

APPENDIX B

HAND CALCULATION SPOT CHECK AREA 1 CANTILEVER SLAB

Preliminary Slab Thickness

Longest span	28.5	ft
L/d=	45	
h=	7.59	in
Assume	10	in

Materials

Normal Weight Concrete	150	pcf
8" Concrete Block	55	psf
f'_c =	5000	psi
f_y =	60	ksi
1/2" ϕ , 7 Wire Tendon	0.153	in ²
f_{pu} =	270	ksi
Loss Assumed	15	ksi
f_{se} =	174	ksi
P_{eff} =	26.622	kip/tendon

Set Design Parameters

At time of jacking

f_{ci} =	3000	psi
Compression=	1800	psi
Tension=	164	psi

At service loads

f'_c =	5000	psi
Compression=	2250	psi
Tension=	424	psi

Precompression Limits

P/A=	125	psi	min
	300	psi	max

Section Properties

A=	120	in ²
S=	200	in ³

Prestress force required for balancing

Trib Width= 12.00 in UNIT STRIP

L= 37.458 ft
 x= 9 ft
 L-x= 28.458 ft
 x/L= 0.240

e₁= 3.75 in max
 e₂= 1.88 in
 h= 5.25 in

USE
 3.25 in
 4 in

w_b= 0.09 k/ft
 P= 21.69 kip

Precompression Allowance

tendons= 0.815

USE 1 TENDON

P_{act}= 26.622 kip

w_b= 0.11505 k/ft

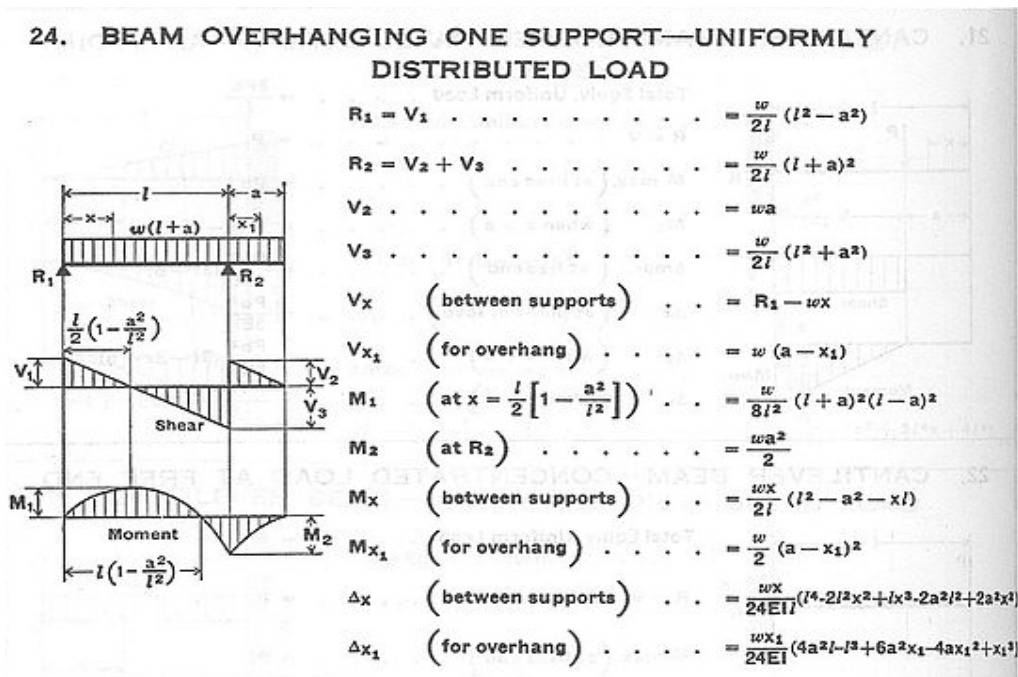
P_{act}/A= 221.85 psi >125 psi
 <300 psi

Loading

Dead Loads

Slab	125	plf
Finishes	5	plf
MEP	10	psf
	<hr/>	
	140	plf

Live Load 100 psf



Dead Load		Live Load		Balanced Load	
WDL=	0.14 klf	WLL=	0.10 klf	WDL=	0.12 klf
R _A =	1.79 k	R _A =	1.28 k	R _A =	1.47 k
R _B =	3.45 k	R _B =	2.47 k	R _B =	2.84 k
M _A =	11.48 ft-k	M _A =	8.20 ft-k	M _A =	9.43 ft-k
M _B =	5.67 ft-k	M _B =	4.05 ft-k	M _B =	4.66 ft-k

Stage 1: Stresses immediately after jacking (DL+PT)

Midspan Stresses			
$f_{top} =$	-344.579	psi	COMP
$f_{bot} =$	-99.121	psi	COMP

Support Stresses			
$f_{top} =$	-161.23	psi	COMP
$f_{bot} =$	-282.47	psi	COMP

Stage 2: Stresses at service loads (DL + LL + PT)

