JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO,

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CALCULATIONS FOR

# 埼玉県第九橋梁設計書

昭和三年四月

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CALCULATIONS FOR

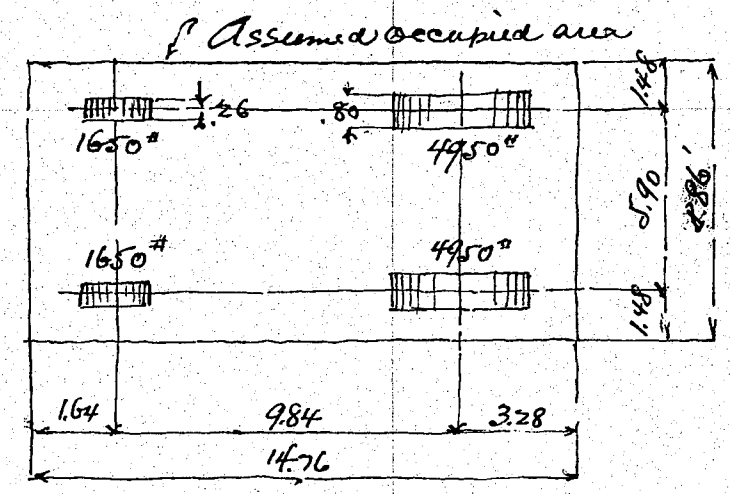
# Design of Arakawa-Bashi for Saitama-Ken

Type of Bridge Ballanced arch
Span length. Centr arch 22 panels @ 12'-9" = 280'-6" = 85.496 metres.
Side spans each 7 panels @ 12'-9" = 89'-3" = 27.204 metres.
Total length of ballanced arch bridge = 459'-0" c to c of end bearings. = 139.904 m
At the one end of said bridge plate girder span will be added.
Roadway 5.5 metres wide ~~inside to inside of lamp posts~~ or 18.0446' pavement with 1.0' about copings at both ends.
Kind of pavement 2½" mortar pavement or 2" asphalt Block pavement with ½" mortar Cushion at base Surface of roadway will be curved to $\frac{1}{60}$-$\frac{1}{50}$ parabolic slope.

Assumed Loadings
Uniform load on roadway $w = \frac{100.000}{170+l} = 500$ kg/m² or say 100 lb/.

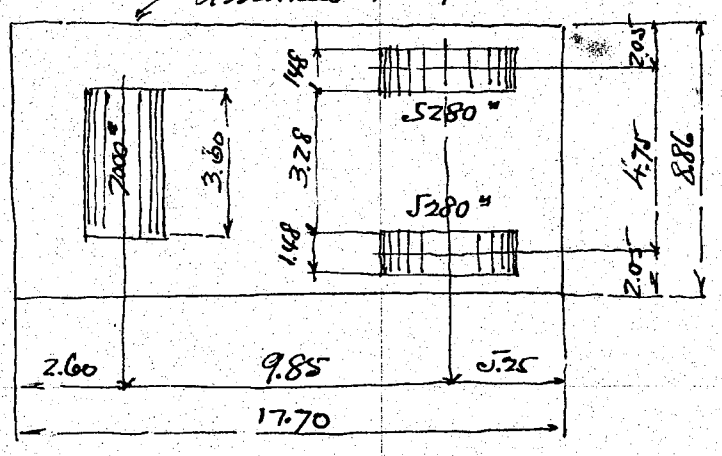
where w = Uniform load in kg per square meter
l = span length in meter

6 ton motor truck loading




2 rows of motor truck traffic on roadway with occupied width of 8.86' each Unoccupied space of front and rear and also sides of motor truck shall be filled with Uniform load specified above.

8 ton road roller




One road roller on span

Impact for motor truck loading

$$\frac{20}{60+l}$$

where l = span length in meter
max. impact 30%
No impact for road roller and uniform load.

Allowable Working strength
Structural steel or reinforcing bars
Tension 17000 lb/.
Extreme fibre stress 17000 "
Shear on web gross section 12800 "
Compression member $21300\left(1-0.0055\frac{l}{r}\right) = 14000$ lb/.
Compression flange of plate girder $17000\left(1-0.012\frac{l}{b}\right) = 15400$ lb/.

where l = unsupported length of flange in inches
b = width of flange in inches

Shearing on shop rivet (machine driven) 12000 lb/.
field " 10.000 "
Extreme fibre stress of pin 24.000 "

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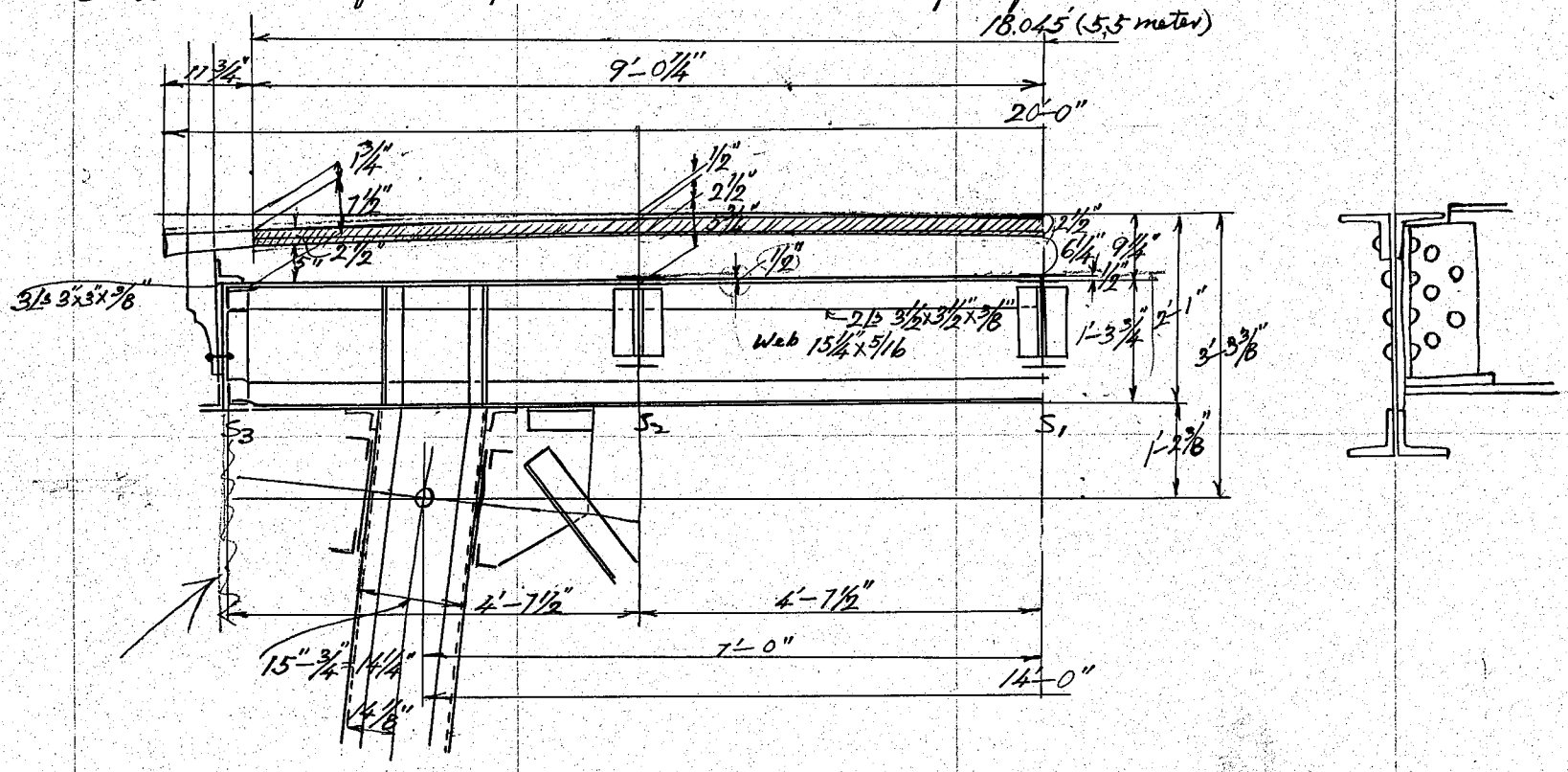
CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken

| | |
|---|---|
| Bearing on shop rivets | 24000 #/□" |
| " " field rivets | 20.000 " |
| Bearing on pin | 24.000 " |
| Expansion roller 640 d per lin inch | where d = diameter of roller in inches |
| Bearing on masonry | 640 #/□" |
| Concrete 1:2:4 mixture | |
| Compression fibre stress | 640 #/□" |
| Shear for plain concrete | 58 |
| punching shear | 128 |
| Bond stress of plain bar | 85 |
| Bond stress of deformed bar | 128 |
| Shear for reinforced Concrete with web reinforcement | 128 #/□" |

Considering wind and temperature stresses in addition to dead live and impact stresses the allowable working strength shall be increased 25% and proportioned the parts.
In figuring earthquake, the working strength shall be increased 80% and proportioned the parts.
Accelleration of Earthquake assumed 2000 mm per sec² = k = 0.2

Cross section of bridge and construction of floor as shown on sketch below.




Reinforced Concrete slab. 4-1 7/2" c to c of stringers

| | | |
|---|---|---|
| Dead Load | pavement 2 1/2" asphalt block | 22# |
| | 1/2" mortar cushion. | 5# |
| | Dead Load slab say | 75 |
| | | 102# per sq ft. |

Dead Load moment = 1/10 × 102 × 4.62² = 218.0 ft#
Dead Load shear = 1/2 × 102 × 4.62 = 236.# 

Live Load
Motor truck rear wheel concentration 4950
30% impact 1485
6435#
Front wheel concentration 6435 ÷ 3 = 2145#
Distribution of wheel Concentration
Contact between wheel and pavement assumed 20cm = 0.66
2 × .21 pavement and cushion = .42
a = 1.08'

Effective width E = 2/3 l + a where l = span length in ft.
= 2/3 × 4.62 + 1.08 = 4.16'

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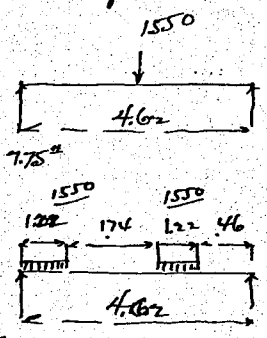
CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken




Load for one ft strip 6435 ÷ 4.16 = 1550 #
moment due to concentration = 775 × 2.31 = 1790 ft#
For continuity of slab 0.8 × 1790 = 1430 ft#
max shear as simple beam
Transverse distribution b = .46 + .80 = 1.22
1550 × 5.08/4.62 = 1700 #

Summary for moments and shears

| | moment | shear |
|---|---|---|
| Dead Load | 218. | 236 |
| Live Load | 1790 | 1700 |
| | 2008 ft# | 1936 # |

Effective depth of slab for steel stress of 17000 #/□" and Concrete stress of 640 #/□"

$d = \sqrt{\frac{2008}{102}} = 4.44"$

make slab 5 3/8" min. with 1/2" insulation at bottom

Depth of slab. at S1 6 1/4"
S2 5 3/4"
S3 5"

Steel area required = $\frac{2008 \times 12}{7/8 \times 4.44 \times 17000} = 0.3770$ " per ft

Use 1/2"□ bars 6" centers = 0.390" per ft.

Unit shear = $\frac{1936}{7/8 \times 4.44 \times 12} = 41.5$ #/□"

Bond stress = $\frac{1936}{7/8 \times 444} = 498$ # per lin ft.

2- 1/2"□ bars @ 1.57 × 128 # = 402.0
1- 3/8" bar @ 1.18/.59 × 128 = 151.0
553.0 # per ft.

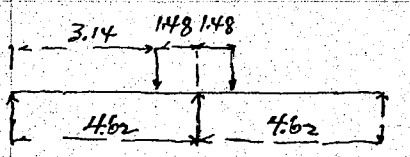
Shear at stringer S2. one wheel on span
Live load shear = 1550 × 4.01/4.62 = 1345
Dead load shear = 236
1781 #

Bond stress = $\frac{1781}{7/8 \times 444} = 459$ # add 3/8" bar for bond per ft.

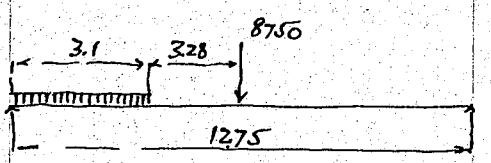
Longitudinal stringer span length 12'-9" stringer spacing 4'-7 1/2"
Stringer S1
Dead Load slab and pavement 102 × 4.62 = 470
stringer assumed 35
505 # per lin ft of stringer

Dead Load moment = 1/8 × 505 × 12.75² = 10280 ft#
Dead Load shear = 1/2 × 505 × 12.75 = 3220 #

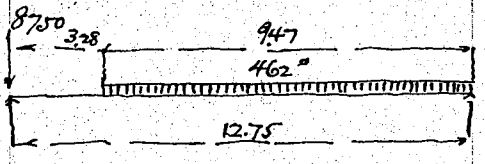
Live Load motor truck loading




Rear wheel Concentration with impact = 6435 #
Front wheel Concentration " " = 2145 #
max load on stringer
6435 × 3.14/4.62 = 4375
4375
8750 #




Uniform Live load 100 # per sq ft. 462 # per ft of stringer
Total load = 462 × 3.1 = 1430 #
Live Load moment
Due to wheel load 4375 × 6.38 = 27900
" " Unif. load 1430 × 1.55 × 6.38/12.75 = 1110
29010 ft#




End shear Total load 462 × 9.47 = 4370
Reaction 4370 × 4.73/12.75 = 1620
wheel load 8750
10370 #

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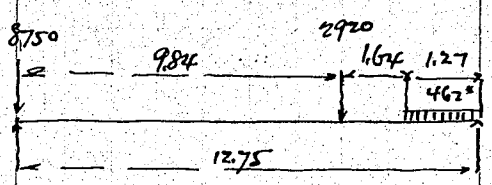
CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken




Unif load Total load $462 \cdot 1.27 = 587^{\#}$

Reaction $587 \cdot \frac{.63}{12.75} = 29$

motor truck $2920 \cdot \frac{2.91}{12.75} = 666$

" " 8750

$9445^{\#}$

Summary for moments and shears

| | moment | shear |
|---|---|---|
| Dead Load | 10280 | 3220 |
| Live Load | 29010 | 10370 |
| | $39290^{\#}$ | $13590^{\#}$ |

Iny 12" · 5" @31.99 Sm = 36.686

Unit stress = $\frac{39290 \times 12}{36.686} = 12870^{\#}/\square"$

Stringer S2 Section same as S1

Fascia stringer S3.

Dead Load say

| | |
|---|---|
| pavement 2" | 22# |
| ½" cushion | 5 |
| Slab 5 3/8" av. | 67 |
| | 94# per sq ft. |

Load on stringer

4'-7½
9
5'-4½

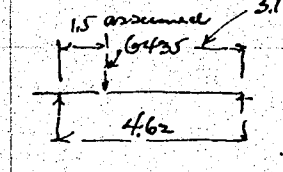
$94 \cdot \frac{5.37^2}{2 \cdot 4.62} = 294^{\#}$

| | |
|---|---|
| Handrail assumed | 70 |
| stringer assumed | 46 |
| | 410# per lin ft of span |

Dead Load moment = $\frac{1}{8} \cdot 410 \cdot 12.75^2 = 417\ 8320^{\#}$

Dead Load shear = $\frac{1}{2} \cdot 410 \cdot 12.75 = 2620^{\#}$

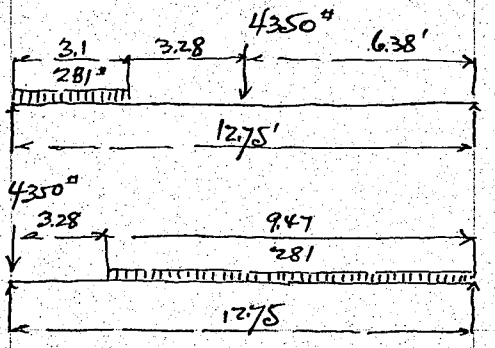
Live Load




$6435 \cdot \frac{3.12}{4.62} = 4350$

Uniform load 100# per square ft. load assumed on full span

Uniform live load on stringer = $100 \cdot \frac{4.62}{2} = 231^{\#}$ per lin ft.




Total load = $281 \times 3.1 = 717^{\#}$

Live Load moment

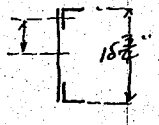
| | | |
|---|---|---|
| Due to wheel load | 2175 · 6.38 | = 13880 |
| " " Unif. load | $717 \pm \frac{1.55}{12.75} \cdot 6.38$ | = 555 |
| | | 14435 lb# |

End shear or reaction

| | | |
|---|---|---|
| Total load | $281 \cdot 9.47$ | = 2660 |
| Reaction | $2660 \cdot \frac{4.73}{12.75}$ | = 9880 |
| of wheel load | | 4350 |
| | | 5338 call this 5340# |

Summary for moments and shears

| | moment | Shear |
|---|---|---|
| Dead Load | 8320 | 2620 |
| Live Load | 14435 | 5340 |
| | $22755^{\#}$ | $7960^{\#}$ |




web assumed $15\frac{3}{4} \cdot 9/16 = 4.760$ ⅛ web = .590

2 ls 3" · 3" · 3/8" = $4.22 \cdot 7.0^2 + 3.6 = 211$

15¾ · 9/16" = 4.76 92.2

8.98 303.2

fibre stress = $\frac{22755 \cdot 12 \cdot 7.88}{303.2} = 7100^{\#}/\square"$

This stringer will serve as chord member for upper lateral system, the stress shall be checked due to wind load stresses.

Approximate weight main section 306

Details say 20% $\frac{60}{366}$ # per lin ft. or say 35#

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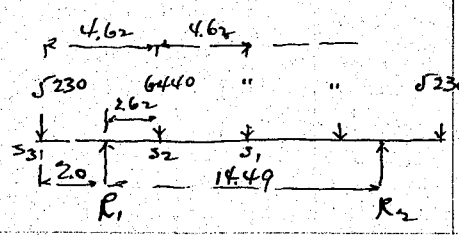
CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken.

Cross beam ℄ to ℄ of supports. ranges from 13.72' to 14.49'
spacing of cross beams 12'9"

Dead Load. assumed

Concentration at $S_1$ 505 × 12.75 = 6440
$S_2$ " " = 6440
$S_3$ 410 " " = 5230




Reaction = 17890 14890

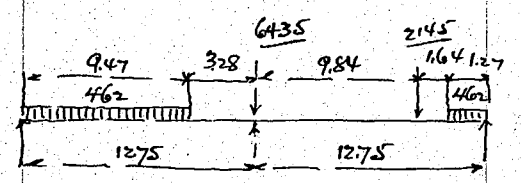
moment at $R_1$ 5230 × 2.0 = -10460 ''

at $S_2$ 5230 × 4.62 = -24200
39000
17890/14890 × 2.62 = +46900
22700
14800 ''

at $S_1$ 5230 × 4.62 × 2 = -48400
6440 × 4.62 = -29800
-78200 -78200
17890/14890 × 7.24 = 17800 107800
129200
51000 '' 34600 296000 ''

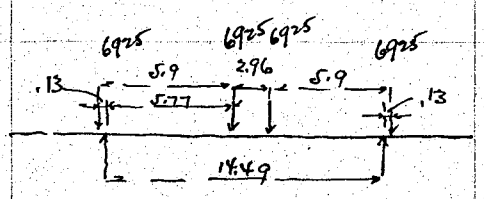
End shear Cantilever Portion 5230 #
Center span 9660 #

Live Load motor truck loading, rear wheel concentration with impact 6435
Front wheel " " " 2145

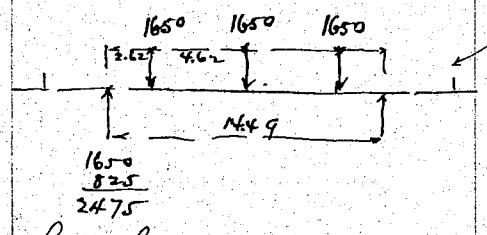



Motor truck loading Front 2145 × 2.91/12.75 = 490
rear. 6435
6925 #

Uniform load per stringer 462# per lin ft.
Uniform load total 462 × 1.27 = 587 587 × .63/12.75 = 29
462 × 9.47 = 4370 4370 × 4.73/12.75 = 1620
1649 call this 1650# per stringer

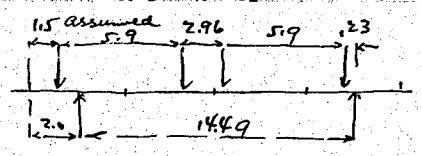



moment at center motor truck loading.
6925 × 5.77 =
6925 × -0.13 =
564 = 39000 ''

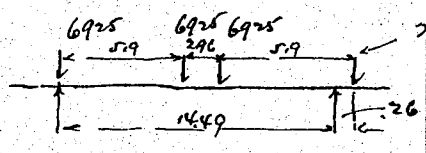



This load neglected on safe side.
moment at center uniform live load
2475 × 7.24 = 17900 Total 39000
1650 × 2.62 = -4325 13575
13575 '' 52575 ''

Live Load End shear. between supports.




max reaction 6925 × 30.44/14.49 = 14550 #




this load neglected. 6925 × 14.24/14.99 = 6580
6925
13505

Uniform load on stringer 1650
825
2475
15980 #

Cantilever Portion. max projection 2.38.
Dead Load moment 5230 × 2.38 = 12450 ''
shear 5230
Live Load moment
for max load see Stringer $S_3$.

