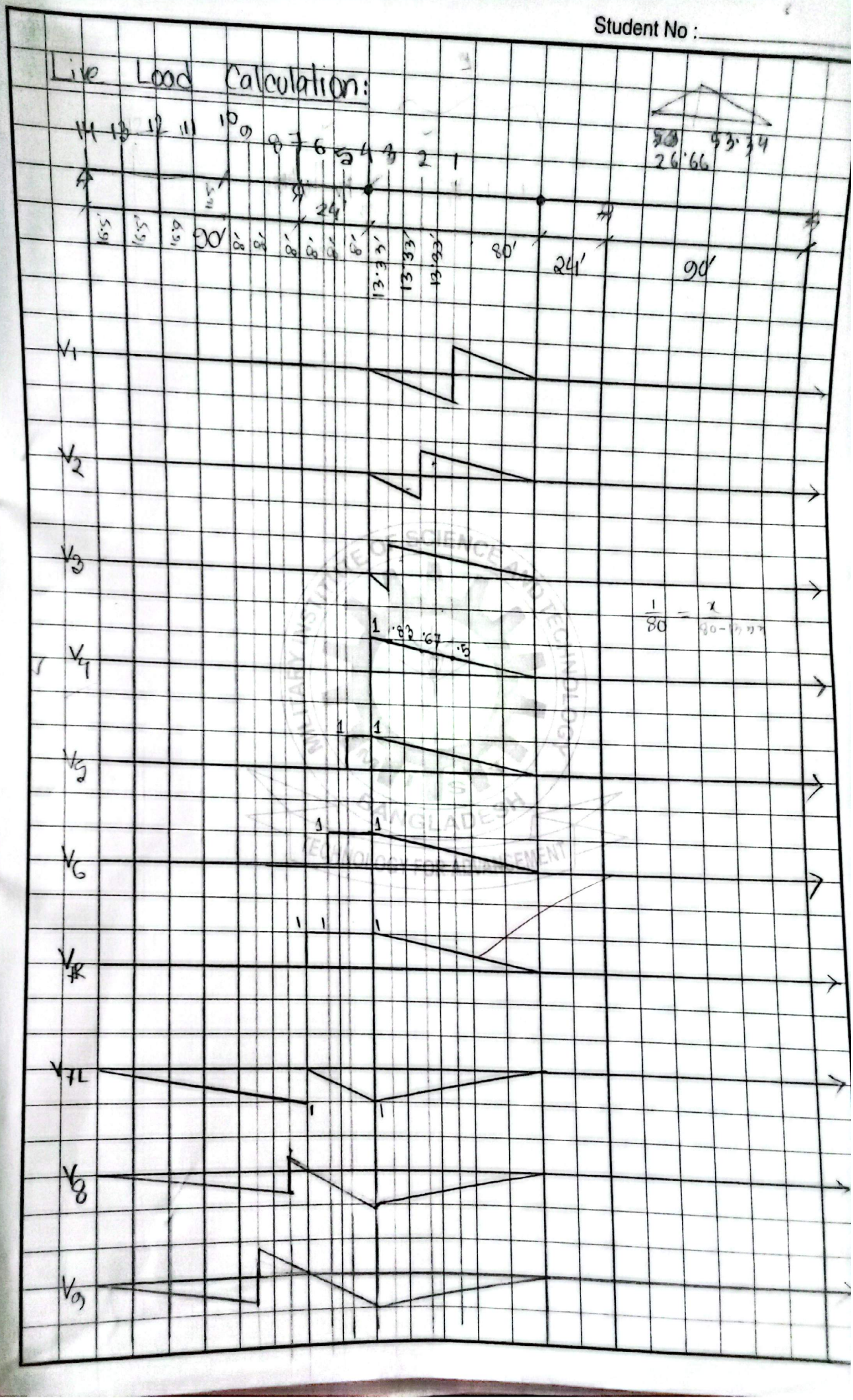