Midspan Stresses			
$f_{top} =$	-836.548	psi	COMP
$f_{bot} =$	392.8484	psi	TENS

Support Stresses			
$f_{top} =$	81.76991	psi	TENS
$f_{bot} =$	-525.47	psi	COMP

Ultimate Strength

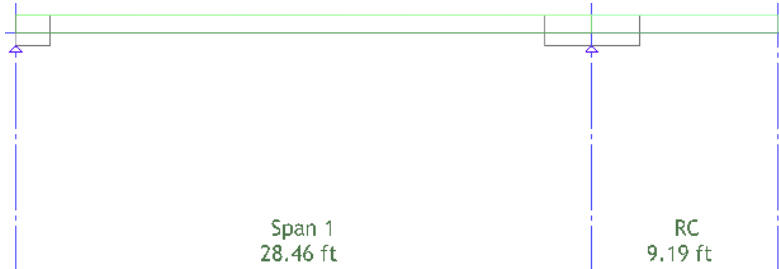
$M_1 =$	8.87	ft-k
$M_{sec} =$	-4.21	ft-k

Midspan Moment		
$M_u =$	22.67999	ft-k

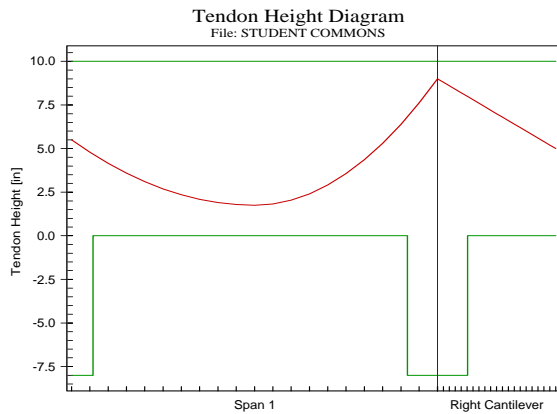
Support Moment		
$M_u =$	-17.4983	ft-k

AREA 1

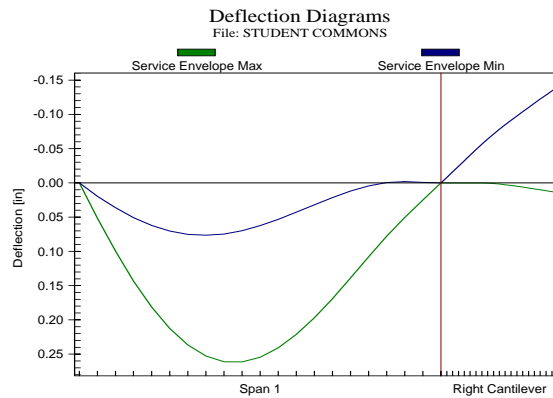
STUDENT COMMONS CANTILEVER SLAB



Span	Form	Length	Width	Depth	Rh	Right Mult.	Left Mult.
		ft	in	in	in		
1	1	28.46	12.00	10.00	10.00	0.50	0.50
C	1	9.19	12.00	10.00	10.00	0.50	0.50



**POST-TENSIONING
PROFILE**

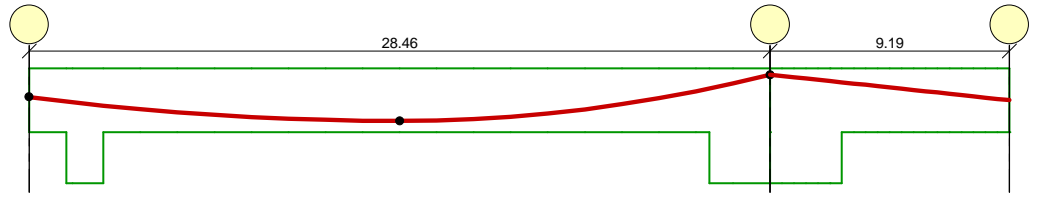


DEFLECTION

Span	Class	Type	W
			k/ft ²
1	LL	U	0.100
1	SDL	U	0.015
CANT	LL	U	0.100
CANT	SDL	U	0.015

INPUT LOADING

2 - MEMBER ELEVATION
 [ft]