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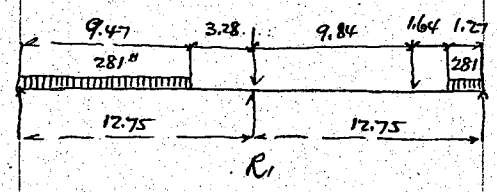
CALCULATIONS FOR

# Design of Arakawa-Bashi for Saitama-Ken




Rear wheel 4350
Front wheel 4350 ÷ 3 = 1450 #
max R1 1450 × 2.91/12.75 = 330
4350
4680 #

Uniform load 281 × 9.47 = 2660 — 2660 × 4.73/12.75 = 988
281 × 1.27 = 356 — 356 × .63/12.75 = 18
1006
4680
Total concentration — 5686 #

Live Load moment = 5686 × 2.38 = 13500 ft
" " shear = 5686

Dead Load of beam 50# per lin. ft assumed.
Cantilever bracket max projection 2.38
moment = 50 × 2.38²/2 = 142 ft say 140
shear = 50 × 2.38 = say 120 #

max dead load moment between supports.
Projection 2.0 span length 14.49' Uniform load assumed 50# per lin. ft.
4
Total length — 18.49'
reaction at support 18.49 × 50/2 = 462 # say 460
moment at center. 462 × 9.25 ÷ 2 =
- 7.25
~~2.00~~ 2.625 say 920
+1,214
Shear inside 50 × 7.25 = say 360 #

Summary for moments and shears

| | cantilever moment | cantilever shear | cross beam moment | cross beam shear | Load on column |
|---|---|---|---|---|---|
| Dead Load | 12450 | 5230 | 29600 | 9660 | 14890 |
| " " cross beam | 140 | 120 | 920 1214 | 360 | 460 |
| Live Load. | 13500 | 5686 | 52575 | 15980 | 18170 |
| | 26090 ft | 11036 # | ~~83095~~ 83389 ft | 26000 # | ~~33540~~ 33540 # |

15350
say 15500

max live load on column
motor truck loading max reaction 14550
uniform load between supports 2475
Cantilever 1006 × 16.49/14.49 = 1145
18170 #

Section of cross beam
web assumed 15¼" × 5/16 = 4.760" 1/8 web = .60 bbob of Ls 1.31
Effective depth 1.31 − .17 = 1.14
83389
flange stress = 83095/1.14 = ~~72900~~ 73100
73100
Section required = 72900/17000 = 4.29 "
1/8 web .60
3.690" net
Try 2Ls 3½ . 3½ × 3/8 = 4.960" − .66 = 4.300" net.

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CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken.

Load on Column direct load Dead Load 15350 × 1.007 = 15460
Live load 18170 × 1.007 = 18300
33520 # 35760 #

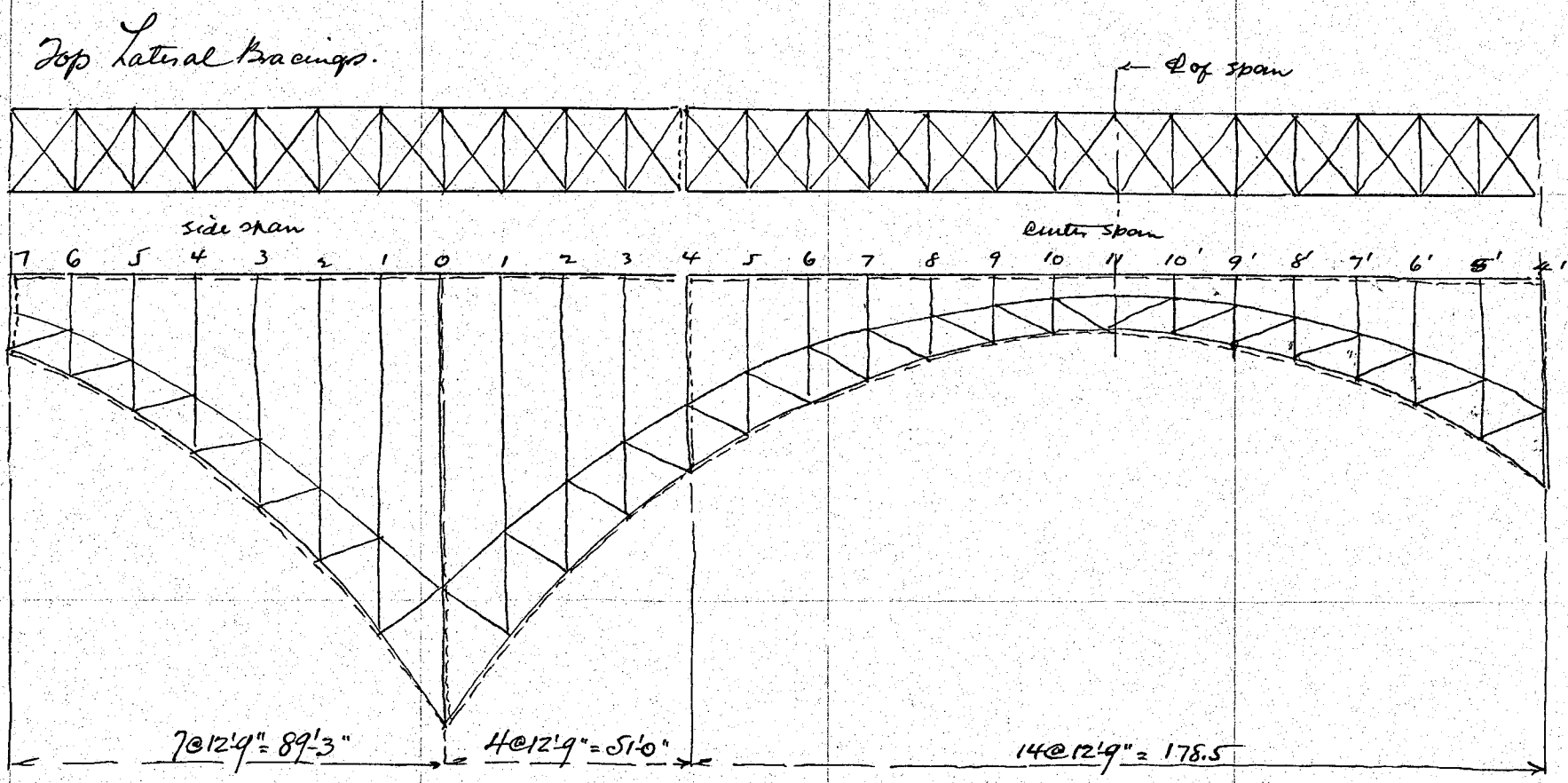
8.56 / 8.5 / 1. $\frac{8.56}{8.50} = 1.007$

Adding weight of Column and bracing Total Dead 16500
Live load 18300
34800 #

Try 10" - 3½" @ 23.55# radius of gyration 3.85 sectional area 25 = 13.85 in²
Unsupported length of Column 25'-6" = 300" 78

allowable unit stress = 21300 (1 − 0.0055 $\frac{l}{r}$) = 12180 #/□"
section required 34800 ÷ 12180 = 2.86 □"
Unit stress = 34800 ÷ 13.85 = 2510 #/□"
wind load or Earthquake stresses shall be added to the above and proportioned the parts

Top Lateral Bracings.




Top Lateral Bracings divided into 3 parts center portion carried down by bent at panel point 4 and 4' and then carried to pier. Side portion as cantilever truss support at 7 and 0 and overhang 4 panels into center span, the reactions will be carried down by bent at 0 and 7 of side span; at each bent wind pressure will be carried down to bottom chord of truss and then to bottom lateral bracings.

Assumption of wind pressure on truss.

Loaded chord center span assumed 85.7 m
50.0 --- 270#
35.7 36
306# per lin ft of span

Unloaded chord or bottom lateral Bracing 135
36
171.# per lin. ft of span

Total wind pressure 306 + 171 = 477# per lin ft.
In average 477 ÷ 2 = 238.5# assumed for top lateral bracing
panel Concentration 238.5 × 12.75 = 3040#

Top Lateral Bracings and all bents figured for this panel load.

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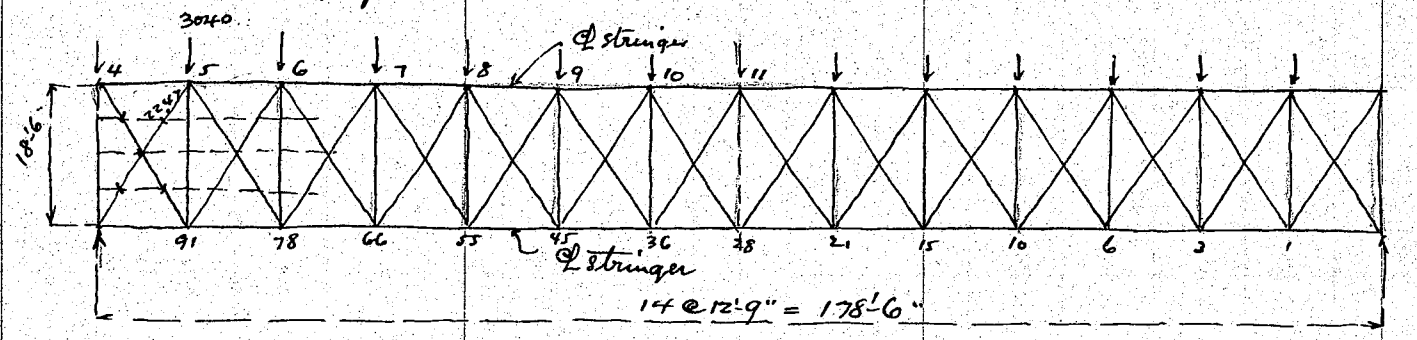
CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken.

Top Lateral Bracing for 178'-6" simple span.




$12.75^2 = 162.5$
$18.5^2 = 342.5$
$505.0 - 22.47'$

$\sec\theta = \frac{22.47}{18.50} = 1.214$

| panel | | | Shear | | | Stress | For one member | 3/4" Rivet | SR Comp. | SR tension | Section |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4-5 | $\frac{30\#0}{14}$ × | 91 | 19760 | × 1.214 = | | 24.000 | 12000 | 2.72 | 1.85□" | 0.705□" net. | L 3½×3½×⅜ = 2.480□" |
| 5-6 | " | 78 | 16930 | | | 20600 | 10300 | | | | |
| 6-7 | " | 66 | 14330 | | | 17400 | 8700 | | | | |
| 7-8 | " | 55 | 11950 | | | 4500 | 7250 | Use 3 Rivets for connection and the bracing shall be connected to Stringer as shown on sketch by cross - X | | | |
| 8-9 | " | 45 | 9770 | | | 11850 | 5925 | | | | |
| 9-10 | " | 36 | 7820 | | | 9500 | 4750 | | | | |
| 10-11 | " | 28 | 6080 | | | 7390 | 3695 | | | | |

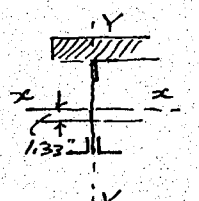
Unsupported length $\frac{11.74}{2} \times 12 = 67.5"$ L 3½.3½.⅜ $r = .59$ $l/r = 126$

allowable unit stress = $21300 (1 - 0.0055 \times 126) = 6500$ #/□" for compression
$17000$ " for tension.

Chord stress.

| Panel | | | | | Chord stress. |
|---|---|---|---|---|---|
| 4-5 | 3040 × | 6.5 × | $\frac{12.75}{18.5}$ | = | 13600 # |
| 5-6 | " × | 12.0 | " | | 25200 |
| 6-7 | " | 16.5 | " | | 34600 |
| 7-8 | " | 20.0 | " | | 42000 |
| 8-9 | " | 22.5 | " | | 47200 |
| 9-10 | " | 24.0 | " | | 50400 |
| 10-11 | " | 24.5 | " | | 51500 |

Revised section of fascia stringer.




r yy axis = 1.36 about unsupported length 12.75' = 153" $l/r = 127$

Allowable working strength = $21300 (1 - 0.0055 \times 127) = 8100$ #/□" for comp.

Centr of gravity of section XX axis.

| | | | | | |
|---|---|---|---|---|---|
| 2L 3×3×⅜ | = 4.22 | | | | |
| 1L 3×3×⅜ | = 2.11 | × 7.0 = | 14.77 | $\text{Ecc} = \frac{14.77}{11.09} = 1.33"$ | |
| 1Pl 15¼×9/16 | = 4.76 | | | | |
| | 11.09 □" | | | | |

Moment of inertia of section

| | | Area | | | | |
|---|---|---|---|---|---|---|
| 2L 3×3×⅜ | = | 4.22 | × $5.67^2$ | + 3.6 | = | 139.0 |
| 1Pl. 15¼"×9/16 | = | 4.76 | × $1.33^2$ | | = | 9.2.2 |
| 1L 3×3×⅜ | = | 2.11 | × $8.33^2$ | + 1.8 | = | 148.5 |
| | | 11.09 | | | | 379.7 |

fibre stress due to dead load only =

Compression = $\frac{8320 \times 12 \times 9.20}{379.7} = 2420$ #/□".

Dead and live load. Comp = $\frac{22755 \times 12 \times 9.20}{379.7} = 6620$ #/□".

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Tension gross. Dead Load only fibre stress = $\frac{8320 \cdot 12 \cdot 6.54}{379.7} = \frac{1720}{2346}$ # T

Dead and Live " " = $\frac{22755 \cdot 12 \cdot 6.54}{379.7} = 4700$ # T

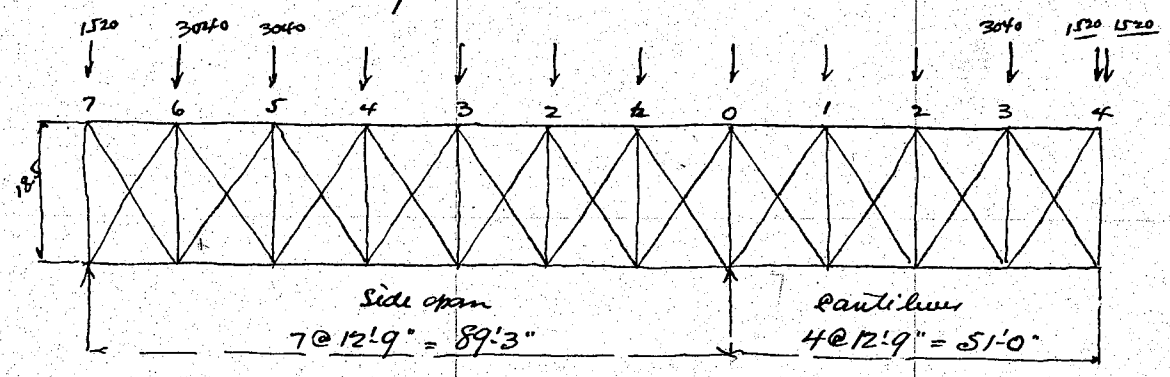
Direct compression or tension max $\frac{51500}{11.09} = 4650$ #/□ C or T.

Summary for compression or tension.

| | Dead load | D+ Live loads | Dead load | D+ Live load |
|---|---|---|---|---|
| Fibre stress | 2420 C | 6620 C | 1720 T | 4700 T |
| direct stress. | 4650 C | 4650 C | 4650 T | 4650 T |
| | 7070 #/□ | 11270 #/□ | 6370 T | 9350 # T gross. |

allowable unit stress for combined stress 8100 · 1.25 = 10100 #/□ say OK.

Top Lateral Bracing for side span and Cantilever arm




Reaction for side span loaded R = 3040 · 3 = 9120 #

Extra Reaction at support due to cantilever action

1520 · 4 = 6080
3040 · 6 = 18220
24300 ÷ 7 = 3470 #

Cantilever Portion.

| Panel | Shear | | Diagonal stress | One member | |
|---|---|---|---|---|---|
| 4-3 | 1520 | · 1.214 = | 1850 # | 925 # | Use 1L 3½ · 3½ · ⅜ = 2.48 |
| 3-2 | 4560 | | 5540 | 2770 | with 3-¾" Rivet connection |
| 2-1 | 7600 | | 9220 | 4610 | throughout |
| 1-0 | 10640 | | 12950 | 6475 | |

Side span

| | Shear | | Diagonal stress | For one member |
|---|---|---|---|---|
| 0 | | | | |
| 0-1 | 3470 + 9120 = 12590 | · 1.214 = | 15300 | 7650 # |
| 1-2 | " + 7600 = 11070 | | 13420 | 6710 |
| 2-3 | " + 5060 = 8530 | | 10350 | 5175 |
| 3-4 | ~~3470~~ + ~~3040~~ 2610 = 5080 | | 6170 | 3085 |
| 4-5 | 3040 · 10/7 = 5060 | | 6150 | 3075 |
| 5-6 | 3040 · 15/7 = 7600 | | 9210 | 4605 |
| 6-7 | 9120 | | 11080 | 5540 |

Max load at panel point 7 3040 · 3.5 = 10640 #

max load at panel point 0

| | | |
|---|---|---|
| Shear | Cantilever portion | 10640 |
| · | Side span | 9120 |
| Panel load | | 3040 |
| Extra reaction due to Cant.r | | 3470 |
| | | 26270 # |

Max Chord stress moment at support 24300 · 12.75 = 309500 !#

chord stress = 309500 ÷ 18.5 = 16720 #

Unit stress = $\frac{16720}{11.09}$ = 1510 #/□" 16720 ÷ 8100 = 2.06 □" gross for direct stress.

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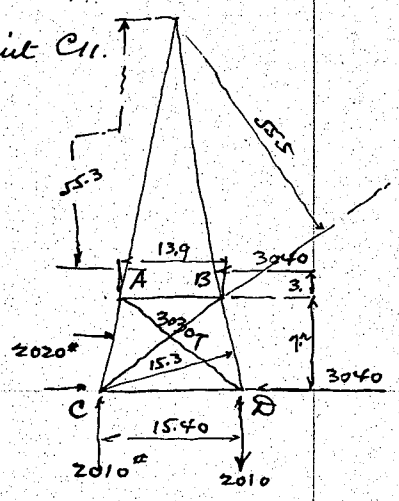
Sway Bracings for Bents.

Panel Point C11.