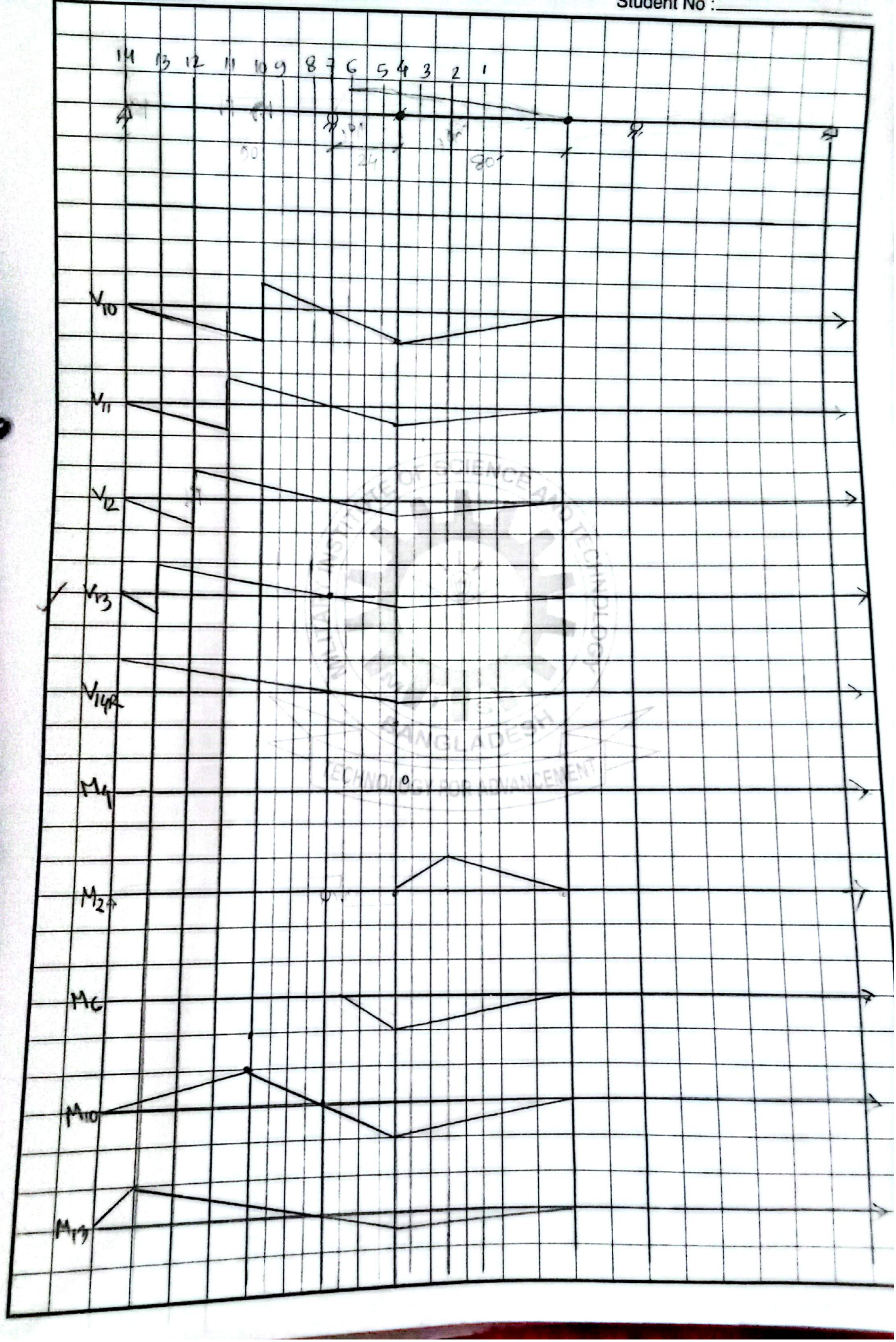
Student No :