3 - TOP REBAR

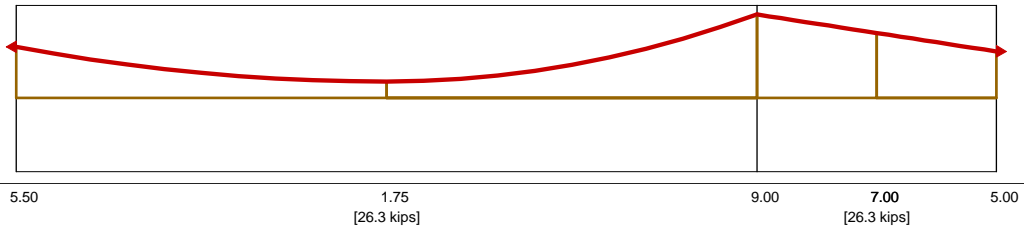
3.1 ADAPT selected
 3.2 ADAPT selected



4 - TENDON PROFILE

4.1 Datum Line

4.2 CGS Distance A[in]
 4.3 Force A



4.6 CGS Distance B[in]
 4.7 Force B

4.10 CGS Distance C[in]
 4.11 Force C

5 - BOTTOM REBAR

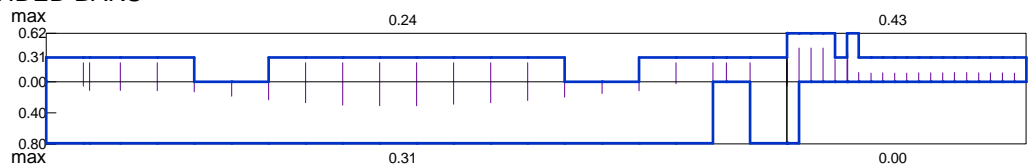
5.1 ADAPT selected
 5.2 ADAPT selected



6 - REQUIRED & PROVIDED BARS

6.1 Top Bars
 [in²]
 required
 provided

6.2 Bottom Bars

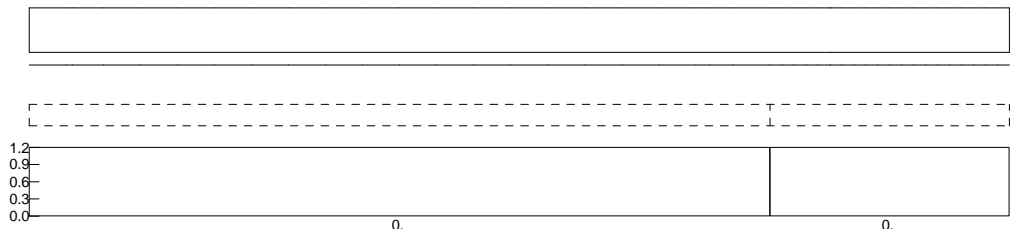


7 - SHEAR STIRRUPS

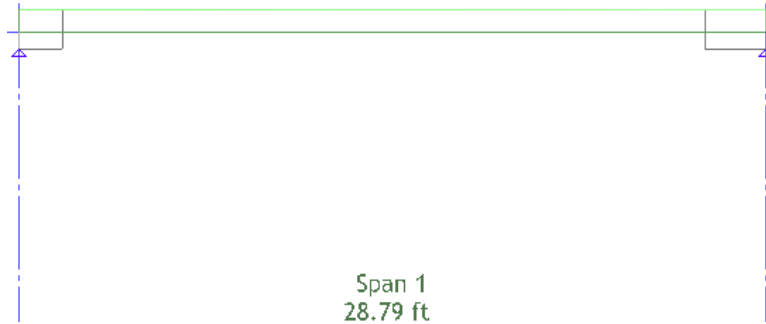
7.1 ADAPT selected.
 Bar Size # 5 Legs: 2
 Spacing [in]

7.2 User-selected
 Bar Size # Legs:

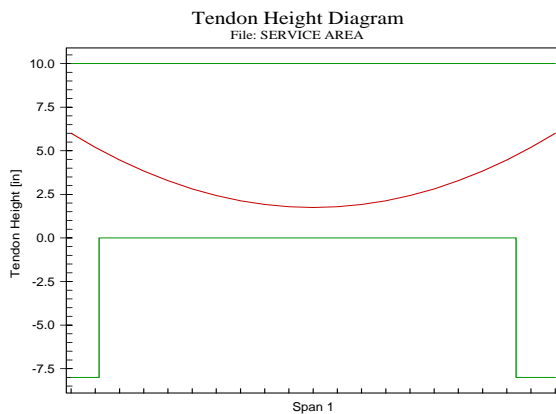
7.3 Required area
 [in²/ft]



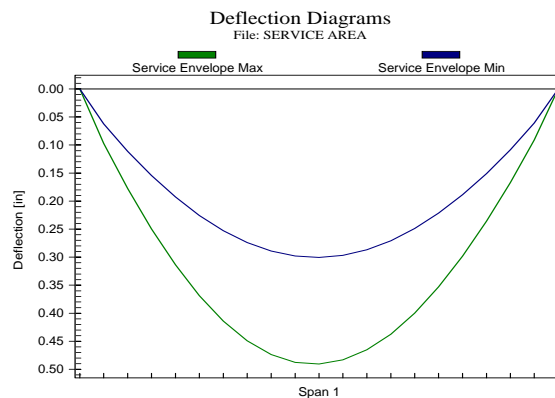
AREA 1 SERVICE AREA SIMPLE SLAB



Span	Form	Length ft	Width in	Depth in	Rh in	Right Mult.	Left Mult.
1	1	28.79	12.00	10.00	10.00	0.50	0.50



**POST-TENSIONING
 PROFILE**

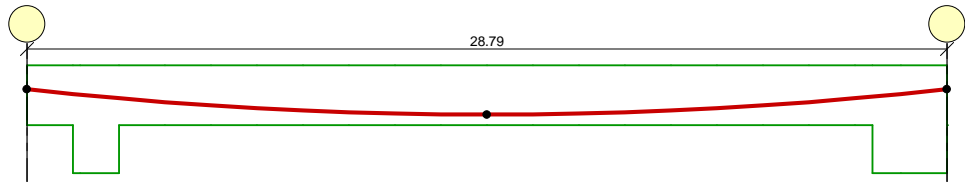


DEFLECTION

Span	Class	Type	W k/ft ²	A ft	B ft
1	LL	P	0.150	0.000	8.600
1	LL	P	0.050	8.600	28.790
1	SDL	U	0.015		

