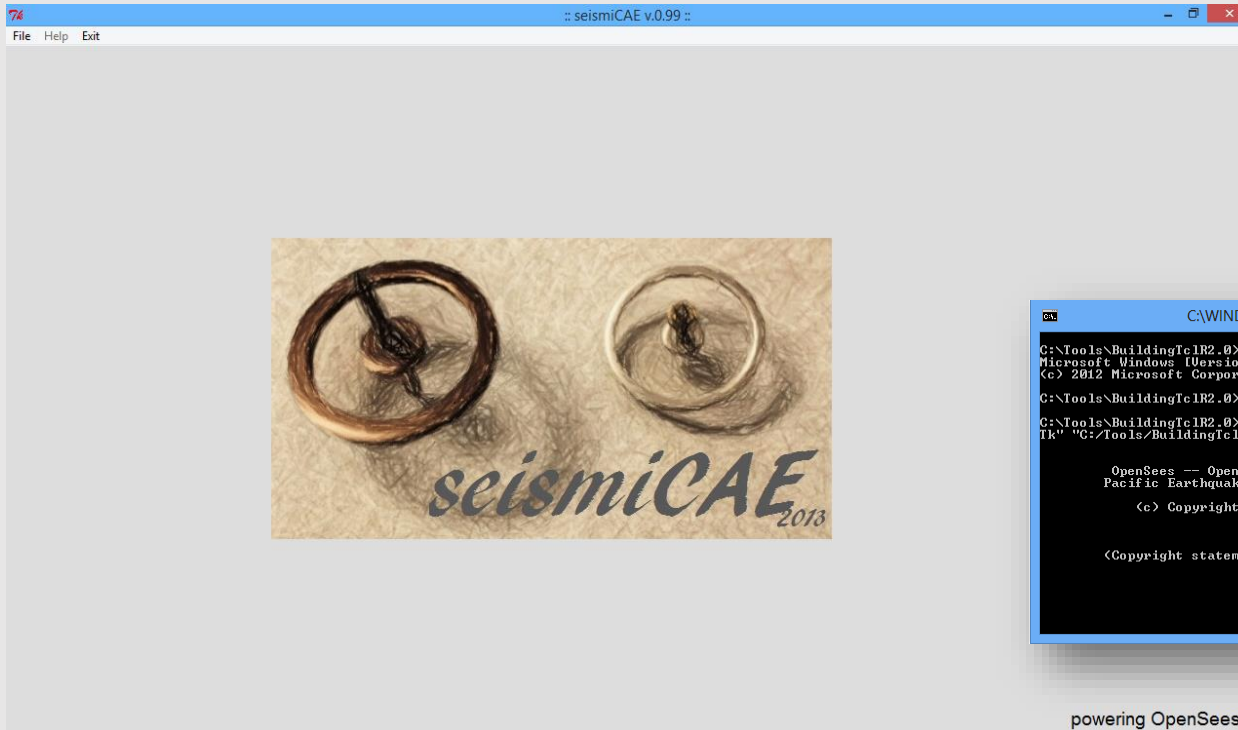
Interesting Example

```
addModelData ModelLabel "SMRFsetbacks"
addModelData ModelDescription "SMRF Elevation at Grid Line A and D with Setbacks"
addModelData ModelPlaneType Elevation
addModelData -GridLines GridLine "A" GridColumnLines "3 5 4.5 5.5 6.5 7.5 8.5 9.5"
addModelData -GridLines GridLine "D" GridColumnLines "9.5 8.5 7.5 6.5 5.5 4.5 3.5"
addModelData -Geometry Height 18*\$ft Story "1"
addModelData -Geometry Height 14*\$ft StoryRange "2 18"
addModelData -Geometry Height 16*\$ft Story "19"
addModelData -Geometry Width 40*\$ft BayRange "1 6"
addModelData -Columns SectionLabel W24x370 ColumnLine "1 7" Story "1"
addModelData -Columns SectionLabel W24x335 ColumnLine "1 7" StoryRange "2 13"
addModelData -Columns SectionLabel W24x279 ColumnLine "2 6" Story "1"
addModelData -Columns SectionLabel W24x250 ColumnLine "2 6" StoryRange "2 15"
addModelData -Columns SectionLabel W24x279 ColumnLineRange "3 5" Story "1"
addModelData -Columns SectionLabel W24x250 ColumnLineRange "3 5" StoryRange "2 18"
addModelData -Columns SectionLabel W24x192 ColumnLineRange "3 5" Story "19"
addModelData -Beams SectionLabel "W30x124 W30x173 W30x173 W30x173 W30x173 W30x108" FloorRange "2 4"
addModelData -Beams SectionLabel "W30x124 W30x173 W30x173 W30x173 W30x173 W30x124" FloorRange "5 7"
addModelData -Beams SectionLabel "W30x173 W30x173 W30x173 W30x173 W30x173 W30x124" Floor "8 9"
addModelData -Beams SectionLabel W30x132 BayRange "1 6" FloorRange "10 14"
addModelData -Beams SectionLabel W30x132 BayRange "2 5" FloorRange "15 16"
addModelData -Beams SectionLabel W30x148 BayRange "3 4" FloorRange "17 19"
addModelData -Beams SectionLabel W30x148 BayRange "3 4" Floor "20"
addModelData -ChevronBraces SectionLabel "W30x148" Bay "1 6" StoryRange "1 9" Eccentricity "5.*\$ft"
addModelData -ChevronBraces SectionLabel "W12x14" BayRange "2 5" StoryRange "1 14"
addModelData SupportBC fix
addModelData TributaryWidth 7*\$ft
addModelData -GravityLoad LoadLabel DL1 Floor "2 3" DistributedLoad 74*\$psf
addModelData -GravityLoad LoadLabel DL1 FloorRange "4 19" DistributedLoad 74*\$psf
addModelData -GravityLoad LoadLabel DL1 Floor "20" DistributedLoad 60*\$psf
addModelData -GravityLoad LoadLabel DL2 FloorRange "2 19" DistributedLoad 74*\$psf
addModelData -GravityLoad LoadLabel DL2 Floor "20" DistributedLoad 60*\$psf
addModelData -GravityLoad LoadLabel LL1 FloorRange "2 19" DistributedLoad 74*\$psf
addModelData -GravityLoad LoadLabel LL1 Floor "20" DistributedLoad 60*\$psf
addModel
```



The Viewer

- Provide a graphical user interface for BuildingTcl input
- Provide capability of running OpenSees **real-time**
- Visualization of Input / real-time response / output
- Save GUI-generated input into BuildingTcl script file &/or OpenSees script



```
C:\WINDOWS\system32\cmd.exe - mybuildingtclviewer
C:\Tools\BuildingTclIR2.0>cmd
Microsoft Windows [Version 6.2.9200]
(c) 2012 Microsoft Corporation. All rights reserved.

C:\Tools\BuildingTclIR2.0>mybuildingtclviewer
C:\Tools\BuildingTclIR2.0>"C:/Tools/BuildingTclIR2.0/OpenSeesProgramFiles/OpenSeesTk" "C:/Tools/BuildingTclIR2.0/myBuildingTclViewer.tcl"

OpenSees -- Open System For Earthquake Engineering Simulation
Pacific Earthquake Engineering Research Center -- 2.4.0.4
(c) Copyright 1999 The Regents of the University of California
All Rights Reserved

<Copyright statement @ http://www.berkeley.edu/OpenSees/copyright.html>
```

powering OpenSees

New Input-Menu Format

File Input Analysis Results Help Exit

Material Section ElementType Model Load AnalysisModel LoadCombination

New Edit

New Material

Default Units:

Length: in; Force: kip; Time: sec

Material Model Label:

Select MaterialModelLabel

74 :: seismiCAE v.0.99 :: NewFile.tcl

File Input Analysis Results Help Exit

Material Section ElementType Model Load AnalysisModel LoadCombination

New Edit

Edit Material

Default Units:
Length: in; Force: kip; Time: sec

Material Label:
SteelMaterial_1

Material Model Label:
Steel

Input Arguments
Required Arguments
FY: Yield stress
66 OptionalUnits

Optional Arguments
E: Elastic Modulus
29000 *Skai OptionalUnits
f2: Stress/Force value in second envelope point
1.3*fy OptionalUnits
eps2: Strain/Deformation value in second envelope point
0.014 OptionalUnits
f3: Stress/Force value in third envelope point
OptionalUnits

Test Full 3

TestMaterialStrainRange (in/in)
0.000 0.050 0.100 range

Modify/Save

Save As...
Save As... SteelMaterial_1_1

Material Behavior

Stress (kip/in²)

Strain (in/in)

Material Arguments

OpenSees Material: Hysteretic
fy = 66
E = 2.9e+004
f2 = 65.8
eps2 = 0.014
f3 = 69.1
eps3 = 1
pinchX = 1
pinchY = 1
damage1 = 0
damage2 = 0
beta = 0.5
WeightDensity = 0

MIN
Strain: -5.600e-002 (in/in)
Stress: -8.594e+001 (kip/in²)

MAX
Strain: 5.600e-002 (in/in)
Stress: 8.594e+001 (kip/in²)

Materials

New Material

Default Units:
Lenth: in; Force: kip; Time: sec

Material Model Label:
Select Material Model Label

- Elastic
- Steel
- ConfinedConcrete**
- UnconfinedConcrete
- TrilinearHysteretic
- UnSymmetricTrilinear
- Steel02
- Rigid

Edit Material

Default Units:
Lenth: in; Force: kip; Time: sec

Material Label:
4ksiConfinedConcrete

Material Model Label:
ConfinedConcrete

Input Arguments

Required Arguments

Fc: nominal strength
4000.*\$psi OptionalUnits

Optional Arguments

rF0: Ratio of maximum strength to nominal strength -- confined
1.3 OptionalUnits

rFu: Ratio of residual strength to maximum strength -- confined
0.8 OptionalUnits

E: Elastic Modulus
57000.*\$psi* OptionalUnits

epsU: strain at crushing strength
-0.040 OptionalUnits

lambda: ratio between unloading slope at epscu and initial slope
0.1 OptionalUnits

fT: tensile strength

Test Real-Time Display (slower)

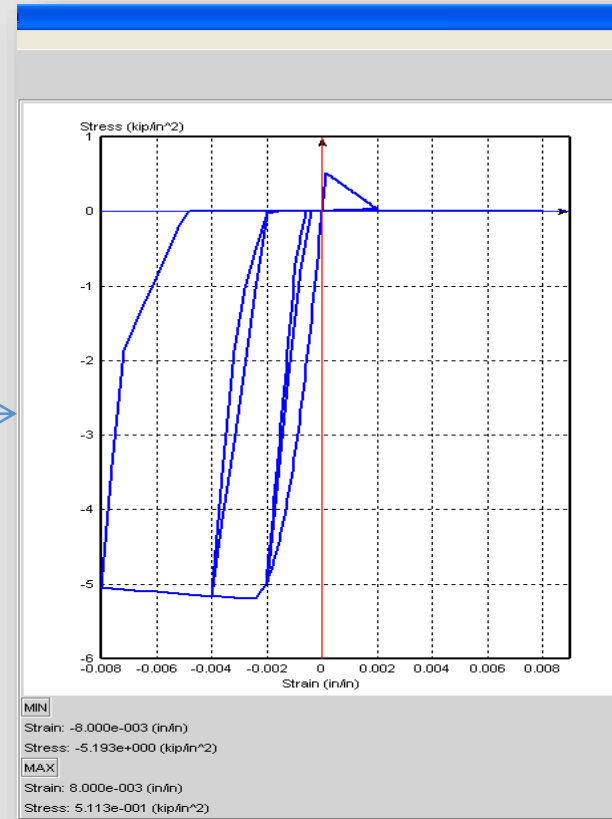
TestMaterialStrainRange (in/in)

0.010 range
0.000 0.050 0.100

Modify/Save

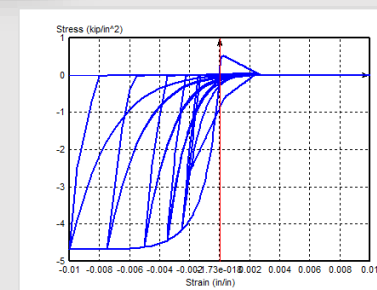
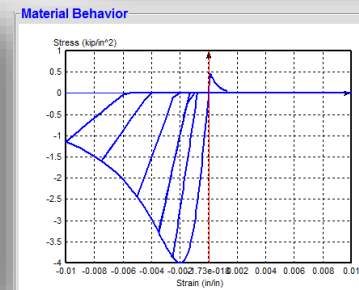
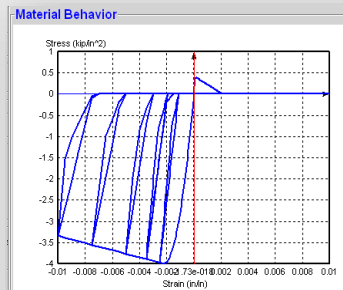
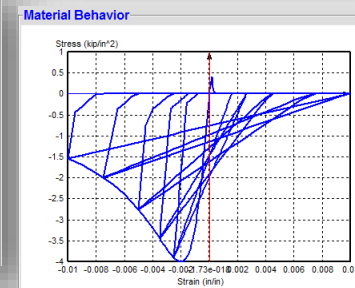
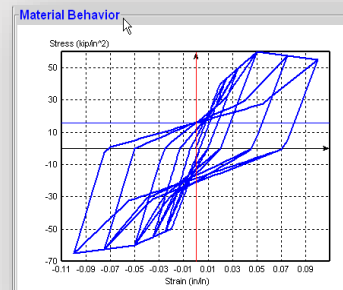
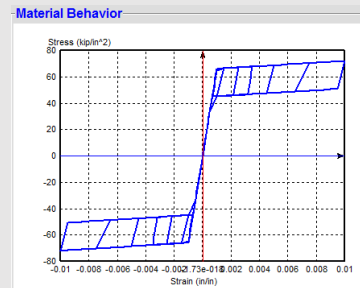
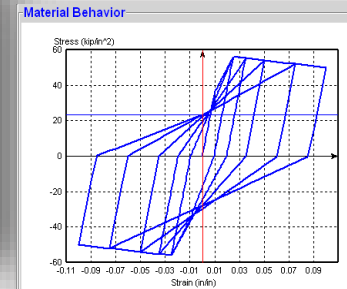
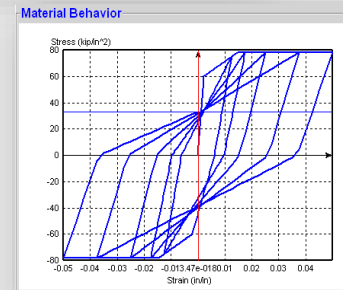
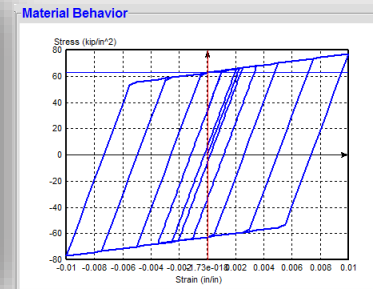
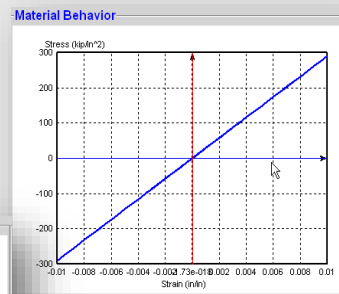
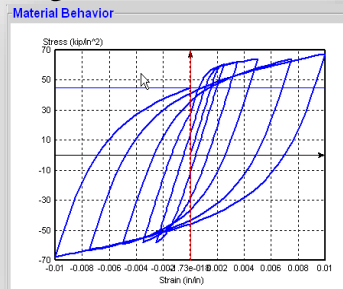
Save As...

Save As... 4ksiConfinedConcrete_1



Material Library

- Elastic
 - Elastic
 - ElasticNoTension
- Multilinear
 - Steel*
 - Bilinear & Multilinear
 - symmetric & not, define Ks or points
 - Steel01
 - Steel02
- Concrete
 - Confined Concrete*
 - Unconfined Concrete
 - Concrete01,02,03,04,06,07
- Additional
 - Viscous
 - SelfCentering
- Combined
 - Series
 - Parallel
- nDMaterial
 - Elastic Isotropic
 - Etc.



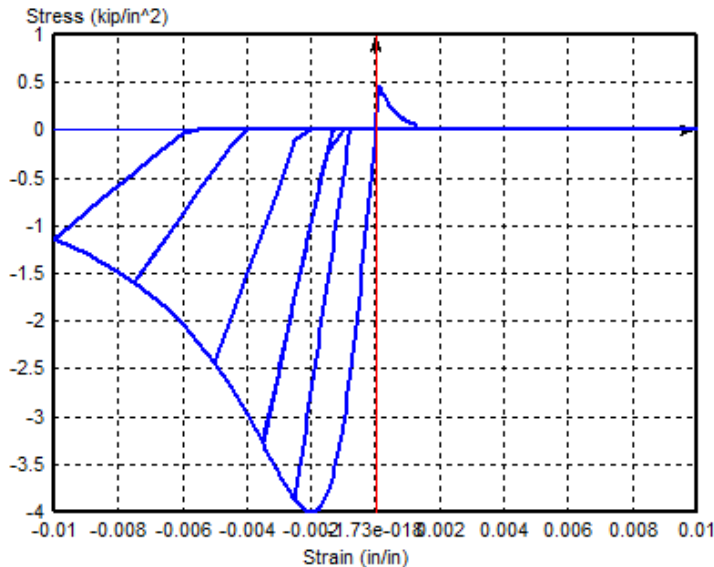
Simplified Input

Material Model Label:
Concrete04

Input Arguments
Unique Material Label:
Concrete04Material

Required Arguments
Fc: nominal strength
4 ksi

Material Behavior



Optional Arguments

rFc: Ratio of maximum strength to nominal strength -- confinement
1.0 OptionalUnits

ec: strain at maximum strength
 $-\text{pow}(\$rFc*\text{abs}(\$Fc)/\$ps$ OptionalUnits

ecu: strain at crushing strength
0.2 OptionalUnits

Ec: initial stiffness
 $57000.*\$psi*\text{sqrt}(\$rFc*ab$ OptionalUnits

fct: maximum tensile strength
 $7.5*\$psi*\text{sqrt}(\$rFc*\text{abs}(\$$ OptionalUnits

et: ultimate tensile strain
 $5.*2.*\$fct/\Ec OptionalUnits

beta: exponential curve parameter to define the residual stress (a
0.1 OptionalUnits

MaterialDescription: ""
OptionalUnits

BuildingTcl Viewer – Sections

New Section

Default Units:

Length: in; Force: kip; Time: sec

Section Model Label:

Select Section

- Elastic
- ElasticRectangular
- RCRectangularFiber**
- AISCWideFlangeElastic
- AISCWideFlangeFiber
- CustomWideFlangeElastic
- CustomWideFlangeFiber

Edit Section

Default Units:

Length: in; Force: kip; Time: sec

Section Label:

30x60RCRectangularFiber

Section Model Label:

RCRectangularFiber

Input Arguments

Required Arguments

B: Section Width

30" in Optional Units

H: Section Depth

60" in Optional Units

CoverMaterialLabel: Previously-Defined Material Label for Concrete

4ksiUnconfinedConcrete

CoreMaterialLabel: Previously-Defined Material Label for Core Concrete

4ksiConfinedConcrete

ReinMaterialLabel: Previously-Defined Material Label for Reinforcing Steel

60ksiReinforcingSteel

Optional Arguments

NBarTop: Number of Reinf. Bars in Top Layer

4

NBarBot: Number of Reinf. Bars in Bottom Layer

6

NBarInt: Number of Reinf. Bars in Each Intermediate Layer

6

BarSizeTop: Size Label of Reinf. Bars in Top Layer

#11

BarSizeBot: Size Label of Reinf. Bars in Bottom Layer

#9

BarSizeInt: Size Label of Reinf. Bars in Intermediate Layer

#6

Test

Real-Time Display (slower)

TestSectionAxialForce (kip)

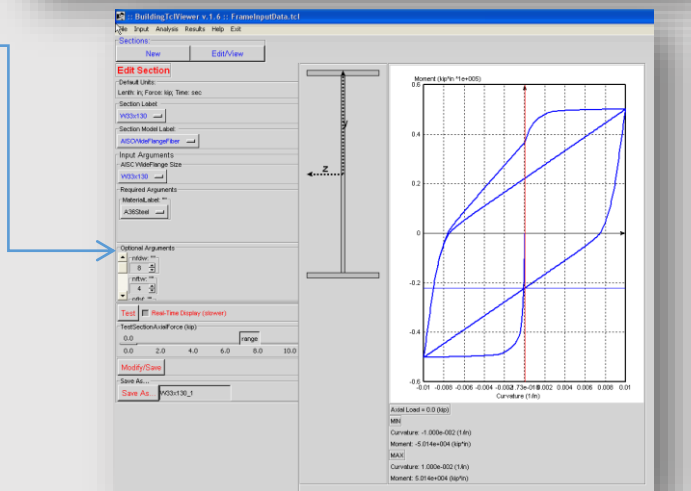
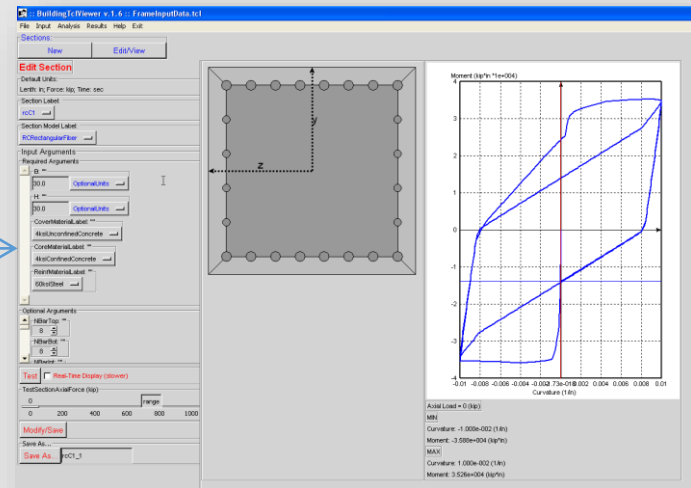
0.0

0.0 2.0 4.0 6.0 8.0 10.0

Modify/Save

Save As...

Save As... 30x60RCRectangularFiber



Minimal Section Input

Section Model Label:

RCRectangularFiber

Input Arguments

Unique Section Label:

RCRectangularFiberSecti

Required Arguments

Required Arguments

B: Section Depth

40

in

H: Section Width

60

in

CoverMaterialLabel: Previously-Defined Material Label for Core

UnconfinedConcreteMaterial

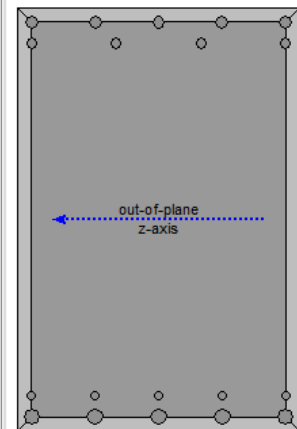
CoreMaterialLabel: Previously-Defined Material Label for Core

