

รายการคำนวณโครงสร้าง

อาคารโรงงานฟอกผ้าโครงสร้างคอนกรีตเสริมเหล็ก 1 ชั้น

เจ้าของ คุณสุเมธ รุจิรัชกุล

สถานที่ก่อสร้าง

ถนน คลองทราย ตำบลดอนแฝก

อ. นครชัยศรี จ. นครปฐม

วิศวกรผู้ออกแบบ

นายเอนก พ่วงสุด ส.ย. 7354

จำนวน 59 แผ่น

ข้อกำหนดในการออกแบบโครงสร้าง (Design Criteria)

รายการคำนวณนี้อ้างตามพระราชบัญญัติควบคุมอาคาร พ.ศ. 2522 และ พ.ศ. 2535 (ฉบับที่ 2) และกฎกระทรวงฉบับที่ 6 (พ.ศ. 2527) ส่วนอื่นใดที่ไม่ได้กำหนดไว้จะอ้างอิงตามมาตรฐานอาคารคอนกรีตเสริมเหล็ก พ.ศ. 2517 ของวิศวกรรมสถานแห่งประเทศไทยในพระบรมราชูปถัมภ์ และข้อกำหนดมาตรฐาน ของ AISC

คอนกรีต

คอนกรีตที่ใช้อัตราส่วนผสมโดยปริมาตร ซีเมนต์ : หิน : ทราย : หิน 1 : 2 : 4 หรือ Mixed Design โดยอัตราส่วนผสมน้ำต่อซีเมนต์ (Water Ratio) อยู่ระหว่าง 0.50-0.60 เพื่อให้กำลังอัดประลัยของแท่งทดสอบคอนกรีต ที่อายุ 28 วัน ค่ากำลังอัดประลัย ไม่น้อยกว่า 145 กก.ต่อ ตร.ซม.

กำลังอัดประลัยของแท่งคอนกรีต	f_c'	=145	ksc.
หน่วยแรงที่ยอมให้ของคอนกรีต	f_c	=65	ksc.
หน่วยแรงเฉือนแบบคาน	V_{c1}	=3.49	ksc.
หน่วยแรงเฉือนแบบทะลุ	V_{c2}	=6.38	ksc.
หน่วยแรงเฉือนจากโมเมนต์บิด	V_{c3}	=15.89	ksc.
โมดูลัสยืดหยุ่นของคอนกรีต	E_c	=182086	ksc.

เหล็กเส้นกลม

f_y	=2400	ksc.
f_s	=1200	ksc.
E_s	=2040000	ksc.

เหล็กข้ออ้อย

f_y	=3000	ksc.
f_s	=1500	ksc.
E_s	=2040000	ksc.

เหล็กรูปพรรณ และเหล็กตามท้องตลาด

กำลังจุดคานของเหล็ก	fy	=2310	ksc.
หน่วยแรงดึงที่ยอมให้ (AISC)	ft	=0.6x f_y	ksc.
	Ft	=0.60x2310	
		=1386	ksc.
หน่วยแรงดัดที่ยอมให้(AISC)	Fb	=0.60x2310	
		=1386	ksc.

หน่วยแรงที่ยอมให้ของเหล็กเส้นกลม

n	=11	
k	=0.373	SR24
	=0.322	SD30
j	=0.876	SR24
	=0.892	SD30
R	=10.62	SR24
	=9.36	SD30

น้ำหนักบรรทุกจร

หลังคามุงกระเบื้อง	= 30	กก./ ตรม.
พื้นที่โรงงาน	= 500	กก./ ตรม.

น้ำหนักบรรทุกคงที่ตายตัว

คอนกรีตเสริมเหล็ก	=2400	กก./ลบม.
ผนังก่ออิฐฉาบปูนครึ่งแผ่น	=180	กก./ตรม.

เสาเข็มฐานรากของอาคาร

กำลังรับน้ำหนักปลอดภัยของเสาเข็มคอนกรีตอัดแรงตัวไอ 0.26x0.26 เมตร สามารถรับน้ำหนักปลอดภัยได้ไม่น้อยกว่า 25 ตัน ต่อ ต้น

Design Truss-A Analysis By Microfeap P1

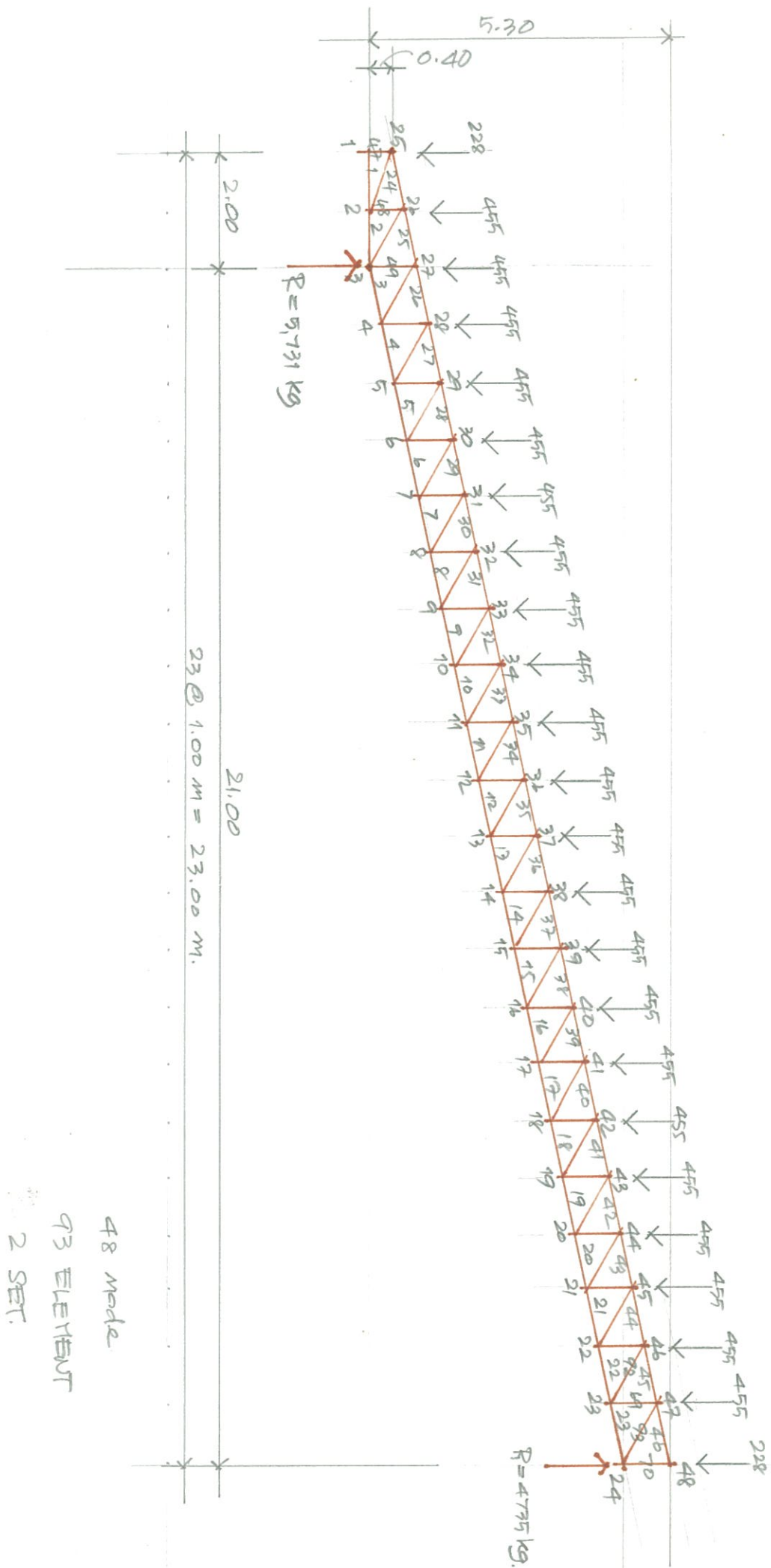
ความกว้างของโครงถัก	L=	21.00 เมตร
ระยะวางห่างกัน BAY	@	5.00 เมตร
น้ำหนักบรรทุกจรหลังคา	W=	30.00 เมตร
น้ำหนักบรรทุกตายตัวกระเบื้อง		15.00 กก/ตรม.
น้ำหนักแป		7.00 กก/ตรม.
รวมน้ำหนัก		52.00 กก/ตรม.
น้ำหนักโครงถัก	$(0.333 \times L) + 5$	12.00 กก/ตรม.
	รวม	64.00 กก/ตรม.
	ปรับเป็น	65.00 กก/ตรม.
น้ำหนักลงจุดต่อภายใน	65x7x1	455.00 กก.
น้ำหนักลงจุดต่อภายนอก	65x7x0.5	228.00 กก.

Force In Member

Element	14	29,975.00 kg.	Tension
Element	36	29,982.00 kg.	Compression
Element	49	5,049.00 kg.	Compression
Element	69	4,057.00 kg.	Tension
Element	73	6,518.00 kg.	Tension
Element	93	6,294.00 kg.	Compression

Reaction

R1	5,731.00 kg.
R2	4,734.00 kg.



Data Preparation for Microfeap II (P1)**Project Information**

Project Title : โรงงานฟอกผ้า
Force Unit : กิโลกรัม
Length Unit : เซนติเมตร
Engineer : นายเอนก พ่วงสุด สย. 7354

Structural Model

Number of Node = 48
Number of Element = 93
Number of Material set = 2
Load factor = 1.0


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MICROFEAP-P1      DATE: 10-27-2000      <DATA> P.1
PROJECT : FAC      FILENAME: TRUSS21M
AUTHORITY: MR. ANEK PUNGSOOD      ENGINEER: ANEK
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*****
*                               *
*  STRUCTURE DATA  *
*                               *
*****