INPUT LOADING

2 - MEMBER ELEVATION
 [ft]

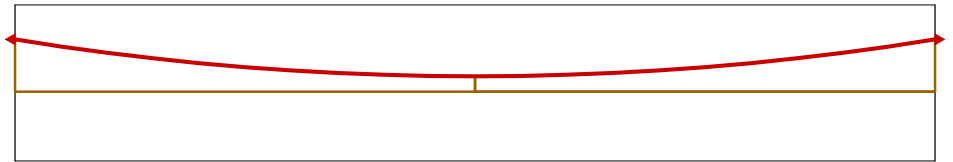


3 - TOP REBAR

- 3.1 ADAPT selected
- 3.2 ADAPT selected



4 - TENDON PROFILE



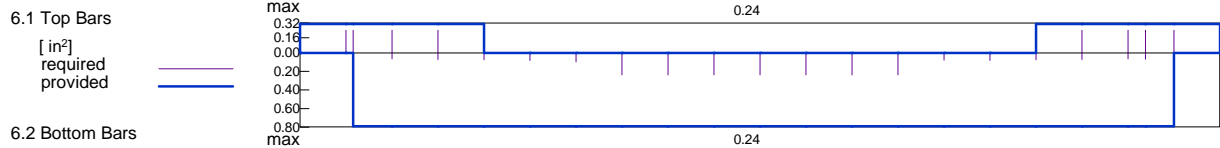
- 4.1 Datum Line
- 4.2 CGS Distance A[in] 6.00
- 4.3 Force A 1.75 [36 kips]
- 4.6 CGS Distance B[in]
- 4.7 Force B
- 4.10 CGS Distance C[in]
- 4.11 Force C

5 - BOTTOM REBAR

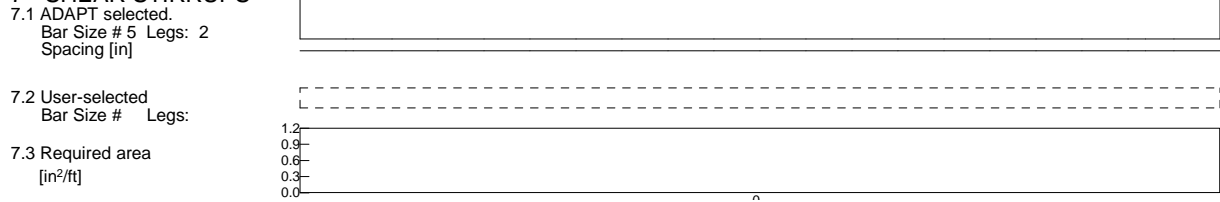
- 5.1 ADAPT selected
- 5.2 ADAPT selected



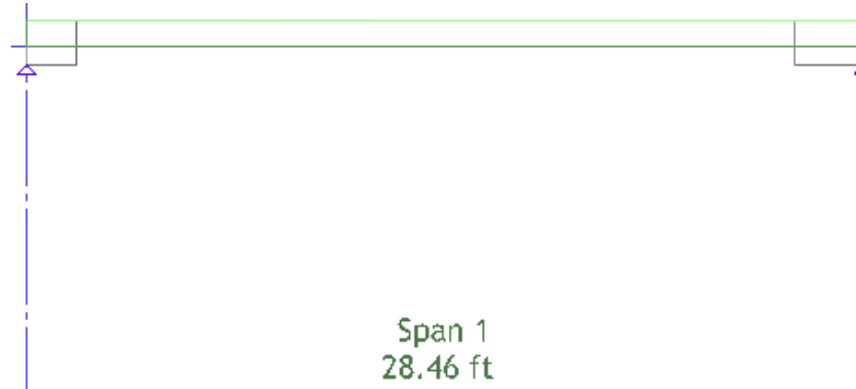
6 - REQUIRED & PROVIDED BARS



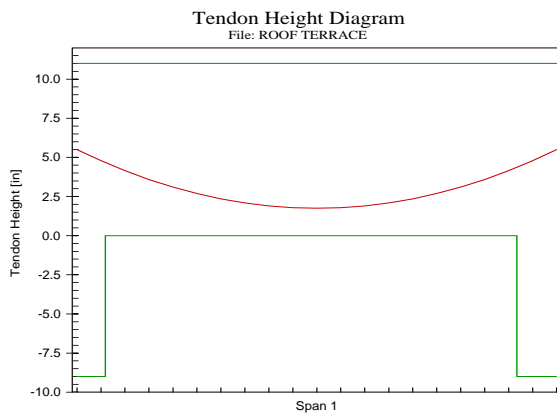
7 - SHEAR STIRRUPS



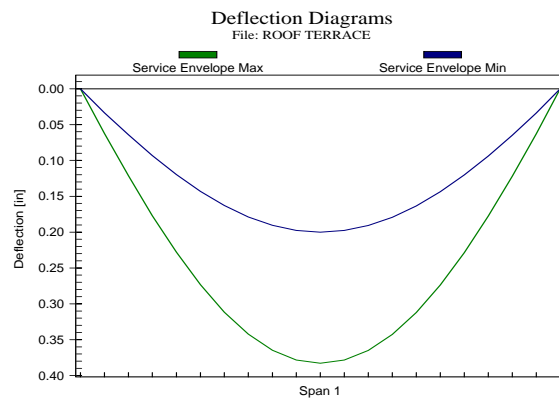
AREA 1 ROOF TERRACE SIMPLE SLAB



Span	Form	Length	Width	Depth	Rh	Right Mult.	Left Mult.
		ft	in	in	in		
1	1	28.13	12.00	11.00	11.00	0.50	0.50



