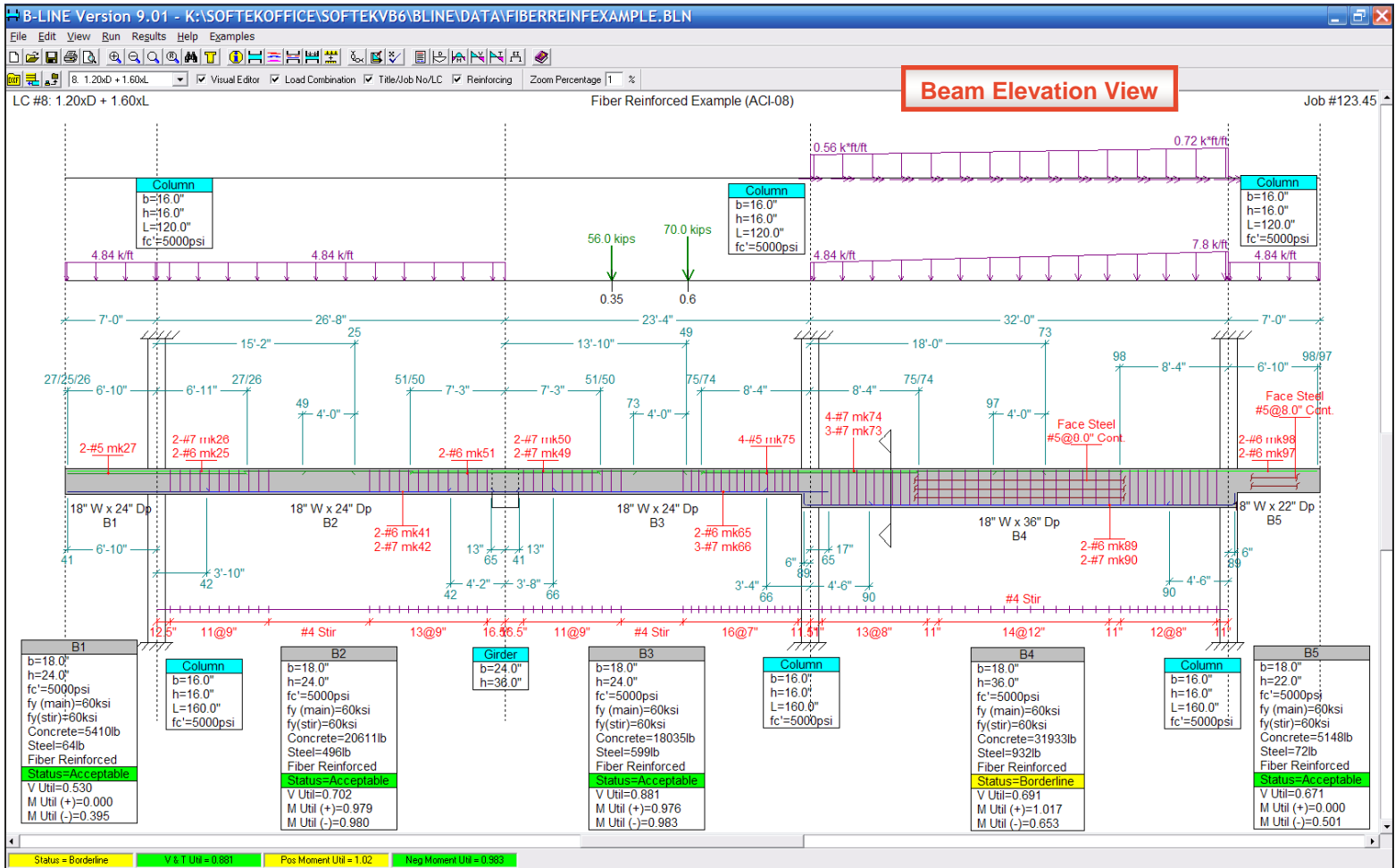


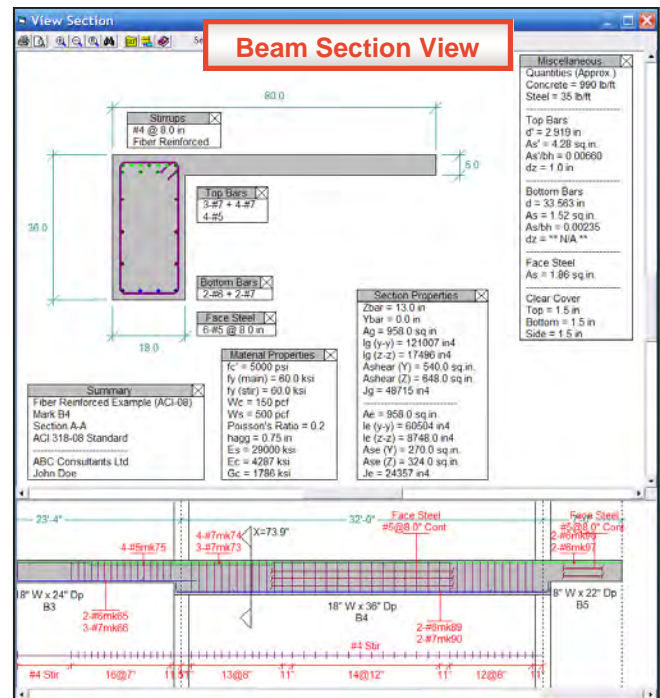


# S-LINE™



## S-LINE™ is a stand-alone continuous beam design and detailing application

- Reinforced concrete continuous beam design and detailing application featuring a visual editor. Simply drag lines to change dimensions or click on hot-spots to change reinforcing.
- Support for ACI 318-08, 05, 02, & 99, CSA A23.3-04 & 94, BS 8110:1997 & 1985, CP 65:1999.
- Design of T-beams, L-beams, slab bands and rectangular beams.
- Rectangular and circular columns as well as girder supports.
- Standard and user defined reinforcing styles are available.
- Combined moment, shear and torsion design for all codes.
- CSA-A23.3 simplified or general method of shear and torsion design.
- Automatic generation of pattern loading and load combinations.
- Short term and long term (cracked section) deflection evaluation.
- Apply moment redistribution.
- Automatic design with beam section and/or reinforcement optimization.
- American, British, Canadian, Korean, Singaporean, or define your own set of reinforcing bars (Custom Bars).
- Full graphical output including capacity envelopes on shear, moment and torsion diagrams.
- Apply distributed or concentrated vertical and torsional loads on members.
- Support for fiber-reinforced concrete beams (ACI 318-08 only) with implications on minimum shear reinforcing requirements.
- Quality output to AutoCAD® and Microsoft Word®.
- Fully integrated with TEDDS®.





# S-LINE™

### Reinforcing Styles

Top Bars | Bottom Bars | Miscellaneous

Other Parameters:  
 Lap Coefficient: 1.00 x L  
 Short Span: 0.60 x L  
 Rho (Gross): 0.0080

Bar Size: b / db  
 Min  
 Max  
 Bar Coat: Normal

Top Bar Style #2

Curtailment & Area Coefficients:  
 k1: 0.500, c1: 0.333  
 k2: 0.250, c2: 0.667  
 k3: 0.250, c3: N/A  
 k4: 0.400, c4: 0.167  
 k5: 0.250