ConfinedConcreteMaterial

ReinMaterialLabel: Previously-Defined Material Label for Reinforcement

SteelMaterial

Section Geometry



Optional Arguments

NBarTop: Number of Reinf. Bars in Top Layer

0

BarSizeTop: Size Label of Reinf. Bars in Top Layer

#9

NBarTop: Number of Reinf. Bars in Second Top Layer

0

BarSizeTop: Size Label of Reinf. Bars in Second Top Layer

#9

NBarBot: Number of Reinf. Bars in Bottom Layer

0

BarSizeBot: Size Label of Reinf. Bars in Bottom Layer

#9

NBarBot: Number of Reinf. Bars in Second Bottom Layer

0

BarSizeBot: Size Label of Reinf. Bars in in Second Bottom Layer

#9

NBarInt: Number of Reinf. Bars in Each Intermediate Layer

0

BarSizeInt: Size Label of Reinf. Bars in Intermediate Layer

#9

LayerSpacingTop: Spacing Between Top Reinforcing Layers

3.*\$in

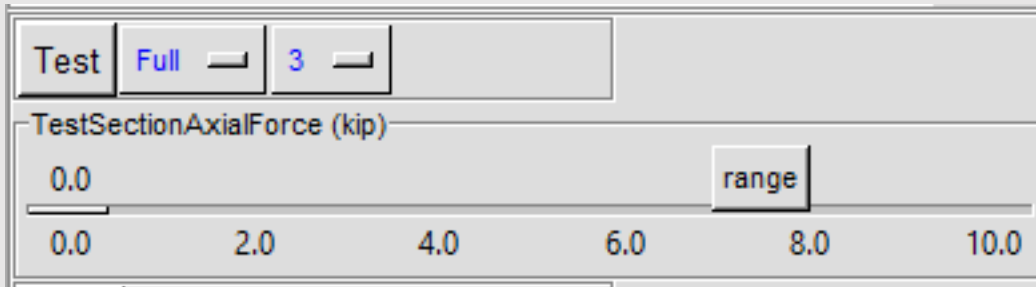
OptionalUnits

LayerSpacingBot: Spacing Between Bottom Reinforcing Layers

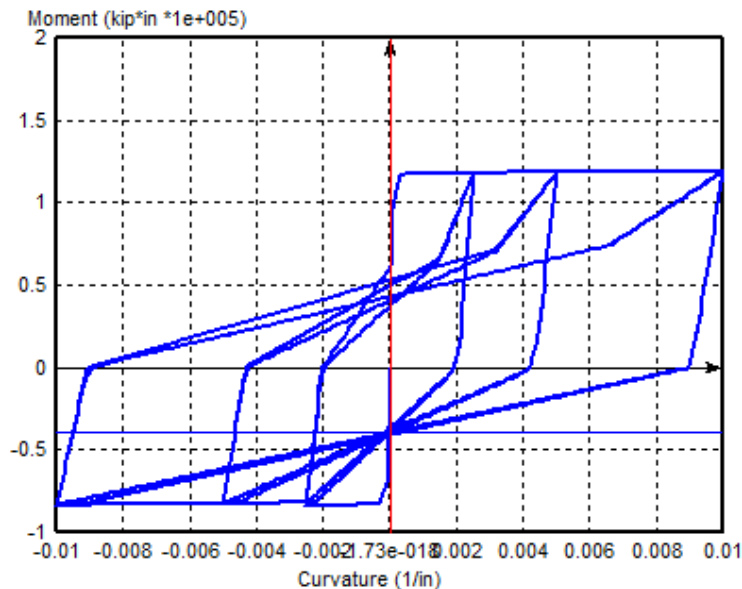
3.*\$in

OptionalUnits

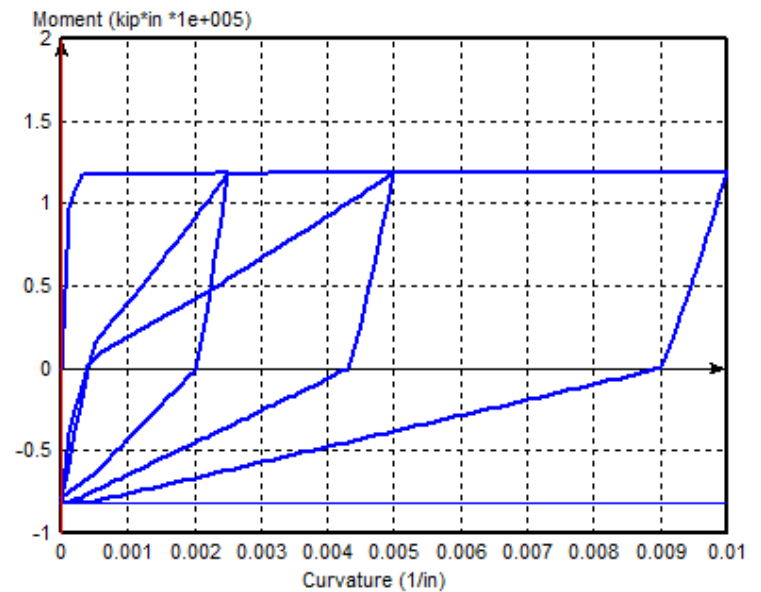
Test Section Behavior



Section Behavior



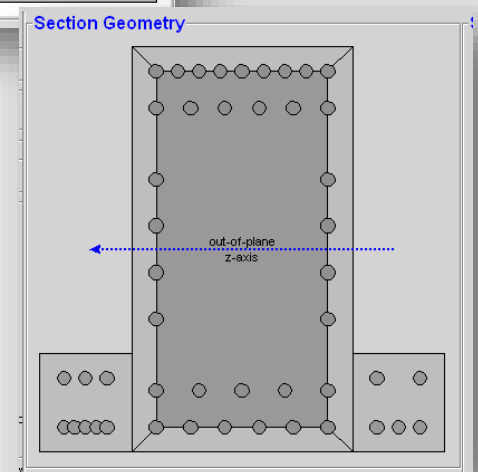
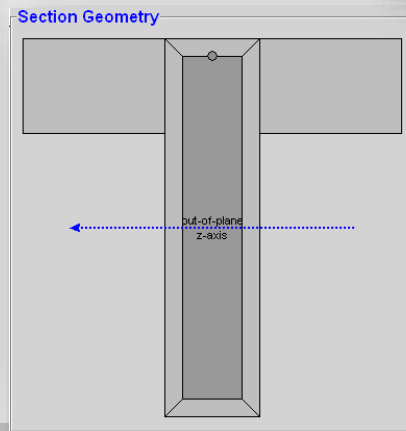
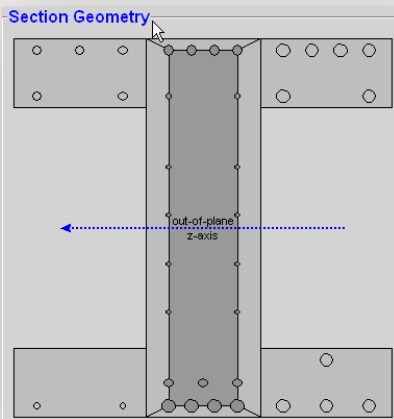
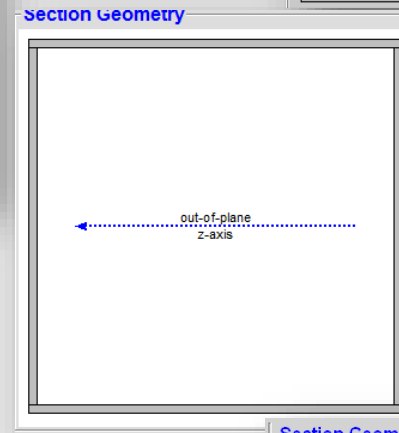
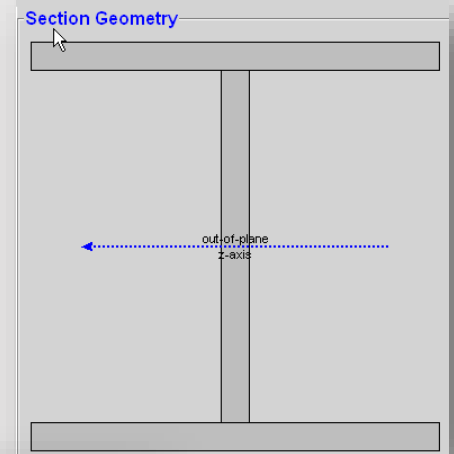
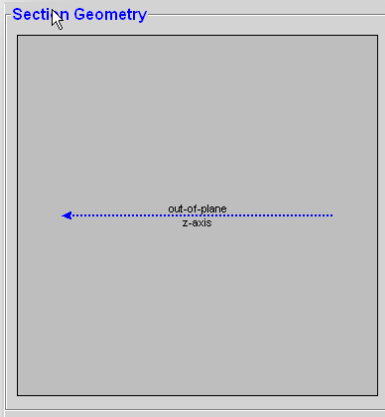
Section Behavior



Axial Load = 0.0 (kip)

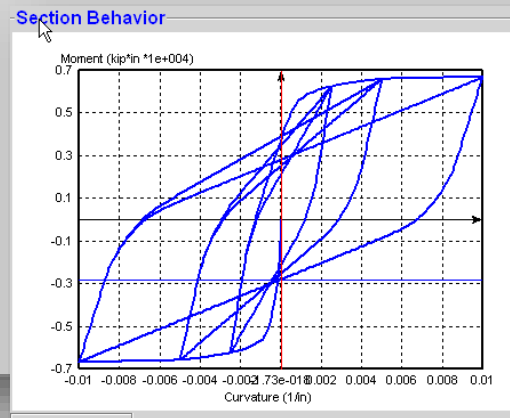
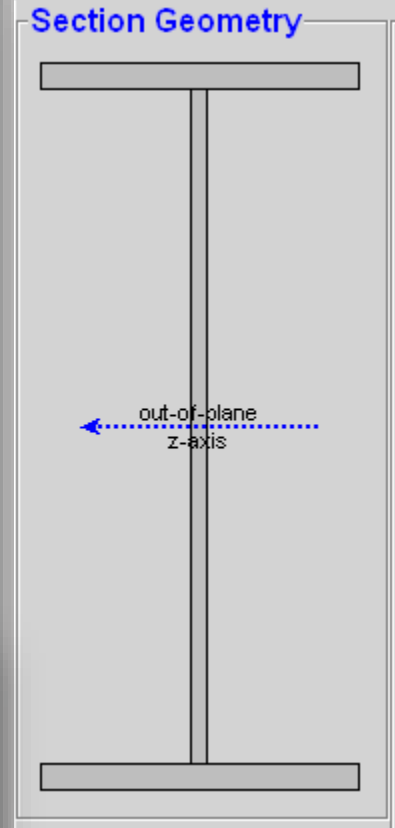
Library of Section Models

- Aggregator
- RectFiber
- RC
- Uniaxial
- AISCWideFlange
- Custom WideFlange
- HSS
- Etc.



AISC Standard Wide Flange Sections

Label	Properties
W44	
W40	
W36	
W33	W36X798 (A = {235*\$in2} D = {42*\$in} Bf = {18*\$in} Tf = {4.29*\$in} Tw = {2.38*\$in} bxx = {62600*\$in4} lyy = {4200*\$in4} lzz = {62600*\$in4})
W30	W36X650 (A = {191*\$in2} D = {40.5*\$in} Bf = {17.6*\$in} Tf = {3.54*\$in} Tw = {1.97*\$in} bxx = {48900*\$in4} lyy = {3230*\$in4} lzz = {48900*\$in4})
W27	W36X527 (A = {155*\$in2} D = {39.2*\$in} Bf = {17.2*\$in} Tf = {2.91*\$in} Tw = {1.61*\$in} bxx = {38300*\$in4} lyy = {2490*\$in4} lzz = {38300*\$in4})
W24	W36X439 (A = {129*\$in2} D = {38.3*\$in} Bf = {17*\$in} Tf = {2.44*\$in} Tw = {1.36*\$in} bxx = {31000*\$in4} lyy = {1990*\$in4} lzz = {31000*\$in4})
W21	W36X393 (A = {116*\$in2} D = {37.8*\$in} Bf = {16.8*\$in} Tf = {2.2*\$in} Tw = {1.22*\$in} bxx = {27500*\$in4} lyy = {1750*\$in4} lzz = {27500*\$in4})
W14	W36X359 (A = {105*\$in2} D = {37.4*\$in} Bf = {16.7*\$in} Tf = {2.01*\$in} Tw = {1.12*\$in} bxx = {24800*\$in4} lyy = {1570*\$in4} lzz = {24800*\$in4})
W18	W36X256 (A = {75.4*\$in2} D = {37.4*\$in} Bf = {12.2*\$in} Tf = {1.73*\$in} Tw = {0.96*\$in} bxx = {16800*\$in4} lyy = {528*\$in4} lzz = {16800*\$in4})
W16	W36X328 (A = {96.4*\$in2} D = {37.1*\$in} Bf = {16.6*\$in} Tf = {1.85*\$in} Tw = {1.02*\$in} bxx = {22500*\$in4} lyy = {1420*\$in4} lzz = {22500*\$in4})
W12	W36X232 (A = {68.1*\$in2} D = {37.1*\$in} Bf = {12.1*\$in} Tf = {1.57*\$in} Tw = {0.87*\$in} bxx = {15000*\$in4} lyy = {468*\$in4} lzz = {15000*\$in4})
W10	W36X300 (A = {88.3*\$in2} D = {36.7*\$in} Bf = {16.7*\$in} Tf = {1.68*\$in} Tw = {0.945*\$in} bxx = {20300*\$in4} lyy = {1300*\$in4} lzz = {20300*\$in4})
W8	W36X210 (A = {61.8*\$in2} D = {36.7*\$in} Bf = {12.2*\$in} Tf = {1.36*\$in} Tw = {0.83*\$in} bxx = {13200*\$in4} lyy = {411*\$in4} lzz = {13200*\$in4})
W6	W36X280 (A = {82.4*\$in2} D = {36.5*\$in} Bf = {16.6*\$in} Tf = {1.57*\$in} Tw = {0.885*\$in} bxx = {18900*\$in4} lyy = {1200*\$in4} lzz = {18900*\$in4})
W5	W36X194 (A = {57*\$in2} D = {36.5*\$in} Bf = {12.1*\$in} Tf = {1.26*\$in} Tw = {0.765*\$in} bxx = {12100*\$in4} lyy = {375*\$in4} lzz = {12100*\$in4})
W4	W36X260 (A = {76.5*\$in2} D = {36.3*\$in} Bf = {16.6*\$in} Tf = {1.44*\$in} Tw = {0.84*\$in} bxx = {17300*\$in4} lyy = {1090*\$in4} lzz = {17300*\$in4})
S8	W36X182 (A = {53.6*\$in2} D = {36.3*\$in} Bf = {12.1*\$in} Tf = {1.18*\$in} Tw = {0.725*\$in} bxx = {11300*\$in4} lyy = {347*\$in4} lzz = {11300*\$in4})
S6	W36X170 (A = {50.1*\$in2} D = {36.2*\$in} Bf = {12*\$in} Tf = {1.1*\$in} Tw = {0.68*\$in} bxx = {10500*\$in4} lyy = {320*\$in4} lzz = {10500*\$in4})
S5	W36X245 (A = {72.1*\$in2} D = {36.1*\$in} Bf = {16.5*\$in} Tf = {1.35*\$in} Tw = {0.8*\$in} bxx = {16100*\$in4} lyy = {1010*\$in4} lzz = {16100*\$in4})
S4	W36X160 (A = {47*\$in2} D = {36*\$in} Bf = {12*\$in} Tf = {1.02*\$in} Tw = {0.65*\$in} bxx = {9760*\$in4} lyy = {295*\$in4} lzz = {9760*\$in4})
S3	W36X230 (A = {67.6*\$in2} D = {35.9*\$in} Bf = {16.5*\$in} Tf = {1.26*\$in} Tw = {0.76*\$in} bxx = {15000*\$in4} lyy = {940*\$in4} lzz = {15000*\$in4})
S24	W36X150 (A = {44.2*\$in2} D = {35.9*\$in} Bf = {12*\$in} Tf = {0.94*\$in} Tw = {0.625*\$in} bxx = {9040*\$in4} lyy = {270*\$in4} lzz = {9040*\$in4})
S20	W36X135 (A = {39.7*\$in2} D = {35.6*\$in} Bf = {12*\$in} Tf = {0.79*\$in} Tw = {0.6*\$in} bxx = {7800*\$in4} lyy = {225*\$in4} lzz = {7800*\$in4})



RC WideFlangeFiber

BuildingTclViewer v.1.9 :: GettingStartedDataFile.tcl

File Input Analysis Results Help Exit

Sections:

New Section

Default Units:
 Lenht: in, Force: kip, Time: sec

Section Model Label:
 RCWideFlangeFiber

Input Arguments
 Unique Section Label:
 RCWideFlangeFiberSectic

Required Arguments

tf: Flange Thickness

tw: Web Thickness

CoverMaterialLabel: Previously-Defined Material Label for Co

CoreMaterialLabel: Previously-Defined Material Label for Cov

ReinfMaterialLabel: Previously-Defined Material Label for Rei

FlangeReinfMaterialLabel: Previously-Defined Material Label

Optional Arguments

nfCoreH: Number of core fibers along depth

nfCoreB: Number of core fibers along width

nfCoverH: Number of cover fibers along depth

nfCoverB: Number of cover fibers along width

nu:

J: Torsional Moment of Inertia

Test RealTime

TestSectionAxialForce (kip)

0.0 2.0 4.0 6.0 8.0 10.0

Section Geometry

Diagram showing the cross-section geometry of a wide flange beam. The central vertical axis is labeled "out-of-plane z-axis". Reinforcement bars are shown in the flanges and web.

Section Behavior

Graph showing the Moment (kip*in *1e+004) versus Curvature (1/in) for the section. The plot displays a hysteretic loop, indicating the behavior under cyclic loading. The y-axis ranges from -1 to 2, and the x-axis ranges from -0.01 to 0.01.

MIN
 Curvature: -1.000e-002 (1/in)
 Moment: -9.006e+003 (kip*in)

MAX
 Curvature: 9.630e-003 (1/in)
 Moment: 1.547e+004 (kip*in)

Axial Load = 1.2 (kip)

Section Arguments

OpenSees Section : Fiber

bf = 33
 d = 33
 tf = 6
 tw = 10

CoverMaterialLabel = 4ksiUnconfinedConcrete
 CoreMaterialLabel = 4ksiConfinedConcrete
 ReinfMaterialLabel = 60ksiReinforcingSteel
 FlangeReinfMaterialLabel = 4ksiUnconfinedConcrete

NBarTop = 4
 BarSizeTop = #7
 NBarTopI = 2
 BarSizeTopI = #4
 NBarBot = 4
 BarSizeBot = #9
 NBarBotI = 3
 BarSizeBotI = #6
 NBarInt = 4
 BarSizeInt = #3
 NBarTopFlangeL = 3
 BarSizeTopFlangeL = #6
 NBarTopFlangeLI = 2
 BarSizeTopFlangeLI = #6
 NBarTopFlangeR = 4
 BarSizeTopFlangeR = #9
 NBarTopFlangeRI = 2
 BarSizeTopFlangeRI = #9
 NBarBotFlangeL = 2
 BarSizeBotFlangeL = #4
 NBarBotFlangeLI = 0
 BarSizeBotFlangeLI = #9
 NBarBotFlangeR = 3
 BarSizeBotFlangeR = #9
 NBarBotFlangeRI = 1
 BarSizeBotFlangeRI = #9
 LayerSpacingTop = 4
 LayerSpacingBot = 2

Uncoupled-Response Sections

New Section

Default Units: _____
Lenth: in; Force: kip; Time: sec

Section Model Label:
ColumnHinge

Input Arguments

Unique Section Label:
ColumnHingeSection

Optional Arguments

ShearModelLabel: Previously-Defined Material Label for Shear
Rigid

BendingModelLabel: Previously-Defined Material Label for Bending
Rigid

SectionDescription: ""
OptionalUnits

Section Model Label: _____

Uncoupled

Input Arguments

Unique Section Label:
UncoupledSection

Optional Arguments

xForceModelLabel: Previously-Defined Material Label for Axial Force
Rigid

yForceModelLabel: Previously-Defined Material Label for Shear Force
Rigid

zForceModelLabel: Previously-Defined Material Label for Shear Force
Rigid

xMomentModelLabel: Previously-Defined Material Label for Torsion
Rigid

yMomentModelLabel: Previously-Defined Material Label for Bending
Rigid

zMomentModelLabel: Previously-Defined Material Label for Bending
Rigid

- Support Springs
- Column-End Hinges (Bending &/or Shear)

ElementTypes

- truss
- corotationalTruss
- elasticBeamColumn
- nonlinearBeamColumn
- dispBeamColumn
- beamWithHinges
- ColumnHinge
- BeamHinge
- Quad
- ShellMITC4
- Bearing
- SupportSpring

ElementModelLabel:

Input Arguments

Unique ElementType Label:

Optional Arguments

TransformationType: ""

PlasticHingeLengthModelLabel: ""

Point08L

ElementTy

NIntegrationPoints: ""

ElementTypeDescription: ""

ElementModelLabel:

Input Arguments

Unique ElementType Label:

Optional Arguments

TransformationType: ""

PlasticHingeLengthModelLabel: ""

Point08L

ElementTy

- Mattock67
- Priestley96
- GaussLobatto5IntegrationWeights
- HOver1
- Point08L
- HOver2
- Berry06
- Point05L
- GaussLobattoIntegrationWeights

ElementModelLabel:

Input Arguments

Unique ElementType Label:

Optional Arguments

ElementTypeDescription: ""



Structural Model

Three components

- Elevation – 2D, vertical
- Grid – 2D, horizontal
- 3DFrame
 - Assemble 2D Elevations on a 2D grid

Elevation Input

BuildingTclViewer v.1.8 :: FrameInputData.tcl

File Input Analysis Results Help Exit

Models: [New] [Edit/View]

Edit Model

Default Units: Length: in, Force: kip, Time: sec

Model Label: TransverseFrameOnLine1

ModelType: Elevation

Elevation: Plan, 3DFrame

Input Arguments: Geometry: No. Stories: 6, No. Bays: 3

Optional Arguments: ModeDescription: Transverse I, TributaryWidth: 10ft, SupportBC: fix, OutOfPlaneSupportBC: fix, RigidFloor: off, JointOffsetsSwitch: off

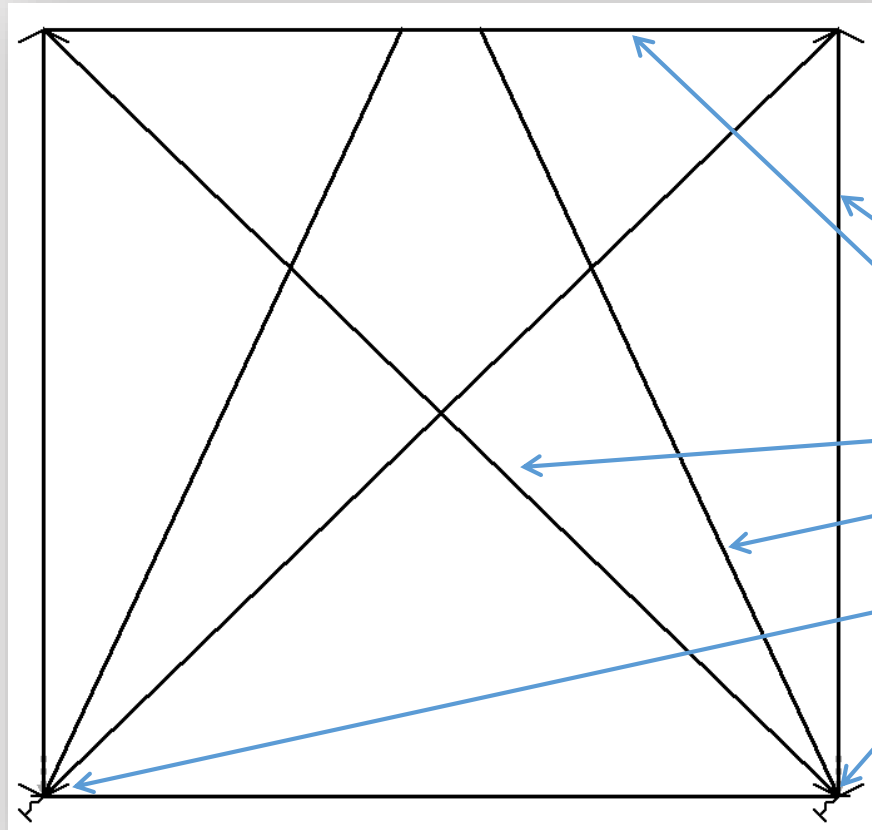
Modify/Save: Save As... Save As... TransverseFrameOnLine

Current Selection (Element): SectionLabel & Orient: W14x176 HorizAxisBending, ElementType: Default, Brace Eccentricity: 1.5ft, GravityLoadLabel: DL, GravityLoad Value: 1000 *Sps

View Tools: View Ghost Data, View Data, View Labels

SectionLabel ElementType Orient GravityLoad

Structural Elements



- Column
- Beam
- DiagonalBrace
- ChevronBrace
- ColumnHinge
- SupportSpring

Elevation-Model Input



BuildingTclViewer v.1.8 :: FrameInputData.tcl

File Input Analysis Results Help Exit

Models:
New Edit/View

Edit Model

Default Units:
Length: in; Force: kip; Time: sec

Model Label:
TransverseFrameOnLine1

ModelType:
Elevation
Plan
3DFrame

Input Arg:
No. Stories: 6 No. Bays: 3

Optional Arguments:
ModelDescription: ""
TributaryWidth: 10.0
SupportBC: fix
OutOfPlaneSupportBC: fix
RigidFloor: off
JointOffsetsSwitch: off

Modify/Save
Save As...
Save As: TransverseFrameOnLine

Current Selection (Element)
SectionLabel & Orient: W14x176 HorizAxisBending
ElementType: Default
Brace Eccentricity: 1.0
GravityLoadLabel: DL
GravityLoad Value: 1000.0

View Tools:
View Ghost Data View Data View Labels
SectionLabel ElementType Orient GravityLoad

Elevation Model Input

Model Variables

New Model

Default Units:

Length: in; Force: kip; Time: sec

Model Type Label:

Elevation

Input Arguments

Unique Model Label:

ElevationModel

Geometry

No. Stories

3

No. Bays

4

Optional Arguments

ModelDescription: ""

TributaryWidth: ""

1

SupportBC: ""

fix

OutOfPlaneSupportBC: ""

fix

RigidFloor: ""

off

JointOffsetsSwitch: ""

off

Geometry

No. Stories: 3, No. Bays: 4

Optional Arguments

- Default ElementType
- Default Column Element
- Default Column
- Default Beam Element
- Default Beam
- Default Diagonal Brace
- Default Brace
- Default Column Hinge
- Default Column Hinge
- Default Support Spring Element Type Label
- Default Support Spring
- Default Chevron Brace Element Type Label

DefaultNBC
DefaultBeam
DefaultBrace
DefaultNBCPDelta
✓ DefaultColumn
DefaultRCBWH
DefaultBracePDelta
DefaultRCBWHPDelta
DefaultBWH
DefaultColumnHinge
DefaultBWHPDelta
DefaultSupportSpring

Elevation-Model Input: Elements

The image displays the OpenSees software interface for defining structural elements. The top panel, titled "Current Selection (Element)", contains several input fields:

- SectionLabel & Orient:** A dropdown menu with "Select Section Label" highlighted in red. A mouse cursor is pointing at it, and a list of options is shown in a tooltip:
 - W12x16
 - 30x60RCRectangularFiber
 - 30x30RCRectangularFiber
 - AISC WSections
- ElementType:** A dropdown menu set to "Default".
- ShearModel:** A dropdown menu set to "Rigid".
- Brace Eccentricity:** A text input field containing "1.*\$ft".
- GravityLoadLabel:** A dropdown menu set to "DefaultGravity".
- GravityLoad Value:** A text input field containing "1000.*\$psf".

Below the input fields, a diagram shows a horizontal beam with a coordinate system (Y-axis pointing up) and two segments of length "14*\$ft".

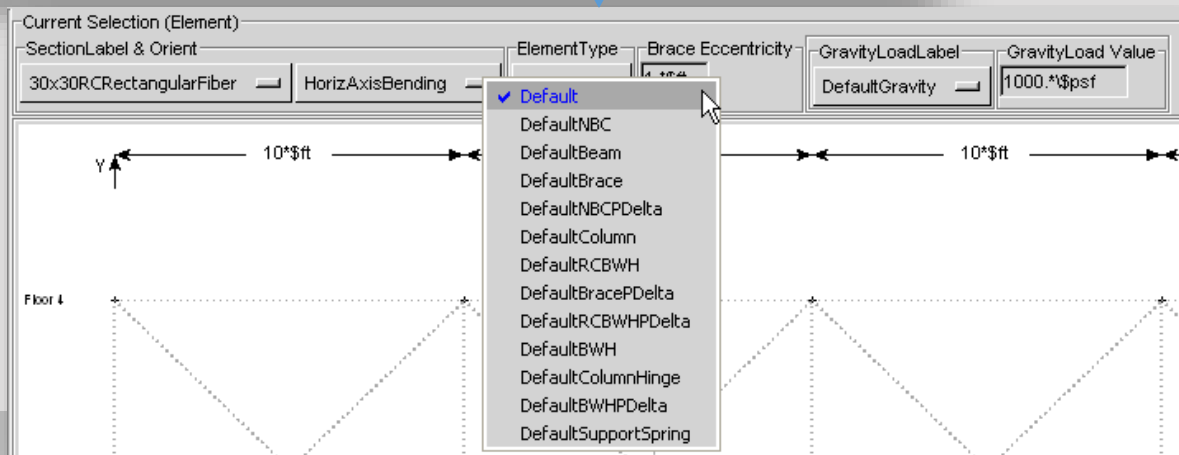
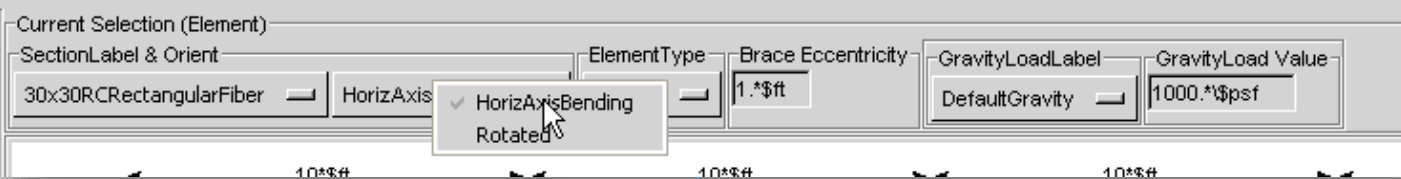
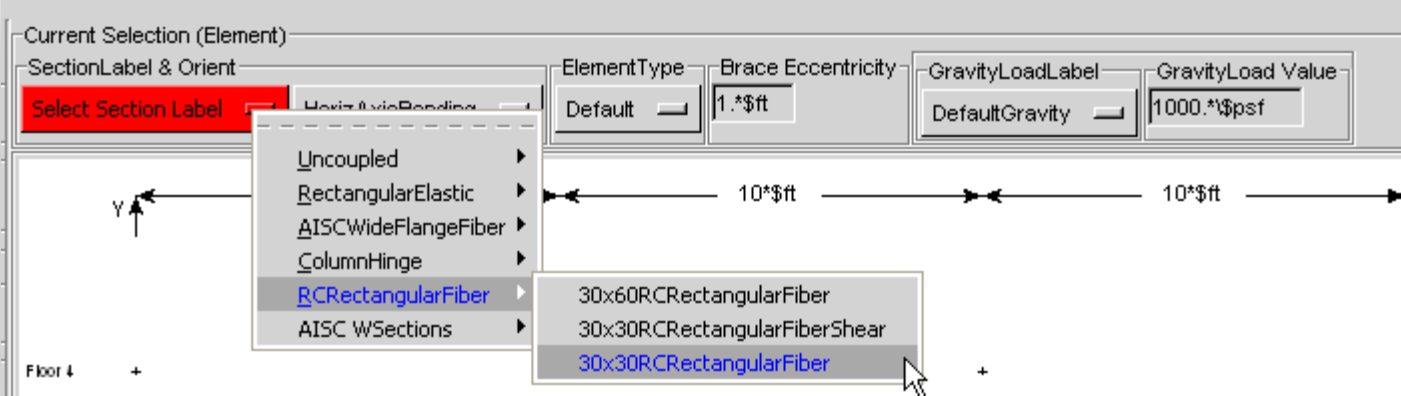
The bottom panel shows a larger structural grid with the following parameters:

- Current Selection (Element):** 30x30RCRectangularFiber
- SectionLabel & Orient:** HorizAxisBending
- ElementType:** Default
- ShearModel:** Rigid
- Brace Eccentricity:** 1.*\$ft
- GravityLoadLabel:** DefaultGravity
- GravityLoad Value:** 1000.*\$psf

The grid is defined by vertical columns (CL1 to CL6) and horizontal levels (Floor 1 to Floor 5). The horizontal spacing between columns is: 16*\$ft (CL1-CL2), 14*\$ft (CL2-CL3), 14*\$ft (CL3-CL4), 14*\$ft (CL4-CL5), and 16*\$ft (CL5-CL6). The vertical levels are labeled as Floor 1, Stly 1, Floor 2, Stly 2, Floor 3, Stly 3, Floor 4, Stly 4, and Floor 5.

