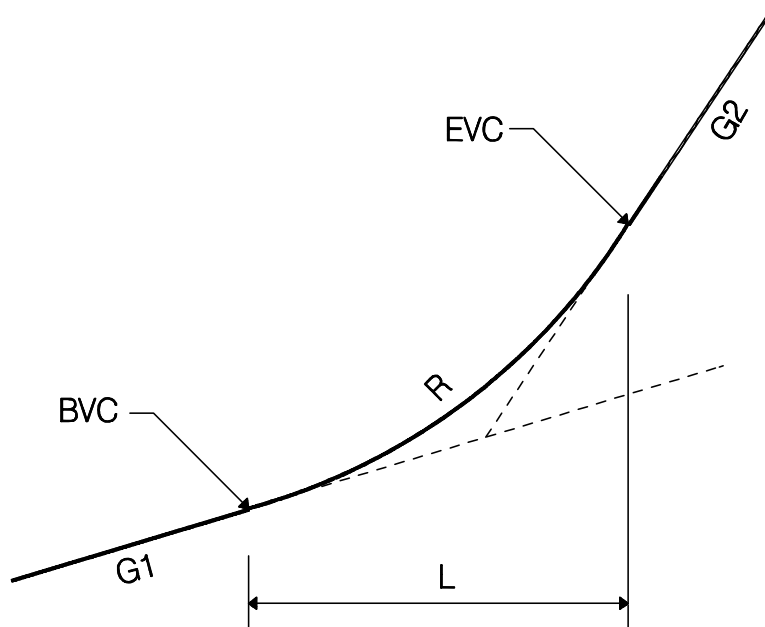


STRUCTWARE[®]
←—————→
Program Documentation

for

ELEV

Elevation Calculation Program



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JOB TITLE Elev Program Documentation ORIGINATOR RM DATE 4/9/2004

JOB No. _____ CALCULATION No. _____ REVIEWER _____ DATE _____

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INTRODUCTION

ELEV may be used to calculate elevations from vertical curve and superelevation information. The equations to calculate the roadway elevations were taken directly from Caltrans Bridge Design Details Manual page 4.34.

The online help file and graphical interface is shown in Section B. The verification problem is included in Section C. Additional information is contained in the following files installed in the program directory.

License.txt - The license agreement contains the terms and conditions for use of this program and documentation.

Readme.txt – The installation instructions, copyright notices and version history is contained in this file.

The following steps are recommended for users new to the program or specific features.

1. To learn how to use the program, view the Flash Demonstration Movie that is installed along with the program and read the "Instructions" section of the help file.

To apply this program to a specific problem, find a similar case in the Verification Problems section of this document. Run the program to see if you can reproduce the results. If your problem varies significantly from the Verification Problem, you should perform manual calculations for verification.

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ONLINE HELP FILE

[Elev help](#)

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GRAPHICAL INTERFACE

Elevation Calculation

File Reset Print Help

ELEVATIONS

Station	Offset	Elevation
<input type="text"/>	<input type="text" value="0"/>	<input type="text"/>

Next

NO. OF SEGMENTS

<input type="text" value="0"/>	Vertical curves
<input type="text" value="0"/>	Superelevations

VERTICAL CURVES

Beginning elevation:	<input type="text"/>
Beginning grade:	<input type="text"/>
Ending grade:	<input type="text"/>
Beginning station:	<input type="text"/>
Ending station:	<input type="text"/>

Navigation: Left Arrow, Right Arrow

SUPERELEVATION SEGMENTS

Beginning superelevation:	<input type="text"/>
Beginning super grade:	<input type="text"/>
Ending super grade:	<input type="text"/>
Beginning station:	<input type="text"/>
Ending station:	<input type="text"/>

Navigation: Left Arrow, Right Arrow

No input file specified No output file specified Elevation logging is off

CHECKED _____ DATE _____

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BY RM DATE 4/28/93Verification Problem

- Problem: Calculate top of MSE wall RW2 elevations for Pico Avenue Bridge Project (stations 3008 to 3408 by 25)
- Input information: Ref. Civil drawings P2 & P3 for profile & super-elevation

Profile	Begin elev	Begin grade	End grade	Begin station	End station
1	12.09	-.0024	.0521	2825	3225
2	22.03	.0521	.0521	3225	3625