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**COORDINATE DATA (cm)**      **BOUNDARY DATA**
NODE      1-COOR      2-COOR      1-B      2-B
-----

```

1	0.00	0.00		
2	100.00	0.00		
3	200.00	0.00	F	L
4	300.00	21.19		
5	400.00	42.38		
6	500.00	63.57		
7	600.00	84.76		
8	700.00	105.95		
9	800.00	127.14		
10	900.00	148.33		
11	1000.00	169.52		
12	1100.00	190.71		
13	1200.00	211.90		
14	1300.00	233.10		
15	1400.00	254.29		
16	1500.00	275.48		
17	1600.00	296.67		
18	1700.00	317.86		
19	1800.00	339.05		
20	1900.00	360.24		
21	2000.00	381.43		
22	2100.00	402.62		
23	2200.00	423.81		
24	2300.00	445.00	L	L
25	0.00	40.00		
26	100.00	61.30		
27	200.00	82.61		
28	300.00	103.91		
29	400.00	125.22		
30	500.00	146.52		
31	600.00	167.83		
32	700.00	189.13		
33	800.00	210.43		
34	900.00	231.74		
35	1000.00	253.04		
36	1100.00	274.35		
37	1200.00	295.65		

MICROFEAP-P1

DATE: 10-27-2000

<DATA> P.2

PROJECT : FAC

FILENAME: TRUSS21M

AUTHORITY: MR. ANEK PUNGSDOD

ENGINEER: ANEK

COORDINATE DATA (cm)

BOUNDARY DATA

NODE	1-COOR	2-COOR	1-B	2-B
38	1300.00	316.96		
39	1400.00	338.26		
40	1500.00	359.57		
41	1600.00	380.87		
42	1700.00	402.17		
43	1800.00	423.48		
44	1900.00	444.78		
45	2000.00	466.09		
46	2100.00	487.39		
47	2200.00	508.70		
48	2300.00	530.00		

ELEMENT DATA

ELEM	1-NODE	2-NODE	HINGE	MATERIAL
1	1	2		1
2	2	3		1
3	3	4		1
4	4	5		1
5	5	6		1
6	6	7		1
7	7	8		1
8	8	9		1
9	9	10		1
10	10	11		1
11	11	12		1
12	12	13		1
13	13	14		1
14	14	15		1
15	15	16		1
16	16	17		1
17	17	18		1
18	18	19		1
19	19	20		1
20	20	21		1
21	21	22		1
22	22	23		1
23	23	24		1
24	25	26		1
25	26	27		1
26	27	28		1
27	28	29		1
28	29	30		1
29	30	31		1
30	31	32		1
31	32	33		1

MICROFEAP-P1

DATE: 10-27-2000

<DATA> P.3

PROJECT : FAC

FILENAME: TRUSS21M

AUTHORITY: MR. ANEK PUNGSOOD

ENGINEER: ANEK

ELEMENT DATA

ELEM	1-NODE	2-NODE	HINGE	MATERIAL
32	33	34		1
33	34	35		1
34	35	36		1
35	36	37		1
36	37	38		1
37	38	39		1
38	39	40		1
39	40	41		1
40	41	42		1
41	42	43		1
42	43	44		1
43	44	45		1
44	45	46		1
45	46	47		1
46	47	48		1
47	1	25		2
48	2	26		2
49	3	27		2
50	4	28		2
51	5	29		2
52	6	30		2
53	7	31		2
54	8	32		2
55	9	33		2
56	10	34		2
57	11	35		2
58	12	36		2
59	13	37		2
60	14	38		2
61	15	39		2
62	16	40		2
63	17	41		2
64	18	42		2
65	19	43		2
66	20	44		2
67	21	45		2
68	22	46		2
69	23	47		2
70	24	48		2
71	2	25		2
72	3	26		2
73	4	27		2
74	5	28		2
75	6	29		2
76	7	30		2
77	8	31		2
78	9	32		2

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=====
MICROFEAP-P1      DATE: 10-27-2000      <DATA> P.4
PROJECT : FAC      FILENAME: TRUSS21M
AUTHORITY: MR. ANEK PUNGSOOD      ENGINEER: ANEK
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ELEMENT DATA

ELEM	1-NODE	2-NODE	HINGE	MATERIAL
79	10	33		2
80	11	34		2
81	12	35		2
82	13	36		2
83	14	37		2
84	15	38		2
85	16	39		2
86	17	40		2
87	18	41		2
88	19	42		2
89	20	43		2
90	21	44		2
91	22	45		2
92	23	46		2
93	24	47		2

MATERIAL DATA

MATE	E-MODULUS (kg/cm ²)	AXIAL-AREA (cm ²)
1	2.100D+06	2.538D+01
2	2.100D+06	1.128D+01

LOAD CASE 11: POINT LOAD

NODAL FORCE DATA

NODE	1-FORC (kg)	2-FORC (kg)
25	0.000D+00	-2.280D+02
26	0.000D+00	-4.550D+02
27	0.000D+00	-4.550D+02
28	0.000D+00	-4.550D+02
29	0.000D+00	-4.550D+02
30	0.000D+00	-4.550D+02
31	0.000D+00	-4.550D+02
32	0.000D+00	-4.550D+02
33	0.000D+00	-4.550D+02
34	0.000D+00	-4.550D+02
35	0.000D+00	-4.550D+02
36	0.000D+00	-4.550D+02
37	0.000D+00	-4.550D+02
38	0.000D+00	-4.550D+02
39	0.000D+00	-4.550D+02
40	0.000D+00	-4.550D+02
41	0.000D+00	-4.550D+02

MICROFEAP-P1

DATE: 10-27-2000

<DATA> P.5

PROJECT : FAC

FILENAME: TRUSS21M

AUTHORITY: MR. ANEK PUNGSOOD

ENGINEER: ANEK

LOAD CASE £1 : POINT LOAD

NODAL FORCE DATA

NODE	1-FORC (kg)	2-FORC (kg)
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42	0.000D+00	-4.550D+02
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43	0.000D+00	-4.550D+02
----	-----------	------------

44	0.000D+00	-4.550D+02
----	-----------	------------

45	0.000D+00	-4.550D+02
----	-----------	------------

46	0.000D+00	-4.550D+02
----	-----------	------------

47	0.000D+00	-4.550D+02
----	-----------	------------

48	0.000D+00	-2.280D+02
----	-----------	------------

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MICROFEAP-P1      DATE: 10-27-2000      <COMB> P.1
PROJECT : FAC      FILENAME: TRUSS21M
AUTHORITY: MR. ANEK PUNGSOOD      ENGINEER: ANEK
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*****
*                               *
* COMBINATION                   *
*                               *
*****

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DISPLACEMENT COMBINATION <2D-TRUSS SYSTEM>

LOAD FACTOR : 1

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NODE      1-DISP      2-DISP
          (cm)       (cm)

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-----
1 -8.1304D-01  1.9179D+00
2 -8.1304D-01  9.5742D-01
3 -8.1374D-01  0.0000D+00
4 -5.9712D-01 -1.0327D+00
5 -3.7524D-01 -2.0377D+00
6 -1.5435D-01 -2.9908D+00
7  5.9901D-02 -3.8707D+00
8  2.6246D-01 -4.6589D+00
9  4.4886D-01 -5.3395D+00
10 6.1521D-01 -5.8994D+00
11 7.5818D-01 -6.3282D+00
12 8.7504D-01 -6.6181D+00
13 9.6359D-01 -6.7641D+00
14 1.0222D+00 -6.7636D+00
15 1.0499D+00 -6.6168D+00
16 1.0461D+00 -6.3265D+00
17 1.0108D+00 -5.8979D+00
18 9.4471D-01 -5.3389D+00
19 8.4885D-01 -4.6598D+00
20 7.2491D-01 -3.8735D+00
21 5.7508D-01 -2.9953D+00
22 4.0208D-01 -2.0431D+00
23 2.0913D-01 -1.0371D+00
24 0.0000D+00  0.0000D+00
25 -4.2688D-01  1.9179D+00
26 -2.2159D-01  9.5780D-01
27 -1.1570D-02 -1.7610D-02
28 1.9917D-01 -1.0487D+00
29 3.9400D-01 -2.0521D+00
30 5.6890D-01 -3.0036D+00
31 7.2046D-01 -3.8819D+00
32 8.4583D-01 -4.6685D+00
33 9.4275D-01 -5.3475D+00
34 1.0096D+00 -5.9058D+00
35 1.0451D+00 -6.3330D+00

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$$= 6.76 \text{ cm. } \Delta_{\max} = \frac{L}{300} = \frac{2100}{300} = 7.0 > 6.76 \text{ cm.}$$

=====

MICROFEAP-P1 DATE: 10-27-2000 <COMB> P.3
 PROJECT : FAC FILENAME: TRUSS21M
 AUTHORITY: MR. ANEK PUNGSOOD ENGINEER: ANEK

=====

STRESS COMBINATION <2D-TRUSS SYSTEM>

LOAD FACTOR : 1

ELEM	MA	LENGTH (cm)	1-FORCE (kg)	2-FORCE (kg)	1-STRESS (kg/cm ²)	2-STRESS (kg/cm ²)
26	1	102.24	-4.5514D+03	-4.5514D+03	-1.7933D+02	-1.7933D+02
27	1	102.24	-9.6531D+03	-9.6531D+03	-3.8034D+02	-3.8034D+02
28	1	102.24	-1.4180D+04	-1.4180D+04	-5.5871D+02	-5.5871D+02
29	1	102.24	-1.8134D+04	-1.8134D+04	-7.1451D+02	-7.1451D+02
30	1	102.24	-2.1519D+04	-2.1519D+04	-8.4786D+02	-8.4786D+02
31	1	102.24	-2.4335D+04	-2.4335D+04	-9.5883D+02	-9.5883D+02
32	1	102.24	-2.6586D+04	-2.6586D+04	-1.0475D+03	-1.0475D+03
33	1	102.24	-2.8274D+04	-2.8274D+04	-1.1140D+03	-1.1140D+03
34	1	102.24	-2.9401D+04	-2.9401D+04	-1.1584D+03	-1.1584D+03
35	1	102.24	-2.9969D+04	-2.9969D+04	-1.1808D+03	-1.1808D+03
36	1	102.24	-2.9982D+04	-2.9982D+04	-1.1813D+03	-1.1813D+03
37	1	102.24	-2.9440D+04	-2.9440D+04	-1.1600D+03	-1.1600D+03
38	1	102.24	-2.8346D+04	-2.8346D+04	-1.1169D+03	-1.1169D+03
39	1	102.24	-2.6703D+04	-2.6703D+04	-1.0521D+03	-1.0521D+03
40	1	102.24	-2.4513D+04	-2.4513D+04	-9.6583D+02	-9.6583D+02