Moment at C 3040 × 10.2 = 31000 #

Reaction = $\frac{31000}{15.4}$ = 2010 #

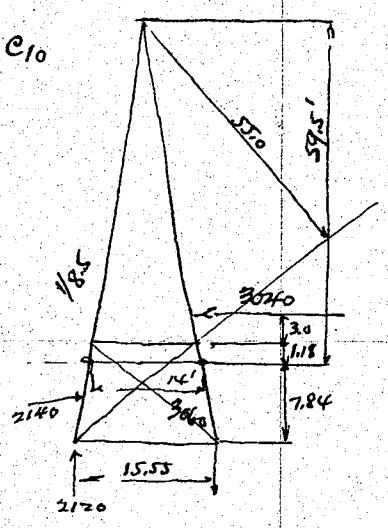
Stress in diagonal

intersection point 59.5 - 4.2 = 55.3' arm = 55.5'

Stress in diagonal = 3040 · $\frac{55.3}{55.5}$ = 3030 #

Stress in Col. = $\frac{31000}{15.3}$ = 2020 #

Panel Point C10

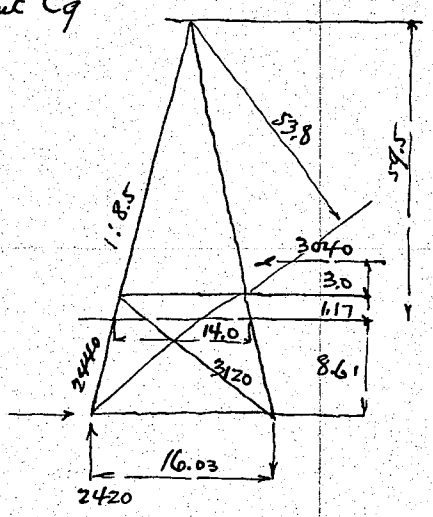



Reaction = 3040 · $\frac{10.84}{15.55}$ = 2120 #

Column stress = 2120 × 1.007 = 2140 #

Diagonal stress = 3040 · $\frac{55.32}{55.0}$ = 3060 #

Panel Point C9

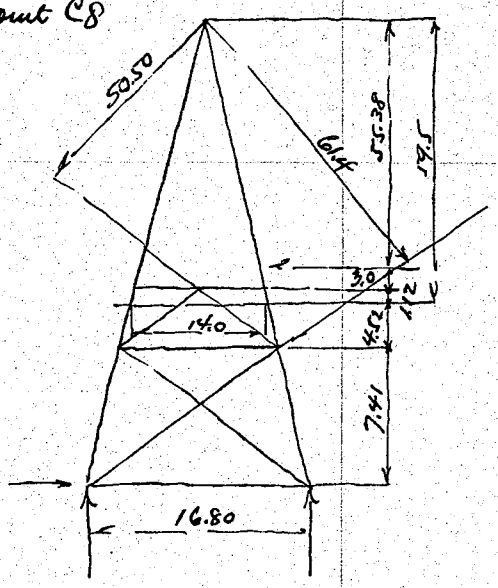



Reaction = $\frac{3040 \times 12.78}{16.03}$ = 2420

Column stress = 2420 · 1.007 = 2440 #

Diagonal stress = 3040 · $\frac{55.33}{53.80}$ = 3120 #

Panel Point C8




Stress due to unit panel load

Reaction = 3040 · $\frac{16.05}{16.80}$ = 2900 #

1st diagonal 3040 · $\frac{55.38}{50.50}$ = 3330

acting as compression member S = $\frac{3330}{2}$ = 1665 #

2nd diagonal 3040 · $\frac{55.38}{61.4}$ = 2740 # T

Carrying 5 panels.

Reaction = 2900 · 5.0 = 14500 #

1st diag. = 1665 · 5.0 = 8330 #

2nd diag = 2740 · 5.0 = 13700 #

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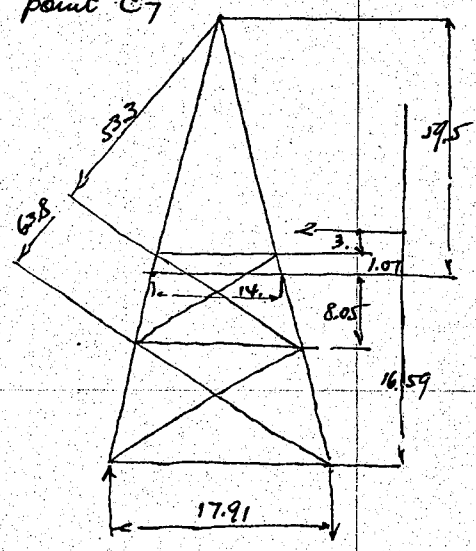
CALCULATIONS FOR

# Design of Arakawa-Bashi for Saitama-Ken

## Sway Bracings for Bents.

### Panel point C7



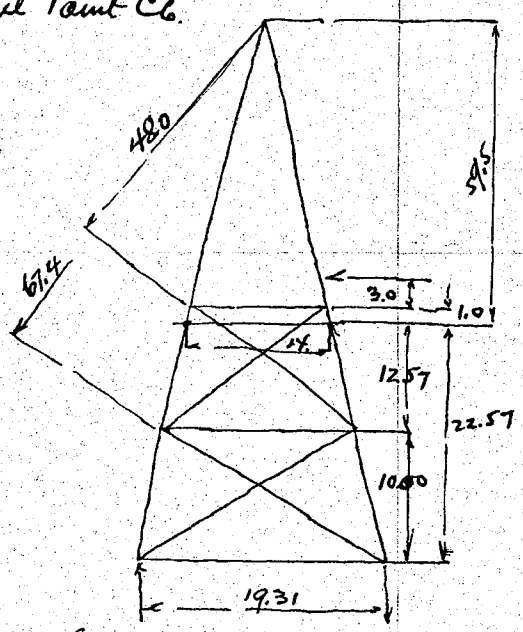

Reaction = $3040 \cdot \frac{20.66}{17.91} = 3510^{\#}$

1st diag. = $3040 \cdot \frac{55.43}{53.3} = 3160^{\#}$

2nd diag = $3040 \cdot \frac{55.43}{63.8} = 2640^{\#}$

Column stress = $3510 \times 1.007 = 3540^{\#}$

### Panel Point C6



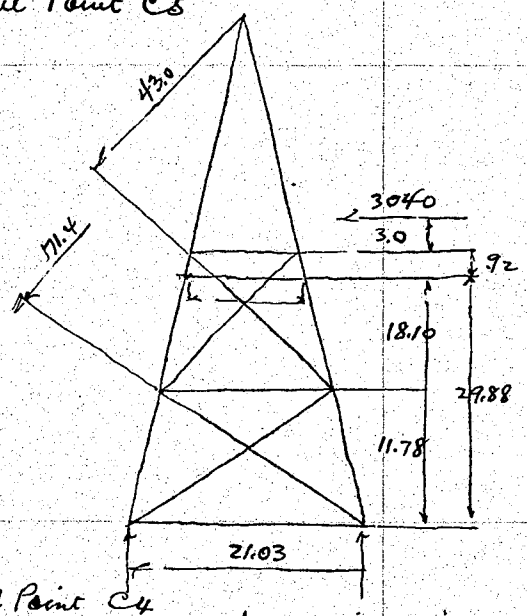

Reaction = $3040 \cdot \frac{2657}{19.31} = 4175$

1st diag = $3040 \cdot \frac{55.5}{48.0} = 3520$

2nd diag = $3040 \times \frac{55.5}{67.4} = 2510$

Column stress = $4175 \cdot 1.007 = 4200^{\#}$

### Panel Point C5



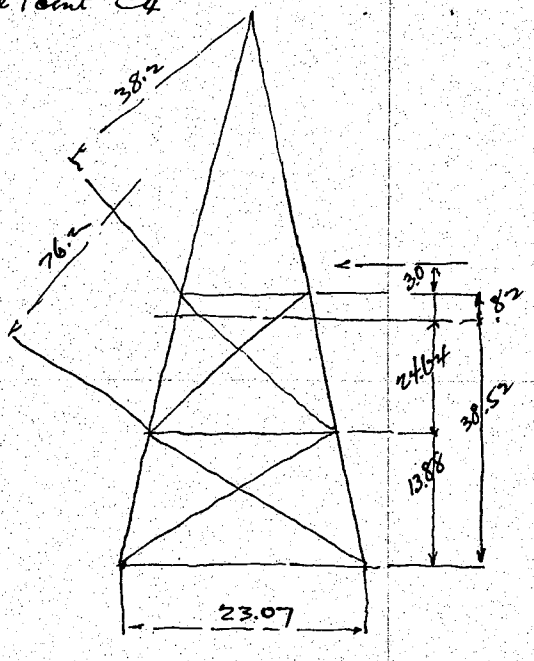

Reaction = $3040 \cdot \frac{33.80}{21.03} = 4880$

1st diag = $3040 \cdot \frac{55.58}{43.0} = 3930$

2nd diag = $3040 \cdot \frac{55.58}{71.4} = 2370$

Col. stress = $4880 \cdot 1.007 = 4920$

### Panel Point C4




For 4 panels

Reaction = $3040 \cdot \frac{42.34}{23.07} = 5570 \cdot 4 = 22300$

1st diag = $3040 \cdot \frac{55.68}{38.2} = 4430 \cdot 4 = 17700$

2nd diag = $3040 \cdot \frac{55.68}{76.2} = 2220 \cdot 4 = 8880$

Col. stress = $5570 \cdot 1.007 = 5600 \cdot 4 = 22400$

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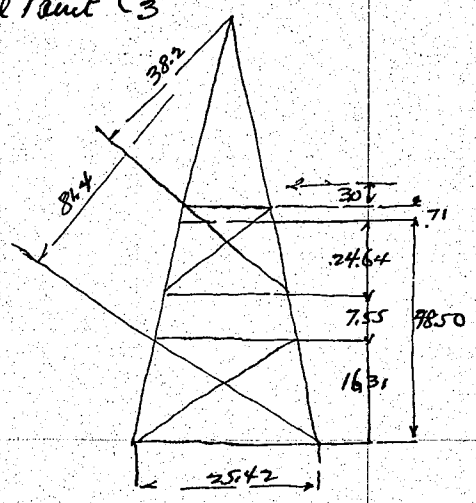
Panel Point $C_3$



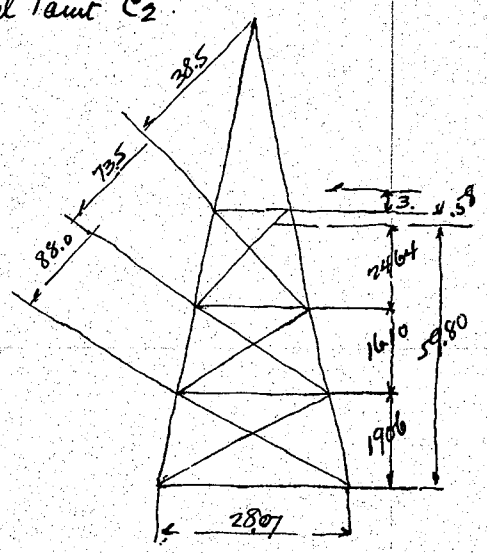

Reaction = $3040 \cdot \frac{52.21}{25.42} = 6240$

1st diag = $3040 \cdot \frac{55.79}{38.2} = 4440$

2nd diag = $3040 \cdot \frac{55.79}{81.4} = 2080$

Col. stress = $6240 \cdot 1.007 = 6280$

Panel Point $C_2$




Reaction = $3040 \cdot \frac{63.38}{28.07} = 6850$

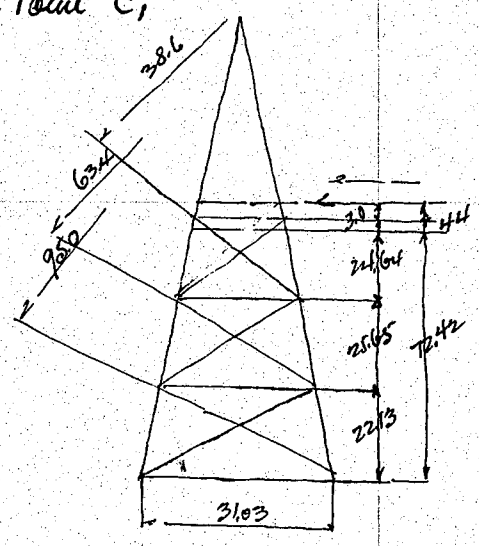
1st diag = $3040 \cdot \frac{55.92}{38.5} = 4420$

2nd diag = $3040 \cdot \frac{55.92}{73.5} = 2320$ T

3d diag = $3040 \cdot \frac{55.92}{88.0} = 1930$ T

Col. stress = $6850 \cdot 1.007 = 6900$ C

Panel Point $C_1$




Reaction = $3040 \cdot \frac{75.86}{31.03} = 7360$

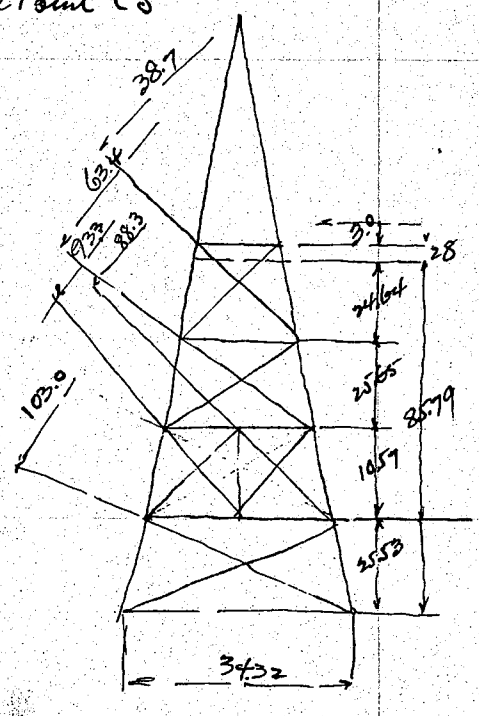
1st diag = $3040 \cdot \frac{56.06}{38.6} = 4410$

2nd diag = $3040 \cdot \frac{56.06}{63.4} = 2680$

3d diag = $3040 \cdot \frac{56.06}{95.0} = 1790$

Col. stress = $7360 \cdot 1.007 = 7410$

Panel Point $C_0$




S.S Panels.

Reaction = $3040 \cdot \frac{89.97}{34.32} = 7900 \cdot 5.5 = 43500$

1st diag = $3040 \cdot \frac{56.22}{38.7} = 4410 \cdot = 24300$

2nd diag = $3040 \cdot \frac{56.22}{63.4} = 2700 \cdot = 14850$

3rd diag = $\frac{3040}{2} \cdot \frac{56.22}{88.30} = 965 \cdot = 5310$

" = $\frac{3040}{2} \cdot \frac{56.22}{93.3} = 915 \cdot = 5050$

4th diag = $3040 \cdot \frac{56.22}{103} = 1660 \cdot = 9130$

Col. stress = $7900 \cdot 1.007 = 7960 \cdot = 43800$

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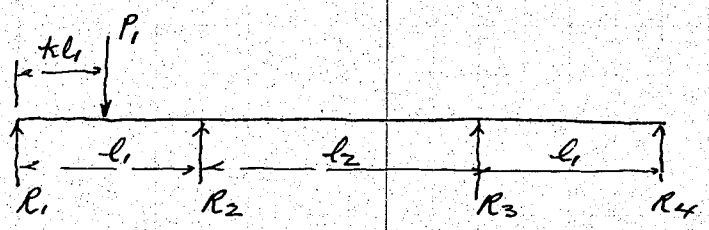
CALCULATIONS FOR

(A)

Design of Arakawa-Bashi for Saitama-Ken.
Continuous trusses of 3 Spans.




$B = k - k^3$.

$M_1 l_1 + 2M_2(l_1+l_2) + M_3 l_2 = -P_1 l_1^2 (B)$ ①  $M_1 = 0$

$M_2 l_2 + 2M_3(l_1+l_2) + M_4 l_1 = 0$ ②  $M_4 = 0$

② を $M_3$ について解く

$$M_3 = -\frac{M_2 l_2}{2(l_1+l_2)} \quad ③$$

③ を ① に代入

$$2M_2(l_1+l_2) - \frac{M_2 l_2^2}{2(l_1+l_2)} = -P_1 l_1^2 (B)$$

$$M_2 \left\{ 2(l_1+l_2) - \frac{l_2^2}{2(l_1+l_2)} \right\} = -P_1 l_1^2 (B).$$

$$M_2 = -\frac{P_1 l_1^2 (B)\, 2(l_1+l_2)}{4(l_1+l_2)^2 - l_2^2} \quad ④$$

④ を ③ に代入

$$M_3 = -\frac{M_2 l_2}{2(l_1+l_2)} = \frac{P_1 l_1^2 (B) l_2}{4(l_1+l_2)^2 - l_2^2} \quad ⑤$$

Reactions

$$R_1 = P(1-k) - \frac{P_1 l_1 (B)\, 2(l_1+l_2)}{4(l_1+l_2)^2 - l_2^2}$$

$$R_4 = \frac{M_3}{l_1} = +\frac{P_1 l_1 (B) l_2}{4(l_1+l_2)^2 - l_2^2}$$

$R_2$ :

$$R_1(l_1+l_2) + R_2 l_2 - P_1(l_1 - kl_1 + l_2) = M_3$$

$$R_2 = -\frac{R_1(l_1+l_2)}{l_2} + \frac{P_1(l_1 - kl_1 + l_2)}{l_2} + \frac{M_3}{l_2}$$

$$= -\frac{P_1(1-k)(kl_1+l_2)}{l_2} + \frac{P_1 l_1 (B)\, 2(l_1+l_2)(l_1+l_2)}{l_2\{4(l_1+l_2)^2 - l_2^2\}}$$

$$+ \frac{P_1(1-k)l_1 + Pl_2}{l_2} + \frac{P_1 l_1^2 (B) l_2}{l_2\{4(l_1+l_2)^2 - l_2^2\}}$$

$$R_2 = P/c + \frac{P_1 l_1 (B)\{2(l_1+l_2)^2 + l_1 l_2\}}{l_2\{4(l_1+l_2)^2 - l_2^2\}}$$

$R_3$ :

$$R_4(l_1+l_2) + R_3 l_2 = M_2$$

$$R_3 = -\frac{R_4(l_1+l_2)}{l_2} + \frac{M_2}{l_2}$$

$$R_3 = -\frac{P_1 l_1 (B) l_2 (l_1+l_2)}{l_2\{4(l_1+l_2)^2 - l_2^2\}} - \frac{P_1 l_1 (B) l_1 2(l_1+l_2)}{l_2\{4(l_1+l_2)^2 - l_2^2\}}$$

$$= -\frac{P_1 l_1 (B)\{(l_1+l_2) l_2 + 2(l_1+l_2) l_1}{l_2\{4(l_1+l_2)^2 - l_2^2\}}$$

$$= -\frac{P_1 l_1 (B)(l_1+l_2)(2l_1+l_2)}{l_2\{4(l_1+l_2)^2 - l_2^2\}}$$

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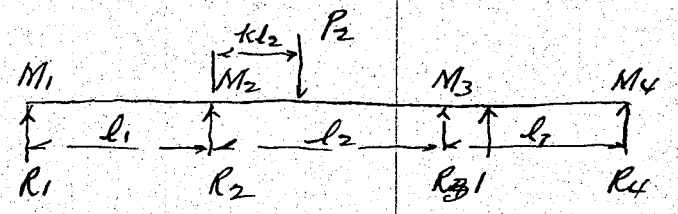
B

CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken.

