JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

CALCULATIONS FOR

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1/93.769 parabolic grade.

459'-0" (139.904)

89'-3" (27.204)

22 @ 12'-9" = 280'-6" (85.496)

7 @ 12'-9" = 89'-3" (27.204)

4 @ 12'-9" = 51'-0" (15.545)

1/46.635 Straight grade

El = 102.00

El = 101.717

El = 101.750

El = 101.235

El = 100.902

El = 98.972

El = 95.078 Top of pier

El = 74.605

Top of pier 73.717

El = 73.717

0.750

0.283

0.765

1.098

1.989

6.172

27.032

27.332

20.413

2'-3" = 0.700

13" = 0.021 m

0.715

0.011

0.006

0.009

89 = 27.273
.076
27.203

45 = 137.160
9 = 2.743
139.903

48.5
1.85
5010

1.072 = .294
18.3

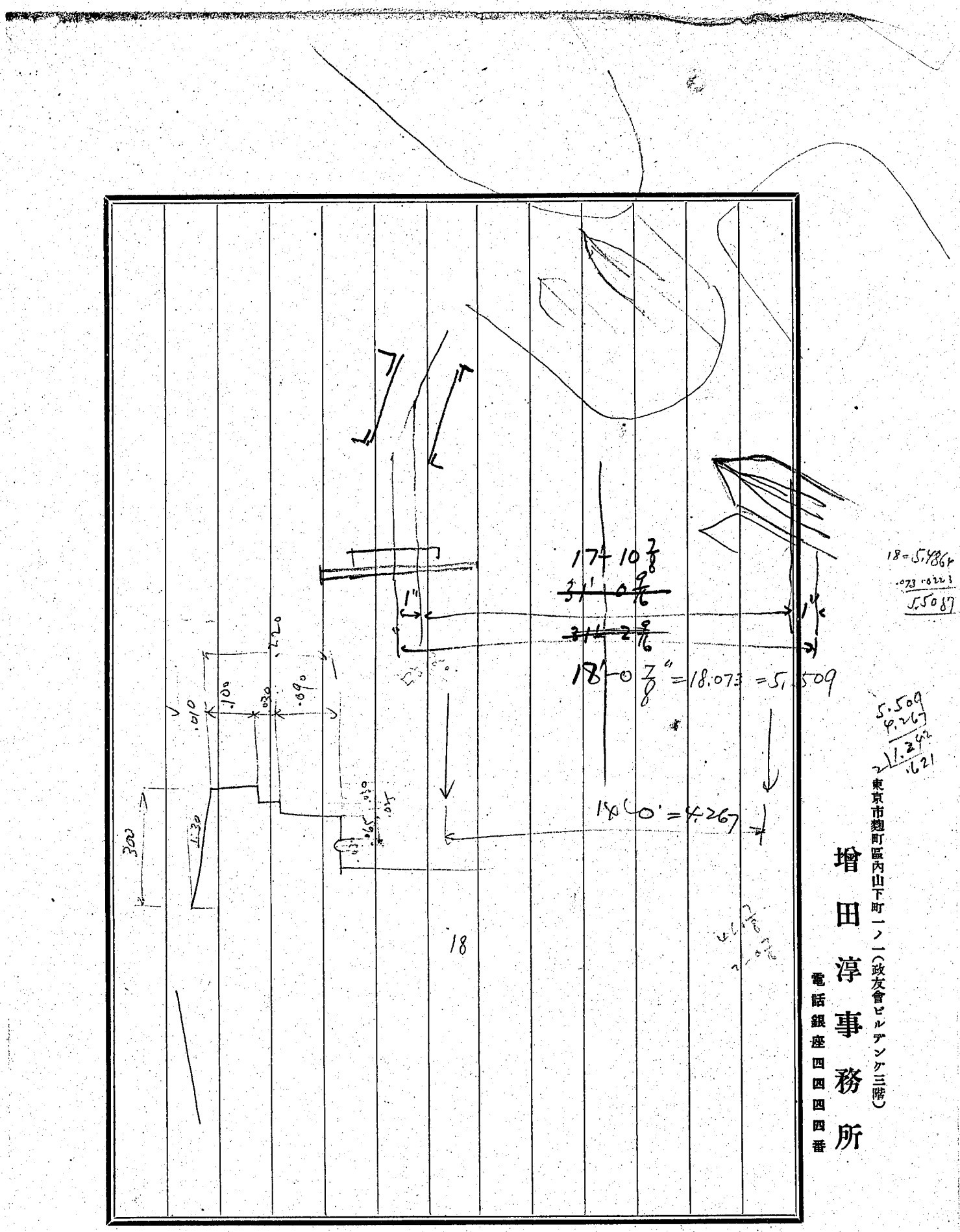
0.0254
18
0.027

.3047945

26969.80
42.12
9.09
27191.01

7 @ .70 m
5 .50

ℓ + .29
.15



東京市麹町區内山下町一ノ一（政友會ビルデング三階）
増田淳事務所
電話銀座四四四四番

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CALCULATIONS FOR

17000 × 1.25 = 21300#
21300 × 5.0' = 106500
Panel load = 17600 / 123000#

4"φ roller
allowable load = 640×4 = 2560 #/lin.in.
req'd total length of roller = 123000/2560 = 48" 5 rollers

4½"φ roller
123000/(640×4.5) = 42.7" 4 rollers

4½"φ — 3 rollers @ 14¼" net.

4½" pin bearing 24000
123000/(24000×4.5×2) = 0.57" req'd bearing thickness (one side)

1¼ 1½"

Bending moment on pin
61,500 × 2.25 = 138,200 "#
6" pin req'd.

Anchor.
61500/(2×17000) = 1.80" - one side ② 1½×1¼"

Anchor bolt (adjust.)
61500/21300 = 2.90"
2¼"φ = 3.021" net.

3/4" Pin.

3+2/8 + 5/8
moment on pin
= 61500 × 1.25 = 76,900"#
10/8 = 1¼
bearing 61500/(0.75×14cm) 3.4"d

use 4¼"d pin

4 1/16" − 1 1/8" = 2 15/16 = 2.94"

moment on pin = 61500 × 2.94 = 180,700"#
use 7½" pin

5½" Rollers

640 × 5 = 3200 #/l.i.
123000/3200 = 38.4"
use 3 rollers @ 12.8"

60,000# × 12" = 600,000"#
Section modulus req'd = 600,000/17000 = 35.3"³

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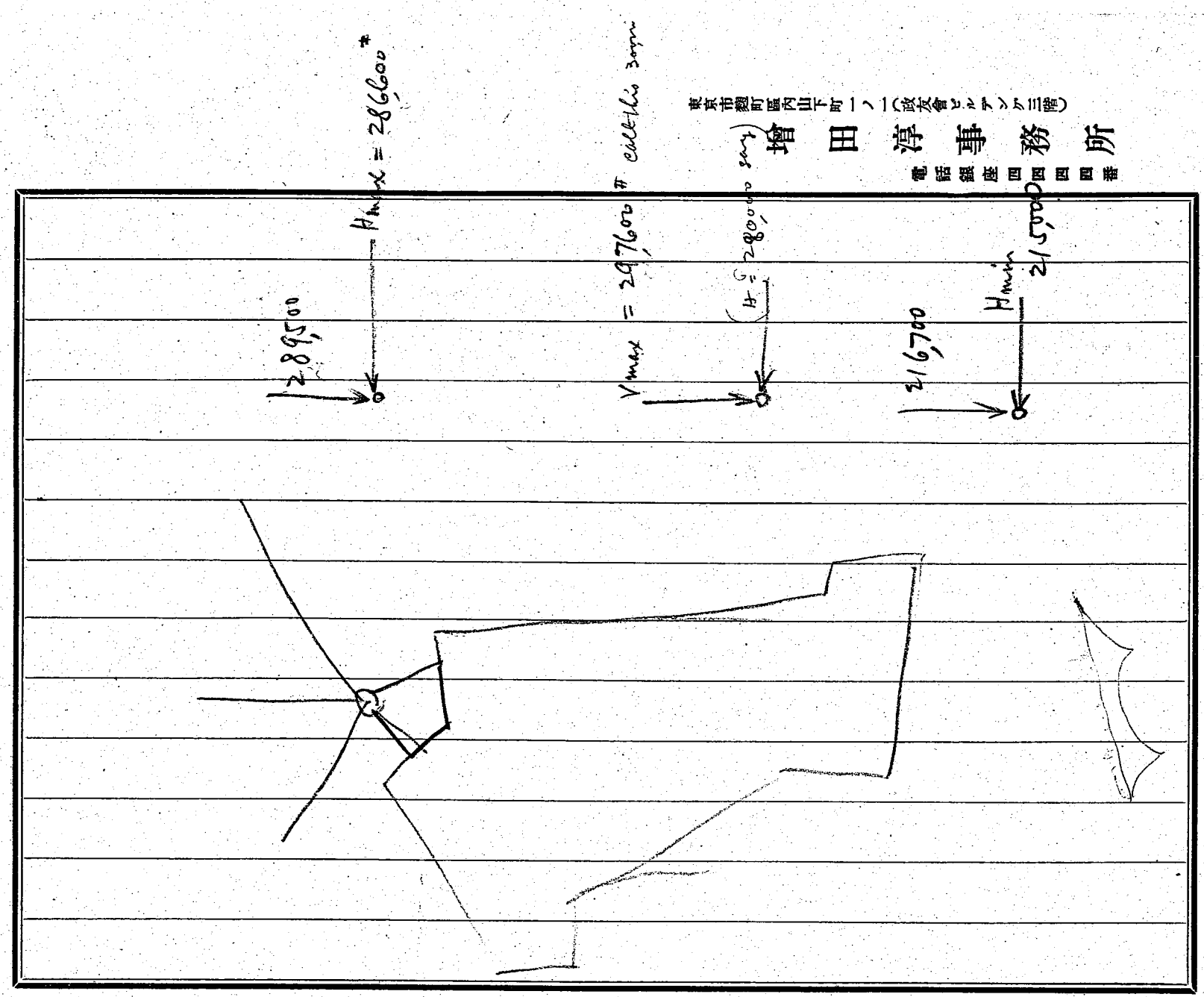
増田淳事務所
電話銀座四四四四番



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CALCULATIONS FOR

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girder | span

1/46.635 stringer slope.

1/93.269 parabolic slope 69.952 m c to c of posts.

11 @ 12.75' = 140.25' = 42.748 m
(span 85.496 m)

Crown of Roadway
El = 102.00 m

0.750 m

0.280 m 0.283 m

El = ~~101.720~~ m

101.717 m (-0.003 ~ 3/32 in)

11 panels

9 23/32" = 1.250 m

2-4 3/32" (-1/8)

3-3 3/8 (1 in)

El. = 101.25 m

7 panels

3 11/32
2-1/2
2-4 11/32

73.715
.95
74.665

20'-3" = 6.172 m

91-4 3/32" = 27.796 m

86'-4 13/16"

8'-0
6-0
2'-4 11/32
89'-4 11/32 = 27.238 m
4.344

0.75 × 11²/18² = .75 × 121/324 = 0.280 m

8'-0
6-0
3-3 3/8
90'-3 3/8 = 27.518 m
= 3.375"

90' = 27.432 m
3.3" = 0.0838
.075" = .0019
27.5178

89' = 27.127
4.3" = 0.109
.04" = 0.0012
27.1377 m

H = 28.66 m

74.665 m (-0.003 m 3/32 in)

El = ~~74.483~~

0.95 m

2967 lb

34'-3 7/8" = (10.462 m)

5 7/8" = (10.506 m) 3.875" 7/8"

34'-3 7/8"
2@ 7/8" = 1 3/4"
34'-5 5/8" =

34' = 10.3632
3.8" = 0.0965
10
10.4610 m.

34' = 10.363 m
5.6" = .142 m
10.5060 m

42.67 m
.076 m
42.748

10
24

no uplift.
95.078 m

R = 131.200 m

7.844"

C15

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550 2750 1410 1340

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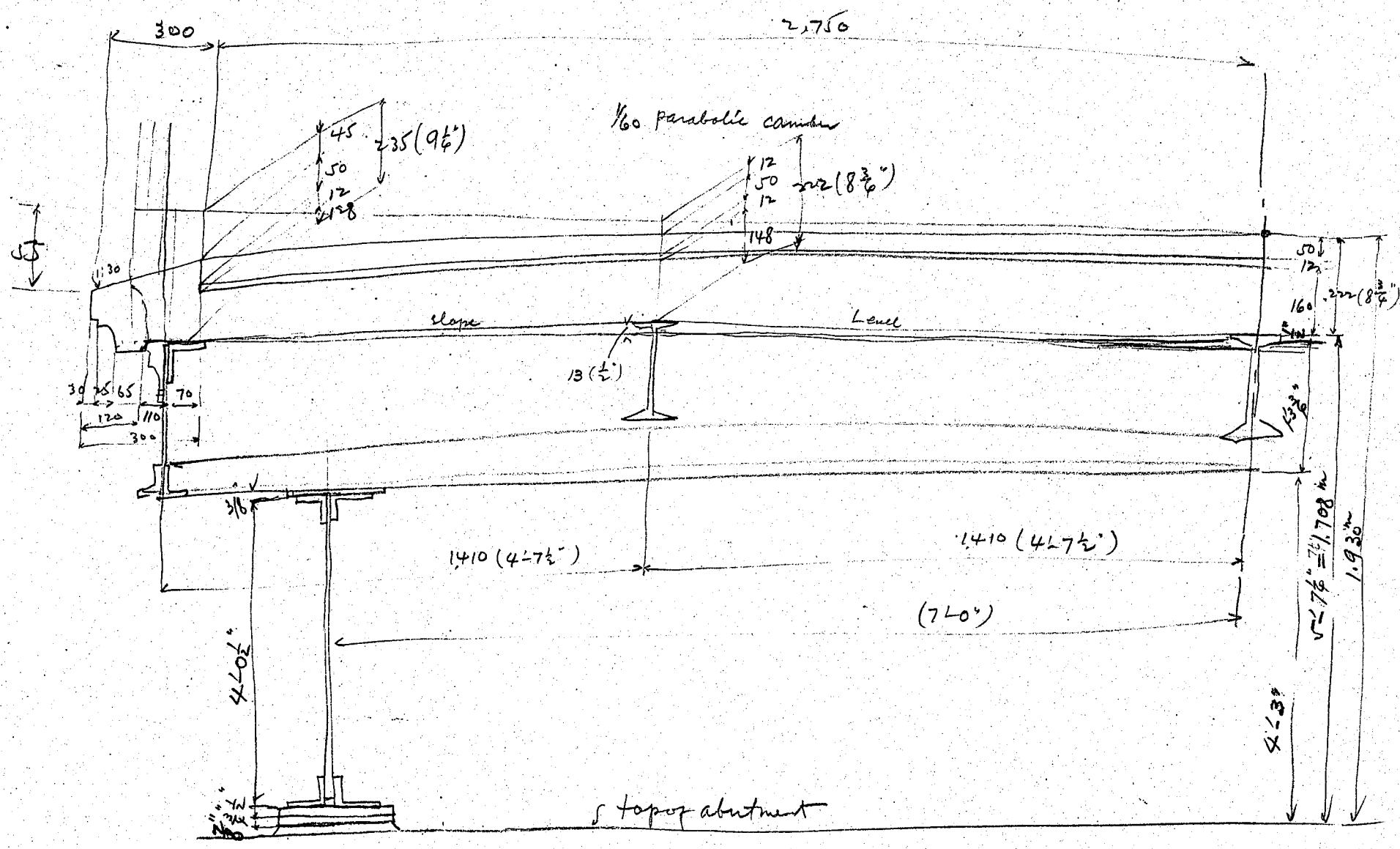

1-3¾ ½ 1-4½" =

16.5 = 0.4064
64
.4128
.413
2m
.635 m

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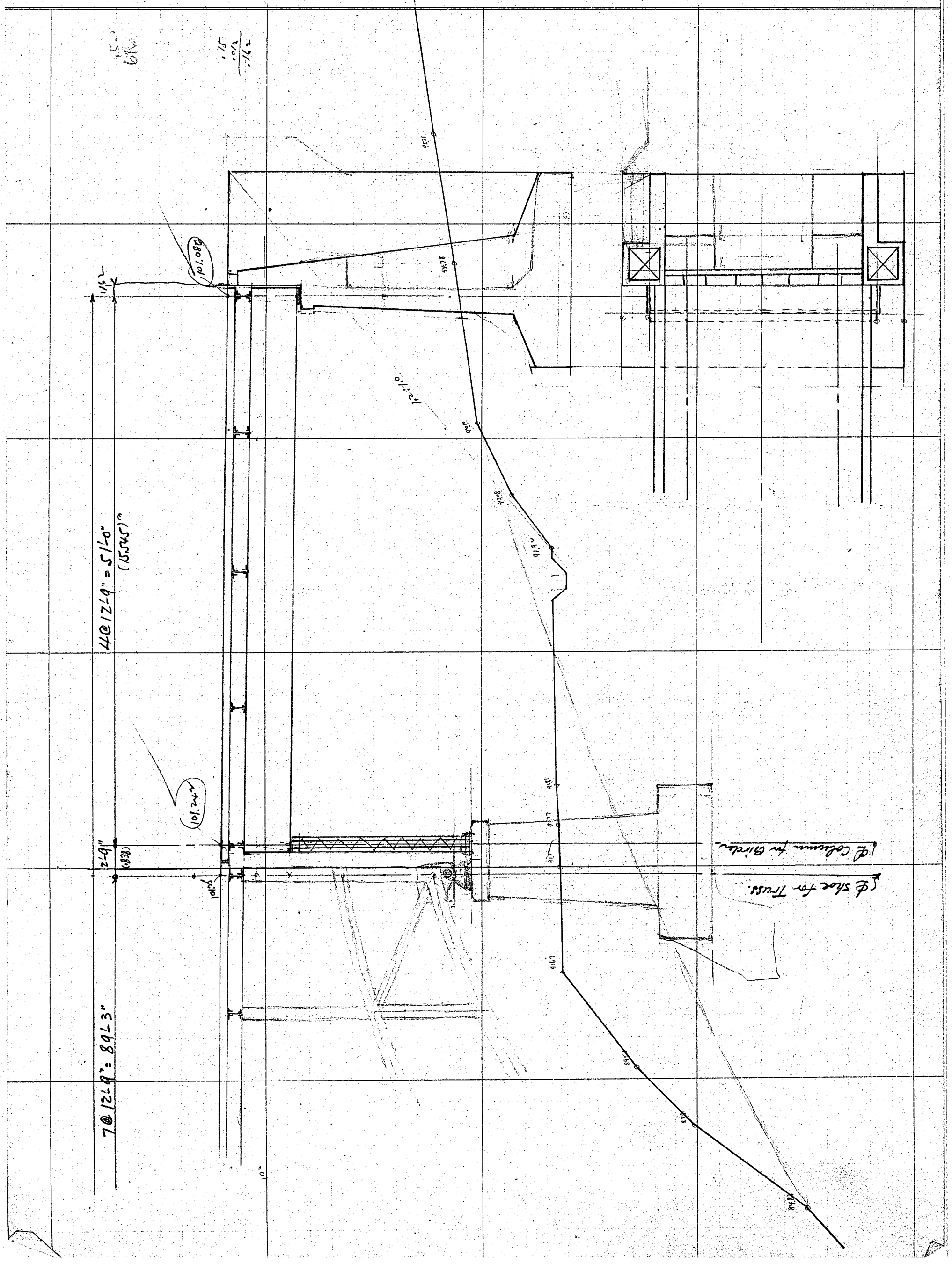

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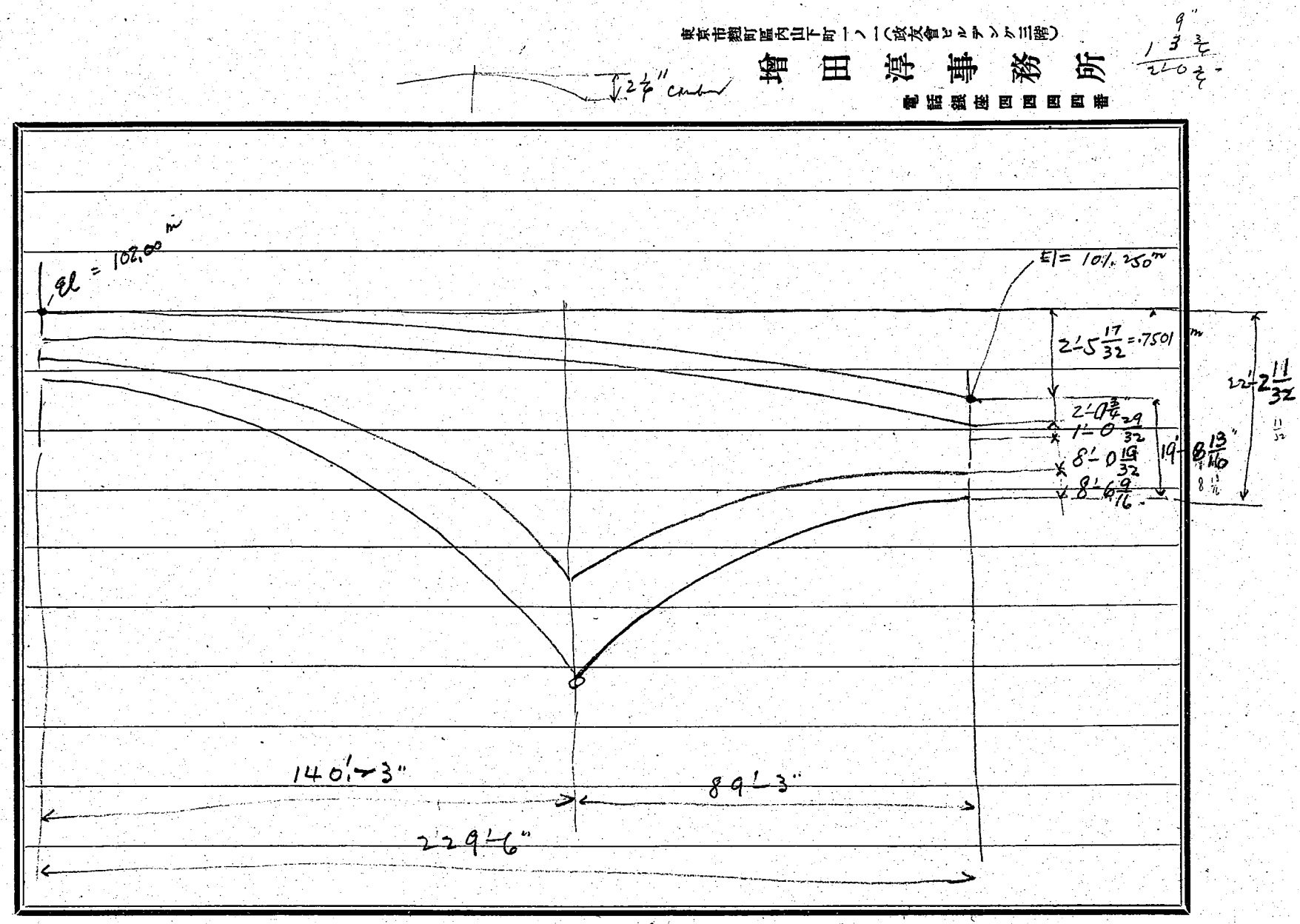
増田淳事務所
電話牛込四四四四番



2.295 = 2'-3 9/16"

増田潤氏構造設計
(増田潤氏事務所)

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CALCULATIONS FOR

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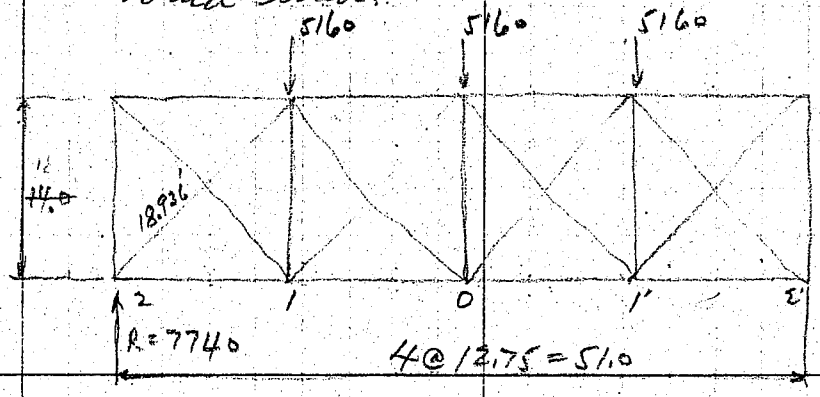
CALCULATIONS FOR

Fig (4)

4

Lateral Bracing.
Wind load.



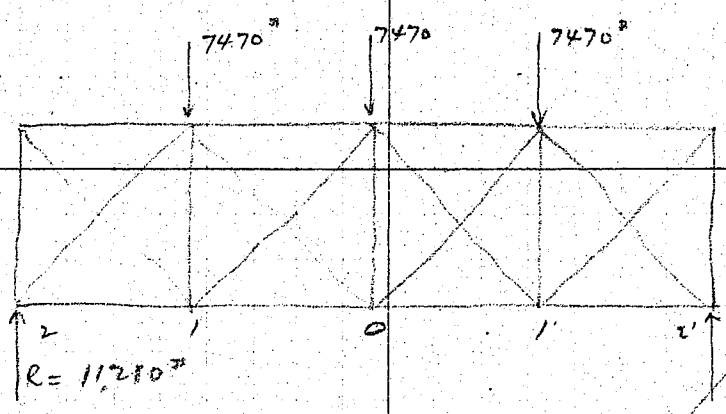
Diagonal Length $14^2 = 196.0$
$12.75^2 = 162.563$
358.563
$l = \sqrt{358.563} = 18.936'$
$\sec\theta = \frac{18.936}{14} = 1.353$

Moving wind load of 405 #/# of span assumed
Panel load $405 \times 12.75 = 5160^{\#}$
Reaction $5160 \times 1.5 = 7740$
Shears for panel 2–1 7,740 #

panel load on 0. & 1' only
reaction $\frac{5160 \times 3}{4} = 3870$ #
Shear between 1–0 = 3,870 #

Panel dead load.
Floor beam concentration 15,350 #
wt. of girder $260 \times 12.75 = 3320$
18,670 # × 2 = 37,340 #

Seismic load.



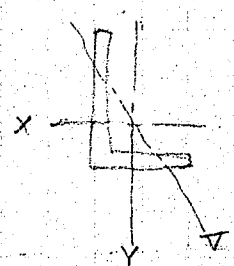
Seismic panel load = 37,340 × .2 = 7470 #
Reaction = 7470 × 1.5 = 11,210 #
Shear between 2–1 11,210 #
" " 1–0 3,740 #

Member	Wind Stress		S.R.	Rivet no. $\frac{3}{4}$"ϕ	Seismic Stress		S.R.	$\frac{3}{4}$" rivet no.
2–1	7,740 × 1.353 =	10,480	.62" net	2.4	11,210 × 1.353 =	15,180	0.50" net	1.9
1–0	3870 × " =	5240	.31	1.2	3,740 × " =	5060	0.17	.6

Min radius of gyration req'd $= \frac{18.0 \times 12}{200} = 1.08$"

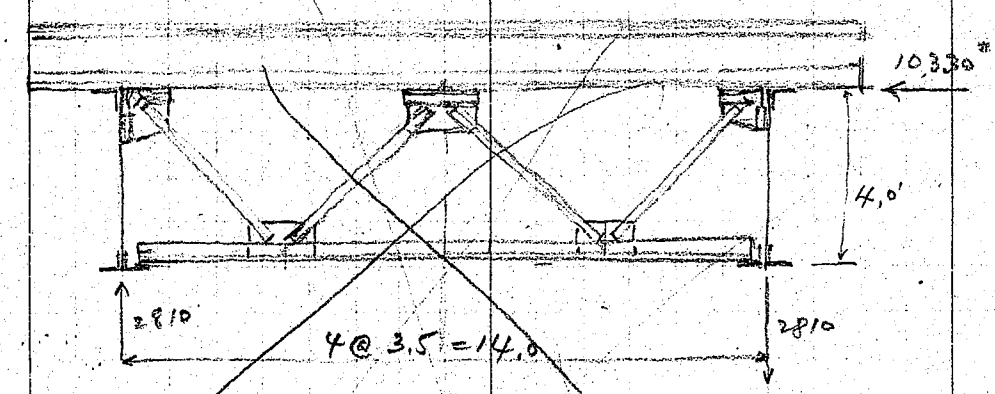
Use L 5"×3" × $\frac{3}{8}$" length $18 \times 12 = 216$"
$r_x = 1.591$"
$r_v = .649$
$\frac{l}{r_x} = \frac{216}{1.591} = 135$ OK
$\frac{l_1}{r_v} = \frac{108}{0.649} = 167$ OK.

L 5"×3"× $\frac{3}{8}$" = 2.86" − .33 = 2.53" net OK.
use 3 — $\frac{3}{4}$"ϕ rivets.



End cross frame on abutment

Wind load. $405 \times 25.5 = 10,330$ #

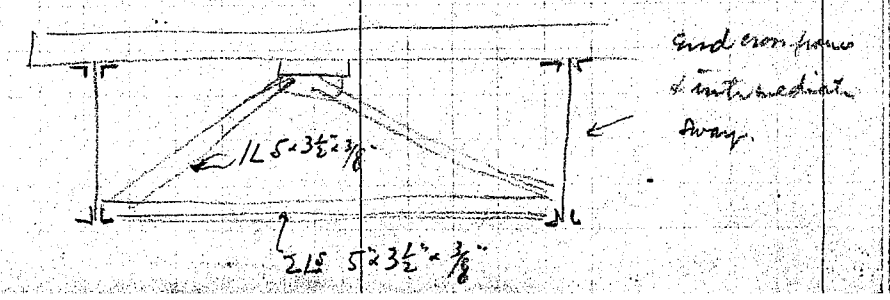


Effective depth say 3.8'
reaction $\frac{10,330 \times 3.8}{14} = \pm 2810$ #
Diagonal stress $= 2810 \times 1.36 = 3820$ #
Chord stress $= \frac{2810 \times 7}{3.8} = 5170$ #

use
Diagonal L 3"×3"× 5/16
chord 2L 5"×3"× 3/8"

Length of member $3.5^2 = 12.25$
$3.8^2 = 14.44$
26.69
$l = \sqrt{26.69} = 5.16'$
$\sec\theta = \frac{5.16}{3.8} = 1.36$

Intermediate sway bracing same as above.



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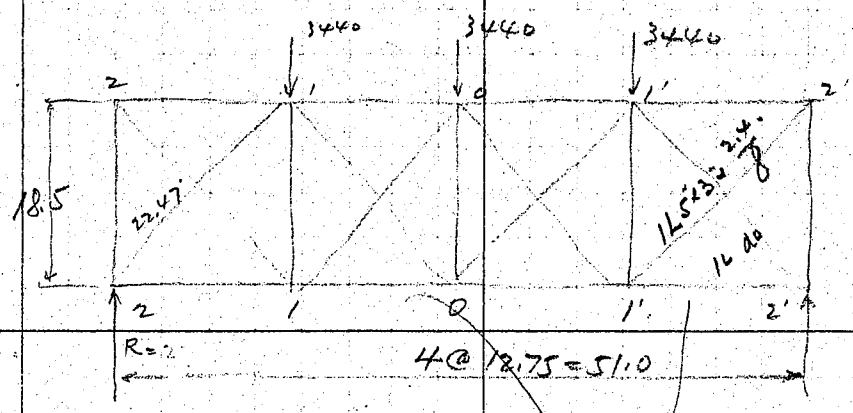
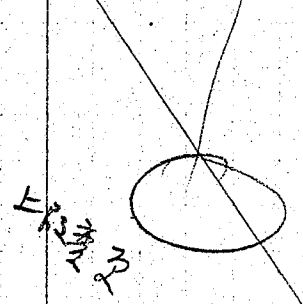
CALCULATIONS FOR

上元 (1)

4R

Lateral Bracing (under floor beam)





Diagonal Length $18.5^2 = 342.25$ ✓
$12.75^2 = 162.563$ ✓
504.813 ✓

$d = \sqrt{504.813} = 22.47'$ ✓

$\sec\theta = \frac{22.47}{18.5} = 1.215$ ✓

Moving wind load of 270 #/ft. of span assumed.
panel load. $270 \times 12.75 = 3{,}440\#$ ✓
Reaction = $3440 \times 1.5 = 5{,}160\#$ = max end shear ✓

panel load on 0 & 1' only.
reaction $\frac{3440 \times 3}{4} = 2{,}580\#$ ✓ Shear between 1–0.