41	1	102.24	-2.1777D+04	-2.1777D+04	-8.5805D+02	-8.5805D+02
42	1	102.24	-1.8499D+04	-1.8499D+04	-7.2888D+02	-7.2888D+02
43	1	102.24	-1.4680D+04	-1.4680D+04	-5.7840D+02	-5.7840D+02
44	1	102.24	-1.0322D+04	-1.0322D+04	-4.0670D+02	-4.0670D+02
45	1	102.24	-5.4281D+03	-5.4281D+03	-2.1388D+02	-2.1388D+02
46	1	102.24	-1.8343D+04	-1.8343D+04	-7.2274D+06	-7.2274D+06
47	2	40.00	0.0000D+00	0.0000D+00	0.0000D+00	0.0000D+00
48	2	61.30	1.4876D+02	1.4876D+02	1.3188D+01	1.3188D+01
49	2	82.61	-5.0496D+03	-5.0496D+03	-4.4766D+02	-4.4766D+02
50	2	82.72	-4.5883D+03	-4.5883D+03	-4.0677D+02	-4.0677D+02
51	2	82.84	-4.1276D+03	-4.1276D+03	-3.6592D+02	-3.6592D+02
52	2	82.95	-3.6676D+03	-3.6676D+03	-3.2514D+02	-3.2514D+02
53	2	83.06	-3.2082D+03	-3.2082D+03	-2.8441D+02	-2.8441D+02
54	2	83.18	-2.7495D+03	-2.7495D+03	-2.4375D+02	-2.4375D+02
55	2	83.29	-2.2913D+03	-2.2913D+03	-2.0313D+02	-2.0313D+02
56	2	83.41	-1.8337D+03	-1.8337D+03	-1.6256D+02	-1.6256D+02
57	2	83.52	-1.3769D+03	-1.3769D+03	-1.2206D+02	-1.2206D+02
58	2	83.63	-9.2069D+02	-9.2069D+02	-8.1621D+01	-8.1621D+01
59	2	83.75	-4.6504D+02	-4.6504D+02	-4.1227D+01	-4.1227D+01
60	2	83.86	-1.0102D+01	-1.0102D+01	-8.9555D-01	-8.9555D-01
61	2	83.98	4.4441D+02	4.4441D+02	3.9398D+01	3.9398D+01
62	2	84.09	8.9824D+02	8.9824D+02	7.9631D+01	7.9631D+01
63	2	84.20	1.3514D+03	1.3514D+03	1.1980D+02	1.1980D+02
64	2	84.32	1.8039D+03	1.8039D+03	1.5992D+02	1.5992D+02
65	2	84.43	2.2558D+03	2.2558D+03	1.9999D+02	1.9999D+02
66	2	84.54	2.7072D+03	2.7072D+03	2.4000D+02	2.4000D+02
67	2	84.66	3.1580D+03	3.1580D+03	2.7996D+02	2.7996D+02
68	2	84.77	3.6081D+03	3.6081D+03	3.1987D+02	3.1987D+02
69	2	84.89	4.0577D+03	4.0577D+03	3.5972D+02	3.5972D+02
70	2	85.00	-2.2800D+02	-2.2800D+02	-2.0213D+01	-2.0213D+01

MICROFEAP-P1

DATE: 10-27-2000

<COMB> P.4

PROJECT : FAC

FILENAME: TRUSS21M

AUTHORITY: MR. ANEK PUNGSOOD

ENGINEER: ANEK

STRESS COMBINATION <2D-TRUSS SYSTEM>

LOAD FACTOR : 1

ELEM	MA	LENGTH (cm)	1-FORCE (kg)	2-FORCE (kg)	1-STRESS (kg/cm ²)	2-STRESS (kg/cm ²)
71	2	107.70	-4.0056D+02	-4.0056D+02	-3.5511D+01	-3.5511D+01
72	2	117.30	-8.5729D+02	-8.5729D+02	-7.6001D+01	-7.6001D+01
73	2	117.36	6.5182D+03	6.5182D+03	5.7786D+02	5.7786D+02
74	2	117.41	5.8587D+03	5.8587D+03	5.1939D+02	5.1939D+02
75	2	117.47	5.2012D+03	5.2012D+03	4.6110D+02	4.6110D+02
76	2	117.53	4.5458D+03	4.5458D+03	4.0299D+02	4.0299D+02
77	2	117.59	3.8923D+03	3.8923D+03	3.4507D+02	3.4507D+02
78	2	117.65	3.2410D+03	3.2410D+03	2.8732D+02	2.8732D+02
79	2	117.71	2.5916D+03	2.5916D+03	2.2976D+02	2.2976D+02
80	2	117.77	1.9443D+03	1.9443D+03	1.7236D+02	1.7236D+02
81	2	117.83	1.2989D+03	1.2989D+03	1.1515D+02	1.1515D+02
82	2	117.89	6.5550D+02	6.5550D+02	5.8111D+01	5.8111D+01
83	2	117.95	1.4043D+01	1.4043D+01	1.2450D+00	1.2450D+00
84	2	118.02	-6.2542D+02	-6.2542D+02	-5.5445D+01	-5.5445D+01
85	2	118.08	-1.2629D+03	-1.2629D+03	-1.1196D+02	-1.1196D+02
86	2	118.14	-1.8985D+03	-1.8985D+03	-1.6831D+02	-1.6831D+02
87	2	118.20	-2.5322D+03	-2.5322D+03	-2.2448D+02	-2.2448D+02
88	2	118.26	-3.1640D+03	-3.1640D+03	-2.8049D+02	-2.8049D+02
89	2	118.32	-3.7938D+03	-3.7938D+03	-3.3633D+02	-3.3633D+02
90	2	118.38	-4.4218D+03	-4.4218D+03	-3.9200D+02	-3.9200D+02
91	2	118.44	-5.0479D+03	-5.0479D+03	-4.4751D+02	-4.4751D+02
92	2	118.50	-5.6721D+03	-5.6721D+03	-5.0285D+02	-5.0285D+02
93	2	118.56	-6.2945D+03	-6.2945D+03	-5.5803D+02	-5.5803D+02

SUPPORT REACTIONS <2D-TRUSS SYSTEM>

LOAD FACTOR : 1

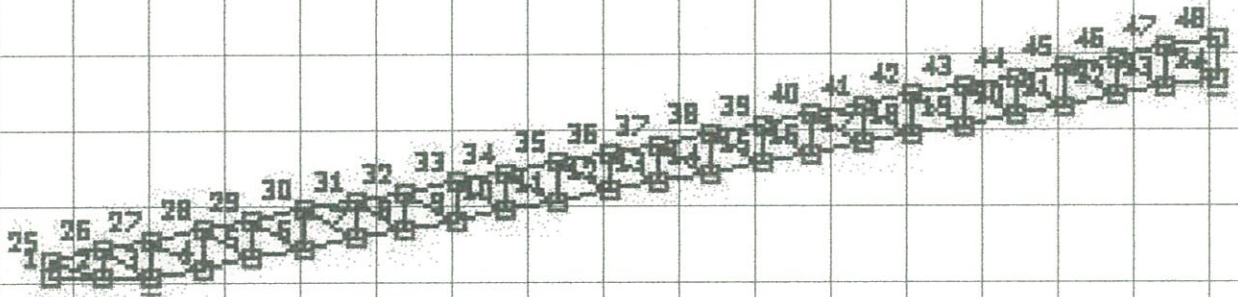
NODE	1-REACTION (kg)	2-REACTION (kg)
------	--------------------	--------------------

3	0.0000D+00	5.7314D+03
24	-6.3881D-04	4.7346D+03

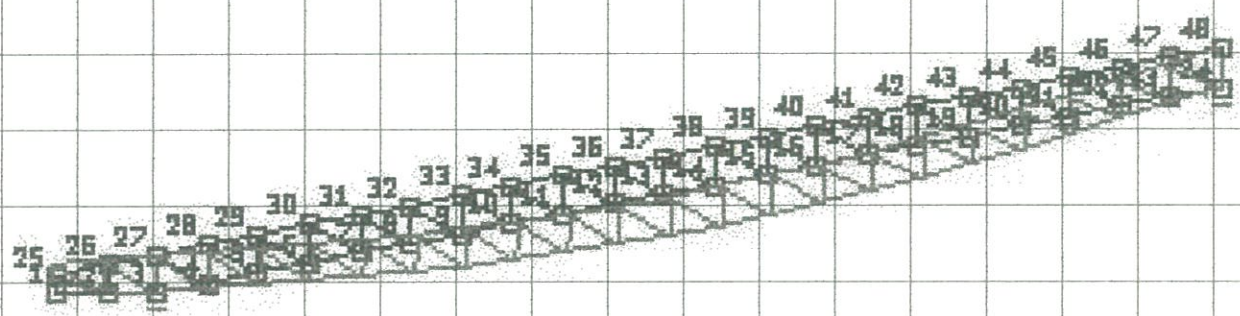
VOLUME OF MATERIALS <2D-TRUSS SYSTEM>

SETS	VOLUME (cm ³)
------	------------------------------

1	1.1924D+05
2	5.2419D+04



GEOMETRY (1 = 1.25E+02)



DISP.COM (1 = 9.58E+00)

DATA & PARAMETERS FOR DESIGN

TENSION STRUCTURAL DESIGN : E14

YIELD STRENGTH OF STEEL, $F_y =$ 2310 ksc.
 MODULUS OF ELASTICITY, $E =$ 2040000 ksc.
 TENSION FORCED, $P =$ 29975 kg. ✓
 LENGTH OF MEMBER, $L =$ 1.02 m.

STRUCTURAL TENSION DESIGN E14

SELECTED SECTION OF STEEL: 2-L-75x75x9 mm. ✓

PROPERTIES OF SECTION

LENGTH OF LEG A, $A =$ 75 mm.
 LENGTH OF LEG B, $B =$ 75 mm.
 THICKNESS OF STEEL SECTION, $t =$ 9.000 mm.
 CROSS-SECTION AREA, $A =$ 25.380 sq. cm.
 WEIGHT OF SECTION / UNIT LENGTH, $w =$ 19.92 kg/m.
 CENTROID ABOUT x-AXIS, $C_x =$ 2.170 cm.
 CENTROID ABOUT y-AXIS, $C_y =$ 0.000 cm.
 MOMENT OF INERTIA ABOUT x-AXIS, $I_x =$ 128.800 cm⁴.
 MOMENT OF INERTIA ABOUT y-AXIS, $I_y =$ 248.312 cm⁴.
 MAXIMUM MOMENT OF INERTIA, $I_{max} =$ 248.312 cm⁴.
 MINIMUM MOMENT OF INERTIA, $I_{min} =$ 128.800 cm⁴.
 RADIUS OF GYRATION ABOUT x-AXIS, $r_x =$ 2.250 cm.
 RADIUS OF GYRATION ABOUT y-AXIS, $r_y =$ 3.128 cm.
 MAXIMUM RADIUS OF GYRATION, $r_{max} =$ 3.128 cm.
 MINIMUM RADIUS OF GYRATION, $r_{min} =$ 2.250 cm.
 SECTION MODULUS ABOUT x-AXIS, $S_x =$ 24.200 cm³.
 SECTION MODULUS ABOUT y-AXIS, $S_y =$ 33.108 cm³.
 SLENDERNESS RATIO, $R = L/r_{min} =$ 45.333

*** ALLOWABLE TENSILE STRENGTH, $F_t =$ 1386.000 ksc. ***

*** THIS SECTION SUPPORT TENSILE FORCE, $P_1 =$ 35176.680 kg. *** ✓

DATA & PARAMETERS FOR DESIGN

COMPRESSION STRUCTURAL DESIGN : E36

YIELD STRENGTH OF STEEL,.....	$F_y =$	2310 ksc.
MODULUS OF ELASTICITY ,	$E =$	2040000 ksc.
COMPRESSION FORCE ,	$P =$	29982 kg. ✓
LENGTH OF MEMBER ,	$L =$	1.02 m.
EFFECTIVE LENGTH COEFFICIENT ,	$K =$	1.00

STRUCTURAL COMPRESSION DESIGN E36

SELECTED SECTION OF STEEL: 2-L-75x75x9 mm. ✓

PROPERTIES OF SECTION

LENGTH OF LEG A ,	$A =$	75 mm.
LENGTH OF LEG B ,	$B =$	75 mm.
THICKNESS OF STEEL SECTION ,	$t =$	9.000 mm.
CROSS-SECTION AREA ,	$A =$	25.380 sq.cm.
WEIGHT OF SECTION / UNIT LENGTH ,	$w =$	19.92 kg/m.
CENTROID ABOUT x-AXIS ,	$C_x =$	2.170 cm.
CENTROID ABOUT y-AXIS ,	$C_y =$	0.000 cm.
MOMENT OF INERTIA ABOUT x-AXIS ,	$I_x =$	128.800 cm ⁴ .
MOMENT OF INERTIA ABOUT y-AXIS ,	$I_y =$	248.312 cm ⁴ .
MAXIMUM MOMENT OF INERTIA ,	$I_{max} =$	248.312 cm ⁴ .
MINIMUM MOMENT OF INERTIA ,	$I_{min} =$	128.800 cm ⁴ .
RADIUS OF GYRATION ABOUT x-AXIS ,	$r_x =$	2.250 cm.
RADIUS OF GYRATION ABOUT y-AXIS ,	$r_y =$	3.128 cm.
MAXIMUM RADIUS OF GYRATION ,	$r_{max} =$	3.128 cm.
MINIMUM RADIUS OF GYRATION ,	$r_{min} =$	2.250 cm.
SECTION MODULUS ABOUT x-AXIS ,	$S_x =$	24.200 cm ³ .
SECTION MODULUS ABOUT y-AXIS ,	$S_y =$	33.108 cm ³ .
SLENDerness RATIO	$R = L/r_{min} =$	45.333

ALLOWABLE COMPRESSIVE STRENGTH ,	$F_a =$	1214.185 ksc.
THIS SECTION SUPPORT COMPRESSION FORCE, $P_1 =$		30816.006 kg. ✓

DATA & PARAMETERS FOR DESIGN

COMPRESSION STRUCTURAL DESIGN : E49

YIELD STRENGTH OF STEEL, $F_y =$ 2310 ksc.
 MODULUS OF ELASTICITY, $E =$ 2040000 ksc.
 COMPRESSION FORCE, $P =$ 5049 kg. ✓
 LENGTH OF MEMBER, $L =$ 0.82 m.
 EFFECTIVE LENGTH COEFFICIENT, $K =$ 1.00

STRUCTURAL COMPRESSION DESIGN E49

SELECTED SECTION OF STEEL: 2-L-65x65x6 mm. ✓

PROPERTIES OF SECTION

LENGTH OF LEG A, $A =$ 65 mm.
 LENGTH OF LEG B, $B =$ 65 mm.
 THICKNESS OF STEEL SECTION, $t =$ 6.000 mm.
 CROSS-SECTION AREA, $A =$ 15.054 sq.cm.