Live Load Calculation:



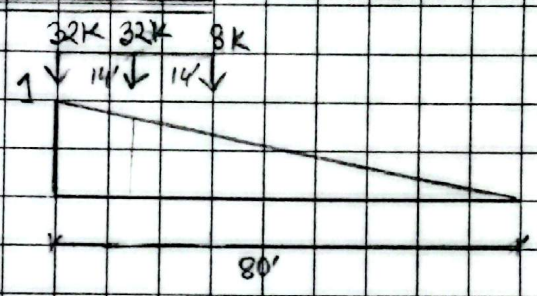
Student No :



Shear for section 4-4

Student No : _____

For section 4-4 : Truck load :

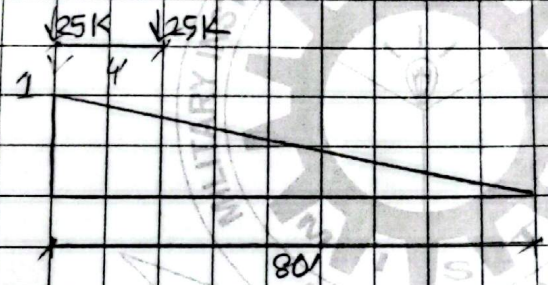


Max positive shear $= \frac{1}{80} \times (32 \times 80 + 32 \times 66 + 8 \times 52) = 63.6\,K$

$\therefore V_{truck}\ (+ve) = 63.6\,K$

$V_{truck}\ (-ve) = 0\,K$

For section 4-4 : Tandem load :

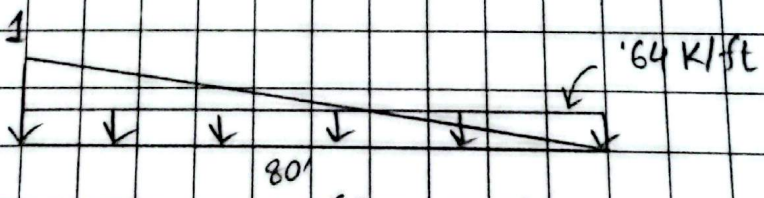


Max positive shear $= \frac{1}{80} \times (25 \times 80 + 25 \times 76) = 48.75\,K$

$\therefore V_{Tandem}\ (+ve) = 48.75\,K$

$V_{Tandem}\ (-ve) = 0\,K$

For section 4-4 : Lane load



Max positive shear $= .64 \times (\frac{1}{2} \times 80 \times 1) = 25.6\,K$

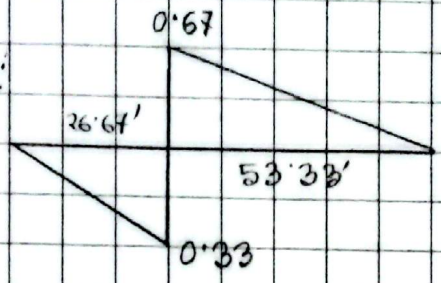
$\therefore V_{lane}\ (+ve) = 25.6\,K$

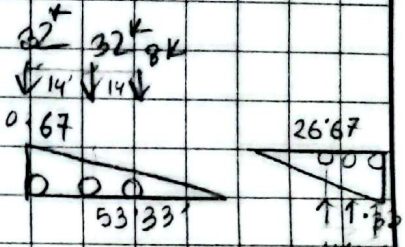
$V_{lane}\ (-ve) = 0\,K$

Student No :_____ 1

For Section 2-2 :

Truck load :



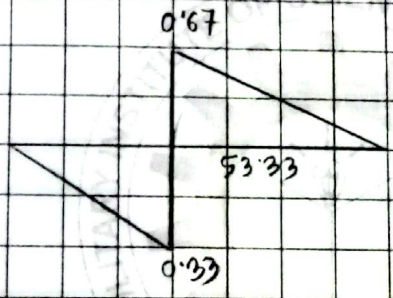


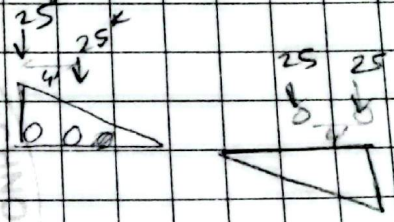
for maximum shear:

$V_{truck\ (+ve)} = \frac{.67}{53.33}(32 \times 53.33 + 32 \times 39.33 + 8 \times 25.33) = 39.79K$

$V_{truck\ (-ve)} = \frac{-.33}{26.67}(32 \times 26.67 + 32 \times 12.67 + 8 \times 0) = 15.58K$

Tandem Load:



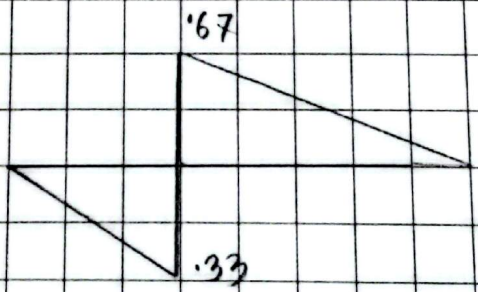


for maximum shear:

$V_{tandem\ (+ve)} = \frac{.67}{53.33}(25 \times 53.33 + 25 \times 40.33) = 32.24K$