Continuous truss




$A=(2k-3k^2+k^3)$.
$B=(k-k^3)$.

$$M_1 l_1 + 2M_2(l_1+l_2) + M_3 l_2 = -P_2 l_2^2 (A). \quad ① \qquad M_1 = 0$$
$$M_2 l_2 + 2M_3(l_1+l_2) + M_4 l_1 = -P_2 l_2^2 (B) \quad ② \qquad M_4 = 0$$

②より
$$M_3 = -\frac{P_2 l_2^2 (B)}{2(l_1+l_2)} - \frac{M_2 l_2}{2(l_1+l_2)} \quad ③$$

③を①へ入れ
$$2M_2(l_1+l_2) - \frac{P_2 l_2^2 (B) l_2}{2(l_1+l_2)} - \frac{M_2 l_2^2}{2(l_1+l_2)} = -P_2 l_2^2 (A).$$
$$M_2\left\{2(l_1+l_2) - \frac{l_2^2}{2(l_1+l_2)}\right\} = -P_2 l_2^2 (A) + \frac{P_2 l_2^2 (B) l_2}{2(l_1+l_2)}.$$
$$M_2 = -\frac{P_2 l_2^2 (A) 2(l_1+l_2).}{4(l_1+l_2)^2 - l_2^2} + \frac{P_2 l_2^2 (B) l_2}{4(l_1+l_2)^2 - l_2^2}$$
$$= -\frac{P_2 l_2^2}{4(l_1+l_2)^2 - l_2^2}\{(A) 2(l_1+l_2) - (B) l_2\}.$$

④より
$$M_3 = -\frac{2M_2(l_1+l_2)}{l_2} - \frac{P_2 l_2^2 (A)}{l_2}$$
$$= \frac{P_2 l_2^2 (A) 4(l_1+l_2)^2}{l_2\{4(l_1+l_2)^2 - l_2^2\}} - \frac{P_2 l_2^2 (B) l_2 \, 2(l_1+l_2)}{\{4(l_1+l_2)^2 - l_2^2\} l_2} - \frac{P_2 l_2^2 (A).}{l_2}$$
$$= \frac{P_2 l_2^2 (A) 4(l_1+l_2)^2}{4(l_1+l_2)^2 - l_2^2} - \frac{P_2 l_2 (A)\{4(l_1+l_2)^2 - l_2^2\}}{4(l_1+l_2)^2 - l_2^2} - \frac{P_2 l_2^2 (B) 2(l_1+l_2)}{4(l_1+l_2)^2 - l_2^2}$$
$$= \frac{P_2 l_2^2 (A) l_2}{4(l_1+l_2)^2 - l_2^2} - \frac{P_2 l_2^2 (B) 2(l_1+l_2).}{4(l_1+l_2)^2 - l_2^2}$$
$$= +\frac{P_2 l_2^2}{4(l_1+l_2)^2 - l_2^2}\{(A) l_2 - (B) 2(l_1+l_2)\}.$$

Reactions

$$R_1 = \frac{M_2}{l_1} = -\frac{P_2 l_2^2}{l_1\{4(l_1+l_2)^2 - l_2^2\}}\{(A) 2(l_1+l_2) - (B) l_2\}.$$

$$R_4 = \frac{M_3}{l_1} = +\frac{P_2 l_2^2}{l_1\{4(l_1+l_2)^2 - l_2^2\}}\{(A) l_2 - (B) 2(l_1+l_2)\}.$$

$R_2$ :—
$$R_1(l_1+l_2) + R_2 l_2 - P_2(1-k) l_2 = M_3.$$
$$R_2 = -\frac{R_1(l_1+l_2)}{l_2} + \frac{P_2(1-k) l_2}{l_2} + \frac{M_3}{l_2}$$

$$R_2 = +\frac{P_2 l_2^2 (l_1+l_2).}{l_2 l_1\{4(l_1+l_2)^2 - l_2^2\}}\{(A) 2(l_1+l_2) - (B) l_2\}$$
$$+ P_2(1-k).$$
$$+ \frac{P_2 l_2^2 l_1}{l_1 l_2\{4(l_1+l_2)^2 - l_2^2\}}\{(A) l_2 - (B) 2(l_1+l_2)\}.$$

$$R_2 = P_2(1-k) + \frac{P_2 l_2}{l_1\{4(l_1+l_2)^2 - l_2^2\}}\begin{Bmatrix}(A) 2(l_1+l_2)^2 - (B) l_2(l_1+l_2) \\ (A) l_1 l_2 - (B) 2l_1(l_1+l_2)\end{Bmatrix}$$
$$= P_2(1-k) + \frac{P_2 l_2}{l_1\{4(l_1+l_2)^2 - l_2^2\}}\{(A)(2l_1+l_2)^2 + l_1 l_2) - (B)(l_1+l_2)(l_2+2l_1)\}$$

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C

CALCULATIONS FOR

Design of Arakawa - Bashi for Saitama-Ken

Reaction $R_3$.

$$R_4(l_1+l_2) + R_3 l_2 - P_2 k l_2 = M_2$$

$$R_3 = -\frac{R_4(l_1+l_2)}{l_2} + \frac{P_2 k l_2}{l_2} = \frac{M_2}{l_2}$$

$$R_3 = -\frac{P_2 l_2^2 (l_1+l_2)}{l_1 l_2 \{4(l_1+l_2)^2 - l_2^2\}} \{(A) l_2 - (B) 2(l_1+l_2)\}$$

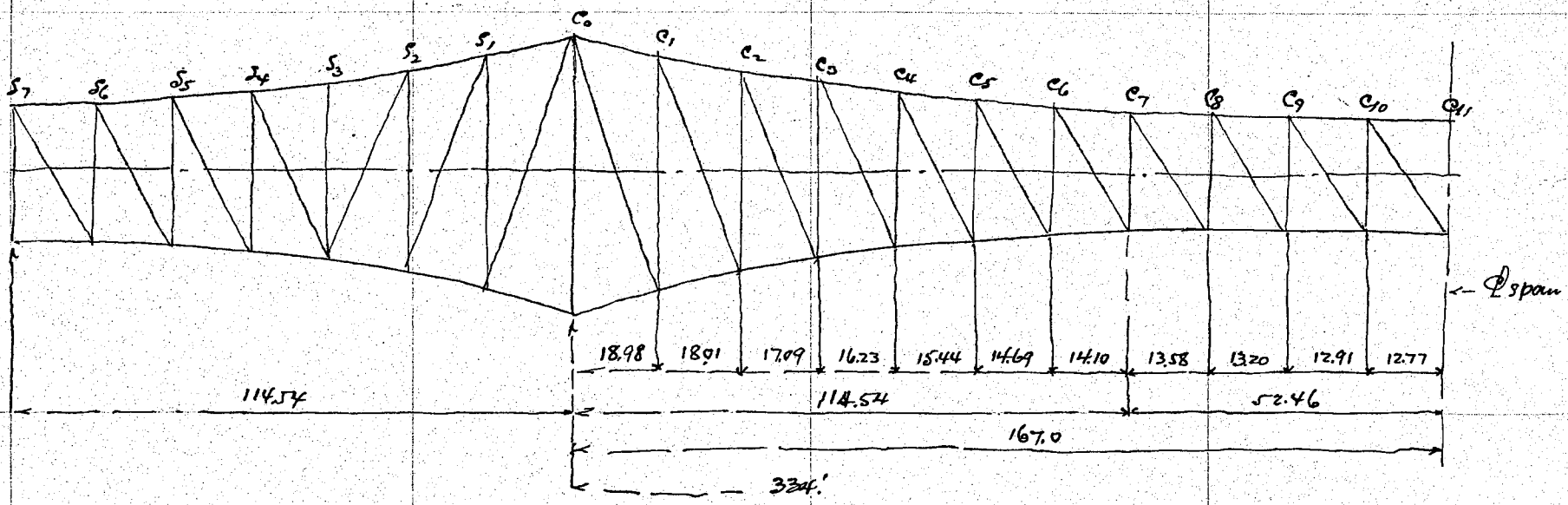
$$+ P_2 k$$

$$-\frac{P_2 l_2^2 l_1}{l_1 l_2 \{4(l_1+l_2)^2 - l_2^2\}} \{(A) 2(l_1+l_2) - (B) l_2\}$$

$$R_3 = + P_2 k - \frac{P_2 l_2^2}{l_1 l_2 \{4(l_1+l_2)^2 - l_2^2\}} \begin{Bmatrix} (A) l_2 (l_1+l_2) - (B) 2(l_1+l_2)^2 \\ (A) 2(l_1+l_2) l_1 - (B) l_1 l_2 \end{Bmatrix}$$

$$= + P_2 k - \frac{P_2 l_2}{l_1 \{4(l_1+l_2)^2 - l_2^2\}} \{(A)(l_1+l_2)(2l_1+l_2) - (B)(2(l_1+l_2)^2 + l_1 l_2)\}$$

Lower Lateral Bracings.




Values of $k$.

| $k$. | $k-k^3$. | | $k$. | $1-k$ | $A = 2k-3k^2+k^3$ | $B = k-k^3$ |
|---|---|---|---|---|---|---|
| $S_7$ | 0.0000 | 0.0000 | $C_0$ | 0.0000 | 1.0000 | 0.0000 | ——— |
| $S_6$ | 0.1230 | 0.122 | $C_1$ | 0.0568 | 0.9432 | 0.1020 | 0.056 |
| $S_5$ | 0.2515 | 0.242 | 2 | 0.1107 | 0.8893 | 0.1860 | 0.109 |
| $S_4$ | 0.3860 | 0.327 | 3 | 0.1620 | 0.8380 | 0.2500 | 0.157 |
| $S_3$ | 0.5270 | 0.383 | 4 | 0.2105 | 0.7895 | 0.2970 | 0.201 |
| $S_2$ | 0.6760 | 0.365 | 5 | 0.2568 | 0.7432 | 0.3320 | 0.239 |
| $S_1$ | 0.8330 | 0.255 | 6 | 0.3008 | 0.6992 | 0.3560 | 0.274 |
| $S_0$. | 1.000 | 0.000 | 7 | 0.3430 | 0.6570 | 0.3730 | 0.303 |
| | | | 8 | 0.3835 | 0.6165 | 0.3820 | 0.326 |
| | | | 9 | 0.4230 | 0.5770 | 0.3850 | 0.346 |
| | | | 10 | 0.4620 | 0.5380 | 0.3820 | 0.362 |
| | | | 11 | 0.5000 | 0.5000 | 0.3750 | 0.375 |
| | | | 10 | 0.5380 | 0.4620 | 0.3620 | 0.382 |
| | | | 9 | 0.5770 | 0.4230 | 0.3460 | 0.385 |
| | | | 8 | 0.6165 | 0.3835 | 0.3270 | 0.382 |
| | | | 7 | 0.6570 | 0.3430 | 0.3020 | 0.373 |
| | | | 6 | 0.6992 | 0.3008 | 0.2740 | 0.356 |
| | | | 5 | 0.7432 | 0.2568 | 0.2400 | 0.332 |
| | | | 4 | 0.7895 | 0.2105 | 0.2010 | 0.297 |
| | | | 3 | 0.8380 | 0.1620 | 0.1570 | 0.250 |
| | | | 2 | 0.8893 | 0.1107 | 0.1090 | 0.186 |
| | | | 1 | 0.9432 | 0.0568 | 0.0560 | 0.102 |

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CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken

Reactions :-
Loaded on side span.

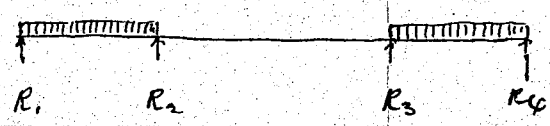
| | $R_1$ | $R_2$ | $-R_3$ | $+R_4$ |
|---|---|---|---|---|
| $S_7$ | 1.0000 | 0.0000 | - 0.0153 | — — |
| $S_6$ | 0.8601 | 0.1497 | 0.0302 | 0.0067 |
| $S_5$ | 0.7155 | 0.3039 | 0.0302 | 0.0133 |
| $S_4$ | 0.5687 | 0.4575 | 0.0409 | 0.0180 |
| $S_3$ | 0.4200 | 0.6106 | 0.0479 | 0.0211 |
| $S_2$ | 0.2735 | 0.7558 | 0.0456 | 0.0201 |
| $S_1$ | 0.1317 | 0.8887 | 0.0318 | 0.0140 |
| $S_0$ | 0.0000 | 1.0000 | 0.0000 | 0.0000 |
| | 2.9895 | 3.1662 | −0.2117 | 0.0932 |

Center Span loaded.

| $C_0$ | $R_1$ | $R_2$ | $R_3$ | $R_4$ |
|---|---|---|---|---|
| 1 | −0.1024 | 1.0741 | 0.0868 | − 0.0368 |
| 2 | −0.1760 | 1.1193 | 0.1157 | − 0.0530 |
| 3 | −0.2410 | 1.1350 | 0.1881 | − 0.0808 |
| 4 | −0.2795 | 1.1280 | 0.2686 | − 0.1136 |
| 5 | −0.3065 | 1.1062 | 0.3502 | − 0.1462 |
| 6 | − 0.3210 | 1.0692 | 0.4318 | − 0.1785 |
| 7 | − 0.3275 | 1.0280 | 0.5076 | − 0.2060 |
| 8 | − 0.3275 | .9805 | 0.5855 | − 0.2340 |
| 9 | − 0.3225 | .9257 | 0.6570 | − 0.2550 |
| 10 | − 0.3110 | .8635 | 0.7295 | − 0.2762 |
| 11 | − 0.2965 | .7985 | 0.7985 | − 0.2965 |
| 10' | − 0.2762 | .7295 | 0.8635 | − 0.3110 |
| 9' | − 0.2550 | .6570 | 0.9257 | − 0.3225 |
| 8' | − 0.2340 | .5855 | 0.9805 | − 0.3275 |
| 7' | − 0.2060 | .5076 | 1.0280 | − 0.3275 |
| 6' | − 0.1785 | .4318 | 1.0692 | − 0.3210 |
| 5' | − 0.1462 | .3502 | 1.1062 | − 0.3065 |
| 4' | − 0.1136 | .2686 | 1.1280 | − 0.2795 |
| 3' | − 0.0808 | .1881 | 1.1350 | − 0.2410 |
| 2' | − 0.0530 | .1157 | 1.1193 | − 0.1760 |
| 1' | − 0.0368 | .0568 | 1.0741 | − 0.1024 |
| | − 4.5915 | + 15.1188 | + 15.1188 | − 4.5915 |

Panel Concentration assumed 6080 # per panel.

Side span Full load on 2 side spans for positive moments.




$R_1$ = 2.9895
$R_4$ = 0.0932
3.0827 @ 6080 = 18750 #

Chord stresses.

7-6. 18750 · 14.10/19.25 = 13720 #

6-5 18750 · 28.79 = 540.000
6080 · 14.69 = 89 400
450 600 ÷ 21.0 = 21500 #

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Design of Arakawa-Bashi for Saitama-Ken.

| | | | | | |
|---|---|---|---|---|---|
| 5-4 | 18750 | × 44.23 | = | 830.000 | |
| | 6080 | · 45.57 | = | 278.000 | |
| | | | | −552.000 ÷ 23.1 | = 23.900 # |
| 4-3 | 18750 | · 60.46 | = | 1132.000 | |
| | 6080 | · 94.26 | = | 573.000 | |
| | | | | 559.000 ÷ 25.4 | = 22.000 # |
| 3-2 | | | | 559.000 ÷ 25.35 | = 22.000 # |
| 2-1 | 18750 | × 77.55 | = | 1452.000 | |
| | 6080 | · 162.62 | = | 990.000 | |
| | | | | 462.000 ÷ 28.00 | = 16500 # |
| 1-0 | 18750 | · 95.56 | = | 1790.000 | |
| | 6080 | · 252.67 | = | 1535.000 | |
| | | | | 255.000 ÷ 31.00 | = 8220 # |

For negative moment 1 side span and centre span loaded.
− reaction = 4.5915 @ 6080 = 27900 #

| | | | | | |
|---|---|---|---|---|---|
| 7-6 neg m | 27900 | · 14.10/19.25 | = | 20400 # | Centre span loaded |
| 6-5 | 27900 | · 28.79/21.0 | = | 382.00 # | " |
| 5-4 | 27900 | · 44.23/23.1 | = | 53400 # | " |
| 4-3 | 27900 | · 60.46/25.4 | = | 66500 | " |
| 3-2 | 27900 | · 77.55/28.0 | = | 77200 | " |
| 2-1 | 27900 | · 95.56/31.0 | = | 86000 | " |
| 1-0 | 27900 | · 114.54 | = | − 3,200.000 | Side span and centre span loaded. |
| 2.9895 @ 6080 = | 18150 | · 114.58 | = | + 2.080.000 | |
| | 6080 | × 36.55 | = | − 2230.000 | |
| | | | | − 3350.000 ÷ 34.3 | = 97700 # |

Chord stress for centre span

| | | | | |
|---|---|---|---|---|
| at C1. | 3.166 | @ 6080 | = | 19300 |
| | 15.1188 | @ 6080 | = | 92000 |
| | | | | 111300 # |

moment = 111300 · 18.98 = + 2.110.000
(27900 − 18150) · 133.52 = −1.301.000
9750
6080 · 499.41 = −3040.000
−4341.000
− 2231.000 ÷ 31.0 = 71.900 #

| | | | | |
|---|---|---|---|---|
| at C2 | 9750 | · 151.53 | = | − 1.478.000 |
| | 6080 | · 643.49 | = | − 3.920.000 |
| | | | | − 5398.000 |
| 111300 · 36.99 | | | | 4120.000 |
| | | | | − 1278.000 ÷ 28.0 = 45600 # |

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at $C_3$
9750 · 168.62 = − 1.643.000
6080 · 797.30 = − 4850.000
− 6.493.000
111300 · 54.08 = + 6020.000
− 473.000 ÷ 25.4 = − 18600

at $C_4$
9750 · 184.85 = 1.803.000
6080 · 959.60 = 5840.000
7.643000
111300 · 70.31 = 7.830.000
+ 187.000 ÷ 2310 = + 8100"

Positive Moment Centre span loaded.


R1 · 4.5915 @6080 = − 27900"
R2 · 15.1188 @6080 = + 92.000"

at $C_1$.
92.000 · 18.98 = 1.745.000
27900 · 133.52 = 3.725.000
− 1980.000 ÷ 31.0 = −63900"

at $C_2$.
92.000 · 36.99 = 3.400.000
6080 · 18.01 = − 169.000
+ 3291.000
27900 · 151.53 = − 4.230.000
− 939.000 ÷ 28.0 = −33500"

at $C_3$
92000 · 54.08 = 4975.000
− 6080 · 52.19 = − 318.000
+ 4.657.000
27900 · 168.62 = − 4.710.000
− 53.000 ÷ 25.4 = − 2080"

at $C_4$
92000 · 70.31 = 6470.000
− 6080 · 100.88 = 612.000
5.858.000
27900 · 184.85 = 5150.000
+ 708.000 ÷ 23.1 = + 30600

at $C_5$
92000 · 85.75 = 7.890.000
6080 · 162.64 = 910.000
+ 6.900.000
27900 · 200.29 = − 5600.000
1.300.000 ÷ 21.0 = + 61900

at $C_6$.
92000 · 100.44 = 9.250.000
6080 · 236.09 = 1.436000
+ 7.814.000
27900 · 214.98 = 6.000.000
1814.000 ÷ 19.25 = + 94200

at $C_7$
92000 · 114.54 = 10.540.000
6080 · 320.69 = − 1950.000
8.590.000
27900 · 229.08 = 6400.000
2190.000 ÷ 17.92 = + 122.000

at $C_8$
92000 · 128.12 = 11.800.000
6080 · 415.75 = 2.530.000
9.270.000
27900 · 242.66 = 6.775.000
2495,000 ÷ 1680 = + 149.000

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CALCULATIONS FOR

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at $C_9$

92.000 · 141.32 = 13000.000
6080 · 521.35 = 3170.000
9830.000
27900 · 255.86 = 7140.000
2.690.000 ÷ 16.00 = + 168.000

at $C_{10}$

92000 · 154.23 = 14.190.000
6080 · 637.54 = 3880.000
10.310.000
27900 · 268.17 = 7500.000
2810.000 ÷ 15.5 = 181.000

at $C_{11}$

92000 · 167.0 = 15.370.000
6080 · 765.24 = 4.650.000
10.720.000 - 10.720.000
27900 · 281.54 = - 7850.000
2.870.000 ÷ 15.3 = 188000

Diagonal Stresses.