Panel dead Load
Floor Beam concentration 15,350# ✓
wt. of main girder $260 \times 12.75 = 3{,}320$ ✓
$18{,}670\# \times 2 = 37{,}340\#$ ✓

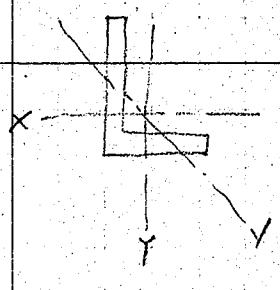
Seismic panel load = $37{,}340 \times .2 = 7{,}470\#$ ✓
Reaction = $7470 \times 1.5 = 11{,}210\#$ ✓
Shear between 2–1 11,210# ✓
" " 1–0 3740# ✓

Member	wind shear		S.R.	3/4" rivet no.	Seismic Shear		S.R.	3/4" rivet no.
2–1	$5{,}160 \times 1.215 =$	6,260# ✓	0.37" ✓	1.4 ✓	$11{,}210 \times 1.215 =$	13610# ✓	0.445" ✓	1.71 ✓
1–0	$2580 \times 1.215 =$	3130 ✓	0.185	0.71	$3740 \times 1.215 =$	4540 ✓	0.149 ✓	0.57 ✓

Try 1L 5"x3"x(3/8)" length say 21' = 252"
$r_x = 1.591$ $\frac{l}{r_x} = \frac{252}{1.591} = 158$ ✓ OK
2-3/8" $r_y = .649$ $\frac{l}{r_y} = \frac{126}{.649} = 194$ ✓ OK

1L 5"x3"x(3/8) = 2.86 ✓ − .33 ✓ = 2.53" ✓ net OK
2.40 − 127 2.15

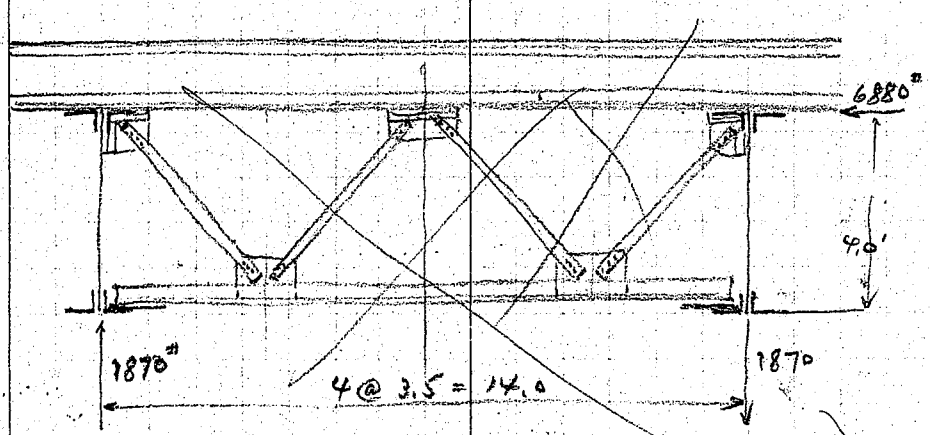
use 3 − 3/4" rivet for connection.



Lower lateral bracing. Use same diagonal member as for upper lateral.

End cross frame on abutment.

wind load. $270 \times 25.5 = 6880\#$ ✓
Effective depth say 3.8'
reaction $\frac{6880 \times 3.8}{14} = \pm 1870\#$ ✓

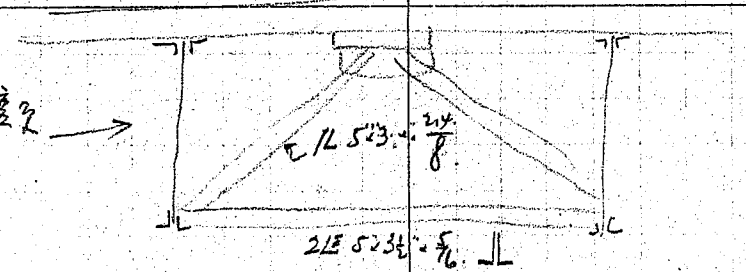


Diagonal stress = $1870 \times 1.36 = 2560$ ✓ * C

Chord stress = $\frac{1870 \times 7}{3.8} = 3450\#$ ✓ T & C

use
for diagonal 1L 3"x3"x 5/16"
bottom chord 2L 5"x3" 3/8"

Length of member
$3.5^2 = 12.25$ ✓
$3.8^2 = 14.44$ ✓
26.69 ✓
$l = \sqrt{26.69} = 5.16$ ✓
$\sec\theta = \frac{5.16}{3.8} = 1.36$ ✓



For Intermediate Sway bracing use the same detail as above.

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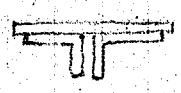
CALCULATIONS FOR

荒川橋

Assumed section at Center of span.



Moment 821,100'# End Shear 54,785 #

2 Ls. 5 - 3½ x ½" = 8.01 " - 2.00 = 6.01 " net

1 Corpl. 12" x ⅜" = 4.50 - 0.75 = 3.75

12.51 " gross 9.76 " net

Depth of girder 48½" b to b of flange Ls.

Use web pl. 48" x ⅜" = 18.00 " gross ⅞ web area = 2.25 "

effective depth 4.04 + .06 - .13 = 3.97 '

flange stress = 821,100 / 3.97 = 207,000 #

Batter flange area reqd = 207,000 / 17000 = 12.20 " net.

⅞ web = 2.25

9.95 " net

1 Pl. 4.5 x .19 = .855

2 Ls. 8.01 x 1.08 = 8.651

9.506

9.506 / 12.51 = 0.76 " = .063

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CALCULATIONS FOR

荒川橋材料調書

埼玉縣　昭和三年四月

使用材料要目ノ如ク九月納ムセリ

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CALCULATIONS FOR

埼玉縣秩父三峰線 荒川橋材料調書（鐵材之部）

昭和三年九月廿日訂正

日本橋梁株式會社提出

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CALCULATIONS FOR

List of materials for Arakawa-Bashi Saitama-Ken

Side span 2 Required
material for one side span.

							Remarks
Middle chord SM7 - SM6			2 Required.				
2	Pls.	15" . 3/8	14 : 2 1/2	@	19.13	544	90 . 90 . 10 mm
2	Ls	3 1/2 . 3 1/2 . 3/8	14 : 2 1/2	@	8.96	255	
2	Ls	do	13 : 9 3/4	@	8.96	247	
2	Pls.	25 1/2 . 3/8	2 : 3"	@	32.51	146	
4	Pls.	21 . 3/8	1 : 10"	@	26.78	196	
16	Lacing bars	2 1/2 . 7/16	2 : 6 3/4	@	3.72	152	
2	Pls.	29 . 3/8	3 : 5"	@	36.98	253	
2	fills	8 3/4 . 3/8	2 : 5"	@	11.16	54	
2	Pls.	14 1/2 . 3/8	2 : 5"	@	18.49	90	
2	"	3 1/2 . 3/8	1 : 11"	@	4.46	17	
2	"	"	2 : 0 1/2	@	"	18	
						1972 . 2 = 3944	

SM6 - SM5 2 Required

2	Pls.	15 . 3/8	13 : 11 3/4	@	19.13	535	
2	Ls	3 1/2 . 3 1/2 . 3/8	13 : 11 3/4	@	8.96	251	90 . 90 . 10
2	Ls	3 1/2 . 3 1/2 . 3/8	13 : 10 3/4	@	"	249	
4	Pls.	21 . 3/8	1 : 10"	@	26.78	196	
18	Lacing bars	2 1/2 . 7/16	2 : 6 3/4	@	3.72	171	
2	Pls.	29 1/2 . 3/8	3 : 3"	@	37.61	245	
2	fills	8 3/4 . 3/8	2 : 6"	@	11.16	56	
2	Pls.	14 1/2 . 3/8	2 : 6"	@	18.49	92	
2	"	3 1/2 . 3/8	2 : 0"	@	4.46	18	
2	"	"	1 : 10 1/2	@	"	17	
						1830 . 2 = 3660	

SM5 - SM4 2 Required

2	Pls.	15 . 3/8	14 : 5 1/4	@	19.13	552	
2	Ls	3 1/2 . 3 1/2 . 3/8	14 - 5 1/4	@	8.96	259	90 . 90 . 10
2	Ls	do	14 : 3 3/4	@	"	256	
4	Pls.	21 . 3/8	1 : 10	@	26.78	196	
20	Lacing bars	2 1/2 . 7/16	2 : 6 3/4	@	3.72	190	
2	fills	8 3/4 . 3/8	2 : 6 3/4	@	11.16	57	
2	Pls.	14 1/2 . 3/8	2 : 6 3/4	@	18.49	95	
2	"	3 1/2 . 3/8	2 : 0 3/4	@	4.40	18	
2	"	"	1 : 11"	@	"	17	
						1640 . 2 = 3280	

SM4 - SM3 2 Required

2	Pls.	15 . 3/8	14 : 11 1/4	@	19.13	572	
2	Ls	3 1/2 . 3 1/2 . 3/8	14 : 11 1/4	@	8.96	268	90 . 90 . 10
2	Ls	"	14 : 9 3/4	@	"	265	
2	Pls.	36 . 3/8	4 : 11"	@	45.90	452	
4	"	21 . 3/8	1 : 10	@	26.78	196	
16	Lacing Bars	2 1/2 . 7/16	2 : 6 3/4	@	3.72	152	
2	Pls.	31 . 3/8	3 : 1 1/2	@	39.53	247	
2	Pls	14 1/2 . 3/8	2 : 1 1/2	@	18.49	79	
2	fills	8 3/4 . 3/8	2 : 1 1/4	@	11.16	47	
2	Pls.	3 1/2 . 3/8	1 : 10 1/2	@	4.46	17	
2	"	3 1/2 . 3/8	2 : 0"	@	"	18	
						2313 . 2 = 4.626	

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CALCULATIONS FOR

List of materials for Arakawa-Bashi Saitama-ken

		SM3 - SM2	Z Required				
2	Pls.	15 . 3/8	15'-5½	19.13#	592	90.90.10	
2	L⌞	3½.3½.3/8	15'-5½	8.96	277	"	
2	L⌞	do	15'-4"	"	275		
4	Pls	21 . 3/8	1'-10"	26.78	196		
22	Lacing Bars	2½ . 7/16	2'-6¾	3.72	209		
2	Pls	33 . 3/8	3'-3½	42.08	277		
2	"	14½ . 3/8	2'-3½	18.49	85		
2	fills	8¾ . 3/8	2'-3¾	11.16	51		
2	Pls	3½ . 3/8	2'-0"	4.46	18		
2	"	"	1'-11"	"	17		
					1.997 × 2 = 3994 ✓		
		SM2 - SM1	Z Required				
2	Pls.	15 . 3/8	16'-0¾"	19.13	615		
2	L⌞	3½.3½.3/8	16'-0¾	8.96	288	90.90.10	
2	L⌞	do	15'-11¼	"	286		
4	Pls	21 . 3/8	1'-10"	26.78	196		
22	lacing Bars	2½ . 7/16	2'-6¾	3.72	209		
2	Pls	33 . 3/8	3'-4½	42.08	285		
2	Pls	14½ . 3/8	2'-4½	18.49	88		
2	fills	8¾ . 3/8	2'-4½	11.16	53		
2	Pls	3½ . 3/8	1'-11"	4.46	17		
2	Pls.	"	1'-9"	"	16		
					2053 . 2 = 4106 ✓		
		SM1 - M0	Z Required				
2	Pls.	15 . 3/8	17'-2½	19.13	658		
2	L⌞	3½.3½.3/8	16'-4¼	8.96	293	90.90.10	
2	L⌞	do	17'-2"	"	308		
4	Pls.	21 . 3/8 5/16	1'-10"	22.31	163		
20	Lacing Bars	2½ . 3/8 7/16	2'-6¾	~~3.19~~ 3.72	~~170~~ 190		
2	fills	21 . 3/8	2'-11½	26.78	158		
2	Pls.	27½ . 3/8	3'-3"	35.06	228		
					~~1980 . 2 = 3960~~		
					1998 . 2 = 3996 ✓		

Summary for middle chord ~~27.570~~ 27.606#

Bottom Chord.		SL7 - SL6	Z Required				
2	Pls.	15 . 3/8	13'-4¾"	19.13	513		
2	L⌞	3½.3½.3/8	15'-7¼	8.96	280		
2	"	"	15'-0¼	"	269		
1	Pl.	8½ . 3/8	1'-10"	10.84	20 ?		
4	L⌞	3½.3½.3/8	1'-4¼	8.96	48 ?	90.90.10	
4	"	6 . 3½ . 3/8	1'-0½	11.64	48 ?		
4	fills	6 . 3/8	0'-6"	7.65	15 ?		
1	Pl	13 . 3/8	1'-4¼	16.58	22 ?		
4	L⌞	3½.3 . 3/8	1'-3 9/16	7.81	40 ?		
2	Pls	12½ . 3/8	2'-8"	15.94	85 ?		
2	Pls	18 . 3/8	2'-2"	22.95	100 ?		
2	"	31 . 3/8	3'-4½	39.53	267 ?		
1	Pl	22 . 3/8	2'-8¾	28.05	77 ?		
1	"	19 . 3/8	2'-2 5/8	24.23	54 ?		
2	Pls	21 . 5/16	1'-10	22.31	82		
20	Lac Bars	2½ . 3/8	2'-6¾	3.19	~~170~~ 163		
1	Pl	19½ . 3/8	2'-8 5/8	24.86	68 ?		
					~~2158 . 2 = 4316~~		
					2151 . 2 = 4.302 ✓		

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CALCULATIONS FOR

List of materials for Arakawa-Bashi, Saitama-Ken.

#						
		SL6 - SL5	Z Required			
2	Pls.	15 . 3/8	14 : 9 3/4"	19.13	567	
2	Ls	3 1/2 . 3 1/2 . 3/8	14 : 9 3/4"	8.96	265	90 . 90 . 10
2	"	"	14 : 8 1/2	"	264	"
2	Pls.	29 1/2 . 3/8	3 : 0 1/2	37.61	229	
2	Fills	8 3/4 . 3/8	2 : 3 1/2	11.16	51	
2	Pls	14 1/2 . 3/8	2 : 3 1/2	18.49	85	
2	"	3 1/2 . 3/8	2 : 0 1/2	4.46	18	
1	Pl	22 . 3/8	3 : 4 1/2	28.05	95	
1	"	18 . 3/8	3 : 4 1/2	22.95	78	
2	Pls	21 . 5/16	1 : 10"	22.31	82	
22	Lacing Bars	2 1/2 . 3/8	2 : 6 3/4	3.19	~~187~~ 180	
					~~1921 . 2 = 3842~~	
					1914 × 2 = 3828 ✓	
		SL5 - SL4	Z Required			
2	Pls.	15 . 3/8	15 : 6 1/4	19.13	~~598~~ 594	
2	Ls	3 1/2 . 3 1/2 . 3/8	15 : 6 1/4	8.96	278	90 . 90 . 10
2	"	"	15 : 4 3/4	8.96	276	"
2	Pls.	29 1/2 . 3/8	3 : 5"	37.61	257	
2	Fills	8 3/4 . 3/8	2 : 2"	11.16	48	
2	Pls.	14 1/2 . 3/8	2 : 2"	18.49	80	
2	"	3 1/2 . 3/8	2 : 1 3/4	4.46	19	
1	Pl.	22 . 3/8	3 : 0"	28.05	84	
1	"	18 . 3/8	3 : 0"	22.95	59	
2	Pls.	21 . 5/16	1 : 10	22.31	82	
24	Lacing Bars	2 1/2 . 3/8	2 : 6 3/4	3.19	~~204~~ 196	
					~~1989 . 2 = 3978~~	
					1983 × 2 = 3966 ✓	
		SL4 - SL3	Z Required			
2	Pls.	15 . 3/8	16 : 3 3/4	19.13	624	
2	Ls	3 1/2 . 3 1/2 . 3/8	16 : 3 3/4	8.96	292	90 . 90 . 10
2	"	"	16 : 2 1/4	"	290	"
2	Pls.	31 . 3/8	3 : 2 3/4	39.53	255	
2	Fills	8 3/4 . 3/8	2 : 2 3/4	11.16	50	
2	Pls.	14 1/2 . 3/8	2 : 2 3/4	18.49	82	
2	"	3 1/2 . 3/8	1 : 11 3/4	4.46	18	
1	Pl	22 . 3/8	3 : 0 1/2	28.05	85	
1	Pl.	19 . 3/8	3 : 0 1/2	24.23	74	
2	Pls.	21 . 5/16	1 : 10"	22.31	82	
28	Lacing Bars	2 1/2 . 3/8	2 : 6 3/4	3.19	~~238~~ 229	
					~~2090 . 2 = 4180~~	
					2081 × 2 = 4162 ✓	
		SL3 - SL2	Z Required			
2	Pls.	15 . 3/8	17 : 2	19.13	657	
2	Ls	3 1/2 . 3 1/2 . 3/8	17 : 2	8.96	308	
2	"	"	17 : 0 1/2	"	305	
2	Pls.	33 . 3/8	3 : 4"	42.08	280	
2	"	14 1/2 . 3/8	2 : 4"	18.49	86	
2	Fills	8 3/4 . 3/8	2 : 3 3/4	11.16	52	
2	Pls.	3 1/2 . 3/8	2 : 2	4.46	19	
1	Pl	22 . 3/8	2 : 11 1/4	28.05	82	
1	"	19 . 3/8	2 : 11 1/4	24.23	71	
2		21 . 5/16	1 - 10	22.31	82	
28	Lacing Bars	2 1/2 . 3/8	2 : 6 3/4	3.19	~~238~~ 229	
					~~2180 . 2 = 4360~~	
					2171 . 2 = 4342 ✓	

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註文主 埼玉縣	工事番號 722

CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama Ken

		SL2-SL1		2 Required			
2	P/s	15	× 3/8	× 18'-0 3/4	× 19.13	691	
2	Ls	3½ × 3½	× 3/8	× 18'-0 3/4	× 8.96	324	90×90×10
2	,	"		× 17'-11 3/4	× "	322	
2	P/s	33½	× 3/8	× 3'-5½	× 42.71	296	
2	,	14½	× 3/8	× 2'-2½	× 18.49	82	
2	fills	8¾	× 3/8	× 2'-2¼	× 11.16	49	
2	P/s	3½	× 3/8	× 1'-6	4.46	13	
1	Pl.	22	× 3/8	× 3'-1½	28.05	88	
1	,	19	× 3/8	× 3'-1½	24.23	74	
2	P/s	21	× 3/8	× 1'-10	26.78	98	
30	Lac. Bars	2½	× 7/16	× 2'-6¾	3.72	286	
2	P/s	34	× 3/8	× 3'-3	43.35	282	
						2605	× 2 = 5210
		SL1-L0		2 Required			
2	P/s	15	× 3/8	× 16'-4¾	× 19.13	628	
2	Ls	3½ × 3½	× 3/8	× 17'-7¼	× 8.96	315	90×90×10
2	,	"		× 18'-0¾	× "	324	
2	P/s	14½	× 3/8	× 2'-3	18.49	83	
2	fills	8¾	× 3/8	× 2'-3	11.16	50	
2	P/s	3½	× 3/8	× 1'-6	4.46	13	
1	Pl.	22	× 3/8	× 3'-1¼	28.05	87	
1	,	23	× 3/8	× 3'-1¼	29.33	91	
1	,	21	× 3/8	× 1'-10	26.78	49	
1	,	15	× 3/8	× 1'-10	19.13	35	
28	Lacing Bars	2½	× 7/16	× 2'-6¾	3.72	267	
2	Ls	3½ × 3½	× 3/8	× 1'-8½	8.96	31	
1	Pl.	13	× 3/8	× 1'-8½	16.58	28	
1	,	22	× 3/8	× 2'-8½	28.05	76	
1	,	21	× 3/8	× 2'-8½	26.78	73	
2	Fills	14	× 1/8	× 1'-11½	5.95	23	
2	,	8¼	× 3/8	× 1'-11½	10.52	41	
						2214	× 2 = 4428
		Bottom chord diaphragms		12 Required			
4	Ls	3½ × 3	× 3/8	× 0'-6 1/8	× 7.81	16	
2	,	4 × 3	× 3/8	× 0'-6	× 8.45	8	
1	Pl.	6 1/8	× 9/16	× 1'-6	× 6.51	7	
						31	× 12 = 372
		Summary for Bottom chord.		30,610			
		Diagonal members					
		SL7-SM6		2 Required			
4	Ls	4 × 3	× 3/8	× 11'-0½	× 8.45	373	
2	P/s	13	× 9/16	× 1'-3	× 13.81	35	
11	lacing bars	2	× 9/16	× 1'-2¾	× 2.13	28	
						436	× 2 = 872
		SL6-SM5		2 Required			
4	Ls	4 × 3	× 3/8	× 11'-3½	8.45	382	
2	P/s	13	× 9/16	× 1'-3		35	
11	L.B.	2	× 9/16	× 1'-2¾		28	
						445	× 2 = 890

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CALCULATIONS FOR

List of materials for arakawa-Baashi, Saitama-Ken.

		SL5 - SM4	2 Required		
4	Ls	4 × 3 × 3/8 "	11-9½	@ 8.45	399
2	P/s	13 × 5/16 "	1-3		35
12	Lac. Bars	2 × 5/16 "	1-2⅛	2.13	30
					464 × 2 = 928 ✓
		SL4 - SM3	2 Required		
4	Ls	4 × 3 × 3/8 "	12-3	8.45	414
2	P/s	13 × 5/16 "	1-0		28
13	Lac. Bars	2 × 5/16 "	1-2⅛		33
					475 × 2 = 950 ✓
		SL3 - SM2	2 Required		
4	Ls	4 × 3 × 3/8 "	13-3	8.45	448
2	P/s	13 × 5/16 "	1-0		28
14	Lac. Bars	2 × " "	1-2⅛		35
					511 × 2 = 1,022 ✓
		SL2 - SM1	2 Required		
4	Ls	4 × 3 × 3/8 "	14-3½	8.45	483
2	P/s	13 × 5/16 "	1-0		28
15	Lac. Bars	2 × " "	1-2⅛		38
					549 × 2 = 1,098 ✓
		SL1 - M0	2 Required		
4	Ls	4 × 3 × 3/8 "	15-4	8.45	518
2	P/s	13 × 5/16 "	1-3	13.81	35
17	Lac. Bars	2 × " "	1-2⅛	2.13	43
					596 × 2 = 1,192 ✓
			6.942		
	Summary for Diagonal =		~~6.952~~ #		
		Vertical member SL7 - SU7	2 Required.		
1	L	8 × 2½ @ 15.12 .	16-3¼	15.12	246
1	"	"	16-4½	"	248
2	P/s	13 × 5/16	1-0½	13.81	29
4	"	"	0-7½	"	35
38	Lac. Bars	2 × 5/16	1-2⅝	2.13	99
2	Ls	3 × 3 × 5/16	2-5⅞	6.1	30
2	"	"	2-7	"	31
1	Pl.	12 × 5/16	2-5⅞	12.75	32
2	Fills	5 × 5/16	0-6¼	5.31	6
1	L	5 × 5 × 3/8	1-0	12.2	12 130×130×9
1	L	5 × 3½ × 3/8	1-0	10.37	10
4	Ls	3 × 3 × 5/16	1-5	6.1	35
1	Pl.	12 × 5/16	1-5	12.75	18
					831 × 2 = 1,662 ✓
		SL6 - SU6	2 Required		
1	L	8 × 2½	21-8	15.12	328
1	"	"	21-9¼	"	329
2	P/s	13 × 5/16	1-0½	13.81	29
4	"	"	0-7½	"	35
66	Lac. Bars	2 × 5/16	1-2⅝	2.13	172
4	Ls	3 × 3 × 5/16	1-8½	6.1	36
1	Pl.	12 × 5/16	1-5½	12.75	19
					948 × 2 = 1.896 ✓

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CALCULATIONS FOR

List of materials for Arakawa-Bashi, Saitama-Ken.

		SL5 - SU5	2 Required		
1	L	8" x 2½"	29-2¼	15.12	441
1	"	"	29-3½	"	443
2	Pls	13 x 5/16	1-0½	13.81	29
4	"	"	0-7½	"	35
100	Lac. Bars	2 x 5/16	1-2 5/8	2.13	260
4	Ls	3 x 3 x 5/16	1-6	6.1	37
1	Pl.	12 x 5/16	1-6	12.75	19
					1,264 x 2 = 2,528 ✓
		SL4 - SM4 & SM4 - SU4	2 Required		
2	Ls	8 x 2½	16-7½	15.12	502
1	L	"	21-7	"	326
1	"	"	21-8¼	"	328
2	Pls	13 x 5/16	1-0½	13.81	29
4	"	"	0-7½	"	35
126	Lac. Bars	2 x 5/16	1-2 5/8	2.13	327
4		3 x 3 x 5/16	1-7	6.1	39
1		12 x 5/16	1-7	12.75	20
2		13 x 3/8	2-0	16.58	66
2		8 x 3/8	2-0	10.2	41
					1,713 x 2 = 3,426 ✓
		SL3 - SN3 & SN3 - SU3	2 Required		
2	Ls	8 x 2½	26-6¼	15.12	802
1	L	"	21-11¾	"	332
1	"	"	22-1	"	~~319~~ 334
2	Pls	13 x 5/16	1-0½	13.81	29
4	"	"	0-7½	"	35
158	Lac. Bars	2 x 5/16	1-2 5/8	2.13	411
4	Ls	3 x 3 x 5/16	1-7½	6.1	40
1	Pl.	12 x 5/16	1-7½	12.75	21
2	Pls	13 x 5/16	0-7½	13.81	17
2	"	"	0-8½	"	20
2	"	13 x 3/8	2-0	16.58	66
2	"	8 x 3/8	2-0		41
					~~2133 x 2 = 4266~~
					2148 x 2 = 4,296 ✓
		SL2 - SM2, SM2 - SN2 & SN2 - SU2	2 Required		
2	Ls	8 x 2½	22-0	15.12	666
2	"	"	15-11	"	481
1	L	"	22-2¼	"	~~336~~ 335
1	"	"	22-3½	"	337
2	Pls	13 x 5/16	1-0½	13.81	29
4	"	"	0-7½	"	35
196	Lac. Bars.	2 x 5/16	1-~~2⅞~~ 2 5/8	2.13	~~509~~ 505
4	Ls	3 x 3 x 5/16	1-7½	6.1	40
1	Pl.	12 x 5/16	1-7½	12.75	21
2	Pls	13 x 5/16	0-7½	13.81	17
2	"	"	0-8½	"	20
4	"	13 x 3/8	2-0	16.58	133
4	"	8 x 3/8	2-0		82
					~~2,706 x 2 = 5,412~~
					2701 x 2 = 5,402 ✓

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CALCULATIONS FOR

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List of Materials for Arakawa-Bashi, Saitama-Ken.

SL1-SM1, SM1-SN1 & SN1-SU1 2 Required

2	⊏	8 × 2½ ×	25'-0¾	15.12	758
2	〃	〃	25'-6¼	〃	772
1	⊏	〃	22-4½	〃	338
1	〃	〃	22-5¾	〃	340
2	P/s	13 × 5/16	1-0½	13.81	29
4	〃	〃	0-7½	〃	35
250	Lac. Bars	2 × 5/16	1-2⅝	2.13	650
4	⊾	3 × 3 × 5/16	1-9½	6.1	44
1	Pl.	12 × 5/16	1-9½	12.75	23
2	P/s	13 × 5/16	0-7½	13.81	17
2	〃	〃	0-8½	〃	20
4	〃	13 × 3/8	2-0	16.58	133
4	〃	8 × 3/8	2-0		82

3.241 × 2 = 6.482

Common part of Vertical members 14 Required

2	⊾	3.3 × 5/16 ×	1-3¼	6.1	16
2	〃	〃 ×	1-4¼	〃	17
1	Pl.	12 × 5/16	〃	12.75	17
2	Fill/s	4 × 5/16	0-7	4.25	5
2	⊾	4 × 3 × 3/8	1-0¾	8.45	18
2	P/s	13 × 5/16	0-8¾	13.81	20
1	Pl.	10 × 3/8	1-1¾	12.75	15

108 × 14 = 1.512

Summary for Vertical members = 27,204

Total Summary for 1 Side span = 92,362
Total Summary for 2 Side span = 184.724

Bottom lateral bracings for Side span 2 Required

1	L	5 × 3½ × 3/8 ×	20'-9⅝	10.37	216	7-6
1	〃	〃 ×	20-4⅛	〃	211	
1	〃	〃 ×	9-6⅛	〃	99	
1	〃	〃	9-3⅜	〃	96	
1	〃	〃	10-6	〃	109	
1	〃	〃	10-3¼	〃	106	
1	Pl.	17 × 3/8	2'-8	21.68	58	
2	⊾	5 × 3½ × 3/8	22-3 11/16	10.37	463	6-5
1	L	〃	10-4⅛	〃	107	
1	〃	〃	10-1⅜	〃	105	
1	〃	〃	11-3 13/16	〃	117	
1	〃	〃	11-1 11/16	〃	115	
1	Pl.	17 × 3/8	2'-9	21.68	60	
1	L	5 × 3½ × 3/8	24-4⅜	10.37	253	5-4
1	〃	〃	24-1⅝	〃	250	
2	⊾	〃	11-1	〃	230	
1	L	〃	12-4⅝	〃	128	
1	〃	〃	12-1⅜	〃	126	
1	Pl.	17 × 3/8	2-9¼	21.68	60	
1	L	5 × 3½ × 3/8	26-7¾	10.37	276	4-3
1	〃	〃	26-5	〃	274	
2	⊾	〃	12-0⅜	〃	250	
1	L	〃	13-6¾	〃	141	
1	〃	〃	13-4	〃	138	

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama-Ken

1	Pl.	17 × 3/8	2-10"	21.68	61	1145
1	L	5 × 3½ × 3/8	29-1	10.37	302	3-2
1	"	"	28-10¼	"	299	
1	"	"	13-4⅝	"	139	
1	"	"	13-1⅞	"	136	
2	"	"	14-9¼	"	306	
2	"	4 × 3 × 2.4/8	7-11⅞	6.84	109	
1	Pl.	27 × 3/8	2-7½	34.43	90	1281
1	L	5 × 3½ × 3/8	15-2⅝	10.37	158	2-1
1	"	"	14-11⅞	"	155	
2	"	"	16-8⅜	"	346	
1	"	"	14-8½	"	152	
1	"	"	14-5¾	"	150	
2	"	"	16-2⅝	"	336	
2	"	4 × 3 × 2.4/8	8-5½	6.84	116	
1	Pl.	27 × 3/8	2-8	34.43	92	1505
1	L	5 × 3½ × 3/8	16-2¼	10.37	168	1-0
1	"	"	15-8¾	"	163	
1	"	"	17-8	"	183	
1	"	"	17-5¼	"	181	
1	"	"	15-7½	"	162	
1	"	"	15-2	"	157	
1	"	"	17-1¼	"	177	
1	"	"	16-10½	"	175	
2	"	4 × 3 × 2.4/8	7-8⅞	6.84	106	
4	Pls	4½ × 3/8	1-6½	5.74	35	
1	"	26 × 3/8	2-10¾	33.15	96	
3	Fills	3 × 5/16	0-5¾	3.19	5	
15	Washers	3"ϕ × 5/16"		.63	9	1617
					8,552 × 2 = 17,104	

Center span

Middle chord Mo-CM1 4 Required.

2	Pls	15 × 3/8	17-2½	19.13	658	
2	LS	3½ × 3½ × 3/8	16-4¼	8.96	293	90×90×10
2	"	"	17-2	"	308	"
4	Pls	21 × 5/16	1-10	22.31	163	
20	Lac. Bars.	2½ × 3/8	2-6¾	3.19	163	
2	Pls	30 × 3/8	3-5½	38.25	265	
2	"	14½ × 3/8	2-5½	18.49	91	
2	Fills	8¾ × 3/8	2-5½	11.16	55	
2	Pls	3½ × 3/8	1-8½	4.46	15	
2	"	"	1-7½	"	15	
					2,026 × 4 = 8,104	

CM1 - CM2 4 Required.

2	Pls	15 × 3/8	16-0¾	19.13	614	
2	LS	3½ × 3½ × 3/8	16-0¾	8.96	288	90×90×10
2	"	"	15-11¼	"	286	"
4	Pls	21 × 5/16	1-10	22.31	163	
22	Lac. Bars	2½ × 3/8	2-6¾	3.19	180	
2	Pls	30 × 3/8	3-1	38.25	236	
2	"	14½ × 3/8	2-4	18.49	86	
2	Fills	8¾ × 3/8	2-4	11.16	52	
2	Pls	3½ × 3/8	1-8	4.46	15	

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2	P/s	3½ × 3/8	1-8½	4.46	15
					1.935 × 4 = 7,740

CM2 - CM3 4 Required.

2	P/s	15 × 3/8	15-5½	19.13	592
2	L5	3½ × 3½ × 3/8	15-5½	8.96	277
2	,	"	15-4¼	"	275
2	P/s	30 × 3/8	3-2	38.25	242
2	,	14½ × 3/8	2-2	18.49	80
2	Fills	8¾ × 3/8	2-2	11.16	48
2	P/s	3½ × 3/8	2-1	4.46	19
2	"	"	1-8	"	15
4	P/s	21 × 5/16	1-10	22.31	163
22	Lac. Bars	2½ × 3/8	2-6¾	3.19	180
					1,891 × 4 = 7,564

CM3 - CM4 4 Required.

2	P/s	15 × 3/8	14-10¾	19.13	570
2	L5	3½ × 3½ × 3/8	"	8.96	267
2	,	"	14-10	"	266
4	P/s	21 × 5/16	1-10	22.31	163
16	Lac. Bars	2½ × 3/8	2-6¾	3.19	131
2	P/s	36 × 3/8	4-11	45.90	452
2	,	14½ × 3/8	2-1	18.49	77
2	Fills	8¾ × 3/8	2-1	11.16	46
2	P/s	3½ × 3/8	2-1¼	4.46	19
2	"	"	2-3¼	"	20
					2,011 × 4 = 8,044

CM4 - CM5 4 Required.

2	P/s	15 × 3/8	14-4¾	19.13	551
2	L5	3½ × 3½ × 3/8	14-4¾	8.96	258
2	"	"	14-4	"	257
4	P/s	21 × 5/16	1-10	22.31	163
18	Lac. Bars	2½ × 3/8	2-6¾	3.19	147
2	P/s	29 × 3/8	3-5¼	36.98	254
2	"	14½ × 3/8	2-2¼	18.49	81
2	Fills	8¾ × 3/8	2-2¼	11.16	49
2	P/s	3½ × 3/8	1-11¼	4.46	17
2	"	"	2-0¼	"	18
					1,795 × 4 = 7,180

CM5 - CM6 4 Required.

