Calculate Composite Centroid - Positive Bending

n= 8

Element	Actual Height of Element	Effective Height of Element (Concrete above N.A.) See Note.	Width of Element	Spacing of Elements c-c (in.)	Number of Elements (per ft)	Actual Area	Trans-formed Area (A/n)	Distance from Bottom of Grid to Horiz. Centroid of Element	
						A	A_t	d	A_t x d
Main Bars	3.945	3.945		12	1	1.480	1.480	0.953	1.410
less punchout hol	0.75	0.75	0.17	12	1	-0.128	-0.128	1.820	-0.232
less shear hole	0.75	0.75	0.17	12	1	-0.128	-0.128	3.320	-0.423
Concrete	4.5	2.6331	12	12	1	31.597	3.950	6.128	24.205
Rebar *				4	3	0.515	0.515	4.685	2.420
Σ							5.690		27.380

Centroid of composite section = y (measured from bottom of grid) = $\Sigma(A_t{}^*d)/\Sigma(A_t)$ = **4.812** In.

Notes: Effective Height of concrete found by iterating until no effective concrete is below the centroid.
* Rebar area reduced by (n-1)/n to account for concrete displaced by rebar.

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	Trans-formed Moment of Inertia	Times Number of Elements (per ft.)	Trans-formed Moment of Inertia (per ft.)
	d'	A_t x $(d')^2$	I	I/n		I_t
Main Bars	-3.859	22.039	2.150	2.150	1	2.150
less punchout hol	-2.992	-1.141	-0.006	-0.006	1	-0.006
less shear hole	-1.492	-0.284	-0.006	-0.006	1	-0.006
Concrete	1.317	6.846	18.255	2.282	1	2.282
Rebar	-0.117	0.007	0.000	0.000	3	0.000
Sums		27.467				4.420

I_g=Moment of Inertia for Composite Section= $\Sigma(At \times (d')^2) + \Sigma(I_t)$ = **31.887** In^4

Computation of Section Properties -- Exodermic Deck

SECTION MODULI - POSITIVE BENDING

Point of Interest	Location Relative to Bottom of Grid	Distance from Centroid to Point of Interest	Effective Section Modulus In^3
Top of Concrete	7.945	- 3.133	81.42
Top of Steel Grid	3.945	-0.867	-36.76
Top of Shear hole	3.595	-1.117	-28.55
Bottom of Shear hole	2.945	-1.867	-17.08
Top of distribution bar	2.945	-1.867	-17.08
Top of Weld	2.945	-1.867	-17.08
Bot of Weld	2.445	-2.367	-13.47
Top of Punchout	2.195	-2.617	-12.18
Bottom of distrib. Bar	1.445	-3.367	-9.47
Bottom of Steel Grid	0	-4.812	-6.63