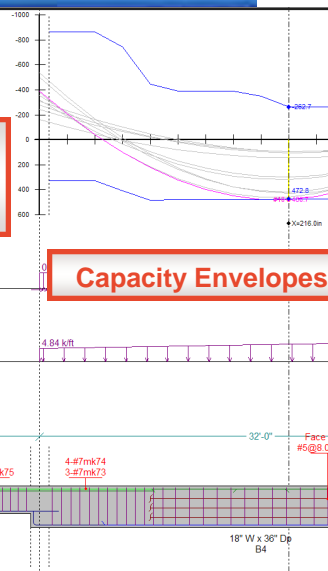
### Load Cases and Combinations

LOAD CASES	Identification and Description	B1	B2
D	Dead Load		
L	Full Live Load		
L1	Live Load 1		
L2	Live Load 2		
L3	Live Load 3		
L4	Live Load 4		
L5	Live Load 5		
L6	Live Load 6		
L7	Live Load 7		
L8	Live Load 8		
L9	Live Load 9		
L10	Live Load 10		
L11	Live Load 11		
L12	Live Load 12		
L13	Live Load 13		
L14	Live Load 14		
L15	Live Load 15		
L16	Live Load 16		
L17	Live Load 17		

LEVEL OF CHECKS	Span (in)	Span (ft)	B1	B2
20	Assayn	# Stations	5	17

DEFLECTION LOAD COMBINATIONS (Service Loads)	LC	Active	Description
1	D		Immediate Deflection
2	L		Immediate Deflection
3	L1		Immediate Deflection
4	L2		Immediate Deflection
5	D + L		Long Term Net Defl
6	D + L1		Long Term Net Defl
7	D + L2		Long Term Net Defl

STRENGTH LOAD COMBINATIONS (Factored Loads)	LC	Active	New Dead Load	Loaded L
8			1.20	x D + 1.60
9			1.20	x D + 1.60
10			1.20	x D + 1.60
11			1.20	x D + 1.60
12			1.20	x D + 1.60
13			1.20	x D + 1.60
14			1.20	x D + 1.60
15			1.20	x D + 1.60
16			1.20	x D + 1.60
17			1.20	x D + 1.60



### Results Report

Member Summary | Member Loads | Closure Spacing | Crack Control | List of Messages  
 Member Properties | Reinforcing Material | Bar Spacing | Reinforcement Bar |  
 Member Reinforcement | Shear & Torsion | Material Properties | Deflection

Positive Moment Results:  
 X: 376.0 in  
 GLC: #9  
 Mu: 0.0 kips  
 Mu: -207.4 k/ft  
 mu: -200.5 k/ft  
 Utilization: 1.057  
 Maximum: 1.055  
 Status: Satisfactory

Shear and Torsion Results:  
 Utilization: 0.0  
 GLC: #13  
 Nu: 0.0 kips  
 Tu: 79.7 k/ft  
 Vtu: -204.7 k/ft  
 Vu: 32.7 kips  
 T Util: 1.062 + Tu/Td  
 V Util: 0.351 + (Vu/Vd)/Vd  
 Utilization: 1.650  
 Status: Satisfactory

Design Information:  
 B: 18.0 in  
 d: 29.66 in  
 Av: 0.4 in²  
 Lambda: 1.00  
 OVs: 68.7 kips  
 OVs: 56.6 kips  
 OVs: 123.4 kips  
 OVs: 46.6 k/ft  
 OVs: 75.1 k/ft

Max Shear & Torsional Stress:  
 Stress: 265.9 psi  
 Maximum: 532.3 psi  
 Status: Satisfactory

- Choose a variety of reinforcing styles to serve as a guideline.
- Automatic generation of pattern loading and load combinations.
- Full graphical output including capacity envelopes on shear, torsion, and moment diagrams.

- Apply distributed or concentrated vertical and torsional loads.
- View Results Report (displaying status levels or code violations) and clause references with on-line help for details.

### S-LINE Help Version 9.01

Contents | Index | Search

Getting Started | Quick Start | Menu Bar and Tool Bar | Status Bar and Status Line | Visual Editor in Elevation | Visual Editor in Section

File Menu Commands | Edit Menu Commands | View Menu Commands | Run Menu Commands | Engineering Notes (All Status) | Analysis Model - Discuss | Moment Capacity | Minimum and Maximum | Effective Area of Steel | Effective Slab Width | Slab Band Definition | Critical Section for Moment | List of Messages | Moment Redistribution | Deflection Estimation | American Standard | Miscellaneous Requiremen | Shear Resistance | Shear and Torsion | Shear Reinforcing | Development Length | Crack Control