2	P/s	15 × 3/8	13-11½	19.13	534
2	L5	3½ × 3½ × 3/8	"	8.96	250
2	,	"	13-10½	"	249
4	P/s	21 × 5/16	1-10	22.31	163
18	Lac. Bars	2½ × 3/8	2-6¾	3.19	147
					1,343 × 4 = 5,372

CM6 - CM7 4 Required.

2	P/s	15 × 3/8	13-7	19.13	520
2	L5	3½ × 3½ × 3/8	"	8.96	243
2	,	"	13-6¼	"	242
4	P/s	21 × 5/16	1-10	22.31	163
18	Lac. Bars	2½ × 3/8	2-6¾	3.19	147
2	P/s	29 × 3/8	3-9½	36.98	280

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2	P/s	14½	× ⅜	2-4	18.49	86
2	Fills	8¾	× ⅜	2-4	11.16	52
2	P/s	3½	× ⅜	2-1	4.46	19
2	"			2-0	"	18
						1,770 × 4 = 7,080

CM7 - CM8 4 Required.

2	P/s	15	× ⅜	13-3¼	19.13	508
2	LS	3½	× 3½ × ⅜	13-3¼	8.96	238
2	"			13-2½	"	237
4	P/s	21	× 5/16	1-10	22.31	163
18	Lac. Bars	2½	× ⅜	2-6¾	3.19	147
2	P/s	29	× ⅜	4-0	36.98	296
2	"	14½	× ⅜	2-3	18.49	83
2	Fills	8¾	× ⅜	2-3	11.16	50
2	P/s	3½	× ⅜	2-0	4.46	18
2	"			1-11	"	17
						1,757 × 4 = 7,028

CM8 - CM9 4 Required.

2	P/s	15	× ⅜	13-1	19.13	500
2	LS	3½	× 3½ × ⅜	13-1	8.96	234
2	"			12-11½	"	232
4	P/s	21	× 5/16	1-10	22.31	163
14	Lac. Bars	2½	× ⅜	2-6¾	3.19	114
2	P/s	29	× ⅜	3-11	36.98	290
2	"	14½	× ⅜	2-2	18.49	80
2	Fills	8¾	× ⅜	"	11.16	48
2	P/s	3½	× ⅜	1-11½	4.46	17
2	"			1-10	"	16
						1,694 × 4 = 6,776

CM9 - CM10 4 Required.

2	P/s	15	× ⅜	12-11	19.13	495
2	LS	3½	× 3½ × ⅜	"	8.96	232
2	"			12-9¾	"	230
4	P/s	21	× 5/16	1-10	22.31	163
14	Lac. Bars	2½	× ⅜	2-6¾	3.19	114
2	P/s	28½	× ⅜	4-1	36.34	297
2	"	14½	× ⅜	2-1	18.49	77
2	Fills	8¾	× ⅜	2-1	11.16	46
2	P/s	3½	× ⅜	1-10	4.46	16
2	"			1-8	"	15
						1,685 × 4 = 6,740

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List of Materials for Arakawa-bashi, Saitama-ken.

CM10 - CM11 2 Required

2	Pls	15 × $\frac{3}{8}$	12 - 10¼	19.13	492
2	Ls	3½ × 3½ × $\frac{3}{8}$	"	8.96	230
1	"	"	12 - 8½	"	228
2	Pls	28 × $\frac{3}{8}$	4 - 2¾	35.7	302
2	"	14½ × $\frac{3}{8}$	1 - 11¾	18.49	73
2	Fills	8¾ × $\frac{3}{8}$	"	11.16	44
2	Pls	3½ × $\frac{3}{8}$	"	4.46	18
2	"	"	1 - 9¾	"	16
4	"	21 × $\frac{5}{16}$	1 - 10	22.31	163
14	Lac Bars	2½ × $\frac{3}{8}$	2 - 6¾	3.19	114
2	Pls	29¼ × $\frac{3}{8}$	2 - 3	37.29	168
2	"	14½ × $\frac{3}{8}$	1 - 11¼	18.49	72
2	Fills	8¾ × $\frac{3}{8}$	"	11.16	43
2	Pls	3½ × $\frac{3}{8}$	2 - 2¼	4.46	20
2	"	"	2 - 0¼	"	18
					2,001 × 2 = 4,002

CM11 - CM10' 2 Required.

2	Pls	15 × $\frac{3}{8}$	13 - 1	19.13	500
2	Ls	3½ × 3½ × $\frac{3}{8}$	"	8.96	234
2	"	"	12 - 11¾	"	233
2	Pls	28 × $\frac{3}{8}$	4 - 2¾	35.7	302
2	"	14½ × $\frac{3}{8}$	1 - 11¾	18.49	73
2	Fills	8¾ × $\frac{3}{8}$	"	11.16	44
2	Pls	3½ × $\frac{3}{8}$	"	4.46	18
2	"	"	1 - 9¾	"	16
4	"	21 × $\frac{5}{16}$	1 - 10	22.31	163
14	Lac. Bars	2½ × $\frac{3}{8}$	2 - 6¾	3.19	114
					1,697 × 2 = 3,394

Summary for Middle chord = 79,024

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CALCULATIONS FOR

List of material for Arakawa - Bashi, Saitama-Ken.

		Bottom chord Lo - CL1. 4 Req'd.				
2	Pls	15" × 3/8"	16'-4 3/4"	19.13	627	
2	∠s	4" × 3 1/2" × 1/2"	17'-7 1/2"	11.90	420	
2	"	"	18'-3 3/4"	"	436	
2	Pls	8 1/4" × 1/2"	18'-4 1/4"	14.03	515	
2	"	13 3/4" × 3/8"	17'-5 1/2"	17.53	612	
2	∠s	3 1/2" × 3 1/2" × 3/8"	1'-6"	8.96	27	90 × 90 × 10
1	Pl.	13" × 3/8"	1'-6"	16.58	25	
1	"	15" × 3/8"	1'-11"	19.13	37	
26	Lac. bars.	2 1/2" × 1/2"	2'-8 1/8"	4.25	296	
1	Pl.	21" × 3/8"	1'-11"	2678	51	
2	Pls.	32" × 3/8"	3'-3 1/2"	40.80	268	
2	Fills	14 1/4" × 3/8"	2'-3 1/2"	18.17	83	
2	Pls	14 1/2" × 1/2"	3'-9 1/2"	24.65	187	
2	"	4" × 1/2"	2'-0 1/2"	6.80	28	
1	Pl	23" × 3/8"	3'-5 1/2"	29.33	101	
1	"	37" × 3/8"	"	47.18	163	
					3876 × 4 = 15504	
		CL1 - CL2 4 Req'd.				
2	Pls	15" × 3/8"	18'-0 3/4"	19.13	691	
2	∠s	4" × 3 1/2" × 1/2"	18'-0 3/4"	11.90	430	
2	"	"	17'-11 3/4"	"	428	
2	Pls	8 1/4" × 1/2"	18'-0 1/2"	14.03	506	
2	"	13 3/4" × 3/8"	15'-9"	17.53	552	
2	"	21" × 3/8"	1'-11"	26.78	103	
28	Lac. bars	2 1/2" × 1/2"	2'-8 1/8"	4.25	320	
2	Pls	33 1/2" × 3/8"	3'-0 1/2"	42.71	260	
2	Fills.	14 1/4" × 3/8"	2'-3"	18.17	82	
2	Pls	14 1/2" × 1/2"	3'-9"	24.65	185	
2	"	4" × 1/2"	2'-3 1/4"	6.80	31	
1	Pl.	23" × 3/8"	3'-4 1/2"	29.33	99	
1	"	29 1/2" × 3/8"	3'-4 1/2"	37.61	127	
					3814 × 4 = 15.256	
		CL2 - CL3 4 Req'd.				
2	Pls.	15" × 3/8"	17'-2"	19.13	657	
2	∠s	4" × 3 1/2" × 1/2"	17'-2"	11.90	409	
2	"	"	17'-0 3/4"	"	406	
2	Pls	8 1/4" × 1/2"	17'-1 3/4"	14.03	482	
2	"	13 3/4" × 3/8"	14'-6"	17.53	508	
2	"	21" × 3/8"	1'-11"	26.78	103	
28	Lac. bars.	2 1/2" × 1/2"	2'-8 1/8"	4.25	320	
2	Pls	31" × 3/8"	3'-0 1/2"	39.53	240	
2	Fills	14 1/4" × 3/8"	2'-9 1/2"	18.17	101	
2	Pls	14 1/2" × 1/2"	4'-3 1/2"	24.65	212	
2	"	4" × 1/2"	2'-0 1/2"	6.80	28	
1	Pl.	23" × 3/8"	3'-8"	29.33	108	
1	"	27 1/2" × 3/8"	3'-8"	35.06	129	
					3703 × 4 = 14.812	

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List of material for Arakawa-Bashi, Saitama-Ken.

			CL3 - CL4	4 Req'd.	
2	p/s	15" × 3/8"	16'-3 1/4"	19.13	622
2	L	4 × 3 1/2 × 1/2	16'-3 1/4"	11.90	387
2	"	"	16'-2 1/2"	"	386
2	p/s	8 1/4 × 1/2	16'-3"	14.03	456
2	"	13 3/4 × 3/8	13'-6"	17.53	473
2	"	21 × 3/8	1'-11"	26.78	103
24	Lac. bars.	2 1/2 × 1/2	2'-8 1/8"	4.25	273
2	p/s	30 × 3/8	3'-2"	38.25	242
2	Fills.	14 1/4 × 3/8	2'-8"	18.17	97
2	p/s.	14 1/2 × 1/2	4'-2"	24.65	206
2	"	4 × 1/2	2'-7 3/4"	6.80	36
1	pl.	23 × 3/8	3'-6 1/4"	29.33	103
1	"	27 1/2 × 3/8	3'-6 1/4"	35.06	123
					3.507 × 4 = 14.028

			CL4 - CL5	4 Req'd.	
2	p/s	15 × 3/8	15'-5 3/4"	19.13	592
2	L	4, 3 1/2 × 1/2	15'-5 3/4"	11.90	369
2	"	"	15'-5"	"	367
2	p/s	8 1/4 × 1/2	15'-5 1/2"	14.03	434
2	"	13 3/4 × 3/8	12'-10"	17.53	450
2	"	21 × 3/8	1'-11"	26.78	103
24	Lac.bars.	2 1/2 × 1/2	2'-8 1/8"	4.25	273
2	p/s	29 1/2 × 3/8	3'-2"	37.61	239
2	"	14 3/4 × 1/2	4'-5"	25.08	222
2	Fills.	14 1/2 × 3/8	2'-11"	18.49	108
2	p/s	4 × 1/2	2'-8"	6.80	36
1	pl.	23 × 3/8	3'-8 1/2"	29.33	109
1	"	25 × 3/8	3'-8 1/2"	31.88	118
					3.420 × 4 = 13.680

			CL5 - CL6	4 Req'd.	
2	p/s	15" × 3/8"	14'-9 3/4"	19.37	574
2	L	4 × 3 1/2 × 1/2	14'-0 3/4"	11.90	335
2	"	"	14'-8 1/4"	"	350
2	p/s	8 1/4" × 1/2"	14'-9 1/4"	14.03	415
2	p/s.	13 3/4 × 3/8"	11'-10 1/2"	17.53	416
2	"	21 × 3/8	1'-11"	26.78	103
20	Lac. bars.	2 1/2 × 1/2"	2'-8 1/8"	4.25	228
2	p/s.	29 × 3/8	3'-4"	36.98	246
2	"	14 1/2 × 3/8	2'-9 3/4"	18.49	104
2	"	14 1/2 × 1/2	3'-3 3/4"	24.65	163
2	"	4 × 1/2	2'-3 3/4"	6.80	31
1	pl.	23 × 3/8	3'-8 1/4"	29.33	108
1	"	25 × 3/8	3'-8 1/4"	31.88	118
					3.191 × 4 = 12.764

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			CL6-CL7	4 Req'd.	
2	pls	15" × 3/8	14'-2 1/4"	19.13	543
2	⌊s	4 × 3 1/2 × 1/2	14'-2 1/4"	11.90	338
2	"	"	14'-0 3/4"	"	335
2	pls	8 1/4 × 1/2	14'-1 3/4"	14.03	397
2	"	21 × 3/8	1'-11"	26.78	103
20	Lac. bars.	2 1/2 × 1/2	2'-8 1/8"	4.25	228
2	pls.	29 × 3/8	3'-6"	36.98	259
2	"	14 1/2 × 1/2	2'-8 3/4"	24.65	135
2	"	4 × 1/2	2'-2 3/4"	6.80	30
1	pl.	23 × 3/8	3'-7"	29.33	105
1	"	24 × 3/8	3'-7"	30.60	110
					2.638 × 4 = 10.332
			CL7-CL8	4 Req'd.	
2	pls.	15 × 3/8	13'-8"	19.13	523
2	⌊s	4 × 3 1/2 × 1/2	"	11.90	326
2	"	"	13'-6 1/2"	"	322
2	pls.	8 1/4 × 1/2	13'-7 1/2"	14.03	382
2	"	21 × 3/8	1'-11"	26.78	103
20	Lac. bars.	2 1/2 × 1/2	2'-8 1/8"	4.25	228
2	pls	28 1/2 × 3/8	3'-6"	36.34	254
2	"	14 1/2 × 1/2	2'-9"	24.65	136
2	"	4 × 1/2	2'-3"	6.80	31
1	pl	23 × 3/8	3'-7 1/4"	29.33	106
1	"	22 × 3/8	3'-7 1/4"	28.05	101
					2.512 × 4 = 10.048
			CL8-CL9	4 Req'd.	
2	pls	15" × 3/8	13'-3 1/4"	19.13	508
2	⌊s	4 × 3 1/2 × 1/2	13'-3 1/4"	11.90	316
2	"	"	13'-1 3/4"	"	313
2	pls	8 1/4 × 1/2	13'-2 3/4"	14.03	371
2	"	21 × 3/8	1'-11"	26.78	103
16	Lac. bars.	2 1/2 × 1/2	2'-8 1/8"	4.25	182
2	pls.	28 × 3/8	3'-9"	35.70	268
2	"	14 1/4 × 1/2	2'-9"	24.23	133
2	"	4 × 1/2	2'-3"	6.80	31
1	pl	23 × 3/8	3'-4 1/4"	29.33	98
1	"	21 × 3/8	3'-4 1/4"	26.78	90
					2.413 × 4 = 9.652
			CL9-CL10	4 Req'd.	
2	pls.	15 × 3/8	13'-0"	19.13	497
2	⌊s	4 × 3 1/2 × 1/2	13'-0"	11.90	310
2	"	"	12'-10 1/2"	"	307
2	pls	8 1/4 × 1/2	12'-11 1/2"	14.03	364
2	"	21 × 3/8	1'-11"	26.78	103
16	Lac. bars.	2 1/2 × 1/2	2'-8 1/8"	4.25	182
2	pls	27 1/2 × 3/8	3'-10 3/4"	35.06	273
2	"	14 1/4 × 1/2	2'-4 3/4"	24.23	116

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2	pls	4 × ½	2'-4¾"	6.80	33	
1	pl.	23 × ⅜	3'-6"	29.33	103	
1	"	21 × ⅜	3'-6"	26.78	94	
					2382 × 4	= 9528
			CL10 - CL11	2 Req'd		
2	pls	15" × ⅜	12'-10¼"	19.13	492	
2	ls	4 × 3½ × ½	12'-10¼"	11.90	306	
2	"	"	12'-8¾"	"	303	
2	pls	8¼ × ½	12'-9¾"	14.03	359	
2	"	21 × ⅜	1'-11"	26.78	103	
16	Lac. bars	2½ × ½	2'-8⅜"	4.25	182	
2	pls	29 × ⅜	6'-5"	36.98	475	
2	"	14¼ × ½"	2'-5"	24.23	117	
2	"	4 × ½"	2'-2"	6.80	30	
1	"	23 × ⅜"	2'-8"	29.33	78	
1	"	21 × ⅜	2'-8"	26.78	72	
					2517 × 2	= 5034
			CL11 - CL10'	2 Req'd.		
2	pls	15" × ⅜	13'-0¼"	19.13	498	
2	ls	4 × 3½ × ½	13'-0¼"	11.90	310	
2	"	"	12'-10¾"	"	307	
2	pls	8¼ × ½	12'-11¾"	14.03	364	
2	"	21 × ⅜	1'-11"	26.78	103	
16	Lac. bars	2½ × ½	2'-8⅜"	4.25	182	
					1,764 × 2	= 3528
			Bottom. diaphragms.	42 Req'd.		
4	ls	2½ × 3½ × 5/16	0'-6⅜"	7.81	16	
2	"	4 × 3 × 5/16	0'-6"	8.45	8	
1	pl	6⅜ × 5/16	1'-1"	6.51	7	
					31 × 42	= 1,302

Summary of Bottom chord = 135,468#.

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama-Ken.

Diagonal MO-CL1 4 Required.

4	Ls	4 × 3 × 3/8	15-4	8.45	518
2	Pls	13 × 5/16	1-3	13.81	35
17	Lac. Bars	2 × 5/16	1-2 1/8	2.13	43
					596 × 4 = 2,384

CM1-CL2 4 Required

4	Ls	4 × 3 × 3/8	14-3 1/2	8.45	483
2	Pls	13 × 5/16	1-0	13.81	27
15	Lac. Bars.	2 × 5/16	1-2 1/8	2.13	38
					548 × 4 = 2,192

CM2-CL3 4 Required

4	Ls	4 × 3 × 3/8	13-3	8.45	448
2	Pls	13 × 5/16	1-0		27
14	Lac. Bars	2 × 5/16	1-2 1/8		35
					510 × 4 = 2040

CM3-CL4 4 Required

4	Ls	4 × 3 × 3/8	12-3	8.45	414
2	Pls	13 × 5/16	1-0		27
13	Lac. Bars	2 × 5/16	1-2 1/8		33
					474 × 4 = 1.896

CM4-CL5 4 Required.

4	Ls	4 × 3 × 3/8	11-9 1/2	8.45	399
2	Pls	13 × 5/16	1-3	13.81	35
12	Lac. Bars	2 × 5/16	1-2 1/8		30
					464 × 4 = 1.856

CM5-CL6 4 Required

4	Ls	4 × 3 × 3/8	11-3 1/2	8.45	382
2	Pls	13 × 5/16	1-3		35
11	Lac. Bars	2 × 5/16	1-2 1/8		28
					445 × 4 = 1.780

CM6-CL7 4 Required

2	Ls	4 × 3 × 3/8	10-9	8.45	182
2	"	"	11-0	"	186
1	Pl.	13 × 5/16	1-3	13.81	17
1	"	"	1-0	"	13
11	Lac. Bars	2 × 5/16	1-2 1/8		28
					426 × 4 = 1.704

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3.9.1

		CM7-CL8	**4 Required**		
4	LS	4 x 3 x 3/8	10-5½	8.45	353
2	P/S	13 x 5/16	1-3	13.81	35
11	Lac. Bars	2 x 5/16	1-2⅛	2.13	28
					416 x 4 = 1,664
		CM8-CL9	**4 Required**		
4	LS	4 x 3 x 3/8	10-1	8.45	341
2	P/S	13 x 5/16	1-3	13.81	35
10	Lac. Bars	2 x 5/16	1-2⅛		25
					401 x 4 = 1,604
		CM9-CL10	**4 Required**		
2	LS	4 x 3 x 3/8	9-10½	8.45	167
2	"	"	10-0½	"	170
1	P/L	13 x 5/16	1-6	13.81	21
1	"	"	1-3	"	17
10	Lac. Bars	2 x 5/16	1-2⅛		25
					400 x 4 = 1600
		CM10-CL11	**2 Required**		
4	LS	4 x 3 x 3/8	10-0½	8.45	339
2	P/S	13 x 5/16	1-6	13.81	41
10	Lac. Bars	2 x 5/16	1-2⅛		25
					405 x 2 = 810
		CL11-CM10	**2 Required**		
4	LS	4 x 3 x 3/8	10-2½	8.45	345
2	P/S	13 x 5/16	1-6	13.81	41
10	Lac. Bars	2 x 5/16	1-2⅛		25
					411 x 2 = 822

Summary of Diagonals = 20350

	Panel point	**Lo**	**4 Required**			
2	Pls	32 x 3/8	2-10		40.8	231
2	"	25 x ½	2-11⅝		42.5	252
2	"	32 x 3/8	3-6		40.8	286
2	"	55 x 3/8	4-9½		70.1	671
2	"	32 x ½	3-6		54.4	381
2	"	41 x 3/8 ½	3-7		52.28	374
2	LS	6 x 6 x ½	1-3		19.6	49
2	P/S	15 x 3/8	2-0		19.13	77
2	"	14 x 3/8	2-0		17.85	71
2	"	13 x 3/8	2-3		16.58	75
8	LS	4 x 4 x 3/8	0-8¼		9.8	54
1	P/L	8¼ x 3/8	1-0		10.52	11
1	"	"	1-1		"	11
2	Fills	5½ x 3/8	0-8¼		7.01	10
2	"	3¼ x 3/8	1-5¼		4.14	12
2	LS	3½ x 3½ x 3/8	2-11½		8.96	53

90 x 90 x 10

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CALCULATIONS FOR

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List of Materials for Arakawa Bashi, Saitama-Ken.

2	Pls	15 × 3/8	×	2-7	19.13	99
4	Ls	3½ × 3½ × 3/8	×	5-1½	8.96	184
2	Pls	8¼ × 3/8	×	5-6½	10.52	117
						3,018 × 4 = 12,072

Summary of Gusset plates at Lo = 12,072

Vertical members Lo-Mo, Mo-No & No-Uo 4 Required

2	Pls	15 × 3/8	×	29-2		19.13	1 115	
4	Ls	3½ × 3½ × 3/8	×	29-2	17	8.96	1 045	90×90×10
2	Pls	8¼ × 3/8	×	23-6	5	10.52	495	
2	Pls	15 × 3/8	×	31-3 5/32	6	19.13	1 195	
4	Ls	3½ × 3½ × 3/8	×	31-3 5/32	"	8.96	1 120	do
1	Pl.	15 × 3/8	×	22-10½	8	19.13	438	
1	"	"	×	22-0¼	2	"	421	
2	Ls	3½ × 3½ × 3/8	×	21-11	12	8.96	393	do
2	"	"	×	22-0¼	2	"	395	do.
2	Pls	43 × 3/8	×	5-0		54.83	548	
332	Lac Bars	2 × 5/16	×	1-0 3/4	06	2.13	749	
4	Pls	12 × 5/16	×	1-3	5	12.75	64	
4	Ls	3 × 3 × 5/16	×	3-7½	03	6.1	89	
1	Pl.	11½ × 5/16	×	3-7½	"	12.22	44	
4	Ls	3 × 3 × 5/16	×	2-11½	96	6.1	72	
1	Pl.	12 × 5/16	×	2-11½	"	12.75	38	
4	Ls	3 × 3 × 5/16	×	3-7 3/4	65	6.1	89	
1	Pl.	12 × 5/16	×	3-7 3/4	"	12.75	47	
2	Ls	3 × 3 × 5/16	×	1-3¼	27	6.1	16	
2	"	"	×	1-4¼	35	"	16	
1	Pl.	12 × 5/16	×	1-4¼	"	12.75	17	
2	Fills	4 × 5/16	×	0-7	58	4.25	5	
2	Ls	4 × 3 × 3/8	×	1-0¾	06	8.45	18	
2	Pls	12 × 5/16	×	0-8¾	73	12.75	19	
1	"	13¾ × 3/8	×	1-4¼	35	17.53	24	
4	"	15 × 3/8	×	2-0		19.13	153	
4	Fills	8¼ × 3/8	×	2-0		10.52	84	
4	Pls	14 × 3/8	×	2-0		17.85	143	
2	Pls	13 × 3/8	×	2-3		16.58	75	
							8,927 × 4 = 35,708	

CL1-CM1, CM1-CN1 & CN1-CU1 4 Required

2	Ls	8 × 2½ @ 15.12		24-0¾	15.12	727
2	"	"		25-6½	"	771
1	"	"		22-8½	"	343
1	"	"		22-9¾	"	345
2	Pls	13 × 5/16		1-0½	13.81	29
6	"	"		0-7½	"	52
254	Lac-Bars	2 × 5/16		1-2⅝	2.13	660
2	Pls	13 × 5/16		0-8½	13.81	20
4	Ls	3 × 3 × 5/16		11-9½	6.1	44
1	Pl.	12 × 5/16		1-9½	12.75	23
4	Pls	8 × 3/8		2-0	10.52	82
4	"	13 × 3/8		2-0	16.58	133
						3229 × 4 = 12,916

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List of Materials for Arakawa-Baashi, Saitama-Ken.

CL2-CM2, CM2-CN2 & CN2-CU2 — 4 Required

2	ES	8 × 2½	22-0	15.12	665
2	"	"	15-11	"	481
1	"	"	22-10¼	"	345
1	"	"	22-11½	"	347
198	Lac. Bars	2 × 5/16	1-2⅝	2.13	514
2	PLs	13 × 5/16	1-0½	13.81	29
6	"	"	0-7½	"	52
2	"	"	0-8½	"	20
4	LS	3 × 3 × 5/16	1-7½	6.1	40
1	PL	12 × 5/16	1-7½	12.75	21
4	PLs	8 × ⅜	2-0	10.2	82
4	"	13 × ⅜	2-0	16.58	133

2729 × 4 = 10,916

CL3-CN3 & CN3-CU3 — 4 Required

2	ES	8 × 2½	26-6¼	15.12	802
1	"	"	23-0	"	348
1	"	"	23-1¼	"	249
2	PLs	13 × 5/16	1-0½	13.81	29
6	"	"	0-7½	"	52
2	"	"	0-8½	"	20
162	Lac. Bars	2 × 5/16	1-2⅝	2.13	421
4	LS	3 × 3 × 5/16	1-7½	6.1	40
1	PL	12 × 5/16	1-7½	12.75	21
2	PLs	13 × ⅜	2-0	16.58	66
2	"	8 × ⅜	2-0	10.2	41

2089 × 4 = 8,356

CL4-CM4 & CM4-CU4 — 4 Required

2	ES	8 × 2½	16-7¼	15.12	502
1	"	"	22-11	"	346
1	"	"	23-0¼	"	348
132	Lac. Bars	2 × 5/16	1-2⅝	2.13	343
2	PLs	13 × 5/16	1-0½	13.81	29
4	"	"	0-7½	"	35
4	LS	3 × 3 × 5/16	1-7	6.1	39
1	PL	12 × 5/16	1-7	12.75	20
2	PLs	13 × ⅜	2-0	16.58	66
2	"	8 × ⅜	2-0	10.2	41

1769 × 4 = 7,076

CL5-CU5 — 4 Required

11	ES	8 × 2½	30-10⅝	15.12	467
1	"	"	30-11⅜	"	468
2	PLs	13 × 5/16	1-0½	13.81	29
4	"	"	0-7½	"	35

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CALCULATIONS FOR

List of Material for Arakawa-Bashi, Saitama-Ken.

106	Lac. Bars	2 × 5/16	×	1-2 5/8	2.13	276
4	LS "	3 × 3 × 5/16	×	1-6	6.1	37
1	Pl.	12 × 5/16	×	1-6	12.75	19
						1331 × 4 = 5324
			CL6-CM6-CU6		4 Required	
1 ✓	I ✓	8 × 2½	×	23-7¼	15.12	357
1 ✓	"	"	×	23-8½	"	358
2 ✓	Pls	13 × 5/16	×	1-0½	13.81	29
4 ✓	"	"	×	0-7½	"	35
74 ✓	Lac. Bars	2 × 5/16	×	1-2 5/8	2.13	192
4	LS	3 × 3 × 5/16	×	1-5½	6.1	36
1 ✓	Pl. ✓	12 × 5/16	×	1-5½	12.75	19
						1026 × 4 = 4.104
			CL7-CM7-CU7		4 Required	
1 ✓	I	8 × 2½	×	17-8¼	15.12	268
1 ✓	"	"	×	17-9½	"	269
2 ✓	Pls	13 × 5/16	×	1-0½	13.81	29
4 ✓	"	"	×	0-7½	"	35
50 ✓	Lac. Bars	2 × 5/16	×	1-2 5/8	2.13	130
4 ✓	LS	3 × 3 × 5/16	×	1-5	6.1	35
1 ✓	Pl.	12 × 5/16	×	1-5	12.75	18
						784 × 4 = 3136
			CL8-CM8-CU8		4 Required	
1 ✓	E	8 × 2½	×	13-0¾	15.12	197
1 ✓	" ✓	"	×	13-2	"	200
2 ✓	Pls	13 × 5/16	×	1-0½	13.81	29 ✓
4 ✓	"	"	×	0-7½	"	35
32 ✓	Lac. Bars	2 × 5/16	×	1-2 5/8	2.13	83
4 ✓	LS	3 × 3 × 5/16	×	1-4	6.1	32
1 ✓	Pl.	12 × 5/16	×	1-4	12.75	17
						593 × 4 = 2,372
			CL9-CU9		4 Required	
1 ✓	E	8 × 2½	×	9-7	15.12	145
1 ✓	"	"	×	9-8¼	"	147
2 ✓	Pls	13 × 5/16	×	1-0½	13.81	29
4 ✓	"	"	×	0-7½	"	35
18 ✓	Lac. Bars	2 × 5/16	×	1-2 5/8	2.13	47
4 ✓	LS	3 × 3 × 5/16	×	1-3½	6.1	32
1 ✓	Pl. ✓	12 × 5/16	×	1-3½	12.75	16
						451 × 4 = 1,804

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CALCULATIONS FOR

List of material for Arakawa-bashi, Saitama-Ken. Revised 3-5-11

CL10-CU10 4 Required

1	L	8 × 2½ ×	7-8¾	74	15.12		117
1	〃	〃 ×	7-10	83	〃		118
2	Pls	13 × 5/16 ×	0-7½	6	13.81		17
2	〃	〃 ×	1-0½	04	〃		29
14	Lac. Bars	2 × 5/16 ×	1-2⅝	22	2.13		36
2	Ls	3 × 3 × 5/16 ×	2-5	42	6.1		30
2	〃	〃 ×	2-4	33	〃		28
1	Pl.	12 × 5/16 ×	2-5	42	12.75		31
2	Fills	4 × 5/16 ×	6-7	78	4.25		5
2	Ls	4 × 3 × 3/8 ×	1-0¾	06	8.45		18
2	Pls	13 × 5/16 ×	0-8¾	3	13.81		20
1	Pl.	10 × 3/8 ×	1-1¾	15	12.75		15
							464 × 4 = 1,856

CL11-CU11 2 Required

1	L	8 × 2½ ×	7-0¾	06	15.12		107
1	〃	〃 ×	7-2	17	〃		108
2	Pls	13 × 5/16 ×	0-7½	63	13.81		17
2	〃	〃 ×	1-0½	04	〃		29
12	Lac. Bars	2 × 5/16 ×	1-2⅝	22	2.13		31
2	Ls	3 × 3 × 5/16 ×	1-0½	88	6.1		23
2	〃	〃 ×	1-9½	79	〃		22
1	Pl.	12 × 5/16 ×	1-10½	88	12.75		24
2	Fills	4 × 5/16 ×	0-7	78	4.25		5
2	Ls	4 × 3 × 3/8 ×	1-0¾	6	8.45		18
2	Pls	13 × 5/16 ×	0-8¾	73	13.81		20
1	Pl.	10 × 3/8 ×	1-1¾	15	12.75		15
							419 × 2 = 838

Common part of Vertical members 36 Required

2	Ls	3 × 3 × 5/16 ×	1-3¼	71	6.1		16
2	〃	〃 ×	1-4¼	35	〃		17
1	Pl.	12 × 5/16 ×	1-4¼	71	12.75		17
2	Fills	4 × 5/16 ×	0-7	58	4.25		5
2	Ls	4 × 3 × 3/8 ×	1-0¾	06	8.45		18
2	Pls	13 × 5/16 ×	0-8¾	73	13.81		20
1	〃	10 × 3/8 ×	1-1¾	15	12.75		15
							108 × 36 = 3,888

Summary for Vertical Members = 98,294

Total Summary for Center span = 345,208

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CALCULATIONS FOR

List of materials for Arakawa-bashi. Saitama-Ken

Pins or bolts for Center span shoes

4	Pins	7½"φ x for 7½"φ Pin	2-7¾"	150.21	1892
8	Nuts			@ 14.43	114
2	Pilot nuts	"	0-3	@ 16.0	32
64	Bolts	1¼"φ	0-5¼	@ 3.55	227
32	Anchor bolts	1½"φ	3-6	@ 24.0	768
32	Washers	6" x ½	0-6	@ 10.2	163
					2896

Pins, Rollers, Anchor bolt, etc for side span shoes

4	Pins	3½"φ	1-4¾"	32.71	183
8	nuts	for 3½"φ Pin		@ 2.5	20
12	Rollers	4½"φ	1-4½	54.07	895
8	P/s	3" x ⅜	1-1	3.83	33
24	Bolts	⅞"φ	0-2¼	@ 0.5	12
8	P/s	5⅝ x ¼	1-7¼	4.78	61
40	Tapped bolts	⅝"φ	0-7	@ 0.03	1
16	Anchor bolts	1¼"φ	2-6	@ 12.2	195
16	Washers	6 x ⅜	0-6	7.65	61
					1,461

Summary for Shoes, Pins, Roller etc = 4,367

Cast steel shoe for center span (鋳鋼ノ部)

4	Top shoe	@ 2853.0	11412
4	Bottom	@ 4200.0	16800
4	Diaphragm	@ 471.0	1884
			30096

Cast steel shoe for side span (鋳鋼ノ部)