Side span. Reaction = 4.5915 @ 6080 = 27.900 t

| | | | |
|---|---|---|---|
| 7-6. | 27900 · 179.32/112.39 | = | 44500 T |
| 6-5 | 27900 · 151.08/101.52 | = | 41500 |
| 5-4 | 27900 · 130.26/95.26 | = | 38100 |
| 4-3 | 27900 · 114.61/92.60 | = | 34500 |
| 3-2 | 27900 · 102.58/92.06 | = | 31100 |
| 2-1 | 27900 · 91.56/92.44 | = | 27600 |
| 1-0 | 27900 · 82.08/93.89 | = | 24400 |

Center span

0-1 loaded 1st side span and center span

9750 · 114.54 = 1.116.000
6080 · 366.55 = 2.230.000
9750 · 197.52 = 1.930.000
6080 · 6 · 197.52 = 7.200.000
12.476.000
111300 · 197.52 = 22.000.000
9.524.000 ÷ 93.89 = 101600

Center span loaded

92000 · 197.52 = 18.170.000
- 27900 · 312.06 = 8.700.000
9.470.000 ÷ 93.89 = 10100 t

Neglect load on side span the effect is very small.

1-2.

86.000 · 206.10 = 17.750.000
- 27300 · 320.64 = 8750.000
9.000.000 ÷ 92.44 = 97500 t

2-3

79300 · 217.12 = 17.210.000
26200 · 331.66 = 8670.000
8540.000 ÷ 92.06 = 93000 t

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CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken

| | | | | | |
|---|---|---|---|---|---|
| 3-4 | 72500 | × | 229.15 | = | 16.600.000 |
| | 24800 | × | 343.69 | = | 8510.000 |
| | | | | | 8090.000 ÷ 92.63 = 87500 " |
| 4-5. | 65500 | × | 244.80 | = | 16.050.000 |
| | 23050 | × | 359.34 | = | 8.280.000 |
| | | | | | 7.780.000 ÷ 95.26 = 81700 |
| 5-6 | 58800 | × | 265.62 | = | 15.600.000 |
| | 21200 | × | 380.16 | = | 8060.000 |
| | | | | | 7540.000 ÷ 101.52 = 74200 |
| 6-7 | 52250 | × | 293.86 | = | 15,340.000 |
| | 19250 | × | 408.40 | = | 7870.000 |
| | | | | | 7470.000 ÷ 112.39 = 66500 |
| 7-8 | 46000 | × | 335.68 | = | 15.400.000 |
| | 17260 | × | 450.22 | = | 7780.000 |
| | | | | | 7620.000 ÷ 132.24 = 57500 |
| 8-9 | 40100 | × | 411.62 | = | 16500.000 |
| | 15260 | × | 526.16 | = | 8030.000 |
| | | | | | 8470.000 ÷ 173.17 = 48900 |
| 9-10 | 34400 | × | 582.07 | = | 20.050.000 |
| | 13300 | × | 696.61 | = | 9.250.000 |
| | | | | | 10.800.000 ÷ 274.8 = 39300 |
| 10-11 | 29200 | × | 1425.92 | = | 41.650.000 |
| | 11400 | × | 1540.47 | = | 17.600.000 |
| | | | | | 24.050.000 ÷ 805.4 = 29800 |

Summary for diagonal stresses.

| | stresses. | S.R. | Section used | 7/8" rivets | No of rivets |
|---|---|---|---|---|---|
| T 7-6 | 44500 | 2.62 | 2LS 5"×3½"×3/8 | 7.3 | 8 |
| 6-5 | 41500 | 2.44 | " | 6.8 | 8 |
| 5-4 | 38100 | 2.24 | " | 6.3 | 8 |
| 4-3 | 34500 | 2.03 | " | 5.7 | 8 |
| 3-2 | 31100 | 1.83 | " | 5.1 | 8 |
| 2-1 | 27600 | 1.63 | " | 4.5 | 8 |
| 1-0 | 24400 | 1.44 | " | 4.0 | 8 |
| C 0-1 | 101000 | 5.94 | 2LS 6"×6"×3/8 | 16.6 | 18 |
| 1-2 | 97500 | 5.75 | " | 16.0 | 18 |
| 2-3 | 93000 | 5.47 | " | 15.3 | 16 |
| 3-4 | 87500 | 5.15 | " | 14.4 | 16 |
| 4-5 | 81700 | 4.81 | " | 13.5 | 14 |
| 5-6 | 74200 | 4.37 | " | 12.2 | 14 |
| 6-7 | 66500 | 3.92 | 2L 5"×5"×3/8 | 11.0 | 12 |
| 7-8 | 57500 | 3.39 | 2LS 5"×5"×3/8 | 9.5 | 10 |
| 8-9 | 48900 | 2.88 | 2L 5"×3½"×3/8 | 8.0 | 8 |
| 9-10 | 39300 | 2.32 | " | 6.5 | 8 |
| 10-11 | 29800 | 1.75 | " | 4.9 | 8 |

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CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-ken.

Approximate weight of steel.

| | | | | | | |
|---|---|---|---|---|---|---|
| stringers | 3 I s | 12"×5" @ 31.99 # | × | 12.75 | = | 1225 |
| | 12 L s | 5×3½×3/8 @ 10.4 | × | .81 | = | 101 |
| | | | | | | 1326 say 1350 # |
| | 2 Pls. | 15½×5/16 @ 16.47 | × | 12.75 | = | 420 |
| | 6 L s | 3×3×3/8 @ 7.2 | × | 12.75 | = | 580 |
| splice | 2 Pls. | 12×3/8 @ 15.30 | × | 1.10 | = | 34 |
| " | 2 Pls. | 7×3/8 @ 8.93 | × | 0.70 | = | 13 |
| | | Rivet heads &c | | | | 53 |
| | | | | | | 1070 |
| | | | | | | 2420 # |

For one panel.
2420 ÷ 1975 = 190 # per lin. ft.

Cross Beam

| | | | | | |
|---|---|---|---|---|---|
| 1 Pl. | 15½×5/16 @ 16.47 | × | 18.50 | = | 305 |
| 4 L s | 3½×3½×3/8 @ 8.5 | × | 18.50 | = | 629 |
| 4 L s | 6×3½×3/8 @ 11.7 | × | 1.25 | = | 59 |
| 4 fills | 6×3/8 @ 7.65 | × | .65 | = | 20 |
| 8 L s | 3×3×3/8 @ 7.2 | × | 1.25 | = | 72 |
| 8 fills | 3×3/8 @ 3.83 | × | .65 | = | 20 |
| 4 fills | 7×3/8 @ 8.93 | × | 0.70 | = | 25 |
| | Rivet heads &c | | | | 58 |
| | | | | | 1185 # |

1185 ÷ 12.75 = 93 # per lin. ft.

Latival Bracing under slab. (one panel).

| | | | | | |
|---|---|---|---|---|---|
| | 2 L s | 3½×3½×3/8 @ 8.5 | × | 21.0 | = | 357 |
| Connection | 5 L s | 4×3×3/8 @ 8.5 | × | 0.5 | = | 21 |
| | 1 Pl. | 7×3/8 @ 8.93 | × | 1.7 | = | 15 |
| | 2 Pls. | 16½×5/16 @ 17.53 | × | 1.7 | = | 60 |
| | | Rivet heads &c | | | | 22 |
| | | | | | | 475 — say 500 # |

500 ÷ 12.75 = 39.2 # say 40 # per lin. ft.

Sway Bracings, struts, and Col. above truss.

| | | | | | |
|---|---|---|---|---|---|
| C11. | 2 L s | 5×3½×3/8 @ 10.4 | × | 13.5 | = | 282 |
| center | 1 Pl. | 7×3/8 @ 8.93 | × | 1.25 | = | 12 |
| corner | 2 L s | 3×3×3/8 @ 7.2 | × | 1.25 | = | 18.0 |
| | 2 L s | 5×3×3/8 @ 9.8 | × | 0.6 | = | 12.0 |
| | 1 Pl. | 15×7/16 @ 15.94 | × | 1.5 | = | 24.0 |
| | | 540 say 60 | | | | |
| | | 4 @ 60 = | | | | 240 |
| | | | | | | 534 # |

Transverse 4 L s 4×3×2.4/8 @ 6.84 = 27.3
1 Pl. 18×5/16 @ 19.13 = 19.13
46.43 × 15.4 = 715 #

Details of Cap.

| | | | | | |
|---|---|---|---|---|---|
| 1 Pl. | 10×½ @ 17.0 | × | 1.25 | = | 21 |
| 1 Pl. | 15×3/8 @ 19.13 | × | 1.25 | = | 24 |
| 4 L s | 3×3×3/8 @ 7.2 | × | 1.25 | = | 36 |
| 2 L s | 3×3×3/8 @ 7.2 | × | 1.25 | = | 18 |
| 2 fills | 3×3/8 @ 3.38 | × | 0.9 | = | 6 |
| 2 Pls. | 12×3/8 @ 15.30 | × | 1.25 | = | 39 |
| | | | | | 144 # say 150 # |

Column 2 L s 9×3" @ 19.37 × 1.2 46
196

2 @ 196 = 392 #

| | |
|---|---|
| Bracings | 534 |
| strut | 715 |
| Col. | 392 |
| | 1641 # |
| | say 1640 # |

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CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken.

C10. Bracing 2LS 5 × 3½ × 3/8 @ 10.4 × 14.0 = 291.
12
Center Connection
Corner Connection 4@60 240
543 #

Bracing strut 543
Col. 720
460
1723. say 1720 #

Brace. strut. 46.43 × 15.5 = 720 #
Col with details 46. × 1.70 = 80
Cap. 150
2 × 230 = 460 #

C09
Bracing 2LS 5×3½×3/8 @ 10.4 × 14.7 = 306
12
4@60 = 240
558
Strut say 46.43 × 16.0 = 743
Col. 46.0 × 3.2 = 147
Cap 150
2 × 297 = 594
1895 # — — 1900 #

C8 Bracing 2LS 5 × 3½ × 3/8 @ 10.4 × 12.75 = 265
2LS do × 14.60 = 304
Center connection 2@15 30
Corner connection 8@60 480
1079

Strut HLS 4 × 3 × 2.4/8 @ 6.84 = 27.4
1Pl. 10 × 5/16 = 10.63
38.00 × 15.0 = 570
" × 16.8 = 780
1350

Column 46 # × 5.7 = 262
Cap 150
2 × 412 = 824
3253 — — 3250 #

C7 Bracings 2LS 5×3½×3/8 @ 10.4 × 14.75 = 307
2LS do × 15.80 = 331
Center 2@15 = 30
Corner 8@60 = 480
1148

Strut. 38.0 × 15.8 = 600
46.43 × 17.9 = 830
1430 — 1430

Col. 46. × 9.1 = 420
Cap. 150
2 × 570 = 1140
3718 — — 3720 #

C6. Bracings 2LS 5×3½×3/8 @ 10.4 × 14.75 (18.1) = 376
× 17.8 = 370
Center 2@15 = 30
Corner 8@60 = 480
1256

Strut. 38.0 × 17.0 = 645
HLS 5×3×2.4/8 @ 7.85 = 31.40
1Pl. 18×5/16 = 19.13
50.53 × 19.3 = 975
1620

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CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken

| | | | | | | |
|---|---|---|---|---|---|---|
| | Col. | 46 . 13.6 = 625 | | | | |
| | | Cap 150 | | | | |
| | | 2 . 775 = | | | 1550 | |
| | | | | | 4426 | -- 4430 |
| C5 | Bracings | 2Ls 5×3½×⅜ @ 10.4 | × 23.6 = | 490 | | |
| | | 2Ls do | × 20.0 = | 416 | | |
| | | Centre 2@15 | = | 30 | | |
| | | Corner 8@60 | = | 480 | | |
| | | | | | 1416 | |
| | Strut | 38.00 . 18.3 = 695 | | | | |
| | | 50.53 . 21.0 = 1060 | | | | |
| | | ∑ 1755 = | | | 1755 | |
| | Col. | 46 . 19.1 = 880 | | | | |
| | | 150 | | | | |
| | | 2 × 1030 = | | | 2060 | |
| | | | | | 5231 | - 5230 |
| C4 | Bracings | 2Ls 5 . 3½ . ⅜ @ 10.4 | . 28.0 = | 583 | | |
| | | 2Ls do | . 22.3 = | 465 | | |
| | | 2@15 | = | 30 | | |
| | | 8@60 | = | 480 | | |
| | | | | | 1558 | |
| | Struts | 38.0 . 19.8 = 752 | | | | |
| | | 50.53 . 23.1 = 1170 | | | | |
| | | | | | 1922 | |
| | Col. | 46 . 25.6 = 1180 | | | | |
| | | cap 150 | | | | |
| | | 2 . 1330 = | | | 2660 | |
| | | | | | 6140 | - 6140 |
| C3 | Bracings | 2Ls 5 . 3½ . ⅜ @ 10.4 | . 28.5 = | 593 | | |
| | | 2Ls do | 25.5 = | 530 | | |
| | | 2@15 | = | 30 | | |
| | | 8@60 | = | 480 | | |
| | | | | | 1630 | |
| | Struts | 38.0 . 19.8 = 752 | | | | |
| | | 38.0 . 21.6 = 820 | | | | |
| | | 50.53 . 25.4 = 1280 | | | | |
| | | | | | 2852 | |
| | Col. | 46 . 33.1 = 1520 | | | | |
| | | cap. 150 | | | | |
| | | splice 150 | | | | |
| | | 2 . 1820 = | | | 3640 | |
| | | | | | 8122 | 8120 |
| C2 | Bracings | 2Ls 5×3½×⅜ @ 10.4 | × 28.5 = | 592 | | |
| | | | . 24.4 = | 507 | | |
| | | | . 28.8 = | 600 | | |
| | | 3@15 | | 45 | | |
| | | 12@60 | | 720 | | |
| | | | | | 2464 | |
| | Strut | 38.0 . 19.8 = 752 | | | | |
| | | 46.43 . 23.6 = 1100 | | | | |
| | | 50.53 . 28.1 = 1420 | | | | |
| | | | | | 3272 | |
| | Col. | 46.0 . 41.6 = 1915 | | | | |
| | | details 500 | | | | |
| | | 2 . 2415 = | | | 4830 | |
| | | | | | 10566 | 10570 |

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CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken

C1 Bracings 2LS 5-3½-⅜ @ 10.4 · 28.5 = 592
2LS do · 31.9 = 664
2LS do · 33.0 = 685
3@15 45
12@60 720
2706

Strut. 38.0 · 19.8 = 752
46.43 · 25.8 = 1200
50.53 · 31.0 = 1570
3522

Col. 46.0 · 51.1 = 2340
detail 600
2 · 2940 = 5880
12108 12110

C0. Bracings 4LS 5-3½-⅜ @ 10.4 · 28.5 = 1190
4LS do · 28.5 = 1190
4LS · 14.0 = 580
4LS · 13.0 = 540
2LS · 8.5 = 180
4LS · 33.5 = 1400
3@20 = 60
12@70 = 840
8@40 = 320 1220
6300

Strut. 38.0 · 19.8 = 752
46.43 · 25.8 = 1200
" · 28.3 = 1310
" · 34.3 = 1590
2@1590 3180
8030

Col. 2Pls. 16-⅜ @ 20.4 = 40.80
4LS 3½-3½-⅜ @ 8.5 = 34.00
74.80
detail say 2520
100.0# per ft
100 · 54 = 5400
Cap say 180
2 · 5580 = 11160
25490 - 25490#

Horizontal longitudinal strut C4-S4
4LS 4-3-2⅛ @ 6.84 = 27.4
detail 8.0
35.4
35.4 · 12.75 = 450# 2@450 = 900# per panel.

Horizontal diagonal bracings at longitudinal strut S3-1 C3-1
weight for one panel same as for top lateral. 500# per panel.

Bottom Lateral Bracing
@center span
11-10 4LS 5×5×⅜ @ 12.3 · 20.0 = 980
10-9 4LS do · 20.7 = 1020
9-8 4LS do · 21.4 = 1050
8-7 4LS do · 22.0 = 1080

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CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken

Bottom Lateral Bracings

Center Span

| | | | | | | |
|---|---|---|---|---|---|---|
| 7—6 | 4 L.S | 6×6×3/8 | @ 14.9 | × 23.0 | = | 1370 |
| 6-5 | 4 L.S | do | | × 24.8 | = | 1480 |
| 5-4 | 4 L.S | do | | × 27.0 | = | 1610 |
| 4-3 | 4 L.S | do | | × 29.0 | = | 1730 |
| 3-2 | 4 L.S | 6×6×3/8 | @ 14.9 | × 32.0 | = | 1910 |
| | 2 L.S | 4×3×3/8 | @ 8.5 | × 8.5 | = | 145 |
| | | | Cente plate etc | | | 100 |
| | | | | | | 2155# |
| 2-1 | 4 L.S | 6×6×3/8 | @ 14.9 | × 34.5 | = | 2050 |
| | 2 L.S | 4×3×3/8 | @ 8.5 | × 9.5 | = | 160 |
| | | | | | | 100 |
| | | | | | | 2310# |
| 1-0 | 4 L.S | 6×6×3/8 | @ 14.9 | × 38.0 | = | 2270 |
| | 2 L.S | 4×3×3/8 | @ 8.5 | × 10.0 | = | 170 |
| | | | | | | 100 |
| | | | | | | 2540 |

Side Span

| | | | | | | |
|---|---|---|---|---|---|---|
| 0-1 | 4 L.S | 5×5×3/8 | @ 12.3 | × 38.0 | = | 1870 |
| | Longitudinal strut. | | | | | 170 |
| | | | | | | 100 |
| | | | | | | 2140 |
| 1-2 | 4 L.S | 5×5×3/8 | @ 12.3 | × 34.5 | = | 1700 |
| | Longitudnal strut | | | | | 170 |
| | | | | | | 100 |
| | | | | | | 1970 |
| 2-3 | 4 L.S | 5×5×3/8 | @ 12.3 | × 32.0 | = | 1570 |
| | | | | | | 170 |
| | | | | | | 100 |
| | | | | | | 1840 |
| 3-4 | 4 L.S | 5×5×3/8 | @ 12.3 | × 29.0 | = | 1430 |
| 4-5 | 4 L.S | do | | × 27.0 | = | 1330 |
| 5-6 | 4 L.S | do | | × 24.8 | = | 1220 |
| 6-7 | 4 L.S | do | | × 23.0 | = | 1130 |

Summary for Panel load. (structural steel only).

| | S7 | S6 | S5 | S4 | S3 | S2 | S1 | C0 | C1 | C2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Stringers. | 1210 | 2420 | 2420 | 2420 | 2420 | 2420 | 2420 | 2420 | 2420 | 2420 |
| Cross beam | 1185 | 1185 | 1185 | 1185 | 1185 | 1185 | 1185 | 1185 | 1185 | 1185 |
| Lateral Bracings | 250 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| Long. strut. | | | | 450 | 900 | 900 | 900 | 900 | 900 | 900 |
| Int. Bracings | | | | | 250 | 500 | 250 | | 250 | 500 |
| Cols & Sways. | 3720 | 4430 | 5230 | 6140 | 8120 | 10570 | 12110 | 25490 | 12110 | 10570 |
| Bottom Laterals. | 565 | 1175 | 1275 | 1380 | 1635 | 1905 | 2055 | 2340 | 2425 | 2230 |
| | 6930 | 9710 | 10610 | 12075 | 15010 | 17980 | 19420 | 32835 | 19790 | 18305 |
| For one truss | 3465 | 4855 | 5305 | 6040 | 7505 | 8990 | 9710 | 16420 | 9895 | 9150 |

| | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11. |
|---|---|---|---|---|---|---|---|---|---|
| Stringers. | 2420 | 2420 | 2420 | 2420 | 2420 | 2420 | 2420 | 2420 | 2420 |
| Cross beam | 1185 | 1185 | 1185 | 1185 | 1185 | 1185 | 1185 | 1185 | 1185 |
| Lateral Bracings | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| Long. strut. | 900 | 450 | | | | | | | |
| Int. Bracings | 250 | | | | | | | | |
| Cols & Sways. | 8120 | 6140 | 5230 | 4430 | 3720 | 3250 | 1900 | 1720 | 1640 |
| Bottom Laterals. | 1940 | 1670 | 1545 | 1425 | 1225 | 1065 | 1035 | 1000 | 980 |
| | 15315 | 12365 | 10880 | 9960 | 9050 | 8420 | 7040 | 6825 | 6725 |
| For one truss. | 7660 | 6180 | 5440 | 4980 | 4525 | 4210 | 3520 | 3410 | 3360 |

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CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken.

