MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Course Code : CE-316

DESIGN OF INTERIOR GIRDER

Name : TASNIM JANNAT TUSHI

Roll No : 202111091

Level/Term : L-3, T-2

Course : CE-23

Date of exp : 04.11.23

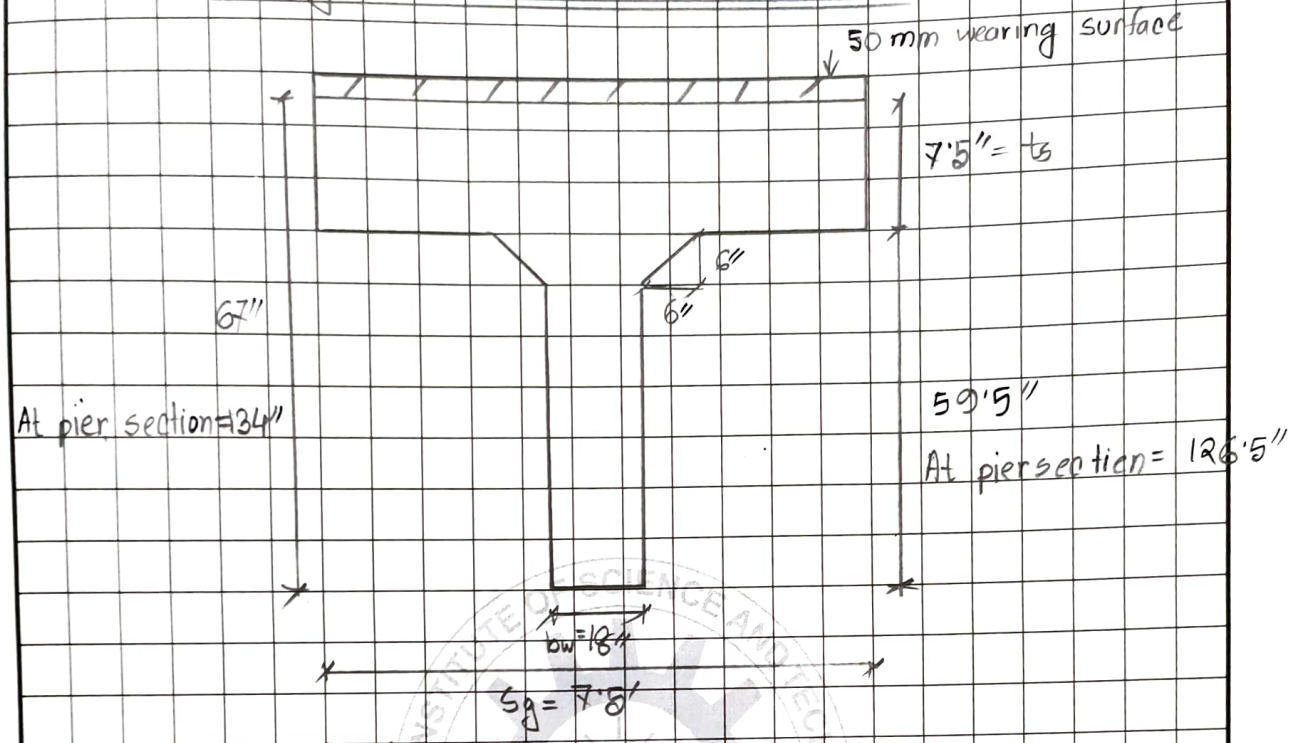
Date of sub : 05.12.23

Group :

Signature of Teacher :

Student No :

Design of Interior Girder



Dead Load Analysis :

Load on interior girder : Dead Load

- UDL from wearing course, $DW = 30 \times S_g = 30 \times 7.5 = .225$ K/ft
- UDL from deck $= \frac{t_{slab}}{12} \times .150 \times S_g = \frac{7.5}{12} \times .150 \times 7.5 = .7$ K/ft
- UDL from haunch $= 2 \times \left(\frac{1}{2} \times \frac{6}{12}" \times \frac{6}{12}"\right) \times .150 = .04$ K/ft
- UDL from constant girder depth $= \frac{18}{12} \times \frac{59.5}{12} \times .15 = 1.12$ K/ft

$\therefore DW = .225$ K/ft

$\therefore DC = .7 + .04 + 1.12 = 1.86 \approx 1.9$ K/ft

- UDL of extra girder height at pier location $= \frac{18}{12} \times \frac{(134-67)}{12} \times .15$

$= 1.2$ K/ft

Student No : _____

Concentrated load from diaphragms:

- Diaphragm at abutment $= \frac{18''}{12} \times \left(\frac{67''}{12} - \frac{7.5''}{12} - \frac{12''}{12}\right) \times (7.5' - \frac{18''}{12}) \times .150$

