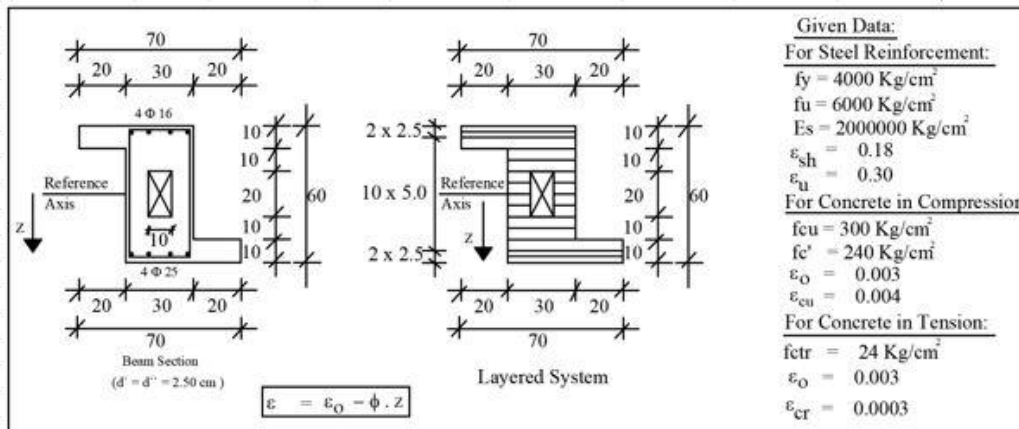


### Example for the Layered Section

<b>Given Data</b>						
Strain at Mid-Height $\epsilon_0 =$	0.0001					
Slope=	0.00009					
<b>Concrete in Compression</b>			<b>Cross Section</b>			
$f_{cu} =$	300	kg/cm <sup>2</sup>		$B =$	50	cm
$f_c =$	240	kg/cm <sup>2</sup>		$b =$	30	cm
$\epsilon_c =$	0.003			$t =$	60	cm
$\epsilon_{cu} =$	0.004			$d' = d'' =$	2.5	cm
$E_c =$	160000	kg/cm <sup>2</sup>				
<b>Concrete in Tension</b>						
$f_t =$	24	kg/cm <sup>2</sup>				
$\epsilon_{ct} =$	0.0003					
$E_{ct} =$	80000	kg/cm <sup>2</sup>				
$\epsilon_{cs} =$	0.0009					
$\epsilon_{cs} =$	0.003					
<b>Steel in Compression and Tension</b>						
$f_y =$	4000	kg/cm <sup>2</sup>				
$f_u =$	6000	kg/cm <sup>2</sup>				
$\epsilon_y =$	0.002					
$\epsilon_u =$	0.03					
$\epsilon_{st} =$	0.018					
$E_s =$	2E+06	kg/cm <sup>2</sup>				
<b>Modular Ratio</b>						
$n =$	12.5					

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n = 12.5



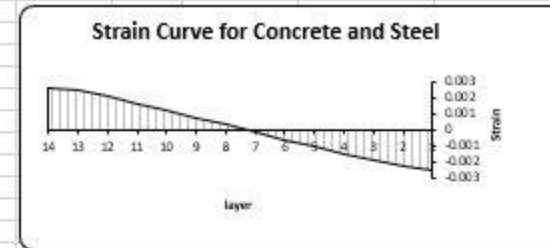
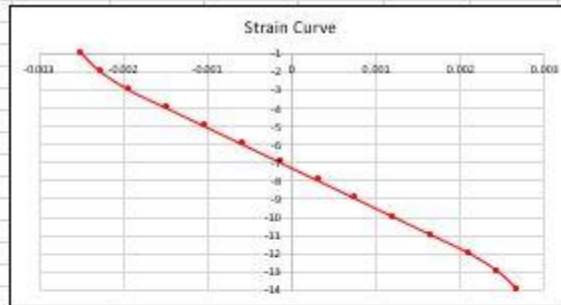
The layers numbered from top to bottom  
z is positive above the reference axis and negative below the reference axis