Summary for structural steel and panel load.

| Panel Pt. | dist of shoe. | load. |
|---|---|---|
| S7 | ~~4000~~ + 3465 = | 7465 |
| S6 | | 4855 |
| S5 | | 5305 |
| S4 | | 6040 |
| S3 | | 7505 |
| S2 | | 8990 |
| S1 | | 9710 |
| C0 | 4000 + 16420 = | 20420 |
| C1 | | 9895 |
| C2 | | 9150 |
| | | 81335 |

| Panel Pt. | load |
|---|---|
| C3 | 7660 |
| C4 | 6180 |
| C5 | 5440 |
| C6 | 4980 |
| C7 | 4525 |
| C8 | 4210 |
| C9 | 3520 |
| C10 | 3410 |
| C11 | 3360. ½ = 1680 |
| | 41605 |
| | 81335 |
| | 122940 |

122940 ÷ 4 = 49|1760 ÷ 2240 = 220 tons

Assumed truss members.

For chord

| | | | | |
|---|---|---|---|---|
| | 2 Pls. | 15 · 3/8 | @ 5.63 | = 11.26 |
| | 4 L s | 3½ · 3½ · 3/8 | @ 2.48 | = 9.92 |
| | | | | 21.18 0" – 137.0 |
| add | 2 Pls. | 8 · 3/8 | @ 3.0 | = 6.00 |
| | | | | 27.18 0" – 175.0 |
| add | 2 Pls. | 14 · 3/8 | @ 5.25 | 10.50 |
| | | | | 37.68 0" – 244.0 |

vertical member 2 L s 9" · 3" @ 19.37# = 38.74# per lin ft.
diagonal member 4 L s 4 · 3 · 3/8 @ 8.5 = 34.00# per lin ft.

Chord members.

| member | Top chord | | main section | with details | Panel loads | Bottom chord | | main section | with details | panel loads |
|---|---|---|---|---|---|---|---|---|---|---|
| C11-10 | 21.19° @ 3.4# | 12.75 | = 920 | 1380 | 1380 (11) | | | | 1770 | (11) |
| 10-9 | | 12.83 | 925 | 1390 | 1385 (10) | 27.18 × 3.4 | 12.75 | = 1180 | 1770 1780 | (10) |
| 9-8 | | 13.00 | 937 | 1405 | 1400 (9) | " | 12.90 | 1190 | 1785 1810 | (9) |
| 8-7 | | 13.20 | 950 | 1425 | 1415 (8) | " | 13.20 | 1220 | 1830 1860 | (8) |
| 7-6 | | 13.55 | 975 | 1460 | 1440 (7) | " | 13.60 | 1260 | 1890 1930 | (7) |
| 6-5 | | 13.90 | 1000 | 1500 | 1480 (6) | " | 14.10 | 1300 | 1950 2385 | (6) |
| 5-4 | | 14.35 | 1035 | 1550 | 1525 (5) | 37.68 × 3.4 | 14.70 | 1880 | 2820 2895 | (5) |
| 4-3 | | 14.85 | 1070 | 1605 | 1575 (4) | " | 15.45 | 1980 | 2970 3045 | (4) |
| 3-2 | | 15.40 | 1110 | 1665 | 1635 (3) | " | 16.20 | 2080 | 3120 3205 | (3) |
| 2-1 | | 16.00 | 1150 | 1725 | 1695 (2) | " | 17.10 | 2190 | 3285 3370 | (2) |
| 1-0 | | 16.60 | 1200 | 1800 | 1760 (1) | " | 18.00 | 2300 | 3450 3550 | (1) |
| | | | | | 1800 (0) | " | 19.00 | 90° 2430 | 3645 2850 | (0) |
| 0-1 | | 12.272 | 1150/1200 | 1725/1800 | 1760 (1) | 21.19 × 3.4 | 19.00 | 1370 | 2055 2000 | (1) |
| 1-2 | | | 1110/1150 | 1665/1725 | 1695 (2) | " | 18.00 | 1300 | 1950 1900 | (2) |
| 2-3 | | | 1070/1110 | 1605/1665 | 1635 (3) | " | 17.10 | 1235 | 1855 1805 | (3) |
| 3-4 | | | 1035/1070 | 1550/1605 | 1575 (4) | " | 16.20 | 1170 | 1755 1710 | (4) |
| 4-5 | | | 1000/1035 | 1500/1550 | 1525 (5) | " | 15.45 | 1110 | 1665 1630 | (5) |
| 5-6 | | | 975/1000 | 1460/1500 | 1480 (6) | " | 14.70 | 1060 | 1590 1560 | (6) |
| 6-7 | | | 950/975 | 1425/1460 | 1430 (7) | " | 14.10 | 1020 | 1530 1165 | (7) |
| | | | 18562 | | | | | 27275 | 40915 | |
| | | | 28210 | | | | | | | |

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CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken

| Verticals Panel Pt. | | | | unit details | | Diagonals | | | | unit details · panel loads | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C11 | 38.74" · | 6.0 (½) | = | 116 | 174 | 11-10 | 34" · 13.9 | = | 473 | 709 | 700 | (11) (10) |
| C10 | | 6.2 | = | 240 | 360 | 10-9 | 13.6 | = | 462 | 693 | 685 | (9) |
| C9 | | 6.65 | = | 257 | 386 | 9-8 | 13.4 | = | 455 | 682 | 682 | (8) |
| C8 | | 7.45 | = | 288 | 432 | 8-7 | 13.4 | = | 455 | 682 | 682 | (7) |
| C7 | | 8.60 | = | 332 | 498 | 7-6 | 13.4 | = | 455 | 682 | 685 | (6) |
| C6 | | 10.00 | = | 387 | 580 | 6-5 | 13.5 | = | 460 | 690 | 700 | (5) |
| C5 | | 11.90 | = | 460 | 690 | 5-4 | 13.8 | = | 470 | 705 | 710 | (4) |
| C4 | | 13.95 | = | 540 | 810 | 4-3 | 14.2 | = | 480 | 720 | 740 | (3) |
| C3 | | 16.45 | = | 635 | 953 | 3-2 | 15.0 | = | 510 | 765 | 790 | (2) |
| C2 | | 19.20 | = | 742 | 1113 | 2-1 | 16.0 | = | 545 | 818 | 845 | (1) |
| C1 | | 22.30 | = | 860 | 1290 | 1-0 | 17.25 | = | 585 | 877 | 877 | (0) |
| C0 | 75" | 25.70 | = | 1920 | 2880 | 0-1 | | 5350 | 585 | 877 | 845 | (1) |
| S1 | | | | 860 | 1290 | 1-2 | | | 545 | 818 | 790 | (2) |
| S2 | | | | 742 | 1113 | 2-3 | | | 510 | 765 | 740 | (3) |
| S3 | | | | 635 | 953 | 3-4 | | | 480 | 720 | 710 | (4) |
| S4 | | | | 540 | 810 | 4-5 | | | 470 | 705 | 700 | (5) |
| S5 | | | | 460 | 690 | 5-6 | | | 460 | 690 | 685 | (6) |
| S6 | | | | 387 | 580 | 6-7 | | | 455 | 682 | 340 | (7) |
| S7 | | | | 332 | 498 | | | | 8155 | 13280 | | |
| | | | | 10.733 | 16100 | | | | 4 | 4 | | |
| | | | | 19.572 | | | | | 35420 | 53120 | | |
| | | | | 30.306 | ×4-12+12=4 | | | | | | | |

| | | |
|---|---|---|
| Top chord unit details | | 28210 |
| Bottom chord | " | 40915 |
| verticals. | " | 16100 |
| Diagonals | " | 13280 |
| | | 98505 |
| | | 3 4 |
| | | 394020" ÷ 2240 = 176 tons |
| | | 17 |
| Structural steel above truss | | 220 |
| steel in shoes etc. | Say | 15 |
| | | 411 tons. |

Summary for Panel load due to truss

| | S7 | S6 | S5 | S4 | S3 | S2 | S1 | C0 | C1 | C2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Top chord | 730 | 1480 | 1525 | 1575 | 1635 | 1695 | 1760 | 1800 | 1760 | 1695 |
| Bott. chord | 765 | 1560 | 1630 | 1710 | 1805 | 1900 | 2000 | 2850 | 3550 | 3370 |
| Verticals | 348 498 | 580 | 690 | 810 | 953 | 1113 | 1290 | 2880 | 1290 | 1113 |
| Diagonals | 340 | 685 | 700 | 710 | 740 | 790 | 845 | 877 | 845 | 790 |
| shoes etc | 4000 | | | | | | | 4000 | | |
| | 6333 | 4305 | 4545 | 4805 | 5133 | 5498 | 5895 | 12407 | 7445 | 6968 |

| | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 |
|---|---|---|---|---|---|---|---|---|---|
| Top chord | 1635 | 1575 | 1525 | 1480 | 1440 | 1415 | 1400 | 1385 | 1380 |
| Bott. chord | 3205 | 3045 | 2895 | 2385 | 1930 | 1860 | 1810 | 1780 | 1770 |
| Verticals | 953 | 810 | 690 | 580 | 498 | 432 | 386 | 360 | 348 |
| Diagonals | 740 | 710 | 700 | 685 | 682 | 682 | 685 | 700 | 709 |
| | 6533 | 6140 | 5810 | 5130 | 4550 | 4389 | 4281 | 4225 | 4207 # |

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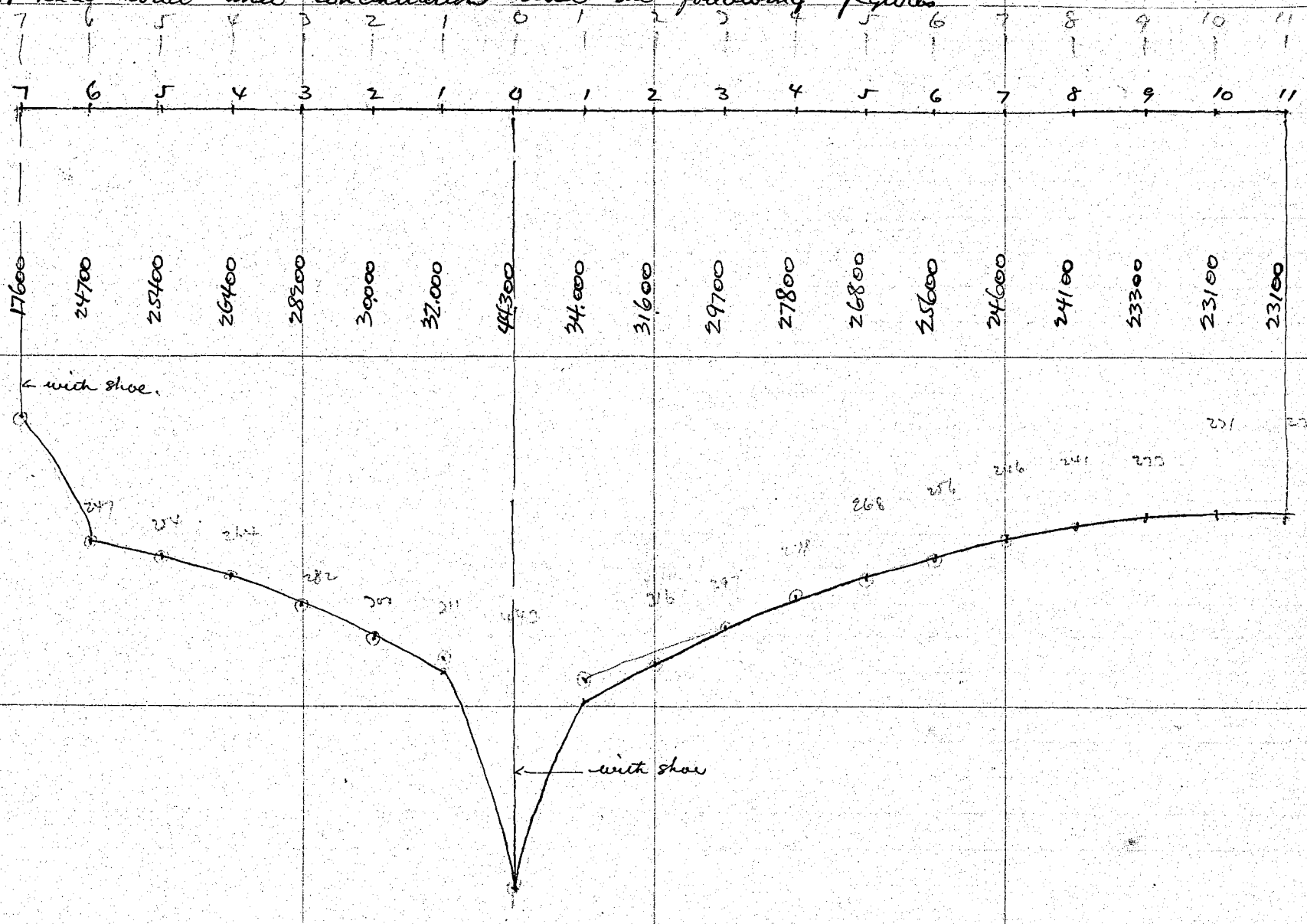
CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama-Ken.

Grand summary for panel load (structural steel)

| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Co | 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|
| Deck. | 3465 | 4855 | 5305 | 6040 | 7505 | 8990 | 9710 | 16420 | 9895 | 9150 |
| Truss. | 6333 | 4305 | 4545 | 4805 | 5133 | 5498 | 5895 | 12407 | 7445 | 6968 |
| | 9798 | 9160 | 9850 | 10845 | 12638 | 14488 | 15605 | 28827 | 17340 | 16118 |
| Floor load say | 15500/2 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 |
| Total | 17548 → 17600 C3 | 24660 → 24700 C4 | 25350 → 25400 C5 | 26345 → 26400 C6 | 28138 → 28200 C7 | 29988 → 30,000 C8 | 31105 → 31600 C9 | 44327 → 44300 C10 | 32840 → 32900 C11 | 31618 → 31600 |
| Deck | 7660 | 6180 | 5440 | 4980 | 4525 | 4210 | 3520 | 3410 | 3360 | |
| truss, | 6533 | 6140 | 5810 | 5130 | 4550 | 4389 | 4281 | 4225 | 4207 | |
| | 14193 | 12320 | 11250 | 10110 | 9075 | 8599 | 7801 | 7635 | 7567 | |
| Floor load say | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | 15500 | |
| | 29693 | 27820 | 26750 | 25610 | 24575 | 24099 | 23301 | 23135 | 23067 | |
| Total. | 29700 | 27800 | 26800 | 25600 | 24600 | 24100 | 23300 | 23100 | 23100 | |

For Dead Load Panel Concentration use the following figures.



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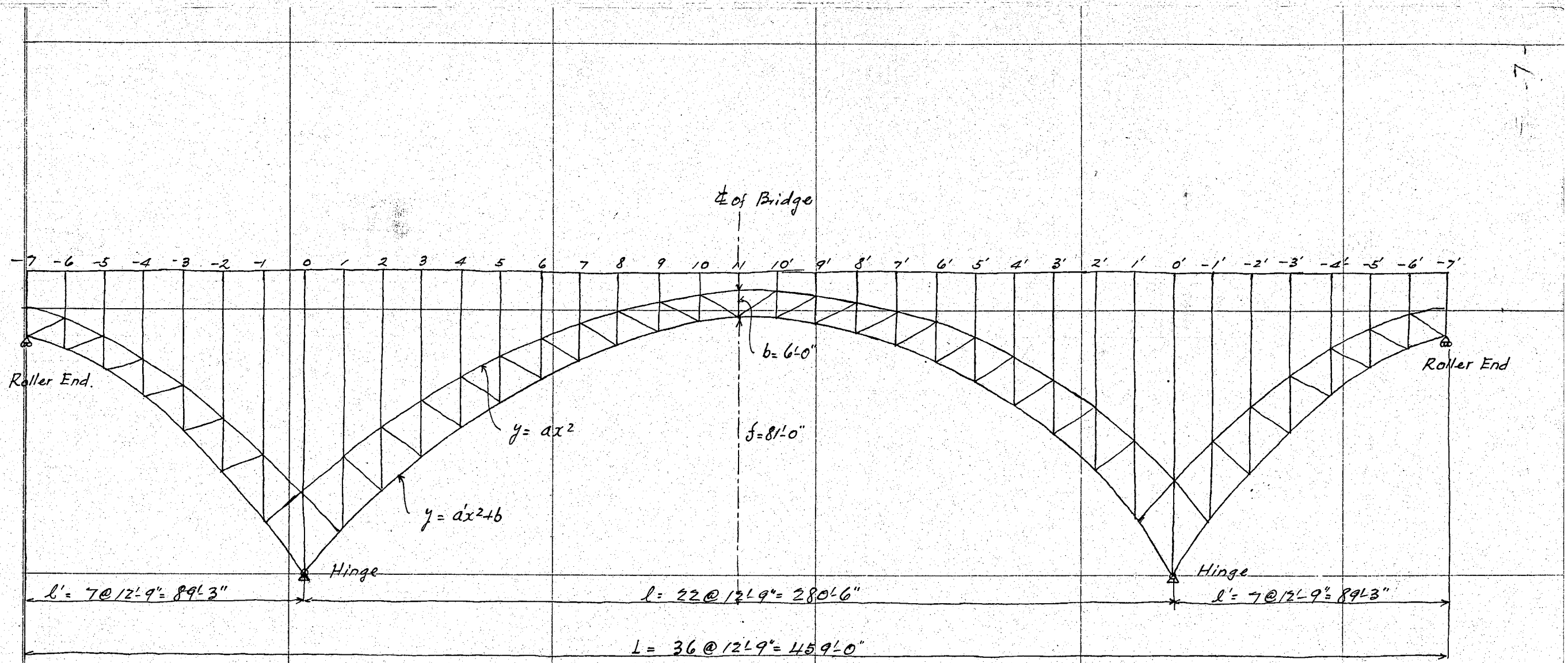
CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken.

Skeleton diagram of Truss.




$y = ax^2$

$y = a'x^2 + b$

$\begin{cases} x = 140'-3" \\ y = 81'-0" + 6'-0" = 87'-0" \end{cases}$

$87'-0" = a'(140.25)^2 + 6.0$

$a' = \dfrac{81.0}{140.25^2} = \dfrac{81.0}{(11\times12.75)^2} = \dfrac{0.66942}{12.75^2}$

$y = ax^2 = a(140.25+12.75)^2 = a(12\times12.75)^2$

$y = a'x^2+b = \dfrac{81.0}{140.25^2}(140.25-12.75)^2+6.0 = \dfrac{81.0}{(11\times12.75)^2}(10\times12.75)^2+6.0$

$\therefore a = \dfrac{81.0}{(11\times12.75)^2}\dfrac{(10\times12.75)^2}{(12\times12.75)^2} + \dfrac{6.0}{(12\times12.75)^2} = \dfrac{0.506542}{(12.75)^2}$

Inclination of Truss 1 : 8.5 assumed.