4	Top brackets	@ 307.0	1228
4	shoes	@ 248.0	992
4	Bed p/s	@ 253.0	1012
8	Dust guards	@ 28.0	224
			3456

Summary for Cast steel shoe = 33,552

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi Saitama-Ken

		Center span Bottom lateral braeings		2 Required			
✓	1	L	6 × 6 × 3/8	16-8 5/8	14.9	249	0-1
✓	1	〃	〃	16-2 5/8	〃	242	
✓	1	〃	〃	16-1	〃	240	
✓	1	〃	〃	15-7	〃	232	
✓	1	〃	〃	17-6	〃	261	
✓	1	〃	〃	17-0	〃	253	
✓	1	〃	〃	15-3 5/8	〃	228	
✓	1	〃	〃	14-9 5/8	〃	221	
	2	ls	4 × 3 × 2.4/8	7-6 1/2	6.84	103	
	1	Pl.	3 × 5/16	0-5 3/4	3.19	2	
	5	Washers	3"φ × 5/16		24.033	3	
✓	2	Pls	5 1/2 × 3/8	1-9 1/2	7.01	25	
✓	1	Pl.	33 × 3/8	3-11	42.08	165	
✓	1	L	6 × 6 × 3/8	15-11 1/8	14.9	237	2
✓	1	〃	〃	15-8 5/8	〃	234	
✓	1	〃	〃	31-6 3/8	〃	470	
✓	1	〃	〃	31-3 3/8	〃	466	
✓	1	〃	〃	14-5 1/4	〃	215	
✓	1	〃	〃	13-11 1/4	〃	208	
	2	ls	4 × 3 × 2.4/8	8-2 5/8	6.84	113	
	1	Pl.	3 × 5/16	0-5 3/4	3.19	2	
	5	Washers	3"φ × 5/16		24.033	3	
✓	1	Pl.	34 × 3/8	3-7 1/2	43.35	157	2105
✓	1	L	6 × 6 × 3/8	14-4 7/16	14.9	215	2-3
✓	1	〃	〃	14-3 3/8	〃	213	
✓	1	〃	〃	28-7 3/8	〃	426	
✓	1	〃	〃	28-5 7/8	〃	425	
✓	1	〃	〃	13-0 1/2	〃	194	
✓	1	〃	〃	12-9 1/2	〃	191	
	2	ls	4 × 3 × 2.4/8	7-8 3/4	6.84	106	
	1	Pl.	3 × 5/16	0-5 3/4	3.19	2	
	5	Washers	3"φ × 5/16		24.033	3	
✓	1	Pl.	33 × 3/8	3-6	42.08	147	1972
✓	2	ls	6 × 6 × 3/8	12-10 1/2	14.9	384	3-4
✓	1	L	〃	26-1 1/2	〃	389	
✓	1	〃	〃	25-10 1/2	〃	386	
✓	1	〃	〃	11-8 1/2	〃	174	
✓	1	〃	〃	11-5 1/2	〃	171	
✓	1	Pl.	27 × 3/8	3-9 1/2	34.43	131	1695
✓	2	ls	6 × 6 × 3/8	11-8 7/8	14.9	350	4-5
✓	1	L	〃	23-10 3/4	〃	356	
✓	1	〃	〃	23-7 3/4	〃	352	
✓	1	〃	〃	10-8	〃	159	
✓	1	〃	〃	10-5	〃	155	
✓	1	Pl.	27 × 3/8	3-6	34.43	121	1493
✓	2	ls	6 × 6 × 3/8	10-8 9/16	14.9	319	5-6
✓	2	〃	〃	21-9 9/16	〃	651	
✓	2	〃	〃	9-8	〃	288	1258
✓	1	Pl.	26 × 3/8	3-5	33.15	113	6-7
✓	1	L	5 × 5 × 3/8	10-1 7/8	11.91	120	130-130-9
✓	1	〃	〃	9-9 7/8	〃	117	
✓	1	〃	〃	20-6 5/8	〃	245	
✓	1	〃	〃	20-2 7/8	〃	241	
✓	2	ls	〃	9-3	〃	220	
✓	1	Pl.	22 × 3/8	3-3 3/4	28.05	93	1149

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CALCULATIONS FOR

List of materials for Arakawa-bashi Saitama-Ken

1	L	5 × 5 × 3/8	9 L 5 5/8	@ 11.91	113	7-8	130×130×9	
1	〃	〃	9 L 1 5/8	〃	109		〃	
1	〃	〃	19 L 3 1/4	〃	230		〃	
1	〃	〃	18 L 1 1/4	〃	226		〃	
2	⊔	〃	8 L 8 3/8	〃	207		〃	
1	Pl.	21 〃	3/8 2 L 1 1/4	26.78	79	9-4		
1	L	5 × 3 1/2 × 3/8	9 L 1 7/8	10.37	95		8-9	
1	〃	〃	8 L 1 1/8	〃	93			
2	⊔	〃	18 L 5 1/8	〃	382			
1	L	〃	8 L 8 1/2	〃	90			
1	〃	〃	8 L 5 3/4	〃	88			
1	Pl.	17 〃	3/8 2 L 8	21.68	58	8-6		
1	L	5 × 3 1/2 × 3/8	8 L 9 1/4	10.37	91		9-10	
1	L	〃	8 L 6 1/2	〃	89			
2	⊔	〃	17 L 9 5/8	〃	369			
1	L	〃	8 L 5 7/8	〃	88			
1	〃	〃	8 L 3 3/8	〃	86			
1	Pl.	17 〃	3/8 2 L 7 3/4	21.68	57	7-7		
					14335	× 2 =	28,670	

BOTTOM LATERAL BRACINGS

1	L	5 × 3 1/2 × 3/8	8 L 5 7/8	@ 10.37	88		10-11
1	〃	〃	8 L 3 3/8	〃	86		
2	⊔	〃	17 L 5 5/8	〃	361		
1	〃	〃	8 L 5	〃	87		
1	〃	〃	8 L 2 1/4	〃	85		
1	Pl.	17 ×	3/8 2 L 7 1/2	21.68	57		
1	L	5 × 3 1/2 × 3/8	8 L 5 7/8	10.37	88		11-10
1	〃	〃	8 L 3 3/8	〃	86		
2	⊔	〃	17 L 7 5/8	〃	365		
1	L	〃	8 L 7	〃	89		
1	〃	〃	8 L 4 1/4	〃	87		
1	Pl.	17 ×	3/8 2 L 7 1/2	21.68	57		10-6
					1,536		1,536

Summary of center span Bottom lateral bracings: 30,206

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CALCULATIONS FOR

List of Materials for Arakawa-bashi, Saitama-Ken

FLOOR BEAMS. FB1.2.3.4.5.6.7.9.10.11.13.14.15.17.18. & FB19 31 Req'd.

1	Web Pl.	15¼ × 5/16"	18'-4½	@ 16.21	298	
4	Flg. L	3½ × 3½ × ⅜	18'-5¼	8.96	661	90×90×10
4	L	6" × 3½ × ⅜	1'-3	11.64	58	
8	L	3½ × 3½ × ⅜	1'-3	8.96	90	90×90×10
8	Fills	3½ × ⅜	0'-8¼	4.46	25	
6	"	7" × ⅜	0'-7½	8.93	34	
					1166 × 31 =	36,146

FLOOR BEAMS. FB8.12. & FB16 6 Req'd.

1	Web Pl.	15¼ × 5/16	18'-4½	16.21	298	
4	Flg. L	3½ × 3½ × ⅜	18'-5¼	8.96	661	90×90×10
4	L	6 × 3½ × ⅜	1'-3	11.64	58	
8	"	3½ × 3½ × ⅜	1'-3	8.96	90	90×90×10
8	Fills.	3½ × ⅜	0'-8¼	4.46	25	
3	"	7" × ⅜	0'-7½	8.93	17	
3	L	5 × 3½ × ⅜	1'-1	10.37	34	
					1183 × 6 =	7,098

STRINGERS. S1L~S6L. S8L~S10L. S12L~S14L. S16L~S18L / S19~S24. S26~S28. S30~S32. & S34~S36 } 87 Req'd.

1	I	12 × 5	12'-7½	@ 31.99	404	
4	L	5 × 3½ × ⅜	0'-9½	10.37	33	
					437 × 87 =	38,019

STRINGERS S7L. S11L. S15L. S25. S29 & S33 18 Req'd.

1	I	12" × 5	12'-6½	@ 31.99	401	
2	L	5 × 3½ × ⅜	0'-9½	10.37	16	
					417 × 18 =	7,506

STRINGERS S1BAL & S36A 3 Req'd.

1	I	12 × 5"	12'-9½	@ 31.99	409	
6	L	5 × 3½ × ⅜	0'-9½	10.37	33	
					442 × 3 =	1,326

STRINGER S40A 3 Req'd.

1	I	12 × 5	1'-0¼	@ 31.99	33	
2	L	5 × 3½ × ⅜	0'-9½	10.37	16	
					49 × 3 =	147

STRINGER S40 3 Req'd.

1	I	12" × 5	1'-1½	@ 31.99	36	
2	L	5 × 3½ × ⅜	0'-9½	10.37	16	
					52 × 3 =	156

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CALCULATIONS FOR

List of materials for Arakawa-bashi Saitama-Ken

FASCIA STRINGERS. FS2R_L-FS6R_L. FS9R_L-FS10R_L. FS13R_L-FS14R_L FS17R_L & FS18R_L 42 Reqd.

3	L	3 × 3 × 5/16	12'-8½	@ 6.1	233		
1	Web Pl.	15¾ × 5/16	12'-8½	16.21	206		
3	L	3½ × 3½ × 3/8	0'-8⅝	8.96	19	(+1)	90×90×10
1	Pl.	11⅝ × 5/16	1'-0⅝	12.35	12	(+2)	中央スプライス1方
1	Fill.	6⅝ × 5/16	0'-9	7.04	5	(+2)	
					474	× 42 =	19950
							5
							19955

FASCIA STRINGER FS1R_L 2 Reqd.

3	L	3 × 3 × 5/16	13'-11	@ 6.1	255		
1	Web Pl	15¾ × 5/16	13'-11	16.21	226		
4	L	3½ × 3½ × 3/8	0'-8⅝	8.96	26		90×90×10
1	Pl	11⅝ × 5/16	1'-0⅝	12.35	12		
1	Fill	6⅝ × 5/16	0'-9	7.04	5		
					524	× 2 =	1,048

FASCIA STRINGERS FS1AR_L 2 Reqd.

3	L	3 × 3 × 5/16	13'-9¾	@ 6.1	253		
1	Web Pl.	15¾ × 5/16	13'-9¾	16.21	224		
4	L	3½ × 3½ × 3/8	0'-8⅝	8.96	26		90×90×10
1	Pl.	11⅝ × 5/16	1'-0⅝	12.35	12		
1	Fill	6⅝ × 5/16		7.04	5		
					520	× 2 =	1,040

FASCIA STRINGER FS18AR_L 2 Reqd.

3	L	3 × 3 × 5/16	13'-10½	@ 6.1	254		
1	Web. Pl.	15¾ × 5/16	12'-10½	16.21	209		
2	L	3½ × 3½ × 3/8	0'-8⅝	8.96	13		90×90×10
					476	× 2 =	952

FASCIA STRINGERS FS7R_L FS11R_L & FS15R_L 12 Reqd.

1	L	3 × 3 × 5/16	12'-2¾	@ 6.1	74		
1	Web Pl.	15¾ × 5/16	12'-2¾	16.21	198		
2	L	3 × 3 × 5/16	11'-4¾	6.1	138		
4	L	4 × 3½ × 2.4/8	0'-8½	7.34	21		
2	Pls	8½ × ½	0'-8½	14.45	21		
2	L	3½ × 3½ × 3/8	0'-8⅝	8.96	13		
					465	× 12 =	5,580

FASCIA STRINGERS FS8R_L. FS12R_L & FS16R_L 12 Reqd.

1	L	3 × 3 × 5/16	13'-1¾	@ 6.1	80		
1	Web	15¾ × 5/16	13'-11¾	16.21	227		
2	L	3 × 3 × 5/16	13'-11¾	6.1	171		
4	L	3½ × 3½ × 3/8	0'-8⅝	8.96	26		90×90×10
1	Pl	11⅝ × 5/16	1'-0⅝	12.35	12		
1	Fill.	6⅝ × 5/16	0'-9	7.04	5		
					521	× 12 =	6,252

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CALCULATIONS FOR

List of materials for Arakawa-bashi. Saitama-Ken

LATERAL BRACINGS. GUSSET PLATES & STRUTS.

29	L's	3½ × 3½ × 3/8	20 ℄ 10	@ 8.96	5412	90×90×10
1	〃	〃	21 ℄ 0	〃	188	
59	〃	〃	10 ℄ 2¼	〃	5387	
1	〃	〃	10 ℄ 4¼	〃	93	
30	P/s	7" × 3/8	1 ℄ 8½	8.93	458	
6	L's	3½ × 3½ × 5/8	20 ℄ 2	8.96	1084	90×90×10
6	〃	〃	9 ℄ 8 5/8	〃	521	
6	〃	〃	9 ℄ 11 5/8	〃	536	
6	P/s	7" × 5/8	1 ℄ 9	8.93	94	
6	L's	3½ × 3½ × 3/8	17 ℄ 11¼	8.96	964	90×90×10
180	〃	4 × 3 × 3/8	0 ℄ 6	8.45	761	
18	〃	〃	0 ℄ 5¼	〃	67	
44	P/s.	17½ × 5/16	1 ℄ 9	18.59	1431	
2	〃	19½ × 5/16	1 ℄ 11	20.72	80	
4	〃	14 × 5/16	1 ℄ 5½	14.88	87	
12	〃	18½ × 5/16	1 ℄ 8½	19.66	403	
12	〃	10 × 5/16	1 ℄ 5½	10.63	186	
12	〃	17½ × 5/16	2 ℄ 1½	18.59	475	
12	〃	17¼ × 5/16	1 ℄ 5½	18.33	321	
					18,548	18,548

108	3/4" Bolts	× 2"	@ .63	68
618	5/8" 〃	× 1¾	〃 .38	235
12	1" 〃	× 3	〃 1.54	18
				321

	321

Summary of Top bracing Floor beams and stringers center and side span

144,094

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CALCULATIONS FOR

List of materials for Arakawa-Bashi, Saitama-Ken

		Sway Bracing Panel no. ⑥ 2- Required					
		Bracing.					
2	ls	5 × 3½ × 3/8	× 27'-11	10.37	579		
2	〃	〃	× 28-1½	〃	583		
4	〃	〃	31-11/4	〃	1325		
4	〃	〃	36-0½	〃	1495		
4	〃	3½ × 3½ × 3/8	15-3⅝	8.96	548		90×90×10
4	〃	〃	14-6⅜	〃	521		
2	〃	〃	9'-6¼	〃	171		
1	Pl	14 × 5/16	1-6	14.88	22		
4	Pls	〃	1-3	〃	74		
						5,318	
		Strut SN1.					
4	Ls	4 × 3 × 2.4/8	× 17-11¾	6.84	492		
10	Pls	6½ × 5/16	× 0-6½	6.91	38		
						530	
		SUM.					
4	Ls	5 × 3 × 3/8	× 24'-1/4"	9.72	937		
28	Lac. Bars	2 × 5/16	× 1-0½	2.13	62		
1	Pl.	19½ × 5/16	3-2½	20.72	67		
						1,066 ✓	
		SMO					
4	Ls	5 × 3 × 3/8	× 26'-2½	9.72	1,019		
32	Lac. Bars	2 × 5/16	× 1'-0½	2.13	71		
1	Pl.	19½ × 5/16	× 2-10½	20.72	61		
						1,150 ✓	
		Bracket BK1					
4	Ls	3½ × 3 × 3/8	× 0-11	7.81	29		
4	〃	3 × 3 × 3/8	× 1-1	6.10	26		
2	Pls	12 × 5/16	× 1-4	12.75	34		
						89	
		BK2.					
4	Ls	3 × 3 × 5/16	× 3-2⅜	6.10	78	78	
2	Pls	15 × 5/16	〃	15.94	102	102	
2	fillers	6¼ × 1/2 ✓	1-0	10.63 ✓	21 ✓	21 ✓	
2	〃	〃	1-5½	〃 ✓	31 ✓	23 ✓	
						232 ✓	
		BK3.					
4	Ls	3 × 3 × 5/16	× 2-6½	6.10	62		
2	Pls	18 × 5/16	× 〃	19.13	97		
						159	
		BK4					
4	Ls	3 × 3 × 5/16	× 1-9	6.10	43		
4	〃	5 × 3 × 3/8 ✓	× 0-7½	9.72 ✓	24 ✓		
4	〃	〃	× 0-5½	〃	18 ✓		
2	Pls	18 × 5/16	× 3-1½	19.13	120		
						205 ✓	
		BK5.					
4	Ls	3 × 3 × 5/16	× 0-11½	6.10	23		
4	〃	5 × 3 × 3/8 ✓	× 1-2½	9.72 ✓	47 ✓		
2	Pls	15 × 5/16	× 1-3	15.94	40		
						110 ✓	
						8,859 ✓ × 2 = 17,718 ✓	

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CALCULATIONS FOR

List of Materials for Arakawa-Baashi, Saitama-Ken.

		Panel no. ①		2-Req'd.		
		Bracing.				
2	L's	5 × 3½ × 3/8	32'-1"	10.37	666	
2	"	"	32'-10⅛"	"	682	
1	Pl.	8½ × 5/16	1'-0½	9.03	9	
1	"	"	1'-0	"	9	
1	"	9 × 5/16	1'-0	9.56	10	
						1,376
		Strut SN1				530
		SM1				
4	L's	5 × 3 × 3/8 ✓	23-9¼	9.72 ✓	924 ✓	
33	Lac. Bars	2 × 5/16	1-0½	2.13	73	
						997 ✓
		SL1				
4	L's	5 × 3 × 3/8 ✓	28'10"	9.72 ✓	1,121 ✓	
1	Pl.	20 × 5/16	29'-10½	21.25	634	
1	L	4 × 3 × 2.4/8	1-7⅜	6.84	11	
1	Pl.	12½ × 5/16	1-3	13.28	17	
1	fill.	3 × 2.4/8	1-2	2.87	3	
1	Pl.	11⅜ × 3/8	1-6½	14.50	22	
4	L's	5 × 3 × 3/8 ✓	1-7	9.72 ✓	61 ✓	
						1,869 ✓
		Bracket BK 11.				
4	L's	3 × 3 × 5/16	0-10½	6.10	21	
4	"	3½ × 3 × 3/8	"	7.81	27	
2	Pl's	10 × 5/16	1-2	10.63	25	
						73
		BK12.				
4	L's	3 × 3 × 5/16	2-6⅜	6.10	62	
2	Pl's	12 × 5/16	"	12.75	64	
2	fills	6¼ × ½ ✓	0-10"	10.63 ✓	18 ✓	
2	"	"	0-11½	"	20 ✓	
						164 ✓
		BK13.				
8	L's	5 × 3 × 3/8 ✓	0-7½	9.72 ✓	49 ✓	
4	"	3 × 3 × 5/16	1-8	6.10	41	
2	Pl's	15 × 5/16	3-6½	15.94	113	
						203 ✓
		BK14				
4	L's	3. 3 × 5/16	0-10"	6.10	20	
4	"	5 × 3 × 3/8 ✓	"	9.72 ✓	32 ✓	
2	Pl's	12 × 5/16	1'-3"	12.75	32	
						84 ✓
		Horizontal Brackets HB1				
2	L's	3 × 3 × 5/16	0-7½	6.10	8	
2	"	4 × 3 × 2.4/8	0-10¼	6.84	12	
2	Pl's	10 × 5/16	1'-0½"	10.63	22	
						42
		Center span.				✓5338
2	L's	5 × 3½ × 3/8	28'-4"	10.37		588
						✓5.926 . 2 = ✓11,852
		Side span.				584
2	L's	5 × 3½ × 3/8	28'-1¼"	10.37		✓5,338
						✓5,922 × 2 = ✓11,844

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CALCULATIONS FOR

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List of materials for Arakawa-Bashi, Saitama-Ken.

Panel no. (2) 2 Req'd.

Bracing.

2	Ls	5 × 3½ × 3/8	× 24'-8⅞	10.37	514	
2	"	"	× 28'-11½	"	602	
3	Pls	8½ × 5/16	× 1'-0½	9.03	28	
						1,144

Strut SN1 530

SN2.

4	Ls	5 × 3 × 3/8 ✓	× 21'-6¼	9.72 ✓	837 ✓	
30	Lac. Bars.	2 × 5/16	× 1'-0½	2.13	67	
						904 ✓

SL2.

4	Ls	5 × 3 × 3/8 ✓	× 25'-10½	9.72 ✓	1,006 ✓	
4	"	"	× 1-7	" ✓	61 ✓	
1	Bent Pl.	20 × 5/16	26-11	21.25	572	
1	L	4 × 3 × 2.4/8	1-7⅜	16.84	11	
1	Pl.	12½ × 5/16	1-3	13.28	17	
1	Fill.	3 × 2.4/8 3/8	1-2	2.87	3	
1	Pl.	11 3/8 × 3/8	1-6½	14.50	22	
						1,692 ✓

Bracket BK21 (Same as BK11) 73

BK22

4	Ls	3 × 3 × 5/16	2-2⅞	6.10	55	
2	Pls	12 × 5/16	"	12.75	57	
2	fills	6¼ × 1/2 ✓	0-11½	10.63 ✓	20 ✓	
2	"	"	0-7½	" ✓	13 ✓	
						145 ✓

BK23

4	Ls	3 × 3 × 5/16	1-8	6.10	41	
4	"	"	0-8	"	16	
4	"	"	0-7½	"	15	
2	Pls	15 × 5/16	3-5½	15.94	110	
						182

BK24 (Same as BK14) 84 ✓

2 - HB1 @ 42 84

4838 ✓

Center span.

2	Ls	5 × 3½ × 3/8	× 28-5	10.38	590	
					4,838 ✓	
					5,428 ✓ × 2 =	10,856 ✓

Side span

2	Ls	5 × 3½ × 3/8	× 27'-11¾"	10.37	580	
					4838 ✓	
					5418 ✓ × 2 =	10,836 ✓

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama Ken

Panel no. (3) 2-Required

		Bracing				
2	∠s	5 × 3½ × 3/8	25'-7¼"	10.37	532	
2	Pls	8½ × 5/16	1-0½	9.03	19	
						551
		Strut	**SN1**			530
			SM3			
26	Lac. Bars	2 × 5/16	1-0½	2.13	58	
4	∠s	4 × 3 × 2.4/8	19-6⅛	6.84	534	
						592
			SL3			
4	∠s	5 × 3 × 3/8 ✓	1-6	9.72 ✓	58 ✓	
4	∠s	" ✓	23-2½	"	902 ✓	
1	Bent Pl.	20 × 5/16	24-3	21.25	515	
						1475 ✓
		Bracket	**BK31**			
4	∠s	3½ × 3 × 3/8	0'-10½	7.81	27	
4	∠s	3 × 3 × 5/16	0'-10	6.10	20	
2	Pls	10 × 5/16	1-2	10.63	25	
						72
			BK32			
4	∠s	3 × 3 × 5/16	2-6⅜	6.10	62	
2	Pls	11 × 5/16	"	11.69	59	
2	Fill s	6¼ × ½ ✓	0-11½	10.63 ✓	20 ✓	
2	"	"	0-10	"	18 ✓	
						159 ✓
			BK33			
4	∠s	3 × 3 × 5/16	1-6	6.10	37	
4	"	5 × 3 × 3/8 ✓	0-7½	9.72 ✓	24 ✓	
4	"	3 × 3 × 5/16	"	6.10	15	
2	Pls	15 × 5/16	3-4½	15.94	108	
						184
			BK34			
4	∠s	3 × 3 × 5/16	0-8	6.10	16	
4	"	5 × 3 × 3/8 ✓	0-10	9.72 ✓	32 ✓	
2	Pls	10 × 5/16	1-3	10.63	27	
						75 ✓
			HB1			42
						3680 ✓
		Center span.				592
2	∠s	5 × 3½ × 3/8	28-6"	10.37		3680 ✓
						4,272 ✓ × 2 = 8,544 ✓
		Side span.				577
2	∠s	5 × 3½ × 3/8	27-9⅞	10.37		3680 ✓
						4257 ✓ × 2 = 8,514 ✓

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CALCULATIONS FOR

List of materials for Arakawa-Bashi, Saitama-Ken.

Panel no. (4) 2- Required

Bracing

2	L⁵	5 × 3½ × 3/8	×	22-7	10.37	468
2	P/s	8½ × 5/16	×	1-0½	9.03	19
						487

Strut SM4

4	L⁵	4 × 3 × 2⅜/8	×	17-8⅞	6.84	485
24	Lacing bars	2 × 5/16	×	1-0½	2.13	53
						538

SL4

4	L⁵	5 × 3 × 3/8 ✓	×	20-8 3/8	9.72 ✓	805 ✓
4	"	"	×	1-6	"	58 ✓
1	Bent Pl.	18 × 5/16	×	21-10	19.13	418
						1,281 ✓

Bracket BK41 (Same as BK31) 72

BK42

4	L⁵	3 × 3 × 5/16	×	0-8	6.1	16
4	"	"	×	1-6	"	37
4	"	5 × 3 × 3/8 ✓	×	0-7½	9.72 ✓	24 ✓
2	P/s	15 × 5/16	×	3-3	15.94	104
						181 ✓

BK43

4	L⁵	3 × 3 × 5/16	×	0-10½	6.10	21
4	"	5 × 3 × 3/8 ✓	×	0-10	9.72 ✓	32 ✓
2	P/s	12 × 5/16	×	1-3	12.75	32
						85 ✓
						2,644 ✓

Center span

2	L⁵	5 × 3½ × 3/8	×	28-3½	10.37	587
						2644 ✓
						3231 ✓ × 2 = 6,462 ✓

Side span

2	L⁵	5 × 3½ × 3/8	×	27-4⅝	10.37	568
						2644 ✓
						3,212 ✓ × 2 = 6,424 ✓

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama Ken

Panel no. ⑤ 2-Required

Bracing

2	Ls	5 × 3½ × 3/8	× 20-1½	10.37	418	
1	Pl.	9 × 5/16	× 0-11½	9.56	9	
1	Pl.	8 × 5/16	× 1-1½	8.50	10	
						437

Strut SM5

4	Ls	4 × 3 × 2.4/8	× 16-2 3/8	6.84	443	
21	Lac. Bars.	2 × 5/16	× 1-0½	2.13	47	
						490

SL5

4	Ls	5 × 3 × 3/8 ✓	× 18'-7 7/8	9.72 ✓	726 ✓	
4	"	"	× 1'-5	"	55 ✓	
1	Bent Pl.	18 × 5/16	× 19'-8½	19.13	377	
						1158 ✓

Bracket BK51 (Same as BK31) 72

BK52

4	Ls	3 × 3 × 5/16	× 1-5	6.10	35	
4	"	5 × 3 × 3/8 ✓	× 0-8	9.72 ✓	26 ✓	
4	"	"	× 0-7½	"	24 ✓	
2	Pls	15 × 5/16	× 3-2½	15.94	102	
						187 ✓

BK53 (Same as BK43) 85 ✓

2,429 ✓

Center span

2	Ls	5 × 3½ × 3/8	× 22-10½	10.37	475	
					2,429 ✓	
					2904 ✓ × 2 = 5,808 ✓	

Side span

2	Ls	5 × 3½ × 3/8	× 21-4 5/8	10.37	444	
					2,429 ✓	
					2,873 ✓ × 2 = 5,746 ✓	

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama Ken.

Panel no. ⑥ 2-Required

Bracing.

2	⊥S	5 × 3½ × 3/8	×	17-8¼	10.37	367
1	Pl.	9 × 5/16	×	1'-0"	9.56	10
1	"	8 × "	×	1'-1½"	8.50	10
						387

Strut SM6

4	⊥S	4 × 3 × 24/8	×	14'-10¾"	6.84	407
19	Lac. Bars	2 × 5/16	×	1'-0½"	2.13	42
						449

SL6

4	⊥S	5 × 3 × 3/8	×	16'-11¼"	9.72 ✓	659 ✓
4	"	"	×	1'-5"	"	55 ✓
1	Bent Pl.	18 × 5/16	×	18'-0"	19.13	344
						1,058 ✓

Bracket BK61 (Same as BK31) 72

BK62

4	⊥S	5 × 3 × 3/8 ✓	×	0-8"	9.72 ✓	26 ✓
4	"	"	×	0-7½"	" ✓	24 ✓
4	"	3 × 3 × 5/16	×	1-4"	6.10	33
2	Pls	15 × 5/16	×	3-1"	15.94	98
						181 ✓

BK63

4	⊥S	3 × 3 × 5/16	×	0-10½"	6.10	21
4	"	5 × 3 × 3/8 ✓	×	0-10"	9.72 ✓	32 ✓
2	Pls	12 × 5/16	×	1-4"	12.75	34
						87 ✓
						2,234 ✓

Center span.

2	⊥S	5 × 3½ × 3/8	×	18'-1⅝"	10.37	376
						2234 ✓
						2610 ✓ × 2 = 5,220 ✓

Side span

2	⊥S	5 × 3½ × 3/8	×	17-1"	10.37	355
						2234 ✓
						2589 ✓ × 2 = 5,178 ✓

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama-Ken.

Panel no. (7) 2-Required.

Center span Bracing

2	LS	5 × 3½ × 3/8	×	14-10½	10.37	309
2	"	"	×	16-1	"	334
1	Pl.	8 × 5/16	×	1'-1	8.50	10
1	"	"	×	1'-1½"	"	10
						663

Strut SM7

4	LS	4 × 3 × 2.4/8	×	13-10	6.84	378
18	Lacing Bars	2 × 5/16	×	1-0½	2.13	40
						418

SL7

4	LS	4 × 3 × 2.4/8	×	15-6 3/8	6.84	425
4	"	5 × 3 × 3/8 ✓	×	1'-4	9.72 ✓	52 ✓
1	Bent Pl.	17 × 5/16	×	16-7	18.06	300
						777 ✓

Bracket BK71

4	LS	3½ × 3 × 3/8	×	1-3	7.81	39
4	"	5 × 3 × 3/8 ✓	×	0-7½	9.72 ✓	24 ✓
2	Pls	10½ × 5/16	×	1-3	11.16	28
						91 ✓

BK72

4	LS	5 × 3 × 3/8 ✓	×	0-7½	9.72 ✓	24 ✓
4	"	"	×	0-5½	"	18 ✓
4	"	3 × 3 × 5/16	×	1-3	6.10	31
2	Pls	15 × 5/16	×	2-9¾	15.94	90
						163 ✓

BK73

4	LS	3 × 3 × 5/16	×	0-10½	6.1	21
4	"	4 × 3 × 2.4/8	×	0-10	6.84	23
2	Pls	11 × 5/16	×	1-4	11.69	31
						75
						2187 ✓ × 2 = 4,374 ✓

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, ~~Saitama Ken~~.

Panel no. (7) 2-Required.

Side span Bracing

2	∠	5 × 3½ × ⅜	@	14-1⅞	10.37	294
2	"	"	@	16-1	"	334
1	Pl.	7½ × 5/16	@	1-2	7.97	9
1	"	8 × 5/16	@	1-1½	8.50	10
						647

Strut SM7 418

SL7A

4	∠	4 × 3 × 2.4/8	@	15-6⅜	6.84	425
2	"	5 × 3 × ⅜ ✓	@	1-3	9.72 ✓	24 ✓
2	"	"	@	1-5	"	28 ✓
2	Pls	17½ × 5/16	@	1-9	18.59	65
14	Lac. Bars	2½ × 5/16	@	1-5¼	2.66	54
						596 ✓

Bracket SB71 (Same as BK72) 91 ✓

SB72

8	∠	5 × 3 × ⅜ ✓	@	0-7½	9.72 ✓	49 ✓
4	"	3 × 3 × 5/16	@	1-3	6.10	31
2	Pls	15 × 5/16	@	2-10½	15.94	92
						172 ✓

SB73

4	∠	3 × 3 × 5/16	@	0-8	6.1	16
4	"	4 × 3 × 2.4/8	@	0-10	6.84	23
2	Pls	12 × 5/16	@	1-3	12.75	32
						71

1,995 ✓ × 2 = 3,990 ✓

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama-Ken.

Panel no. (8) 2-Required.

Bracing.

2	Ls	5 × 3½ × 3/8	×	12'-11½	10.37	269
2	"	"	×	14'-9	"	306
2	Pls	7½ × 5/16	×	1'-4	7.97	21
						596

Strut SM8

4	Ls	4 × 3 × 2.4/8	×	13'-0"	6.84	356
17	Lac. Bars	2 × 5/16	×	1'-0½	2.13	38
						394

SL8

4	Ls	4 × 3 × 2.4/8	×	14'-5¼	6.84	395
1	Pl.	17 × 5/16	×	15'-5¾	18.06	280
4	Ls	5 × 3 × 3/8 ✓	×	1'-3	9.72 ✓	49 ✓
						724 ✓

Bracket BK81 (Same as BK71) 91 ✓

BK82

4	Ls	5 × 3 × 3/8 ✓	×	0'-7½"	9.72 ✓	24 ✓
4	"	"	×	0'-5½"	"	18 ✓
4	"	3 × 3 × 5/16	×	1'-3	6.1	31
2	Pls	15 × 5/16	×	2'-8 3/8"	15.94	87
						160 ✓

BK83

4	Ls	3 × 3 × 5/16	×	0'-10"	6.10	20
4	"	4 × 3 × 2.4/8	×	0'-10"	6.84	23
2	Pls	11 × 5/16	×	1'-4"	11.69	31
						74
						2,039. × 2 = 4,078 ✓

Panel no (9) 2 Required.

2	Ls	5 × 3½ × 3/8	×	15'-1"	10.37	313
1	Pl.	8 × 5/16	×	1'-1"	8.50	10
						323

Strut SL9

4	Ls	4 × 3 × 2.4/8	×	13'-7⅞"	6.84	373
1	Bent Pl.	17 × 5/16	×	14'-8½"	18.06	266
4	Ls	5 × 3 × 3/8 ✓	×	1'-3	9.72 ✓	49 ✓
						688 ✓

Bracket BK91 (Same as BK71) 91 ✓

BK92 (Same as BK83) 74

1,176 ✓ × 2 = 2,352 ✓

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama Ken.