 WEIGHT OF SECTION / UNIT-LENGTH, $w =$ 13.82 kg/m.
 CENTROID ABOUT x-AXIS, $C_x =$ 1.810 cm.
 CENTROID ABOUT y-AXIS, $C_y =$ 0.000 cm.
 MOMENT OF INERTIA ABOUT x-AXIS, $I_x =$ 58.800 cm⁴.
 MOMENT OF INERTIA ABOUT y-AXIS, $I_y =$ 108.118 cm⁴.
 MAXIMUM MOMENT OF INERTIA, $I_{max} =$ 108.118 cm⁴.
 MINIMUM MOMENT OF INERTIA, $I_{min} =$ 58.800 cm⁴.
 RADIUS OF GYRATION ABOUT x-AXIS, $r_x =$ 1.980 cm.
 RADIUS OF GYRATION ABOUT y-AXIS, $r_y =$ 2.680 cm.
 MAXIMUM RADIUS OF GYRATION, $r_{max} =$ 2.680 cm.
 MINIMUM RADIUS OF GYRATION, $r_{min} =$ 1.980 cm.
 SECTION MODULUS ABOUT x-AXIS, $S_x =$ 12.520 cm³.
 SECTION MODULUS ABOUT y-AXIS, $S_y =$ 16.634 cm³.
 SLENDERNESS RATIO $R = L/r_{min} =$ 41.414

ALLOWABLE COMPRESSIVE STRENGTH, $F_a =$ 1233.608 ksc.
 THIS SECTION SUPPORT COMPRESSION FORCE, $P_1 =$ 18570.736 kg. ✓

DATA & PARAMETERS FOR DESIGN

TENSION STRUCTURAL DESIGN : E69

YIELD STRENGTH OF STEEL,.....	$F_y =$	2310 ksc.
MODULUS OF ELASTICITY,	$E =$	2040000 ksc.
TENSION FORCED,	$P =$	4057 kg. ✓
LENGTH OF MEMBER,	$L =$	0.84 m.

STRUCTURAL TENSION DESIGN E69

SELECTED SECTION OF STEEL: 2-L-65x65x6 mm. ✓

PROPERTIES OF SECTION

LENGTH OF LEG A,	$A =$	65 mm.
LENGTH OF LEG B,	$B =$	65 mm.
THICKNESS OF STEEL SECTION,	$t =$	6.000 mm.
CROSS-SECTION AREA,	$A =$	15.054 sq.cm.
WEIGHT OF SECTION / UNIT LENGTH,	$w =$	13.82 kg/m.
CENTROID ABOUT x-AXIS,	$C_x =$	1.810 cm.
CENTROID ABOUT y-AXIS,	$C_y =$	0.000 cm.
MOMENT OF INERTIA ABOUT x-AXIS,	$I_x =$	58.800 cm ⁴ .
MOMENT OF INERTIA ABOUT y-AXIS,	$I_y =$	108.118 cm ⁴ .
MAXIMUM MOMENT OF INERTIA,	$I_{max} =$	108.118 cm ⁴ .
MINIMUM MOMENT OF INERTIA,	$I_{min} =$	58.800 cm ⁴ .
RADIUS OF GYRATION ABOUT x-AXIS,	$r_x =$	1.980 cm.
RADIUS OF GYRATION ABOUT y-AXIS,	$r_y =$	2.680 cm.
MAXIMUM RADIUS OF GYRATION,	$r_{max} =$	2.680 cm.
MINIMUM RADIUS OF GYRATION,	$r_{min} =$	1.980 cm.
SECTION MODULUS ABOUT x-AXIS,	$S_x =$	12.520 cm ³ .
SECTION MODULUS ABOUT y-AXIS,	$S_y =$	16.634 cm ³ .
SLENDERNES RATIO,	$R = L/r_{min} =$	42.424

*** ALLOWABLE TENSILE STRENGTH, $F_t =$ 1386.000 ksc. ***

*** THIS SECTION SUPPORT TENSILE FORCE, $P_1 =$ 20864.844 kg. *** ✓

DATA & PARAMETERS FOR DESIGN

TENSION STRUCTURAL DESIGN : E73

YIELD STRENGTH OF STEEL,.....	$F_y =$	2310 ksc.
MODULUS OF ELASTICITY ,	$E =$	2040000 ksc.
TENSION FORCED ,	$P =$	6518 kg. ✓
LENGTH OF MEMBER ,	$L =$	1.17 m.

STRUCTURAL TENSION DESIGN E73

SELECTED SECTION OF STEEL: 2-L-50x50x4 mm. ✓

PROPERTIES OF SECTION

LENGTH OF LEG A ,	$A =$	50 mm.
LENGTH OF LEG B ,	$B =$	50 mm.
THICKNESS OF STEEL SECTION ,	$t =$	4.000 mm.
CROSS-SECTION AREA ,	$A =$	7.784 sq.cm.
WEIGHT OF SECTION / UNIT LENGTH ,	$w =$	6.12 kg/m.
CENTROID ABOUT x-AXIS ,	$C_x =$	1.370 cm.
CENTROID ABOUT y-AXIS ,	$C_y =$	0.000 cm.
MOMENT OF INERTIA ABOUT x-AXIS ,	$I_x =$	18.120 cm ⁴ .
MOMENT OF INERTIA ABOUT y-AXIS ,	$I_y =$	32.730 cm ⁴ .
MAXIMUM MOMENT OF INERTIA ,	$I_{max} =$	32.730 cm ⁴ .
MINIMUM MOMENT OF INERTIA ,	$I_{min} =$	18.120 cm ⁴ .
RADIUS OF GYRATION ABOUT x-AXIS ,	$r_x =$	1.530 cm.
RADIUS OF GYRATION ABOUT y-AXIS ,	$r_y =$	2.051 cm.
MAXIMUM RADIUS OF GYRATION ,	$r_{max} =$	2.051 cm.
MINIMUM RADIUS OF GYRATION ,	$r_{min} =$	1.530 cm.
SECTION MODULUS ABOUT x-AXIS ,	$S_x =$	4.980 cm ³ .
SECTION MODULUS ABOUT y-AXIS ,	$S_y =$	6.546 cm ³ .
SLENDERNES RATIO ,	$R = L/r_{min} =$	76.471

*** ALLOWABLE TENSILE STRENGTH , $F_t =$ 1386.000 ksc. ****** THIS SECTION SUPPORT TENSILE FORCE, $P_1 =$ 10788.624 kg. *** ✓

DATA & PARAMETERS FOR DESIGN

COMPRESSION STRUCTURAL DESIGN : E93

YIELD STRENGTH OF STEEL,.....	$F_y =$	2310 ksc.
MODULUS OF ELASTICITY ,	$E =$	2040000 ksc.
COMPRESSION FORCE ,	$P =$	6294 kg. ✓
LENGTH OF MEMBER ,	$L =$	1.17 m.
EFFECTIVE LENGTH COEFFICIENT ,	$K =$	1.00

STRUCTURAL COMPRESSION DESIGN E93

SELECTED SECTION OF STEEL: 2-L-50x50x4 mm. ✓

PROPERTIES OF SECTION

LENGTH OF LEG A ,	$A =$	50 mm.
LENGTH OF LEG B ,	$B =$	50 mm.
THICKNESS OF STEEL SECTION ,	$t =$	4.000 mm.
CROSS-SECTION AREA ,	$A =$	7.784 sq.cm.
WEIGHT OF SECTION / UNIT LENGTH ,	$w =$	6.12 kg/m.
CENTROID ABOUT x-AXIS ,	$C_x =$	1.370 cm.
CENTROID ABOUT y-AXIS ,	$C_y =$	0.000 cm.
MOMENT OF INERTIA ABOUT x-AXIS ,	$I_x =$	18.120 cm ⁴ .
MOMENT OF INERTIA ABOUT y-AXIS ,	$I_y =$	32.730 cm ⁴ .
MAXIMUM MOMENT OF INERTIA ,	$I_{max} =$	32.730 cm ⁴ .
MINIMUM MOMENT OF INERTIA ,	$I_{min} =$	18.120 cm ⁴ .
RADIUS OF GYRATION ABOUT x-AXIS ,	$r_x =$	1.530 cm.
RADIUS OF GYRATION ABOUT y-AXIS ,	$r_y =$	2.051 cm.
MAXIMUM RADIUS OF GYRATION ,	$r_{max} =$	2.051 cm.
MINIMUM RADIUS OF GYRATION ,	$r_{min} =$	1.530 cm.
SECTION MODULUS ABOUT x-AXIS ,	$S_x =$	4.980 cm ³ .
SECTION MODULUS ABOUT y-AXIS ,	$S_y =$	6.546 cm ³ .
SLENDerness RATIO	$R = L/r_{min} =$	76.471

ALLOWABLE COMPRESSIVE STRENGTH ,	$F_a =$	1033.861 ksc.
THIS SECTION SUPPORT COMPRESSION FORCE, $P_1 =$		8047.578 kg. ✓

គណនាបង្គោល

$$\text{តម្លៃបំពង់បង្គោលប្រភេទ ២០៖ ១៥០ គីឡូក្រាម/ម៉ែត្រ} = 15 \text{ kg/m}^2$$

$$\text{តម្លៃបំពង់បង្គោលប្រភេទ ៣០៖ ៣០ គីឡូក្រាម/ម៉ែត្រ} = 30 \text{ kg/m}^2$$

$$\text{ប្រសិទ្ធភាពបង្គោលប្រភេទ ១.០០ ម៉ែត្រ} = 45 \times 1.00$$

$$= 45 \text{ kg/m}$$

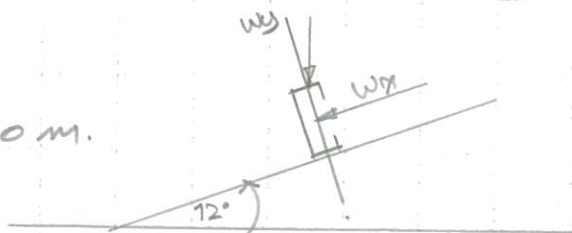
$$\text{តម្លៃបំពង់បង្គោលប្រភេទ ២០៖ ១២ គីឡូក្រាម/ម៉ែត្រ} = 12 \text{ kg/m}$$

$$\text{ប្រសិទ្ធភាពបង្គោលប្រភេទ ២០៖ ៥៧ គីឡូក្រាម/ម៉ែត្រ} = 57 \text{ kg/m}$$

$$\text{ប្រសិទ្ធភាពបង្គោលប្រភេទ ២០៖ ៦០ គីឡូក្រាម/ម៉ែត្រ} = 60 \text{ kg/m}$$

$$\Theta = 12^\circ$$

$$L = 7.00 \text{ m}$$



$$W_x = 60 \sin 12^\circ = 12.47 \text{ kg/m}$$

$$W_y = 60 \cos 12^\circ = 58.68 \text{ kg/m}$$

$$M_x = \frac{W_y L^2}{9} = \frac{58.68 \times 7^2}{9} = 319.48 \text{ kg-m}$$

$$M_y = \frac{W_x L^2}{9} = \frac{12.47 \times (7/2)^2}{9} = 16.97 \text{ kg-m}$$

$$S_x = \frac{M_x}{f_b} < F_b = \frac{319.48 \times 100}{0.6 \times 2310} = 23.05 \text{ cm}^3$$

ប្រភេទបង្គោល C-150x50x20x3.2 mm

$$S_x = 28.30 \text{ cm}^3 \quad S_y = 8.19 \text{ cm}^2 \quad I_x = 280 \text{ cm}^4$$

$$f_b = \frac{M_x}{S_x} + \frac{M_y}{S_y} < F_b = \frac{319.48 \times 100}{28.3} + \frac{16.97 \times 100}{8.19} = 1331 \text{ ksc}$$

$$\therefore f_b < F_b = 1331 < 1386 \text{ ksc}$$

$$\Delta_{all} = \frac{L}{300} = \frac{700}{300} = 2.33 \text{ cm}$$

$$\Delta_{max} = \frac{5 \times 58.68 \times 700^4}{384 \times 100 \times 2.1 \times 10^6 \times 280} = 3.41 \text{ cm No. K.}$$

$\therefore$ ប្រភេទបង្គោល C-150x75x20x3.2 mm @ 1.00 m. ✓

$$f_b = 762 \text{ ksc} \quad \Delta_{max} = 2.38 \text{ cm}$$

ออกแบบเหล็กยึดผนัง. Sag Rod.

ขนาดยาวในเหล็กยึดผนัง $L = 1.02 \text{ m}$.

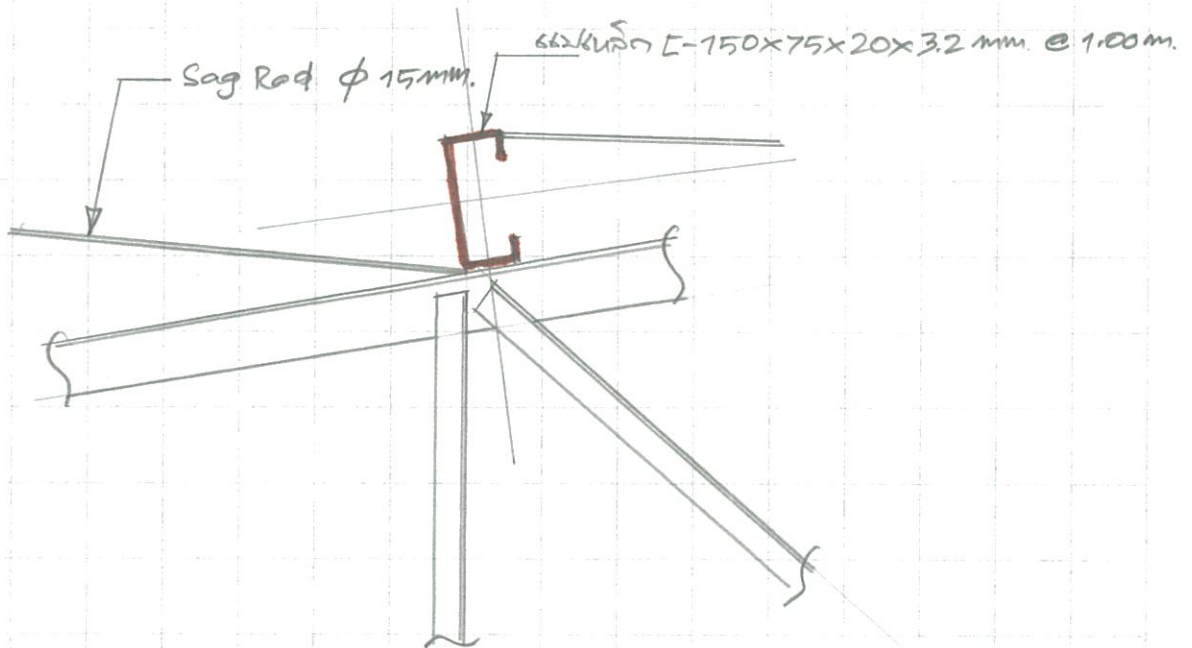
Check $\frac{L}{r} < 300$

$$\text{หรือ } r = \frac{L}{300} = \frac{102}{300} = 0.34 \text{ cm}$$

เหล็กยึดผนัง $\phi 15 \text{ mm}$.

$$r = \frac{D}{4} = \frac{1.5}{4} = 0.375 \text{ cm} > 0.34 \text{ cm}$$

$\therefore$ Sag Rod $\phi 15 \text{ mm}$. @ 3.50 m. ผนังคอนกรีต.



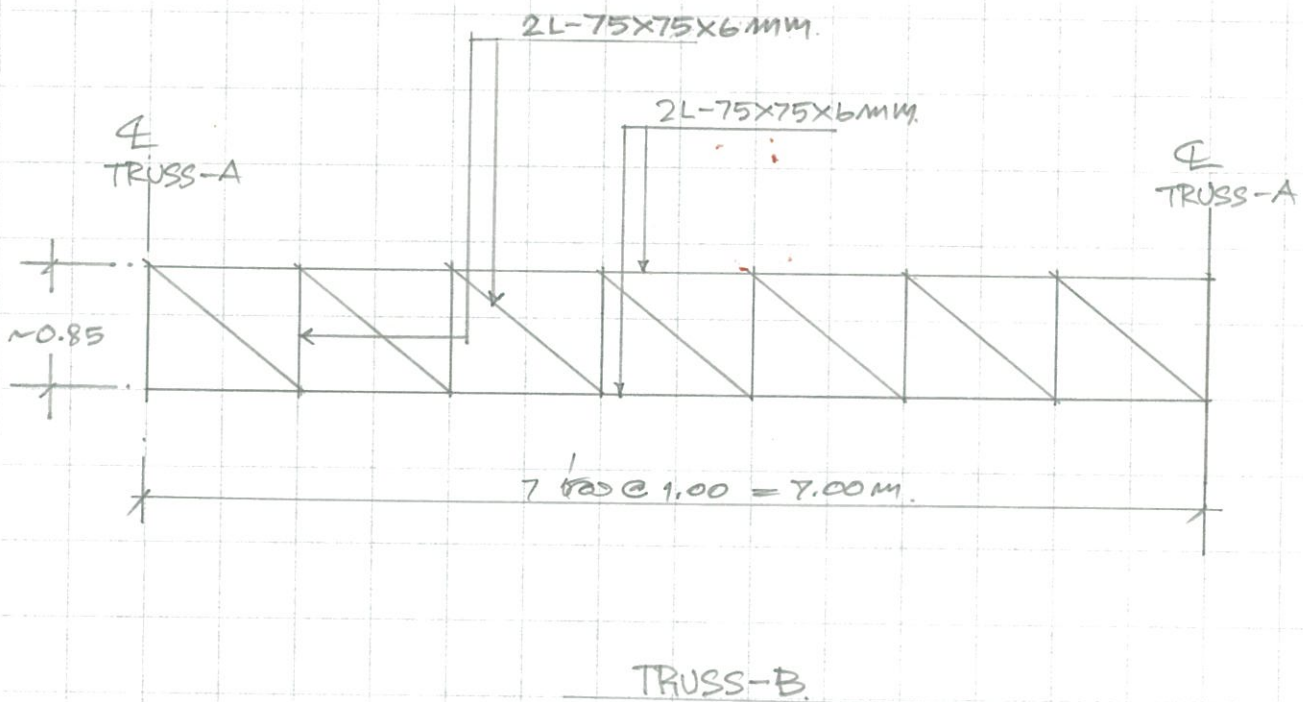
Design TRUSS-2.

$$L = 7.00 \text{ m.}$$

$$\text{Iron } L5-75 \times 75 \times 6 \text{ mm. } r_i = 2.28 \text{ cm.}$$

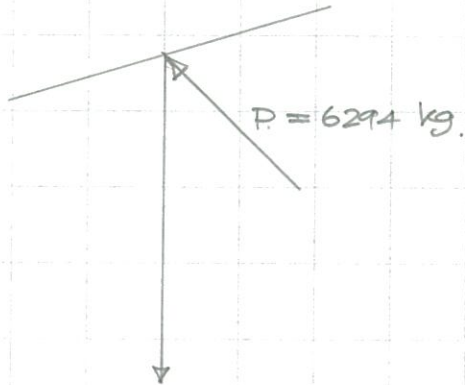
$$A = 8.75 \text{ cm}^2$$