Intrados $\dfrac{f}{\ell} = \dfrac{81.0}{280.5} = \dfrac{1}{3.465}$

Extrados $\dfrac{f}{\ell} = \dfrac{81.0+6.0-25.71}{280.5} = \dfrac{1}{4.575}$

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CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken

☐ Ordinates of each panel

For Upper chord.

| panel points | $\frac{x}{12.75}$ | $(\frac{x}{12.75})^2$ | $a \times 12.75^2 = 0.506542$ | |
|---|---|---|---|---|
| 0 | 0 | 0 | 0.0000 | 0'- 0" |
| 1 | 1 | 1 | 0.5065 | 0'- 6 1/16" |
| 2 | 2 | 4 | 2.0262 | 2'- 0 5/16" |
| 3 | 3 | 9 | 4.5588 | 4'- 6 23/32" |
| 4 | 4 | 16 | 8.1047 | 8'- 1/4" |
| 5 | 5 | 25 | 12.6634 | 12'- 7 31/32" |
| 6 | 6 | 36 | 18.2355 | 18'- 2 13/16" |
| 7 | 7 | 49 | 24.8206 | 24'- 9 27/32" |
| 8 | 8 | 64 | 32.4187 | 32'- 5 1/32" |
| 9 | 9 | 81 | 41.0299 | 41'- 0 11/32" |
| 10 | 10 | 100 | 50.6542 | 50'- 7 27/32" |
| 11 | 11 | 121 | 61.2915 | 61'- 3 1/2" |

For Lower chord.

| panel points | $\frac{x}{12.75}$ | $(\frac{x}{12.75})^2$ | $a' \times 12.75^2 = 0.66942$ | plus 6.0000 | | 87'-0" minus |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0.0000 | 6.0000 | 6'- 0" | 81'- 0" |
| 1 | 1 | 1 | 0.6694 | 6.6694 | 6'- 8 1/32" | 80'- 3 31/32" |
| 2 | 2 | 4 | 2.6777 | 8.6777 | 8'- 8 1/8" | 78'- 3 7/8" |
| 3 | 3 | 9 | 6.0248 | 12.0248 | 12'- 0 9/32" | 74'- 11 23/32" |
| 4 | 4 | 16 | 10.7107 | 16.7107 | 16'- 8 17/32" | 70'- 3 15/32" |
| 5 | 5 | 25 | 16.7355 | 22.7355 | 22'- 8 13/16" | 64'- 3 3/16" |
| 6 | 6 | 36 | 24.0991 | 30.0991 | 30'- 1 3/16" | 56'- 10 13/16" |
| 7 | 7 | 49 | 32.8016 | 38.8016 | 38'- 9 5/8" | 48'- 2 3/8" |
| 8 | 8 | 84 | 42.8429 | 48.8429 | 48'- 10 1/8" | 38'- 1 7/8" |
| 9 | 9 | 81 | 54.2230 | 60.2230 | 60'- 2 11/16" | 26'- 9 5/16" |
| 10 | 10 | 100 | 66.9420 | 72.9420 | 72'- 11 5/16" | 14'- 0 11/16" |
| 11 | 11 | 121 | 81.0000 | 87.0000 | 87'- 0" | 0'- 0" |

☐ Length of Verticals.

| panel points. | ord.s | " | Liff. | ft decimals |
|---|---|---|---|---|
| 0 | 6'-0" | 0'-0" | 6'-0" | 6.000 |
| 1 | 6'-8 1/32" | 0'-6 1/16" | 6'-1 31/32" | 6.1641 |
| 2 | 8'-8 1/8" | 2'-0 5/16" | 6'-7 13/16" | 6.6510 |
| 3 | 12'-0 9/32" | 4'-6 23/32" | 7'-5 9/16" | 7.4635 |
| 4 | 16'-8 17/32" | 8'-1/4" | 8'-7 9/32" | 8.6068 |
| 5 | 22'-8 13/32" | 12'-7 31/32" | 10'-0 27/32" | 10.0703 |
| 6 | 30'-1 3/16" | 18'-2 13/16" | 11'-10 3/8" | 11.8646 |
| 7 | 38'-9 5/8" | 24'-9 27/32" | 13'-11 25/32" | 13.9818 |
| 8 | 48'-10 1/8" | 32'-5 1/32" | 16'-5 3/32" | 16.4245 |
| 9 | 60'-2 11/16" | 41'-0 11/32" | 19'-2 11/32" | 19.1953 |
| 10 | 72'-11 5/16" | 50'-7 27/32" | 22'-3 15/32" | 22.2891 |
| 11 | 87'-0" | 61'-3 1/2" | 25'-8 1/2" | 25.7083 |

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CALCULATIONS FOR

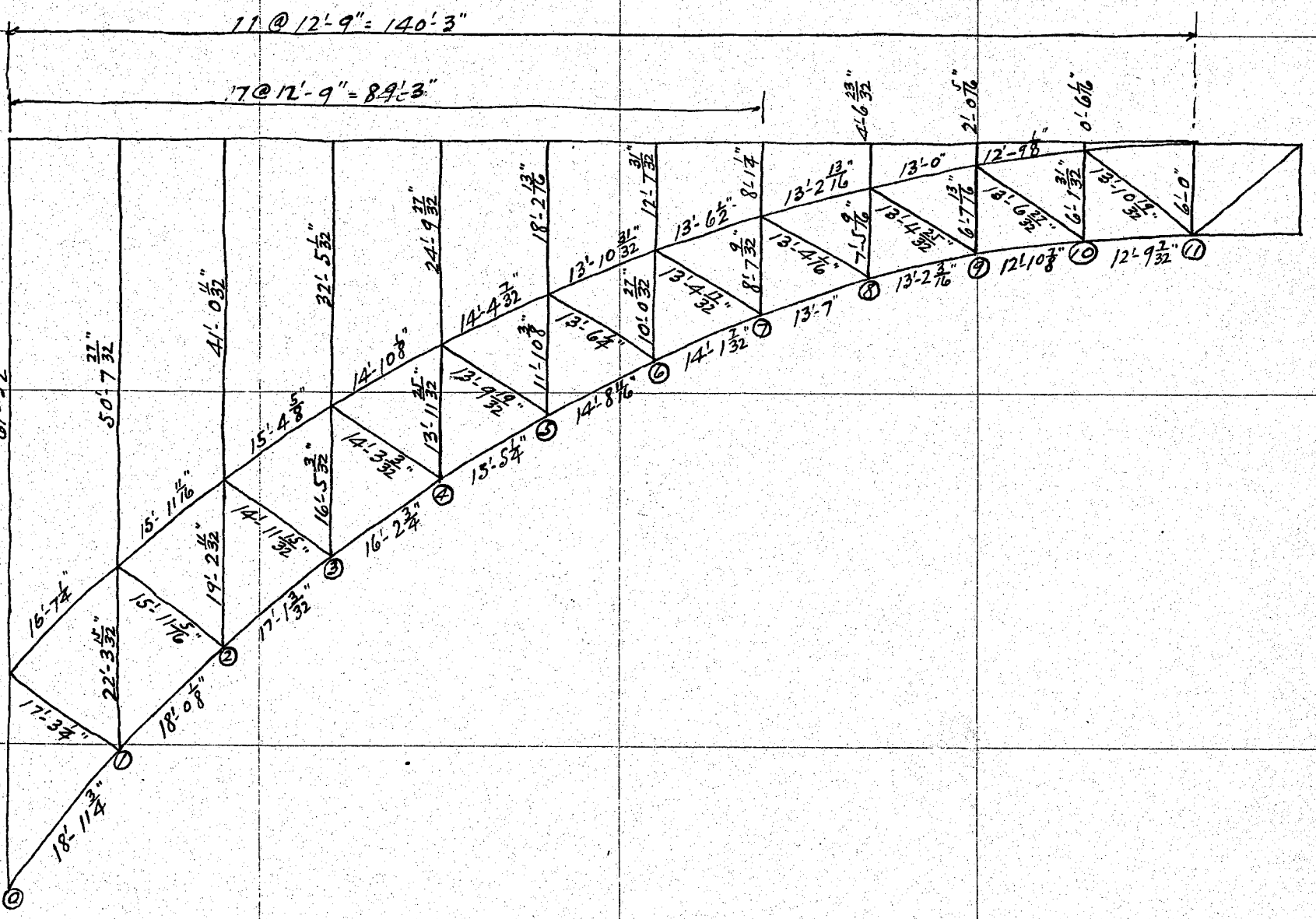
Arakawa Bashi for Saitama-Ken

☐ Length of Upper chords.

| panel points | ord. | diffs. | Squar | $(12'-9")^2$ | plus | length |
|---|---|---|---|---|---|---|
| 11 | $61'-3\frac{1}{2}"$ | $10'-7\frac{21}{32}"$ | 113.1675 | 162.5625 | 275.7300 | $16'-7\frac{1}{4}$ |
| 10 | $50'-7\frac{27}{32}"$ | $9'-7\frac{1}{2}"$ | 92.6406 | " | 255.2031 | $15'-11\frac{11}{16}"$ |
| 9 | $41'-0\frac{11}{32}"$ | $8'-7\frac{5}{16}"$ | 74.1213 | " | 236.6838 | $15'-4\frac{5}{8}"$ |
| 8 | $32'-5\frac{1}{32}"$ | $7'-7\frac{3}{16}"$ | 57.7442 | " | 220.3067 | $14'-10\frac{1}{8}"$ |
| 7 | $24'-9\frac{27}{32}"$ | $6'-7\frac{1}{32}"$ | 43.3746 | " | 205.9371 | $14'-4\frac{7}{32}"$ |
| 6 | $18'-2\frac{13}{16}"$ | $5'-6\frac{27}{32}"$ | 31.0284 | " | 193.5909 | $13'-10\frac{31}{32}"$ |
| 5 | $12'-7\frac{31}{32}"$ | $4'-6\frac{23}{32}"$ | 20.7927 | " | 183.3552 | $13'-6\frac{1}{2}"$ |
| 4 | $8'-1\frac{1}{4}"$ | $3'-6\frac{17}{32}"$ | 12.5619 | " | 175.1244 | $13'-2\frac{13}{16}"$ |
| 3 | $4'-6\frac{23}{32}"$ | $2'-6\frac{13}{32}"$ | 6.4204 | " | 168.9829 | $13'-0"$ |
| 2 | $2'-0\frac{5}{16}"$ | $1'-6\frac{1}{4}"$ | 2.3129 | " | 164.8754 | $12'-10\frac{3}{32}"$ |
| 1 | $0'-6\frac{1}{16}"$ | $0'-6\frac{1}{16}"$ | 0.2552 | " | 162.8177 | $12'-9\frac{7}{8}"$ |

☐ Length of Lower chords

| panel points | ord. | diff. | Squar | 12'-9" | Length |
|---|---|---|---|---|---|
| 11 | 87'-0" | $14'-0\frac{11}{16}"$ | 197.6074 | 298.3093 | $17'-3\frac{1}{4}"$ |
| 10 | $72'-11\frac{5}{16}"$ | $12'-8\frac{5}{8}"$ | 161.7666 | 254.1534 | $15'-11\frac{5}{16}"$ |
| 9 | $60'-2\frac{11}{16}"$ | $11'-4\frac{9}{16}"$ | 129.5091 | 223.6384 | $14'-11\frac{15}{32}"$ |
| 8 | $48'-10\frac{1}{8}"$ | $10'-0\frac{1}{2}"$ | 100.8351 | 203.3028 | $14'-3\frac{3}{32}"$ |
| 7 | $38'-9\frac{5}{8}"$ | $8'-8\frac{7}{16}"$ | 75.7444 | 190.4266 | $13'-9\frac{19}{32}"$ |
| 6 | $30'-1\frac{3}{16}"$ | $7'-4\frac{3}{8}"$ | 54.2371 | 182.8125 | $13'-6\frac{1}{4}"$ |
| 5 | $22'-8\frac{13}{16}"$ | $6'-6\frac{9}{32}"$ | 36.2818 | 178.9397 | $13'-4\frac{17}{32}"$ |
| 4 | $16'-8\frac{17}{32}"$ | $4'-8\frac{1}{4}"$ | 21.9727 | 177.9232 | $13'-4\frac{1}{16}"$ |
| 3 | $12'-0\frac{9}{32}"$ | $3'-4\frac{5}{32}"$ | 11.1981 | 179.5137 | $13'-4\frac{25}{32}"$ |
| 2 | $8'-8\frac{1}{8}"$ | $2'-0\frac{3}{32}"$ | 4.0313 | 184.1221 | $13'-6\frac{27}{32}"$ |
| 1 | $6'-8\frac{1}{32}"$ | $0'-8\frac{1}{32}"$ | 0.4479 | 192.7552 | $13'-10\frac{19}{32}"$ |



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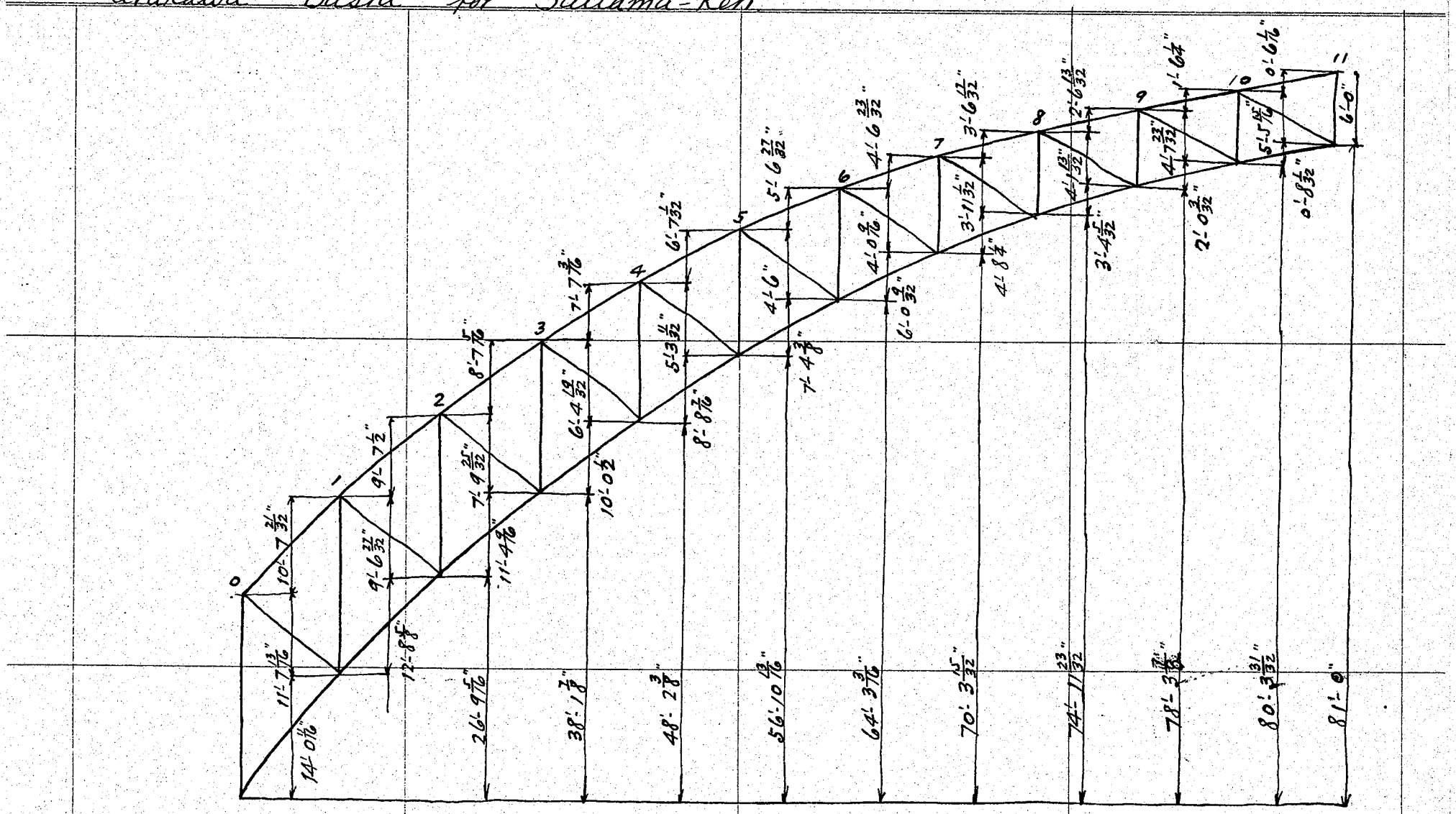
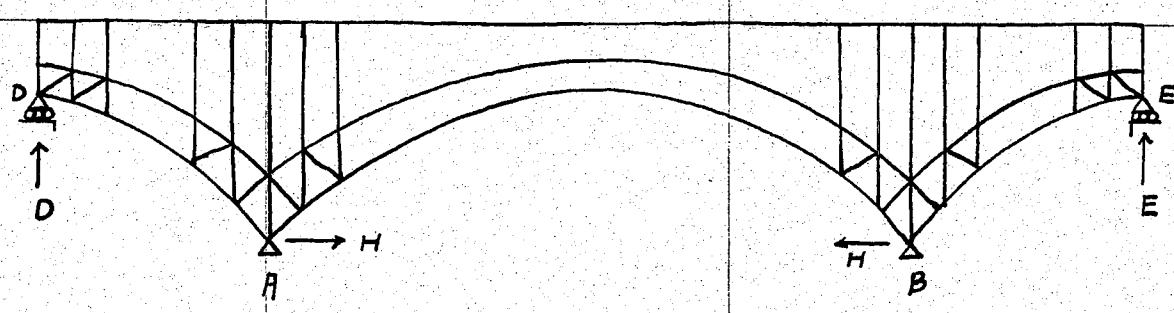
CALCULATIONS FOR

Arakawa Baski for Saitama-Ken.




□ Formula finding the stresses of truss members




3- Redundancy.

The ends of the cantilever arms of an arch are constrained to move in horizontal planes.

$H \rightarrow$ Horizontal thrust of the arch.

$D \rightarrow$ } Vertical displacements at the end-supports D and E

$E \rightarrow$ }

For the analytical treatment, we will determine the series of stresses $S_h$, $S_d$, and $S_e$, which are produced in the members of the statically determinate structure when there are upon it the force $H=1$, $D=1$, and $E=1$, respectively.

If the external loading produces stress $S_o$ in the determinate structure, then the accession of the forces H, D and E will render

$$\text{Final stress} = S_o + H.S_h + D\,S_d + E\,S_e$$

and the theorem of Vertual work will therefore yield the following equations of condition

$$\Sigma\, \delta\, S_o S_h + H \Sigma\, \delta S_h^2 + D \Sigma\, \delta S_h S_d + E \Sigma\, \delta S_h S_e = 0$$
$$\Sigma\, \delta\, S_o S_d + H \Sigma\, \delta S_h S_d + D \Sigma\, \delta S_d^2 + E \Sigma\, \delta S_d S_e = 0$$
$$\Sigma\, \delta\, S_o S_e + H \Sigma\, \delta S_h S_e + D \Sigma\, \delta S_d S_e + E \Sigma\, \delta S_e^2 = 0$$

where $\delta = \frac{l}{AE}$

$l \rightarrow$ length of member
$A \rightarrow$ area of member
$E \rightarrow$ Modulus of elasticity.