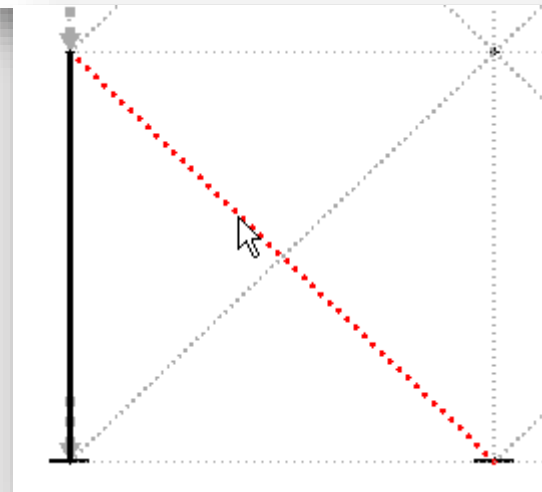
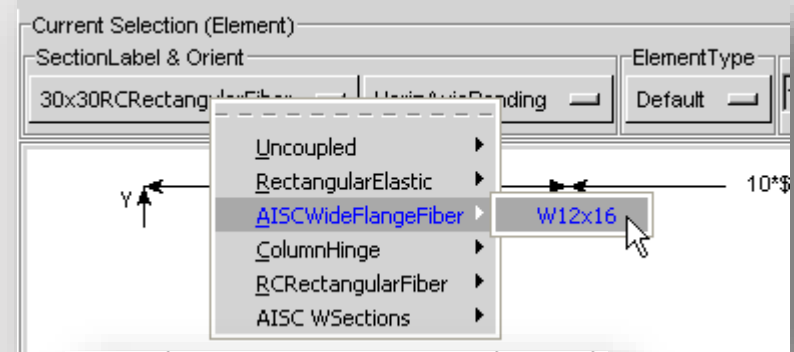
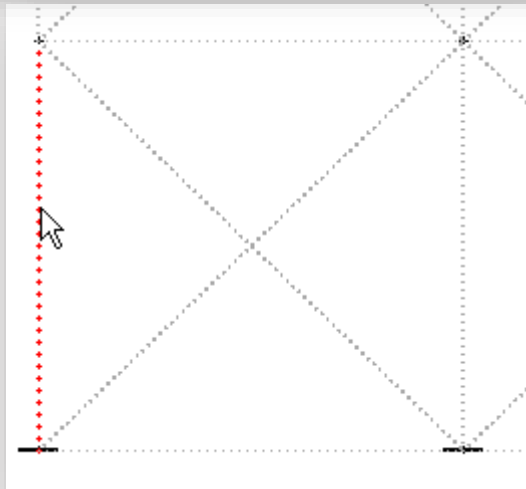
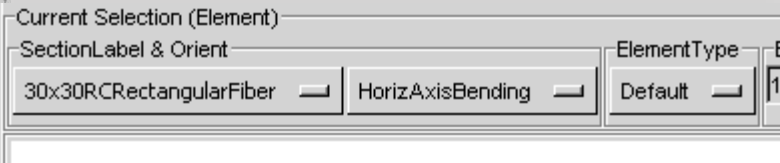
Elevation Model Input

Current-Selection Properties



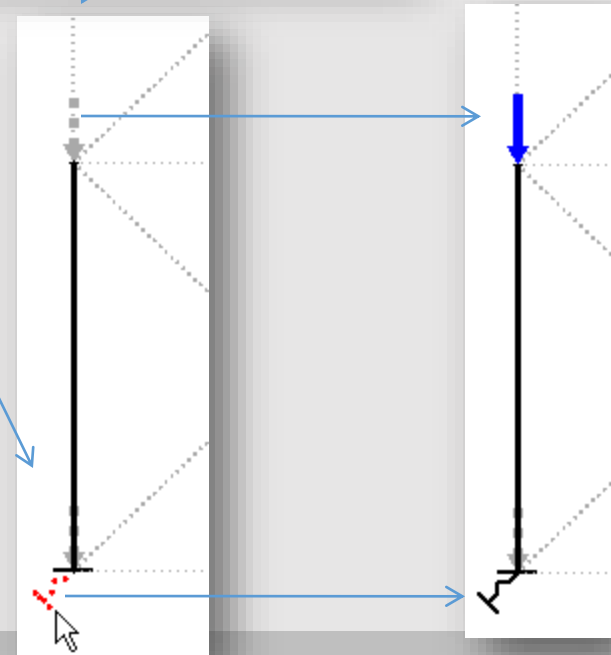
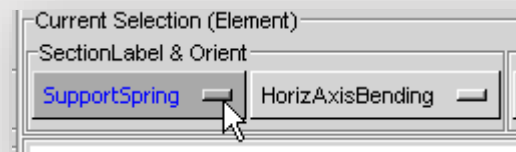
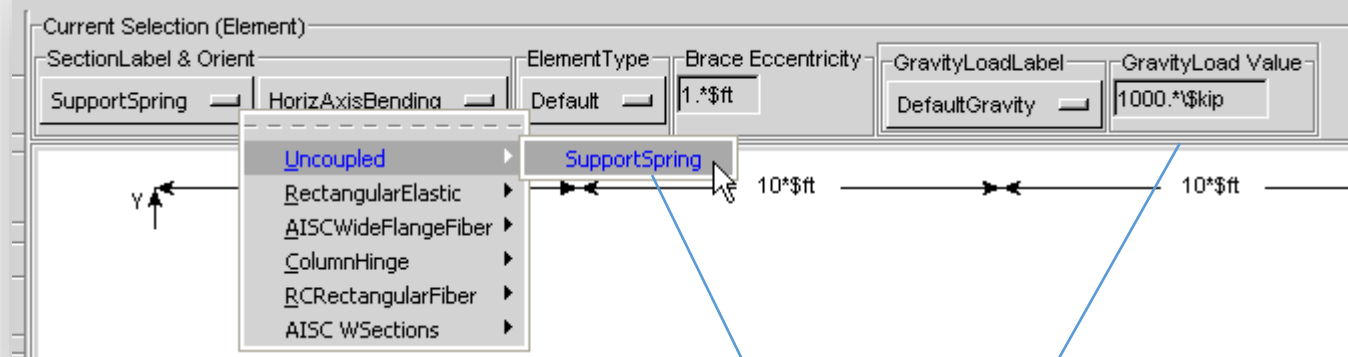
Elevation Model Input

Columns & Diagonal Braces

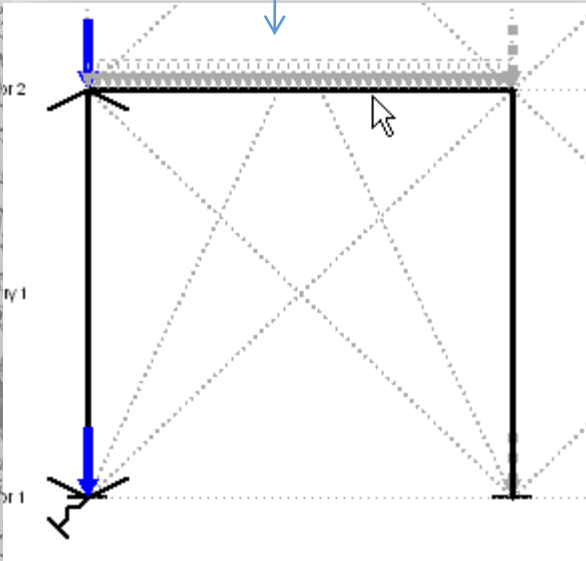
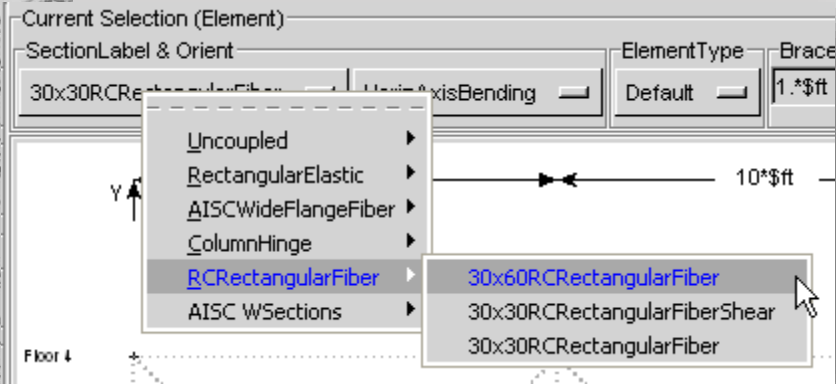


Elevation Model Input

Support Springs & Nodal Loads appear



Elevation Model Input *Beams*

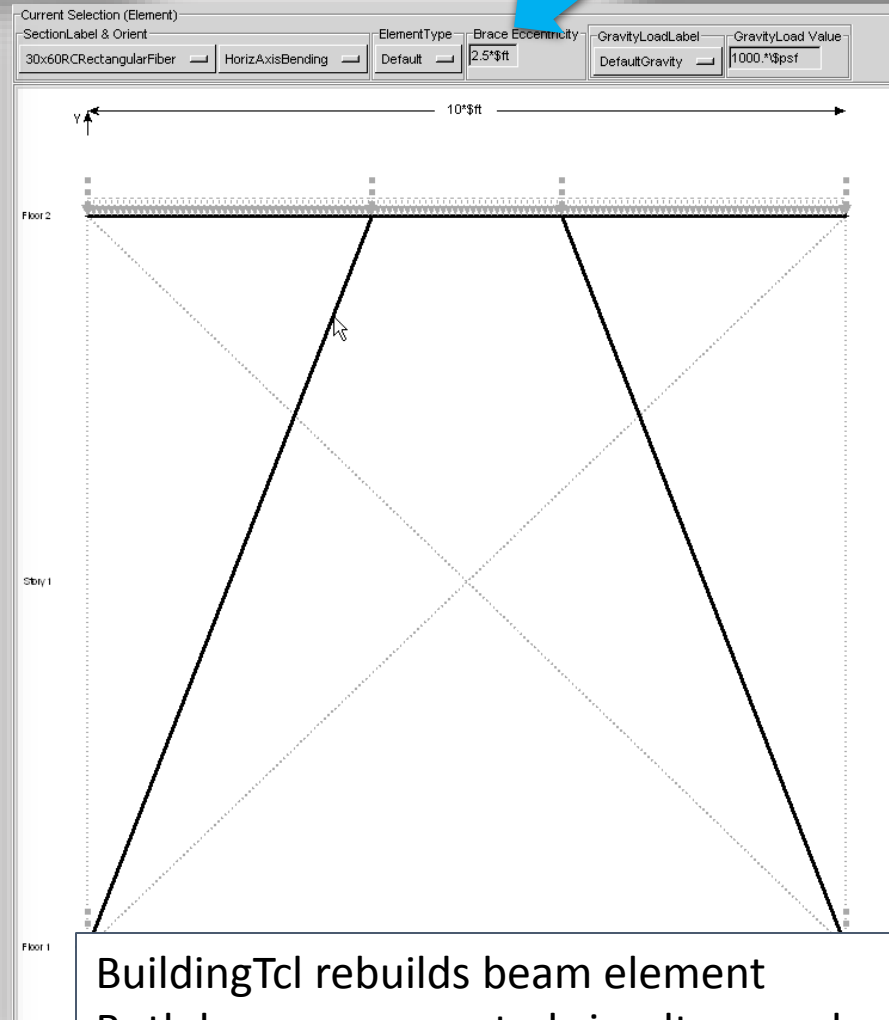
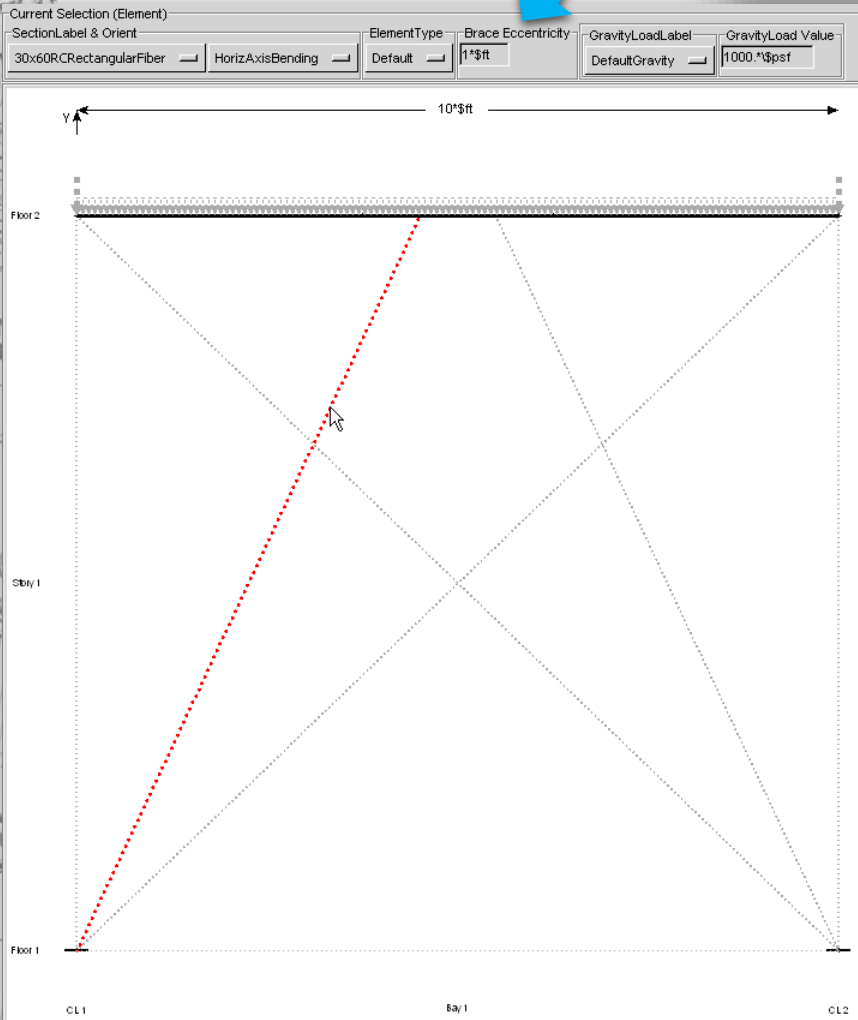
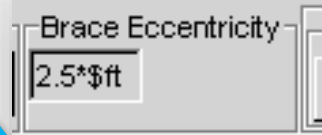


Once Beam has been defined,
user can define:

- Distributed gravity loads
- Chevron Braces

Elevation Model Input

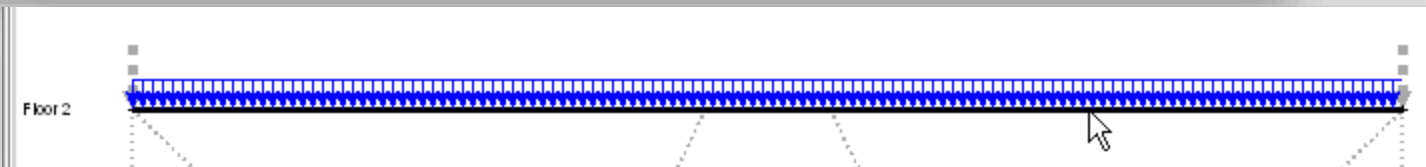
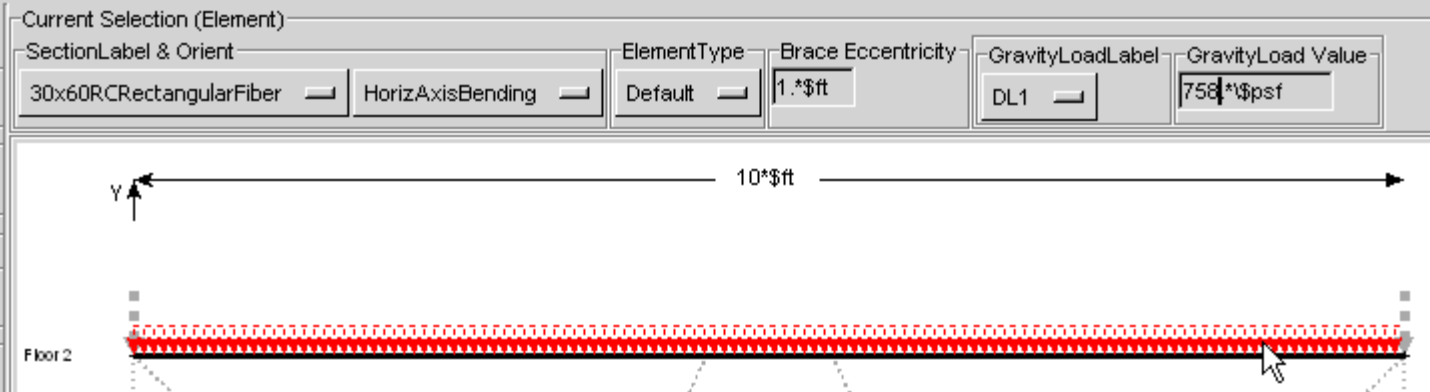
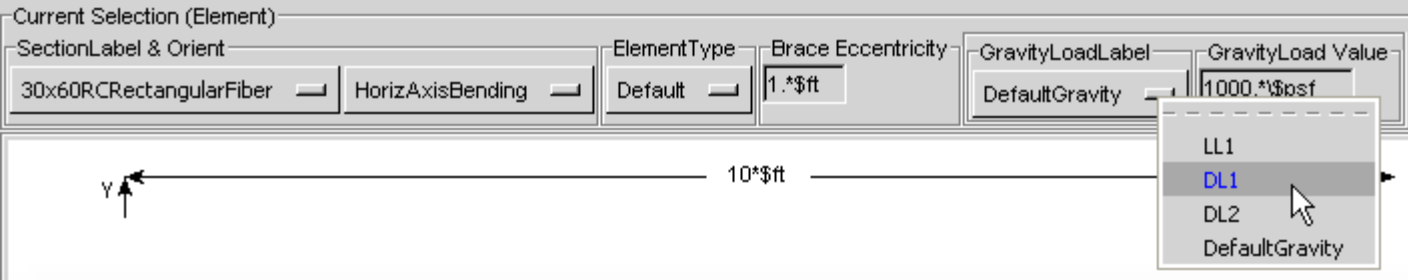
ChevronBraces



BuildingTcl rebuilds beam element
Both braces are created simultaneously

Elevation Model Input

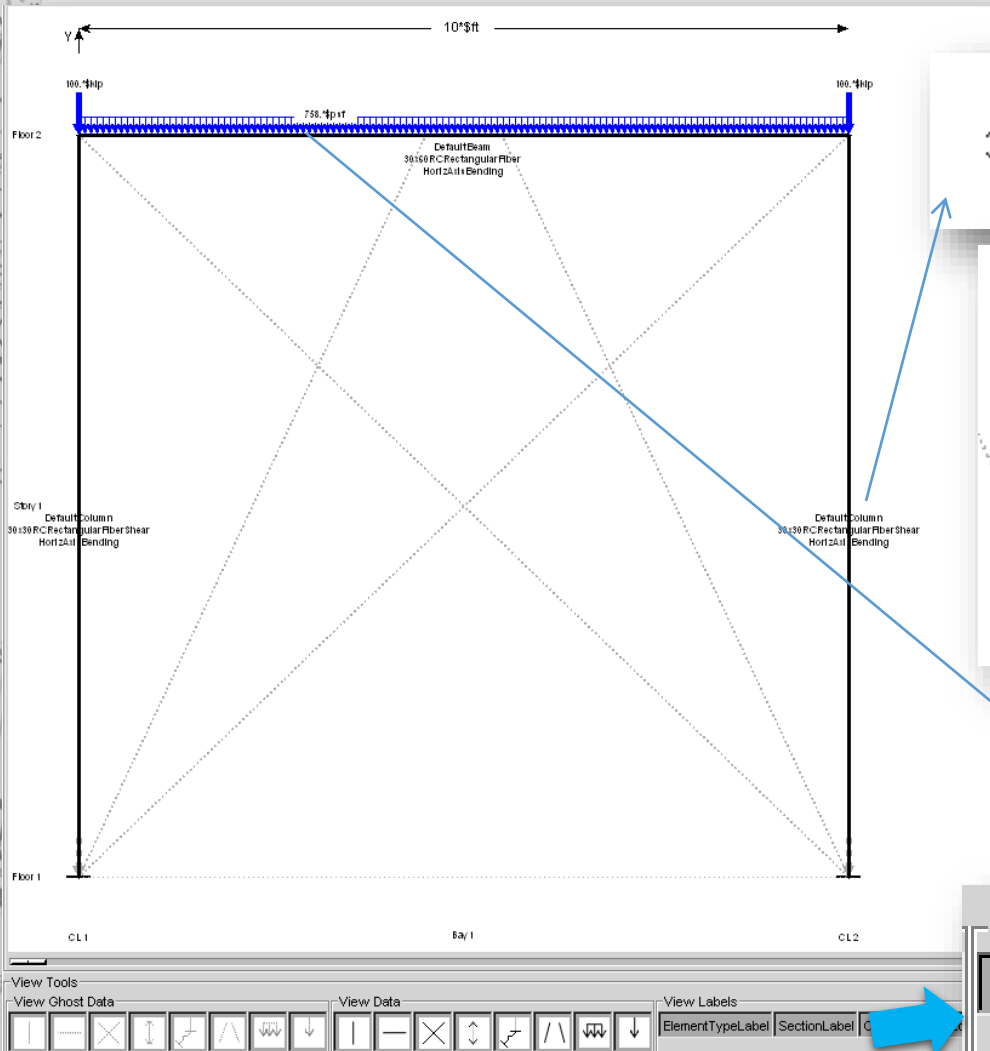
Distributed Loads



User needs to specify gravity loads for each gravity-load case.

Elevation Model Input

Element-Properties Editing



Detail Column
30x30RCRectangularFiberShear
Horizontal Bending

30x30RCRectangularFiberShear

- 30x30RCRectangularFiber
- 30x30RCRectangularElastic
- 30x30RCRectangularFiberShear
- 30x60RCRectangularFiber
- ColumnHinge
- SupportSpring
- W12x16
- AISC WSections

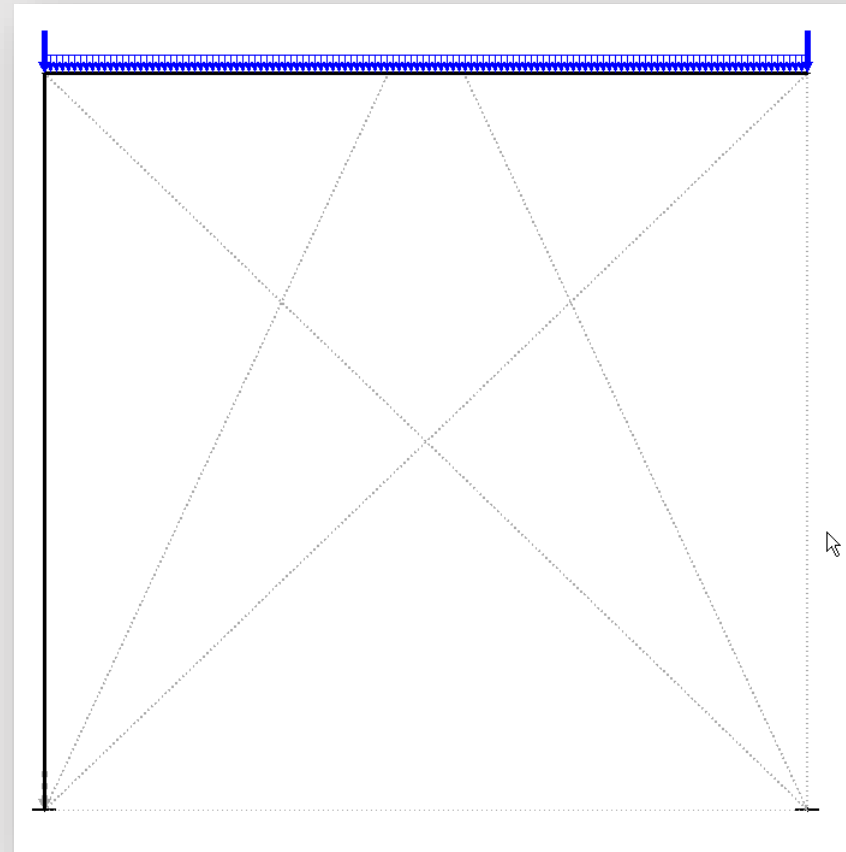
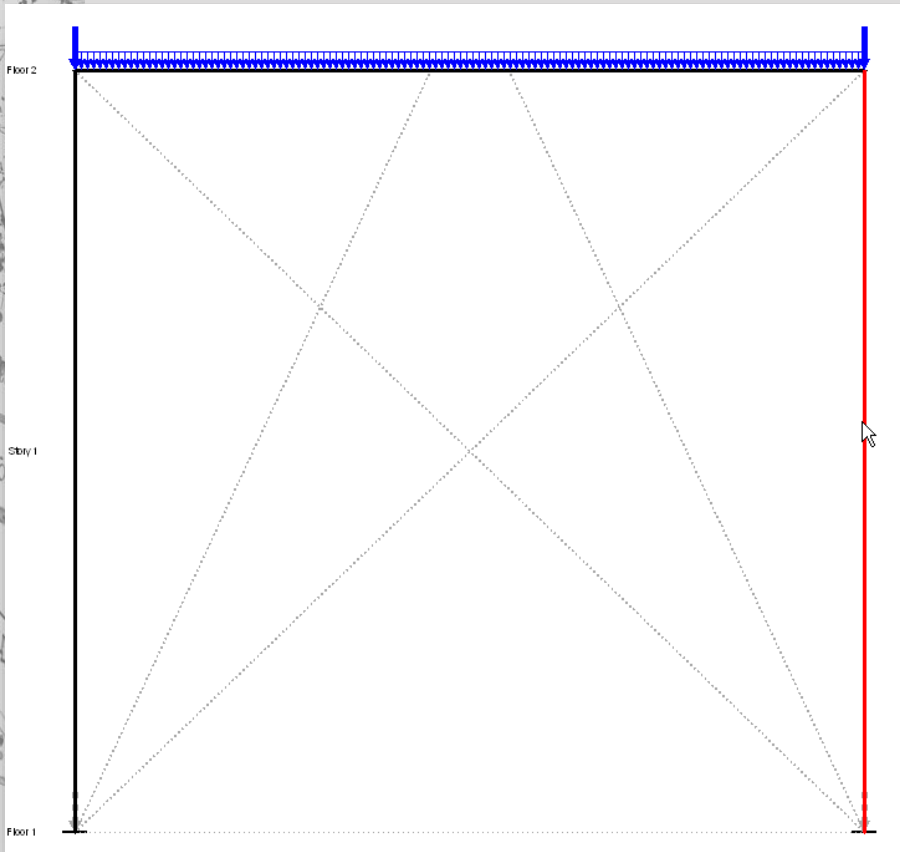
1758.*\$psf