$$r \geq \frac{L}{300} = \frac{700}{300} = 2.33 \text{ cm.} \approx 2.28 \text{ cm.}$$



បំពង់ប្រឡាក់/ប្រឡាក់

$$P_{ws} = 0.707 \times 0.40 \times 1260 = 356 \text{ kg/cm.}$$



$$F_a = \frac{6294 \times 1.45}{5} = 1825 \text{ kg.}$$

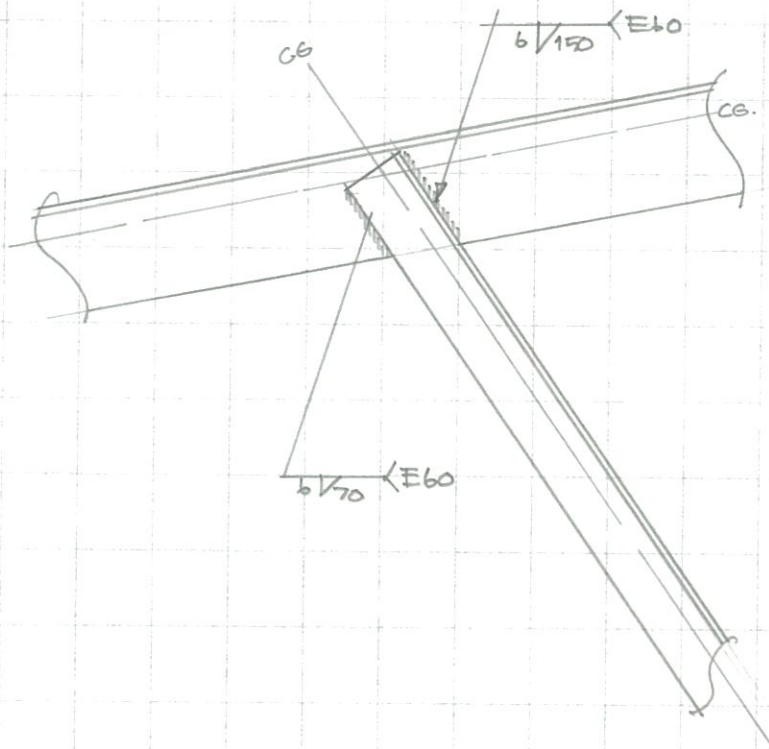
$$L_1 = \frac{1825}{356} = 5.12 \text{ cm.}$$

$$L_1 = 5.12 + (2 \times 0.6) = 6.32 \text{ cm.}$$

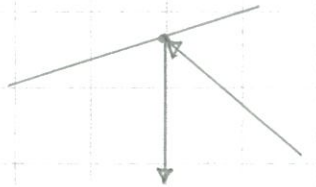
$$F_b = \frac{6294 \times 3.55}{5} = 4468 \text{ kg.}$$

$$L_2 = \frac{4468}{356} = 12.55 \text{ cm.}$$

$$L_2 = 12.55 + (2 \times 0.6) = 13.75 \text{ cm.}$$



ଉତ୍ତରାଧିକାରୀ.



$$P_w = 0.707 \times 0.6 \times 1260 = 534 \text{ kg/cm}$$

$$F_a = \frac{4057 \times 1.80}{6.5} = 1123 \text{ kg}$$

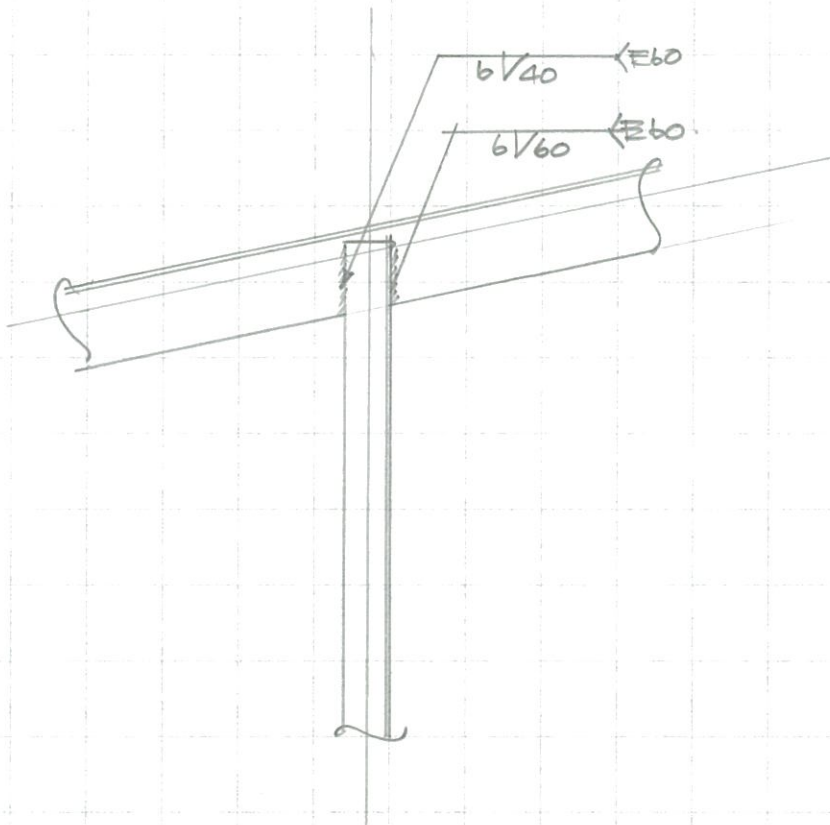
$$L = \frac{1123}{534} = 2.10 \text{ cm.}$$

$$L = 2.10 + 1.2 = 3.30 \text{ cm}$$

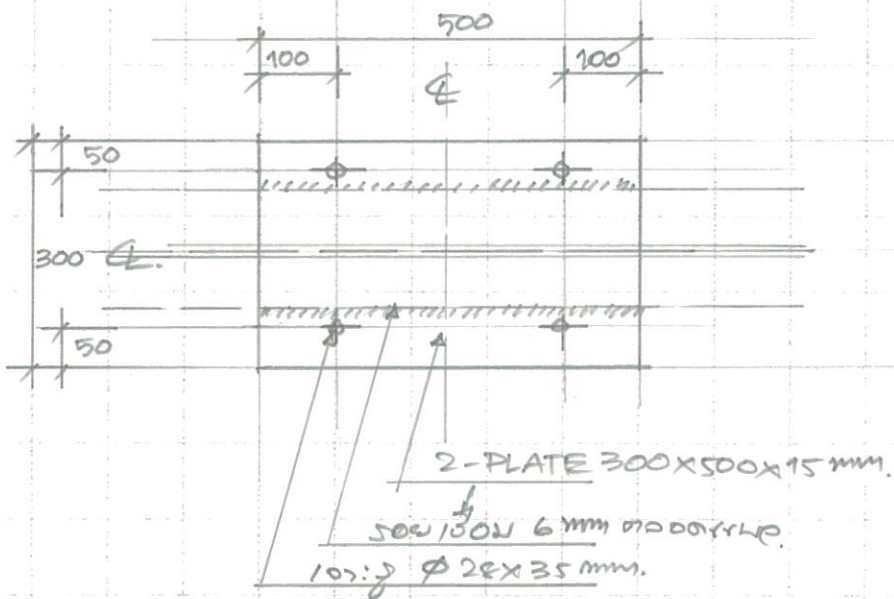
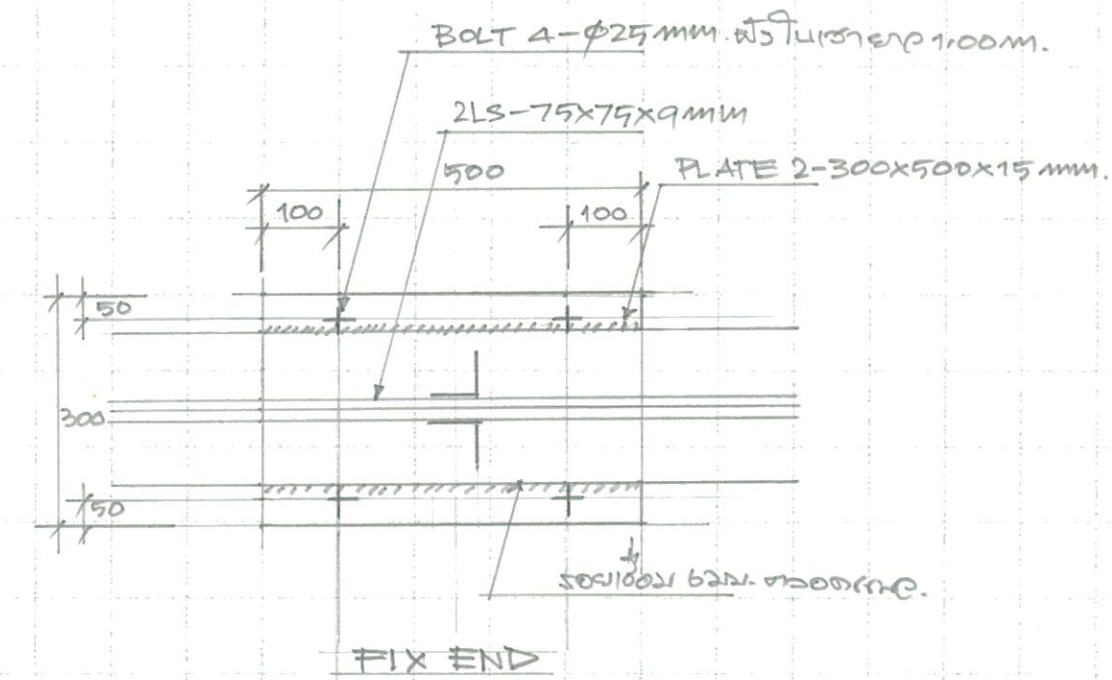
$$F_b = \frac{4057 \times 3.61}{6.5} = 2253 \text{ kg}$$

$$L = \frac{2253}{534} = 4.21 \text{ cm}$$

$$L = 4.21 + 1.2 = 5.41 \text{ cm.}$$



Detail.



AUTORC LIMITED Version

Project :

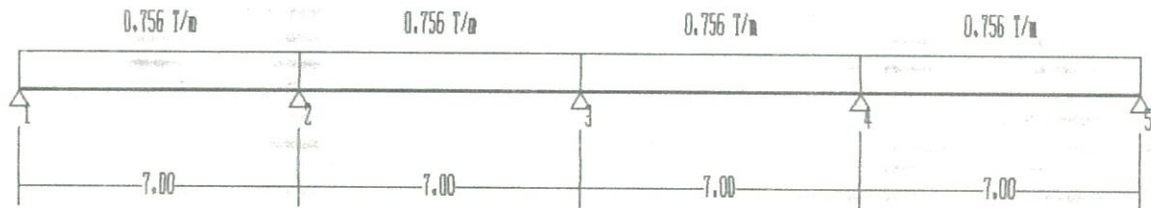
Date : 27/9/2001 File : RB1

Engineer :

Layer :

Result of Beam No. 1

RB1.

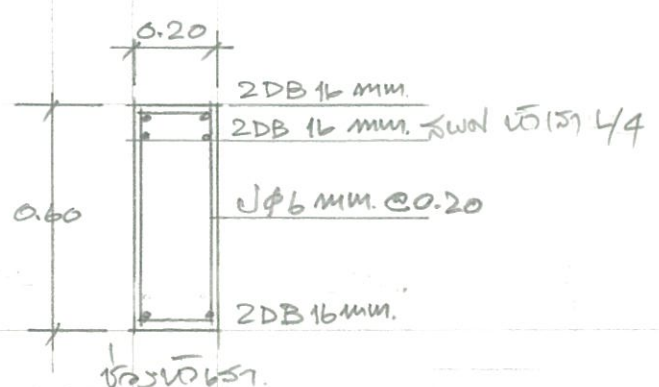
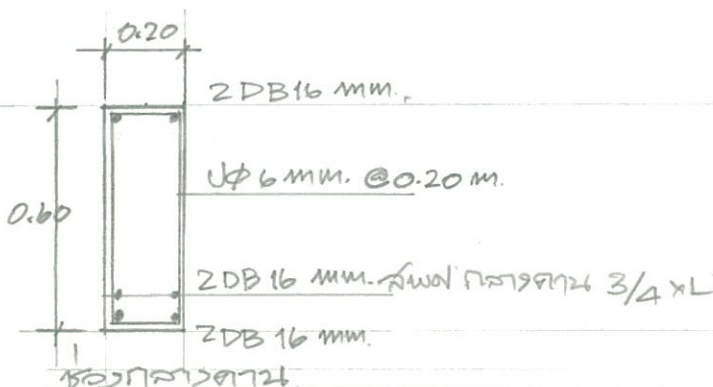


Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1	0.000	0.000	0.000	0.000	2.079	0.250	0.250	0.250	
(0.200x0.600)	1.750	2.481	0.000	5.509	0.756	0.250	0.250	0.250	
(0.030,0.030)	3.500	2.646	0.000	5.876	-0.567	0.250	0.250	0.250	
(7.000 m.)	5.250	0.496	0.000	1.102	-1.890	0.250	0.250	0.250	
	7.000	-3.969	6.650	0.000	-3.213	0.250	0.250	0.250	
2	0.000	-3.969	6.650	0.000	2.835	0.250	0.250	0.250	
(0.200x0.600)	1.750	-0.165	0.367	0.000	1.512	0.250	0.250	0.250	
(0.030,0.030)	3.500	1.323	0.000	2.938	0.189	0.250	0.250	0.250	
(7.000 m.)	5.250	0.496	0.000	1.102	-1.134	0.250	0.250	0.250	
	7.000	-2.646	5.876	0.000	-2.457	0.250	0.250	0.250	
3	0.000	-2.646	5.876	0.000	2.457	0.250	0.250	0.250	
(0.200x0.600)	1.750	0.496	0.000	1.102	1.134	0.250	0.250	0.250	
(0.030,0.030)	3.500	1.323	0.000	2.938	-0.189	0.250	0.250	0.250	
(7.000 m.)	5.250	-0.165	0.367	0.000	-1.512	0.250	0.250	0.250	
	7.000	-3.969	6.650	0.000	-2.835	0.250	0.250	0.250	
4	0.000	-3.969	6.650	0.000	3.213	0.250	0.250	0.250	
(0.200x0.600)	1.750	0.496	0.000	1.102	1.890	0.250	0.250	0.250	
(0.030,0.030)	3.500	2.646	0.000	5.876	0.567	0.250	0.250	0.250	
(7.000 m.)	5.250	2.481	0.000	5.509	-0.756	0.250	0.250	0.250	
	7.000	0.000	0.000	0.000	-2.079	0.250	0.250	0.250	

Seet = 0.20 x 0.60 m.

AS = 6.65 cm² ⇒ 4 DB 16 mm. AS = 8.04 cm².

Uφ 6 mm. @ 0.20 m.

M_i = 3969 kg-mM_{cr} = 4939 kg-m∴ M < M_{cr}.

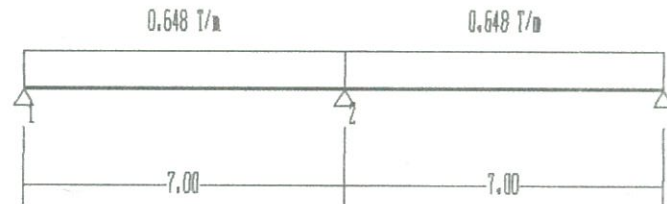
AUTORC LIMITED Version

Project :
Engineer :

Date : 27/9/2001 File : RB2
Layer :

Result of Beam No. 1

RB2.



Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1	0.000	0.000	0.000	0.000	1.701	0.250	0.250	0.250	
(0.200x0.600)	1.750	1.984	0.000	4.407	0.567	0.250	0.250	0.250	
(0.030,0.030)	3.500	1.984	0.000	4.407	-0.567	0.250	0.250	0.250	
(7.000 m.)	5.250	-0.000	0.000	0.000	-1.701	0.250	0.250	0.250	
	7.000	-3.969	6.650	0.000	-2.835	0.250	0.250	0.250	
2	0.000	-3.969	6.650	0.000	2.835	0.250	0.250	0.250	
(0.200x0.600)	1.750	0.000	0.000	0.000	1.701	0.250	0.250	0.250	
(0.030,0.030)	3.500	1.984	0.000	4.407	0.567	0.250	0.250	0.250	
(7.000 m.)	5.250	1.985	0.000	4.407	-0.567	0.250	0.250	0.250	
	7.000	0.000	0.000	0.000	-1.701	0.250	0.250	0.250	

Sect. = 0.20 x 0.60 m.

As = 6.65 cm² ⇒ 4 DB 16 mm. As. = 8.04 cm².

Uφ 6 mm. @ 0.20 m.

$$M_c = 9.33 \times 0.20 \times 55^2$$

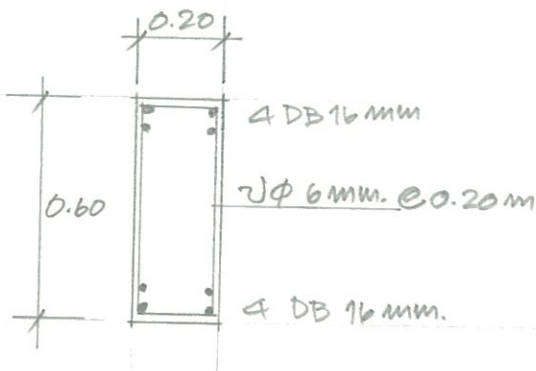
$$= 5644 \text{ kg-m.}$$

$$r = 1.75 \left(\frac{700}{40 \times 20} \right) = 0.875$$

$$M_{cr} = 5644 \times 0.875$$

$$= 4939 \text{ kg-m.}$$

$$\therefore M < M_{cr}$$



RB2.

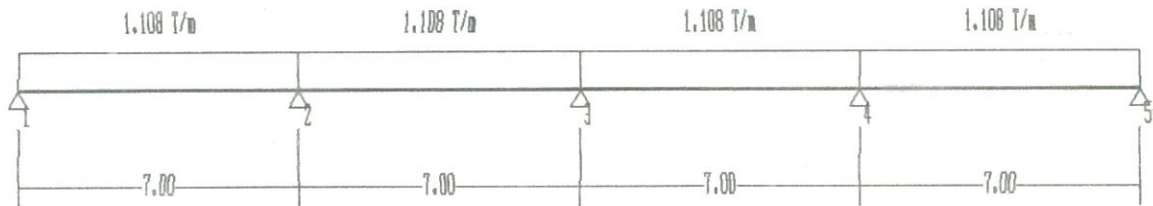
AUTORC LIMITED Version

Project :
Engineer :

Date : 27/9/2001 File : RB3
Layer :

Result of Beam No. 1

RB3.



Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1		0.000	0.000	0.000	3.047	0.250	0.250	0.250	
(0.200x0.600)	1.750	3.636	0.000	6.650	1.108	0.250	0.250	0.250	
(0.030,0.030)	3.500	3.878	0.000	6.650	-0.831	0.250	0.250	0.250	
(7.000 m.)	5.250	0.727	0.000	1.615	-2.770	0.250	0.250	0.250	
	7.000	-5.817	9.640	0.000	-4.709	0.250	0.250	0.250	
2		0.000	-5.817	9.640	4.155	0.250	0.250	0.250	
(0.200x0.600)	1.750	-0.242	0.538	0.000	2.216	0.250	0.250	0.250	
(0.030,0.030)	3.500	1.939	0.000	4.306	0.277	0.250	0.250	0.250	
(7.000 m.)	5.250	0.727	0.000	1.615	-1.662	0.250	0.250	0.250	
	7.000	-3.878	6.650	0.000	-3.601	0.250	0.250	0.250	
3		0.000	-3.878	6.650	3.601	0.250	0.250	0.250	
(0.200x0.600)	1.750	0.727	0.000	1.615	1.662	0.250	0.250	0.250	
(0.030,0.030)	3.500	1.939	0.000	4.306	-0.277	0.250	0.250	0.250	
(7.000 m.)	5.250	-0.242	0.538	0.000	-2.216	0.250	0.250	0.250	
	7.000	-5.817	9.640	0.000	-4.155	0.250	0.250	0.250	
4		0.000	-5.817	9.640	4.709	0.250	0.250	0.250	
(0.200x0.600)	1.750	0.727	0.000	1.615	2.770	0.250	0.250	0.250	
(0.030,0.030)	3.500	3.878	0.000	6.650	0.831	0.250	0.250	0.250	
(7.000 m.)	5.250	3.636	0.000	6.650	-1.108	0.250	0.250	0.250	
	7.000	0.000	0.000	0.000	-3.047	0.250	0.250	0.250	

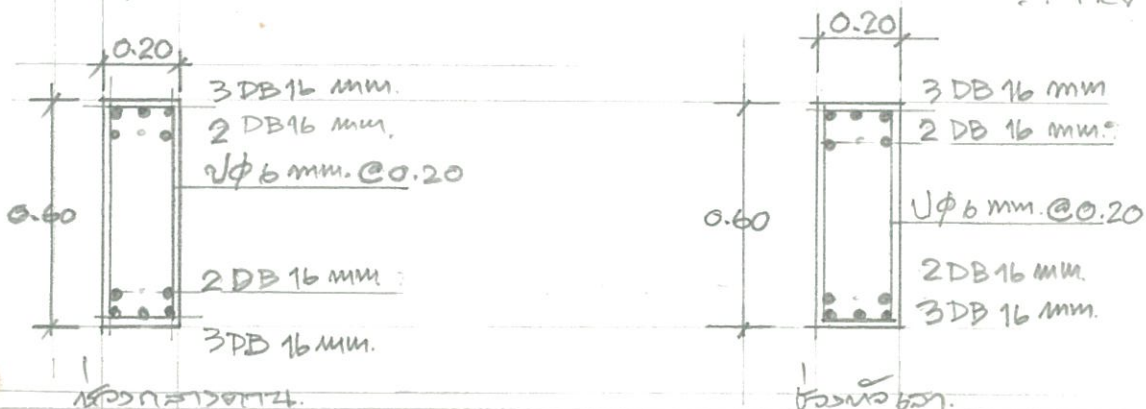
Sect = 0.20 x 0.60 m.

AS = 9.64 cm² ⇒ 5 DB 16 mm. AS = 10.05 cm²

∅ 6 mm. @ 0.20 m.

M_{cr} = 4939 kg-m

M = 5817 kg-m.

∴ M_{cr} < M.A_{st} = A_{sc}.AS = 7.90 cm².

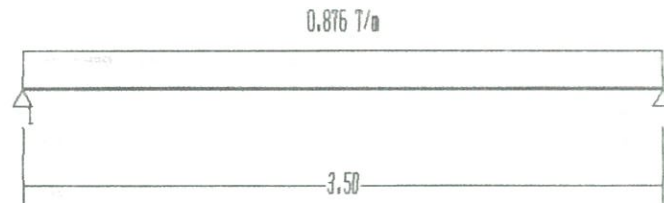
AUTORC LIMITED Version

Project :
Engineer :

Date : 27/9/2001 File : B1
Layer :

Result of Beam No. 1

B1.

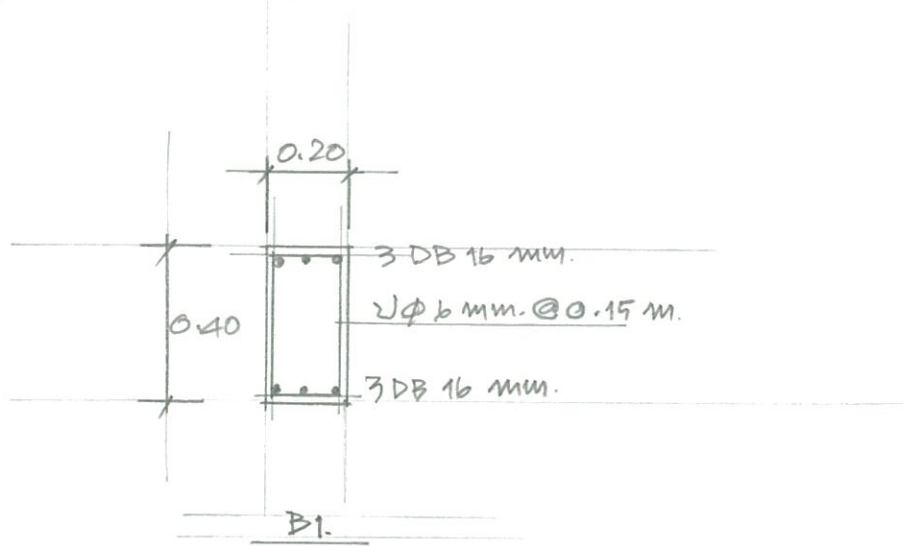


Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1		0.000	0.000	0.000	1.533	0.180	0.180	0.180	
(0.200x0.400)	0.875	1.006	0.000	3.442	0.767	0.180	0.180	0.180	
(0.030,0.030)	1.750	1.341	0.000	4.317	-0.000	0.180	0.180	0.180	
(3.500 m.)	2.625	1.006	0.000	3.442	-0.766	0.180	0.180	0.180	
	3.500	0.000	0.000	0.000	-1.533	0.180	0.180	0.180	

Sect = 0.20 x 0.40 m.

As = 4.31 cm² ⇒ 3 DB 16 mm. AS = 6.03 cm².

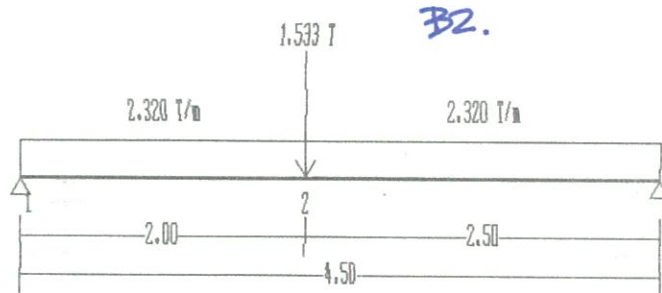
Stir φ 6 mm. @ 0.15 m.



AUTORC LIMITED Version

 Project :
 Engineer :

 Date : 27/9/2001 File : B2
 Layer :

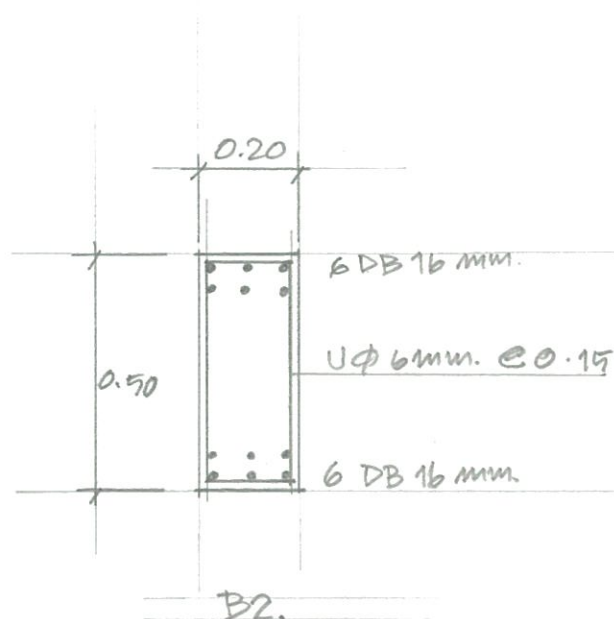
Result of Beam No. 1


Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1	0.000	0.000	0.000	0.000	6.072	0.100	0.200	0.200	
(0.200x0.500)	1.125	5.363	5.805	8.287	3.462	0.200	0.200	0.200	
(0.030,0.030)	2.250	7.405	11.045	11.382	-0.681	0.200	0.200	0.200	
(4.500 m.)	3.375	5.171	5.314	7.997	-3.291	0.200	0.200	0.200	
	4.500	0.000	0.000	0.000	-5.901	0.120	0.200	0.200	

Sect. = 0.20x0.50 m.

AS = 11.04 cm² ⇒ 6 DB 16 mm. AS = 12.06 cm²

Uφ 6 mm. @ 0.15 m.



AUTORC LIMITED Version

Project :

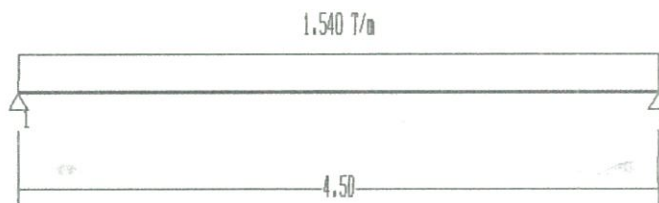
Date : 27/9/2001 File : B3

Engineer :

Layer :

Result of Beam No. 1

B3.

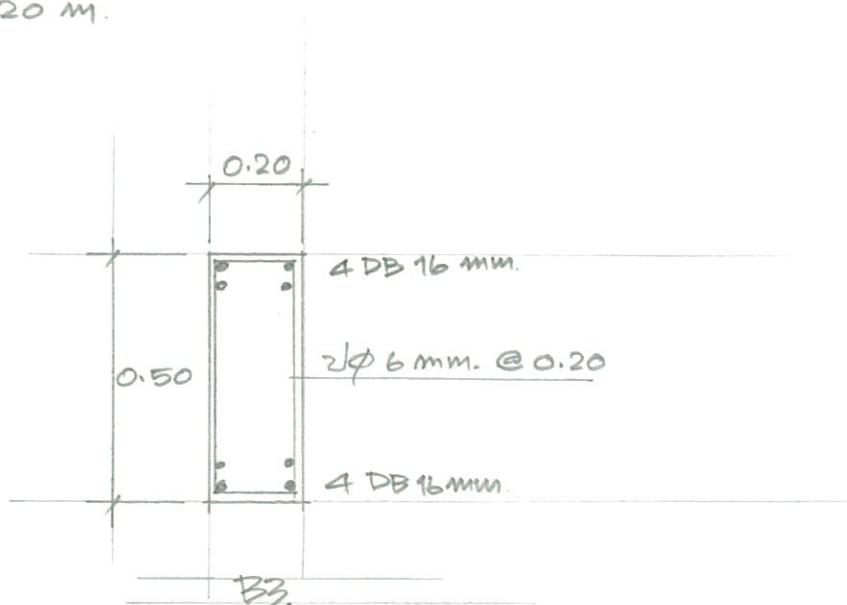


Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1	0.000	0.000	0.000	0.000	3.465	0.200	0.200	0.200	
(0.200x0.500)	1.125	2.924	0.000	4.582	1.733	0.200	0.200	0.200	