Super	Begin super	Begin grade	End grade	Begin sta	End sta	Distance L
1	.02	0	-.000133 ^①	2910	3010	31
2	.0133 ^②	-.000133	-.000133	3010	3210	31
3	-.0133 ^③	-.000133	0	3210	3310	31
4	-.02	0	0	3310	3442	31

$$\textcircled{1} \quad \frac{-.02 - (+.02)}{3260 - 2960} = -.000133$$

$$\textcircled{2} \quad -.000133(3010 - 2960) + .02 = .0133$$

$$\textcircled{3} \quad -.000133(3210 - 2960) + .02 = -.0133$$

} Intermediate calcs
required for input

- Calculations:

$$\text{Vertical curve no. 1} \quad R = \frac{.0521 - (-.0024)}{3225 - 2825} = .00013625 \quad \checkmark$$

$$\text{Super curve no. 1} \quad R = \frac{-.000133 - 0}{(3010 - 2910)} = -.00000133 \quad \checkmark$$

$$\text{Super curve no. 3} \quad R = \frac{0 - (-.000133)}{(3310 - 3210)} = +.00000133 \quad \checkmark$$

$$\left\{ \begin{aligned} \text{Elev}(3008) &= 12.09 + (3008 - 2825)(-.0024) + (3008 - 2825)^2 (.00013625) / 2 \\ &= 13.932 \text{ @ station line} \\ \text{Super} &= .02 + (3008 - 2910)(0) + (3008 - 2910)^2 (-.00000133) / 2 = .013613 \quad \checkmark \\ \text{Elev} &= 13.932 + .013613(31) = 14.35 \quad \checkmark \end{aligned} \right.$$

CHECKED _____ DATE _____

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BY em DATE 4/28/93

$$\left\{ \begin{aligned} \text{Elev (3158)} &= 12.09 + (3158 - 2825)(-.0024) + (3158 - 2825)^2(.00013625)/2 \\ &= 18.845 \text{ @ station line} \\ \text{Super} &= .0133 + (3158 - 3010)(-.000133) = -.006384 \checkmark \\ \text{Elev} &= 18.845 - .006384(31) = 18.65 \checkmark \end{aligned} \right.$$

$$\left\{ \begin{aligned} \text{Elev (3283)} &= 22.03 + (3283 - 3225)(.0521) = 25.052 \text{ @ station line} \\ \text{Super} &= -.0133 + (3283 - 3210)(-.000133) + (3283 - 3210)^2(.00000133)/2 \\ &= -.019465 \checkmark \\ \text{Elev} &= 25.052 - .019465(31) = 24.45 \checkmark \end{aligned} \right.$$

$$\begin{aligned} \text{Elev (3408)} &= 22.03 + (3408 - 3225)(.0521) = 31.564 \text{ @ station line} \\ \text{Super} &= -.02 \checkmark \\ \text{Elev} &= 31.564 - .02(31) = 30.94 \checkmark \end{aligned}$$

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Program ELEV Output File = VER.OUT

12/25/02,8:58 pm

Number of vertical curves = 2

ELEV 1	GRADE 1	GRADE 2	STA 1	STA 2
12.090	-0.0024	0.0521	2825.000	3225.000
22.030	0.0521	0.0521	3225.000	3625.000

Number of superelevation segments = 4

SUPER 1	GRADE 1	GRADE 2	STA 1	STA 2
0.02	0.	-0.000133	2910.000	3010.000
0.0133	-0.000133	-0.000133	3010.000	3210.000
-0.0133	-0.000133	0.	3210.000	3310.000
-0.02	0.	0.	3310.000	3492.000

STATION	OFFSET	SUPER	ELEVATION
3008.000	31.000	0.01361334	14.354
3033.000	31.000	0.010241	14.856
3058.000	31.000	0.006916	15.444
3083.000	31.000	0.003591	16.117
3108.000	31.000	0.000266	16.875
3133.000	31.000	-0.003059	17.719
3158.000	31.000	-0.006384	18.647
3183.000	31.000	-0.009709	19.661
3208.000	31.000	-0.013034	20.760
3233.000	31.000	-0.01600721	21.951
3258.000	31.000	-0.01815184	23.187
3283.000	31.000	-0.01946521	24.448
3308.000	31.000	-0.01994734	25.736
3333.000	31.000	-0.02	27.037
3358.000	31.000	-0.02	28.339
3383.000	31.000	-0.02	29.642
3408.000	31.000	-0.02	30.944