$V_{tandem\ (-ve)} = \frac{-.33}{26.67}(25 \times 26.67 + 25 \times 22.67) = -15.26K$

Lane Load :



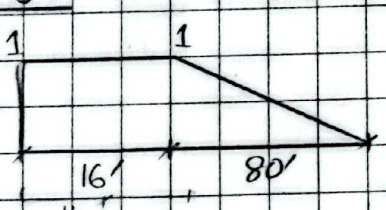


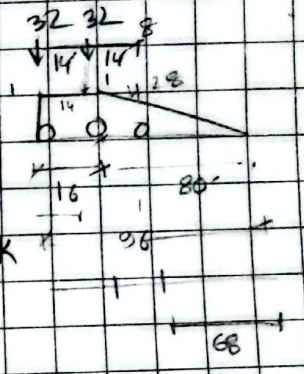
$V_{lane\ (+ve)} = (\frac{1}{2} \times 53.33 \times .67) \times .64 = 11.43K$

$V_{lane\ (-ve)} = (-\frac{1}{2} \times 26.67 \times .33) \times .64 = -2.82K$

For Section 6-6 : For Maximum Shear :

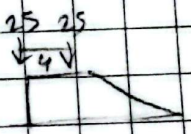
Truck Load :





$V_{truck\ (+ve)} = 32\times1 + 32\times1 + \frac{1}{80}\times 68\times 8 = 70.8\ K$

$V_{truck\ (-ve)} = 0\ K$



Tandem Load :

$V_{tandem\ (+ve)} = 25\times1 + 25\times1 = 50K$

$V_{tandem\ (-ve)} = 0\ K$

Lane Load :

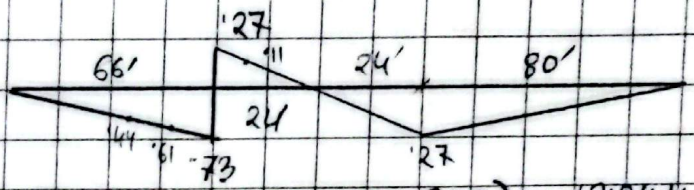
$V_{Lane\ (+ve)} = 1\times16\times.64 + \frac{1}{2}\times80\times1\times.64 = 35.8\ K$

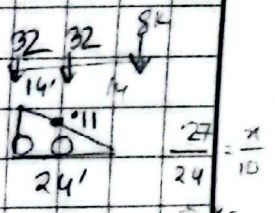
$V_{Lane\ (-ve)} = 0\ K$

Student No : _____

For Section 10-10 : Max Shear

Truck Load :

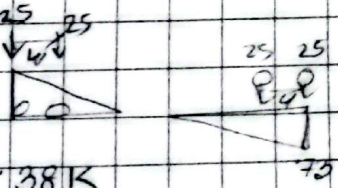




$V_{truck\ (+ve)} = \frac{.27}{24}(32\times24 + 32\times10 + 8\times0) = 12.24K$

$V_{truck\ (-ve)} = -\frac{.73}{66}(32\times66 + 32\times52 + 8\times38) = -45.1K$

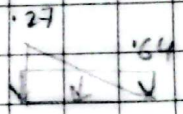
Tandem Load :



$V_{tandem\ (+ve)} = \frac{.27}{24}(25\times24 + 25\times20) = 12.38K$

$V_{tandem\ (-ve)} = \frac{.73}{66}(25\times66 + 25\times62) = -35.39K$

Lane Load :



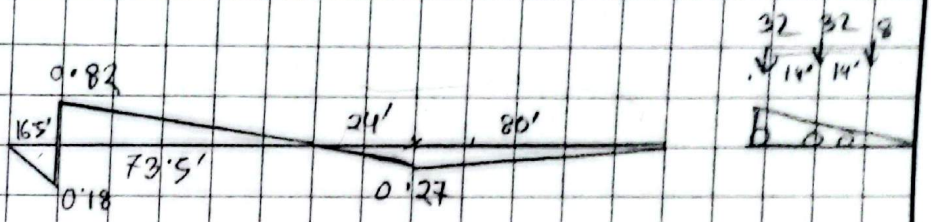
$V_{Lane\ (+ve)} = \frac{1}{2}\times24\times.27\times.64 = 2.07K$

$V_{Lane\ (-ve)} = \left(\frac{-1}{2}\times66\times.73\times.64\right) + \left(\frac{-1}{2}\times24\times.27\times.64\right) + \left(\frac{-1}{2}\times80\times.27\times.64\right) = -24.4K$