**POST-TENSIONING
 PROFILE**

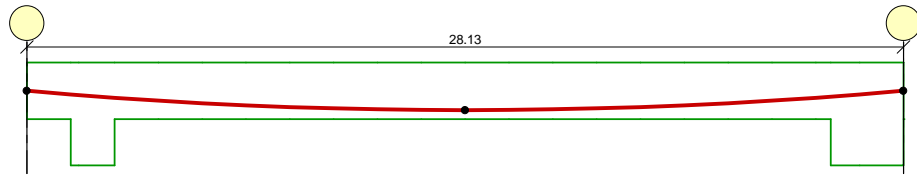


DEFLECTION

Span	Class	Type	W
			k/ft2
1	LL	U	0.100
1	SDL	U	0.025

INPUT LOADING

2 - MEMBER ELEVATION
 [ft]



3 - TOP REBAR

3.1 ADAPT selected

3.2 ADAPT selected



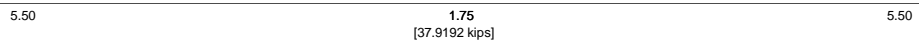
4 - TENDON PROFILE



4.1 Datum Line

4.2 CGS Distance A[in]

4.3 Force A



4.6 CGS Distance B[in]

4.7 Force B

4.10 CGS Distance C[in]

4.11 Force C

5 - BOTTOM REBAR

5.1 ADAPT selected

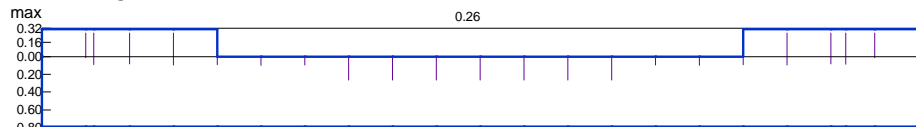
5.2 ADAPT selected



6 - REQUIRED & PROVIDED BARS

6.1 Top Bars

[in²]
 required
 provided



6.2 Bottom Bars

7 - SHEAR STIRRUPS

7.1 ADAPT selected.

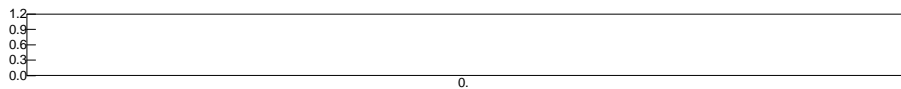
Bar Size # 5 Legs: 2
 Spacing [in]



7.2 User-selected

Bar Size # Legs:

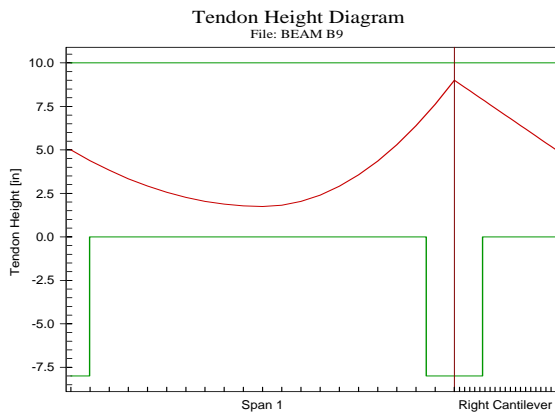
7.3 Required area
 [in²/ft]



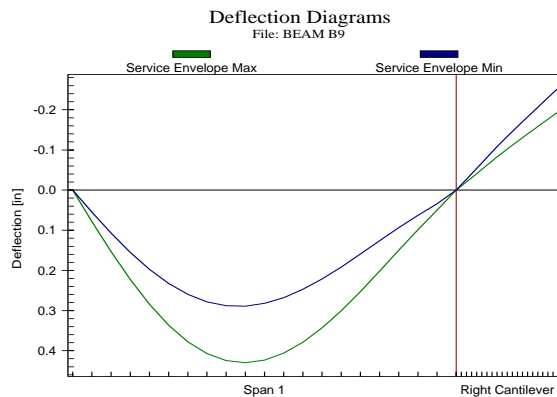
AREA 2 ENTRANCE CANTILEVER SLAB



Span	Form	Length	Width	Depth	Rh	Right Mult.	Left Mult.
		ft	in	in	in		
1	1	34.09	12.00	10.00	10.00	0.50	0.50
C	1	9.05	12.00	10.00	10.00	0.50	0.50