View Labels

ElementInputLabel	SectionLabel	Orient	GravityLoad
-------------------	--------------	--------	-------------

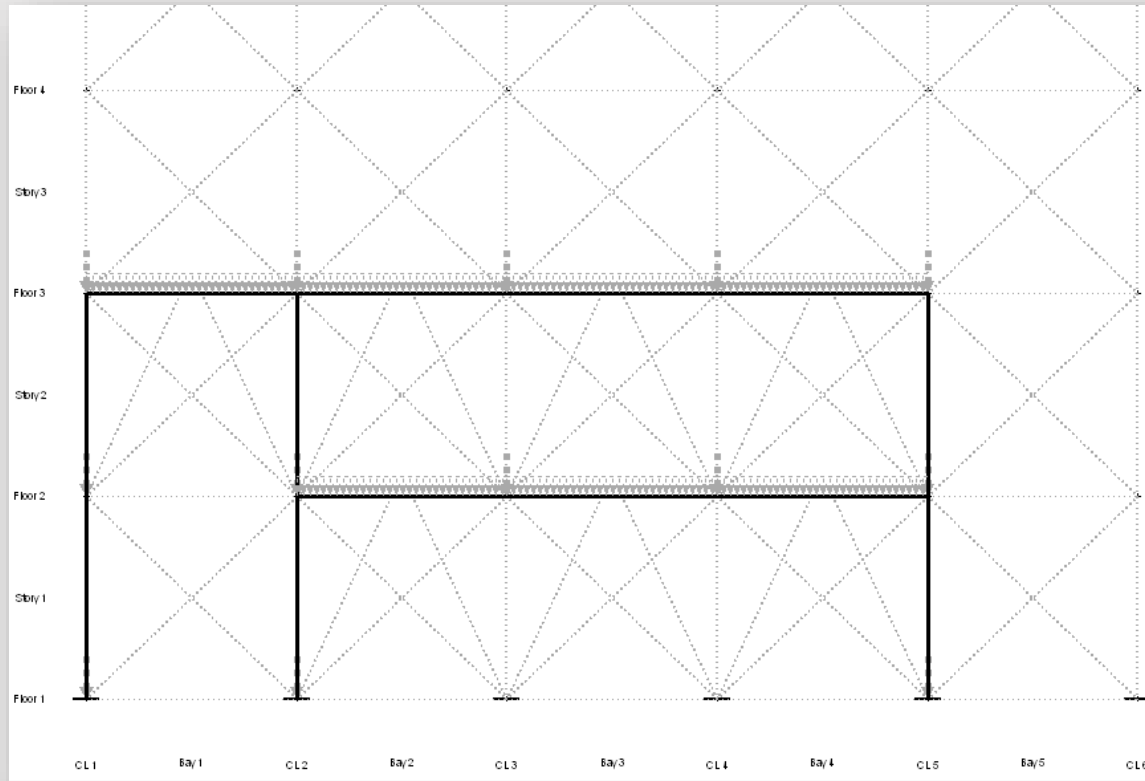
Elevation Model Input

Element/Load removal: Ctrl-key



Elevation Model Input

View-Object Selection



View Tools

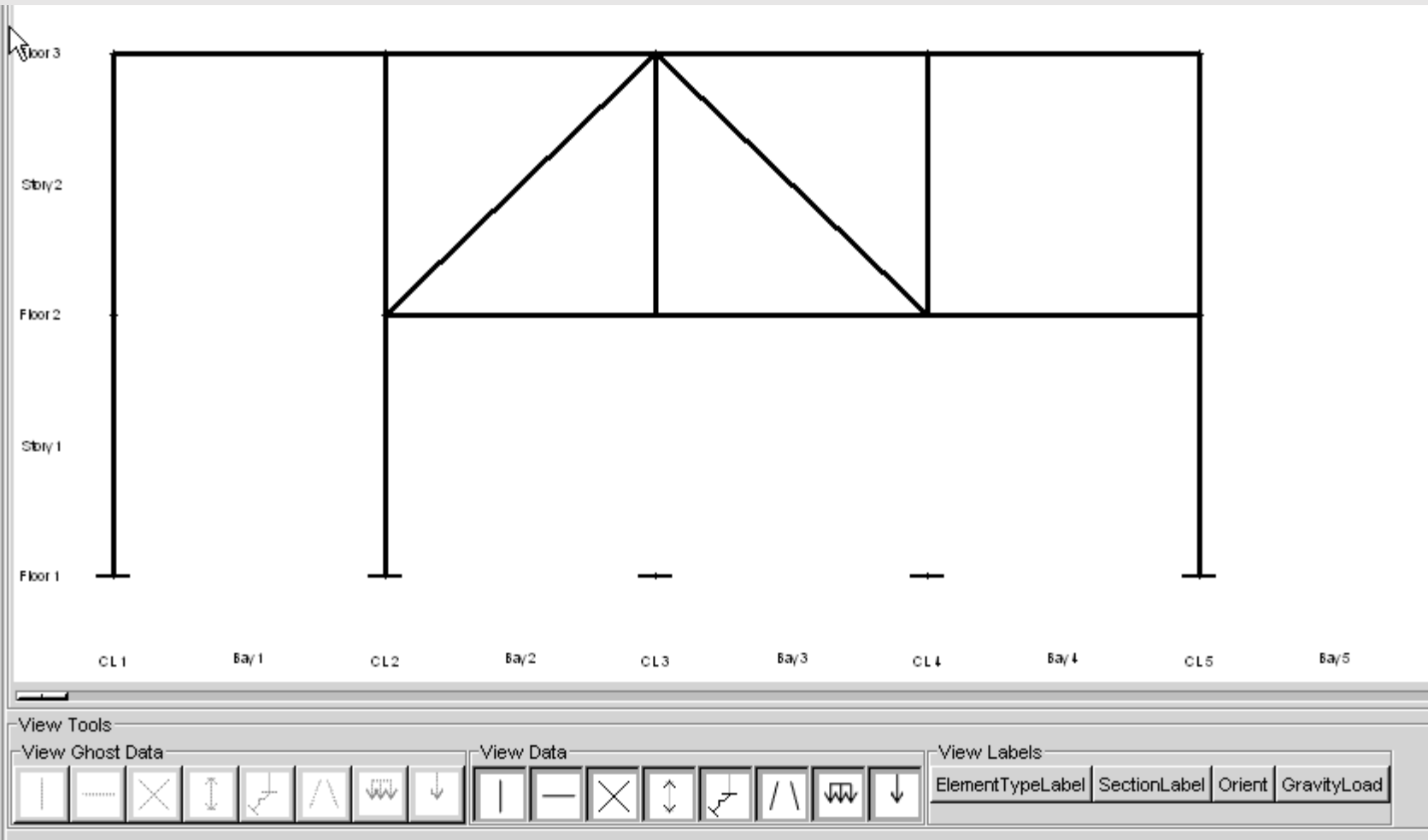
View Ghost Data

View Data

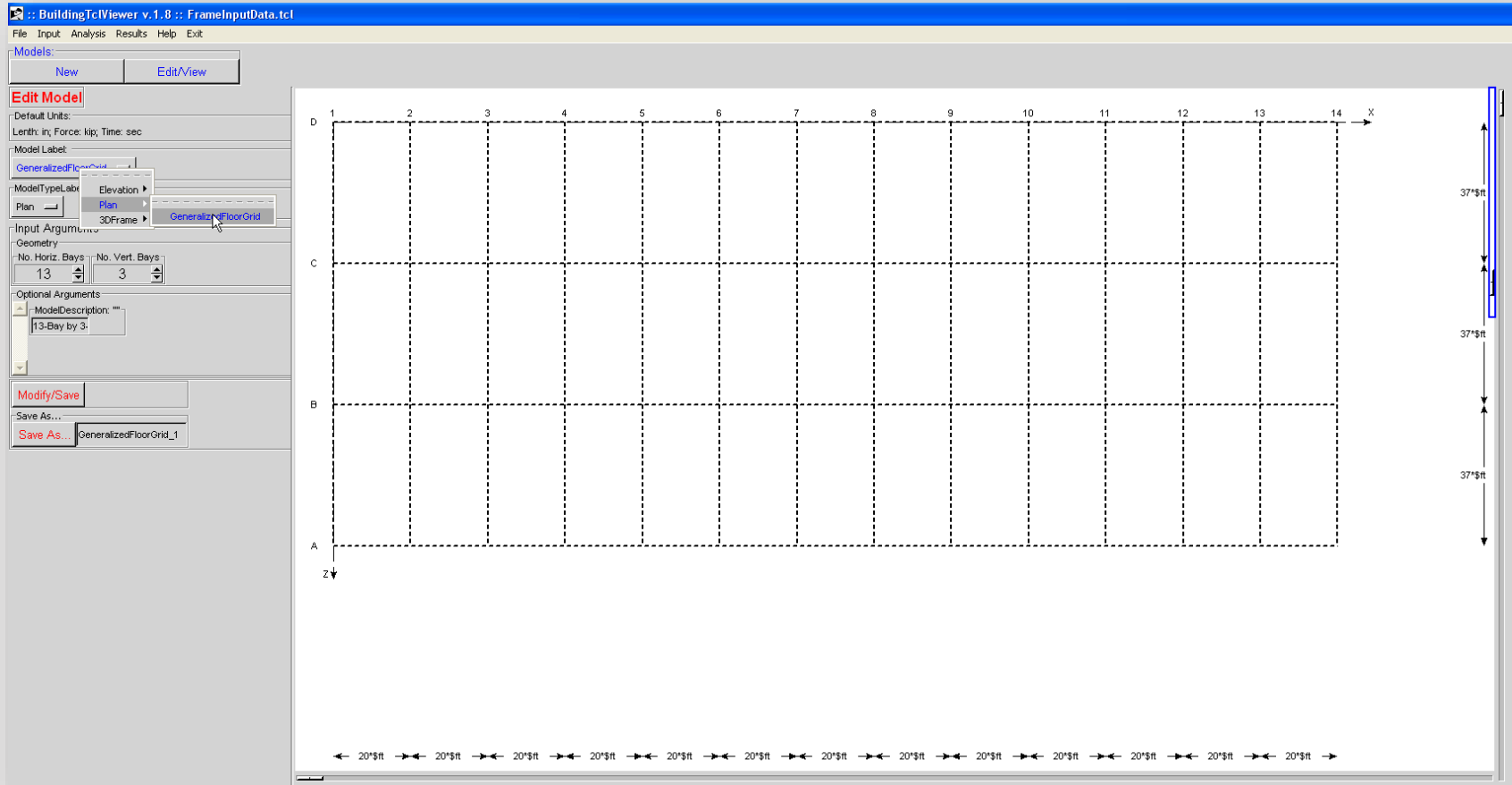
The toolbar contains two groups of icons. The 'View Ghost Data' group includes icons for: vertical line, horizontal line, diagonal line, double-headed vertical arrow, diagonal line with arrow, diagonal line with arrow, double-headed vertical arrow, and a downward arrow. The 'View Data' group includes icons for: vertical line, horizontal line, diagonal line, double-headed vertical arrow, diagonal line with arrow, diagonal line with arrow, double-headed vertical arrow, and a downward arrow.

Elevation-Model Input

View Existing Elements only



BuildingTcl Viewer – Grid Model



Grid-Model Input

edit grid

Number of Bays

Model Label:

ModelTypeLabel:

Input Arguments

Geometry

No. Horiz. Bays:

No. Vert. Bays:

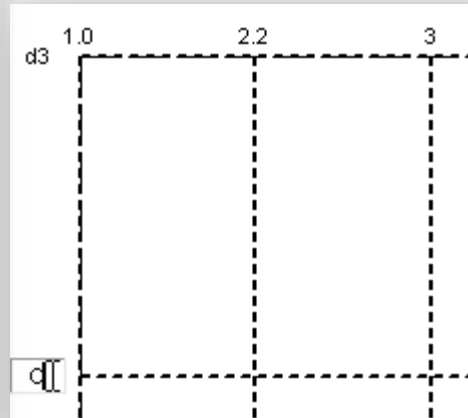
Optional Arguments

ModelDescription: ""

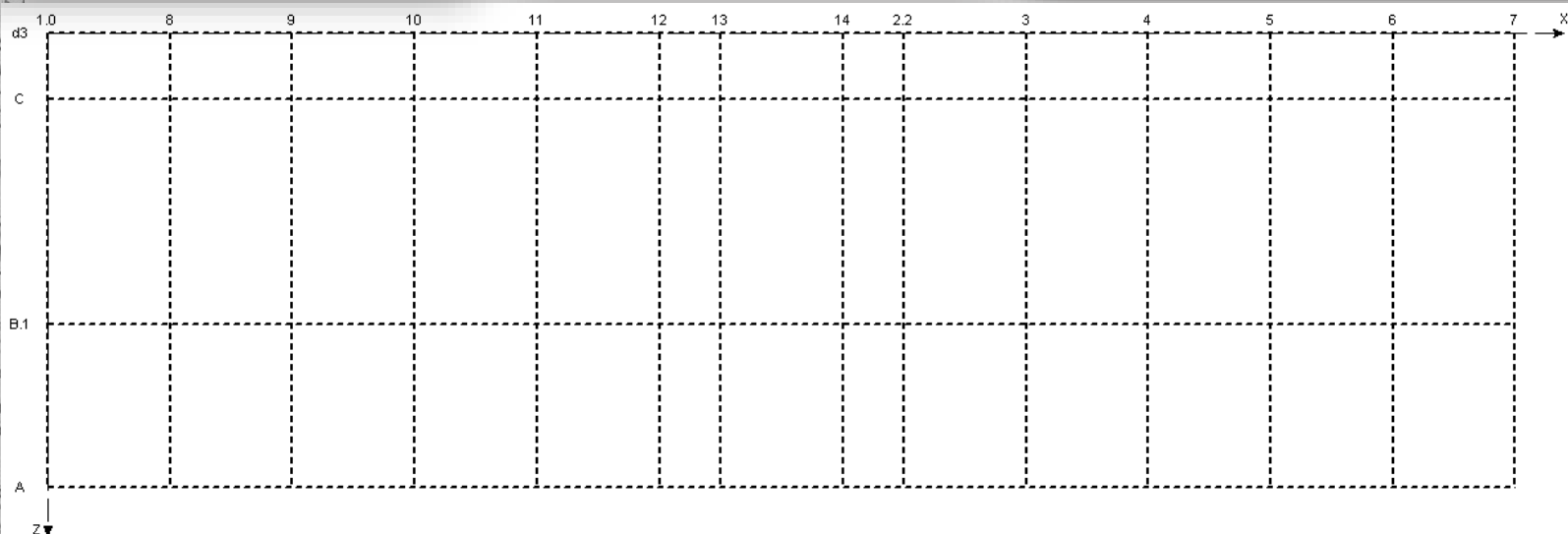
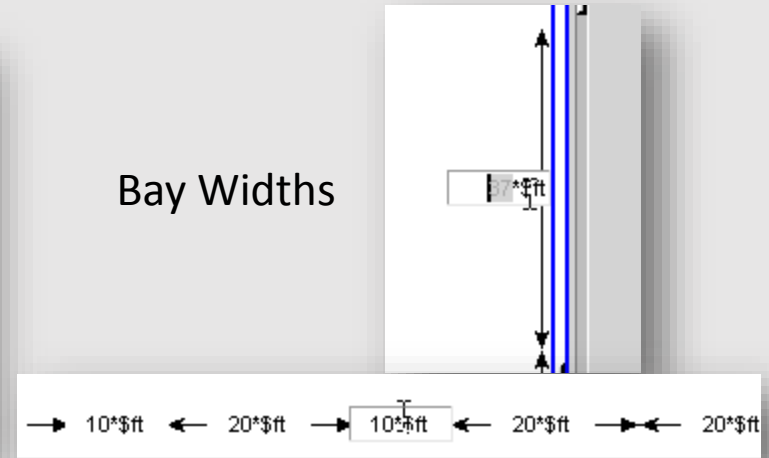
13-Bay by 3-

Plan Bay widths control
3DFrame Bay Widths

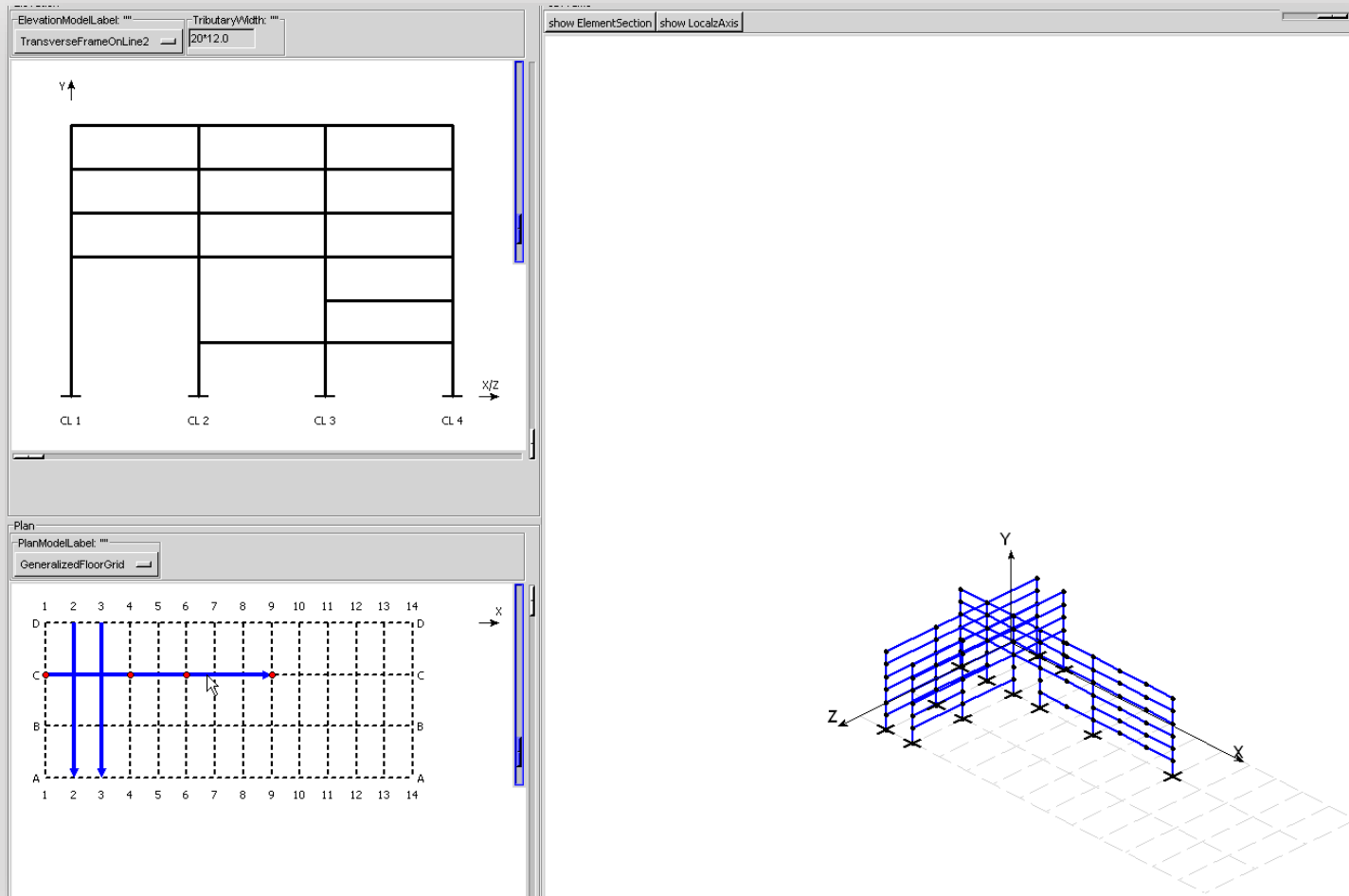
Column-Line Labels



Bay Widths



BuildingTcl Viewer – 3D Frame-Model Input



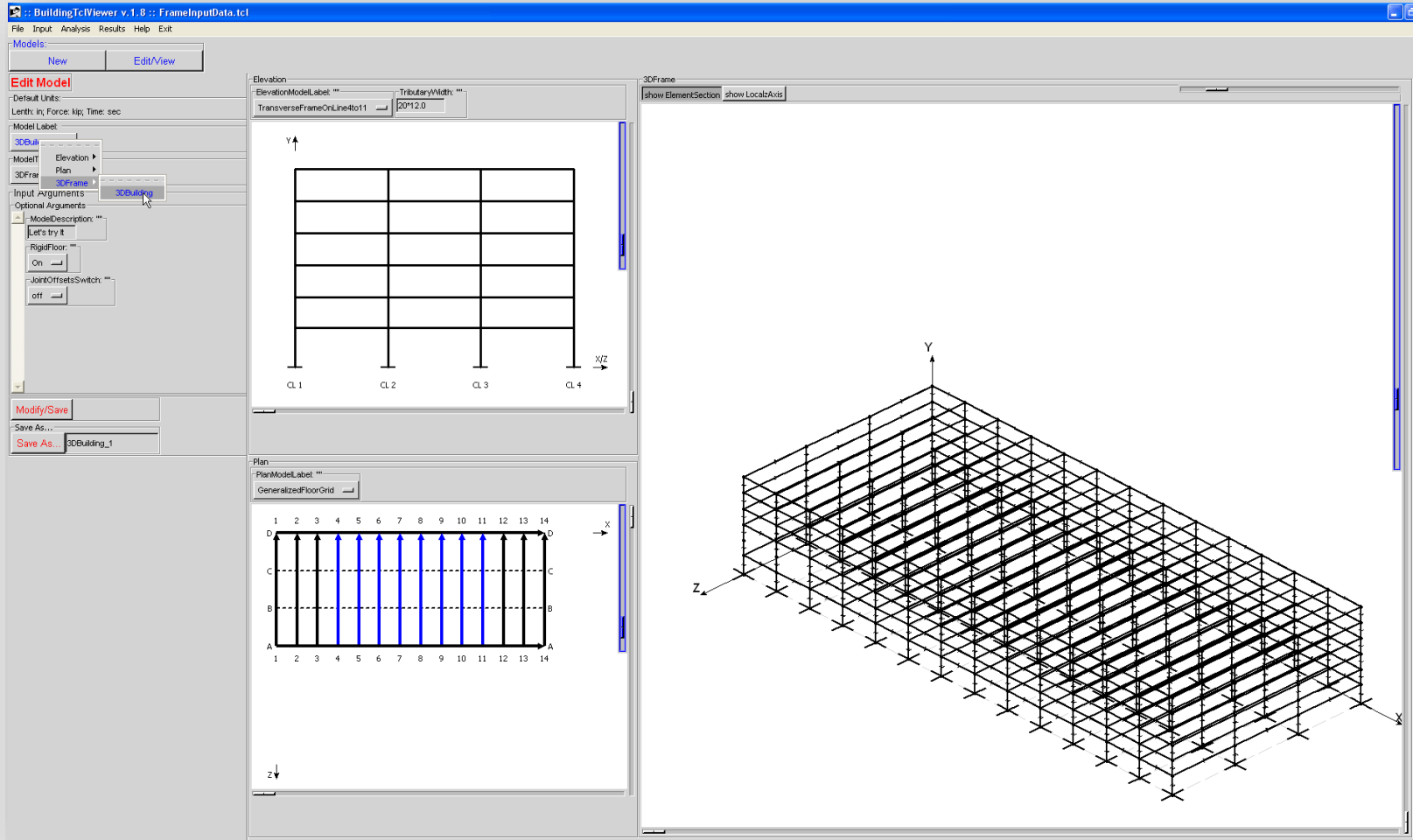
BuildingTcl Viewer – 3D Frame-Model Input



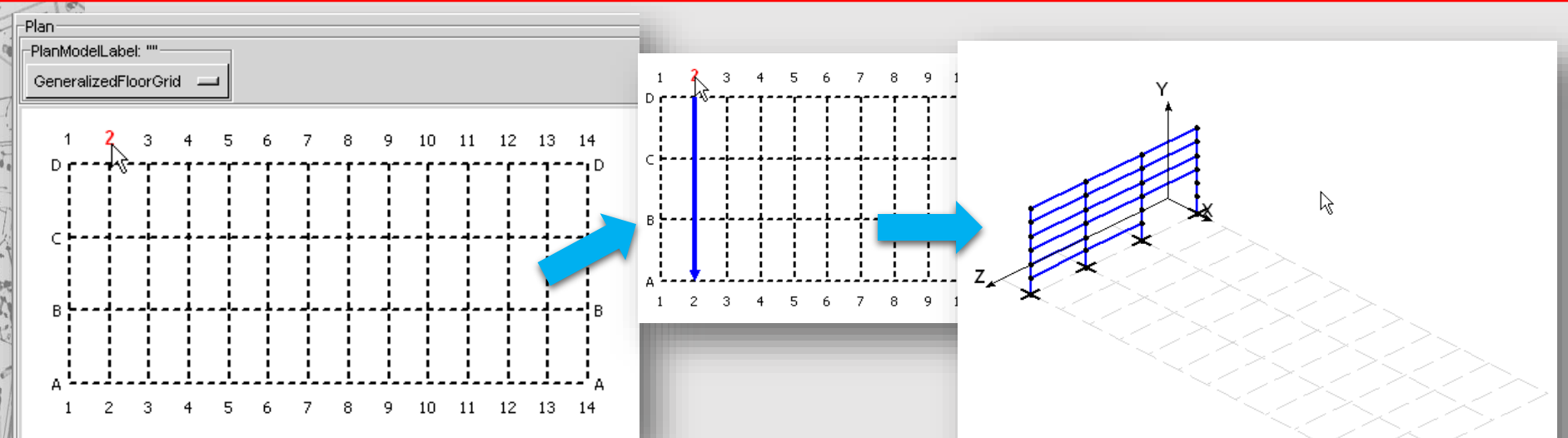
The screenshot shows the BuildingTcl Viewer interface with four instructional callouts:

- 1. select plan**: Points to the 'Plan' view at the bottom left, which shows a grid of columns and rows labeled A-D and 1-14.
- 2. select elevations**: Points to the 'Elevation' view at the top left, which shows a grid of columns and rows labeled CL 2.
- 3. place elevations on grid column lines**: Points to the 'Elevation' view, indicating the placement of elevation lines on the grid.
- 4. view 3DFrame**: Points to the 3D view on the right, which shows a 3D frame model with blue lines.