(0.030,0.030)	2.250	3.898	2.050	6.068	0.000	0.200	0.200	0.200	
(4.500 m.)	3.375	2.924	0.000	4.582	-1.732	0.200	0.200	0.200	
	4.500	0.000	0.000	0.000	-3.465	0.200	0.200	0.200	

Sect. = 0.20 x 0.50 m.

As. = $6.06 \text{ cm}^2 \Rightarrow 4 \text{ DB } 16 \text{ mm.}$

$\uparrow \phi 6 \text{ mm. @ } 0.20 \text{ m.}$



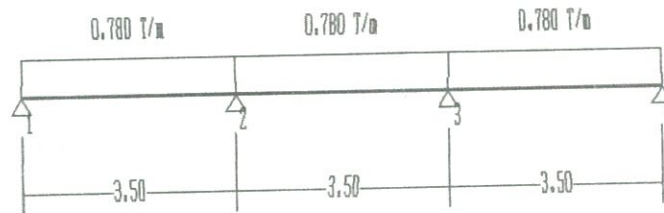
AUTORC LIMITED Version

Project :
Engineer :

Date : 27/9/2001 File : B4
Layer :

Result of Beam No. 1

B4.

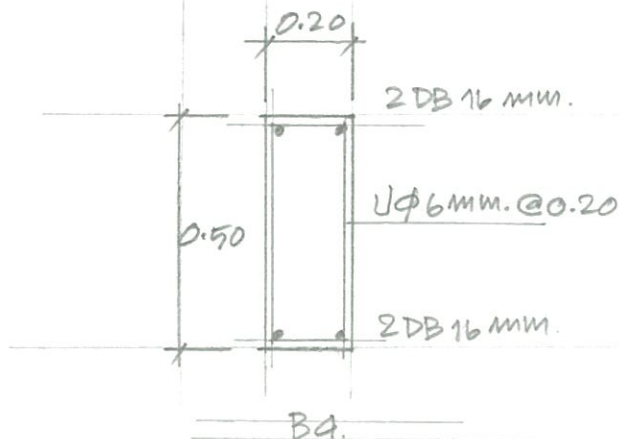


Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1	0.000	0.000	0.000	0.000	1.092	0.200	0.200	0.200	
(0.200x0.500)	0.875	0.657	0.000	1.380	0.410	0.200	0.200	0.200	
(0.030,0.030)	1.750	0.717	0.000	1.505	-0.273	0.200	0.200	0.200	
(3.500 m.)	2.625	0.179	0.000	0.376	-0.956	0.200	0.200	0.200	
	3.500	-0.956	2.007	0.000	-1.638	0.200	0.200	0.200	
2	0.000	-0.956	2.007	0.000	1.365	0.200	0.200	0.200	
(0.200x0.500)	0.875	-0.060	0.125	0.000	0.682	0.200	0.200	0.200	
(0.030,0.030)	1.750	0.239	0.000	0.502	0.000	0.200	0.200	0.200	
(3.500 m.)	2.625	-0.060	0.125	0.000	-0.683	0.200	0.200	0.200	
	3.500	-0.956	2.007	0.000	-1.365	0.200	0.200	0.200	
3	0.000	-0.956	2.007	0.000	1.638	0.200	0.200	0.200	
(0.200x0.500)	0.875	0.179	0.000	0.376	0.955	0.200	0.200	0.200	
(0.030,0.030)	1.750	0.717	0.000	1.505	0.273	0.200	0.200	0.200	
(3.500 m.)	2.625	0.657	0.000	1.380	-0.410	0.200	0.200	0.200	
	3.500	0.000	0.000	0.000	-1.092	0.200	0.200	0.200	

Sect. = 0.20 x 0.50 m.

Ar. = 2.00 cm² ⇒ 2DB16 mm. As. = 4.02 cm².

∅6 mm. @ 0.20 m.



AUTORC LIMITED Version

Project :

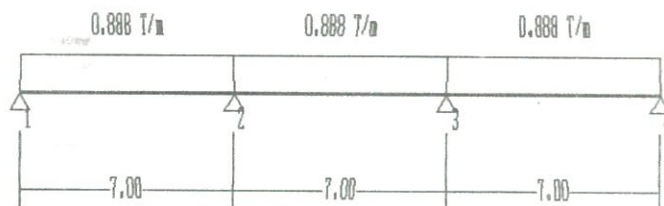
Date : 27/9/2001 File : B5

Engineer :

Layer :

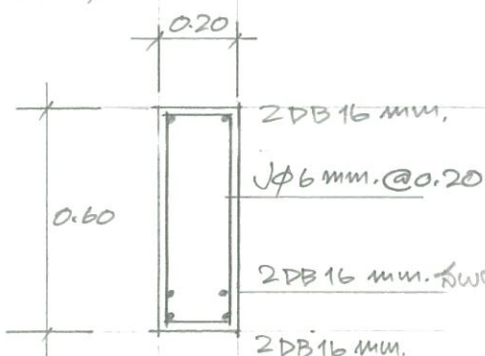
Result of Beam No. 1

B5.

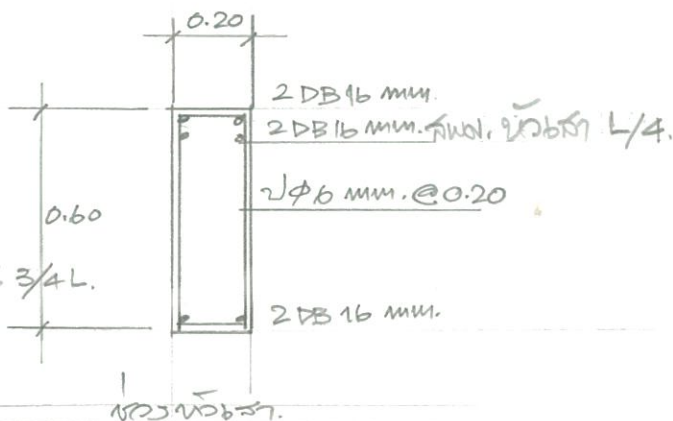


Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1		0.000	0.000	0.000	2.486	0.250	0.250	0.250	
(0.200x0.600)		1.750	2.991	0.000	0.932	0.250	0.250	0.250	
(0.030,0.030)		3.500	3.263	0.000	-0.622	0.250	0.250	0.250	
(7.000 m.)		5.250	0.816	0.000	-2.176	0.250	0.250	0.250	
		7.000	-4.351	7.211	-3.730	0.250	0.250	0.250	
2		0.000	-4.351	7.211	3.108	0.250	0.250	0.250	
(0.200x0.600)		1.750	-0.272	0.604	-1.554	0.250	0.250	0.250	
(0.030,0.030)		3.500	1.088	0.000	0.000	0.250	0.250	0.250	
(7.000 m.)		5.250	-0.272	0.604	-1.554	0.250	0.250	0.250	
		7.000	-4.351	7.211	-3.108	0.250	0.250	0.250	
3		0.000	-4.351	7.211	3.730	0.250	0.250	0.250	
(0.200x0.600)		1.750	0.816	0.000	2.176	0.250	0.250	0.250	
(0.030,0.030)		3.500	3.263	0.000	0.622	0.250	0.250	0.250	
(7.000 m.)		5.250	2.991	0.000	-0.932	0.250	0.250	0.250	
		7.000	0.000	0.000	-2.486	0.250	0.250	0.250	

Seet = 0.20x0.60 m.

 $A_s = 7.21 \text{ cm}^2$ Use = 4 DB 16 mm. $A_s = 8.04 \text{ cm}^2$ Stir ϕ 6 mm. @ 0.20 m. $M = 4,351 \text{ kg-m}$ $M_{cr} = 4939 \text{ kg-m}$ $M < M_{cr}$ 

B5.



AUTORC LIMITED Version

Project :

Date : 28/9/2001 File : GB1

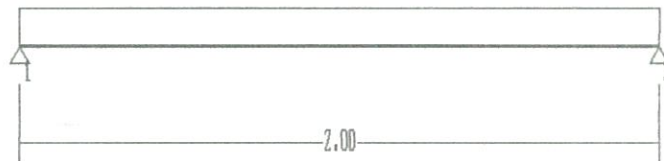
Engineer :

Layer :

Result of Beam No. 1

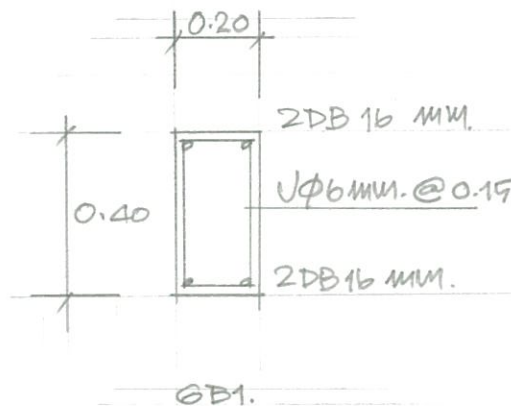
GB1.

1.502 T/m



Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1		0.000	0.000	0.000	1.502	0.180	0.180	0.180	
(0.200x0.400)	0.500	0.563	0.000	1.503	0.751	0.180	0.180	0.180	
(0.030,0.030)	1.000	0.751	0.000	2.004	0.000	0.180	0.180	0.180	
(2.000 m.)	1.500	0.563	0.000	1.503	-0.751	0.180	0.180	0.180	
	2.000	0.000	0.000	0.000	-1.502	0.180	0.180	0.180	

$$A_s = 2.00 \text{ cm}^2 \Rightarrow 2DB \ 16 \text{ mm.}$$



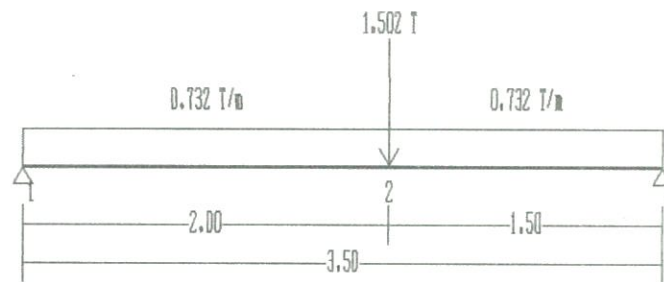
AUTORC LIMITED Version

Project :
Engineer :

Date : 28/9/2001 File : GB2
Layer :

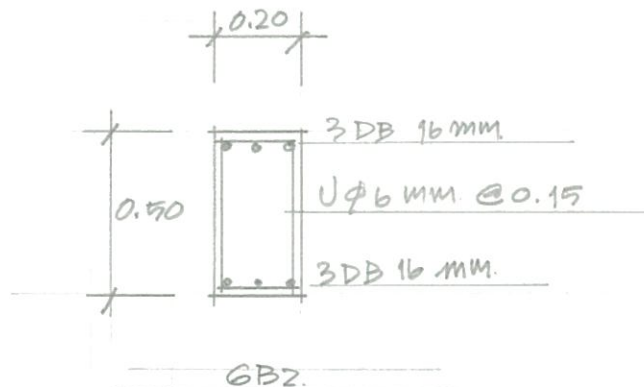
Result of Beam No. 1

GB2.



Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1	0.000	0.000	0.000	0.000	1.925	0.180	0.180	0.180	
(0.200x0.400)	0.875	1.404	0.000	3.453	1.284	0.180	0.180	0.180	
(0.030,0.030)	1.750	2.247	1.177	4.465	0.644	0.180	0.180	0.180	
(3.500 m.)	2.625	1.592	0.000	3.453	-1.499	0.180	0.180	0.180	
	3.500	0.000	0.000	0.000	-2.139	0.180	0.180	0.180	

$$A_s = 4.46 \text{ cm}^2 \Rightarrow 3 \text{ DB } 16 \text{ mm.}$$



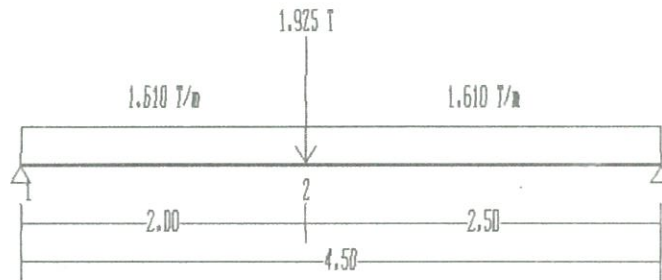
AUTORC LIMITED Version

Project :
Engineer :

Date : 28/9/2001 File : GB3
Layer :

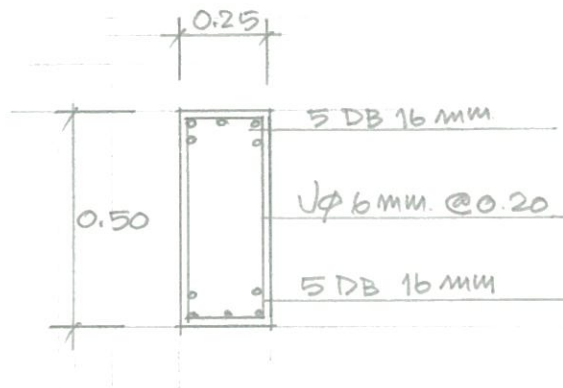
Result of Beam No. 1

GB3



Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1		0.000	0.000	0.000	4.692	0.200	0.200	0.200	
(0.250x0.500)	1.125	4.260	0.990	6.656	2.881	0.200	0.200	0.200	
(0.030,0.030)	2.250	6.000	5.454	9.294	-0.856	0.200	0.200	0.200	
(4.500 m.)	3.375	4.019	0.373	6.292	-2.667	0.200	0.200	0.200	
	4.500	0.000	0.000	0.000	-4.478	0.200	0.200	0.200	

$A_s = 9.24 \text{ cm}^2 \Rightarrow 5 \text{ DB } 16 \text{ mm} \Rightarrow A_s = 10.05 \text{ cm}^2$



GB3

=====

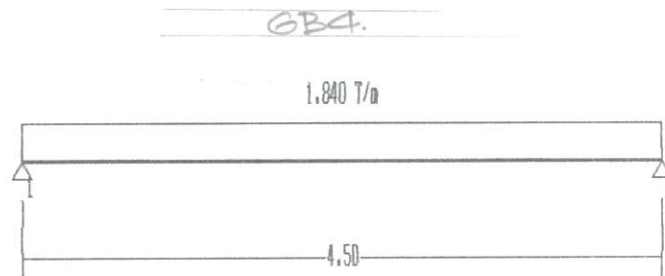
AUTORC LIMITED Version

Project :
Engineer :

Date : 28/9/2001 File : GB4
Layer :

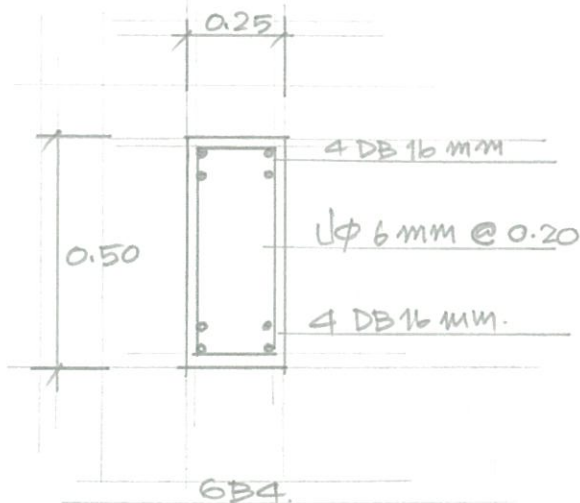
=====

Result of Beam No. 1



Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1	0.000	0.000	0.000	0.000	4.140	0.200	0.200	0.200	
(0.250x0.500)	1.125	3.493	0.000	5.483	-2.070	0.200	0.200	0.200	
(0.030,0.030)	2.250 ✓	4.657 ✓	2.011	7.259 ✓	-0.000	0.200 ✓	0.200 ✓	0.200 ✓	
(4.500 m.)	3.375	3.493	0.000	5.483	-2.070	0.200	0.200	0.200	
	4.500	0.000	0.000	0.000	-4.140	0.200	0.200	0.200	

$$A_s = 7.25 \text{ cm}^2 \Rightarrow 4 \text{ DB } 16 \text{ mm. } A_s = 8.04 \text{ cm}^2.$$



AUTORC LIMITED Version

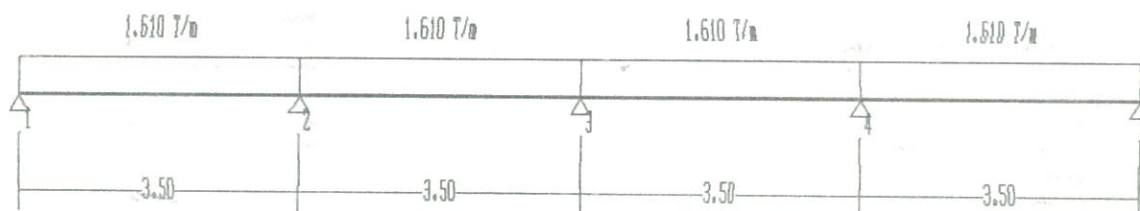
Project :

Date : 30/9/2001 File : GB5

Engineer :

Layer :

Result of Beam No. 1

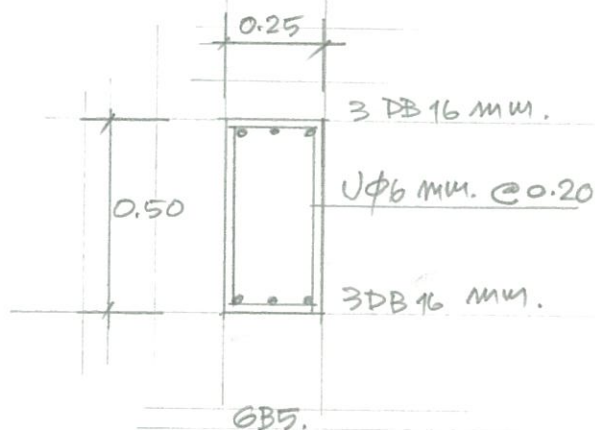
GB5

Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1		0.000	0.000	0.000	2.214	0.200	0.200	0.200	
(0.250x0.500)		0.875	1.321	0.000	2.774	0.805	0.200	0.200	
(0.030,0.030)		1.750	1.409	0.000	2.959	-0.604	0.200	0.200	
(3.500 m.)		2.625	0.264	0.000	0.555	-2.012	0.200	0.200	
		3.500	-2.113	4.438	0.000	-3.421	0.200	0.200	
2		0.000	-2.113	4.438	0.000	3.019	0.200	0.200	
(0.250x0.500)		0.875	-0.088	0.185	0.000	1.610	0.200	0.200	
(0.030,0.030)		1.750	0.704	0.000	1.479	0.201	0.200	0.200	
(3.500 m.)		2.625	0.264	0.000	0.555	-1.208	0.200	0.200	
		3.500	-1.409	2.959	0.000	-2.616	0.200	0.200	
3		0.000	-1.409	2.959	0.000	2.616	0.200	0.200	
(0.250x0.500)		0.875	0.264	0.000	0.555	1.207	0.200	0.200	
(0.030,0.030)		1.750	0.704	0.000	1.479	-0.201	0.200	0.200	
(3.500 m.)		2.625	-0.088	0.185	0.000	-1.610	0.200	0.200	
		3.500	-2.113	4.438	0.000	-3.019	0.200	0.200	
4		0.000	-2.113	4.438	0.000	3.421	0.200	0.200	
(0.250x0.500)		0.875	0.264	0.000	0.555	2.012	0.200	0.200	
(0.030,0.030)		1.750	1.409	0.000	2.959	0.604	0.200	0.200	
(3.500 m.)		2.625	1.321	0.000	2.774	-0.805	0.200	0.200	
		3.500	0.000	0.000	0.000	-2.214	0.200	0.200	

$$A_s = 4.38 \text{ cm}^2$$

USE 3DB 16 mm.

$$A_s = 6.03 \text{ cm}^2$$



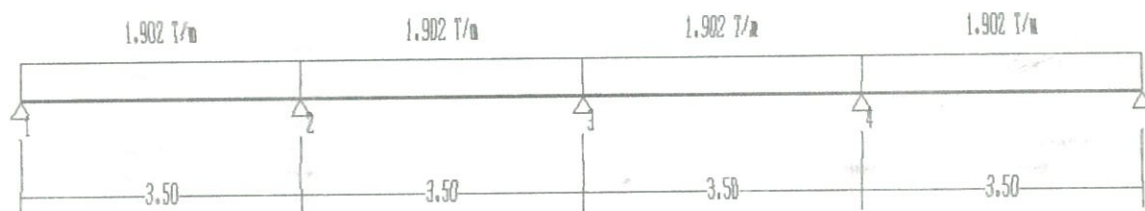
AUTORC LIMITED Version

Project :
Engineer :

Date : 30/9/2001 File : GB6
Layer :

Result of Beam No. 1

GB6.

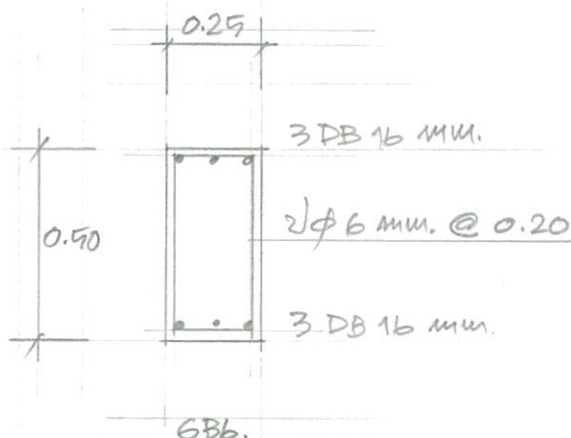


Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1		0.000	0.000	0.000	2.615	0.200	0.200	0.200	
(0.250x0.500)		0.875	1.560	0.000	3.277	0.200	0.200	0.200	
(0.030,0.030)		1.750	1.664	0.000	3.495	0.200	0.200	0.200	
(3.500 m.)		2.625	0.312	0.000	0.655	-2.378	0.200	0.200	0.200
		3.500	-2.496	5.243	0.000	-4.042	0.200	0.200	0.200
2		0.000	-2.496	5.243	0.000	3.566	0.200	0.200	0.200
(0.250x0.500)		0.875	-0.104	0.218	0.000	1.902	0.200	0.200	0.200
(0.030,0.030)		1.750	0.832	0.000	1.748	0.238	0.200	0.200	0.200
(3.500 m.)		2.625	0.312	0.000	0.655	-1.427	0.200	0.200	0.200
		3.500	-1.664	3.495	0.000	-3.091	0.200	0.200	0.200
3		0.000	-1.664	3.495	0.000	3.091	0.200	0.200	0.200
(0.250x0.500)		0.875	0.312	0.000	0.655	1.426	0.200	0.200	0.200
(0.030,0.030)		1.750	0.832	0.000	1.748	-0.238	0.200	0.200	0.200
(3.500 m.)		2.625	-0.104	0.218	0.000	-1.902	0.200	0.200	0.200
		3.500	-2.496	5.243	0.000	-3.566	0.200	0.200	0.200
4		0.000	-2.496	5.243	0.000	4.042	0.200	0.200	0.200
(0.250x0.500)		0.875	0.312	0.000	0.655	2.377	0.200	0.200	0.200
(0.030,0.030)		1.750	1.664	0.000	3.495	0.713	0.200	0.200	0.200
(3.500 m.)		2.625	1.560	0.000	3.277	-0.951	0.200	0.200	0.200
		3.500	0.000	0.000	0.000	-2.615	0.200	0.200	0.200

$$A_s = 5.24 \text{ cm}^2$$

Use 3 DB 16 mm.

$$A_s = 6.03 \text{ cm}^2$$



AUTORC LIMITED Version

Project :

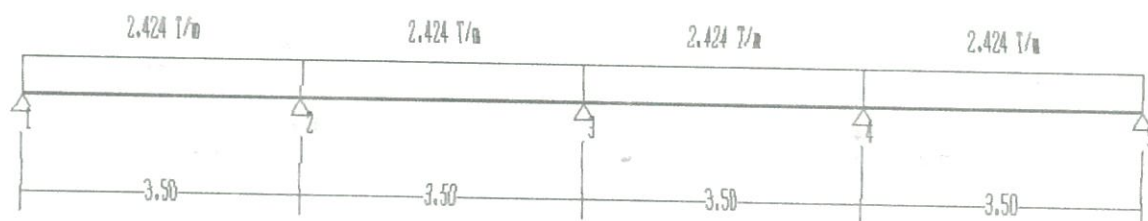
Date : 30/9/2001 File : GB7

Engineer :

Layer :

Result of Beam No. 1

GB7.

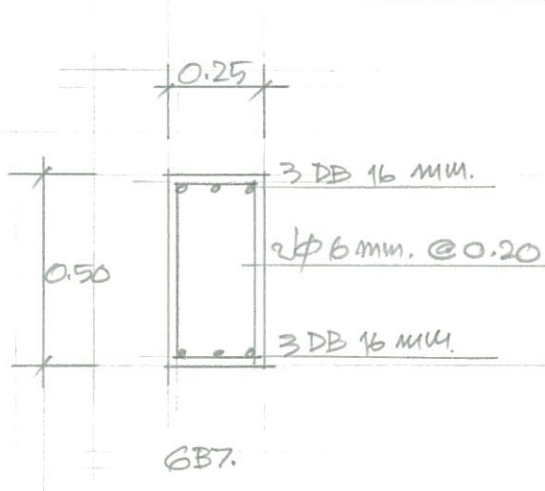


Span no.	Section List	Moment	Top-As	Bot-As	Shear	ST-RB 6	ST-RB 9	ST-RB 12	Remark
1	0.000	0.000	0.000	0.000	3.333	0.200	0.200	0.200	
(0.250x0.500)	0.875	1.988	0.000	4.176	1.212	0.200	0.200	0.200	
(0.030,0.030)	1.750	2.121	0.000	4.455	-0.909	0.200	0.200	0.200	
(3.500 m.)	2.625	0.398	0.000	0.835	-3.030	0.200	0.200	0.200	
	3.500	-3.181	5.483	0.000	-5.151	0.200	0.200	0.200	
2	0.000	-3.181	5.483	0.000	4.545	0.200	0.200	0.200	
(0.250x0.500)	0.875	-0.133	0.278	0.000	2.424	0.200	0.200	0.200	
(0.030,0.030)	1.750	1.060	0.000	2.227	0.303	0.200	0.200	0.200	
(3.500 m.)	2.625	0.398	0.000	0.835	-1.818	0.200	0.200	0.200	
	3.500	-2.121	4.455	0.000	-3.939	0.200	0.200	0.200	
3	0.000	-2.121	4.455	0.000	3.939	0.200	0.200	0.200	
(0.250x0.500)	0.875	0.398	0.000	0.835	1.818	0.200	0.200	0.200	
(0.030,0.030)	1.750	1.060	0.000	2.227	-0.303	0.200	0.200	0.200	
(3.500 m.)	2.625	-0.133	0.278	0.000	-2.424	0.200	0.200	0.200	
	3.500	-3.182	5.483	0.000	-4.545	0.200	0.200	0.200	
4	0.000	-3.182	5.483	0.000	5.151	0.200	0.200	0.200	
(0.250x0.500)	0.875	0.398	0.000	0.835	3.030	0.200	0.200	0.200	
(0.030,0.030)	1.750	2.121	0.000	4.455	0.909	0.200	0.200	0.200	
(3.500 m.)	2.625	1.988	0.000	4.176	-1.212	0.200	0.200	0.200	
	3.500	0.000	0.000	0.000	-3.333	0.200	0.200	0.200	

$$A_s = 5.48 \text{ cm}^2$$

USE 3DB 16 MM.

$$A_s = 6.03 \text{ cm}^2$$



GB7.

SLAB. S1.

48.

<<< Criteria for Slab Design >>>

<< Concrete >>

$F_c' = 145.00 \text{ ksc.}$ $F_c = 65.25 \text{ ksc.}$ $n = 11.13$

<< Steel >>

< Main Steel > < Temp. Steel >

$F_y = 2400.00 \text{ ksc.}$ $F_y = 2400.00 \text{ ksc.}$

$F_s = 1200.00 \text{ ksc.}$ $F_s = 1200.00 \text{ ksc.}$

$K = 0.377$

$J = 0.874$

$R = 10.75 \text{ ksc.}$

<< Shear >>

$V_b = 3.49 \text{ ksc.}$ $V_p = 6.38 \text{ ksc.}$ $V_t = 15.89 \text{ ksc.}$

<<< Two-Way Slab Design >>>

Slab No. = S1

Continue Edge = 0 Edge

Ratio (m) = 0.80

Slab size = 2.00 x 2.50 m.

Thickness = 10.00 cm.

Live Load = 200 kg./sq.m.

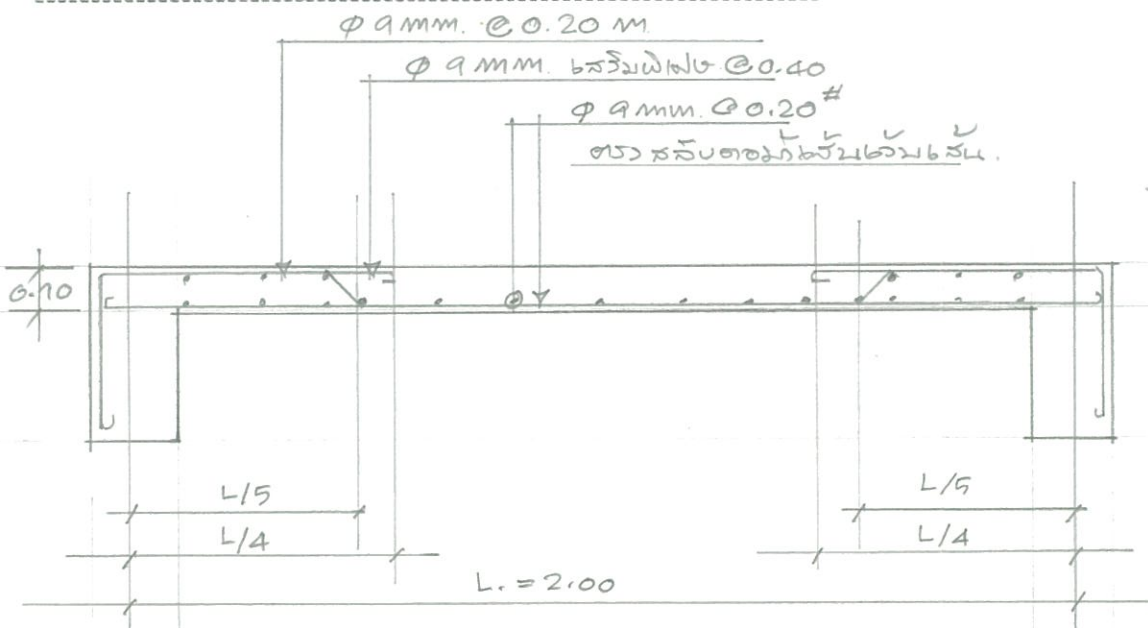
Other Load = 50 kg./sq.m.

Dead Load = 240 kg./sq.m.

Total Load = 490 kg./sq.m.

<< Result >>

Side	Edge.	M_c (kg.-m.)	M_a (kg.-m.)	A_s (sq.m.)	Dia. (mm.)	Spacing (cm.)
	-Conti.	534	0	0.00	RB 9	0.00
Short	-Non-Conti.	534	84	1.14	RB 9	25.00
	+Mid.	534	125	1.70	RB 9	25.00
	-Conti.	534	0	0.00	RB 9	0.00
Long	-Non-Conti.	534	65	0.87	RB 9	25.00
	+Mid.	407	98	1.52	RB 9	25.00
Temp. Steel	-----	-----	-----	2.50	RB 9	25.00



S1. <ကတ်ပုံ>

STAIR ST1.

<<< Criteria for Stair Design >>>

<< Concrete >>

 $F_c' = 145.00 \text{ ksc.}$ $F_c = 65.25 \text{ ksc.}$ $n = 11.13$

<< Steel >>

< Main Steel > < Temp. Steel >

 $F_y = 2400.00 \text{ ksc.}$ $F_y = 2400.00 \text{ ksc.}$ $F_s = 1200.00 \text{ ksc.}$ $F_s = 1200.00 \text{ ksc.}$ $K = 0.377$ $J = 0.874$ $R = 10.75 \text{ ksc.}$

<< Shear >>

 $V_b = 3.49 \text{ ksc.}$ $V_p = 6.38 \text{ ksc.}$ $V_t = 15.89 \text{ ksc.}$

<<< Stringer Beams Flat Stair >>>

Stair No. 1/

Span Length = 3.50 m. Thickness = 15.00 cm.

Riser = 0.180 m. Tread = 0.250 m.

Live Load = 300 kg./sq.m. Other Load = 0 kg./sq.m.

Dead Load = 660 kg./sq.m. Total Load = 960 kg./sq.m.

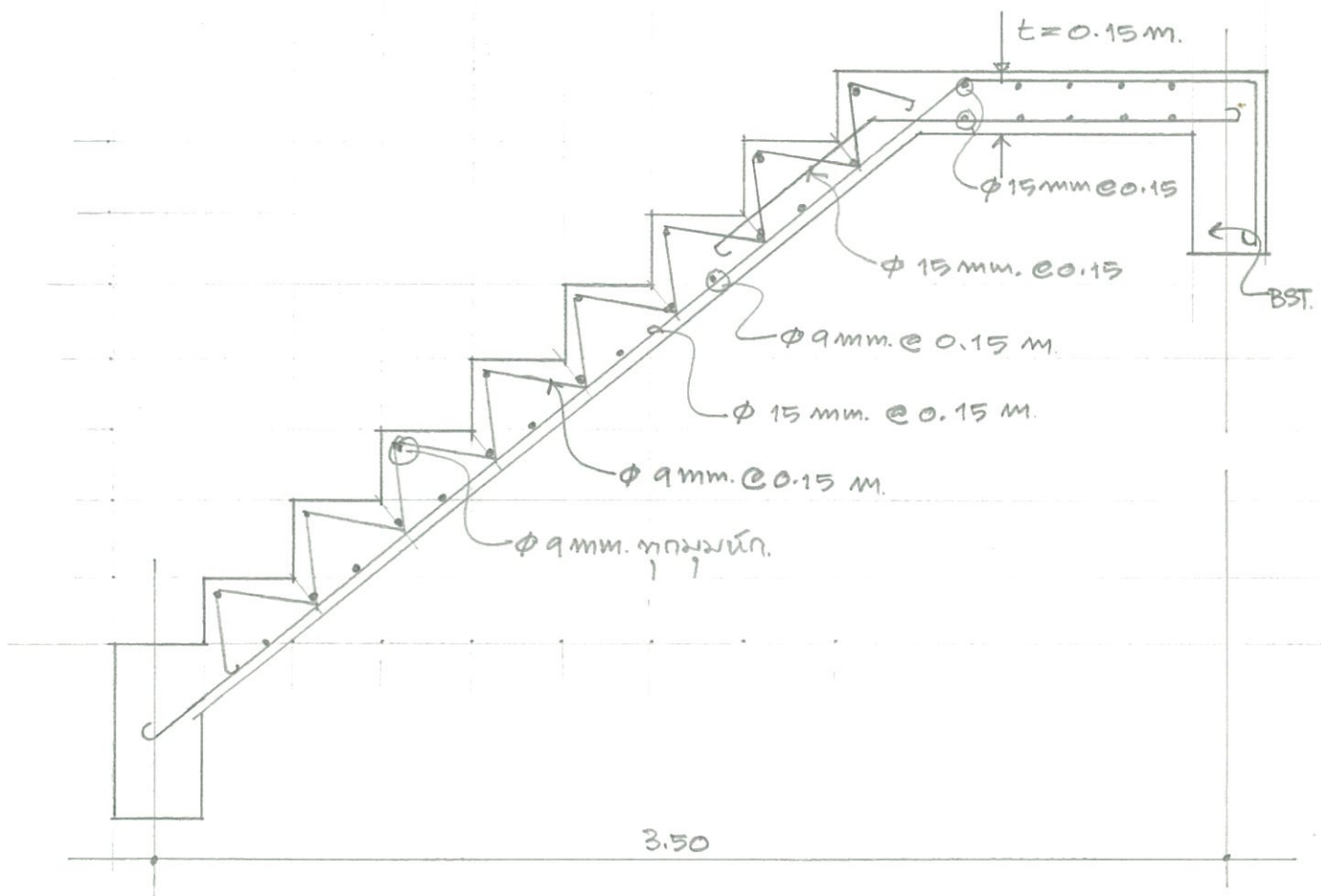
<< Result >>

Item	Mc (kg.-m.)	Ma (kg.-m.)	As (sq.cm.)	Dia. (mm.)	Spacing (cm.)
Main	1484.66	1469.39	11.92	RB 15	14.50
Temp.	-----	-----	3.75	RB 9	16.50

<< Reaction >>

Left = 1679.31 kg./m.

Right = 1679.31 kg./m.



SLAB NAME : FS1
DESCRIPTION : FLAT SLAB1

FS1.

SHORT SPAN, B :	3.50	m.
LONG SPAN, L :	3.50	m.
CAPITAL DIAMETER :	0.22	m.
DROP PANEL SIZE :	1.00	m.
SLAB THICKNESS :	0.15	m.
DROP PANEL THICKNESS :	0.25	m.
LIVE LOAD :	500.00	kg/sq.m.
WEIGHT OF SLAB :	360.00	kg/sq.m.
WEIGHT OF DROP PANEL :	240.00	kg/sq.m.
EFFECTIVE DEPTH OF SLAB :	0.12	m.
EFFECTIVE DEPTH OF DROP PANEL :	0.22	m.
MOMENT M_o OF SHORT SPAN :	3525.17	kg.m.
MOMENT M_o OF LONG SPAN :	3525.17	kg.m.
PUNCHING SHEAR AROUND CAPITAL :	10790.07	kg.
PUNCHING SHEAR AROUND DROP PANEL :	10254.95	kg.
PUNCHING SHEAR STRESS AROUND CAPITAL :	3.60	ksc.
PUNCHING SHEAR STRESS AROUND DROP PANEL :	1.94	ksc.

REINFORCED STEEL ARRANGEMENT IN LONG SIDE

LONG SIDE, COLUMN STRIP

TOP STEEL :	MOMENT $-M_{cc}$:	1762.59	kg.m.
	REQUIRED A_s :	3.43	sq.cm.
	USE STEEL : DB 12 mm. AT SPACING	0.300 m.	
BOTTOM STEEL :	MOMENT $+M_{cc}$:	705.03	kg.m.
	REQUIRED A_s :	2.54	sq.cm.
	USE STEEL : DB 12 mm. AT SPACING	0.300 m.	

LONG SIDE, MIDDLE STRIP

TOP STEEL :	MOMENT $-M_{mm}$:	528.78	kg.m.
	REQUIRED A_s :	1.90	sq.cm.
	USE STEEL : DB 12 mm. AT SPACING	0.300 m.	
BOTTOM STEEL :	MOMENT $+M_{mm}$:	528.78	kg.m.
	REQUIRED A_s :	1.90	sq.cm.
	USE STEEL : DB 12 mm. AT SPACING	0.300 m.	

REINFORCED STEEL ARRANGEMENT IN SHORT SIDE

SHORT SIDE, COLUMN STRIP

TOP STEEL :	MOMENT $-M_{cc}$:	1762.59	kg.m.
	REQUIRED A_s :	3.43	sq.cm.
	USE STEEL : DB 12 mm. AT SPACING	0.300 m.	
BOTTOM STEEL :	MOMENT $+M_{cc}$:	705.03	kg.m.
	REQUIRED A_s :	2.28	sq.cm.
	USE STEEL : DB 12 mm. AT SPACING	0.300 m.	

SHORT SIDE, MIDDLE STRIP

TOP STEEL :	MOMENT $-M_{mm}$:	528.78	kg.m.
	REQUIRED A_s :	1.90	sq.cm.
	USE STEEL : DB 12 mm. AT SPACING	0.300 m.	
BOTTOM STEEL :	MOMENT $+M_{mm}$:	528.78	kg.m.
	REQUIRED A_s :	1.90	sq.cm.
	USE STEEL : DB 12 mm. AT SPACING	0.300 m.	

DB 12 mm. @ 0.30 m. 5: 1000 mm. 1000 mm.

DB 12 mm. @ 0.30 m. 1000 mm.

DB 12 mm. @ 0.30 m.

DB 12 mm. @ 0.30 m.

DB 12 mm. @ 0.15 m.

1-0.22 x 0.22 30 mm. 75 mm. 15 mm.

DB 12 mm. @ 0.30 m.

DB 12 mm. @ 0.30 m. 1000 mm.

DB 12 mm. @ 0.30 m.

3.50

1.75

1000 mm.

1000 mm.

1.75

1.75

1000 mm.

DETAIL F81.

(((Criteria for Slab Design)))

((Concrete))