Panel no. (10) 2 Required.

2	LS	5 × 3½ × ⅜	×	13'-10½	10.37	288
1	Pl.	7½ × 5/16	×	1'-2"	7.97	9
						297

Strut SL10

4	LS	4 × 3 × 24/8	×	13'-2¼	6.84	361
1	Pl.	17 × 5/16	×	14'-2¾	18.06	257
4	LS	5 × 3 × ⅜ ✓	×	1'-3	9.72	49 ✓
						667

Bracket BK101

4	LS	5 × 3 × ⅜ ✓	×	0-10	9.72 ✓	32 ✓
4	"	3½ × 3 × ⅜	×	1-3	7.81	39
2	Pls	13 × 5/16	×	1-3	13.81	35
						106

BK102 (Same as BK83) 74

1,144 × 2 = 2,288 ✓

Panel no. (11) 1- Required

2	LS	5 × 3½ × ⅜	×	13-6¾	10.37	282
1	Pl.	7½ × 5/16	×	1-2	7.97	9
						291

Strut SL11

4	LS	4 × 3 × 24/8	×	13'-0⅜	6.84	357
1	Pl.	17 × 5/16	×	14'-1	18.06	254
4	LS	5 × 3 × ⅜ ✓	×	1'-2	9.72 ✓	45
						656

Bracket BK111

4	LS	3½ × 3 × ⅜	×	1-3	7.81	39
4	"	5 × 3 × ⅜ ✓	×	0-5½	9.72	18
2	Pls	15 × 5/16	×	1-3	15.94	40
						97

BK112 (Same as BK83) 74

1,118 × 1 = 1,118

Summary of Sway bracing for Center span 80,670 or 36.591 Kg. Tons

Summary of Sway bracing for Side span 52,532 or 23.828 Kg. Tons

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama-Ken.

			Horizontal Bracing	**2- Required**		
4	Ls	4 × 3 × 2.4/8	21-3½	6.84	582	
8	"	"	10-4⅞	"	569	
4	Pls	7 × ⅜	1-8½	8.93	61	
						1,212 × 2 = 2,424
			Horizontal Strut HS1	**4 Required**		
4	Ls	4 × 3 × ⅜	11-7½	8.45	393	
1	Pl.	13 × 5/16	1-6½	13.81	21	
1	Pl.	"	0-11½	"	13	
12	Lac. Bars.	2 × 9/16	1-2⅞	2.13	30	
2	Pls	8¼ × ½	3-9½	14.03	106	
						563 × 4 = 2,252
			HS2	**16 Required.**		
4	Ls	4 × 3 × ⅜	11-10½	8.45	401	
2	Pls	13 × 5/16	0-11½	13.81	26	
2	"	8¼ × ½	3-3½	14.03	92	
13	Lac. Bars	2 × 5/16	1-2⅞	2.13	33	
						552 × 16 = 8,832
			HS3	**8 Required.**		
2	Ls	4 × 3 × ⅜	11-1	8.45	187	
2	"	"	10-4	"	175	
1	Pl.	13 × 5/16	0-11½	13.81	13	
1	"	"	1-8½	"	24	
2	"	8¼ × ½	3-3½	"	92	
11	Lac. Bars.	2 × 5/16	1-2⅞	2.13	28	
						519 × 8 = 4,152
			HS4 & HS5	**4 Required.**		
4	Ls	4 × 3 × ⅜	8'-4¼	8.45	282	
4	"	"	3'-0¾	"	103	
1	Pl.	13 × 5/16	0-11½	13.81	13	
1	"	"	3'-0	"	41	
1	"	"	1-10¾	"	26	
7	Lac. Bars.	2 × 5/16	1-2⅞		18	
8	Ls	4 × 3 × ⅜	1-2¾	8.45	83	
4	"	5 × 3½ × ½	0-8¼	13.61	37	
4	fills	8¼ × ½	0-11½	14.03	54	
2	Bolts	2⅞"φ	3-8	12.06	88	
8	nuts	"		3.80	30	
4	Ls	3½ × 3½ × ⅜	1-9	8.5	60	
8	Bolts	⅞"φ	0-2⅞	.95	8	
						843 × 4 = 3372

Summary of Horizontal Bracing & Struts 21,032# or 9.539 Kg. Tons.

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi, Saitama Ken.

Transvers Strut TS1 at panel ⓒ 2-Required.

2	∠s	5 × 3 × 3/8 ✓	×	32-3¾	9.72 ✓	628 ✓
2	"	"	×	32-8	"	635 ✓
4	"	5 × 4 × 3/8	×	1-6¼	11.00	67
4	"	4 × 3 × 2.4/8	×	0-11½	6.84	26
4	Fills	5 × 2.4/8	×	1-0½	5.1	21
2	Pls	18¼ × 5/16	×	1-7	19.4	61
2	"	13½ × 5/16	×	1-6¼	14.34	44
1	"	18¾ × 5/16	×	1-6¼	19.93	30
2	Fills	3 × 2.4/8	×	1-3¼	3.17	8
28	Lac. Bars	2½ × 5/16	×	1-5¼	2.66	107

1,627 × 2 = 3,254 ✓

TS2 R/L 4. Required

2	∠s	5 × 3 × 3/8 ✓	×	31'-6"	9.72 ✓	612 ✓
2	"	"	×	31-8	"	616
4	"	5 × 4 × 3/8	×	1-2¼	11.0	52
2	Pls	15½ × 5/16	×	1-9½	16.47	59
2	"	13½ × 5/16	×	1-3½	14.34	37
1	"	15½ × 5/16	×	1-6⅜	16.47	25
2	Fills	3 × 2.4/8	×	0-9½	3.17	5
30	Lac. Bars	2½ × 5/16	×	1-4⅜	2.66	112
2	Pls	18½ × 3/8	×	2-10	23.59	134

1.652 × 4 = 6.608

Bracket BR1 4-Required

1	L	4 × 3 × 2.4/8	×	1-5⅞	6.84	10
1	"	"	×	1-1½	"	8
1	"	"	×	1-11	"	13
1	"	"	×	1-2⅞	"	8
1	Pl.	17 × 5/16	×	2-2	18.06	39

78 × 4 = 312

BR2 4-Required

1	L	4 × 3 × 2.4/8	×	1-2⅞	6.84	8
1	Pl.	12½ × 5/16	×	1-2	13.28	16
1	"	6½ × 5/16	×	3'-3½	6.91	23

47 × 4 = 188

Summary for transvers Strut 10,362# or 4.700 Kg. Tons ✓

Rivet heads

92,254	7/8"φ	Shop rivet heads	@ 0.2125		19,604
50,805	"	Field " "	"		10,796
86,653	3/4"φ	Shop " "	0.1425		12,348
33,705	"	Field " "	"		4,803
					47,551

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CALCULATIONS FOR

List of Materials for Arakawa-bashi, Saitama-Ken

Revised 3-5-11

Anchors for Erection Purpose

4 Required

2	L	9×3"	4'-4"	19.37	168
2	Pls	8½×½	0-9	14.45	22
2	Rods	2¼"ϕ	3-9	13.52	101
2	"	"	5'-7	"	151
2	Turnbuckles	4¾"ϕ	1-0¾	@20.00	40
4	L	9×3	2-2	19.37	168
4	L	6×6×⅜	0-7¼	14.90	36
2	"	4×4×⅜	"	9.80	12
2	Pls	8½×½	0-9	14.45	22
12	L	3×3×5/16	3-0	6.10	220
3	Pls	24×5/16	3-0	25.50	230
6	L	2½×2½×5/16	1-11⅞	5.00	60
6	Fills	2½×5/16	2-9	2.66	44
5	nuts	(for 2¼"ϕ rods)		@4.50	23
4	Castiron	4"×2½×0-9"		23.41	94
1	"	8½×(1½×4½)/2	×2-2"	172.71	173

1564 × 4 = 6,256

Truss span total Summary

2 Side spans	184,724#	
Center span	345.208	
Lateral bracings for side spans	17.104	
" " " Center span	30.206	
Floor beams, stringers and top lateral bracings	1444.094	
Sway bracings for side spans	52.532	
" " " Center span	80.670	133202
Horizontal bracings and struts	21.032	
Struts at Lo	10.362	
Anchors for erection purpose	6.256	
Rivet heads	47.551	
	939.739# or Kg.Tons 426.259	#8352
Steel Casting	33.552# or Kg.Tons 15.219	
	973291	441.478

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CALCULATIONS FOR

List of Materials for Arakawa-Bashi Saitama Ken.

Girder Span

Main girder

✓	4	Cov. Pls.	13½ ×	3/8	×	17 ∠ 0	@ 17.21	1170
✓	2	Web Pls.	48 ×	3/8	×	17 ∠ 0	" 61.20	2081
✓	8	Flg. Ls.	6 × 4 ×	½	×	"	" 16.15	2196
✓	2	Web Pls.	48 ×	3/8	×	17 ∠ 7 15/16	" 61.20	2162
✓	8	Flg. Ls.	6 × 4 ×	½	×	"	" 16.15	2282
✓	8	"	"		×	17 ∠ 6 15/16	" "	2271
✓	2	Web Pls.	48 ×	3/8	×	"	" 61.20	2152
✓	8	Cov. Pls.	13½ ×	3/8	×	4 ∠ 6¾	" 17.21	628
✓	8	Stf. Pls.	"		×	3 ∠ 0	" "	413
✓	16	Stiff Ls.	5 × 3½ ×	½	×	3 ∠ 11½	" 13.61	862
✓	16	filler	3½ ×	½	×	3 ∠ 4	" 5.95	317
✓	24	Ls.	5 × 3½ ×	3/8	×	4 ∠ 0½	" 10.37	1006
✓	12	"	"		×	3 ∠ 11½	" "	493
✓	12	fillers	3½ ×	½	×	3 ∠ 4	" 5.95	238
✓	8	"	"		×	3 ∠ 3¾	" "	156
✓	8	Ls.	5 × 3½ ×	3/8	×	3 ∠ 10½	" 10.37	322
✓	16	Pls.	6½ ×	3/8	×	2 ∠ 6½	" 8.29	334
✓	8	"	13 ×	3/8	×	2 ∠ 2¾	" 16.58	296
✓	4	Pls.	12½ ×	3/8	×	0 ∠ 11⅞	" 15.94	62
✓	2	"	12 ×	3/8	×	1 ∠ 4½	" 15.30	42
✓	2	filler	3 ×	½	×	0 ∠ 11¼	" 5.10	10
✓	2	Bed Pl.	15⅞ ×	⅞	×	2 ∠ 3	" 47.22	212
✓	4	Cover Pls.	12½ ×	3/8	×	2 ∠ 9½	" 15.94	178
✓	2	"	"		×	2 ∠ 9	" "	88
✓	2	Pls.	12 ×	3/8	×	1 ∠ 0	" 15.30	31
✓	2	Sole Pls.	13⅞ ×	¾	×	1 ∠ 9	" 35.37	124
✓	2	Bed Pls.	14 ×	¾	×	1 ∠ 9	" 35.70	125
✓	16	Ls.	6 × 4 ×	½	×	3 ∠ 0	" 16.15	775
✓	4	Anchor bolts.	1¼"ϕ		×	2 ∠ 0	" 10.10	40
✓	4	Washers	6 ×	3/8	×	0 ∠ 6	" 7.65	15
								21,081

Cross frame and Struts

✓	2	Ls.	5 × 3 ×	3/8	×	7 ∠ 1	@ 9.72	138
✓	2	"	3½ × 3 ×	3/8	×	1 ∠ 5½	" 7.81	23
✓	4	"	3 × 3 ×	5/16	×	0 ∠ 7	" 6.10	14
✓	4	"	"		×	0 ∠ 8	" "	16
✓	2	Pls.	19 ×	5/16	×	1 ∠ 2½	" 20.19	49
✓	1	"	9 ×	5/16	×	2 ∠ 1½	" 9.56	20
✓	6	Ls.	5 × 3½ ×	3/8	×	6 ∠ 7¾	" 10.37	414
✓	6	"	3½ × 3 ×	3/8	×	1 ∠ 5½	" 7.81	68
✓	3	Pls.	9½ ×	5/16	×	2 ∠ 3	" 10.09	68
✓	6	"	10½ ×	5/16	×	1 ∠ 0⅝	" 11.16	67
✓	3	Ls.	5 × 3½ ×	3/8	×	13 ∠ 0	" 10.37	404
✓	3	"	"		×	13 ∠ 9¼	" "	428
✓	20	Washers	3"ϕ ×	5/16			" 0.625	13
✓	2	Ls.	5 × 3½ ×	3/8	×	6 ∠ 7½	" 10.37	138
✓	2	"	3½ × 3 ×	3/8	×	1 ∠ 5½	" 7.81	23
✓	1	Pl.	9½ ×	5/16	×	2 ∠ 3	" 10.09	23
✓	4	Ls.	3 × 3 ×	5/16	×	0 ∠ 1⅝	" 6.10	24
✓	2	"	5 × 3½ ×	3/8	×	13 ∠ 4	" 10.37	277
✓	2	Pls.	10½ ×	5/16	×	0 ∠ 1⅝	" 11.16	22
								2229

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CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

日本橋梁株式會社
註文主 埼玉縣 | 工事番號 722

List of Materials for Arakawa-Bashi Saitama Ken

Bottom Lateral Bracing

1	Ls.	5 × 3 ×	3/8	×	17 ∠ 0 5/8	@	9.72	165	
2	"	"		×	8 ∠ 4 3/8	"	"	163	
2	"	"		×	17 ∠ 4 3/8	"	"	338	
4	"	"		"	8 ∠ 6 5/8	"	"	332	
1	"	"		"	17 ∠ 1/8	"	"	166	
1	"	"		"	8 ∠ 6 5/8	"	"	83	
1	"	"		×	8 ∠ 3	"	"	80	
4	Pl.	9 ×	3/8	×	1 ∠ 2	"	11.48	54	
								1,381	

Top Lateral Bracing

4	Ls.	3½ × 3½ ×	3/8	×	20 ∠ 10	@	8.96	746	90 × 90 × 10
8	Ls.	"		×	10 ∠ 2 1/4	"	"	730	"
4	Pls.	7 ×	3/8	×	1 ∠ 8½	"	8.93	61	
20	Ls	4 × 3 ×	2 4/8	×	0 ∠ 6	"	6.84	68	
								1,605	

Floor Beams FB20

5	Web Pls.	15¼ ×	5/16	×	18 ∠ 4½	@	16.21	1490	
20	Flg Ls.	3½ × 3½ ×	3/8	×	18 ∠ 5¼	"	8.96	3305	90 × 90 × 10
20	Ls.	6 × 3½ ×	3/8	"	1 ∠ 3	"	11.64	291	
40	"	3½ × 3½ ×	3/8	×	1 ∠ 3	"	8.96	451	90 × 90 × 10
40	fillers	3½ ×	3/8	×	0 ∠ 8¼	"	4.46	123	
27	"	7½ ×	3/8	×	0 ∠ 7½	"	9.56	163	
6	Pls.	17½ ×	5/16	"	1 ∠ 9	"	18.59	195	
4	"	14 ×	5/16	×	1 ∠ 5½	"	14.88	87	
								6105	

Fascia Stringer FS20 R/L 4-Req'd.

3	Flg Ls.	3 × 3 ×	5/16	×	12 ∠ 8½	@	6.10	233	
1	Pl.	11 5/8 ×	5/16	×	1 ∠ 0 6/8	"	12.35	12	
1	filler	6 5/8 ×	5/16	×	0 ∠ 9	"	7.04	5	
3	Ls.	3½ × 3½ ×	3/8	×	0 ∠ 8 5/8	"	8.96	19	90 × 90 × 10
1	Web Pl.	15¼ ×	5/16	×	12 ∠ 8½	"	16.21	206	
								475 × 4 = 1900	

FS21 R/L 2-Req'd.

1	Web Pl.	15¼ ×	5/16	×	13 ∠ 2 5/8	@	16.21	214	
3	Flg Ls.	3 × 3 ×	5/16	"	"	"	6.10	242	
3	"	3½ × 3½ ×	3/8	"	0 ∠ 8 5/8	"	8.96	19	90 × 90 × 10
								475 × 2 = 950	

FS19 R/L 2-Req'd.

1	Web Pl.	15¼ ×	5/16	×	13 ∠ 9 3/4	@	16.21	224	
3	Ls.	3 × 3 ×	5/16	"	"	"	6.10	253	

FS20 R/L 2-Req'd.

1	Pl.	11 5/8 ×	5/16	×	1 ∠ 0 6/8	"	12.35	12	
1	filler	6 5/8 ×	5/16	×	0 ∠ 9	"	7.04	5	
4	Ls.	3½ × 3½ ×	3/8	×	0 ∠ 8 5/8	"	8.96	26	90 × 90 × 10
								520 × 2 = 1040	

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日本橋梁株式會社
註文主 埼玉縣 | 工事番號 727

CALCULATIONS FOR

List of Materials for Arakawa Bashi Saitama Ken

Stringers S37, S38 & S39

12	I.	12 × 5	×	12 ÷ 7¼	@	31.99	4837	
3	"	"	"	1 L 0½	"	"	98	
54	L.	5 × 3½ × ⅜	"	0 L 9½	"	10.37	444	
								5379

Summary of Weight 41.670

Fixed Bent Tower BC1.

4	I.	10 ×	3½	×	13 L 10½	@	23.55	1306
4	"	9 ×	3	"	13 L ½	"	19.33	1014
68	Lac. bars	2½ ×	5/16	"	1 L 5⅜	"	2.66	262
72	"			"	1 L 5	"	"	272
4	Pl.	20½ ×	⅜	"	1 L 7¾	"	26.14	172
2	"	15½ ×	⅜	"	1 L 3⅜	"	19.76	52
2	L.	6 × 4 ×	⅜	"	1 L 3⅜	"	12.27	32
8	"	3½ × 3 ×	⅜	"	0 L 11¾	"	7.81	61
2	Pl.	8½ ×	⅜	"	"	"	10.84	21
2	"	"		"	1 L 0	"	"	22
8	L.	4 × 3 ×	⅜	"	1 L 0	"	8.45	68
2	Pl.	19 ×	½	"	1 L 10	"	32.30	118
2	"	22¼ ×	½	"	"	"	37.83	139
2	"	6 ×	½	"	"	"	10.20	37
4	L.	6 × 4 ×	½	"	1 L 10	"	16.15	118
4	"	"		"	0 L 8¼	"	"	44
8	"	6 × 6 ×	½	"	"	"	16.77	92
8	"	5 × 3 ×	½	"	1 L 3¼	"	12.75	130
4	filler	4 ×	½	"	0 L 8¼	"	6.80	19
2	Pl.	11½ ×	5/16	"	1 L 3	"	12.22	31
4	L.	3 × 2½ ×	⅜	"	16 L 10½	"	6.53	441
8	"	"		"	8 L 1	"	"	422
2	Pl.	24 ×	⅜	"	2 L 1	"	30.60	127
6	Pl.	8½ ×	5/16	"	0 L 7½	"	9.03	34
1	Pl.	"		"	1 L 8½	"	"	115
56	Lac. bars.	2 ×	5/16	"	0 L 8¾	"	2.13	87
4	Anchor bolts.	1½" ø		"	4 L 0	"	6.01	96
4	Nut & head.	"				"	2.95	12
4	Washers.	6 ×	⅜	"	0 L 6	"	7.65	15
4	Pl.	20½ ×	⅜	"	1 L 9	"	26.14	183
								5442

Summary of Weight.

5,442
41,670
47,112 or 21.370 kg. Tons.

Rivets Heads.

27,00	7/8"	Shop Rivets	@ 0.2125	574	
1,500	"	Field "	"	319	
4,750	¾" ø	Shop "	0.1425	677	
1,650	"	Field "	"	235	
				1,805	or 0.819 kg. Tons.

Total Summary for girder span 48,917 or 22.188

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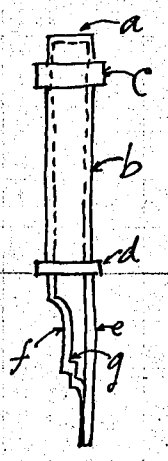
CALCULATIONS FOR

List of Material for Arakawa Bashi Saitamaken.

LIST OF MATERIAL FOR HANDRAILS.

Handrail Post (HP) and (LHP)



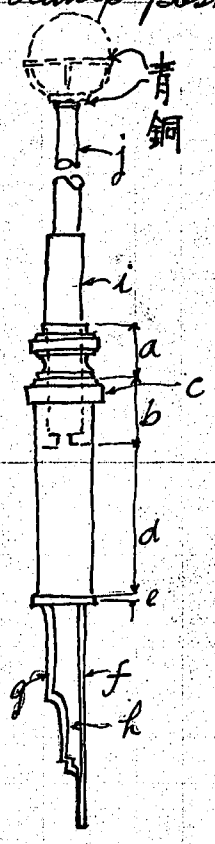
			wt./# per ft as steel pl.	× length.	wt. # as steel pls.
a	4½ × ½ × 0'-4½	=	7.65	× .38	= 2.91
b	17" × ½" × 3'-0	=	28.9	× 3.00	= 86.70
c	2" × ¼ × 1'-7"	=	1.7	× 1.58	= 2.69
d	5 × 1 × 0'-5"	=	17.0	× .42	= 7.14
e	3¾" × ½ × 0'-6½"	=	6.38	× .54	= 3.45
	6" × ½" × 1'-6½"	=	10.2	× 1.54	= 15.71
f	3¾ × ⅜ × 1'-10¾	=	4.78	× 1.90	= 9.08
g	1⅝ × ½ × 1'-3¾	=	2.77	× 1.31	= 3.73

Total 131.41 × 450/490 = 121 #
(.918)

Handrail post (EHP)

a, b. c. d, e, f & g ---------- 121.0
h 5-¾ × ⅜ × 2'-6" = 7.33 × 2.5 × 9.18 = 17.0
138 #

Lamp post (LP)



a (6"φ - 4½"φ) × 0-5½" = (96.13 - 54.07) × 0.46 = 19.0
b (□7"·9 × 1'-1½") - (4½φ × 1'-0½") - (3"φ × 0'-1") = (166.6 × 1.13) - (54.1 × 1.04) - (24 × .08 = 130.0

c	2½ × ¾ × 2'-7½	= 3.19	× 2.63	= 16.7
d	25½ × ½ × 2'-0"	= 43.4	× 2.0	= 86.8
e	8 × 1" × 0'-9"	= 27.2	× 0.75	= 20.4
f	6" × ½" × 2'-1"	= 10.2	× 2.08	= 21.2
g	3¾ × ½ × 1'-11"	= 6.38	× 1.92	= 12.3
h	2¼" × ½" × 11'-6¾"	= 3.83	× 1.56	= 6.0
i	(4½φ - 3¾"φ) × 4'-6"	= (54.1 - 37.6) × 4.5		= 74.2
j	(3¼"φ - 2½"φ) × 5'-2½"	= (28.2 - 16.7) × 5.21		= 60.0
k				
l				

446.6 × .918 = 410 #

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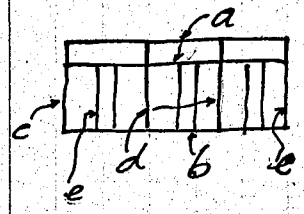
CALCULATIONS FOR

Material List for Arakawa Bashi for Saitama Ken.

Handrails.

Panel (FH)



a	2	1"×1"×3'-11½"	=	3.4 × 3.96 × 2	=	13.5 × 2	= 27.0
b	1	1½"×1"× "	=	5.1 × " × 1	=	20.2 × 1	= 20.2
c	2	1½"×1"×2'-3"	=	" × 2.25 × 2	=	11.5 × 2	= 23.0
d	2	1"×1"× "	=	3.4 × 2.25 × 2	=	7.6 × 2	= 15.2
e	6	¾"×¾"×2'-0"	=	1.91 × 2.0 × 6	=	3.8 × 6	= 22.8
							108.2 × .918 = 99#

(SH)

2	1"×1"×4'-8½"	=	3.4 × 4.71 × 2	=	32.0	
1	1½"×1"× "	=	5.1 × " × 1	=	24.0	
2	1½"×1"×2'-3"	=	" × 2.25 × 2	=	23.0	
3	1"×1"× "	=	3.4 × " × 3	=	"	
8	¾"×¾"×2'-0"	=	1.91 × 2.0 × 8	=	30.6	
					132.6 × .918 =	122#

(EH) (FH) + 1¼"×1"×2'-6½" = 99 + 4.25×2.54×.918 = 109#

(ESH)

2	1"×1"×2'-0"	=	3.4 × 2 × 2	=	13.6
1	1½"×1"× "	=	5.1 × 2.0	=	10.2
1	2¾"×1"×2'-3"	=	9.38 × 2.25	=	21.0
1	1⅝"×1"×2'-3"	=	5.53 × "	=	12.4
2	¾"×¾"×2'-0"	=	1.91 × 2 × 2	=	7.6
					64.8 × .918 = 59

(LH)

2	1"×1"×3'-10⅞"	=	3.4 × 3.84 × 2	=	26.1
1	1½"×1"× "	=	5.1 × "	=	19.6
1	1½"×1"×2'-3"	=	" × 2.25	=	11.5
1	1⅝"×1"× "	=	5.53 × "	=	12.4
2	1"×1"× "	=	3.4 × " × 2	=	15.3
6	¾"×¾"×2'-0"	=	1.91 × 2 × 6	=	22.9
					107.8 × .918 = 99

(ELH) LH + 1¼"×1"×2'-3" = 99 + 10 = 109

(AH)

	(28⅞"ϕ − 24¾"ϕ)×1'-0"	=	(22.07 − 13.52)×1	=	8.6
2	1"×1"×14'0"	=	3.4 × 1 × 2	=	6.8
	1½"×1"× "	=	5.1 × 1	=	5.1
	8¾"×⅜"×24'	=	10.52 × 2.67	=	28.1
1	1¼"×1"×2'-3"	=	4.25 × 2.25	=	9.6
2	⅜"×24'	=	2.55 × 2.67	=	6.8
¾	¾"×17½'	=	1.91 × 1.63	=	3.1
					68.1 × .918 = 63

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CALCULATIONS FOR

Material List for Arakawa Bashi Saitamaken

List of Material for Handrails Cast iron...

HP+LHP	214	@	121	=	25,894#
EHP	20	@	138	=	2760
LP	10	@	410	=	4100
FH + LH	220	@	99	=	21,780
EH + ELH	18	@	109	=	1,962
ESH	2	@	59	=	118
AH	4	@	63	=	252
SH	2	@	122	=	244
Bolts $\frac{5}{8}$"ø × 0'-$2\frac{1}{2}$"	976	@	.45	=	439
Washers $1\frac{1}{2}$"ø × $\frac{3}{16}$"	"	@	.09	=	88
Screws ▷ $\frac{3}{8}$"×0'-$2\frac{1}{4}$" (<$2\frac{1}{4}$"→)	60	@	.07	=	4
" " $\frac{1}{4}$"×0'-$2\frac{1}{4}$"	3,130	@	.03	=	94
					57,735# = 26.188 kg. tons.

Top rail
$2\frac{1}{2}$"ø national tube 1026 ft 5.793#/ft = 5944# or 2.696 kg. tons

上長 312.7米 call this 313米.

28,884 fm .923
.6r

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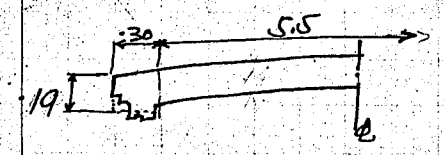
4

CALCULATIONS FOR

List of Material for Arakawa Bashi Saitama Ken.

Floor Slab.

Concrete 1:2:4 mix.



Sectional area.

.145 × 5.5 = .798 sq.m.
.190 × .3 × 2 = .114
.912 × 156.36 m = 142.60 cub.m.

Base of Handrail post .245 × .254 × .055 × 244 = .84
143.44 cub.m.

Cement mortar cushion for pavement

.012 × 5.5 × 156.36 = 10.32 m³

Exp. jt. .190 × 5.5 × .05 × 7 = .365

Asphalt block pavement

5.5 × (156.36 − 1.36) = 852.5 sq.m.

ケレー エクスパイト (#6 厚 1/2")

20 ft. × 4 = 80
3 × 15 × 16 = 72
152 ft.

or or 46.33 m

Deformed bars. 17.868 kg tons.

Forms.

6.8 × 156.36	=	1063.2
.15 × 6.1 × 22	=	20.1
.055 × 1. × 224	=	13.4
.05 × 5.5 × 222	=	6.1
		1102.8 sq.m.
less		124.1
		978.7 sq.m.

下面 差引ケ部分

.127 × 3 × 156.36	= 59.6
.076 × 2 × 156.36	= 23.8
.190 × 42 × 5.106	= 40.7
	124.1 sq.m.

Concrete for Light pedestal (for 4 pedestals).

$\left(\left(\frac{.25+.6}{2}\right)\right)^2 \times 2.65 \times 4 = 1.908$ m³

Reinforcement do. 0.189 kg. tons.

Forms. do. .425 × 4 × 2.65 × 4 = 18.02 m²

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CHECKED BY R.I. DATE 3-4-19 PAGE NO M49

CALCULATIONS FOR

Material List for Arakawa Bashi for Saitama Ken.

List for Expansion Joints.

Joint EJ1. 6 required.

1	L	5"×3"×3/8"	18'-0"	9.8	wt/pica 176.4	176.4#	
1	"	2×2×1/4	17-11½"	3.19	57.29	57	
2	Ls	"	0-6½"	"	1.72	3	
1	web pl.	8½"×3/8"	17-11½"	10.84	194.69	195	
2	pls.	5"×3/8"	0-7	6.38	3.70	7	
1	bar	1¼"×3/8"	18-2	2.23	40.52	41	
13	anchors	1½"×3/16"	0-9	.96	.72	9	
2	washs.	1¼"ϕ×1/4"			@.04	1	
						489×6 = 2,934# or 1.331 kg.tons.	

Joint EJ2. 6 required

1	L	2"×2"×1/4"	18'-1"	3.19	57.68	58	
1	"	"	18-0½"	"	57.58	58	
2	Ls	"	0-6½"	"	1.72	3	
1	Web pl.	8½"×3/8"	18-0½"	10.84	195.55	196	
2	pls	7"×3/8"	0-8	8.93	5.98	12	
13	Anchors	1½"×3/16"	0-9	.96	.72	9	
2	Check. pls.	6"×3/8"	5-0	8.15	40.75	82	
2	"	"	4-0¾"	"	33.09	66	
						484×6 = 2,904# or 1.317 kg tons.	

Joints EJ3 + EJ4

1	L	5"×3"×3/8"	20'-0½"	9.8	196.39	196	
2	"	2×2×1/4	18-10	3.19	60.07	120	
2	web pls	8½"×3/8"	20-0	10.84	216.80	434	
1	bar	1¾"×"	"	2.23	44.60	45	
26	anchors	1½"×3/16"	0-9	.96	.72	19	
1	L	2×2×1/4	20-0½"	3.19	63.93	64	
4	check pls.	6"×3/8"	5-0	8.15	40.75	163	
						1041# or 0.472 kg ton.	

Joints EJ5 + EJ6.

1	L	2×2×1/4	18'-1"	3.19	57.68	59	
1	"	2×2×1/4	18-0½"	3.19	57.55	58	
1	Web pl.	8½"×3/8"	18-0½"	10.84	195.56	19.6	
13	anchors	1½"×3/16"	0-9	.96	.72	9	
2	Checkpls	6"×3/8"	5-0	8.15	40.75	82	
1	L	5"×3"×3/8"	18-1"	9.8	177.18	177	
1	"	"	18-0½"	"	176.79	177	
1	web pl	8½"×3/8"	"	10.84	195.55	196	
1	bar	1¾"×3/8"	"	2.23	40.23	40	
11	anchors	5/8"ϕ	0-8		@.8	9	
11	washs.	1½"ϕ×1/16"			@.03	1	
2	Check. pls.	6"×3/8"	4-0¼"	8.15	32.76	66	
						1070# or .485 kg ton.	

Summary of Expansion joint 3.605 kg.tons

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SEIYU BLDG, TOKIO

MADE BY M.K. DATE 3-4-20 FILE NO 215
CHECKED BY R.J. DATE 3-4-20 PAGE NO M50

CALCULATIONS FOR

6

Material List for Arakawa Bashi for Saitama Ken.

Summary for Reinforcements

				Kg tons.
Plain bars	1	Abutment	AA	2.621
"	1	"	AG	5.243
"	2	Piers	PA1	4.274
"	2		PA2	4.134
"	1	"	PG	3.048
Deformed bars		Slab.		17.868
Plain bars	4	Light pedestals		.189
"		Handrail on AA		.038
"		" " on AG		.060
			Total	37.475 Kg tons.

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SEIYU BLDG, TOKIO

MADE BY K.J. DATE 3-4-17 FILE NO 216
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CALCULATIONS FOR

(7)

Material List for Arakawa Bashi for Saitama Ken.

Concrete 1:2:4 mix.

East Abutment AA.