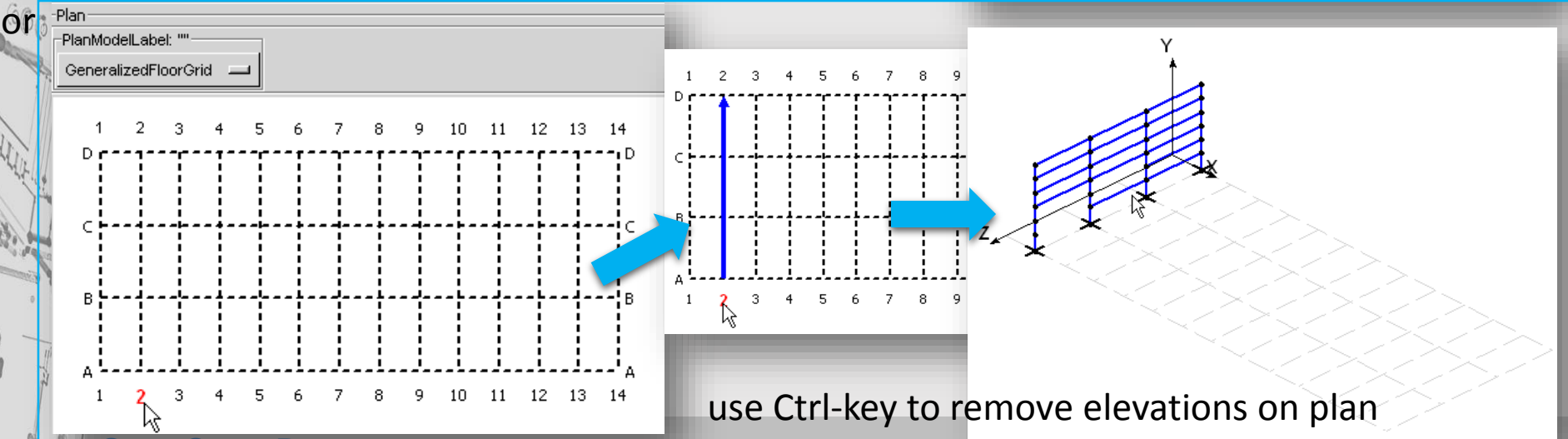
BuildingTcl Viewer – 3D Frame-Model Input



3. place elevation into plan column-line



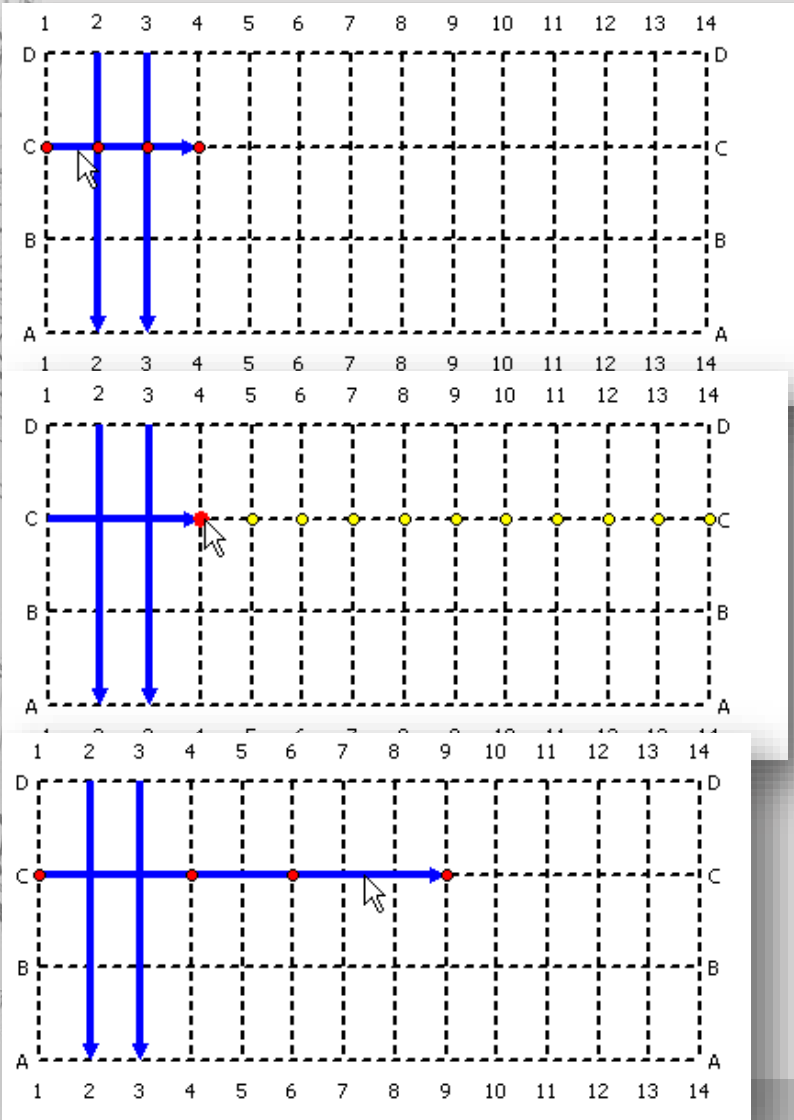
select from first column line for elevation, this determines orientation of elevation



use Ctrl-key to remove elevations on plan

3DFrame-Model Input

Placing elevations



1. select elevation on plan by

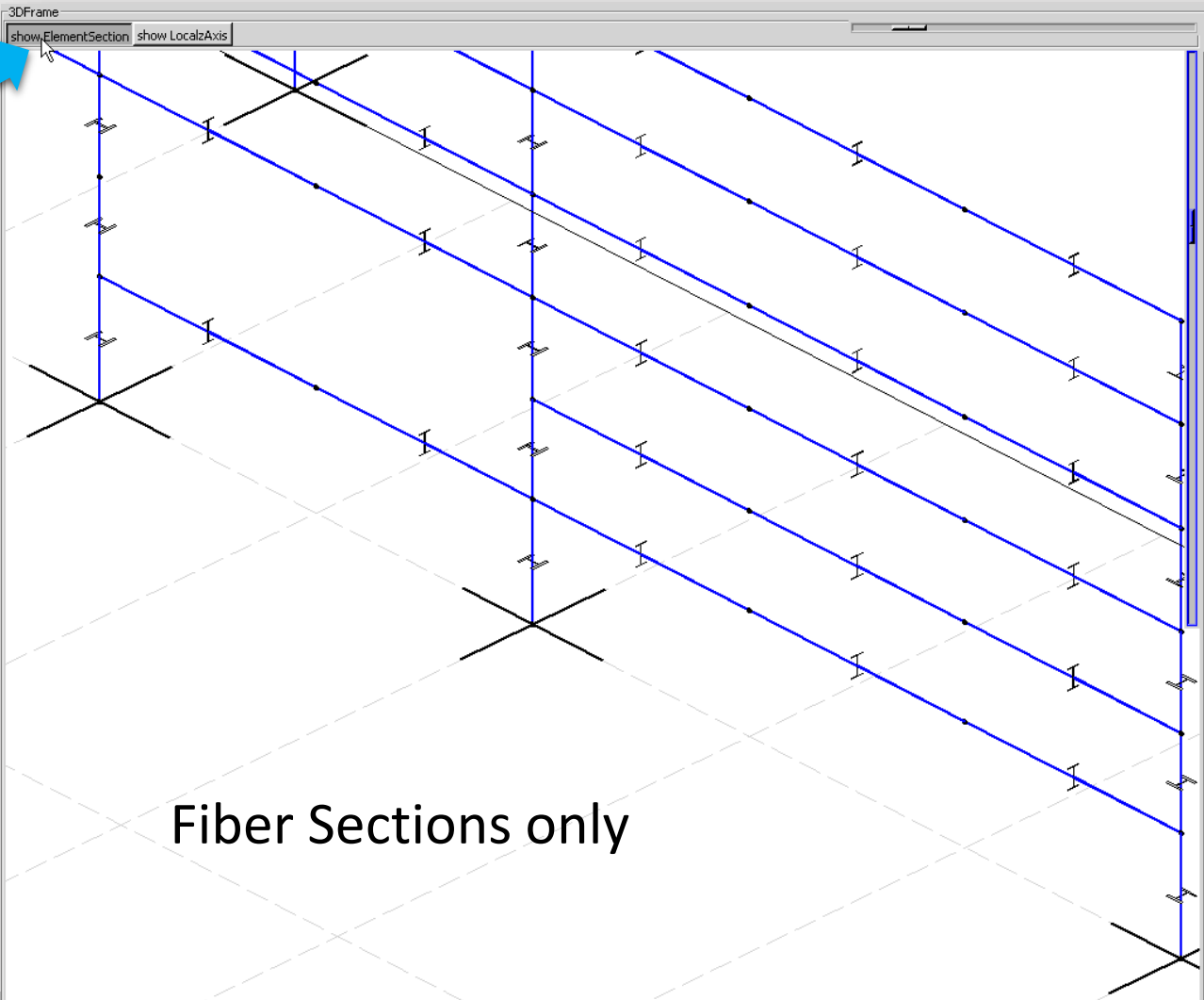
2. select first node to be moved. Nodes can be moved only if there is a free adjacent column-line intersection

3. select one of the possible nodes given

4. move next node.

Nodes can skip column lines.

3DFrame-Model Input *view Element Cross Sections*

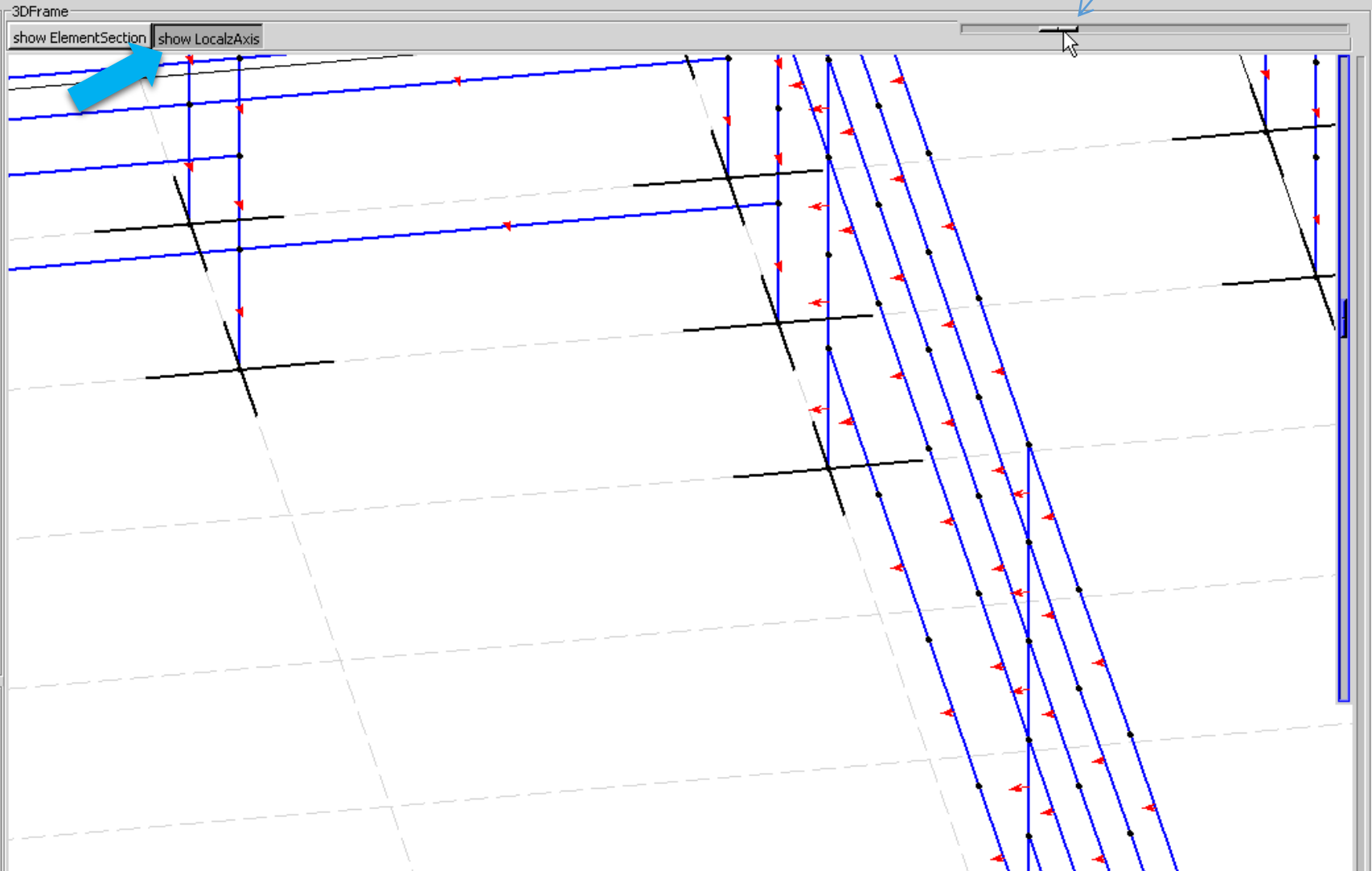


zoom

(double-click to
reset=1)

3DFrame-Model Input *view local z-axis*

rotate
(double-click to reset=1)



Analysis Models

The image displays three overlapping dialog boxes in the OpenSees software interface, each used to create a different type of analysis model. The background shows a technical drawing of a mechanical part.

- New AnalysisModel Dialog (Top Left):**
 - Default Units: Lenth: in; Force: kip; Time: sec
 - AnalysisType Label: Select AnalysisTypeLabel
 - Options: TimeHistory, LoadControl, DisplacementHistory
- DisplacementHistory Dialog (Middle):**
 - AnalysisType Label: DisplacementHistory
 - Unique AnalysisModel Label: DisplacementHistoryAnal
 - Optional Arguments:
 - DisplacementIncrement: 0.01
 - Tolerance: 1e-8
 - constraintsType: Plain
 - alphaSP: 1e6
 - alphaMP: 1e6
 - numbererType: (dropdown)
- TimeHistory Dialog (Top Right):**
 - AnalysisType Label: TimeHistory
 - Unique AnalysisModel Label: TimeHistoryAnalysisMode
 - Optional Arguments:
 - DtAnalysis: 0.01
 - TmaxAnalysis: 50.
 - Tolerance: 1e-8
 - DampingRatio: 0.02
 - DampingModelLabel: StiffnessProportionalDam
 - constraintsType: (dropdown)
- LoadControl Dialog (Bottom Right):**
 - AnalysisType Label: LoadControl
 - Unique AnalysisModel Label: LoadControlAnalysisModi
 - Optional Arguments:
 - Nstep: 10
 - Tolerance: 1e-8
 - maxNumIter: 6
 - numbererType: RCM
 - testType: EnergyIncr
 - constraintsType: (dropdown)

Loads

Load Type Label:
Select LoadTypeLabel

- Gravity
- LateralPushover
- UniformEQ
- UniformEQ2D
- UniformEQ3D
- UniformSine

Load Type Label:
UniformEQ3D

Input Arguments

Unique Load Label:
UniformEQ3DLoad

Required Arguments

- GMfilenameX: select GMfilenameX
- GMfilenameY: select GMfilenameY

Optional Arguments

- GMscaleX: 1.
- GMscaleY: 1.
- GMscaleZ: 1.
- GMdirectory: .
- FileType: PEER
- GMfactor: \$g

Save

Load Type Label:
LateralPushover

Input Arguments

Unique Load Label:
LateralPushoverLoad

Required Arguments

DMax

Optional Arguments

- LateralDirection: X
- CycleType: Push
- NCycles: 1
- ControlNode: top
- ScaleFactor: 1.0
- DMaxFactor: 1.0

Load Type Label:
Gravity

Input Arguments

Unique Load Label:
GravityLoad

Optional Arguments

- LoadDescription
- InertialMassFactor: 1.0

CycleType

- Push
- Full
- Tension
- Compression

FileType

- PEER
- Time&Acceleration
- AccelerationOnly
- PEERNGA

LoadCombinations

BuildingTclViewer v. 1.9 :: GettingStartedDataFile.tcl

File Input Analysis Results Help Exit

LoadCombinations:
New Edit/View

Edit LoadCombination

Default Units:
Lenth: in; Force: kip; Time: sec

LoadCombination Label:
StaticPushover

LoadCombinationModel Label:
DefaultLoadCombinationModel

Input Arguments
Optional Arguments
LoadCombinationDescription
Push Frame 1 OptionalUnits

Modify/Save
Save As...
Save As... StaticPushover_1

Gravity Loads:

LoadLabel	LoadFactor	InertialMassFactor	
DL1	1.0	1.0	remove
LL1	1.0	1.0	remove

Gravity Analysis Parameters

AnalysisModelLabel	Nstep	Tolerance
DefaultLoadControl	10	1e-8

add Gravity Load

Lateral Loads:

LoadLabel	LoadFactor	DMax	LateralDirection	CycleType	NCycles	
StaticPushover	1.0	0.1*1.0	X	Push	1	remove

AnalysisModelLabel	DisplacementIncrement	Tolerance
DefaultDisplacementHistory	0.01	1e-8

LoadLabel	LoadFactor	GMscaleX	GMscaleY	GMscaleZ	GMfilenameX	GMfilenameY	GMfilenameZ	
EQ3D	1.0	1.	0.3	1.	H-E01140.A1	H-E01140.A1	H-E12140.A1	remove

AnalysisModelLabel	DtAnalysis	TmaxAnalysis	Tolerance	DampingRatio
DefaultTimeHistory	0.01	50.	1e-8	0.02

LoadCombinations Gravity Loads

Gravity Loads:

LoadLabel	LoadFactor	InertialMassFactor	
* DL1	1.0	1.0	remove

DefaultGravity

LoadLabel	InertialMassFactor	
DL1		
DL2		
LL1	1.0	remove

Gravity Analysis Parameters

AnalysisModelLabel

DefaultLoadControl

- Loads
- Analysis

Gravity Loads:

LoadLabel	LoadFactor	InertialMassFactor	
* DL1	1.0	1.0	remove
* LL1	1.0	1.0	remove

Gravity Analysis Parameters

AnalysisModelLabel	Nstep	Tolerance
DefaultLoadControl	10	1e-8

add Gravity Load

LoadCombinations

Lateral Loads

- Loads
- Analysis

Lateral Loads:

LoadLabel StaticPushover	LoadFactor 1.0	DMax 0.1*1.0	LateralDirection X	CycleType Push	NCycles 1	remove		
AnalysisModelLabel DefaultDisplacementHistory	DisplacementIncrement 0.01	Tolerance 1e-8				remove		
LoadLabel EQ3D	LoadFactor 1.0	GmscaleX 1.	GmscaleY 0.3	GmscaleZ 1.	GMfilenameX H-E01140.A1	GMfilenameY H-E01140.A1	GMfilenameZ H-E12140.A1	remove
AnalysisModelLabel DefaultTimeHistory	DtAnalysis 0.01	TmaxAnalysis 50.	Toierance 1e-8	DampingRatio 0.02				remove

add Lateral Load

You can use units

The screenshot shows the 'Input Arguments' dialog box. Under 'Required Arguments', the 'fY: Yield stress' field contains '68.8*\$ksi' and an 'OptionalUnits' dropdown menu is open, showing a list of units including 'ksi'. Other fields include 'E: Elastic Modulus' with '29000*\$ksi' and 'Bsh: Strain-Hardening Ratio'. At the bottom, there are buttons for 'Test', 'Push', '1', 'Modify/Save', and 'Save As...'. A blue arrow points from the 'ksi' option in the menu to the 'ksi' unit in the 'fY' field.

A close-up of the 'fY: Yield stress' field, showing the value '68.8*\$ksi' and the unit 'ksi' selected in the dropdown menu. A mouse cursor is pointing at the unit selection.



The 'File Setup' dialog box is shown. It includes fields for 'FileName:' (NewFile.tcl) and 'Data Directory:' (Data). Under 'Input/Output Default Units:', there are dropdown menus for 'Length:' (in), 'Force:' (kip), and 'Time:' (sec). A unit selection menu is open for the 'Length' field, showing options like 'cm', 'meter', 'dm', 'ft', 'mm', and 'in'. A mouse cursor is pointing at the 'in' option.

Run Simulation(s)

The screenshot displays the BuildingTclViewer v.1.8 software interface. The title bar reads "BuildingTclViewer v.1.8 :: FrameInputData.tcl". The menu bar includes "File", "Input", "Analysis", "Results", "Help", and "Exit".

Analysis Panel: This panel is titled "Analysis" and contains two sections:

- Models (Select all that apply):** A list of models with checkboxes and "view" buttons. The checked models are "LongitudinalFrameOnLineA (Elevation)", "LongitudinalFrameOnLineD (Elevation)", and "3DBuilding (3DFrame)".
- Load Combinations (Select all that apply):** A list of load combinations with checkboxes. The checked combinations are "DesignEQ1", "MaxEQ1", "MaxEQ1 Scaled10", "BidirectionalEQ", "BidirectionalEQ10x", "BidirectionalEQ10x25Sec", and "MaxEQ2bidirect5x".

Below the load combinations, there are checkboxes for "Display Deformed Shape" (checked), "Display Response Graph" (checked), and "Process Data for Modeling Results (may take time)" (checked). A "Scale Deformations:" field is set to "1.0" with a "range" button.

3D Model: The main window displays a 3D wireframe model of a building frame, labeled "Model: 3DBuilding". The model is shown in a perspective view with X, Y, and Z axes. A "Rotate Model about Vertical Axis:" slider is positioned below the model, with a "reset" button. The slider is currently set to 0.79 degrees, with a scale from 0.00 to 6.28.

Buttons: A red "Analyze" button is located at the bottom left of the interface, with a mouse cursor hovering over it. Two blue arrows point from the left side of the image to the "Analysis" and "Analyze" buttons.

Select Models and LoadCombinations for Analysis

Analysis

Models (Select all that apply):

- | All | None | |
|--------------------------|-------------------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | view <input type="checkbox"/> TransverseFrameOnLine1 (Elevation) |
| <input type="checkbox"/> | <input type="checkbox"/> | view <input type="checkbox"/> TransverseFrameOnLine2 (Elevation) |
| <input type="checkbox"/> | <input type="checkbox"/> | view <input type="checkbox"/> TransverseFrameOnLine3 (Elevation) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | view <input checked="" type="checkbox"/> TransverseFrameOnLine4to11 (Elevation) |
| <input type="checkbox"/> | <input type="checkbox"/> | view <input type="checkbox"/> TransverseFrameOnLine12 (Elevation) |
| <input type="checkbox"/> | <input type="checkbox"/> | view <input type="checkbox"/> TransverseFrameOnLine13 (Elevation) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | view <input checked="" type="checkbox"/> TransverseFrameOnLine14 (Elevation) |
| <input type="checkbox"/> | <input type="checkbox"/> | view <input type="checkbox"/> LongitudinalFrameOnLineA (Elevation) |
| <input type="checkbox"/> | <input type="checkbox"/> | view <input type="checkbox"/> LongitudinalFrameOnLineD (Elevation) |
| <input type="checkbox"/> | <input type="checkbox"/> | view GeneralizedFloorGrid (Plan) |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | view <input checked="" type="checkbox"/> 3DBuilding (3DFrame) |

Load Combinations (Select all that apply):

- | All | None | |
|--------------------------|-------------------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> GravityDOnly |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> GravityDLandLL |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> Gravity17DLand14LL |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> ReallyShortStaticPushover |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> StaticPushoverLargeSteps |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> StaticPushoverLargeStepsZ |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> PushToTenPercentDrift |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> PushToTenPercentDrift.Z |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> FullCycles1 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> FullCycles2 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> ShortHalfCycle |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> ShortHalfCycle1 |

Real-Time Visualization Controls

Display Deformed Shape

Scale Deformations: 1.0

range

- 0-0.1
- 0-1
- 0-10
- 0-100
- 0-1000

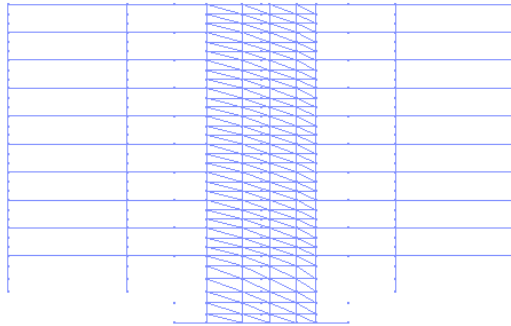
Display Response Graph

Process Data for Modeling Results (may take time)

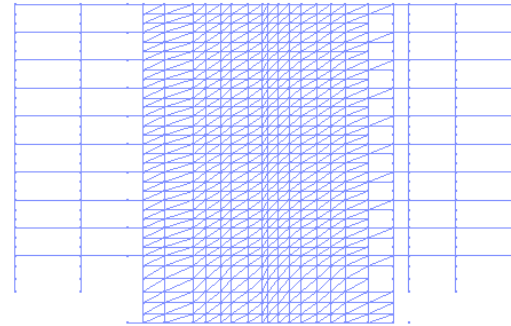
Analyze

Real-Time Visualization

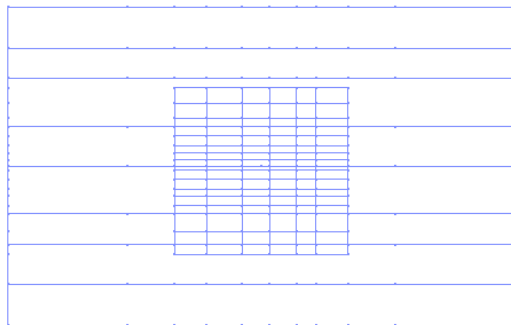
1 Deformed Shape ZY-Plane -- Defo. Amp.: 1.0x



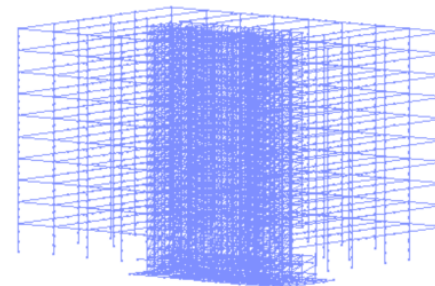
1 Deformed Shape XY-Plane -- Defo. Amp.: 1.0x



1 Deformed Shape ZX-Plane -- Defo. Amp.: 1.0x



1 Deformed Shape 3D -- Defo. Amp.: 1.0x (Not Responding)



Real-Time Visualization

76 :: seismicAE v.0.99 :: FrameInputData.tcl

File Input Analysis Results Help

Analysis

Models (Select all that apply):
-List Models:
 ShowAll Show2D Show3D

All None

view 3DFrameModel (3DFram
view 3DFrameModelIA0 (3DFr
view 3DFrameModel_FixedBa

Load Combinations (Select all that
All None

ALLGravityLoadsAndMass
 StaticPushoverXposShort
 StaticPushoverXpos
 StaticPushoverXneg
 StaticPushoverZpos
 StaticPushoverZneg