 $F_c' = 145.00 \text{ ksc.}$ $F_c = 65.25 \text{ ksc.}$ $n = 11.13$

((Steel))

 $F_y = 2400.00 \text{ ksc.}$ $F_y = 2400.00 \text{ ksc.}$
 $F_s = 1200.00 \text{ ksc.}$ $F_s = 1200.00 \text{ ksc.}$
 $K = 0.377$ $J = 0.874$ $R = 10.75 \text{ ksc.}$

((Shear))

 $V_b = 3.49 \text{ ksc.}$ $V_p = 6.38 \text{ ksc.}$ $V_t = 15.89 \text{ ksc.}$

(((Two-Way Slab Design)))

Slab No. = FS2

Continue Edge = 0 Edge

Ratio (m) = 1.00

Slab size = 3.50 x 3.50 m.

Thickness = 15.00 cm.

Live Load = 500 kg./sq.m.

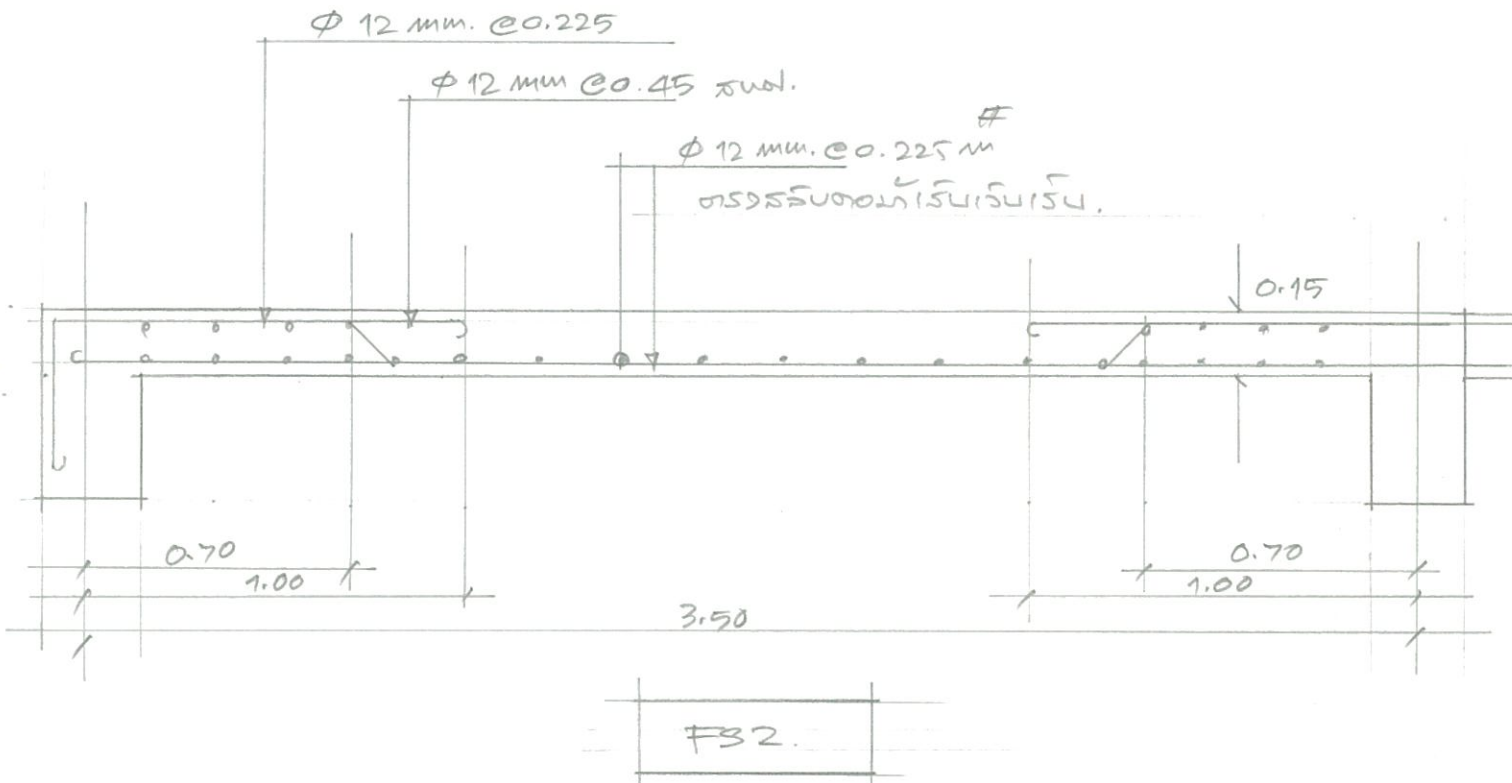
Other Load = 50 kg./sq.m.

Dead Load = 360 kg./sq.m.

Total Load = 910 kg./sq.m.

((Result))

Side	Edge.	Mc (kg.-m.)	Ma (kg.-m.)	As (sq.m.)	Dia. (mm.)	Spacing (cm.)
	-Conti.	1523	0	0.00	RB 12	0.00
Short	-Non-Conti.	1523	368	2.95	RB 12	38.00
	+Mid.	1523	557	4.46	RB 12	25.00
	-Conti.	1523	0	0.00	RB 12	0.00
Long	-Non-Conti.	1523	368	2.95	RB 12	38.00
	+Mid.	1231	557	4.96	RB 12	22.50
Temp. Steel		-----	-----	3.75	RB 9	16.50



F1C1

အား (A) (B)

$$\text{အ.က. နေထိုင်အား} = 5731 \text{ kg}$$

$$\text{အ.က. ဓာတ် RB1} = 0.20 \times 0.6 \times 2400 \times 7 = 2016 \text{ kg}$$

$$\text{အ.က. ဓာတ် B5} = 0.20 \times 0.60 \times 2400 \times 7 = 2016 \text{ kg}$$

$$\text{အ.က. ကျ ဓာတ် B6} = 0.25 \times 0.50 \times 2400 \times 3.5 = 1050 \text{ kg}$$

$$\text{အ.က. အောက်ဘက်} = 180 \times 3 \times 7.0 = 3780 \text{ kg}$$

$$\text{အ.က. အောက်ဘက်} = 180 \times 3 \times 3.50 = 1890 \text{ kg}$$

$$\text{အ.က. အောက်ဘက်} = 910 \times 3.5 \times 1.75 = 5574 \text{ kg}$$

$$\text{အ.က. အောက်ဘက်} = 0.30 \times 0.50 \times 2400 \times 6 = 2160 \text{ kg}$$

$$\text{အောက်ဘက်} = 24,217 \text{ kg}$$

$$\text{Impact load 30\%} = 7,265 \text{ kg}$$

$$\text{အောက်ဘက်} = 31,482 \text{ kg}$$

ဇယား ၁၂.၁၅၇ C1.

ပုံစံအတိုင်း

$$P_i = 31,482 \text{ kg.}$$

၁၂၀၀/၁၅၀၀

$$A = 30 \text{ cm.}$$

$$B = 50 \text{ cm.}$$

$$A_g = A \times B$$

$$= 30 \times 50 = 1500 \text{ cm}^2$$

၁၅၀၀/၁၅၀၀

$$P_i = 0.85 \times A_g \times (0.25 \times f_c' + f_s \times P_g)$$

၁၅၀၀/၁၅၀၀

$$P_c = 0.85 \times 1500 \times 0.25 \times 100$$

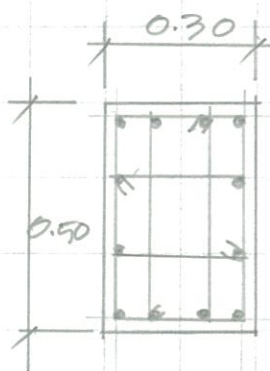
$$= 31,875 \text{ kg.}$$

$$\therefore P_c > P_i \text{ OK.}$$

၁၅၀၀/၁၅၀၀ ၁. - ၈%

၁၅၀၀/၁၅၀၀ ၁၂ DB 20 mm. $A_s = 37.68 \text{ cm}^2$

$$P_g = \frac{37.68}{1500} = 0.025 = 2.5\% \text{ OK.}$$



12-DB20mm.

4-φ6mm @ 0.25

$$P_i = 0.85 \times (0.4 F_y \times A_s) + (0.25 \times f_c' \times A_g)$$

$$= 0.85 \times (1200 \times 37.68) + (0.25 \times 100 \times 1500 \times 0.85)$$

$$38,433 + 31,875 = 70,308 \text{ kg.}$$

$$R = 1.07 - (0.008 \times \frac{H}{r})$$

$$H = K \cdot H = 1.0 \times 6.00 \times 100 = 600 \text{ cm.}$$

$$r = 0.30t = 0.30 \times 30 = 9$$

$$\frac{H}{r} = \frac{600}{9} = 66.67 < 100 \text{ OK.}$$

$$R = 1.07 - (0.008 \times 66.67) = 0.54$$

$$P_{max} = 70,308 \times 0.54 = 37,966 \text{ kg.} > 31,482 \text{ kg}$$

၁၅၀၀/၁၅၀၀ ၁၂ DB 20 mm.

၁၅၀၀

4-6mm @ 0.25 m.

Footing F1

$$P_{\text{max}} = 31,482 \text{ kg.}$$

$$W. 10\% = 3148 \text{ kg.}$$

$$\Sigma W = 34,630 \text{ kg.}$$

∴ ချိတ်တံဆွဲအားကိုးကွယ်ရန် I-0.26x0.26 နှစ် နှစ် နှစ် 25000 kg

$$\therefore \text{ချိတ်တံဆွဲ} = \frac{34,630}{25000} = 1.38 \approx 2 \text{ နှစ်}$$

$$R = \frac{34,630}{2} = 17,315 \text{ kg.}$$

$$L' = \frac{0.90 - 0.50}{2} = 0.20 \text{ m.}$$

$$= 17,315 \times 0.20 = 3463 \text{ kg-m.}$$

Moment

$$d = \sqrt{\frac{3463 \times 100}{8.82 \times 100}} = 19.81 \text{ cm.}$$

$$\text{use } t = 0.60 \text{ m. } d = 0.50 \text{ m.}$$

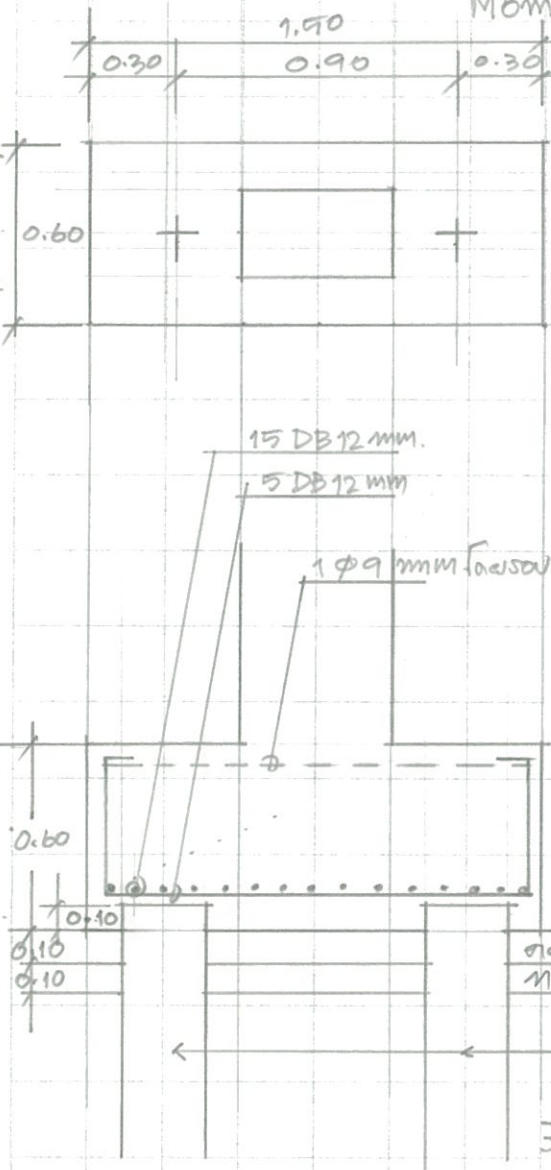
$$M_c = 8.82 \times 0.60 \times 50^2 = 13,230 \text{ kg-m.}$$

$$A_s = \frac{3463 \times 100}{1500 \times 0.892 \times 50} = 5.17 \text{ cm}^2$$

$$\text{use } 5 \text{ DB } 12 \text{ mm } A_s = 5.65 \text{ cm}^2$$

$$A_{s \text{ temp}} = 0.0020 \times 150 \times 50 = 15.0 \text{ cm}^2$$

$$\text{use } 15 \text{ DB } 12 \text{ mm } A_s = 16.95 \text{ cm}^2$$



ချိတ်တံဆွဲအားကိုးကွယ်ရန် 0.26x0.26

နှစ် နှစ် နှစ် 25 နှစ်/နှစ်

ချိတ်တံဆွဲ 2 နှစ်.

F2C2.

សរុប

(7) (B)

$$\text{តម្លៃបំពង់ RB3} = 0.20 \times 0.60 \times 2400 \times 7.00 = 2016 \text{ kg.}$$

$$\text{តម្លៃបំពង់ B4} = 0.20 \times 0.50 \times 2400 \times 3.50 = 840 \text{ kg.}$$

$$\text{តម្លៃបំពង់ GB5} = 0.25 \times 0.50 \times 2400 \times 3.50 = 1050 \text{ kg.}$$

$$\text{តម្លៃបំពង់បិទ} = 4.45 \times 180 \times 7.00 = 5607 \text{ kg}$$

$$\text{តម្លៃបំពង់បិទ} = 6.00 \times 180 \times 3.50 = 3780 \text{ kg.}$$

$$\text{តម្លៃបំពង់បិទ B3} = 3465 \text{ kg.}$$

$$\text{តម្លៃបំពង់បិទ GB4} = 4140 \text{ kg.}$$

$$\text{តម្លៃបំពង់} = 0.30 \times 0.30 \times 2400 \times 10.0 = 2160 \text{ kg}$$

$$\text{សរុបតម្លៃបំពង់បិទ} = 23,058 \text{ kg.}$$

အောက်ပါ C2.

$$\text{အောက်ပါ အား } P = 23,058 \text{ kg}$$

$$\text{အောက်ပါ အား } A = 30 \text{ cm}$$

$$B = 30 \text{ cm}$$

$$A_g = A \times B = 30 \times 30 = 900 \text{ cm}^2$$

$$\text{အောက်ပါ အား } P = 0.85 \times A_g \times (0.25 \times f_c' + f_s \times P_g)$$

$$\text{အောက်ပါ အား } P_c = 0.85 \times 900 \times 0.25 \times 100 = 19,125 \text{ kg}$$

$$P_s = 23,058 - 19,125 = 3,933 \text{ kg}$$

$$A_s = \frac{3,933}{0.85 \times 1200} = 3.85 \text{ cm}^2$$

အောက်ပါ အား P_g ဝန်ဆောင်မှု 1-8 %

$$\therefore \text{အောက်ပါ အား } 6 \text{ DB } 20 \text{ mm. } A_s = 18.84 \text{ cm}^2$$

$$P_g = \frac{18.84}{900} \times 0.02 = 2 \% \text{ OK}$$

$$P = 0.85 \times (0.4 \times 3000 \times 18.84) + (0.25 \times 100 \times 900 \times 0.85)$$

$$19,216 + 19,125 = 38,341 \text{ kg}$$

$$P = 0.2125 \times 19,125 \times 30 \times 30 + (0.85 \times 1200 \times 18.84)$$

$$= 38,341 \text{ kg} > 23,058 \text{ kg}$$

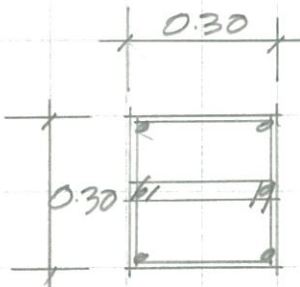
$$\text{အောက်ပါ အား } < 16 \times 2.0 = 32 \text{ cm}$$

$$< 48 \times 2.0 = 96 \text{ cm}$$

$$< 0.30 \times 2.0 = 60 \text{ cm}$$

$\therefore$ အောက်ပါ အား 6 DB 20 mm.

2-အောက်ပါ ϕ 6 mm. @ 0.25 m.



6 DB 20 mm.

2 ϕ 6 mm. @ 0.25 m.

Footing F2.

$$P_{max} = 23,058 \text{ kg.}$$

$$W. 10\% = 2305 \text{ kg.}$$

$$\Sigma W = 25363 \text{ kg.}$$

← 1.5m 1.5m 1.5m 1.5m 1.5m I-0.26x0.26 m.

3.5m. 1.5m 1.5m 1.5m 1.5m 1.5m 25 ตั้ม/ตั้ม.

ระยะ: 1.5m 1.5m 1.5m 1.5m 1.5m 1.5m 0.30 m.

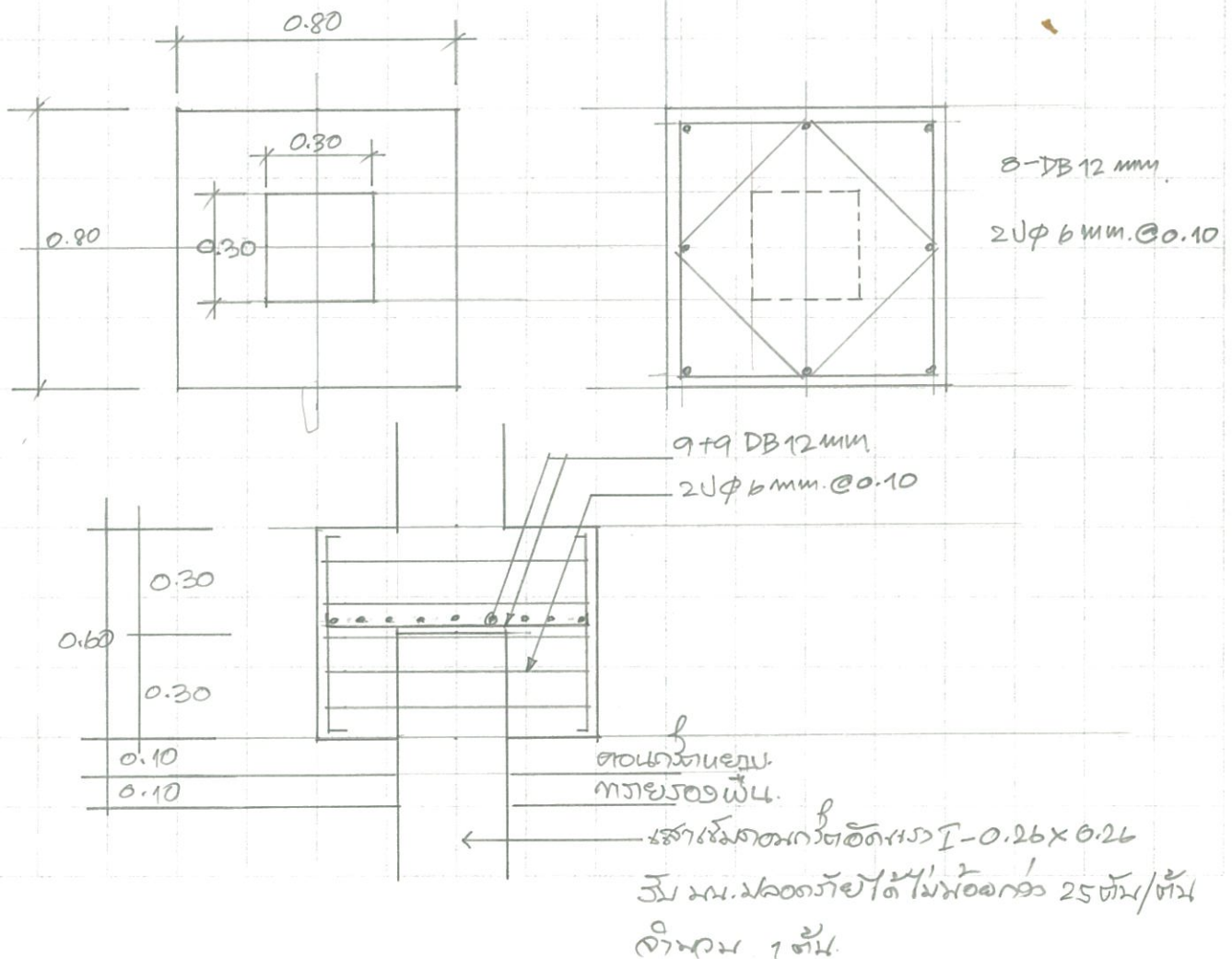
ระยะ: 1.5m 1.5m 1.5m 1.5m 1.5m 1.5m 0.30 m.

1.5m 1.5m 1.5m 1.5m 1.5m 1.5m PILECAP = 0.30+0.30 = 0.60 m.

1.5m 1.5m 1.5m 1.5m 1.5m 1.5m PILECAP B = 2D+0.25 = 2x0.26+0.25 = 0.77 m

∴ PILECAP = 0.80x0.80x0.60 m.

$$A_s = 0.0020 \times 80 \times 60 = 9.6 \text{ cm}^2 \Rightarrow 9 - DB 12 \text{ mm. } A_s = 10.17 \text{ cm}^2$$



Footing F3.

$$P_{max} = 19,394 \text{ kg}$$

$$W. 10\% = 1939 \text{ kg}$$

$$\Sigma W. = 21,333 \text{ kg}$$

เลือกเสาเข็มตามแบบที่ออกแบบ I-0.26x0.26 m.

รับน้ำหนักบรรทุกได้ไม่เกิน 25 ตัน/ต้น.

ระยะห่างระหว่างเสาเข็ม > D 98 0.30 m.

ระยะห่างเสาเข็ม > D 98 0.30 m.

ความหนาของหัวเสา PILECAP = 0.60 m.

$$\text{ขนาด PILECAP} = 2 \times 0.26 + 0.25 = 0.77 \text{ m} \Rightarrow 0.80 \text{ m}.$$

$$\therefore \text{PILECAP} = 0.80 \times 0.80 \times 0.60 \text{ m}.$$

$$A_s = 0.0020 \times 0.80 \times 60 = 9.60 \text{ cm}^2 \quad 9 - \text{DB} 12 \text{ mm} \quad A_s = 10.17 \text{ cm}^2.$$