$= 5.3\ K$

- Diaphragm at intermediate section $= \frac{10''}{12} \times \left(\frac{67''}{12} - \frac{7.5''}{12} - \frac{12''}{12}\right) \times (7.5' - \frac{18''}{12}) \times .15$

$= 2.26K \approx 3\ K$

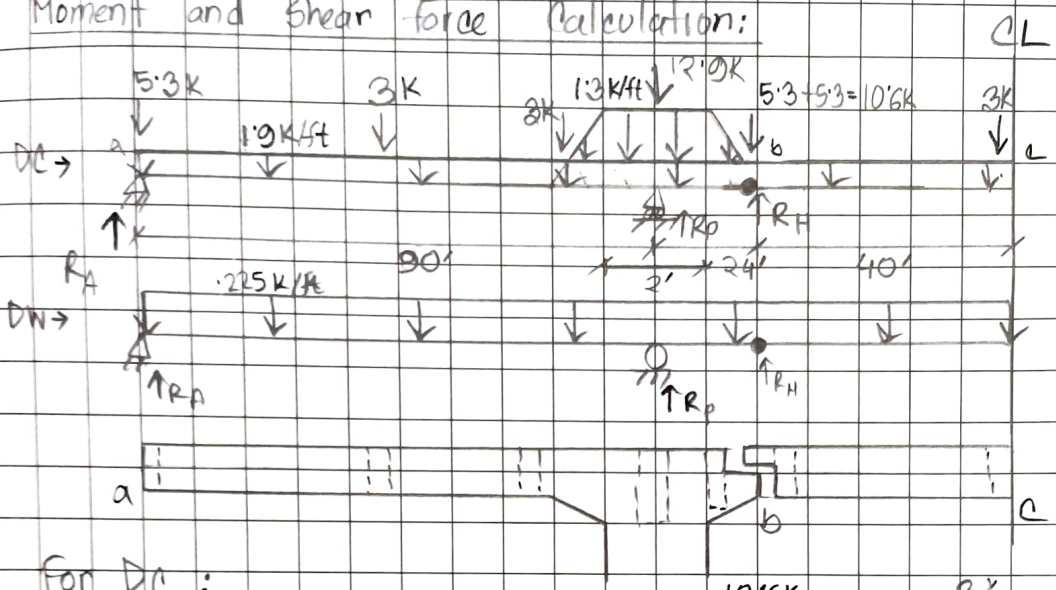
- Diaphragm at pier support $= \frac{18''}{12} \times \left(\frac{134''}{12} - \frac{7.5''}{12} - \frac{12''}{12}\right) \times (7.5' - \frac{18''}{12}) \times .15$

$= 12.0\ K$

BANGLADESH TECHNOLOGY FOR ADVANCEMENT

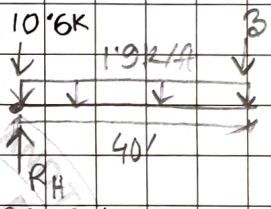
Student No :_____

Moment and Shear force Calculation:



For DC:

Section b-c:

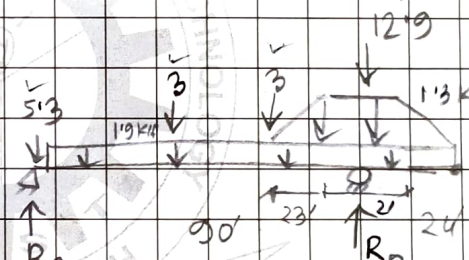


ΣF_y +ve ↑ = 0

$\Rightarrow -10.6 - 3 - 1.9 \times 40' + R_H = 0$

$\Rightarrow R_H = 89.6K \uparrow$

Section a-b:



ΣM_{pier} +ve ↻ = 0

$\Rightarrow R_A \times 90 - 5.3 \times 90 - 3 \times \left(\frac{90-24}{4}\right) - 3 \times 24 - 1.9 \times 90 \times \frac{90}{2} + 1.9 \times 24 \times \frac{24}{2} + 89.6 \times 24 = 0$

$\Rightarrow R_A = 62.2 K \uparrow$

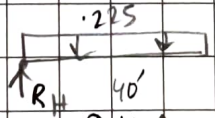
ΣF_y +ve ↑ = 0

$\Rightarrow -5.3 - 3 - 3 - 12.9 - 89.6 + 62.2 - 1.9 \times (90+24) - 1.3 \times 2 - 2 \times \left\{\frac{1}{2} \times 23 \times 1.3\right\} + R_p = 0$

$\Rightarrow R_p = 300.7 K \uparrow$

For DW:

Section b-c:



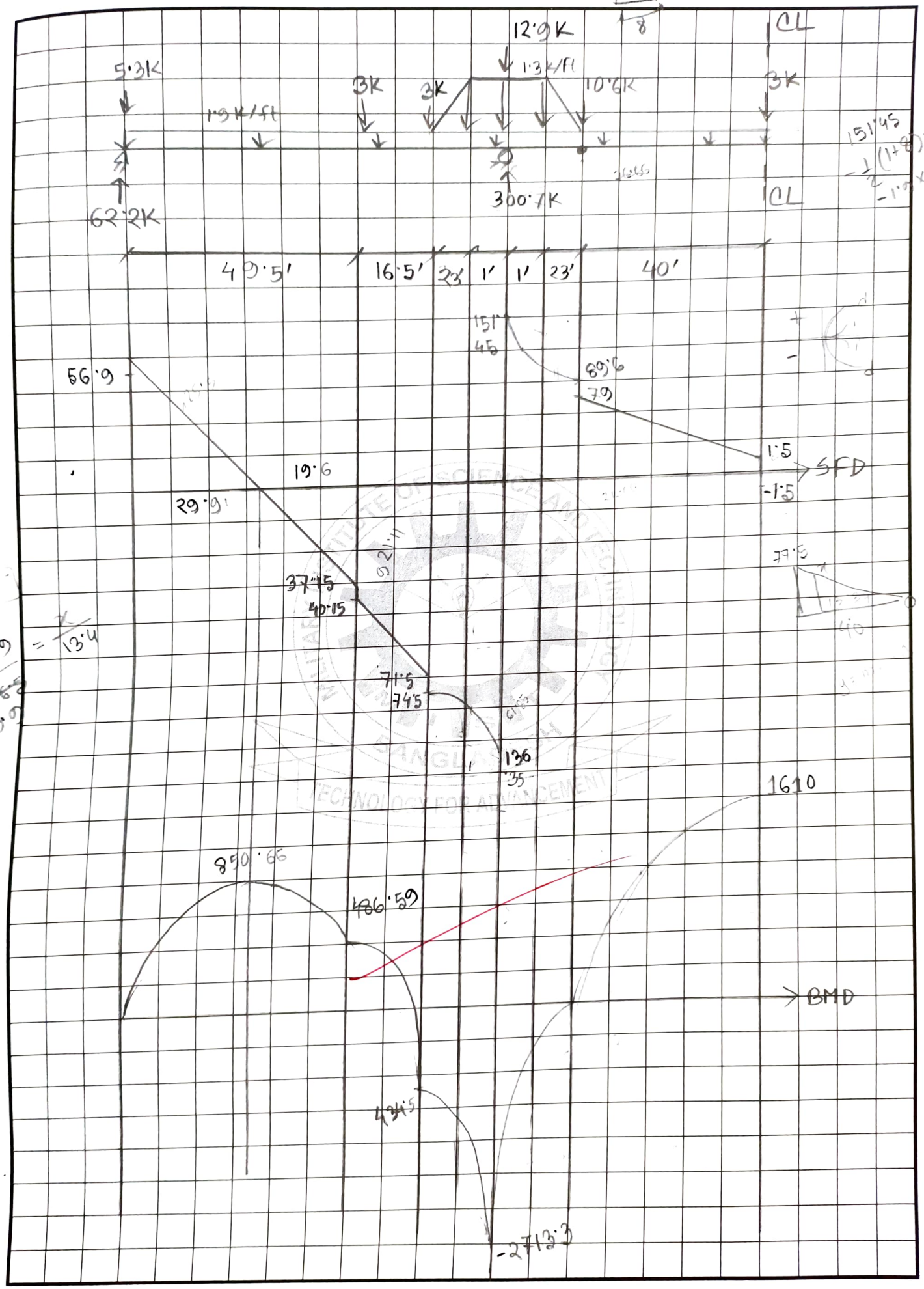
ΣF_y +ve ↑ = 0 $\Rightarrow R_H - 225 \times 40 \Rightarrow R_H = 9K \uparrow$

Section a-b:

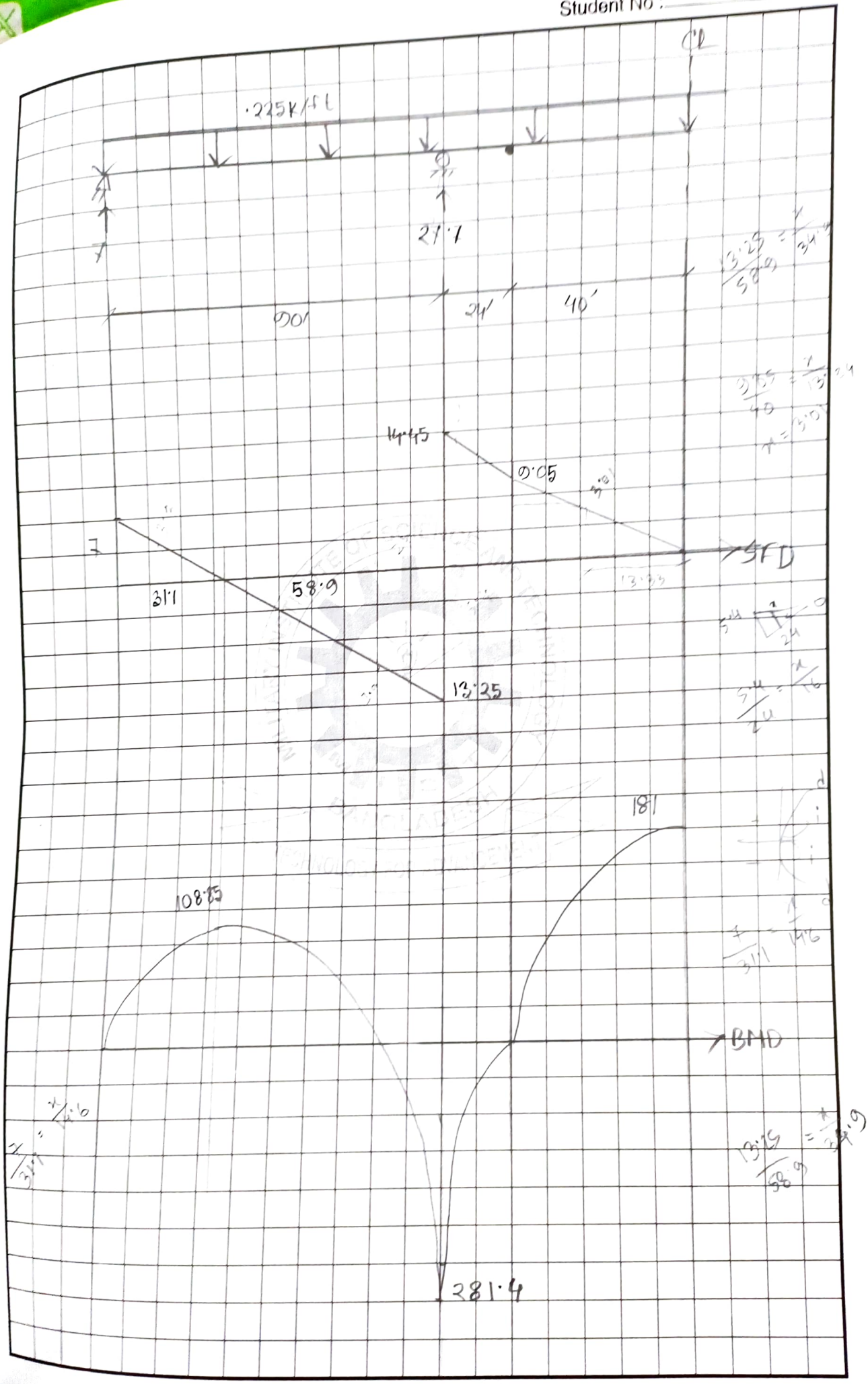
M_{pier} +ve ↻ = 0 $\Rightarrow R_A \times 90 - 225 \times 90 \times \frac{90}{2} + 225 \times 24 \times \frac{24}{2} + 9 \times 24 = 0 \Rightarrow R_A = 7K\uparrow$

ΣF_y +ve ↑ = 0 $\Rightarrow 7 - 225 \times (90+24) + R_p - 9 = 0 \Rightarrow R_p = 27.7 K$

Student No :


12·9K
1·3K/ft
5·3K
3K
3K
10·6K
3K
1·9K/ft
62·2K
300·7K
CL
CL
40·5'
16·5'
3'
1'
1'
23'
40'
56·9
19·6
29·9'
151·45
89·6
79
1·5
-1·5
SFD
37·75
40·15
71·5
74·5
136
35
850·66
486·59
431·5
-2713·3
1610
BMD

Student No :


0.225 K/ft
27.1
20'
24'
40'
14.45
0.05
SFD
31.1
58.9
13.25
181
108.85
281.4
BMD

Student No :

Table of Dead load calculation from SFD, BMD for Interior Girder:

Section	for Self Weight (DC)		for Wearing Course (DW)	
	Shear (K)	Moment (K-ft)	Shear (K)	Moment (K-ft)
2-2	25.8	1416.9	3.01	160.8
6-6	130.5	-1831.6	3.6	-187.4
10-10	-74.5	-434.5	-7.9	-29
13-13	25.5	679.8	3.3	84.9

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY

Course Code : CE -316

DESIGN OF EXTERIOR GIRDER

Name : TASNIM JANNAT TUSHI

Roll No : 202111091

Level/Term : 1-3, T-2

Course : CE-23

Date of exp : 12.11.23

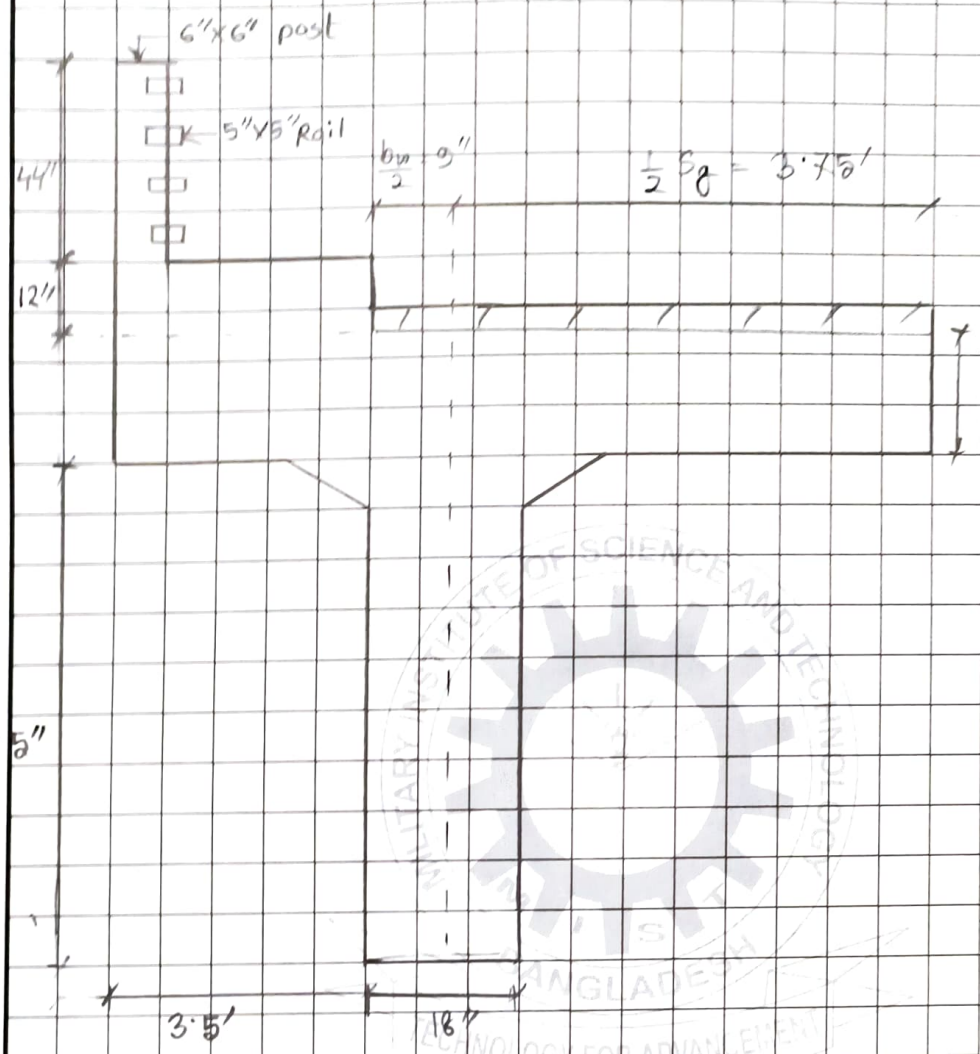
Date of sub : 05.12.23

Group :

Signature of Teacher :

Student No : _____

Design of Exterior Girder



Dead load on exterior girder:

- VDL from wearing surface = $30 \times (\frac{1}{2}S_g + \frac{1}{2}b_w)$
  $= 30 \times (3.75' + \frac{9''}{12}) = 0.14$ K/ft

Self Wt of railing (Concentrated load) = $\frac{5''}{12} \times \frac{5''}{12} \times 5' \times .150 \times 4 = .52$K

Self Wt of post (Concentrated load) = $\frac{6''}{12} \times \frac{6''}{12} \times \frac{44''}{12} \times .150 \times 1 = .14$ K