**Table of Layered Elen**

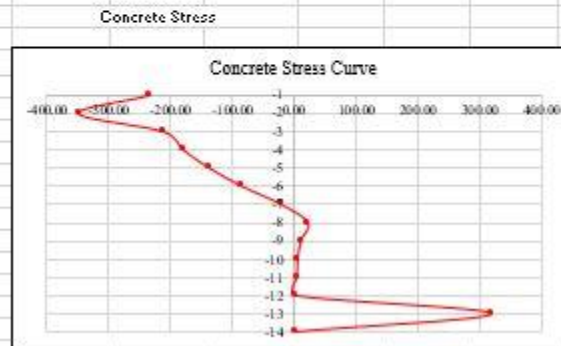
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
Layer No	Material	t	b	Z	$\epsilon$	Stress Condition	Equivalent	$f_s$	$f_s$ equivalent	$E_{equiv}$	N	M	Area	Area* $E_{equiv}$	Area* $E_{equiv}$ *Z	Area* $E_{equiv}$ *Z <sup>2</sup>		
		(cm)					(-)		kg/cm <sup>2</sup>		ton	mt	cm <sup>2</sup>	kg	kg.cm	kg.cm <sup>2</sup>		
1	Concrete	2.5	50	28.75	-0.002488	Compression	1	-233.00	-233.00	93666.67	-29.12	-8.37	125.00	11708333.33	336614583.33	9677669270.83		
2	Steel	2.5	3.22	26.25	-0.002263	Compression	11.5	-4000.00	-347.83	1767955.80	-32.20	-8.45	92.58	163668508.29	4296298342.54	112777831491.71		
3	Concrete	5	50	22.50	-0.001925	Compression	1	-203.18	-203.18	108666.67	-52.30	-11.77	250.00	27166666.67	611250000.00	13753125000.00		
4	Concrete	5	30	17.50	-0.001475	Compression	1	-177.98	-177.98	120666.67	-26.70	-4.67	150.00	18100000.00	316750000.00	5543125000.00		
5	Concrete	5	30	12.50	-0.001025	Compression	1	-135.98	-135.98	132666.67	-20.40	-2.55	150.00	19900000.00	248750000.00	3109375000.00		
6	Concrete	5	20	7.50	-0.000575	Compression	1	-83.18	-83.18	144666.67	-8.32	-0.62	100.00	14466666.67	108500000.00	813750000.00		
7	Concrete	5	20	2.50	-0.000125	Compression	1	-19.58	-19.58	156666.67	-1.96	-0.05	100.00	15666666.67	39166666.67	97916666.67		
8	Concrete	5	20	-2.50	0.000325	Tension	1	23.33	23.33	71794.87	2.33	-0.06	100.00	7179487.18	-17948717.95	44871794.87		
9	Concrete	5	20	-7.50	0.000775	Tension	1	11.33	11.33	14623.66	1.13	-0.09	100.00	1462365.59	-10967741.94	82258064.52		
10	Concrete	5	30	-12.50	0.001225	Tension	1	6.76	6.76	5519.92	1.01	-0.13	150.00	827988.34	-10349854.23	129373177.84		
11	Concrete	5	30	-17.50	0.001675	Tension	1	5.05	5.05	3013.50	0.76	-0.13	150.00	452025.53	-7910447.76	138432835.82		
12	Concrete	5	50	-22.50	0.002125	Tension	1	3.33	3.33	1568.63	0.83	-0.19	250.00	392156.86	-8823529.41	198529411.76		
13	Steel	2.5	7.85	-26.25	0.002463	Tension	12.5	4000.00	320.00	1624365.48	78.50	-20.61	245.31	398477157.36	-10460025380.71	27457566243.66		
14	Concrete	2.5	50	-28.75	0.002688	Tension	1	1.19	1.19	442.97	0.15	-0.04	125.00	55370.39	-1531915.84	45767580.29		
<b>Normal force =</b>		<b>-86.27</b>		<b>ton</b>	<b>Bending moment =</b>		<b>-57.73</b>				<b>m.t</b>		<b>-86.27</b>	<b>-57.73</b>	2087.88	679523393.52	-4560287995.29	420987691537.97
													<b>A</b>	<b>B</b>	<b>D</b>			
													679523394	-2280143998	1.40329E+11			

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Strain	
z	Layer
-0.002488	-1
-0.002263	-2
-0.001925	-3
-0.001475	-4
-0.001025	-5
-0.000575	-6
-0.000125	-7
0.000325	-8
0.000775	-9
0.001225	-10
0.001675	-11
0.002125	-12
0.0024625	-13
0.0026875	-14



Stress	
$f_c$	Layer
-233.00	-1
-347.83	-2
-203.18	-3
-177.36	-4
-135.38	-5
-83.18	-6
-19.58	-7
23.33	-8
11.33	-9
6.76	-10
5.05	-11
3.33	-12
320.00	-13
1.19	-14



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