Student No : _____

For Section 13-13 : Max Shear:

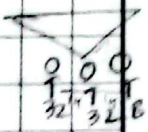
Truck Load:



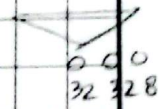
$\frac{.82}{73.5} = \frac{x}{24}$

$V_{(+truck\ (+ve)} = +\frac{.82}{73.5}(32\times73.5 + 32\times59.5 + 8\times45.5) = 51.5K$

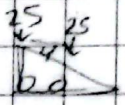
$V_{Truck\ (-ve)} = -\frac{.27}{24}(32\times10) - \frac{.27}{80}(32\times80 + 8\times66) = -14.02K$
trial 1



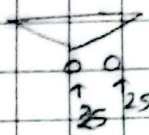
$V_{Truck\ (-ve)} = -\frac{.27}{80}(32\times80 + 32\times66 + 8\times52) = -17.2K\ (Max)$
trial 2



Tandem Load:



$V_{tandem\ (+ve)} = \frac{.82}{73.5}(25\times73.5 + 25\times69.5) = 39.88\ K$



$V_{tandem\ (-ve)} = -\frac{.27}{80}(25\times80 + 25\times76) = -13.16\ K$

Lane Load:

$V_{Lane\ (+ve)} = \frac{1}{2}\times73.5\times.82\times.64 = 19.29\ K$

$V_{Lane\ (-ve)} = +\frac{1}{2}\times16.5\times.18\times.64 - \frac{1}{2}\times24\times.27\times.64 - \frac{1}{2}\times80\times.27\times64$

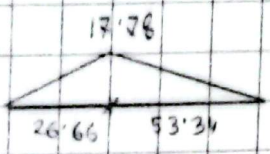
$= -9.94\ K$

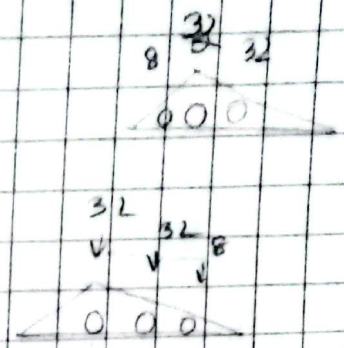
Student No : _____

For Max Moment :

For section 2-2 :

Truck Load :



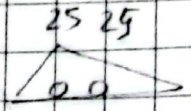


$M_{Truck\ (+ve)} = 17.78 \times 32 + \frac{17.78}{53.34}(32 \times 39.34 + 8 \times 25.34) = 1056.2$ K-ft
trial1

$M_{Truck\ (+ve)} = 17.78 \times 32 + \frac{17.78}{53.34}(32 \times 39.34) + \frac{17.78}{26.66} \times (12.66 \times 8) = 1056.1$ K-ft
trial2

$M_{Truck\ (-ve)} = 0$ K-ft

Tandem Load :



$M_{Tandem\ (+ve)} = \frac{17.78}{53.34}(25 \times 53.34 + 25 \times 49.34) = 855.67$ K-ft

$M_{Tandem\ (-ve)} = 0$ K-ft

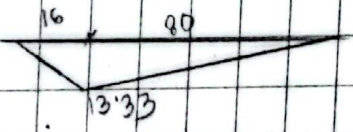
Lane Load :

$M_{Lane\ (+ve)} = \frac{1}{2} \times 80 \times 17.78 \times .64 = 455.17$ K-ft

$M_{Lane\ (-ve)} = 0$ K-ft

Student No :_____

For section 6-6:



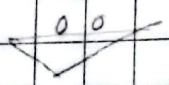


Truck Load:

$M_{Truck\ (+ve)} = 0$ k-ft

$M_{Truck\ (-ve)} = -\frac{13.33}{80} \times (32 \times 80 + 32 \times 66 + 8 \times 52) = -847.8$ k-ft

Tandem Load:



$M_{Tandem\ (+ve)} = 0$ k-ft

$M_{Tandem\ (-ve)} = -\frac{13.33}{80} \times (25 \times 80 + 25 \times 76) = -649.8$ k-ft

Lane Load:

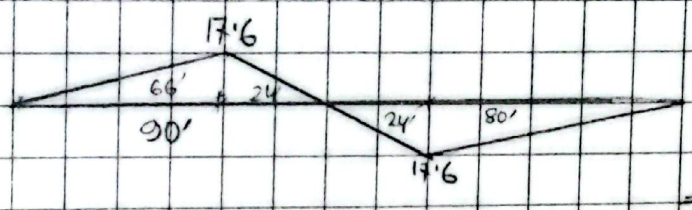


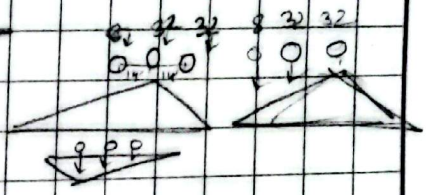
$M_{Lane\ (+ve)} = 0$ k-ft

$M_{Lane\ (-ve)} = -\frac{1}{2} \times 96 \times 13.33 \times .64 = -409.5$ k-ft.

Student No :_____

For Section 10-10:





Truck Load:

$M_{Truck\ (+ve)} = \frac{17.6}{24} \times (32 \times 24 + 32 \times 0) + \frac{17.6}{66} \times (8 \times 52) = 508.8$ k-ft

(trial 1)

$M_{Truck\ (+ve)} = \frac{17.6}{66} (32 \times 66 + 32 \times 52 + 8 \times 44) = 1100.8$ k-ft

(trial 2)

$M_{Truck\ (-ve)} = -\frac{17.6}{80} (32 \times 80 + 32 \times 66 + 8 \times 52) = -1119.4$ k-ft



Tandem load:

$M_{Tandem\ (+ve)} = \frac{17.6}{66} \times (25 \times 66 + 25 \times 62) = 853.3$ k-ft

$M_{Tandem\ (-ve)} = -\frac{17.6}{80} (25 \times 80 + 25 \times 76) = -858$ k-ft.



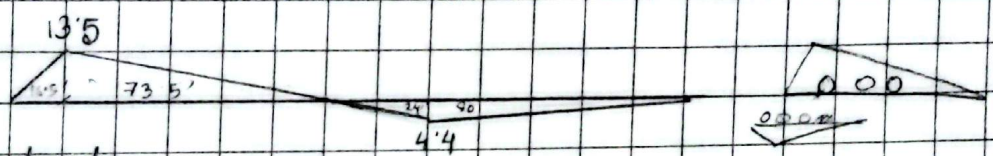
Lane Load:

$M_{Lane\ (+ve)} = \frac{1}{2} \times 90 \times 17.6 \times .64 = 506.9$ k-ft

$M_{Lane\ (-ve)} = -\frac{1}{2} \times 104 \times 17.6 \times .64 = -585.7$ k-ft

Student No : _____

For section 13-13:



Truck Load:

$M_{Truck\ (+ve)} = \frac{13.5}{73.5}(32\times73.5 + 32\times59.5 + 8\times45.5) = 848.6$ k-ft

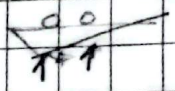
$M_{Truck\ (-ve)} = -\frac{4.4}{80}\times(32\times80 + 32\times66 + 8\times52) = -270.8$ k-ft

trial 1

$M_{Truck\ (-ve)} = -\frac{4.4}{80}\times(32\times80 + 32\times66) + \frac{4.4}{24}(8\times10) = -271.6$ k-ft

trial 2

Tandem load:



$M_{Tandem\ (+ve)} = \frac{13.5}{73.5}\times(25\times73.5 + 25\times59.5) = 656.6$ k-ft

$M_{Tandem\ (-ve)} = -\frac{4.4}{80}\times(25\times80 + 25\times76) = -214.5$ k-ft.

Lane load:

$M_{Lane\ (+ve)} = \frac{1}{2}\times90\times13.5\times.64 = 388.8$ k-ft

$M_{Lane\ (-ve)} = -\frac{1}{2}\times104\times4.4\times.64 = -146.4$ k-ft.