	Section	Length	Unit vol.	req'd. no.	Total vol.	
Parapet wall	$\frac{.4+1.5}{2}$ × 5.887 m	= 5.5 m	30.760	1	30.760 m³	
Column	1.2 × 1.2	= 6.26	9.014	2	18.028	
"	1.2 × .25	= 1.6	.300	2	.600	bottom
Wing	.5 × 1.3	= 1.832	1.191	2	2.382	top
"	.5 × .95	= 1.2	.570	2	1.140	middle
"	.5 × .6	= 3.2	.960	2	1.920	bottom.
Shaft	2.8 × 1.0	= 7.4	20.720	1	20.720	
base	3.3 × 0.2	= 7.4	4.884	1	4.884	
"	1.0 × 3.8	= 7.4	28.120	1	28.120	
Coping, shaft	0.5 × .05	= 9.4	.235	1	.235	
" wing	0.4 × .65	= 1.3	.338	2	.676	
Brackets.	.25 × .6	= .2	.030	2	.060	
				total	109.525 m³	

Handrail

Top rail	.2 × .22	× .95	.042	2	.084
Bottom rail	.15 × .22	× .95	.031	2	.062
post	.15 × .22	× .43	.014	2	.028
panel	.12 × .1	× .80	.010	2	.020
"	.12 × .16	× .33	.006	4	.024
				total	.218 m³

Grand total 109.743 m³

West Abutment AG.

	Section	Length	Unit vol.	req'd. no.	Total vol.	
Parapet wall	$\frac{3+.65}{2}$ × 1.654	× 5.5	4.321	1	4.321	
Column	1.2 × 1.2	× 2.027	2.919	2	5.838	top.
"	1.2 × 0.7	× 2.973	2.497	2	4.994	bottom
Coping, shaft	.06 × .5	× 7.424	0.223	1	0.223	
Shaft	$\frac{1.12+2.2}{2}$ × 1.8	× 6.0	17.885	2	35.770	
Hor. beam	1.18 × 1.2	× 2.9	4.106	1	4.106	
Curtain wall	.73 × 4.8	× 2.9	10.162	1	10.162	
fillet	.15 × .075	× 2.9	0.033	1	0.033	top of Curtain wall
Wing wall.	.52 × 1.671	× 3.3	2.867	2	5.734	top
"	.57 × 1.5	× 2.72	2.326	2	4.652	middle
"	.65 × 4.785	× 1.97	6.127	2	12.254	bottom
"	.7 × .25	× 1.8	.315	2	.630	"
Coping wing	.4 × .65	× 3.3	.858	2	1.716	
Brackets.	.25 × .6	× .2	.036	6	.180	
				total	90.613 m³	

Handrail

Top rail	.2 × .22	× 2.95	.130	2	.260
Bottom rail	.15 × .22	× 2.95	.097	2	.194
post	.15 × .22	× .43	.014	2	.028
"	.2 × .22	× .43	.019	4	.076
panel	.12 × .1	× .8	.010	6	.060
"	.12 × .16	× .33	.006	12	.072
				total	0.690 m³

Grand total = 91.303 m³

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CALCULATIONS FOR

Material List for Arakawa Bashi for Saitama-ken.

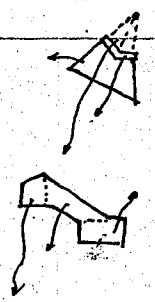
8.

Concrete 1:2:4 mix.
Pier between Truss span and Girder span P6.

		Section	Length	Unit Vol	Redd. no.	Total vol. m^3	Remarks.
Coping, Column		2.2 × 2.4 ×	.55	2.904	2	5.808	Upper
" "		2.1 × 2.3 ×	.15	.725	2	1.450	lower
Column		2.0 × 2.2 ×	~~6.3~~ 5.3	~~27.720~~ 23.320	2	~~35.440~~ 46.640	
Coping	Strut.	1.2 × .55 ×	2.8	1.848	1	1.848	upper
"	"	1.1 × .15 ×	2.9	.479	1	.479	lower
Strut		1.0 × 1.0 ×	3.0	3.000	1	3.000	
Wall		0.6 × 3.0 ×	~~4.3~~ 3.3	~~7.740~~ 5.940	1	~~7.740~~ 5.940	
fillet		.1 × .15 ×	~~10.8~~ 8.8	~~.162~~ .132	2	~~.324~~ .264	Sides & top. both sides.
Wall		2.0 × 1.0 ×	3.0	6.000	1	6.000	bottom
base	0.9	~~0.5~~ × 3.25 ×	8.0	~~13.000~~ 23.400	1	~~13.000~~ 23.400	upper
"	0.6	~~1.0~~ × 4.5 ×	8.0	~~36.000~~ 21.600	1	~~36.000~~ 21.600	lower
					total	~~111.089~~ m^3.	
						~~+31.089~~ 116.429 m^3	

Concrete 1:3:6 mixture
Pier for Arch span P A1.

Coping	.5 × 1.45 ×	2.7	1.958	1	1.958	
"	.5 × 1.75 ×	2.7	2.363	1	2.363	
body	7.9 × 6.0 ×	4.8÷3	75.840	1	75.840	
" less	1.3 × 2.6 ×	2.6÷3	2.929	1	− 2.929	
" "	1.6 × 2.6 ×	2.6÷3	3.605	1	− 3.605	
base	2.0 × 3.0 ×	6.0	36.000	1	36.000	
"	1.853 × 5.82 ×	6.0	64.707	1	64.706	
"	2.6 × 1.3 ×	6.0	20.280	1	20.280	
				total	194.614 m^3	
base plain conc.	3.0 × 1.0 ×	6.0	18.000	1	18.000	
					212.614 × 2 = 425.228 m^3	



Pier for Arch span P A2.

Coping	.5 × 1.45 ×	2.7	1.958	1	1.958
"	.5 × 1.75 ×	2.7	2.363	1	2.363
body	7.4 × 6.0 ×	4.5÷3	66.600	1	66.600
" less	1.3 × 2.6 ×	2.6÷3	2.929	1	− 2.929
" "	1.6 × 2.6 ×	2.6÷3	3.605	1	− 3.605
base	2.0 × 3.0 ×	6.0	36.000	1	36.000
"	1.853 × 5.35 ×	6.0	59.481	1	59.481
"	2.5 × 1.7 ×	6.0	25.500	1	25.500
				total	185.368 m^3

For 2 piers 2 @ 185.368 = 370.736 m^3

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MADE BY K. J. DATE 3-4-17 FILE NO 218
CHECKED BY R.J & M.K. DATE 3-4-20 PAGE NO M53

CALCULATIONS FOR

Material List for Arakawa Bashi for Saitama Ken.

9.

Forms. East abutment AA.

	Width		Length	Unit area	req'd. no.	total area	Remarks.
Parapet wall	5.5	×	5.887	32.379	2	64.758 ㎡	both sides
Column	3.1	×	6.26	19.406	2	38.812	top
"	1.7	×	1.0	1.700	2	3.400	bottom
wing	1.3	×	2.53	3.289	2	6.578	top. outside + Coping
"	1.3	×	2.0	2.600	2	5.200	" inside
"	.95	×	1.2	1.140	2	2.280	middle outside
"	1.33	×	1.2	1.596	2	3.192	" inside
"	.6	×	3.2	1.920	2	3.840	bottom outside
"	.7	×	3.2	2.240	2	4.480	" inside
"	.6	×	6.43	3.858	2	7.716	end face.
Shaft	1.0	×	1.6	1.600	2	3.200	sides
"	1.0	×	7.4	7.400	2	14.800	front + rear
" coping	.05	×	9.4	0.470	1	0.470	
base	1.2	×	3.8	4.560	2	9.120	sides
"	1.0	×	7.4	7.400	1	7.400	front
"	1.2	×	7.4	8.880	1	8.880	rear.
Brackets.	.7	×	.6	0.420	2	.840	
					total	184.970 ㎡	

Handrail on abutment AA.

Top rail	.4	×	.95	.380	2	.760	
"	.1	×	.8	.080	2	.160	
bottom rail	.3	×	.95	.285	2	.570	
post	.74	×	.43	.318	2	.636	
panel	.2	×	.8	.160	2	.320	
"	.12	×	.16	.019	6	.114	
"	.56	×	.33	.185	4	.740	
					total	3.30 ㎡	
					grand total	188.27 ㎡	

Meast Abutment. AG.

parapet wall	5.8	×	1.645	9.048	2	18.096	both sides
Column	3.1	×	2.027	6.284	2	12.568	top
"	2.6	×	2.973	7.730	2	15.460	bottom
Coping. Shaft	.56	×	7.08	3.965	1	3.965	
Shaft.	5.5	×	6.50	35.750	1	35.750	front
"	.5	×	2.473	1.237	2	2.474	sides
"	1.75	×	3.027	5.297	2	10.594	" under col.
"	1.2	×	.7	.840	2	1.680	bottom of col
"	1.2	×	5.5	6.600	1	6.600	hor. beam rear
" Curtain wall	5.4	×	2.9	15.660	1	15.660	rear
" Counterfort	4.8	×	1.2	5.760	2	11.520	rear
"	1.0	×	4.8	4.800	2	9.600	side
wing	2.138	×	8.7	18.601	2	37.202	outside with Coping
"	1.162	×	2.77	3.219	4	12.876	both sides
"	2.42	×	8.0	19.360	2	38.720	inside
"	1.8	×	.25	.450	4	1.800	bottom both side
"	.6	×	8.36	5.016	2	10.032	end face
" Brackets	.7	×	.6	.420	6	2.520	
base	1.0	×	6.5	6.500	2	13.000	front + rear
"	.5	×	3.85	1.925	2	3.850	out side
"	1.0	×	5.5	5.500	2	11.000	"
"	.7	×	2.9	2.030	1	2.030	rear fillet
"	.5	×	1.8	.900	2	1.800	rear inside.
					total	278.797 ㎡	

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MADE BY K. J. DATE 3-4-17 FILE NO 219
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CALCULATIONS FOR

Material List for Arakawa Bashi for Saitama Ken.

10

Forms.

Handrail on abutment AG.

	width		length	unit area	req'd. no	total area	Remarks.
Top rail	.4	×	2.95	1.180	2	2.360	
"	.1	×	2.4	.240	2	.480	
Bottom rail	.3	×	2.95	.885	2	1.770	
post	.74	×	.43	.318	2	.636	
"	.84	×	.43	.361	4	1.444	
panel	.2	×	2.4	.480	2	.960	
"	.12	×	.16	.019	18	.342	
"	.56	×	.33	.185	12	2.220	
					total	10.21	□m

Grand total 293.98 □m

Pier between truss + girder PG

Coping, Column	.75	×	7.7	5.775	2	11.550	
" Strut	.75	×	2.9	2.175	2	4.350	
Column	6.4	×	6.3	40.320	2	80.640	Front, rear + side
"	.5	×	.8	.400	4	1.600	
"	.7	×	4.5	3.150	4	12.600	
Strut + wall	3.0	×	6.3	18.900	2	37.800	
"	.2	×	3.5	.700	2	1.400	
"	.1	×	3.9	.390	4	1.560	
base	1.0	×	8.0	8.000	2	16.000	front + rear
"	1.0	×	4.5	4.500	2	9.000	sides
"	.5	×	3.25	1.625	2	3.250	
					total	179.750	□m

Pier for Arch span PA 1.

Top	2.7	×	3.0	8.100	1	8.100	
Coping	.5	×	11.8	5.900	1	5.900	all around
Shaft	4.3	×	5.5	23.650	1	23.650	front
"	2.5	×	.55	1.375	2	2.750	Sides
"	2.2	×	6.1	13.420	2	26.840	"
base	2.0	×	18.0	36.000	1	36.000	
"	1.853	×	5.82	10.784	2	21.568	
"	2.6	×	1.3	3.380	2	6.760	
"	2.3	×	6.0	13.800	1	13.800	
					total	145.370	□m

for 2 piers 2 @ 145.37 = 290.74 □m

Pier for Arch span. PA 2

Top	2.7	×	3.0	8.100	1	8.100
coping	.5	×	11.8	5.900	1	5.900
Shaft	4.3	×	5.0	21.500	1	21.500
"	2.5	×	.55	1.375	2	2.750
"	1.9	×	5.8	11.020	2	22.040
base	2.0	×	18.0	36.000	1	36.000
"	1.853	×	5.35	9.914	2	19.828
"	2.5	×	1.7	4.250	2	8.500
"	2.1	×	6.0	12.600	1	12.600
					total	137.22 □m

for 2 piers 2 @ 137.22 = 274.44 □m

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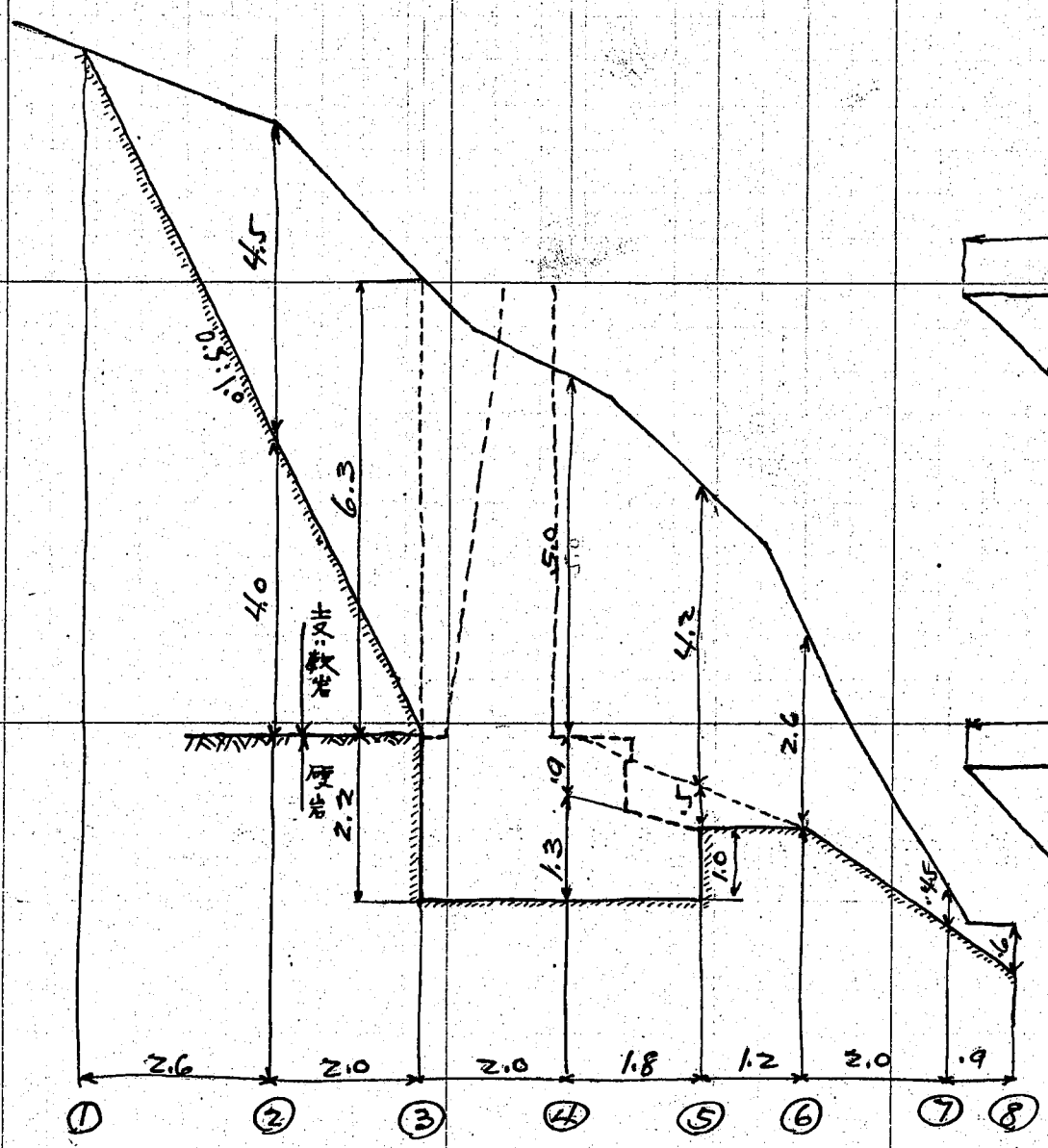
MADE BY K.J. DATE 3-4-18 FILE NO 220
CHECKED BY M.K. DATE 3-4-21 PAGE NO M55

CALCULATIONS FOR

11

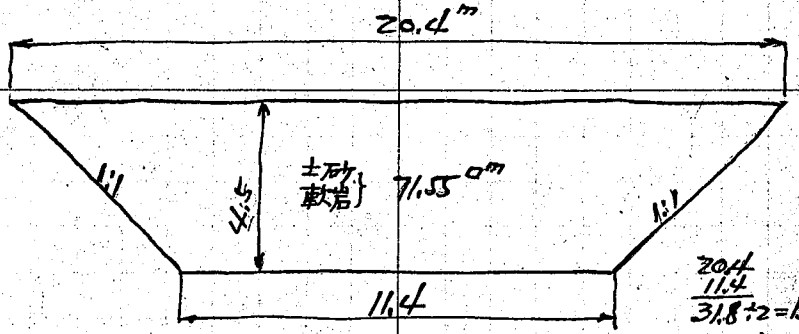
Material List for Arakawa Bashi for Saitama Ken.

Excavation
Abutment for arch truss A5 (east.)



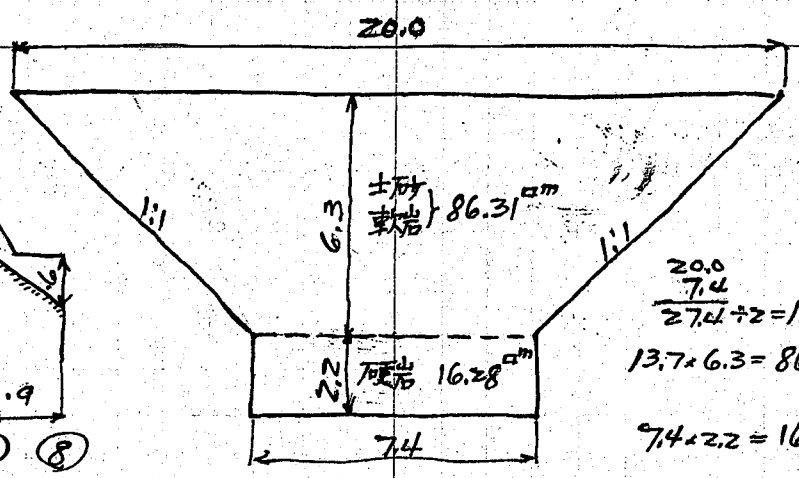
Scale 1:100

Section ①



20.4
11.4
31.8÷2=15.9
15.9×4.5=71.55 cu.m

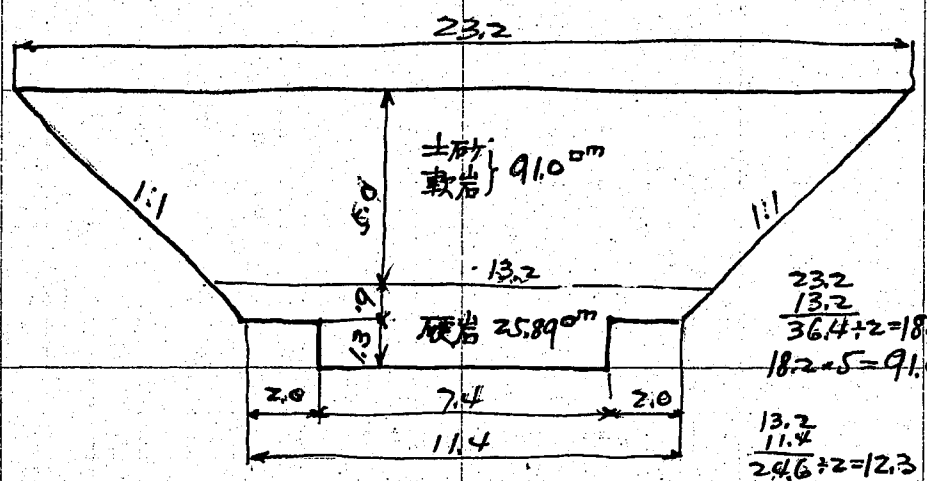
Section ②



20.0
7.4
27.4÷2=13.7
13.7×6.3=86.31

7.4×2.2=16.28 cu.m

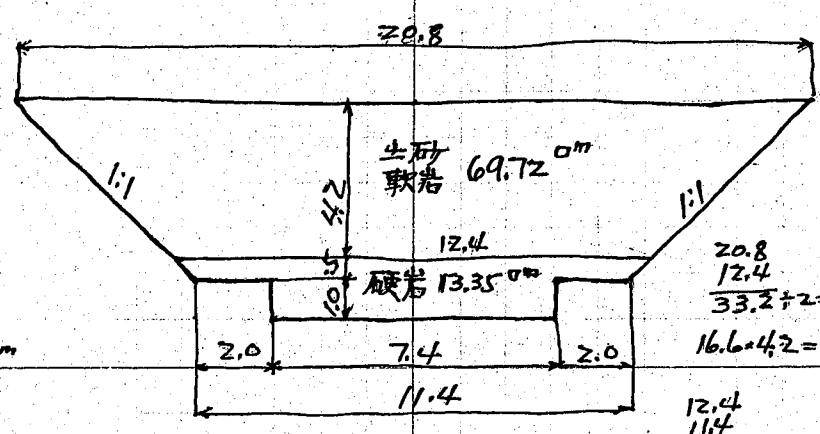
Section ③



23.2
13.2
36.4÷2=18.2
18.2×5=91.0 cu.m

13.2
11.4
24.6÷2=12.3
12.3×.9=11.07 cu.m
7.4×1.3=14.82
25.89 cu.m

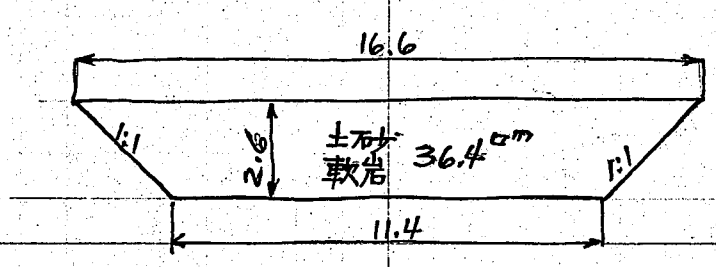
Section ④



20.8
12.4
33.2÷2=16.6
16.6×4.2=69.72 cu.m

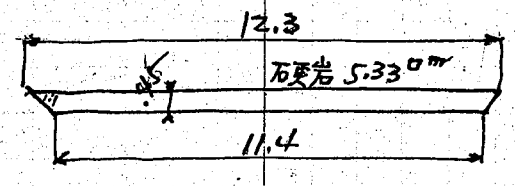
12.4
11.4
23.8÷2=11.9
11.9×.5=5.95
7.4×1.0=7.40
13.35 cu.m

Section ⑤



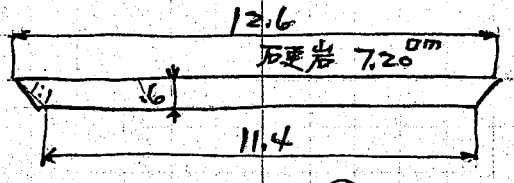
16.6
11.4
28.0÷2=14.0
14.0×2.6=36.4 cu.m

Section ⑥



12.3
11.4
23.7÷2=11.85
11.85×.45=5.33 cu.m

Section ⑦



12.6
11.4
24.0÷2=12.0
12.0×.6=7.20 cu.m

Section ⑧

Scale 1:200

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MADE BY K. J. DATE 3-4-18 FILE NO 221
CHECKED BY 〃 DATE 3-4-21 PAGE NO M56

CALCULATIONS FOR

Material List for Arakawa Bashi for Saitama Ken.

12

堀鑿土量 AA.
土砂及軟岩

断面	断面積	平均断面積	巨離	土量
①	0			
②	71.55 ㎡	35.78 ㎡	2.6 m	93.03 m³
③	86.31	78.93	2.0	157.86
④	91.00	88.66	2.0	177.32
⑤	69.72	80.36	1.8	144.65
⑥	36.40	53.06	1.2	63.67
⑦	—	18.20	2.0	36.40
⑧	—		1.9	—
			計	672.93 立方米

硬岩

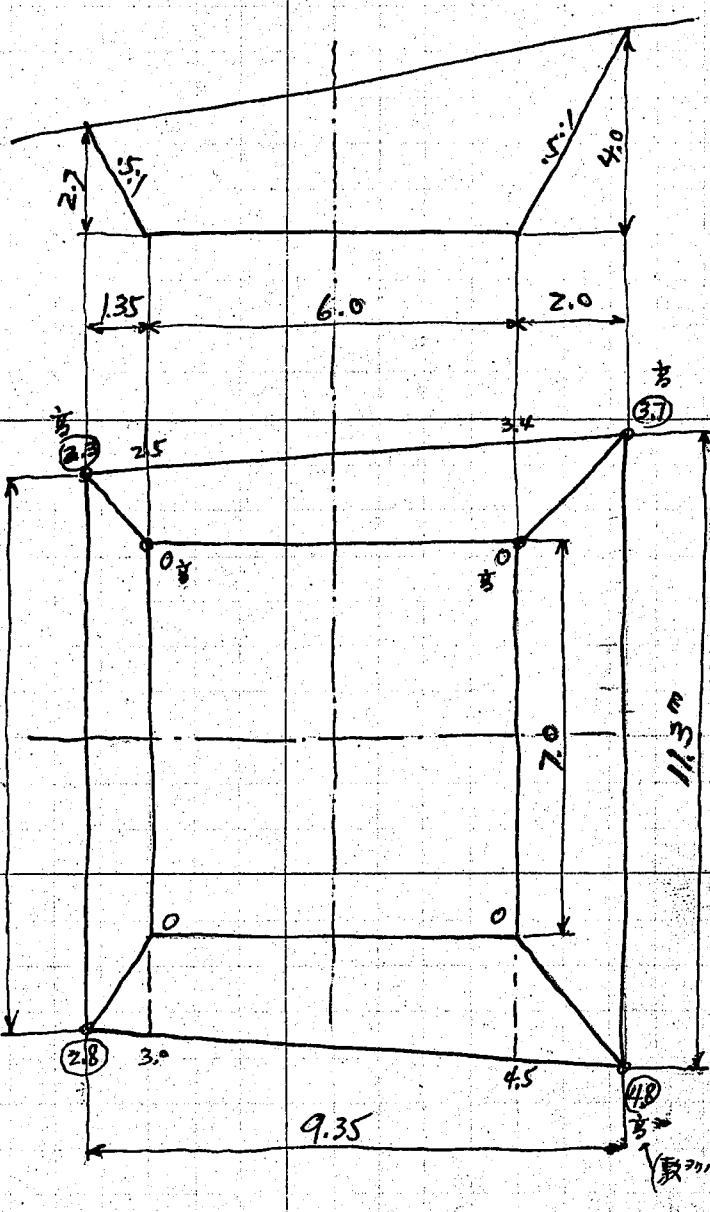
①	—		2.6	—
②	—	8.14	2.0	16.28
③	16.28	18.49	2.0	36.98
④	20.69	17.02	1.8	30.64
⑤	13.35	6.68	1.2	8.02
⑥	—	2.67	2.0	5.34
⑦	5.33	6.27	0.9	5.64
⑧	7.20			
			計	102.90 立方米

堀鑿 AG.
土 砂

根切底面々積 = 7.0 × 6.0 = 42.00 ㎡
〃 頂面 〃 = 10.25 × 9.35 = 95.84
平均面積 137.84 ÷ 2 = 68.92 ㎡

高サ 2.3
3.7
2.8
4.8
平均高 13.6 ÷ 4 = 3.4 m

土量 = 68.92 × 3.4 = 234.33 立方米



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MADE BY K.J. DATE 3-4-18 FILE NO 252
CHECKED BY " DATE 3-4-21 PAGE NO M57

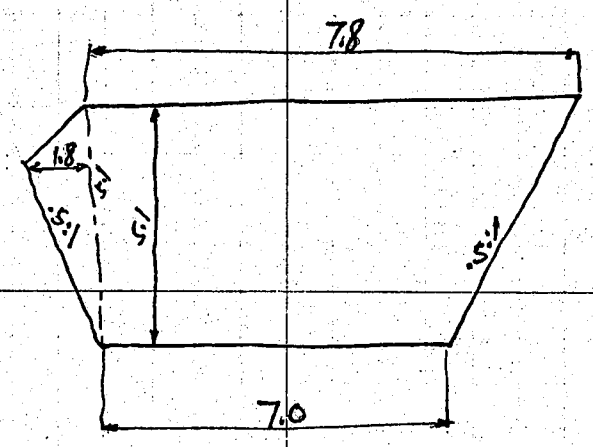
CALCULATIONS FOR

13

Material List for Arakawa Bashi for Saitama Ken.

Excavation

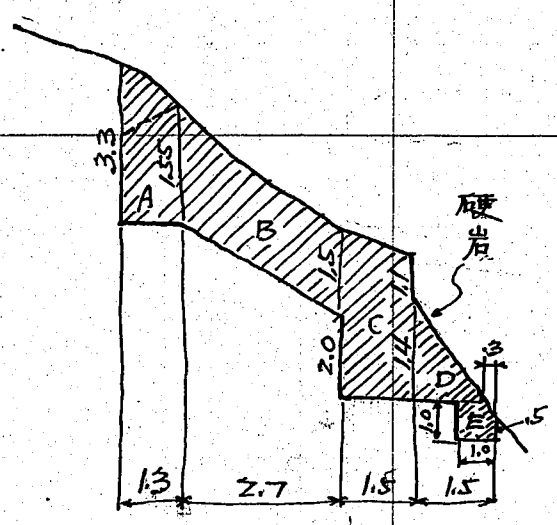
Pier PG.



平均断面 7.4 × 5.1 = 37.74
5.1 × .9 = 4.59
42.33 平方米

平均長 8.5 + 2.7 = 11.2 米
掘鑿土量 11.2 × 42.33 = 474.10 立方米 土砂

Pier PA 1.



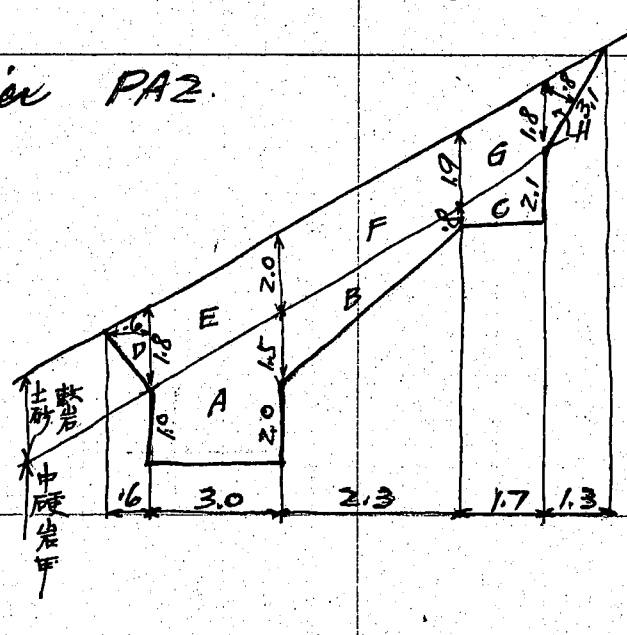
平均断面積

A.	2.43 × 1.3 =	3.16
B.	1.53 × 2.7 =	4.13
C	3.0 × 1.5 =	4.50
D	0.7 × 1.2 =	.84
E	1.0 × .81 =	.81
		13.44 平方米

土量 13.44 × 6 = 80.64 立方米

二基分 80.64 × 2 = 161.28 立方米 右硬岩

Pier PA2.



中硬岩甲.

平均断面積

A.	2.25 × 3.0 =	6.75
B	1.15 × 2.3 =	2.65
C	1.45 × 1.7 =	2.47
		11.87 平方米

11.87 × 6.0 = 71.22 立方米
二基分 = 71.22 × 2 = 142.44 〃

中硬岩乙.

平均断面積

D	1.8 × 0.3 =	0.54
E	1.9 × 3.0 =	5.70
F	1.95 × 2.3 =	4.49
G	1.85 × 1.7 =	3.15
H.	3.1 × .4 =	1.24
		15.12 平方米

平均巾 6.0 + 2 × 0.5 = 7.0 米
土量 = 15.12 × 7 = 105.84 立方米
二基分 = 2 × 105.84 = 211.68 立方米

合計 142.44 + 211.68 = 354.12 立方米

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MADE BY K.J. DATE 3-4-18 FILE NO 223
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CALCULATIONS FOR

Material List for Arakawa Bashi for Saitama Ken.

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土壓擊土 總括表

		硬岩	中硬岩甲	中硬岩乙	軟岩	土砂
Abutment for Truss span	AA.	102.90 m³			101.0 m³	571.93 m³
do for Girder span	AG.					234.33
Pier between Truss & Girder	PG.					474.10
Pier for Arch span	PA1.	161.28				
do	PA2		142.44	211.68		
Total		264.18 m³	142.44	211.68	101.0	1,280.36 m³.

石材表

親柱石材

	斷面	長	單量		負數	總量	
上列 才一段 Ⓓ	0.7×0.7	0.3	0.147	立方米	1	0.147	立方米
才二段	0.35×0.35	0.3	0.037		4	0.148	
才三段	0.7×0.7	0.3	0.147		1	0.147	
才四、五段 Ⓒ	0.4×0.15	0.3	0.018		8	0.144	
〃 〃	0.15×0.15	0.3	0.007		8	0.056	
才六、八段 Ⓑ	0.45×0.45	0.3	0.061		8	0.488	
才七段 Ⓐ	0.4×0.15	0.3	0.018		4	0.072	
〃 〃	0.25×0.75	0.3	0.019		4	0.076	
						1.278 立方米 ×4ヶ所 = 5.112 立方米	
袖柱石材	0.4×0.4	0.9	0.144		4	0.576 〃 一橋台上 = 本ム 0.288 〃	
東橋台 蹴込石 (AA)	0.25×0.25	0.92	0.058		6	0.348	
西 〃 〃 (AG)	〃 〃	〃	〃		〃	0.348	
						0.696 立方米	

親柱金物

青銅金物	底板	34cm×34cm×	15cm	173.4 cm³	1	173.4 cm³	
	尖歌	3×3×	15÷3	45.0	1	45.0	
	上横	6×3×	34	61.2	4	244.8	509#/cu.ft = 509.16.02 = 8,154 kg/m³
	中 〃	2×3×	30	18.0	4	72.0	
	下 〃	3×3×	30	27.0	4	108.0	
	底	32×32×	2	204.8	1	204.8	
	柱	3×3×	35	31.5	8	252.0	
						1,100.0 cm³ = 0.0011 立方米	
						0.0011 m³ @ 8,154 = 8.97 kg	
						親柱四本ヶ 8.97×4 = 35.88 kg	
鋳鉄金物	支金	一ヶ当	3.5 瓩		4ヶ	14.0 kg	
	支金				1	9.0	
						23.0 kg	
						親柱四本ヶ 4@23.0 = 92.0 kg	

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MADE BY K.J. DATE 3-4-19 FILE NO 224
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CALCULATIONS FOR

Material List for Arakawa-Bashi for Saitama Ken.