Display Deformed Shape
Scale Deformations:
1.0
0.0 2.0 4.0

Display Response Graph
 Process Element Data for Modeling Res

Analyze

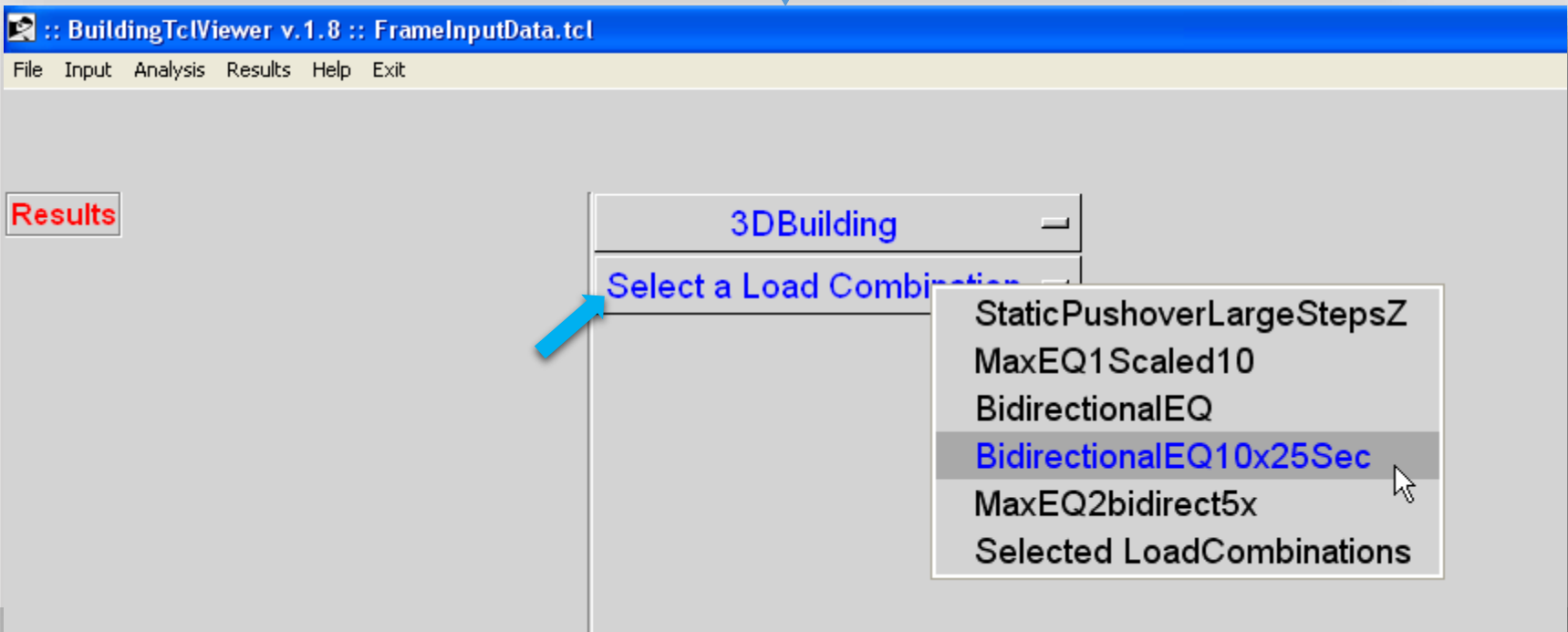
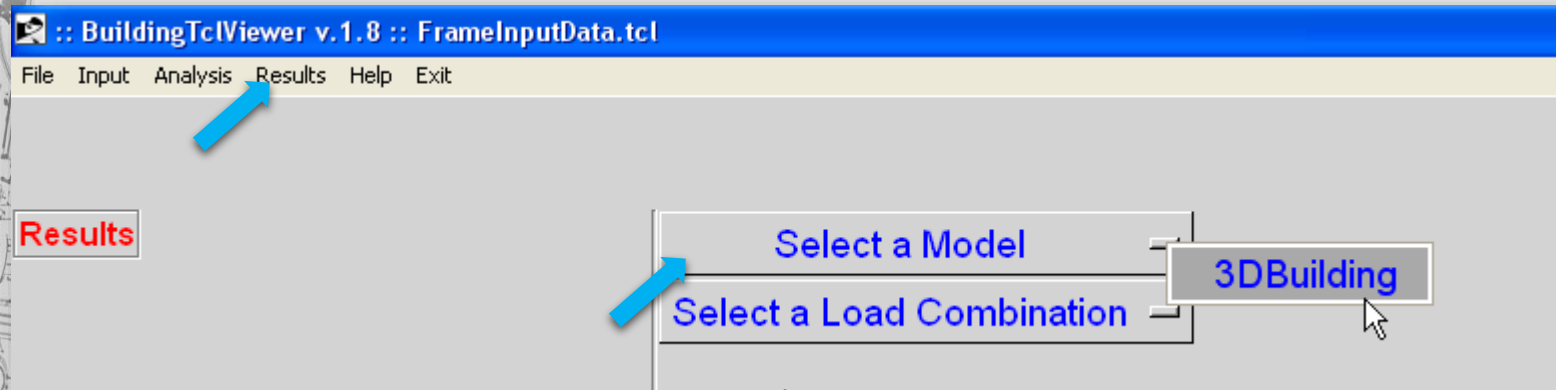
1 Deformed Shape ZY-Plane -- Defo. Amp.: 1.0x

1 Deformed Shape XY-Plane -- Defo. Amp.: 1.0x

1 Deformed Shape ZX-Plane -- Defo. Amp.: 1.0x

1 Deformed Shape 3D -- Defo. Amp.: 1.0x

Visualization of Simulation Results



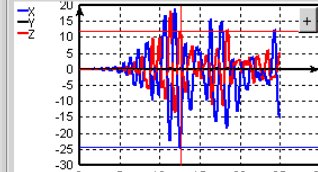
Visualization of Structural Response *animation*

BuildingTclViewer v.1.8 :: FrameInputData.tcl

File Input Analysis Results Help Exit

Results

Analysis History



Analysis Step:

1266

reset

0 504 1008 1512 2016

Animate Results

Scale Deformations:

range

5.8

0.0 2.0 4.0 6.0 8.0 10.0

Scale Diagram:

range

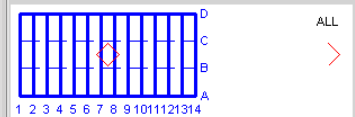
2.4

0.0 2.0 4.0 6.0 8.0 10.0

Select Story to View:

All

Select Elevations ON/OFF & ViewPoint:



ALL

NONE

ViewAnalysisStats

Close All Results Windows

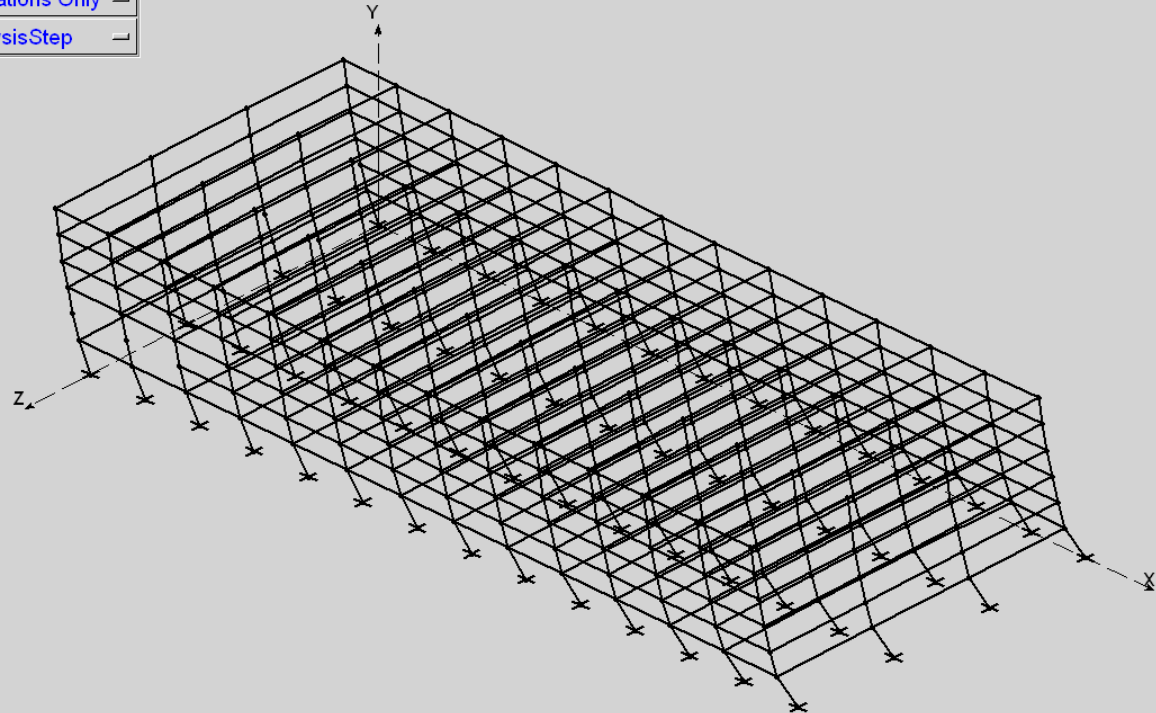
3DBuilding

BidirectionalEQ10x25Sec

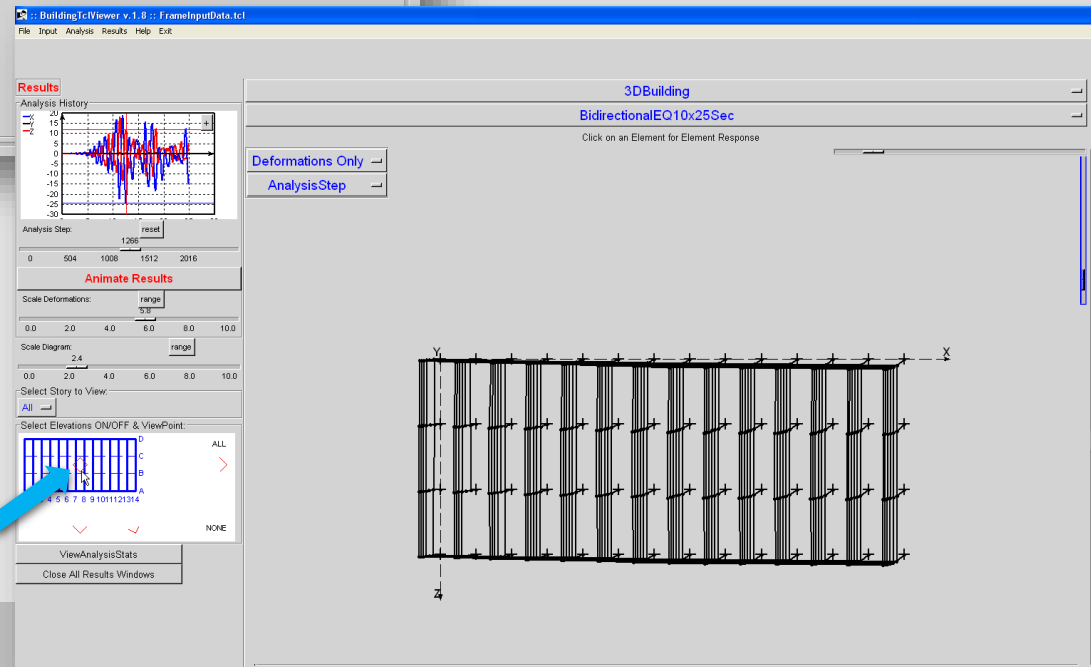
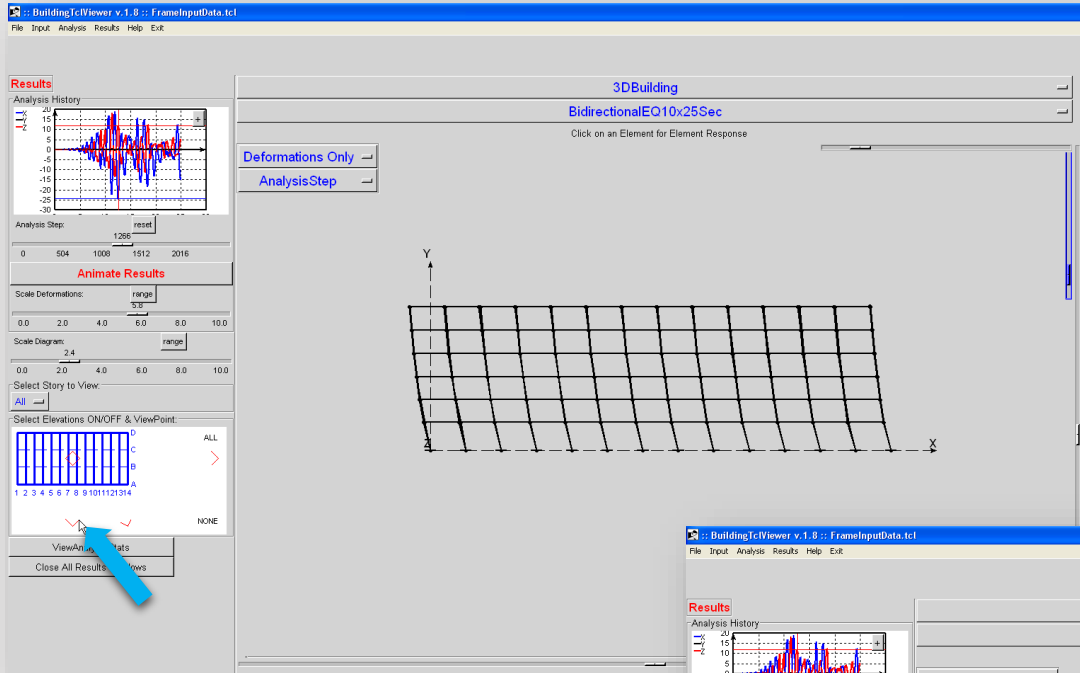
Click on an Element for Element Response

Deformations Only

AnalysisStep



Visualization of Structural Response viewpoints



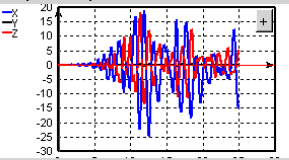
Visualization of Structural Response

nodal-displacement response

BuildingTclViewer v.1.8 :: FramelInputData.tcl
 File Input Analysis Results Help Exit

Results

Analysis History



Analysis Step: 0

Animate Results

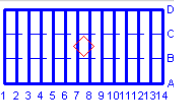
Scale Deformations: 1.0

Scale Diagram: 1.0

Select Story to View:

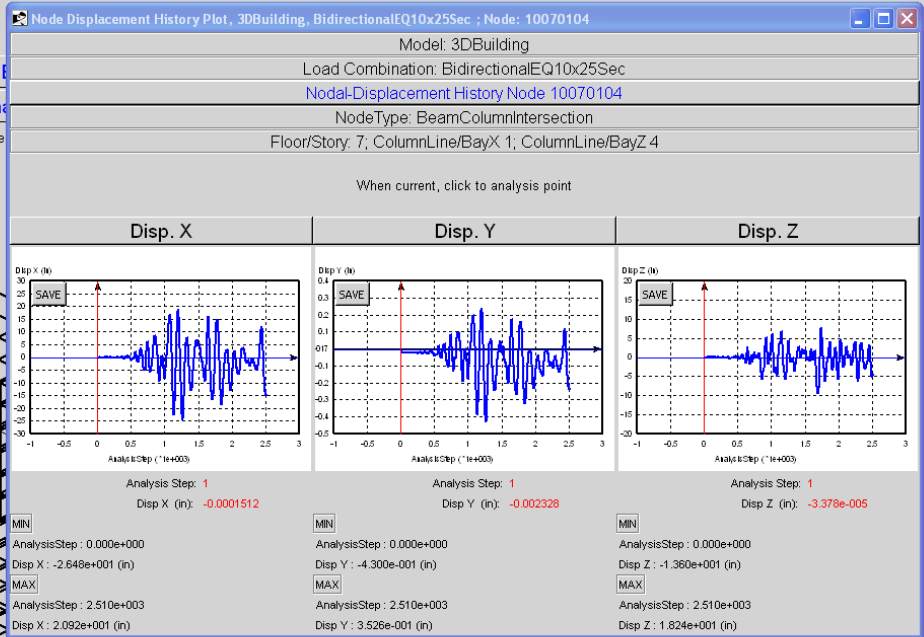
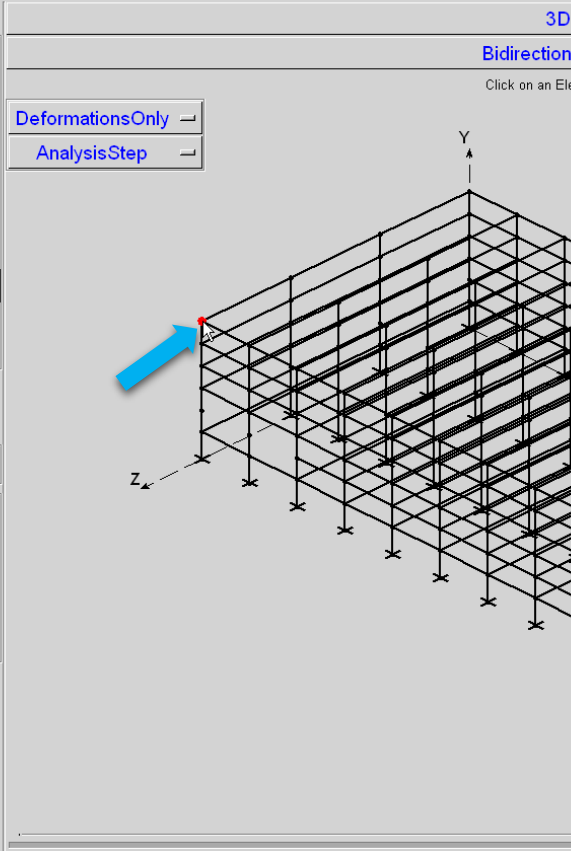
All

Select Elevations ON/OFF & ViewPoint:

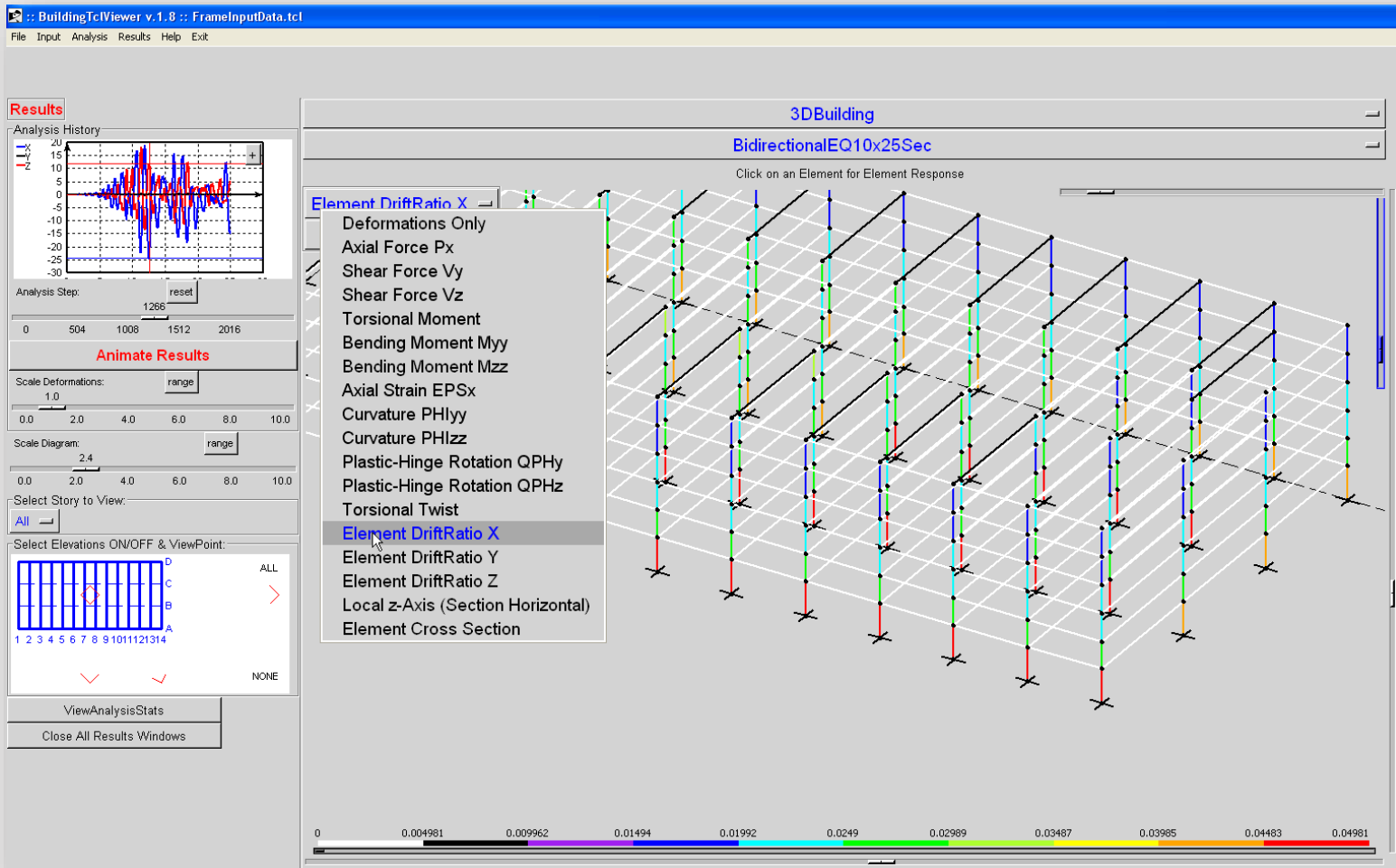


ALL

NONE



BuildingTcl Viewer – Results Element-Response Visualization



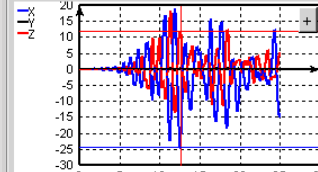
Visualization of Structural Response *animation*

BuildingTclViewer v.1.8 :: FrameInputData.tcl

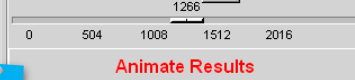
File Input Analysis Results Help Exit

Results

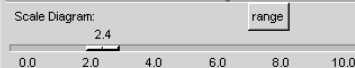
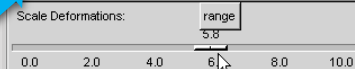
Analysis History



Analysis Step: 1266



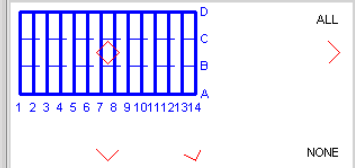
Animate Results



Select Story to View:

All

Select Elevations ON/OFF & ViewPoint:



ViewAnalysisStats

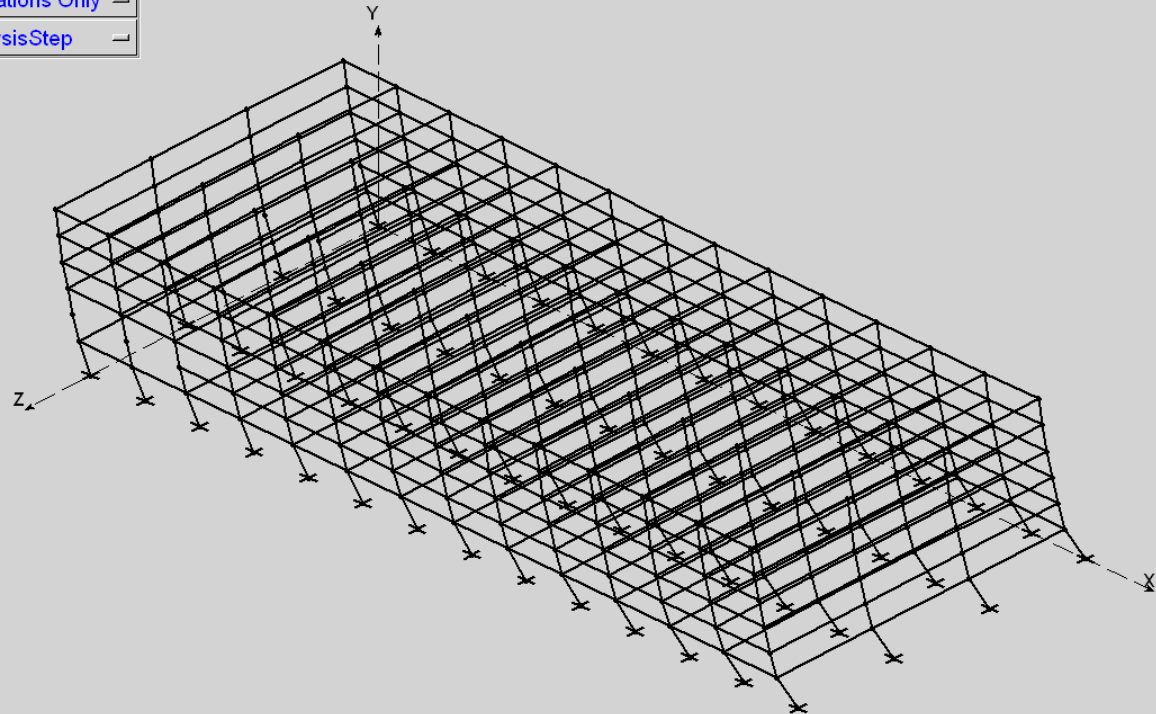
Close All Results Windows

3DBuilding

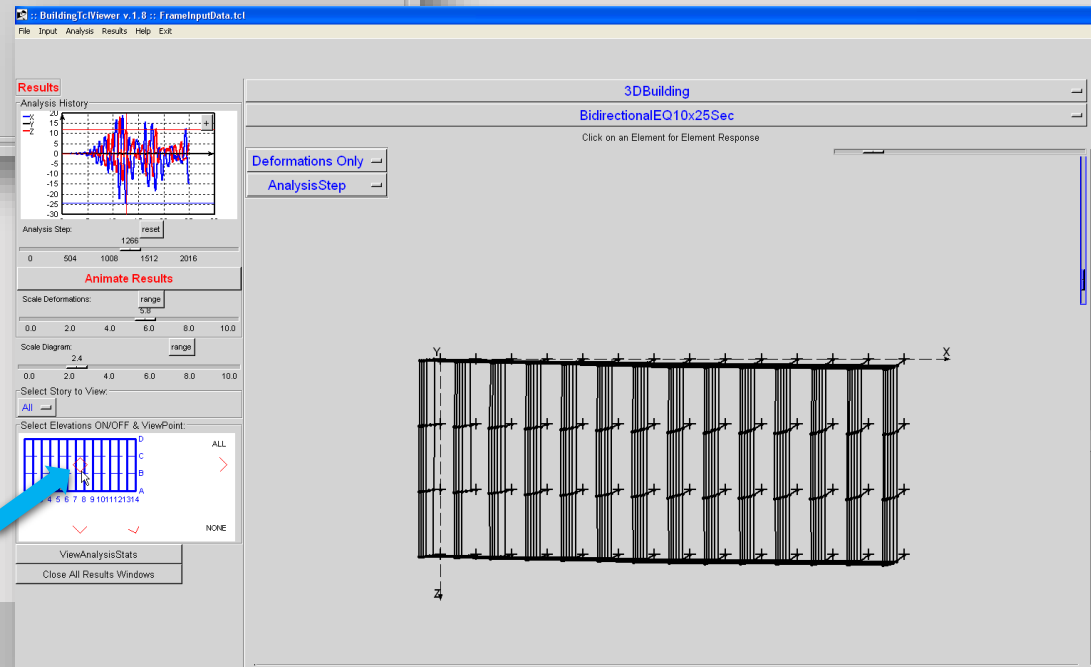
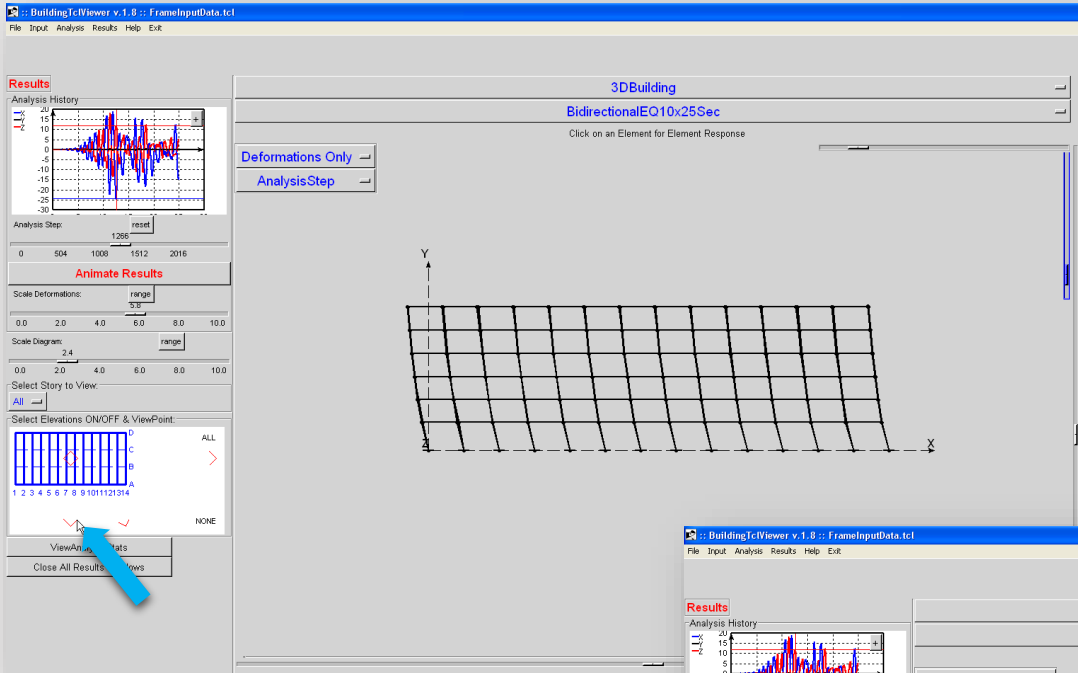
BidirectionalEQ10x25Sec