Student No : _____

Design Shear for section 4-4 : (Positive)

$V_{truck\ (+ve)} = 63.6K$
$V_{tandem\ (+ve)} = 48.75K$ } from ILD
$V_{lane\ (+ve)} = 25.6K$

$V_{DC} = 89.6K$
$V_{DW} = 9.05K$ } from SFD

Distribution factor, $\alpha_{4,v} = .2 + \frac{S}{12} - \left(\frac{S}{35}\right)^2 = .2 + \frac{7.5}{12} - \left(\frac{7.5}{35}\right)^2$
$= 0.779$

$V_{LL} = V_{Truck\ or\ tandem} \times 1.33 \times \alpha_{iv} + V_{Lane}$
$= 63.6 \times 1.33 \times .779 + 25.6$
$= 91.49K$

$V_{Design(+)} = 1.25\,V_{DC} + 1.5\,V_{DW} + 1.75\,V_{LL}$
$= 1.25 \times 89.6 + 1.5 \times 9.05 + 1.75 \times 91.49$
$= 285.68\ K$

Design Moment for Section 2-2 : (Positive)

$\left(K_g/12Lt_s^3\right)^{.1} = 1.05$ for range of Applicability

$\alpha_{2,m} = .075 + \left(\frac{S}{9.5}\right)^{.6}\left(\frac{S}{L}\right)^{.2}\left(\frac{K_g}{12Lt_s^3}\right)^{.1} = .075 + \left(\frac{7.5}{9.5}\right)^{.6}\left(\frac{7.5}{80}\right)^{.2} 1.05 = .643$

$\alpha_{6,m} = .075 + \left(\frac{7.5}{9.5}\right)^{.6}\left(\frac{7.5}{\frac{90+24}{2}}\right)^{.2} \times 1.05 = .682$

$\alpha_{10,m} = .075 + \left(\frac{7.5}{9.5}\right)^{.6}\left(\frac{7.5}{\frac{90+24}{2}}\right)^{.2} \times 1.05 = .682$

$\alpha_{13,m} = .075 + \left(\frac{7.5}{9.5}\right)^{.6}\left(\frac{7.5}{90}\right)^{.2} \times 1.05 = .629$

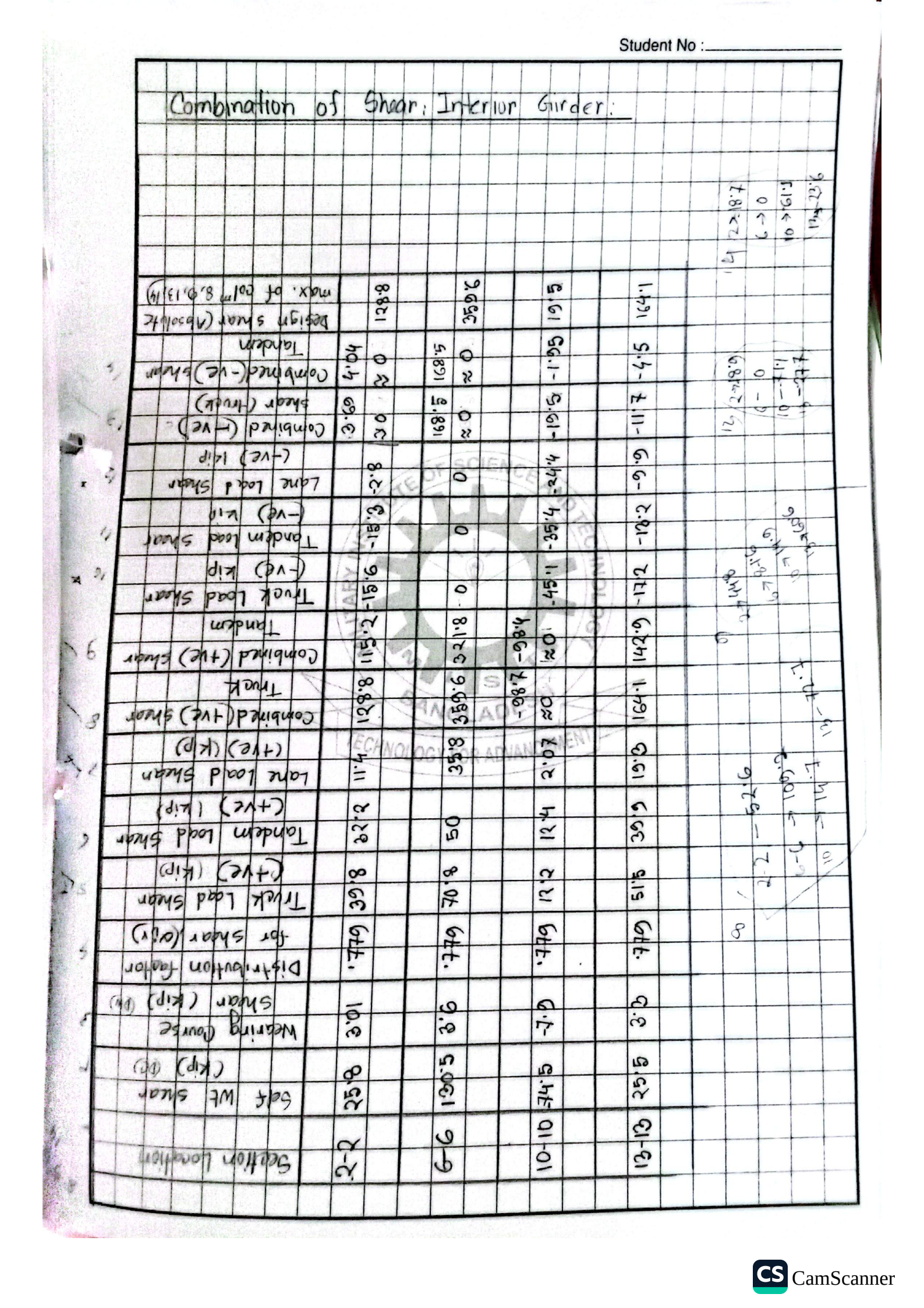
$M_{LL} = M_{Truck\ or\ tandem} \times 1.33 \times \alpha_{im} + M_{Lane} = 1086.2 \times 1.33 \times .643 + 455.2 = 1358.5$ K-ft