British and Singapore Stand | Canadian Standard | Miscellaneous Requiremen | Shear Resistance

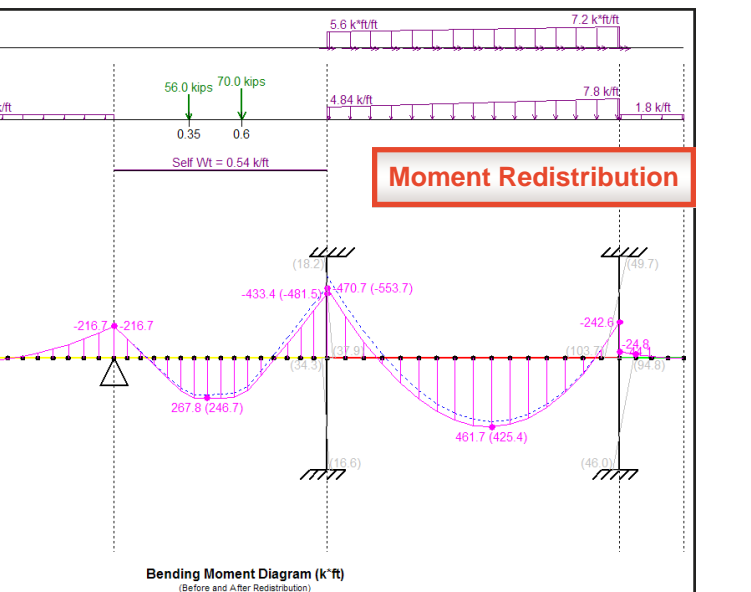
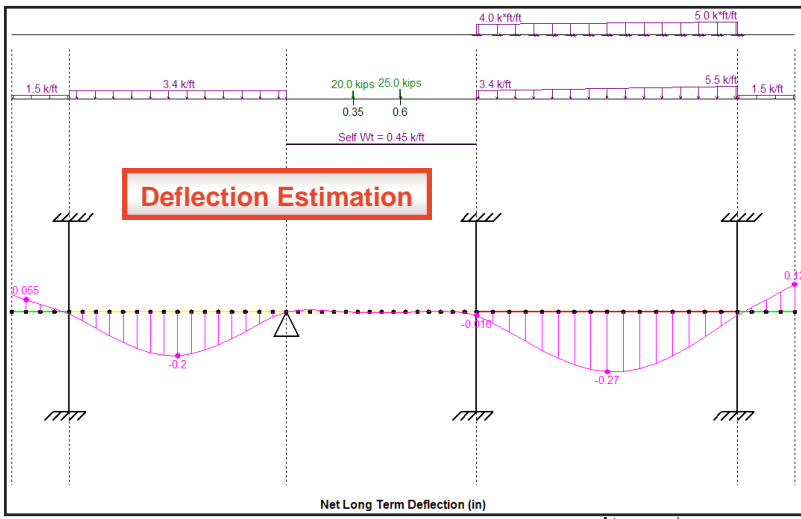
#### Consideration of Torsion

According to Clause 11.5.1 of ACI 318-08 or Clause 11.6.1 of ACI 318-05 & 02, torsional effects shall be considered if the applied ultimate torque is greater than one quarter of the torsional moment required to crack an unreinforced section.

If  $T_U > 0.25 \phi_{TCR}$ , torsional effects shall be considered.

where  $T_{CR} = 7.4 \sqrt{f'_c} \left( \frac{A_{CP}^2}{P_{CP}} \right)$

Torsional Moment Capacity:  
 $T_U \leq \phi T_n = 2A_0 \phi_{TV} \frac{A_t}{S}$   
 where  $A_0 = 0.85 A_{ch}$ ,  $A_{ch} = x y_j$ ,  $A_t = \frac{A_v}{n}$ ,  $n = \text{number of legs}$



- Apply moment redistribution and check if adequate rotational capacity is provided.
- Perform short and long term (cracked section) deflection estimation.