Click on an Element for Element Response

Deformations Only
AnalysisStep



Visualization of Structural Response viewpoints



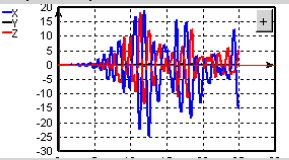
Visualization of Structural Response

nodal-displacement response

BuildingTclViewer v.1.8 :: FrameInputData.tcl
File Input Analysis Results Help Exit

Results

Analysis History



Analysis Step: 0 [reset]

0 504 1008 1512 2016

Animate Results

Scale Deformations: 1.0 [range]

0.0 2.0 4.0 6.0 8.0 10.0

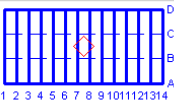
Scale Diagram: 1.0 [range]

0.0 2.0 4.0 6.0 8.0 10.0

Select Story to View:

All [dropdown]

Select Elevations ON/OFF & ViewPoint:

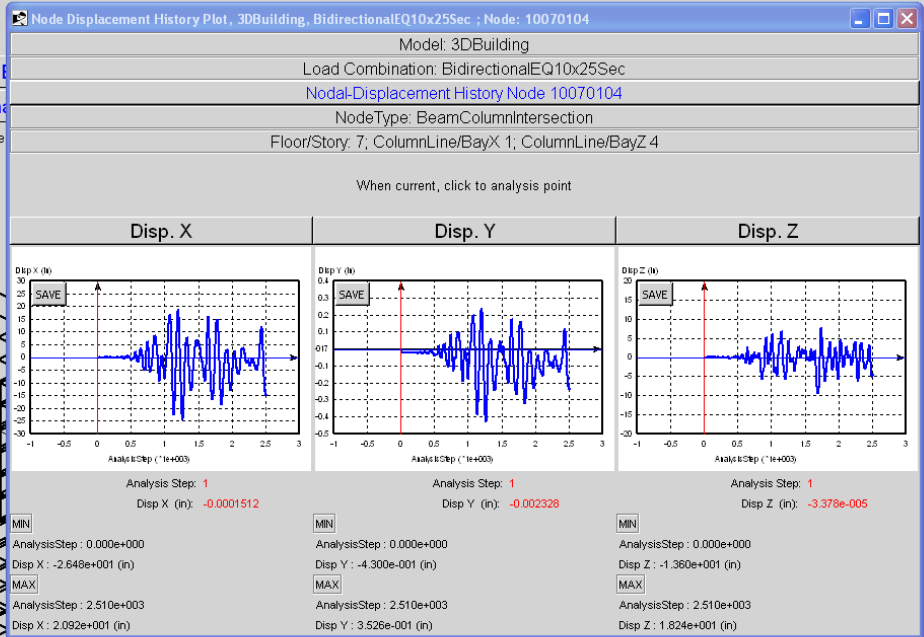
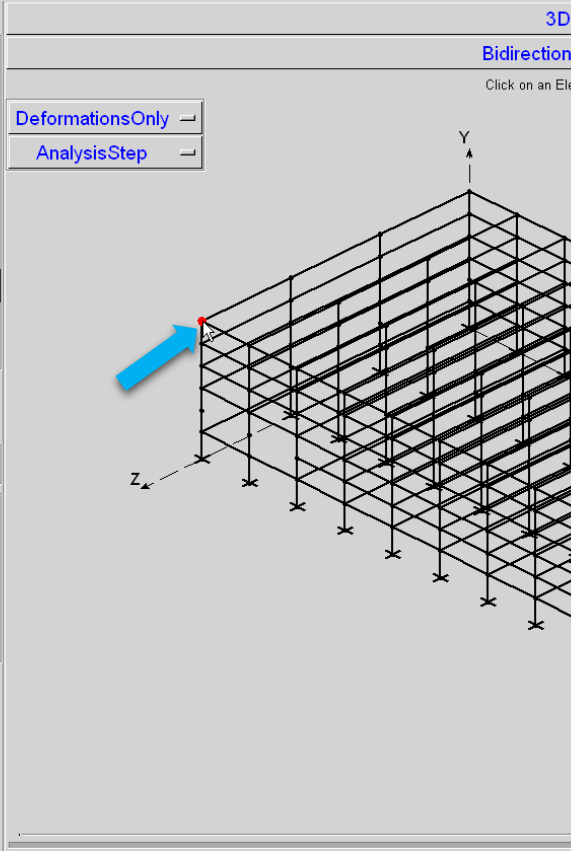


ALL [dropdown] >

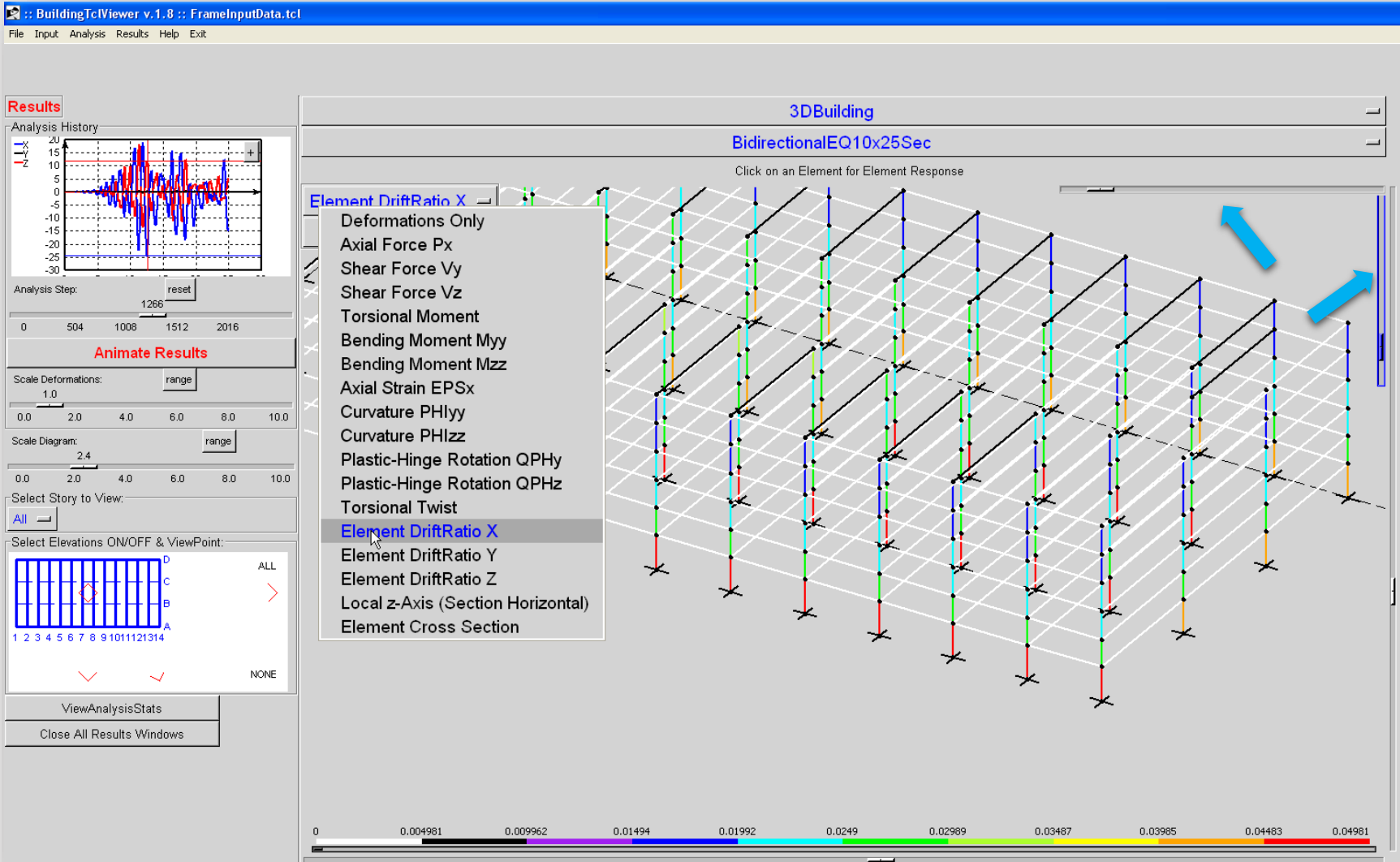
NONE

ViewAnalysisStats

Close All Results Windows



Visualization of Structural Response *zoom & rotate*



Visualization of Structural Response

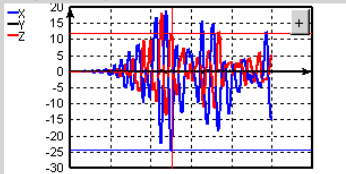
element section

BuildingTclViewer v.1.8 :: FrameInputData.tcl

File Input Analysis Results Help Exit

Results

Analysis History



Analysis Step: 1266

0 504 1008 1512 2016

Animate Results

Scale Deformations: 5.8

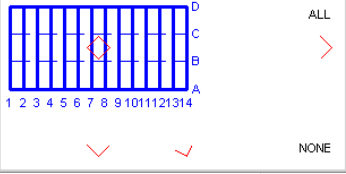
0.0 2.0 4.0 6.0 8.0 10.0

Scale Diagram: 2.4

0.0 2.0 4.0 6.0 8.0 10.0

Select Story to View: All

Select Elevations ON/OFF & ViewPoint:



1 2 3 4 5 6 7 8 9 10 11 12 13 14

ViewAnalysisStats

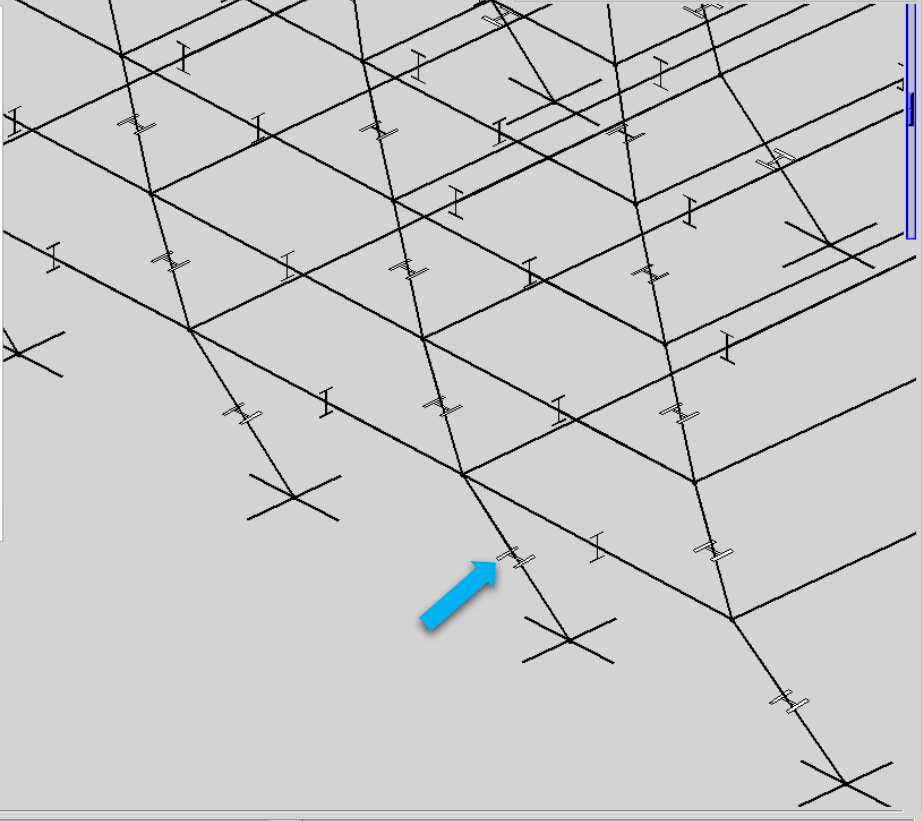
Close All Results Windows

3DBuilding

BidirectionalEQ10x25Sec

Click on an Element for Element Response

- Deformations Only
- Axial Force Px
- Shear Force Vy
- Shear Force Vz
- Torsional Moment
- Bending Moment Myy
- Bending Moment Mzz
- Axial Strain EPSx
- Curvature PHlyy
- Curvature PHlzz
- Plastic-Hinge Rotation QPHY
- Plastic-Hinge Rotation QPHz
- Torsional Twist
- Element DriftRatio X
- Element DriftRatio Y
- Element DriftRatio Z
- Local z-Axis (Section Horizontal)
- Element Cross Section**



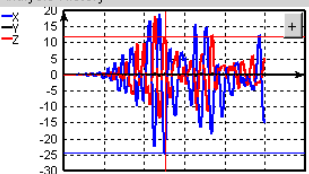
Visualization of Structural Response @ Analysis Steps

BuildingTclViewer v.1.8 :: FramelInputData.tcl

File Input Analysis Results Help Exit

Results

Analysis History



Analysis Step: 1266

0 504 1008 1512 2016

Animate Results

Scale Deformations: 1.0

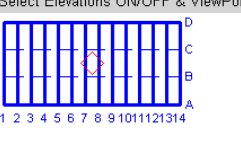
0.0 2.0 4.0 6.0 8.0 10.0

Scale Diagram: 2.4

0.0 2.0 4.0 6.0 8.0 10.0

Select Story to View: All

Select Elevations ON/OFF & ViewPoint: ALL



ViewAnalysisStats

Close All Results Windows

3DBuilding

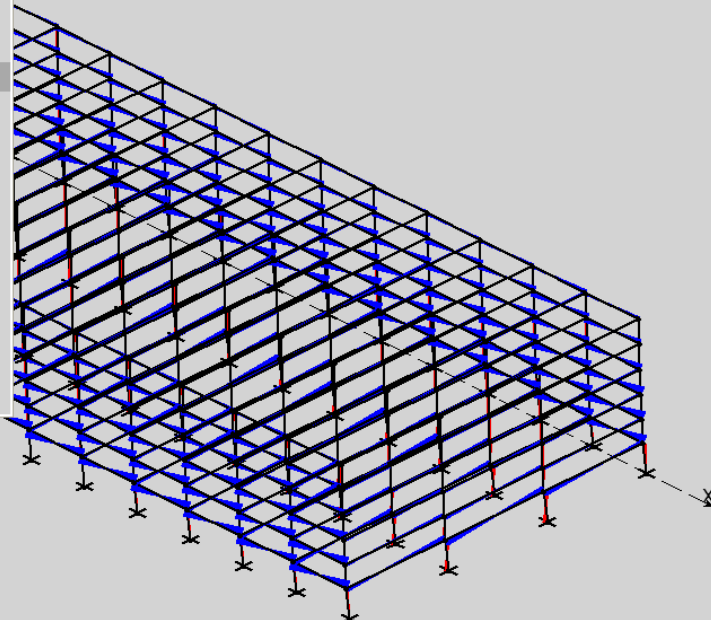
BidirectionalEQ10x25Sec

Click on an Element for Element Response

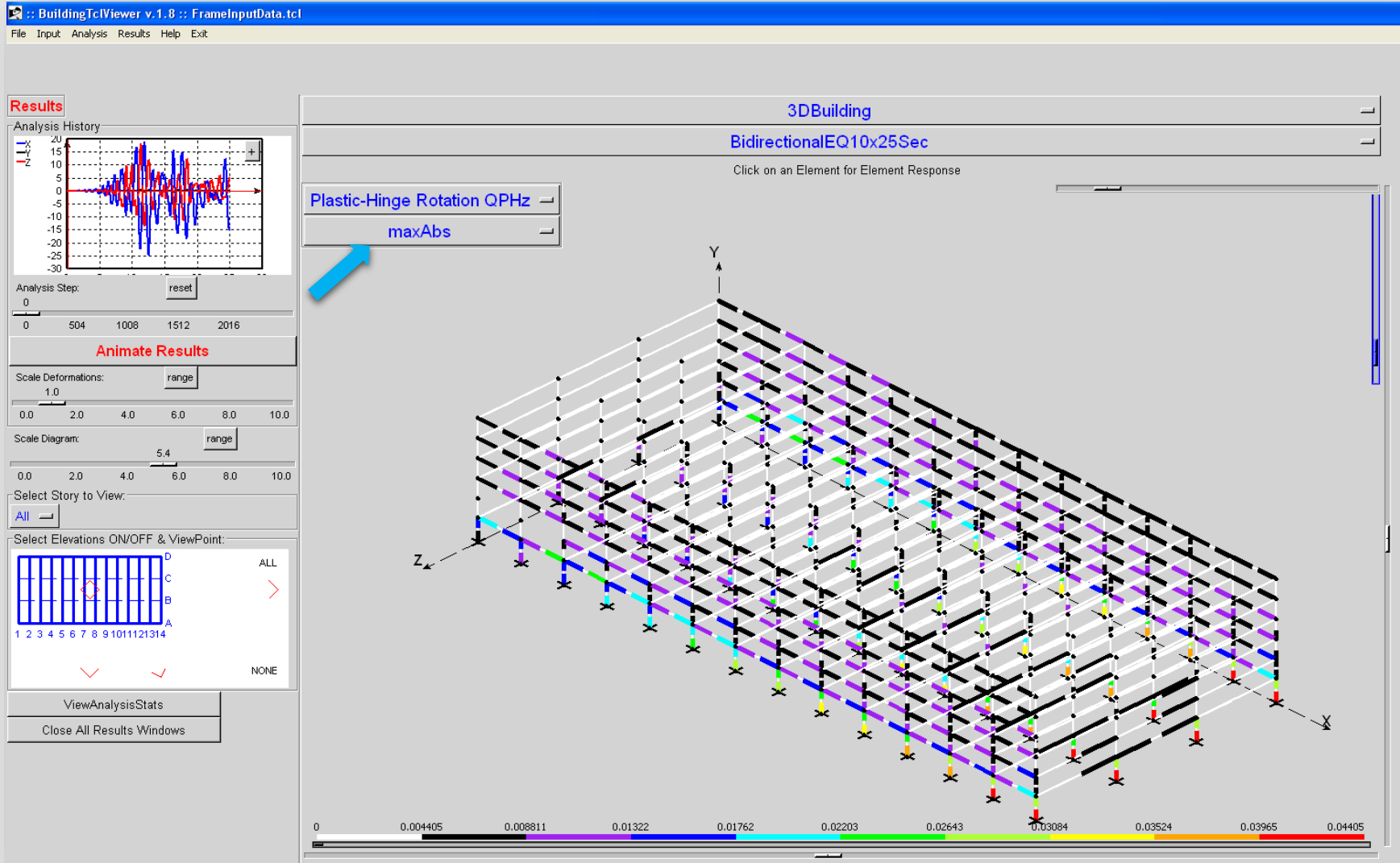
Bending Moment Mzz

AnalysisStep

- Deformations Only
- Axial Force Px
- Shear Force Vy
- Shear Force Vz
- Torsional Moment
- Bending Moment Myy
- Bending Moment Mzz**
- Axial Strain EPSx
- Curvature PHlyy
- Curvature PHlzz
- Plastic-Hinge Rotation QPhy
- Plastic-Hinge Rotation QPhz
- Torsional Twist
- Element DriftRatio X
- Element DriftRatio Y
- Element DriftRatio Z
- Local z-Axis (Section Horizontal)
- Element Cross Section



Visualization of Structural Response *envelope values*



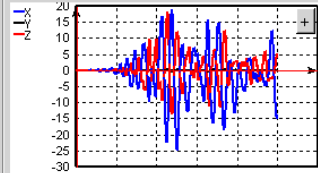
Visualization of Structural Response *individual story*

BuildingTclViewer v.1.8 :: FrameInputData.tcl

File Input Analysis Results Help Exit

Results

Analysis History



Analysis Step:

reset

0 504 1008 1512 2016

Animate Results

Scale Deformations:

range

1.0 0.0 2.0 4.0 6.0 8.0 10.0

Scale Diagram:

range

2.4 0.0 2.0 4.0 6.0 8.0 10.0

Select Story to View:

1

Select All elements ON/OFF & ViewPoint:

1	2	3	4	5	6	7	8	9	10	11	12	13	14
---	---	---	---	---	---	---	---	---	----	----	----	----	----

ALL >

NONE

ViewAnalysisStats

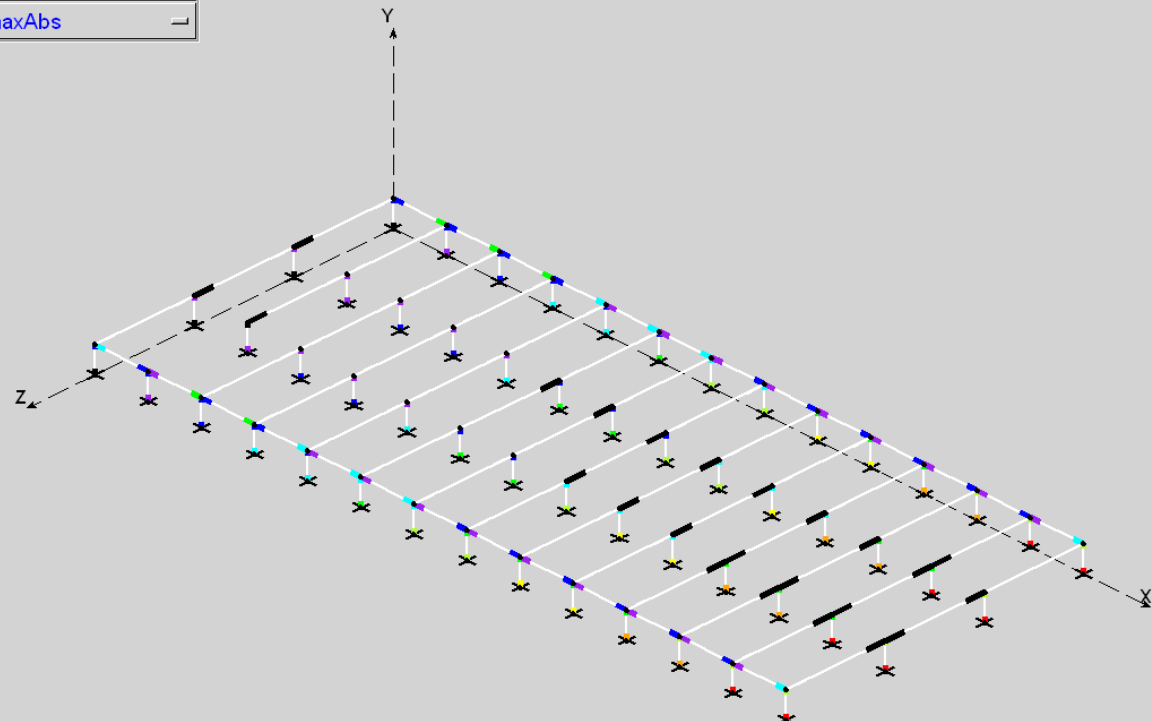
Close All Results Windows

3DBuilding

BidirectionalEQ10x25Sec

Click on an Element for Element Response

Plastic-Hinge Rotation QPHz
maxAbs



Visualization of Structural Response

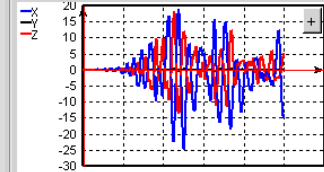
range of response

BuildingTclViewer v.1.8 :: FrameInputData.tcl

File Input Analysis Results Help Exit

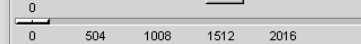
Results

Analysis History



Analysis Step:

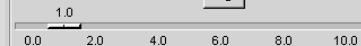
reset



Animate Results

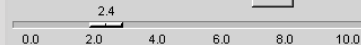
Scale Deformations:

range



Scale Diagram:

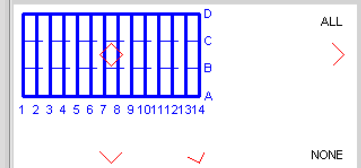
range



Select Story to View:

All

Select Elevations ON/OFF & ViewPoint:



ViewAnalysisStats

Close All Results Windows

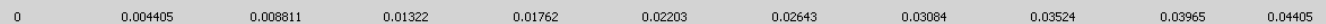
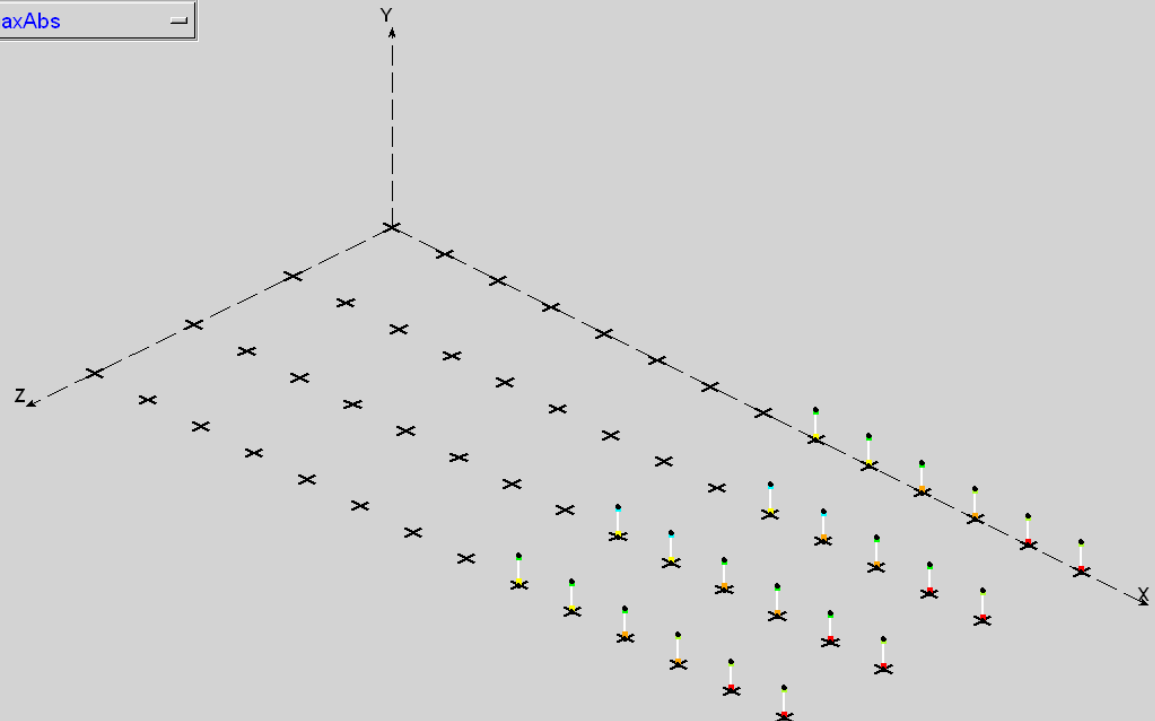
3DBuilding