Total concentrated load = $.52 + .14 = .66 = .7$ K

- UDL from railing and post = $\frac{.7}{5} = .14$ K/ft

Student No :_____

- UDL from sidewalk = $3.5' \times \left(\frac{7.5''}{12} + \frac{12''}{12}\right) \times .15 = .85$ K/ft
- UDL from haunch = $2\left\{\frac{1}{2} \times \frac{6''}{12} \times \frac{6''}{12}\right\} \times .15 = .04$K/ft
- UDL from continous portion of girder = $\frac{18''}{12} \times \frac{59.5''}{12} \times .15 = 1.12$K/
- UDL from self wt of deck = $\left(\frac{1}{2}S_g + \frac{1}{2}b_w\right) \times \frac{7.5''}{12} \times .15$
  $= \left(3.75 + \frac{9''}{12}\right) \times \frac{7.5''}{12} \times .15 = .42$K/ft
- UDL of extra girder height at pier location = $\frac{18}{12} \times \left(\frac{34-67}{12}\right) \times .15$
  $= 1.3$ K/ft

$\therefore$ DC = .42 + .14 + .85 + .04 + 1.12 = 2.57 K/ft

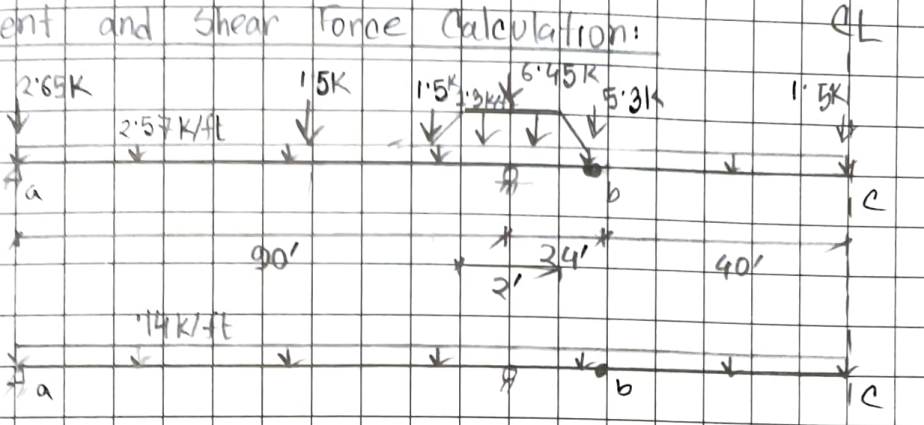
Concentrated load from diaphragm :

- Diaphragm at abutment = $\frac{5.3}{2} = 2.65$K
- Diaphragm at intermediate section = $\frac{3}{2} = 1.5$K
- Diaphragm at pier support = $\frac{12.9}{2} = 6.45$K



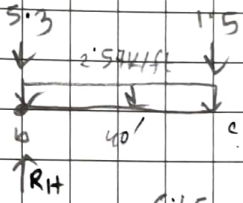
Student No :_____

Moment and Shear Force Calculation:



For DC:

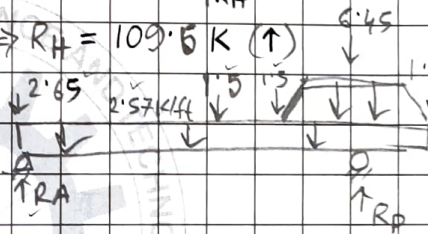
Section b-c:



ΣF_y +ve ↑ = 0

$\Rightarrow -5.3 - 1.5 - 2.57 \times 40 + R_H = 0 \Rightarrow R_H = 109.6\ K\ (\uparrow)$

Section a-b:



ΣM_p +ve ↻ = 0

$\Rightarrow R_A \times 90 - 2.65 \times 90 - 2.57 \times 90 \times \frac{90}{2} - 1.5 \times 16.5 - 1.5 \times 24 + 109.6 \times 24 + 2.57 \times \frac{24}{2} = 0$

$\Rightarrow R_A = 81.5\ K\ (\uparrow)$

ΣF_y +ve ↑ = 0

$\Rightarrow 81.5 - 2.65 - 2.57 \times 90 - 1.5 - 1.5 - 6.45 - 109.6 - 2 \times 1.3 - 2 \times \frac{1}{2} \times 23 \times 1.3 - 2.57 \times 24 + R_p = 0$

$\Rightarrow R_p = 365.7\ K\ (\uparrow)$

For DW:

Section bc:

ΣF_y +ve ↑ = 0

$\Rightarrow R_H - .14 \times 40 \Rightarrow R_H = 5.6\ K$

Section a-b:



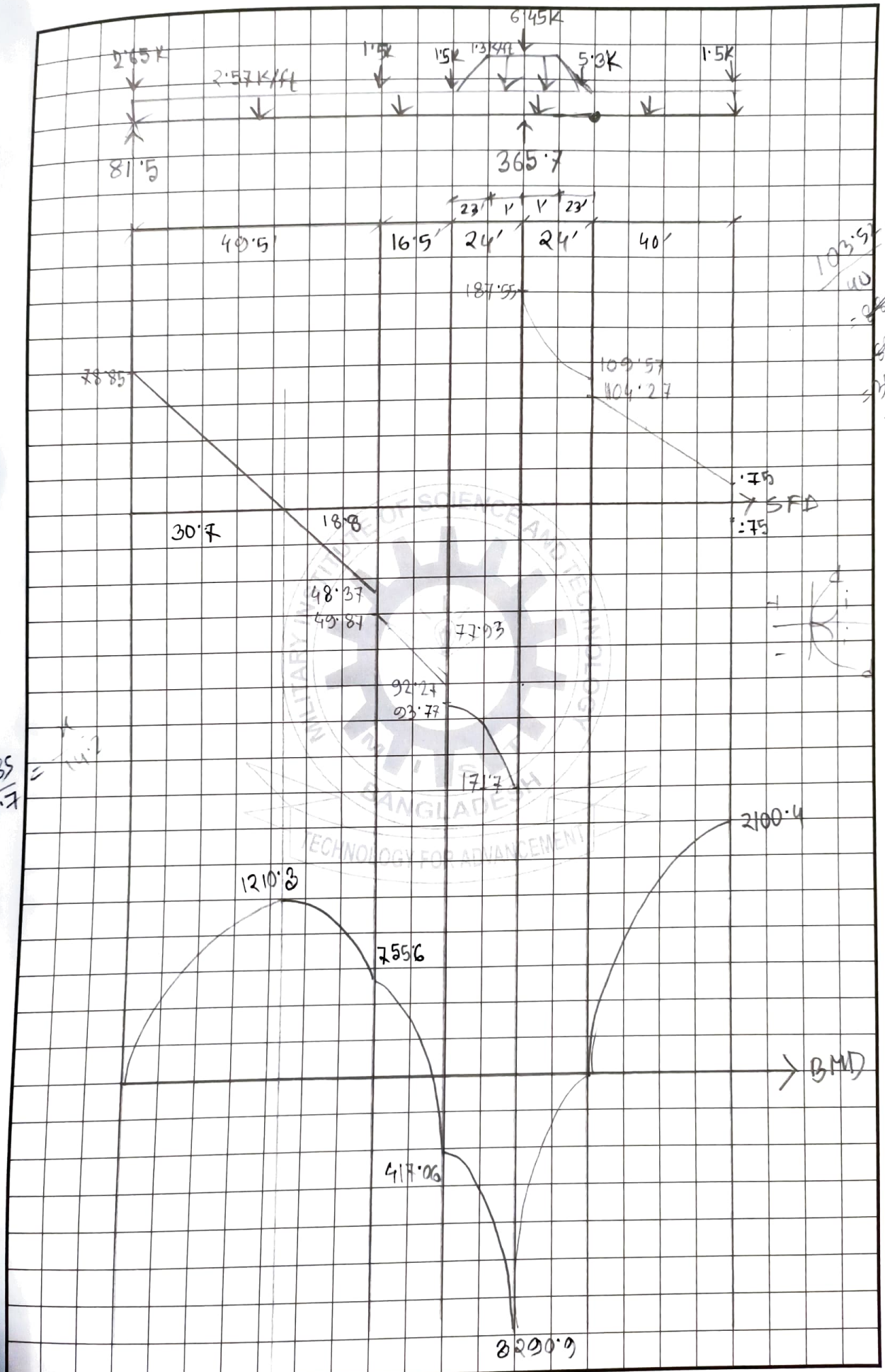
M_p +ve ↻ = 0

$\Rightarrow R_A \times 90 - .14 \times 90 \times \frac{90}{2} + .14 \times 24 \times \frac{24}{2} + 5.6 \times 24 = 0 \Rightarrow R_A = 4.4\ K\ (\uparrow)$