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人造洗ひ出し

Abutment AA

		width		length	Unit area	redd no	total area.	
							3.30 ㎡	See form P3 P9
Handrail on abutment		0.22	×	1.95	0.21	2	0.42	Top of top rail
"		0.22	×	1.16	0.04	6	0.24	" bottom rail
Coping	top	0.3	×	1.3	0.39	2	0.78	
"	side	0.7	×	1.3	0.91	2	1.82	
bracket		0.7	×	0.6	0.42	2	0.84	
column	top □	0.15	×	4.2	0.63	2	1.26	
"	sides ㄇ	3.1	×	7.26	22.51	2	45.02	
							53.68 ㎡	

Abutment AG.

Handrail on abutment							10.21 ㎡	See forms P8 P10
"		0.22	×	2.95	.65	2	1.30	Top of top rail
"		0.22	×	.16	.04	18	0.72	" bottom rail
Coping	top	0.3	×	3.3	.99	2	1.98	
"	side	0.7	×	3.3	2.31	2	4.62	
brackets		0.7	×	.6	.42	6	2.52	
column	top	0.15	×	4.2	.63	2	1.26	
"	sides.	3.1	×	4.2	13.02	2	26.04	
							48.65 ㎡	

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MADE BY K. J. DATE 3-10-4 FILE NO 225
CHECKED BY M. J. DATE 3-10-8 PAGE NO M60
(訂正追加.)

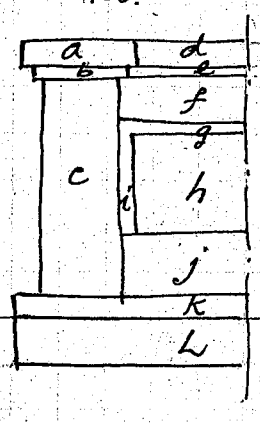
CALCULATIONS FOR

Arakawa Bashi for Saitamaken.

Pier between Truss and Girder spans. PG.

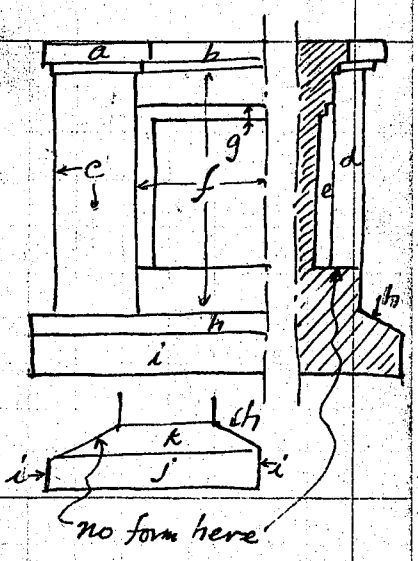
Concrete 1:2:4 mixture.

	Section	Length	Unit vol.	Req'd no	Total vol.		Remarks.
Coping, column	2.0×2.2	× .55	2.420	2	4.840 m³	a	
" "	1.9×2.1	× .15	0.599	2	1.198	b	
column	1.8×2.0	× 5.3	19.080	2	38.160	e	
coping, strut	1.2×.55	× 3.2	2.112	1	2.112	d	
" "	1.1×.15	× 3.3	0.545	1	0.545	e	
strut, top	1.0×.65	× 3.4	2.210	1	2.210	f	
" "	.7×.15	× 3.4	0.357	1	0.357	g	
curtain wall	.5×3.4	× 3.5	5.950	1	5.950	h	
" moulding	.1×.15	× 3.5	0.053	4	0.212	i	
wall at bottom	1.8×1.0	× 3.4	6.120	1	6.120	j	
base	2.95×.9	× 8.0	21.240	1	21.240	k	
"	4.1×.6	× 8.0	19.680	1	19.680	l	
					102.624 m³		



Forms.

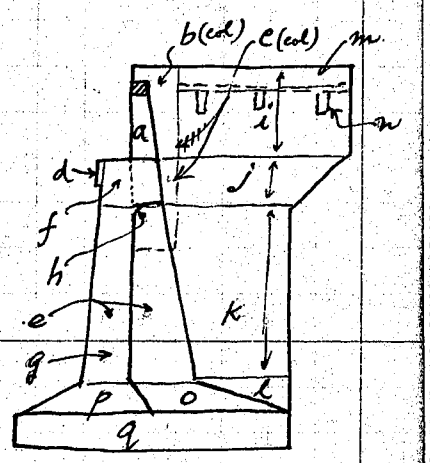
		Width		Length	Unit area	Req'd no	Total area		Remarks.
Coping	column	.75	×	7.0	5.25	2	10.50 m²	a	
"	strut	.75	×	3.2	2.40	2	4.80	b	
column		5.8	×	5.3	30.74	2	61.48	c	
"		.4	×	4.3	1.72	4	6.88	d	
"	moulding, sides	.25	×	3.58	.90	4	3.60	e	
curtain wall		3.4	×	5.3	18.02	2	36.04	f	
"	moulding top	.25	×	3.25	.81	2	1.62	g	
base	top, girder side	1.3	×	8.0	10.40	1	10.40	h	
"	front and rear	.6	×	8.0	4.80	2	9.60	i	
"	sides	.6	×	4.1	2.46	2	4.92	j	
"	"	.9	×	2.95	2.66	2	5.32	k	
							155.16 m²		



Abutment for Girder span AG.

Concrete 1:2:4 mixture

		Section	Length	Unit volume	Req'd no	Total Vol.		Remarks.
parapet wall		(3.1+.54)/2 × 1.65	× 5.5	3.81	1	3.81	a	
column	upper part	1.2×1.2	× 2.03	2.92	2	5.84	b	
"	lower "	1.2×0.7	× 2.57	2.16	2	4.32	c	
coping	shaft	0.06×0.5	× 7.60	.228	1	.23	d	
shaft		(1.03+2.0)/2 × 1.8	× 5.30	14.45	2	28.90	e	
Hor. beam (top of shaft)		1.12×1.2	× 2.90	3.90	1	3.90	f	
curtain wall		.72×4.1	× 2.90	8.56	1	8.56	g	
chamfer		.15×.075	× 2.90	.03	1	.03	h	
wing wall		0.5×1.67	× 3.27	2.73	2	5.46	i	
"		.5×1.5	× 2.69	2.02	2	4.04	j	
"		.5×2.30	× 4.09	4.70	2	9.40	k	
"		.5×.25	× 2.0	.25	2	.50	l	
coping wing		.4×.65	× 3.27	.85	2	1.70	m	
bracket "		.25×.6	× .2	.03	6	.18	n	
base		(1.2+2.7)/2 × .5	× 1.8	1.76	2	3.52	o	
"		(.8+2.55)/2 × .5	× 6.5	5.44	1	5.44	p	
"		.7×5.35	× 6.5	23.89	1	23.89	q	
						109.72 m³		
						0.69		
						110.41 m³		



Handrail see page M51.

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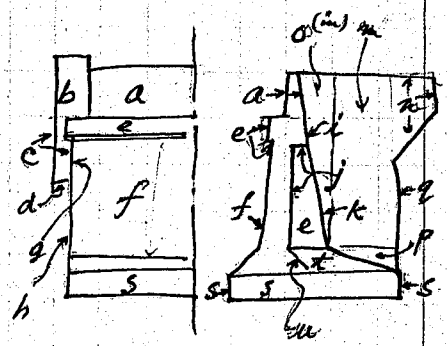
MADE BY K.J. DATE 3-10-4 **FILE NO** 226
CHECKED BY M. J. DATE 3-10-5 **PAGE NO** M.61
予定価格

CALCULATIONS FOR

Arakawa Bashi for Saitama Ken.

Forms for Abutment ~~between Frees~~ for girder span

		width		Length	unit area	req'd. no.	Total area	Remarks
Parapet wall	both sides	5.5	x	1.65	9.08	2	18.16	a
Column	top	2.03	x	3.10	6.29	2	12.58	b
〃	bottom	2.6	x	2.57	6.68	2	13.36	c
〃	〃 plane	.7	x	1.2	.84	2	1.68	d
Coping	Shaft	.56	x	7.7	4.31	1	4.31	e
Shaft	front	6.5	x	4.8	31.20	1	31.20	f
〃	Sides	.5	x	2.07	1.04	2	2.08	g
〃	〃	1.84	x	2.73	5.02	2	10.04	h
〃	rear hor. beam	1.2	x	5.5	6.60	1	6.60	i
〃	Curtain wall	4.7	x	2.9	13.63	1	13.63	j
〃	Counterfort rear	1.3	x	4.1	5.33	2	10.66	k
〃	〃 Sides	0.9	x	4.1	3.69	2	7.38	l
Wing	both sides with coping	2.11	x	7.6	16.04	4	64.16	m
〃	do	1.16	x	2.77	3.21	4	12.84	n
〃	inside	.45	x	5.6	2.52	2	5.04	o
〃	both sides bottom	.25	x	2.0	0.5	4	2.00	p
〃	end face	.5	x	8.1	4.05	2	8.10	q
〃	brackets	.7	x	.6	.42	6	2.52	r
base	all around	.7	x	23.5	16.45	1	16.45	s
〃	inside	.5	x	1.95	.98	2	1.96	t
〃	chamfer	.71	x	2.9	2.06	1	2.06	u
〃	Outside end	.5	x	1.68	.84	2	1.68	v
							248.49 m²	
							10.21	
							258.70 cm	



Handrail see page M52

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CALCULATIONS FOR

埼玉縣荒川橋架設中桟度ニ関スル計算

昭和四年一月

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MADE BY K. Inaba DATE 4-1-18 FILE NO
CHECKED BY DATE PAGE NO 166

CALCULATIONS FOR

Arakawa Bashi for Saitama Ken.

Erection Stresses.

Dead panel load during Erection.

Floor.

Stringers	81981
Floor Beams	43244
Top Lateral	18869
	144094# × 12.75/459 = 4,003# for 2 trusses.

Horizontal Bracing

Panel points	Hor. Strut.		Diagonals		Total for 2 trusses
C M4		519		=	519#
C N3	519+552	= 1071	+ 606	=	1677
C N2	552 × 2	= 1104	+ 1212	=	2316
C N1	563+552	= 1115	+ 606	=	1721
N6	563+775	= 1338		=	1338
S N1	552+775	= 1327	+ 606	=	1933
S N2	552 × 2	= 1104	+ 1212	=	2316
S N3		1071	+ 606	=	1677
S M4		519		=	519

Main Trusses and Sway Bracings for 2 trusses

Panel points	Sway Bracings	Verticals		Middle chord	Lower chord	Diagonals	Gusset	Transv. Strut	Total
C11	1106÷2	838÷2	216÷2	3698÷2	4281÷2	816÷2			5477
C10	1128	928	216	3534	4899	805			11510
C9	1162	902	216	3379	4795	801			11255
C8	2017	1188	216	3451	4925	817			12614
C7	2165	1568	216	3527	5050	842			13368
C6	2457	2052	216	3113	5719	871			14438
C5	2738	2662	216	3138	6611	909			16274
C4	3055	3538	216	3806	6927	938			18480
C3	4068	4178	216	3902	7210	984			20558
C2	5048	5458	216	3826	7617	1058			23223
C1	5496	6458	216	3961	8690	1144			24960
C0	8453	17884	216	4021	6122	1192	6016	4463	48340
S1	5492	6482	216	4051	4892	1145			22278
S2	5038	5402	216	4050	4817	1060			20583
S3	4054	4296	216	4310	4252	986			18114
S4	3036	3426	216	3953	3974	939			15544
S5	2707	2528	216	3510	3897	909			13767
S6	2436	1896	216	4090	2514	881			12033
S7	1971	1662	216	1684	1552	436			7521

Bottom Lateral Bracing

C11	768÷2	= 384
C10	1546÷2	= 773
C9	1584÷2	= 792
C8	1770÷2	= 885
C7	2113÷2	= 1057
C6	2407÷2	= 1204
C5	2753÷2	= 1377
C4	3128÷2	= 1564
C3	3557÷2	= 1779
C2	4027÷2	= 2014
C1	4329÷2	= 2165
0	3844÷2	= 1922

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CALCULATIONS FOR

Arakawa Bashi for Saitama Ken.

S_1	3122 ÷ 2 =	1561
S_2	2886 ÷ 2 =	1443
S_3	2521 ÷ 2 =	1261
S_4	2187 ÷ 2 =	1093
S_5	2014 ÷ 2 =	1007
S_6	1862 ÷ 2 =	931
S_7	896 ÷ 2 =	448

Summary for Dead Panel Loads.

Panel Points	Floor System + Top Lateral	Hor. Bracing	Main truss + Sway Bracing	Bottom Lateral Bracing	Shoes + Anchors	5% Rivet Heads	Total	Panel Load.
C11	2,002		5477	384	4238	499	12600	6300 #
C10	4003		11510	773		714	17000	8500
C9	"		11255	792		750	16800	8400
C8	"		12614	885		898	18400	9200
C7	"		13368	1057		972	19400	9700
C6	"		14438	1204		955	20600	10300
C5	"		16274	1377		1146	22800	11400
C4	"	519	18480	1564		1234	25800	12900
C3	"	1677	20558	1779		1383	29400	14700
C2	"	2316	23223	2014		1444	33000	16500
C1	"	1721	24960	2165		1551	34400	17200
0	"	1338	48340	1922		2797	58400	29200
S_1	"	1933	22278	1561		1425	31200	15600
S_2	"	2316	20583	1443		1455	29800	14900
S_3	"	1677	18114	1261		1145	26200	13100
S_4	"	519	15544	1093		1041	22200	11100
S_5	"		13767	1007		823	19600	9800
S_6	"		12033	931		833	17800	8900
S_7	2002		7521	448		429	10400	5200
								232900 #

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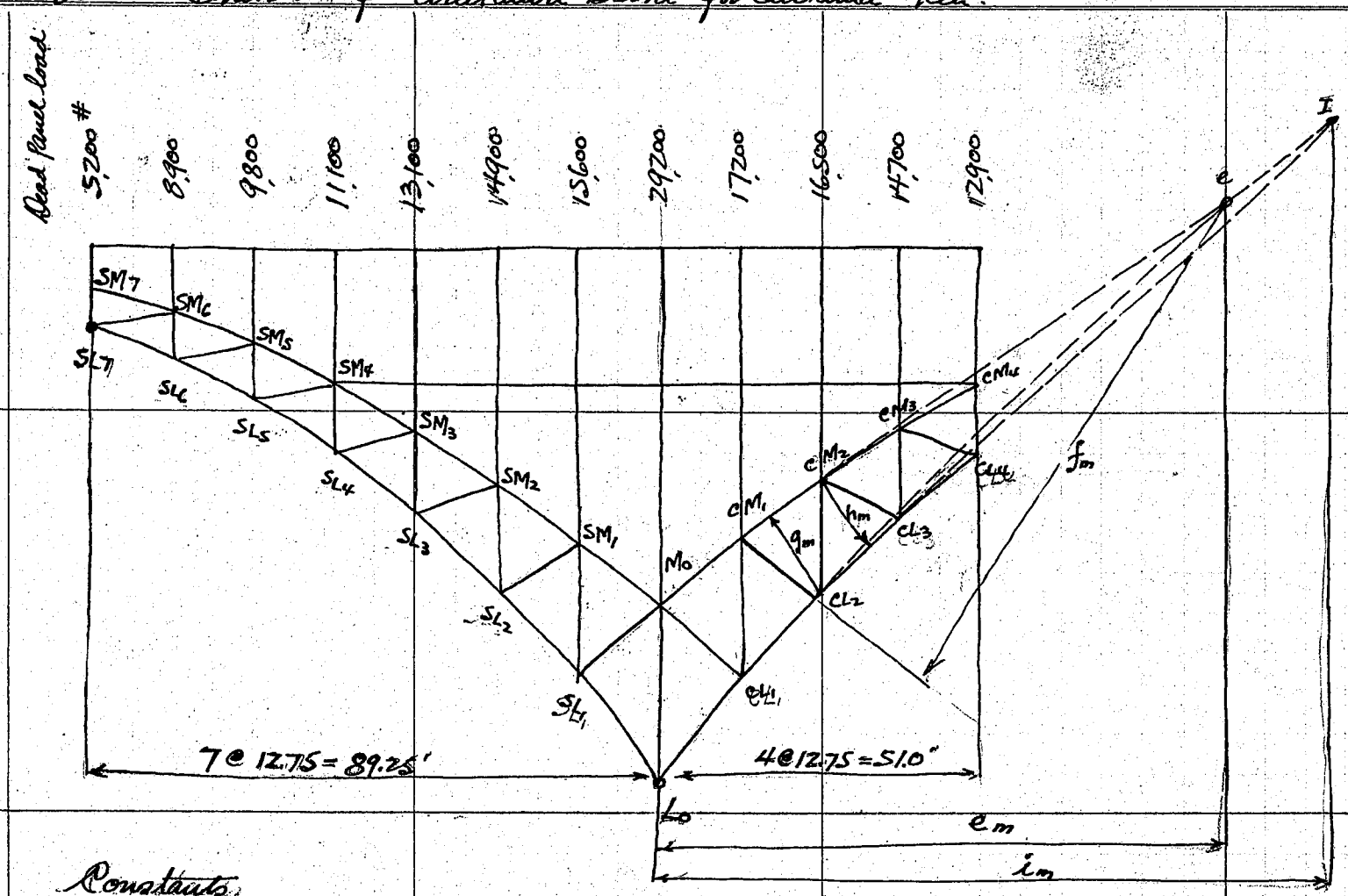
CALCULATIONS FOR

Erection Stresses of Arakawa Bashi for Saitama Ken.



Constants.

Panel point	g_m	h_m	f_m	e_m	i_m
0	—	17.271	—	—	—
1	17.115	15.779	123.72	95.863	149.33
2	15.320	14.320	110.60	104.607	164.97
3	13.612	12.904	97.00	113.828	184.46
4	12.010	11.547	84.07	123.979	212.48
5	10.542	10.273	72.39	135.201	258.03
6	9.229	9.104	62.79	148.057	359.86
7	8.104	8.078	56.44	164.229	949.25
8	7.190	7.219	53.71	185.240	−378.81
9	6.523	6.570	58.14	219.120	−46.46
10	6.120	6.156	79.10	288.890	35.21
11	5.995	—	207.04	606.170	—

Erection Stresses

Taking moment about L_0 to find the reactions

Panel point	Panel load	Lever arm	moment about L_0 (+)	moment about L_0 (−)
SL_7	5,200	7	36,400	
SL_6	8900	6	53400	
SL_5	9800	5	49000	
SL_4	11100	4	44400	
SL_3	13100	3	39300	
SL_2	14900	2	29800	
SL_1	15600	1	15600	
L_0	29200	0	0	
CL_1	17200	−1		17200
CL_2	16500	−2		33000
CL_3	14700	−3		44100
CL_4	12900	−4		51600
	169,100 #		+267,900	−145,900 = 122000 × 12.75 = 1,555,000

Reaction at SL_7 = $\frac{1555000}{89.25}$ = 17,400 #

Reaction at L_0 = 169,100 − 17400 = 151,700 #

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MADE BY K. Inaba DATE 4-1-19 FILE NO
CHECKED BY DATE PAGE NO 169

CALCULATIONS FOR

Erection Stresses for Arakawa Bashi Saitama ken.

Dead Load Stresses
Chord members

Reaction at SL7 = 17400#

Stress (+) sign Tension, (−) sign Compression.

Moment at ⑥ Side span.

17400 × 12.75 = +222 1800
5200 × 12.75 = − 66300
12200#
+155,500 1#

Stresses in

SL7 − SL6 = 155500 ÷ 9.104 = + 17,100#
Sm6 − Sm5 = 155500 ÷ 9.229 = − 16850
SL7 − SM6 = 155500 ÷ 9.800 = − 15850

Moment at ⑤

12200 × 2 = + 24400
8900 × 1 = − 8900
15500 × 12.75 = +197,500

SL6 − SL5 = 197500 ÷ 10.273 = + 19200
SM5 − SM4 = 197500 ÷ 10.542 = − 18750

Moment at ④

12200 × 3 = +36600
8900 × 2 = −17800
9800 × 1 = − 9800
+ 9000 × 12.75 = +114,800

SL5 − SL4 = 114800 ÷ 11.547 = + 9,950
SM4 − SM3 = 114800 ÷ 12,010 = − 9,560

Moment at ③

12200 × 4 = +48800
8900 × 3 = −26,700
9800 × 2 = −19,600
11100 × 1 = − 11100
− 8600 × 12.75 = −109,500

SL4 − SL3 = −109,500 ÷ 12.904 = − 8,500
SM3 − SM2 = −109,500 ÷ 13,612 = + 8,050

Moment at ②

12200 × 5 = 61000
8900 × 4 = − 35,600
9800 × 3 = − 29,400
11100 × 2 = − 22200
13100 × 1 = − 13,100
−39300 × 12.75 = − 501,000

SL3 − SL2 = −501000 ÷ 14320 = −35,000
SM2 − SM1 = −501000 ÷ 15.320 = + 32,700

Moment at ①

+ 12200 × 6 = + 73,200
− 8900 × 5 = − 44,500
− 9800 × 4 = − 39,200
− 11100 × 3 = − 33,300
− 13100 × 2 = − 26200
− 14900 × 1 = − 14,900
− 45600 − 84,900 × 12.75 = −1,082,000

SL2 − SL1 = −1082000 ÷ 15,779 = − 68,500
SM1 − M0 = −1082000 ÷ 17.115 = + 63200

Moment at ⓪

− 84900
45,600 × 1 = − 45600
− 15,600
146,100 × 12.75 = − 1,861,000

SL1 − L0 = −1861000 ÷ 17.271 = − 107,800
L0 − CL1 = −1861,000 ÷ 17.212 = − 108,100

Moment at ① center span

12900 × 3 = 38,700
14700 × 2 = 29,400
16500 × 1 = 16,500
84600 × 12.75 = 1080,000

CL1 − CL2 = 1079000 ÷ 15.779 = − 68,400
M0 − CM1 = 1079,000 ÷ 17.115 = + 63,000

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CALCULATIONS FOR

Erection Stresses for Onakawa Bashi, Saitama Ken.

Moment at ② Center span.

12900 × 2 = 25800
14700
40500 × 12.75 = 516000

$CL_2 - CL_3$ = 516,000 ÷ 14.32 = −36,100
$CM_1 - CM_2$ = 516000 ÷ 15.32 = +33,700

Moment at ③

12900 × 12.75 = 164,500

$CL_3 - CL_4$ = 164,500 ÷ 12.904 = −12,700
$CM_3 - CL_4$ = 164,500 ÷ 14.800 = +11,100
$CM_2 - CM_3$ = 164,500 ÷ 13.612 = +12,100

Diagonal and Vertical members.

SL6 − SM5 e_m = 148.057 distance of intersection pt. e to SL6 = 148.057 − 12.75×6 = 71.557

Moment = +8900 × 71.557 = + 637,000
−12200 × 58.807 = − 717,000
−3300 − 80,000 ÷ 62.79 = −1280

SL6 − SM6 $i_m - e_m$ = 359.86 − 148.057 = 211.803 + 71.557 = 283.36

Moment = −80,000
−3300 × 211.803 = −698,000
−778,000 ÷ −283.36 = +2,800

SL5 − SM4 dist. e − SL5 = 135.201 − 12.75×5 = 71.451

Moment = +9800 × 71.451 = + 700,000
+8900 × 58.701 = + 522,000
−12200 × 45.951 = − 560,000
+6500 + 662,000 ÷ 72.39 = +9150

SL5 − SM5 $i_m - e_m$ = 258.03 − 135.201 = 122.829 + 71.451 = 194.28 = arm.

Moment = +662,000
+6500 × 122.829 = + 798,000
+1,460,000 ÷ −194.28 = −7,520

SL4 − SM3 dist. e − SL4 = 123.979 − 12.75×4 = 72.979

Moment = +11100 × 72.979 = + 810,000
+9800 × 60.229 = + 590,000
+8900 × 47.479 = + 422,000
−12200 × 34.729 = − 423,000
+17600 + 1,399,000 ÷ 84.07 = +16.650

SL4 − SM4 $i_m - e_m$ = 212.45 − 123.979 = 88.471 + 72.979 = 161.45 = arm.

Moment = +1,399,000
+17600 × 88.471 = + 1,556,000
+2,955,000 ÷ −161.45 = −18,300

SL3 − SM2 dist. e − SL3 = 113.828 − 12.75×3 = 75.578

Moment = +13,100 × 75.578 = + 990,000
+11,100 × 62.828 = + 698,000
+9800 × 50.078 = + 490,000
+8900 × 37.328 = + 332,000
−12200 × 24.578 = − 300,000
+30,700 +2,210,000 ÷ 97.00 = +22,800

SL3 − SM3 $i_m - e_m$ = 184.46 − 113.828 = 60.632 + 75.578 = 136.21

Moment = +2,210,000
+30700 × 60.632 = + 1,862,000
+4072,000 ÷ 136.21 = −29,900

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CALCULATIONS FOR

Erection Stresses for Isakawa Bashi, Saitama-ken.

$SL_2 - SM_1$ dist. $e - SL_2$ = 104.607 − 12.752 = 79.107

moment
+14900 × 79.107 = + 1,180,000
+13100 × 66.357 = + 869,000
+11100 × 53.607 = + 595,000
+ 9800 × 40.857 = + 400,000
+ 8900 × 28.107 = + 250,000
−12200 × 15.357 = − 187,000
+45600 + 3,107,000 ÷ 110.60 = +28,100

$SL_2 - SM_2$ $i_m - e_m$ = 164.94 − 104.607 = 60.333 + 79.107 = 139.44

moment
+3,107,000
+45600 × 60.333 = +2,750,000
+5,857,000 ÷ 139.44 = −42,000

$SL_1 - M_0$ dist. $e - SL_1$ = 95.863 − 12.75 = 83.113

moment
+15600 × 83.113 = + 1,297,000
+14900 × 70.363 = + 1,048,000
+13100 × 57.613 = + 755,000
+11100 × 44.863 = + 498,000
+ 9800 × 32.113 = + 315,000
+ 8900 × 19.363 = + 172,000
−12200 × 6.613 = − 81,000
+61,200 + 4,004,000 ÷ 123.72 = +32,400

$SL_1 - SM_1$ $i_m - e_m$ = 149.33 − 95.863 = 53.467 + 83.113 = 136.58

moment
+4,004,000
+61,200 × 53.467 = +3,270,000
+7,274,000 ÷ 136.58 = −53,200

$CL_3 - CM_2$ center span dist. $e - CL_3$ = 113.828 − 3 × 12.75 = 75.578

moment
+12900 × 62.828 = + 811,000
+14,700 × 75.578 = +1,110,000
+27,600 + 1,921,000 ÷ 97.00 = + 19,800

$CL_3 - CM_3$ $i_m - e_m$ = 60.632 + 75.578 = 136.21 cm.

moment
+1,921,000
+27,600 × 60.632 = + 1,673,000
+3,594,000 ÷ 136.21 = + 26,400

$CL_2 - CM_1$ dist. $e - CL_2$ = 79.107

moment
+12900 × 53.607 = + 692,000
+14700 × 66.357 = + 975,000
+16500 × 79.107 = +1305000
+44100 + 2,972,000 ÷ 110.60 = +26,900

$CL_2 - CM_2$ $l_m - e_m$ = 60.333 + 79.107 = 139.44 = cm

moment
+2,972,000
+44100 × 60.333 = + 2,660,000
+5,632,000 ÷ −139.44 = −40,400

$CL_1 - M_0$ dist. $e - CL_1$ = 83.113

moment
+12900 × 44.863 = + 578,000
+14700 × 57.613 = + 848,000
+16500 × 70.363 = + 1,160,000
+17200 × 83.113 = + 1,430,000
+61,300 + 4,016,000 ÷ 123.72 = +32,500

$CL_1 - CM_1$

moment +4,016,000
61300 × 53.467 = +3275000
+7,291,000
7,291,000 ÷ 136.58 = −53,400

$L_0 - M_0$ Vert component of $L_0 - CL_1$ = −108,100 × 14.06/18.98 = −80,100
" " " $SL_1 - L_0$ = −107,800 × " = −79,900
−160,000 +
Reaction at L_0 = +151700
$L_0 - M_0$ = − 8,300

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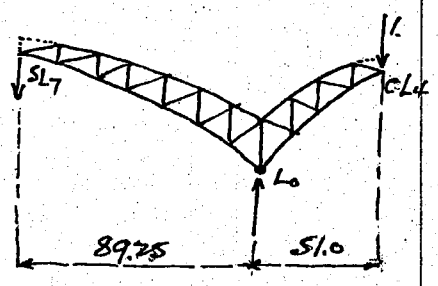
CALCULATIONS FOR

Erection Stresses for Arakawa Bashi, Saitama Ken.

Stresses in members due to unit load at panel point CL4.



Reaction at SL7 = 1×51÷89.75 = −0.571
" L0 = 1+0.571 = +1.571

Chord members — Reaction at SL7 = −0.571

		Stresses in		
Moment at ⑥ Side span.	= 0.571×12.75 = 7.28	SL7−SL6	7.28 ÷ 9.104 = −	0.800
		SM6−SM5	" ÷ 9.229 = +	0.789
		SL7−SM6	" ÷ 9.800 = +	0.743
Moment at ⑤	= 0.571×12.75×2 = 14.56	SL6−SL5	14.56 ÷ 10.273 = −	1.417
		SM5−SM4	" ÷ 10.542 = +	1.381
Moment at ④	= 0.571×12.75×3 = 21.85	SL5−SL4	21.85 ÷ 11.547 = −	1.895
		SM4−SM3	" ÷ 12.010 = +	1.820
Moment at ③	= 0.571×12.75×4 = 29.11	SL4−SL3	29.11 ÷ 12.904 = −	2.256
		SM3−SM2	" ÷ 13.612 = +	2.140
Moment at ②	= 0.571×12.75×5 = 36.37	SL3−SL2	36.37 ÷ 14.32 = −	2.540
		SM2−SM1	" ÷ 15.32 = +	2.375
Moment at ①	= 0.571×12.75×6 = 43.65	SL2−SL1	43.65 ÷ 15.779 = −	2.768
		SM1−M0	" ÷ 17.115 = +	2.551
Moment at ⓪	= 0.571×12.75×7 = 50.92	SL1−L0	50.92 ÷ 17.271 = −	2.950
		L0−CL1	" ÷ 17.212 = −	2.960

Center span.

Moment at ①	= 1×12.75×3 = 38.25	CL1−CL2	38.25 ÷ 15.779 = −	2.428
		M0−CM1	" ÷ 17.115 = +	2.236
Moment at ②	= 1×12.75×2 = 25.50	CL2−CL3	25.50 ÷ 14.320 = −	1.781
		CM1−CM2	" ÷ 15.320 = +	1.665
Moment at ③	= 1×12.75 = 12.75	CL3−CL4	12.75 ÷ 12.904 = −	0.987
		CM3−CL4	" ÷ 14.800 = +	0.862
		CM2−CM3	" ÷ 13.612 = +	0.937

Diagonals & Vertical members.

SL6−SM5	moment = 0.571×58.807 =	33.60	÷ 62.79 =	+0.535
SL6−SM6	" 0.571×211.803 =	120.90		
		154.50	÷ 283.36 =	−0.545
SL5−SM4	moment = 0.571×45.951 =	26.25	÷ 72.39 =	+0.363
SL5−SM5	" 0.571×122.829 =	70.20		
		96.45	÷ 194.28 =	−0.498
SL4−SM3	moment = 0.571×34.729 =	19.83	÷ 84.07 =	+0.236
SL4−SM4	" = " ×88.471 =	50.50		
		70.33	÷ −161.45 =	−0.436
SL3−SM2	moment = 0.571×24.578 =	14.03	÷ 97.00 =	+0.145
SL3−SM3	" " ×60.632 =	34.65	#	
		48.68	÷ 136.21 =	−0.358

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CALCULATIONS FOR

Erection Stresses for Oreakawa Bashi, Saitama Ken.

$SL_2 - SM_1$	moment = 0.571 × 15.357 =	8.77	÷ 110.60	= + 0.076
$SL_2 - SM_2$	" = 0.571 × 60.333 =	34.43		
		43.20	÷ 139.44	= − 0.310
$SL_1 - M_0$	moment = 0.571 × 6.613 =	3.776	÷ 123.72	= + 0.031
$SL_1 - SM_1$	" = 0.571 × 53.467 =	30.540		
		34.316	÷ 136.58	= − 0.252
Center span				
$CL_3 - CM_2$	moment = 1 × 62.828 =	62.828	÷ 97.00	= + 0.648
$CL_3 - CM_3$	" =	60.632		
		123.460	÷ 136.21	= − 0.906
$CL_2 - CM_1$	moment = 1 × 53.607 =	53.607	÷ 110.60	= + 0.485
$CL_2 - CM_2$	" = =	60.333		
		113.940	÷ 139.44	= − 0.817
$CL_1 - M_0$	moment = 1 × 44.863 =	44.863	÷ 123.72	= + 0.363
$CL_1 - CM_1$	" = =	53.467		
		98.330	÷ 136.58	= − 0.720

$L_0 - M_0$ Vert. component of $L_0 - CL_1$ = $-2.960 \times \frac{14.06}{18.98} = -2.192$

" " " $SL_1 - L_0 = -2.950$ " " = −2.185

−4.377

Reaction at L_0 = +1.571

−2.806

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CALCULATIONS FOR

Erection Stresses for Arakawa Bashi, Saitama ken.
Deflection at panel pt. CL4 during erection.