BidirectionalEQ10x25Sec

Click on an Element for Element Response

Plastic-Hinge Rotation OPHz

maxAbs



Visualization of Structural Response

individual-elevation response

BuildingTclViewer v.1.8 :: FrameInputData.tcl

File Input Analysis Results Help Exit

Results

Analysis History

Analysis Step: 1266 (reset)

0 504 1008 1512 2016

Animate Results

Scale Deformations: 1.0 (range)

0.0 2.0 4.0 6.0 8.0 10.0

Scale Diagram: 5.1 (range)

0.0 2.0 4.0 6.0 8.0 10.0

Select Story to View: All

Select Elevations ON/OFF & ViewPoint:

ALL >

NONE

ViewAnalysisStats

Close All Results Windows

3DBuilding

BidirectionalEQ10x25Sec

Click on an Element for Element Response

Shear Force Vz

AnalysisStep

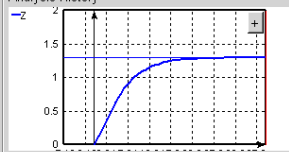
Visualization of Structural Response *selected-element response*

Building TclViewer v.1.8 :: FrameInputData.tcl

File Input Analysis Results Help Exit

Results

Analysis History



Analysis Step:

1 12 23 34 45

Animate Results

Scale Deformations:

0.0 2.0 4.0 6.0 8.0 10.0

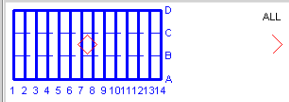
Scale Diagram:

0.0 2.0 4.0 6.0 8.0 10.0

Select Story to View:

All

Select Elevations ON/OFF & ViewPoint:



ALL

NONE

3DBuilding

StaticPushoverLargeStepsZ

Click on an Element for Element Response

DeformationsOnly

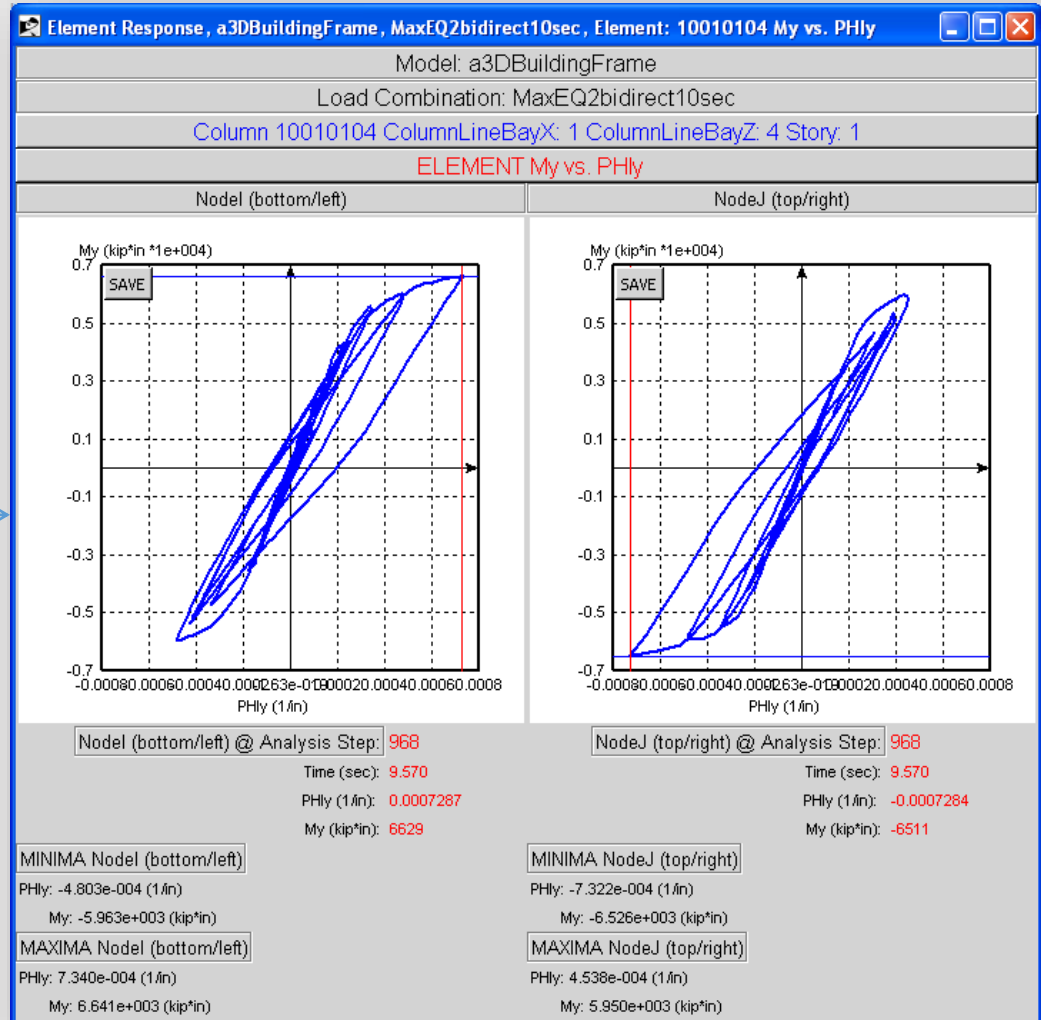
AnalysisStep

Section-Fiber Response

- Plot Fx vs. EPSx
- Plot Fx vs. Time
- Plot EPSx vs. Time
- Plot Fx vs. Analysis Step
- Plot EPSx vs. Analysis Step
- Plot Fy vs. DriftRatio
- Plot Fy vs. Time
- Plot DriftRatio vs. Time
- Plot Fy vs. Analysis Step
- Plot DriftRatio vs. Analysis Step
- Plot Fz vs. DriftRatio
- Plot Fz vs. Time
- Plot DriftRatio vs. Time
- Plot Fz vs. Analysis Step
- Plot DriftRatio vs. Analysis Step
- Plot Mx vs. Twist
- Plot Mx vs. Time
- Plot Twist vs. Time
- Plot Mx vs. Analysis Step
- Plot Twist vs. Analysis Step
- Plot My vs. PHly
- Plot My vs. Time
- Plot PHly vs. Time
- Plot My vs. Analysis Step
- Plot PHly vs. Analysis Step
- Plot My vs. QPHy
- Plot QPHy vs. Time
- Plot QPHy vs. Analysis Step
- Plot Mz vs. PHlz
- Plot Mz vs. Time
- Plot PHlz vs. Time
- Plot Mz vs. Analysis Step
- Plot PHlz vs. Analysis Step
- Plot Mz vs. QPHz
- Plot QPHz vs. Time
- Plot QPHz vs. Analysis Step

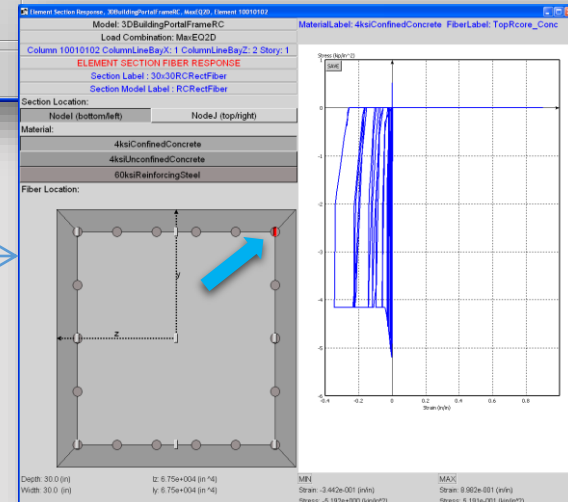
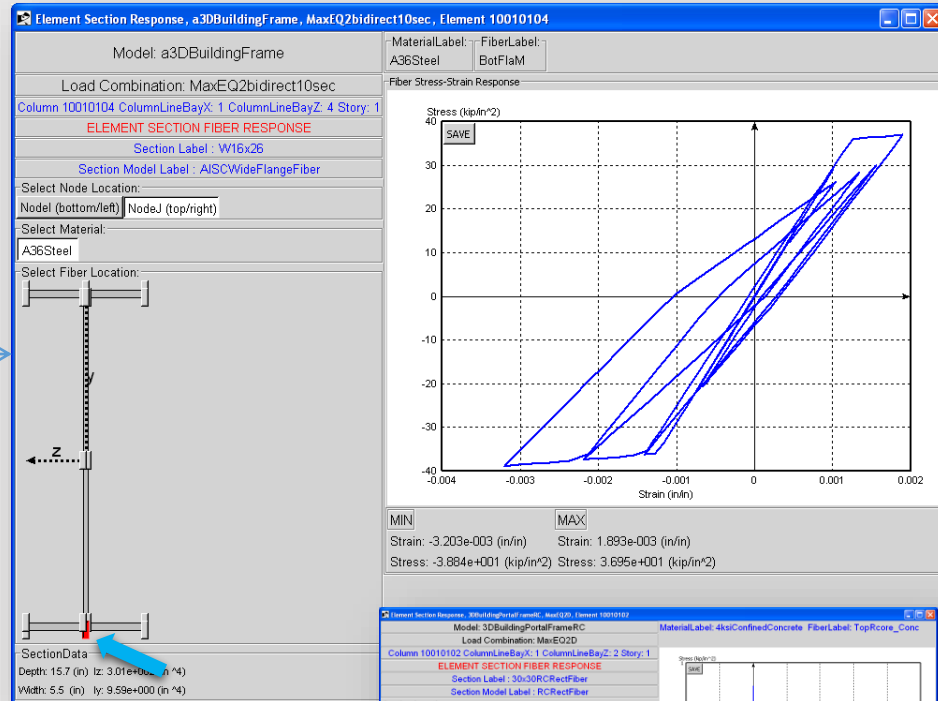
Element-Section Response

- Section-Fiber Response
- Plot Fx vs. EPSx
- Plot Fx vs. Time
- Plot EPSx vs. Time
- Plot Fx vs. Analysis Step
- Plot EPSx vs. Analysis Step
- Plot Fy vs. DriftRatio
- Plot Fy vs. Time
- Plot DriftRatio vs. Time
- Plot Fy vs. Analysis Step
- Plot DriftRatio vs. Analysis Step
- Plot Fz vs. DriftRatio
- Plot Fz vs. Time
- Plot DriftRatio vs. Time
- Plot Fz vs. Analysis Step
- Plot DriftRatio vs. Analysis Step
- Plot Mx vs. Twist
- Plot Mx vs. Time
- Plot Twist vs. Time
- Plot Mx vs. Analysis Step
- Plot Twist vs. Analysis Step
- Plot My vs. PHly ←
- Plot My vs. Time
- Plot PHly vs. Time
- Plot My vs. Analysis Step
- Plot PHly vs. Analysis Step
- Plot My vs. QPHy
- Plot QPHy vs. Time
- Plot QPHy vs. Analysis Step
- Plot Mz vs. PHlz
- Plot Mz vs. Time
- Plot PHlz vs. Time
- Plot Mz vs. Analysis Step
- Plot PHlz vs. Analysis Step
- Plot Mz vs. QPHz
- Plot QPHz vs. Time
- Plot QPHz vs. Analysis Step



BuildingTcl Viewer – Section-Fiber Response

- Section-Fiber Response
- Plot Fx vs. EPSx
- Plot Fx vs. Time
- Plot EPSx vs. Time
- Plot Fx vs. Analysis Step
- Plot EPSx vs. Analysis Step
- Plot Fy vs. DriftRatio
- Plot Fy vs. Time
- Plot DriftRatio vs. Time
- Plot Fy vs. Analysis Step
- Plot DriftRatio vs. Analysis Step
- Plot Fz vs. DriftRatio
- Plot Fz vs. Time
- Plot DriftRatio vs. Time
- Plot Fz vs. Analysis Step
- Plot DriftRatio vs. Analysis Step
- Plot Mx vs. Twist
- Plot Mx vs. Time
- Plot Twist vs. Time
- Plot Mx vs. Analysis Step
- Plot Twist vs. Analysis Step
- Plot My vs. PHly
- Plot My vs. Time
- Plot PHly vs. Time
- Plot My vs. Analysis Step
- Plot PHly vs. Analysis Step
- Plot My vs. QPHy
- Plot QPHy vs. Time
- Plot QPHy vs. Analysis Step
- Plot Mz vs. PHlz
- Plot Mz vs. Time
- Plot PHlz vs. Time
- Plot Mz vs. Analysis Step
- Plot PHlz vs. Analysis Step
- Plot Mz vs. QPHz
- Plot QPHz vs. Time
- Plot QPHz vs. Analysis Step



The model gets saved into a tcl file

```
#####
# __MyModel.tcl
# Mon Sep 22 12:20:05 -0700 2014
#####
# Set Up
setDataDir Data;
setUnits -Length in -Force kip -
# Material
addMaterialData MaterialLabel addModelData ModelLabel ElevationModel_multistory
addMaterialData MaterialModel addModelData ModelTypeLabel Elevation
addMaterialData E 1e9 addModelData ModelDescription ""
addMaterialData MaterialDescr addModelData DefaultElementTypeArray "SupportSpring DefaultSupportSpring Bearing DefaultBearing BeamHinge DefaultBeamHinge Di
addMaterial addModelData -Geometry Story 4 Height 120.0
addMaterialData MaterialLabel addModelData -Geometry Story 1 Height 120.0
addMaterialData MaterialModel addModelData -Geometry Story 2 Height 120.0
addMaterialData E 1e-9 addModelData -Geometry Story 3 Height 120.0
addMaterialData MaterialDescr addModelData -Geometry Bay 1 Width 120.0
addMaterial addModelData -Geometry Bay 2 Width 120.0
addMaterialData MaterialLabel addModelData -Columns ElementTypeLabel DefaultNBCPDelta SectionLabel W33X354 Orient HorizAxisBending ColumnLine 1 Story 1
addMaterialData MaterialModel addModelData -Columns ElementTypeLabel DefaultNBCPDelta SectionLabel W33X354 Orient HorizAxisBending ColumnLine 2 Story 1
addMaterialData E 1e-9 addModelData -Columns ElementTypeLabel DefaultNBCPDelta SectionLabel W33X354 Orient HorizAxisBending ColumnLine 1 Story 2
addMaterialData MaterialDescr addModelData -Columns ElementTypeLabel DefaultNBCPDelta SectionLabel W33X354 Orient HorizAxisBending ColumnLine 2 Story 2
addMaterial addModelData -Columns ElementTypeLabel DefaultNBCPDelta SectionLabel W33X354 Orient HorizAxisBending ColumnLine 1 Story 3
addMaterialData MaterialLabel addModelData -Columns ElementTypeLabel DefaultNBCPDelta SectionLabel W33X354 Orient HorizAxisBending ColumnLine 2 Story 3
addMaterialData MaterialModel addModelData -Columns ElementTypeLabel DefaultNBCPDelta SectionLabel W33X354 Orient HorizAxisBending ColumnLine 1 Story 4
addMaterialData MaterialDescr addModelData -Columns ElementTypeLabel DefaultNBCPDelta SectionLabel W33X354 Orient HorizAxisBending ColumnLine 2 Story 4
addMaterial addModelData -Beams ElementTypeLabel DefaultBeam SectionLabel W33X354 Orient HorizAxisBending Bay 1 Floor 2
addMaterialData MaterialLabel addModelData -GravityLoad LoadLabel DefaultGravity DistributedLoad 0.006944444444000004 Bay 1 Floor 2
addMaterialData MaterialModel addModelData -Beams ElementTypeLabel DefaultBeam SectionLabel W33X354 Orient HorizAxisBending Bay 1 Floor 3
addMaterialData E 1e-9 addModelData -GravityLoad LoadLabel DefaultGravity DistributedLoad 0.006944444444000004 Bay 1 Floor 3
addMaterialData MaterialDescr addModelData -Beams ElementTypeLabel DefaultBeam SectionLabel W33X354 Orient HorizAxisBending Bay 1 Floor 4
addMaterial addModelData -GravityLoad LoadLabel DefaultGravity DistributedLoad 0.006944444444000004 Bay 1 Floor 4
addMaterialData MaterialLabel addModelData -Beams ElementTypeLabel DefaultBeam SectionLabel W33X354 Orient HorizAxisBending Bay 1 Floor 5
addMaterialData MaterialModel addModelData -GravityLoad LoadLabel DefaultGravity DistributedLoad 0.006944444444000004 Bay 1 Floor 5
addMaterialData E 1e-9 addModel
addMaterialData MaterialDescr addModel
addSectionData SectionLabel M addModel
addSectionData SectionModelLa addModel
addSectionData yMomentModelLabel Loose
```

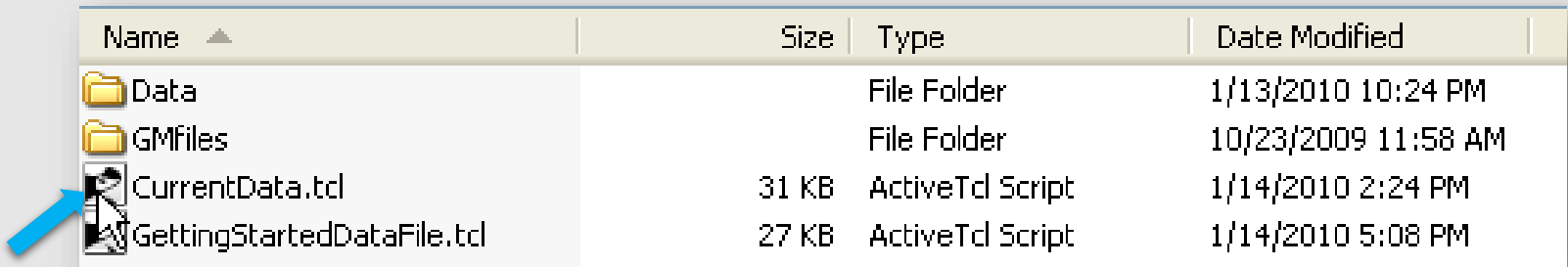

You can take use Tcl commands

```
58 set iVerticalSpringLabel "0309 0308 0307 0306 0305 0304 0303 0409
59 set iVerticalSpringE "16274.2 17145.3 8157.3 9541.2 11070.6 12643.9 16274.2 22783.9 24003.4
60 set iHorizontalSpringLabel "X0309 X0308 X0307 X0306 X0305 X0304 X0303 X0409
61 set iHorizontalSpringE "1763.4 1933.5 1732.5 2026.4 2351.2 2536.8 1763.4 2468.8 2707.0 2425.4 2836
62 set iVerticalDashpotLabel "0309 0308 0307 0306 0305 0304 0303 0409
63 set iVerticalDashpotC "50.421 52.720 20.794 24.321 28.220 33.014 50.421 70.589 73.808 29.111 34.05
64 set iHorizontalDashpotLabel "0309 0308 0307 0306 0305 0304 0303 0409
65 set iHorizontalDashpotC "8.761 9.607 8.607 10.068 11.682 12.604 8.761 12.266 13.449 12.050 14.09
66
67 foreach VerticalSpringLabel $iVerticalSpringLabel VerticalSpringE $iVerticalSpringE {
68   addMaterialData MaterialLabel VerticalSpring$VerticalSpringLabel
69   addMaterialData MaterialModelLabel Elastic
70   addMaterialData E $VerticalSpringE
71   addMaterialData MaterialDescription ""
72   addMaterial
73 }
```

In case you have to hard-exit:

After every time that any object is saved or modified, BuildingTclViewer saves a file in the same directory as the input file:

CurrentData.tcl

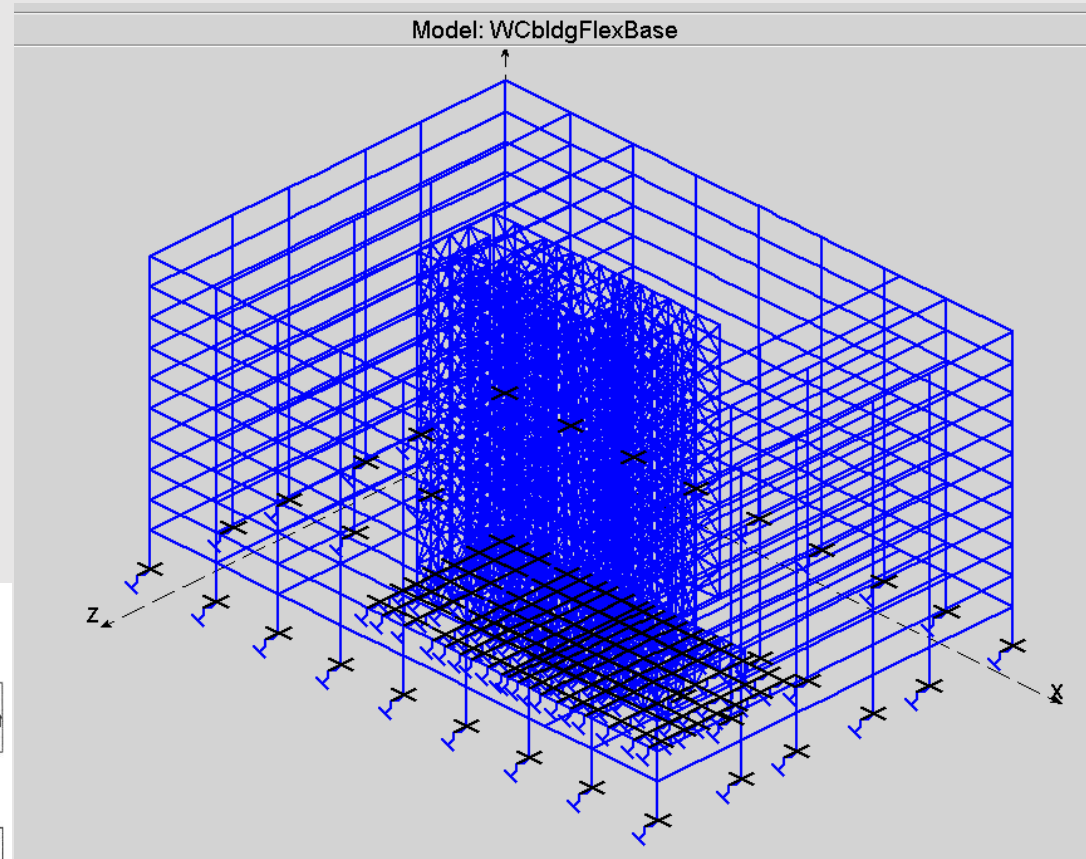
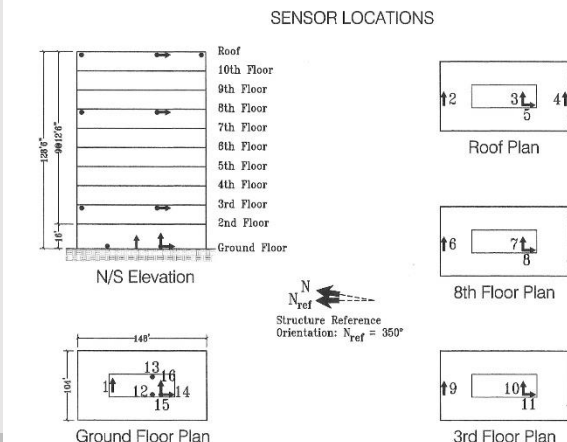


Name ▲	Size	Type	Date Modified
📁 Data		File Folder	1/13/2010 10:24 PM
📁 GMfiles		File Folder	10/23/2009 11:58 AM
📄 CurrentData.tcl	31 KB	ActiveTcl Script	1/14/2010 2:24 PM
📄 GettingStartedDataFile.tcl	27 KB	ActiveTcl Script	1/14/2010 5:08 PM

Soil-Structure Interaction: Base Rocking 10-story RC Frame



Walnut Creek - 10-story Commercial Bldg
(CSMP Station No. 58364)



Documentation: OpenSees wiki

page discussion edit history move watch

Silviamazzoni my talk my preferences my watchlist my contributions log out

BuildingTcl

Introduction

BuildingTcl is a library of Tcl procedures (commands) used to build a database for numerical simulation of building frames. Structural materials, sections, elements, models, analyses, loads and load combinations created in this database. Structural models can be Elevations, Plans, or 3DModels, which combine elevations and plans. Procedures are included to perform the numerical simulation using OpenSees. The OpenSees recorder data is post-processed into more accessible format.

BuildingTclViewer is a Tcl/Tk widget (program) that provides a graphical user interface to create the BuildingTcl database interactively, run the numerical simulations using OpenSees interactively, and view the results interactively.

The user can

- build a simulation-model library via scripting modules or interactively
- run simulations via scripting modules or interactively
- visualize real-time structural response during numerical simulation
- visualize results interactively.

While BuildingTcl and BuildingTclViewer were developed on a Windows platform, they can be made to work on other platforms, even Mac.

Objectives

- Generate numerical-simulation input in a manner consistent with architectural/structural drawings
- Create a database of all structure and simulation data
- The implementation of OpenSees to do the analysis is natural here, but not restrictive
- Be able to run on a number of platforms, just as OpenSees can

BuildingTcl

- High-level scripting tool
- Generate building-model data
 - Materials
 - Sections
 - Element Types
 - Analysis Models
 - Loads (Gravity & Lateral)
 - Load Combinations
 - Models
 - Elevations
 - Plan
 - 3D Frames
- Generate analysis-model data
- Generate loading and load-combination data
- Create OpenSees model of building
- Perform OpenSees numerical simulations
- Post-Process OpenSees recorder output into formatted data
- Generate OpenSees input files

more ...

BuildingTclViewer

- Graphical User Interface (GUI) for BuildingTcl
- Generate and/or visualize ALL BuildingTcl input graphically
- Save ALL input into BuildingTcl script
- Perform numerical simulations using OpenSees interactively
- Visualize OpenSees simulation real-time
- Pause and/or stop OpenSees analysis real-time
- Visualize simulation results interactively
- Export simulation results

more ...

navigation

- Main Page
- Community portal
- Current events
- Recent changes
- Random page
- Help

search

Go Search

toolbox

- What links here
- Related changes
- Upload file
- Special pages
- Printable version
- Permanent link

The program is a simple Windows executable file which you can download from the server

Name	Date modified	Type	Size
 seismiCAE.exe	9/25/2014 12:19 AM	Application	4,398 KB

Now I just need a good name for it

..... thank you!!!