$M_{Design} = 1.25\,M_{DC} + 1.5 M_{DW} + 1.75 V_{LL} = 1.25 \times 1416.9 + 1.5 \times 160.8 + 1.75 \times 1358.5$
$= 4389.7$ K-ft

Student No : _____

Combination of Shear: Interior Girder:

Section location		2-2	6-6	10-10	12-12
Self Wt shear (kip)	(D)	25.8	130.5	-74.5	25.5
Wearing Course shear (kip)	(D)	3.01	8.9	-7.0	3.0
Distribution factor for shear (g.i.v)		.779	.779	.779	.779
Truck Load Shear (+ve) (kip)		39.8	70.8	12.2	51.5
Tandem load Shear (+ve) (kip)		82.2	50	12.4	39.2
Lane Load Shear (+ve) (kip)		11.4	35.8	2.07	19.0
Combined (+ve) shear Truck		128.8	356.6	≈0	164.1
Combined (+ve) shear Tandem		115.2	321.8	12.0	142.6
Truck Load Shear (-ve) kip		-15.6	0	-45.1	-17.2
Tandem load Shear (-ve) kip		-18.3	0	-35.4	-18.2
Lane Load Shear (-ve) kip		-2.8	0	-24.4	-9.6
Combined (-ve) shear Truck		0	≈0	-10.5	-11.7
Combined (-ve) shear Tandem		≈0	≈0	-1.95	-4.5
Design shear (Absolute max. of col^m 8,9,13,14)		128.8	356.6	19.5	164.1



Student No :

Combination of Moment : Interior Girder:

Section	SDL WL Moment (k-ft)	Wearing Course Moment (k-ft)	Distribution factor for moment - ext.	Truck Load Moment (+ve) k-ft	Tandem Load Moment (+ve) k-ft	Lane load Moment (+ve) k-ft	Combined (+ve) Moment Truck k-ft	Combined (+ve) Moment Tandem k-ft	Truck load Moment (-ve) k-ft	Tandem load Moment (-ve) k-ft	Lane load Moment (-ve) k-ft	Combined (-ve) Moment Truck k-ft	Combined (-ve) Moment Tandem k-ft	Design (+ve) Moment k-ft	Design (-ve) Moment k-ft
2-2	1416.9	160.8	.643	1056.2	855.7	455.2	4088.4	4088.4	0	0	0	2012.3	2012.3	4388.7	0
6-6	-1821.6	-187.4	.682	0	0	0	-2570	-2570	-847.8	-649.8	-409.5	-4329	-4329	0	-4682.9
10-10	-424.5	-29	.682	1100.8	653.3	506.9	2047.8	1654.9	-1119.4	-858	-585.7	-3388.7	-2935	2047.8	-3388.7
13-13	670.8	84.6	.629	948.6	655.9	388.8	2899.8	2618.8	-270.8	-214.5	-146.4	≈0	≈0	2899.8	0