	Members	Length L	Area A	L/A	Erection Stress S	Elongation LS/EA	Stress due to unity	Deflection increments	Δ due to 10,000# on CL4
Chord members	SL7 – SLC	14.10	21.18	0.666	+ 17,100	+ 0.000379	– 0.800	– 0.000 304	–0.000178
	SMC – SM5	13.91	"	0.657	– 16,850	– 0.000369	+ 0.789	– 0.000 291	–0.000136
	SLC – SL5	14.72	"	0.695	+ 19,200	+ 0.000445	– 1.417	– 0.000 630	–0.000465
	SM5 – SM4	14.35	"	0.677	– 18,750	– 0.000423	+ 1.381	– 0.000 584	–0.000430
	SL5 – SL4	15.44	"	0.729	+ 9,950	+ 0.000 242	– 1.895	– 0.000 459	–0.000874
	SM4 – SM3	14.84	"	0.701	– 9560	– 0.000 244	+ 1.820	– 0.000 444	–0.000845
	SL4 – SL3	16.23	"	0.766	– 8,500	– 0.000 217	– 2.256	+ 0.000 490	+0.001316
	SM3 – SM2	15.39	"	0.726	+ 8,050	+ 0.000 195	+ 2.140	+ 0.000 417	+0.001109
	SL3 – SL2	17.09	"	0.807	– 35,000	– 0.000 942	– 2.540	+ 0.002390	+0.001736
	SM2 – SM1	15.97	"	0.754	+ 32,700	+ 0.000 822	+ 2.375	+ 0.001950	+0.001417
	SL2 – SL1	18.01	"	0.850	– 68,500	– 0.001940	– 2.768	+ 0.005370	+0.002170
	SM1 – M0	16.60	"	0.783	+ 63,200	+ 0.001648	+ 2.551	+ 0.004205	+0.001697
	SL1 – L0	18.98	"	0.896	– 107,800	– 0.003220	– 2.950	+ 0.009500	+0.002597
Web members	SL7 – SMC	13.38	9.94	1.347	– 15,850	– 0.000 711	+ 0.743	– 0.000 528	–0.000248
	SLC – SM5	13.52	"	1.360	– 1,280	– 0.000 058	+ 0.535	– 0.000 031	–0.000130
	SL6 – SM6	10.07	8.89	1.132	+ 2,750	+ 0.000 104	– 0.548	– 0.000 057	–0.000113
	SL5 – SM4	13.80	9.94	1.388	+ 9,150	+ 0.000 408	+ 0.363	+ 0.000 148	+0.000059
	SL5 – SM5	11.86	8.89	1.334	– 7,520	– 0.000 334	– 0.498	+ 0.000 167	+0.000111
	SL4 – SM3	14.25	9.94	1.435	+ 16,650	+ 0.000 796	+ 0.236	+ 0.000 188	+0.000027
	SL4 – SM4	13.98	8.89	1.573	– 18,300	– 0.000 960	– 0.436	+ 0.000 418	+0.000098
	SL3 – SM2	14.93	9.94	1.502	+ 22,800	+ 0.001 141	+ 0.145	+ 0.000 166	+0.000011
	SL3 – SM3	16.42	8.89	1.846	– 29,900	– 0.001 840	– 0.358	+ 0.000 658	+0.000079
	SL2 – SM1	15.94	9.94	1.603	+ 28,100	+ 0.001 502	+ 0.076	+ 0.000 114	+0.000003
	SL2 – SM2	19.20	8.89	2.159	– 42,000	– 0.003 020	– 0.310	+ 0.000 936	+0.000069
	SL1 – M0	17.27	9.94	1.737	+ 32,400	+ 0.001875	+ 0.031	+ 0.000 058	+0.000001
	SL1 – SM11	22.29	8.89	2.505	– 53,200	– 0.004 440	– 0.252	+ 0.001 120	+0.000053
								+ 0.024967 ft	+0.009127 ft
Chord members	L0 – CL1	18.98	43.83	0.433	– 108,100	– 0.001 560	– 2.960	+ 0.004 620	+0.001265
	CL1 – CL2	18.01	"	0.411	– 68,400	– 0.000 938	– 2.425	+ 0.002 275	+0.000806
	M0 – CM1	16.60	21.18	0.783	+ 63,000	+ 0.001 645	+ 2.236	+ 0.003 677	+0.001305
	CL2 – CL3	17.09	43.83	0.390	– 36,100	– 0.000 470	– 1.781	+ 0.000 836	+0.000413
	CM1 – CM2	15.97	21.18	0.754	+ 33,700	+ 0.000 847	+ 1.665	+ 0.001 410	+0.000697
	CL3 – CL4	16.23	43.83	0.370	– 12,700	– 0.000 157	– 0.987	+ 0.000 155	+0.000121
	CM2 – CM3	15.39	21.18	0.726	+ 12,100	+ 0.000 293	+ 0.937	+ 0.000 275	+0.000213
	CM3 – CL4	14.25	9.94	1.435	+ 11,100	+ 0.000 531	+ 0.862	+ 0.000 468	+0.000364
Web members	CL3 – CM2	14.93	"	1.502	+ 19,800	+ 0.000 990	+ 0.648	+ 0.000 642	+0.000210
	CL3 – CM3	16.42	8.89	1.846	– 26,400	– 0.001 625	– 0.906	+ 0.001 472	+0.000505
	CL2 – CM1	15.94	9.94	1.603	+ 26,900	+ 0.001 438	+ 0.485	+ 0.000 697	+0.000126
	CL2 – CM2	19.20	8.89	2.159	– 40,400	– 0.002 905	– 0.817	+ 0.002 375	+0.000480
	CL1 – M0	17.27	9.94	1.737	+ 32,500	+ 0.001 883	+ 0.363	+ 0.000 684	+0.000076
	CL1 – CM1	22.29	8.89	2.505	– 53,400	– 0.004 460	– 0.720	+ 0.003 210	+0.000433
	L0 – M0	25.71	21.18	1.215	– 8,300	– 0.000 336	– 2.806	+ 0.000 943	+0.000328
								+ 0.023739 ft	+0.010264
								+ 0.048706 ft	+0.019391

Deflection at CL4 due to Dead Load.
Effect of side span = 0.024967 ft or 5/16"
" " Center span = 0.023739 or 9/32"
total = 0.048706 or 19/32" Call this 5/8"

Deflection at CL4 due to 10,000# load on CL4 = 0.019391 ft or 1/4"

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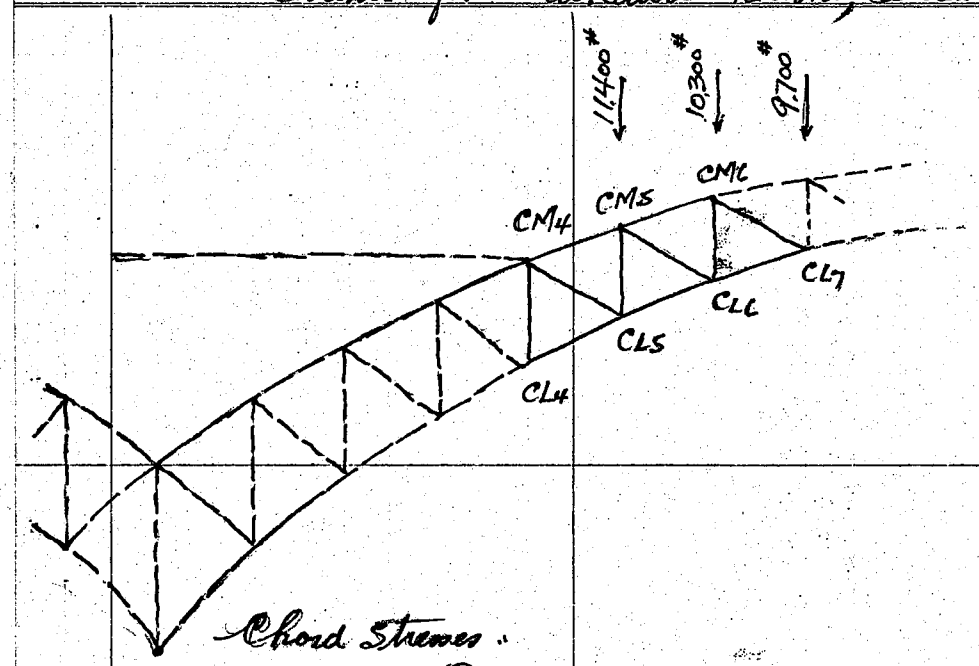
CALCULATIONS FOR

Erection Stresses for Arakawa-Bashi, Saitama Ken.



Deflection for Cantilever CL4 – CL7.

Panel load on CM5 = 11400#
" CM6 = 10300
" CM7 = 9700
31400#

Chord Stresses.

Moment at ⑥
9700 × 12.75 = 123600 ft#

Stress in CL6–CL7: 123600 ÷ 9.104 = − 13580#
CM5–CM6: " ÷ 9.229 = + 13400
CM6–CL7: " ÷ 9.800 = + 12600

Moment at ⑤
9700 × 2 = 19400
10300
29700 × 12.75 = 378000 ft#

CL5–CL6: 378000 ÷ 10.273 = − 36800
CM4–CM5: " ÷ 10.542 = + 35900

Moment at ④
9700 × 3 = 29100
10300 × 2 = 20600
11400
61100 × 12.75 = 779000 ft#

CL4–CL5: 779000 ÷ 11.547 = − 67500
CM3–CM4: " ÷ 12.010 = + 64900

Mbl. members
CM5–CL6
Moment = 10300 × 71.557 = 737000
9700 × 58.807 = 571000
20000 1308000 ft# ÷ 62.79 = + 20850#

CL6–CM6
Moment = 1308000
20000 × 211.803 = 4236000
5544000 ÷ 283.36 = − 19550#

CM4–CL5
Moment = 11400 × 71.451 = 814000
10300 × 58.701 = 604000
9700 × 45.951 = 445000
31400 1863000 ÷ 72.39 = + 25700#

CL5–CM5
Moment = 1863000
31400 × 122.829 = 3855000
5718000 ÷ 194.28 = − 29450#

CM4–CL4 dist. CL4 to I = 217.45 − 51.0 = 161.45
Moment = 9700 × 123.26 = 1195000
10300 × 135.95 = 1400000
11400 × 148.70 = 1695000
4290000 ÷ 161.45 = − 26600#

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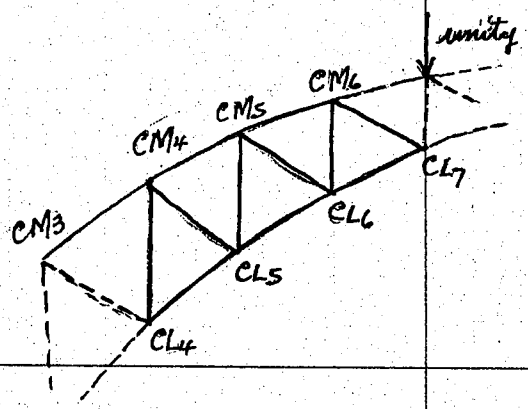
CALCULATIONS FOR

Erection Stresses for Arakawa Bashi, Saitama Ken

Stress due to unity at CL7.



Chord Stress

moment at ⑥
1 × 12.75 = 12.75

moment at ⑤
2 × 12.75 = 25.50

moment at ④
3 × 12.75 = 38.25

Stress in

CL6 – CL7	12.75 ÷ 9.104	= − 1.400
CM5 – CM6	" ÷ 9.229	= + 1.381
CM6 – CL7	" ÷ 9.800	= + 1.301
CL5 – CL6	25.50 ÷ 10.273	= − 2.482
CM4 – CM5	" ÷ 10.542	= + 2.420
CL4 – CL5	38.25 ÷ 11.547	= − 3.315
CM3 – CM4	" ÷ 12.010	= + 3.185

Mel members.

CM5 = CL6

moment 1 × 58.807 = 58.807 ÷ 62.79 = + 0.938

CM6 – CL6 1 × 211.803 = 211.803

270.610 ÷ 283.36 = − 0.956

CM4 – CL5

moment 1 × 45.951 = 45.951 ÷ 72.39 = + 0.635

CL5 – CM5 = 122.829

168.780 ÷ 194.28 = − 0.868

CM4 – CL4

moment 1 × 123.20 = 123.20 ÷ 161.95 = − 0.763

Deflection of Cantilever arm CL4 – CL7 during erection

Members	Length L	Area A	L/A	Erection stress S	Elongation LS/EA	Stress due to unity	Deflection increment
CL6 – CL7	14.10	21.118	0.666	−13,580	−0.000302	−1.400	+0.000423
CM5 – CM6	13.91	"	0.657	+13,400	+0.000294	+1.381	+0.000406
CL5 – CL6	14.72	"	0.695	−36,800	−0.000853	−2.482	+0.002,118
CM4 – CM5	14.35	"	0.677	+35,900	+0.000818	+2.420	+0.001,960
CL4 – CL5	15.44	"	0.729	−67,500	−0.001640	−3.315	+0.005440
CM3 – CM4	14.84	"	0.701	+64,900	+0.001515	+3.185	+0.004860
CM6 – CL7	13.38	9.994	1.347	+12,600	+0.000566	+1.301	+0.000,735
CM5 – CL6	13.52	"	1.360	+20,850	+0.000945	+0.938	+0.000886
CL6 – CM6	10.07	8.89	1.132	−19,550	−0.000738	−0.956	+0.000705
CM4 – CL5	13.80	9.994	1.388	+25,700	+0.001190	+0.635	+0.000756
CL5 – CM5	11.86	8.89	1.334	−29,450	−0.001310	−0.868	+0.001,138
CM4 – CL4	13.98	"	1.573	=26,600	−0.001397	= 0.763	+0.001064
							+0.020491 ft = 1/4"

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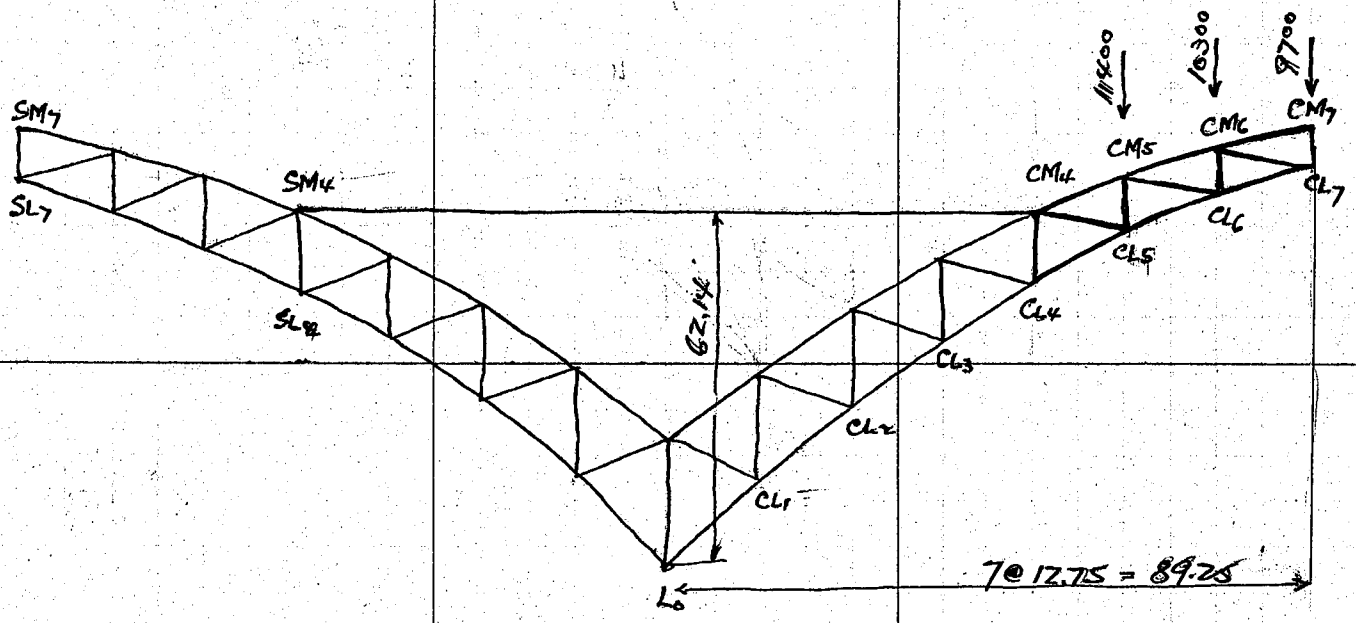
CALCULATIONS FOR

Erection Stresses for Arakawa Bashi, Saitama ken.

Approximate deflection of CL7 due to elongation of hor. tie for the loads at CL5 CL6 + CL7



Approximate tension on hor. tie due to panel loads on CL5, CL6 + CL7 only.

Moment about L0

11400 × 5	=	57,000
10300 × 6	=	61,800
9700 × 7	=	67900

186,700 × 12.75 = 2,380,000 ft# ÷ 62.14 = +38,300 #

Approx. tension on hor. tie due to unit load at CL7

Moment

1 × 89.25 = 89.75 ÷ 62.14 = +1.436 #

Deflection of CL7 due to load on CL5, CL6 + CL7

	Length L	Area A	L/A	Stress S	Elongation SL/EA	Stress due to unity	Deflection at CL6
tie	102.00	9.936	10.270	+38,300	+0.01313	+1.436	0.018850 ft = 7/32"

Erection 中ニ於ケル deflection, panel pt. 4 と 7.

1. Side span 全部及 center span L0 ～ CL4 マデ組立テル時 D.L. ノタメ CL4 ノ deflection 3/32"
2. center span CL4 ～ CL7 ノ cantilever ノ CL7 ニ於ケル D.L. ニヨル deflection 1/4"
3. cantilever CL4 ～ CL7 ノ荷重ニヨル tie ノ elongation ニヨル CL7 ノ deflection 7/32"

2. ノ場合ニ於テ CL7 ガ 1/4" deflect シタル時 規定ノ位置ニ引戻スベク tie ヲ引締メテ CL4 ヲ前以テ引上ゲ置クベキ amount ハ 1/4" × 4/7 = .0117' = 1/8"

3. ノ場合 全上ノ amount ハ 7/32" × 4/7 = .0108' = 1/8"

1. ノ場合 CL4 ヲ引上グベキ amount ハ = 19/32"

計 27/32" Call this 7/8"

外ニ cantilever CL4～CL7 ノ CL4 ニ於ケル moment ノタメ及 tie ノ tension ガ truss ニ満フル Stress ヲ与ヘル deflection ヲモ之ニ対スル allowance ヲ 1/4" トシテ、全部ニテ 1/8" CL4 ヲ引上グルヲ要ス

而テ此場合 CL4 ノ規定ノ Elevation ヨリモ 1/2" 高クナリ居ルヲ要ス (CL4 マデ組立タル時ノ Elevation)

結論 Side span ヲ組ミ SL7 ニ anchor ヲ施シ center span ヲ L0 ヨリ CL4 マデ組立テタル際 CL4 ノ格点ヲ規定ノ Elevation ヨリモ 1/2" 高クナル様 tie ヲ締メ置クヲ要ス。Center span ヲ CL7 マデ cantilever トシテ組立タル時 CL7 ノ格点ハ規定ノ elevation ヲトルヲ要ス

(但シ此目的ヲ達スルタメ CL4 ヲ引上グベキ総量ハ 1/8" ナリ)

終リ.

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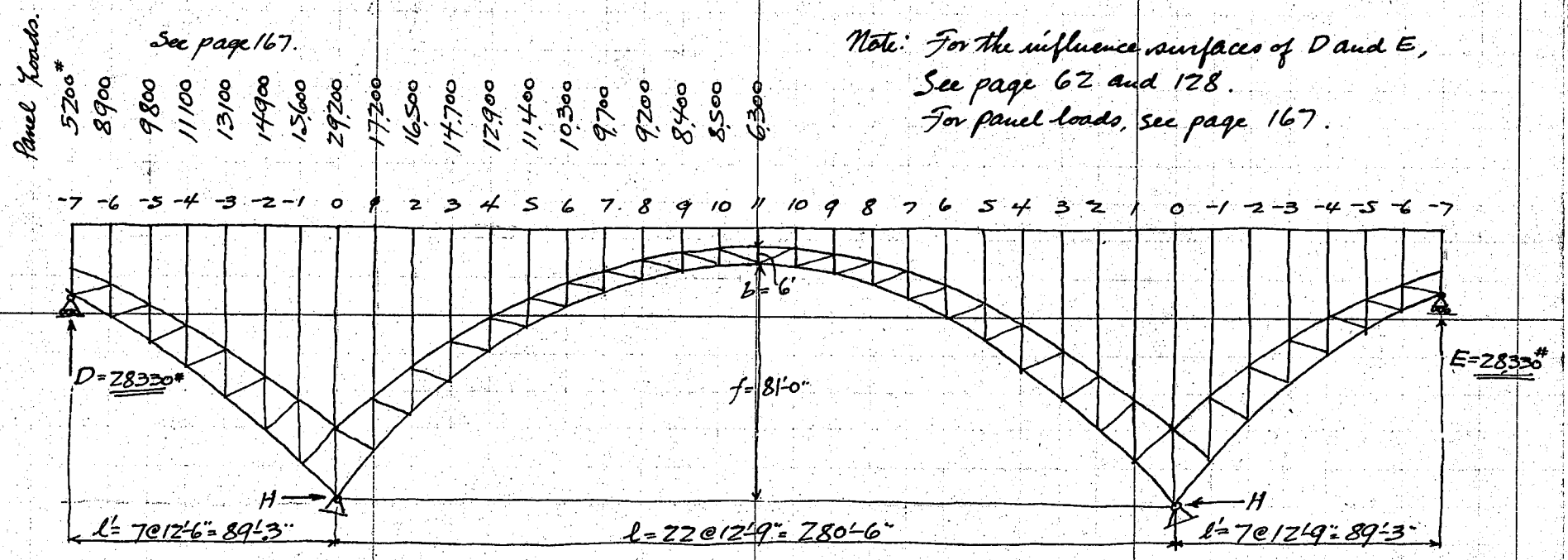
CALCULATIONS FOR

Arakawa Bashi for Saitama Ken.

End Reaction due to Dead Load Excluding floor slab, pavement &c.

See page 167.

Note: For the influence surfaces of D and E, See page 62 and 128. For panel loads, see page 167.



Influence Surface of Reaction D.

Panel Pt.	D-Surface		Panel Load		D.
-7	1.000	×	5200*	=	5200*
-6	0.820		8900		7300
-5	0.647		9800		6340
-4	0.485		11100		5380
-3	0.335		13100		4390
-2	0.198		14900		2950
-1	0.078		15600		1220
0	0.000		29200		0
1	-0.069		17200		-1190
2	-0.106		16500		-1750
3	-0.122		14700		-1790
4	-0.148		12900		-1910
5	-0.145		11400		-1650
6	-0.135		10300		-1390
7	-0.111		9700		-1080
8	-0.084		9200		-770
9	-0.043		8400		-360
10	-0.001		8500		-10
11	0.042		6300		260
					+21140
					+7190
					+28330*

Influence Surface of E. (D due to panel loads on Right half)

Panel Pt.	E-Surface		Panel Load		E
10	0.075	×	8500	=	640*
9	0.100		8400		840
8	0.112		9200		1030
7	0.119		9700		1150
6	0.109		10300		1120
5	0.099		11400		1130
4	0.077		12900		990
3	0.063		14700		930
2	0.040		16500		660
1	0.018		17200		310
0	0.000		29200		0
-1	-0.018		15600		-270
-2	-0.024		14900		-360
-3	-0.027		13100		-350
-4	-0.027		11100		-300
-5	-0.024		9800		-240
-6	-0.010		8900		-90
-7	0.000		5200		0
					+7190*

Reaction D due to panel loads on whole Bridge = +28330* = E. (handrail slal + pavement ~~etc~~ executed)

Summary of influence ordinates = +3.323 − 0.500 = +2.823 (57)

panel load due to handrail = 65 × 12.75 = 830* D = E = 2.823 × 830 = +2340*

Slab and pavement conc: $\frac{5.75}{12} \times 150 = 72$

pav: 1.5" @ 11 = 16.5

mortar $\frac{1}{2}$ @ 9 = 4.5

93.8# × 9.5 × 12.75 = 11250*

D = E = 2.823 × 11250 = +31800*

D when handrail erected 28330 + 2340 = +30670*

D when Bridge completed 30670 + 31800 = +62470*

note: + sign upward reaction

D for Temperature change of ± 30°C = ± 5500*

± 100* for ± 1°F

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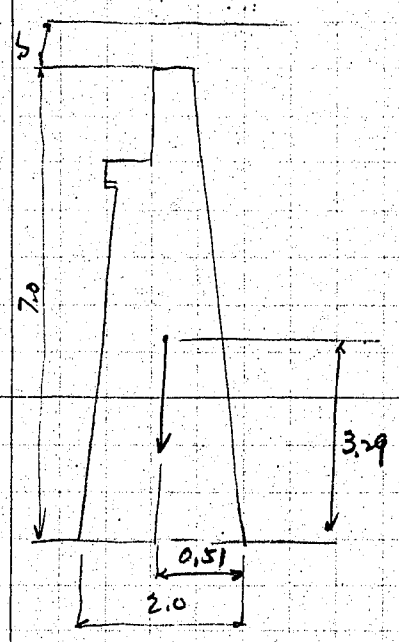
CALCULATIONS FOR
井筒橋台



Center of gravity of shaft. for one half of abutment

	Section	Length	vol		total wt.	lever arm	m	vert lever	moment
Parapet wall	.45×2.0	2.75 = 2.475	@24kN	=	5940 kg	1.07	6,400	5.9	35.1kN
hor. beam	1.2×1.2	3.25 = 4.68	@24kN	=	11,230	1.20	13,5kN	4.4	49.5kN
curtain wall	1.7×13.8	1.45 = 3.86	@ "	=	9kN	1.55	14.3kN	1.78	16,400
Shaft	1.65×3.8	1.8 = 11.3	@ "	=	27.1kN	1.15	31,2kN	1.7	46.1kN
Column	1.2×1.2	2.1 = 3.03	@ "	=	7270	.7	5,100	6.05	44.0kN
4	1.2×.7	3.0 = 2.52	@ "	=	6050	.7	4.2kN	3.5	21.2kN
wing	.6×2.1	7.0 = 8.83	@ "	=	21.2kN	-.95	-20,100	3.2	67.8kN
2	.5×2.25	1.2 = 1.35	@ "	=	3240	-2.5	-8.1kN	6.12	20.1kN
		38.05 ×2 = 76.1 m³			91,230 kg	0.51	46,5kN	8.29	300 kN

Center of gravity of base.

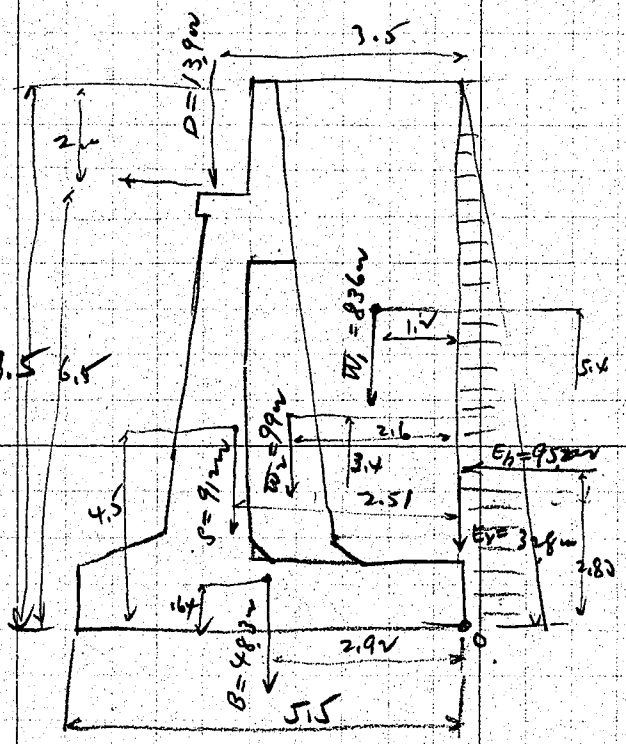
5.5×0.7	3.75 = 12.50	@24kN	=	30.0kN	2.75	82.5kN	9.35	105kN
1.8×0.8	3.75 = 4.68	@ "	=	11.2kN	4.0	44.8kN	1.1	12.3kN
2.05×0.8	1.8 = 2.95	@ "	=	7080	1.9	13.5kN	1.2	8.5kN
				48,3kN	2.9m	140,800	.64	31,300

wt. of earth behind the shaft

$\frac{3.0+2.0}{2} \times 7.0 \times 2.75 = 52.2$ @16kN = 836kN

earth between shaft.

$\frac{.7+1.2}{2} \times 1.45 = 4.8 = 6.2$ @16kN = 9.9kN



Phase 2 Stability of abutment during earth quake $\gamma k = 0.1$

Taking moment abt. o.

	Hor force	vert force	lever arm	moment	(case 3)	(case 1)
D		13,9kN	× 3.5	48,600	○	○ 85.5kN
D'	2.8kN		× 6.5	18,2kN	○	—
S		91,2kN	× 2.51	229,kN	○	○
S'	18,2kN		× 4.5	82,kN	○	—
B		48.3kN	× 2.9m	141,kN	○	○
B'	9.7kN		× 1.64	16,kN	○	—
W_1		83.6kN	× 1.2	100,3kN	○	○
W_1'	16.7kN		× 5.4	90,2kN		
W_2		9.9kN	× 2.6	25,8kN	○	○
W_2'	2kN		× 3.4	6,8kN		
E_h	95,2kN		× 2.83	269,5kN		22.2kN
E_v		32.8kN	× 0	0		
	ΣH = 144.6kN	ΣV = 279,7kN	× 3.64 =	1017,6kN		803,600

Earth pressure

$E_h = .229 \times 16kN \times 8.5^2 \times 3.6 = 95200$

$E_v = .079 \times 16kN \times 8.5^2 \times 3.6 = 32,8kN$

Eccentricity $e = 3.64 - \frac{5.5}{2} = 0.89$ left.

resultant force within middle third

max toe pressure $= \frac{279,700}{3.25 \times 5.5}\left(1 \pm \frac{6 \times 0.89}{5.5}\right) = 30800 \text{ kg/m}^2 \text{ or } (2.82 \text{ ton/m}^2)$

$\pm .97$

≈ 470 "

Case 3.

$\Sigma V = 246.9kN \times 1.78 = m = 438.3kN$

Eccentricity $e = 2.75 - 1.78 = 0.97$

resultant force out of middle third

max heel pres. $= \frac{2 \times 246.9kN}{3.25 \times 1.78 \times 3} = 28400 \text{ kg/m}^2 \text{ or } (2.6 \text{ ton/m}^2)$

Case 1. normal state

$e = \frac{16kN \times 9^2}{6} \times 3.6 = 77800$

$\Sigma V = 257.4kN \times 3.12 = m = 803.6kN$

Eccentricity $e = 3.12 - 2.75 = 0.37$ dept

max toe pres $= \frac{257.4kN}{3.25 \times 5.5}\left(1 \pm \frac{6 \times .37}{5.5}\right) = 20,200 \text{ kg/m}^2 \text{ or } (1.85 \text{ ton/m}^2)$

$\pm .404$

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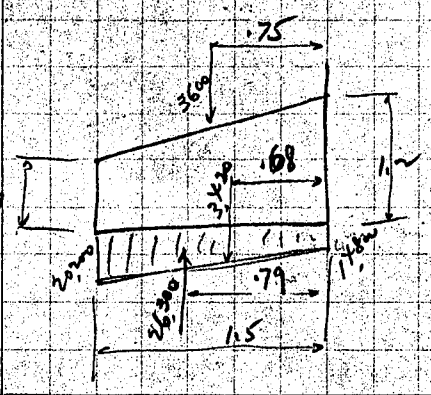
CALCULATIONS FOR
片持梁ノ計算

Cantilever footing



max toe press. = 20 200 kg/sq.m at normal state governs the Section
= 30 8m during earthquake

upward press. = $\frac{20\,200+11,480}{2} \times 1.5$ = +26,300 kg × .79 = 20,700
wt footing = 1.95 × 1.5 C mon = − 3420 × .68 = − 2330
earth filling = 1.5 × 1.5 @ 1.6m = −3.6m × .75 = − 2.7m
19,3m 15,720 kgm.

steel req'd. = $\frac{15,720 \times 100}{1200 \times \frac{7}{8} \times 114}$ = 13.1 cm²

use 5 − 7/8" ϕ bars = 19.4 cm²

Steel ratio = $\frac{19.4}{100 \times 114}$ = 0.0017 k = .197 j = .935

$f_s = \frac{15,720 \times 1m}{19.4 \times .935 \times 11.4}$ = 760 kg/cm² ok

$f_c = \frac{760 \times .197}{15(1-.197)}$ = 124 kg/cm² ok
.803

Unit shear = $\frac{19300}{100 \times .935 \times 114}$ = 1.81 kg/cm² ok

unit bond = $\frac{1930}{6.98 \times 5 \times .935 \times 114}$ = 5.2 " ok.

鉄筋えいままで宜し