For Strength Design Only **Calculate Composite Centroid - Negative Bending**

Element	Actual Height of Element	Effective Height of Element *,**	Width of Element	Spacing of Elements in C/C	Number of Elements per Foot	Actual Area	Transformed Area	Distance from Bottom of Grid to Centroid of Element	
						A	A_t	d	$A_t \times d$
Main Bar	2.000	2.000	N/A	10	1.2	1.26651720	1.26651720	0.44111029	0.55857369
Supplemental Bar 1	0.000	0.000	0.000	4	3	0.00000000	0.00000000	2.00000000	0.00000000
Supplemental Bar 2	0.000	0.000	0.000	3.75	3.2	0.00000000	0.00000000	2.00000000	0.00000000
Concrete**	3.000	0.360	12.000	12	1	4.32000000	0.64000000	0.18000000	0.09720000
Top Punchout*	0.000	0.000	-0.193	10	1.2	0.00000000	0.00200000	1.00000000	0.00200000
Bottom Punchout*	0.000	0.000	-0.193	10	1.2	0.00000000	0.00200000	0.00000000	0.00000000
Σ							1.89652		0.65817369

Centroid of Composite Section = y (measured from bottom of grid) = $\Sigma(A_t * d) / \Sigma(A_t)$ = 0.306763713 Taken as 0.36

Note : Effective Height of Concrete is found by iterating until no effective concrete is below the centroid.

Calculate Composite Moment of Inertia - Negative Bending

Element	Distance from Centroid of Element to Composite Centroid (y)		Moment of Inertia of Element taken by Itself	Transformed Moment of Inertia	Times Number of Elements (per ft.)	Transformed Moment of Inertia (per ft)
	d	$A_t * (d)^2$	I	I / n		I_t
Main Bars	0.07434667	0.00749803	0.31752077	0.31752077	1.2	0.38102492
Supplemental Bar 1	1.63323629	0.00000000	0.00000000	0.00000000	3	0.00000000
Supplemental Bar 2	1.63323629	0.00000000	0	0.00000000	3.2	0.00000000
Concrete**	-0.18676371	0.01883557	0.04666600	0.00583200	1	0.00583200
Top Punchout*	0.63323629	0.00000000	0.00000000	0.00000000	1.2	0.00000000
Bottom Punchout*	-0.36676371	0.00000000	0.00000000	0.00000000	1.2	0.00000000
Σ		0.0283336				0.38685692

I_e = Moment of Inertia for Composite Section = $\Sigma(A_t * (d)^2) + \Sigma(I_t)$ = 0.41316924

Computation of Section Properties

Point of Interest	Location Relative to Bottom of Grid	Distance from Centroid to Point of Interest	Effective Section Modulus
Bottom of Concrete	0.000	-0.36676371	0.91268059
Bottom of Grid	0	-0.36676371	1.12658507
Top of Grid	2.000	1.63323629	-0.25298682
Form Pan	0.000	-0.36676371	1.12658507
CB Weld	2	1.63323629	-0.25298682

*Punchout is Ignored in Compression Areas and Subtracted When in Tension

**Concrete is Transformed to Steel in Compression Areas and Ignored When in Tension