**POST-TENSIONING
 PROFILE**

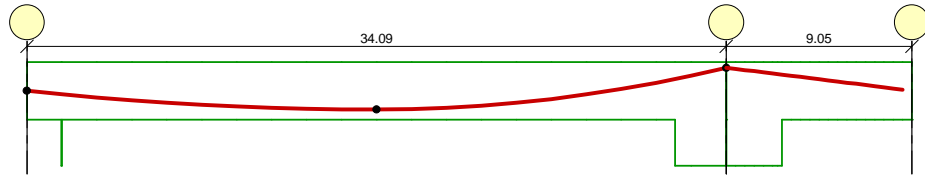


DEFLECTION

Span	Class	Type	W	A	B
			k/ft2	ft	ft
1	LL	P	0.050	0.000	22.000
1	LL	P	0.082	22.000	34.090
1	SDL	U	0.015		
CANT	LL	U	0.082		
CANT	SDL	U	0.015		

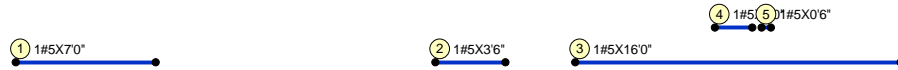
INPUT LOADING

2 - MEMBER ELEVATION
 [ft]



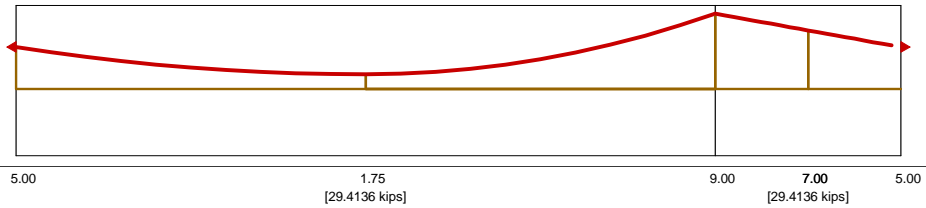
3 - TOP REBAR

3.1 ADAPT selected
 3.2 ADAPT selected



4 - TENDON PROFILE

4.1 Datum Line
 4.2 CGS Distance A[in]
 4.3 Force A



4.6 CGS Distance B[in]
 4.7 Force B

4.10 CGS Distance C[in]
 4.11 Force C

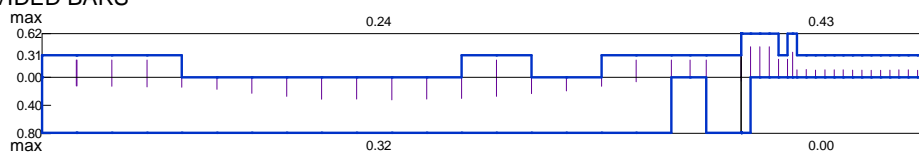
5 - BOTTOM REBAR

5.1 ADAPT selected
 5.2 ADAPT selected



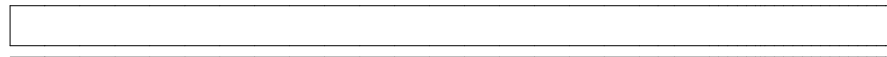
6 - REQUIRED & PROVIDED BARS

6.1 Top Bars
 [in²]
 required
 provided
 6.2 Bottom Bars

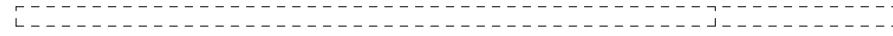


7 - SHEAR STIRRUPS

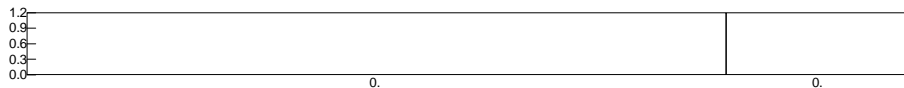
7.1 ADAPT selected.
 Bar Size # 4 Legs: 2
 Spacing [in]



7.2 User-selected
 Bar Size # Legs:



7.3 Required area
 [in²/ft]

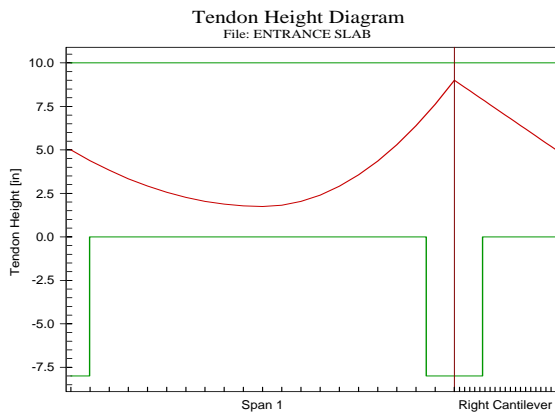


AREA 2

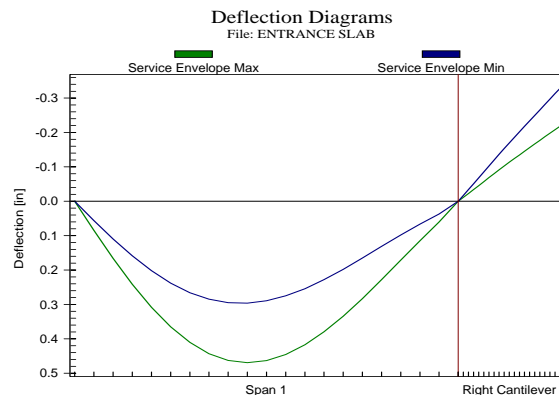
FIRST FLOOR CLASSROOM CANTILEVER SLAB



Span	Form	Length	Width	Depth	Rh	Right Mult.	Left Mult.
		ft	in	in	in		
1	1	34.09	12.00	10.00	10.00	0.50	0.50
C	1	9.05	12.00	10.00	10.00	0.50	0.50