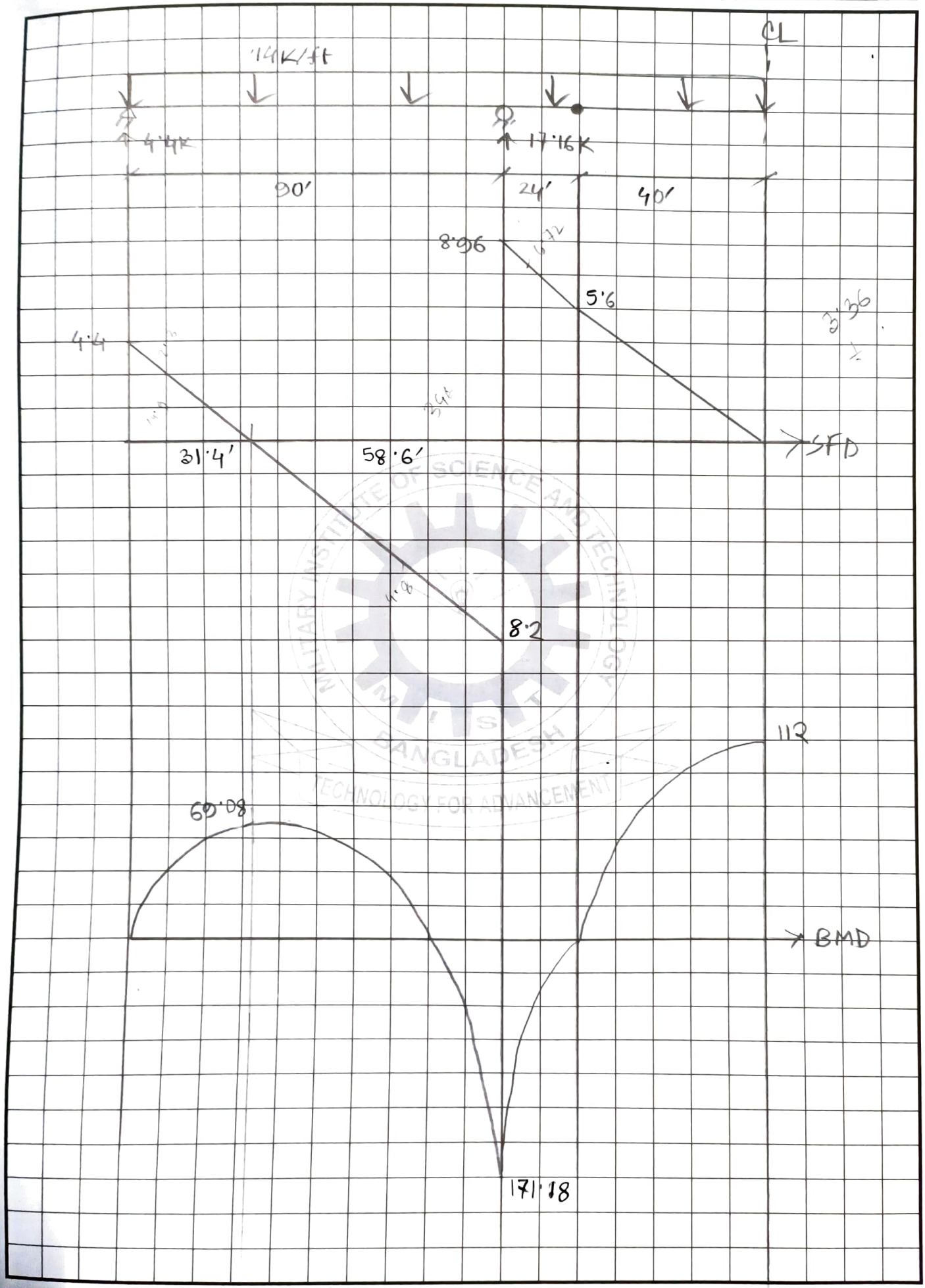
ΣF_y +ve ↑ = 0

$\Rightarrow 4.4 - .14 \times (90 + 24) - 5.6 + R_p = 0 \Rightarrow R_p = 17.16\ K\ (\uparrow)$

Student No :_____


6·45K
2·65K
2·57K/ft
1·5K
1·5K
1·3K/ft
5·3K
1·5K
81·5
365·7
23'
1'
1'
23'
40·5'
16·5'
24'
24'
40'
187·55
109·57
104·27
78·85
·75
SFD
·75
30·7
18·8
48·37
49·81
72·03
92·27
93·77
171·7
2100·4
1210·3
755·6
417·06
8290·9
BMD

Student No : _____


CL
14K/ft
A
4.4K
B
17.16K
30'
24'
40'
8.96
5.6
4.4
31.4'
58.6'
SFD
8.2
112
60.08
171.18
BMD

Student No : _____

Table of Dead Load Calculation from SFD, BMD for Exterior Girder.

Section	For Self Weight (DC)		For Wearing Course DW	
	Shear (K)	Moment (k-ft)	Shear (K)	Moment (k-ft
2-2	35·3	1860·5	1·9	99·9
6-6	161·1	-2622·3	6·7	-108·6
10-10	-93·8	-417·1	-4·8	-13·9
13-13	36·5	951·6	2·3	55·3