

For Strength Design Only Calculate Composite Centroid - Positive Bending

Element	Actual Height of Element	Effective Height of Element **	Width of Element	Spacing of Elements IN CC	Number of Elements per Foot	Actual Area	Transformed Area	Distance from Bottom of Grid to Centroid of Element	A _t x d
	d				n	A	A _t	d	A _t x d
Main Bar	2.000	2.000	N/A	10	1.2	1.2000000	1.2000000	0.4411028	0.5293254
Supplemental Bar 1	0.000	0.000	0.000	4	3	0.0000000	2.0000000	0.0000000	0.0000000
Supplemental Bar 2	0.000	0.000	0.000	3.75	3.2	0.0000000	2.0000000	0.0000000	0.0000000
Concrete**	3.000	1.500	12.000	12	1	17.1000000	2.2500000	4.5013250	0.0000000
Top Punchout*	0.000	0.000	-0.193	10	1.2	0.0000000	0.0000000	1.0000000	0.0000000
Bottom Punchout*	0.000	0.000	-0.193	10	1.2	0.0000000	0.0000000	0.0000000	0.0000000
Σ							32.0152		5.2586593

Centroid of Composite Section = y (measured from bottom of grid) = $\sum (A_t \cdot d) / \sum (A_t) = 1.570661623$ Taken as 1.57

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

Calculate Composite Moment of Inertia - Positive 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.)
	y	I _x	I _x	n	I _x
Main Bar	-1.1265134	1.7076161	0.31762077	1.2	0.38114492
Supplemental Bar 1	0.42252828	0.0000000	0.0000000	3	0.0000000
Supplemental Bar 2	0.42252828	0.0000000	0.0000000	3.2	0.0000000
Concrete**	0.7143268	1.0945413	2.0240270	1	0.3652598
Top Punchout*	-0.57089162	0.0000000	0.0000000	1.2	0.0000000
Bottom Punchout*	-1.57089162	0.0000000	0.0000000	1.2	0.0000000
Σ		2.82531072			0.7465296

I_x = Moment of Inertia for Composite Section = $\sum (A_t \cdot (d')^2) + \sum (I_x) = 3.671001541$

Computation of Section Properties

Point of Interest	Location Relative to Bottom of Grid	Distance from Centroid to Point of Interest	Effective Section Modulus
Top of Concrete	3.000	1.42933838	10.99169182
Bottom of Grid	0	-1.57066162	-2.27411270
Top of Grid	2.000	0.42252828	8.31946855
Form Face	0.000	-1.57066162	-2.27411270
CB WEIR	2	0.42252828	8.31946855

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

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