**POST-TENSIONING
PROFILE**

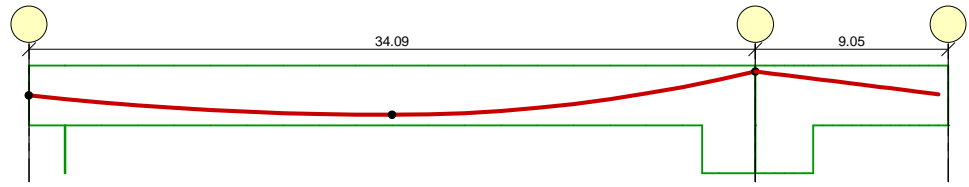


DEFLECTION

Span	Class	Type	W
			k/ft2
1	LL	U	0.05
1	SDL	U	0.015
CANT	LL	U	0.050
CANT	SDL	U	0.015

INPUT LOADING

2 - MEMBER ELEVATION
 [ft]



3 - TOP REBAR

3.1 ADAPT selected

3.2 ADAPT selected

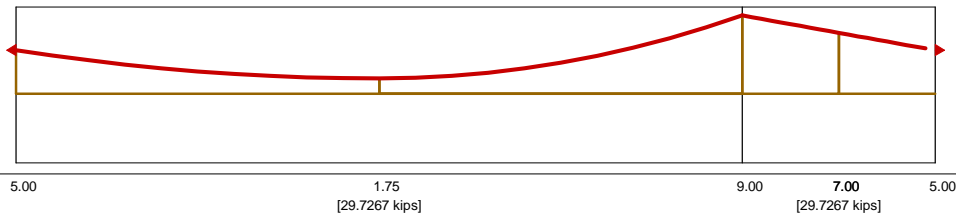


4 - TENDON PROFILE

4.1 Datum Line

4.2 CGS Distance A[in]

4.3 Force A



4.6 CGS Distance B[in]

4.7 Force B

4.10 CGS Distance C[in]

4.11 Force C

5 - BOTTOM REBAR

5.1 ADAPT selected

5.2 ADAPT selected



6 - REQUIRED & PROVIDED BARS

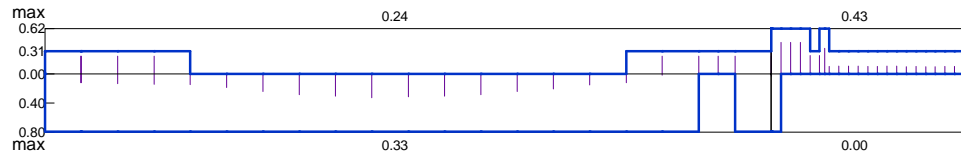
6.1 Top Bars

[in²]

required

provided

6.2 Bottom Bars



7 - SHEAR STIRRUPS

7.1 ADAPT selected.

Bar Size # 4 Legs: 2

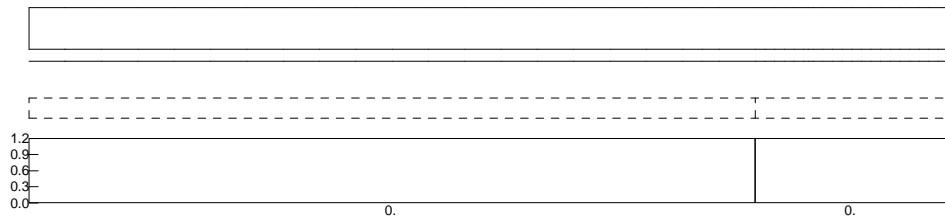
Spacing [in]

7.2 User-selected

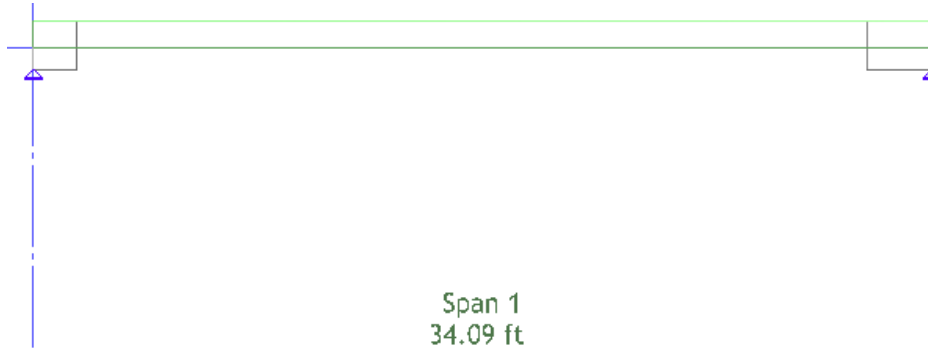
Bar Size # Legs:

7.3 Required area

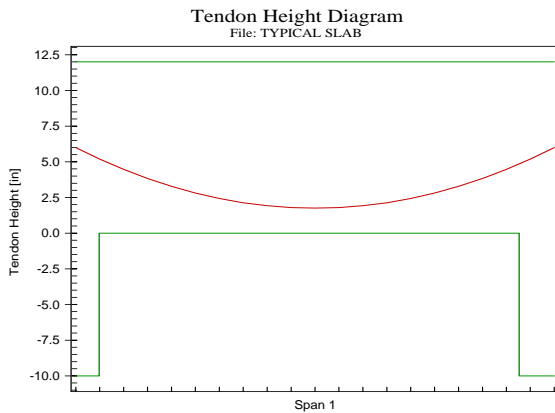
[in²/ft]



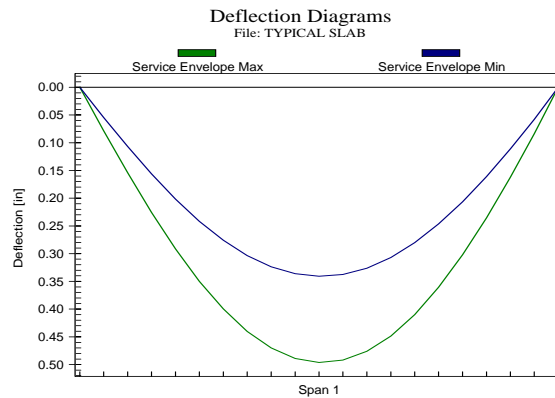
AREA 2 TYPICAL SIMPLE SLAB



Span	Form	Length	Width	Depth	Rh	Right Mult.	Left Mult.
		ft	in	in	in		
1	1	34.09	12.00	12.00	12.00	0.50	0.50



**POST-TENSIONING
 PROFILE**

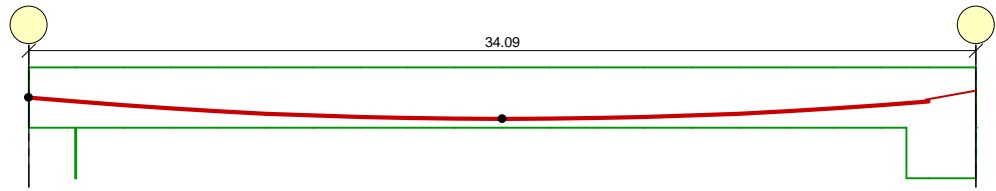


DEFLECTION

Span	Class	Type	W	A	B
			k/ft2	ft	ft
1	LL	P	0.050	0.000	22.000
1	LL	P	0.082	22.000	34.090
1	SDL	U	0.015		

INPUT LOADING

2 - MEMBER ELEVATION
 [ft]



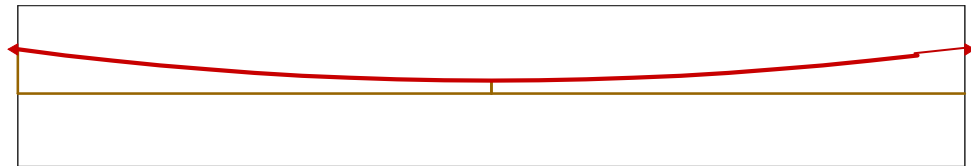
3 - TOP REBAR

3.1 ADAPT selected

3.2 ADAPT selected



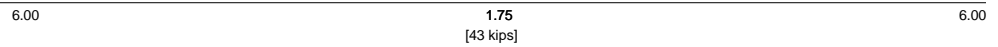
4 - TENDON PROFILE



4.1 Datum Line

4.2 CGS Distance A[in]

4.3 Force A



4.6 CGS Distance B[in]

4.7 Force B

4.10 CGS Distance C[in]

4.11 Force C

5 - BOTTOM REBAR

5.1 ADAPT selected

5.2 ADAPT selected



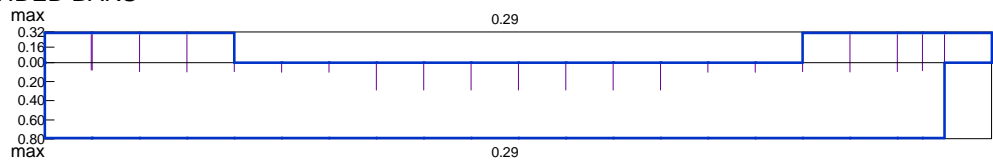
6 - REQUIRED & PROVIDED BARS

6.1 Top Bars

[in²]

required

provided



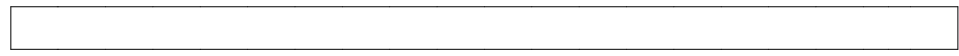
6.2 Bottom Bars

7 - SHEAR STIRRUPS

7.1 ADAPT selected.

Bar Size # 4 Legs: 2

Spacing [in]



7.2 User-selected

Bar Size # Legs:

7.3 Required area

[in²/ft]