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CALCULATIONS FOR

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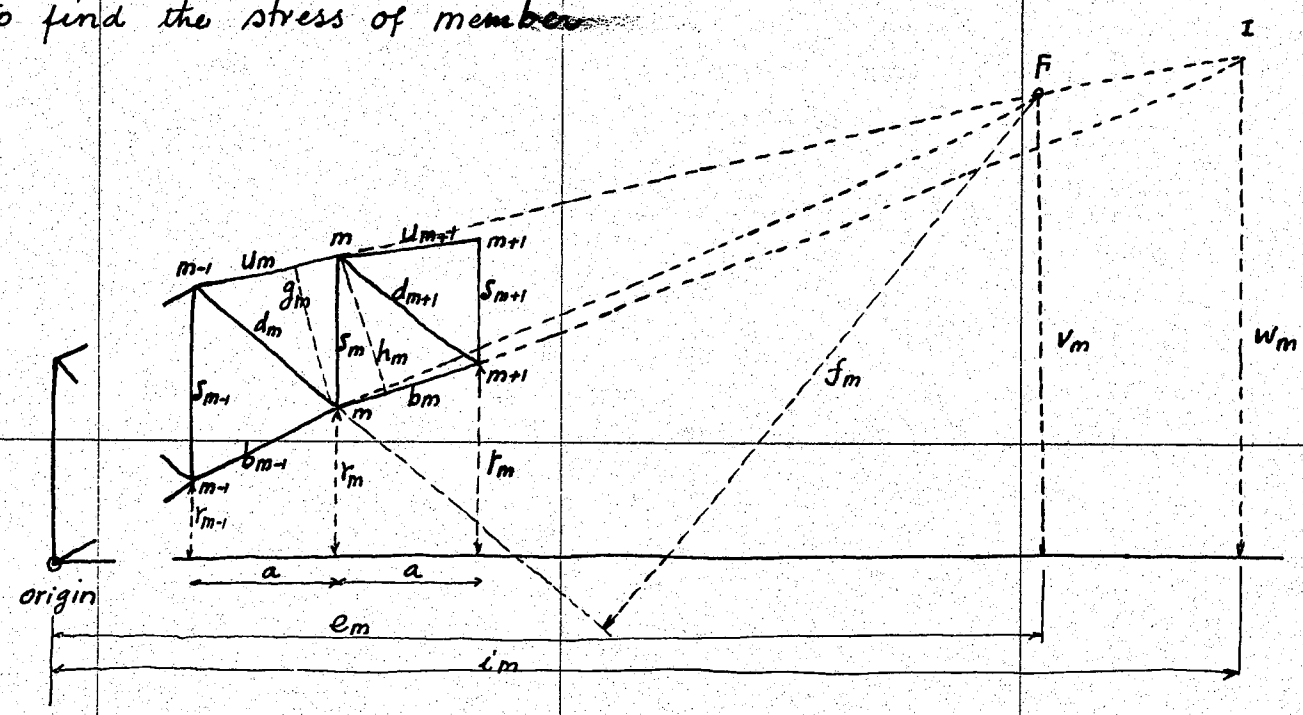
☐ Data needed to find the stress of member




Notation

$S_m$ = length of verticals
$d_m$ = length of diagonals
$U_m$ = length of upper chords
$b_m$ = length of lower chords
$r_m$ = ordinate of lower panel pt.
$a$ = length of panel
$g_m$ = perpendicular distance from lower panel point m to upper chord $U_m$.
$h_m$ = perpendicular distance from upper panel point m to lower chord $b_m$
$V_m$ = vertical distance from intersection point (F) of chord $U_m$ and $b_{m-1}$
$f_m$ = perpendicular distance from (F) to diagonal $d_m$.
$w_m$ = Vertical distance from intersection pt (I) of chord $U_m$ and $b_m$ to left support.
$e_m$ = horizontal distance from intersection pt (F) to left support
$i_m$ = horizontal distance from intersection pt (I) to left support.

then in general

$$g_m = \frac{a}{U_m} S_m$$

$$h_m = \frac{a}{b_m} S_m.$$

$$V_m = \frac{S_{m-1}}{S_{m-1} - S_m} (r_m - r_{m-1}) + r_{m-1}$$

$$f_m = \frac{S_{m-1}}{S_{m-1} - S_m} \frac{a}{d_m} S_m$$

$$e_m = \frac{S_{m-1}}{S_{m-1} - S_m} a + (m-1)a$$

$$i_m = \frac{S_m}{(r_{m+1} - r_m) - (y_m - y_{m-1})} a + m a$$

$$w_m = \frac{S_m}{(r_{m+1} - r_m) - (y_m - y_{m-1})} (r_{m+1} - r_m) + r_m$$

where $\begin{cases} y_m = r_m + S_m \\ y_{m-1} = r_{m-1} + S_{m-1} \end{cases}$

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CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken

☐ Find $q_m = \frac{a}{\Delta_m} \delta_m$ $a = 12'-9''$ $\log a = 1.10551$

| m | $\Delta_m$ | $\delta_m$ | $\log \delta_m$ | $\log \Delta_m$ | $\log q_m$ | $q_m$ | $q_m$ |
|---|---|---|---|---|---|---|---|
| 0 | 0 | 25'-8 1/2" | 1.41007 | — | — | — | |
| 1 | 16'-7 1/4" | 22'-3 11/32" | 1.34809 | 1.22022 | 1.23338 | 17'-1 3/8" | 17.115 |
| 2 | 15'-11 11/16" | 19'-2 11/32" | 1.28320 | 1.20341 | 1.18530 | 15'-3 27/32" | 15.320 |
| 3 | 15'-4 5/8" | 16'-5 3/32" | 1.21549 | 1.18711 | 1.13389 | 13'-7 11/32" | 13.612 |
| 4 | 14'-10 1/8" | 13'-11 25/32" | 1.14556 | 1.17154 | 1.07953 | 12'-0 7/8" | 12.010 |
| 5 | 14'-4 7/32" | 11'-10 3/8" | 1.07425 | 1.15690 | 1.02286 | 10'-6 1/2" | 10.542 |
| 6 | 13'-10 31/32" | 10'-0 27/32" | 1.00304 | 1.14345 | 0.96510 | 9'-2 3/4" | 9.229 |
| 7 | 13'-6 1/2" | 8'-7 9/32" | 0.93484 | 1.13167 | 0.90808 | 8'-1 1/4" | 8.104 |
| 8 | 13'-2 13/16" | 7'-5 9/16" | 0.87294 | 1.12170 | 0.85675 | 7'-2 9/32" | 7.190 |
| 9 | 13'-0" | 6'-7 13/16" | 0.82289 | 1.11394 | 0.81446 | 6'-6 9/32" | 6.523 |
| 10 | 12'-10 3/32" | 6'-1 31/32" | 0.78987 | 1.10860 | 0.78678 | 6'-1 7/16" | 6.126 |
| 11 | 12'-9 1/8" | 6'-0" | 0.77815 | 1.10586 | 0.77780 | 5'-11 15/16" | 5.995 |

☐ Find $h_m = \frac{a}{b_m} \delta_m$ $\log a = 1.10551$

| m | $b_m$ | $\log \delta_m$ | $\log b_m$ | $\log h_m$ | $h_m$ | $h_m$ |
|---|---|---|---|---|---|---|
| 0 | 18'-11 3/4" | 1.41007 | 1.27828 | 1.23730 | 17'-3 1/4" | 17.271 |
| 1 | 18'-0 1/8" | 1.34809 | 1.25552 | 1.19808 | 15'-9 11/32" | 15.779 |
| 2 | 17'-1 3/32" | 1.28320 | 1.23277 | 1.15594 | 14'-3 27/32" | 14.320 |
| 3 | 16'-2 3/4" | 1.21549 | 1.21030 | 1.11070 | 12'-10 27/32" | 12.904 |
| 4 | 15'-5 1/4" | 1.14556 | 1.18858 | 1.06249 | 11'-6 9/16" | 11.547 |
| 5 | 14'-8 11/16" | 1.07425 | 1.16802 | 1.01174 | 10'-3 9/32" | 10.273 |
| 6 | 14'-1 3/32" | 1.00304 | 1.14927 | 0.95928 | 9'-1 1/4" | 9.104 |
| 7 | 13'-7" | 0.93484 | 1.13301 | 0.90734 | 8'-0 15/16" | 8.078 |
| 8 | 13'-2 3/16" | 0.87294 | 1.11999 | 0.85846 | 7'-2 7/8" | 7.219 |
| 9 | 12'-10 3/32" | 0.82289 | 1.11080 | 0.81760 | 6'-6 27/32" | 6.570 |
| 10 | 12'-9 3/32" | 0.78987 | 1.10613 | 0.78925 | 6'-1 3/8" | 6.156 |
| 11 | — | 0.77815 | — | — | — | — |

☐ Find $f_m = \frac{\Delta_{m-1}}{\Delta_{m-1} - \Delta_m} \frac{a}{\delta_m} \Delta_m$ $\log a = 1.10551$

| m. | $\Delta_{m-1} - \Delta_m$ | | $\Delta_{m-1} - \Delta_m$ | $\frac{a}{\delta_m} \Delta_m$ | $\log \Delta_{m-1}$ | $\log \Delta_m$ | $\log \Delta_{m-1} - \Delta_m$ | $\log d_m$ | $\log f_m$ | $f_m$ | $f_m$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | — | 25'-8 1/2" | — | — | — | 1.41007 | — | — | — | — | — |
| 1 | 25'-8 1/2" | 22'-3 11/32" | 3'-4 21/32" | 17'-3 1/4" | 1.41007 | 1.34809 | 0.53393 | 1.23731 | 2.09243 | 123'-8 11/16" | 123.72 |
| 2 | 22'-3 15/16 32 | 19'-2 11/32" | 3'-1 7/8" | 15'-11 5/16" | 1.34809 | 1.28320 | 0.49049 | 1.20256 | 2.04375 | 110'-7 1/4" | 110.60 |
| 3 | 19'-2 11/32" | 16'-5 3/32" | 2'-9 1/4" | 14'-11 15/32" | 1.28320 | 1.21549 | 0.44261 | 1.17481 | 1.98678 | 97'-0 1/32" | 97.00 |
| 4 | 16'-5 3/32" | 13'-11 25/32" | 2'-5 5/16" | 14'-3 3/32" | 1.21549 | 1.14556 | 0.38787 | 1.15405 | 1.92464 | 84'-0 27/32" | 84.07 |
| 5 | 13'-11 25/32" | 11'-10 3/8" | 2'-1 13/32" | 13'-9 19/32" | 1.14556 | 1.07425 | 0.32576 | 1.13986 | 1.85970 | 72'-4 23/32" | 72.39 |
| 6 | 11'-10 3/8" | 10'-0 27/32" | 1'-9 17/32" | 13'-6 1/4" | 1.07425 | 1.00304 | 0.25389 | 1.13100 | 1.79791 | 62'-9 1/2" | 62.79 |
| 7 | 10'-0 27/32" | 8'-7 9/32" | 1'-5 9/16" | 13'-4 11/32" | 1.00304 | 0.93484 | 0.16541 | 1.12638 | 1.75160 | 56'-5 5/16" | 56.44 |
| 8 | 8'-7 9/32" | 7'-5 9/16" | 1'-1 23/32" | 13'-4 1/16" | 0.93484 | 0.87294 | 0.05813 | 1.12511 | 1.73005 | 53'-8 1/2" | 53.71 |
| 9 | 7'-5 9/16" | 6'-7 13/16" | 0'-9 3/4" | 13'-4 25/32" | 0.87294 | 0.82289 | T.90982 | 1.12705 | 1.76447 | 58'-1 11/16" | 58.14 |
| 10 | 6'-7 13/16" | 6'-1 31/32" | 0'-5 27/32" | 13'-6 27/32" | 0.82289 | 0.78987 | T.68751 | 1.13259 | 1.89817 | 79'-1 3/16" | 79.10 |
| 11 | 6'-1 31/32" | 6'-0" | 0'-1 31/32" | 13'-10 19/32" | 0.78987 | 0.77815 | T.21501 | 1.14248 | 2.31604 | 207'-1 9/16" | 207.04 |

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CALCULATIONS FOR

Arakawa Bashi for Saitama ken

☐ Find $e_m = \frac{\Delta_{m-1}}{\Delta_{m-1}-\Delta_m} a + (m-1)a$ $\log a = 1.10551$

| m | $\log \Delta_{m-1}$ | $\log \Delta_{m-1}-\Delta_m$ | $\log \frac{\Delta_{m-1}}{\Delta_{m-1}-\Delta_m} a$ | $\frac{\Delta_{m-1}}{\Delta_{m-1}-\Delta_m} a$ | $(m-1)a$ | $e_m$ | $e_m$ |
|---|---|---|---|---|---|---|---|
| 0 | — | — | — | — | — | — | — |
| 1 | 1.41007 | 0.53393 | 1.98165 | 95'-10 11/32" | — | 95'-10 11/32" | 95.863 |
| 2 | 1.34809 | 0.49049 | 1.96311 | 91'-10 9/32" | 12'-9" | 104'-7 9/32" | 104.607 |
| 3 | 1.28320 | 0.44261 | 1.94610 | 88'-3 15/16" | 25'-6" | 113'-10 5/32" | 113.828 |
| 4 | 1.21549 | 0.38787 | 1.93313 | 85'-8 3/4" | 38'-3" | 123'-11 3/4" | 123.979 |
| 5 | 1.14556 | 0.32576 | 1.92531 | 84'-2 43/32" | 51'-0" | 135'-2 43/32" | 135.201 |
| 6 | 1.07425 | 0.25389 | 1.92587 | 84'-3 11/16" | 63'-9" | 148'-0 11/16" | 148.057 |
| 7 | 1.00304 | 0.16541 | 1.94314 | 87'-8 3/4" | 76'-6" | 164'-2 3/4" | 164.229 |
| 8 | 0.93484 | 0.05813 | 1.98222 | 45'-11 7/8" | 89'-3" | 185'-2 7/8" | 185.240 |
| 9 | 0.87294 | 7.90982 | 2.06863 | 117'-1 7/16" | 102'-0" | 219'-1 7/16" | 219.120 |
| 10 | 0.82289 | 7.68751 | 2.24089 | 174'-1 11/16" | 114'-9" | 288'-10 11/16" | 288.890 |
| 11 | 0.78987 | 7.21501 | 2.68037 | 478'-8 1/16" | 127'-6" | 606'-2 1/16" | 606.170 |

☐ Find $V_m = \frac{\Delta_{m-1}}{\Delta_{m-1}-\Delta_m}(r_m - r_{m-1}) + r_m$

| m | $r_m - r_{m-1}$ | $\log \frac{\Delta_{m-1}}{\Delta_{m-1}-\Delta_m}$ | $\log (r_m - r_{m-1})$ | $\log \frac{\Delta_{m-1}}{\Delta_{m-1}-\Delta_m}(r_m - r_{m-1})$ | $\frac{\Delta_{m-1}}{\Delta_{m-1}-\Delta_m}(r_m - r_{m-1})$ | $r_m$ | $V_m$ | $V_m$ |
|---|---|---|---|---|---|---|---|---|
| 0 | — | — | — | — | — | — | — | — |
| 1 | 14'-0 11/16" | 0.87614 | 1.14790 | 2.024404 | 105'-6 27/32" | 14'-0 11/16" | 119'-7 17/32" | 119.628 |
| 2 | 12'-8 5/8" | 0.85760 | 1.10444 | 1.962204 | 91'-7 9/16" | 26'-9 5/16" | 118'-4 7/8" | 118.406 |
| 3 | 11'-4 9/16" | 0.84059 | 1.05615 | 1.896774 | 78'-10 1/16" | 38'-1 7/8" | 116'-11 15/16" | 116.995 |
| 4 | 10'-0 1/2" | 0.82762 | 1.00181 | 1.829443 | 67'-6 1/4" | 48'-2 3/8" | 115'-8 5/8" | 115.719 |
| 5 | 8'-8 7/16" | 0.81980 | 0.93968 | 1.759948 | 57'-5 1/16" | 56'-10 13/16" | 114'-4 1/2" | 114.375 |
| 6 | 7'-4 3/4" | 0.82036 | 0.86715 | 1.687751 | 48'-8 3/8" | 64'-3 3/16" | 112'-11 9/16" | 112.964 |
| 7 | 6'-0 9/32" | 0.83763 | 0.77984 | 1.617747 | 41'-5 11/32" | 70'-3 15/32" | 111'-8 25/32" | 111.732 |
| 8 | 4'-8 1/4" | 0.87671 | 0.67094 | 1.547765 | 35'-3 1/2" | 74'-11 23/32" | 110'-3 7/32" | 110.268 |
| 9 | 3'-4 5/32" | 0.96312 | 0.52457 | 1.488769 | 30'-8 7/8" | 78'-3 7/8" | 109'-0 3/4" | 109.063 |
| 10 | 2'-0 3/32" | 1.13538 | 0.30272 | 1.438100 | 27'-5 1/16" | 80'-3 31/32" | 107'-9 1/32" | 107.753 |
| 11 | 0'-8 1/32" | 1.57486 | 7.82560 | 1.400046 | 25'-1 3/4" | 81'-0" | 106'-1 3/4" | 106.146 |

☐ Find $I_m = \frac{\Delta_m}{(r_{m+1}-r_m)-(y_m-y_{m-1})} a + ma$ $I_m' = \frac{\Delta_m}{(r_{m+1}-r_m)-(y_m-y_{m-1})} a$

| m | $(r_{m+1}-r_m)-(y_m-y_{m-1})$ | | $\log[(r_{m+1}-r_m)-(y_m-y_{m-1})]$ | $\log \Delta_m$ | $\log i'm'$ | $i'm'$ | $ma$ | $i'm$ |
|---|---|---|---|---|---|---|---|---|
| 0 | 14'-0 11/16" | — | — | 1.41007 | — | — | — | — |
| 1 | 12'-8 5/8" | 10'-7 21/32" | 2'-0 31/32" | 0.31822 | 1.34809 | 2.13538 | 136.58 | 12.75 | 149.33 |
| 2 | 11'-4 9/16" | 9'-7 1/2" | 1'-9 1/16" | 0.24433 | 1.28320 | 2.14438 | 139.44 | 25.50 | 164.94 |
| 3 | 10'-0 1/2" | 8'-7 5/16" | 1'-5 3/16" | 0.15603 | 1.21549 | 2.16497 | 146.21 | 38.25 | 184.46 |
| 4 | 8'-8 7/16" | 7'-7 3/16" | 1'-1 1/4" | 0.04303 | 1.14556 | 2.20804 | 161.45 | 51.00 | 212.45 |
| 5 | 7'-4 3/8" | 6'-7 1/32" | 0'-9 11/32" | 7.89134 | 1.07425 | 2.28842 | 194.28 | 63.75 | 258.03 |
| 6 | 6'-0 9/32" | 5'-6 27/32" | 0'-5 7/16" | 7.65622 | 1.00304 | 2.45233 | 283.36 | 76.50 | 359.86 |
| 7 | 4'-8 1/4" | 4'-6 23/32" | 0'-1 17/32" | 7.10586 | 0.93484 | 2.93449 | 860.00 | 89.25 | 949.25 |
| 8 | 3'-4 5/32" | 3'-6 17/32" | -0'-2 3/8" | -1.29648 | 0.87294 | -2.68197 | -480.81 | 102.00 | -378.81 |
| 9 | 2'-0 3/32" | 2'-6 13/32" | -0'-6 5/16" | -1.72102 | 0.82289 | -2.20738 | -161.21 | 114.75 | -46.46 |
| 10 | 0'-8 1/32" | 1'-6 1/4" | -0'-10 7/32" | -1.93022 | 0.78987 | -1.96516 | -92.29 | 127.50 | 35.21 |
| 11 | — | 0'-6 1/16" | — | — | — | — | — | — | — |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY J.O. DATE FILE NO

CHECKED BY DATE PAGE NO 36

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CALCULATIONS FOR

Arakawa Bashi for Saitama Ken

☐ Find $W_m = \frac{\Delta_m}{(r_{m+1}-r_m)-(y_m-y_{m-1})}(r_{m+1}-r_m)+r_m$ $W_m' = \frac{\Delta_m}{(r_{m+1}-r_m)-(y_m-y_{m-1})}(r_{m+1}-r_m)$

| m | log $(r_{m+1}-r_m)$ | log $\Delta_m$ | log $(r_{m+1}-r_m)-(y_m-y_{m-1})$ | log $W_m'$ | $W_m'$ | $r_m$ | $W_m$ |
|---|---|---|---|---|---|---|---|
| 0 | 1.14790 | 1.41007 | – | – | – | – | – |
| 1 | 1.10444 | 1.34809 | 0.31822 | 2.13431 | 136.24 | 14.06 | 150.30 |
| 2 | 1.05615 | 1.28320 | 0.24433 | 2.09502 | 124.45 | 26.78 | 151.23 |
| 3 | 1.00181 | 1.21549 | 0.15603 | 2.06127 | 115.15 | 38.16 | 153.31 |
| 4 | 0.93968 | 1.14556 | 0.04303 | 2.04221 | 110.21 | 48.20 | 158.41 |
| 5 | 0.86715 | 1.07425 | T.89134 | 2.05006 | 112.22 | 56.90 | 169.12 |
| 6 | 0.77984 | 1.00304 | T.65622 | 2.12666 | 133.86 | 64.27 | 198.13 |
| 7 | 0.67094 | 0.93484 | T.10586 | 2.49992 | 316.17 | 70.29 | 386.46 |
| 8 | 0.52457 | 0.87294 | –T.29648 | –2.10103 | –126.20 | 74.98 | –51.22 |
| 9 | 0.30272 | 0.82289 | –T.72021 | –1.40459 | –25.39 | 78.32 | 52.93 |
| 10 | T.82560 | 0.78987 | –T.93022 | –0.68525 | –4.84 | 80.33 | 75.49 |
| 11 | – | – | – | – | – | – | – |

☐ Tabulate the terms $U_m$, $b_m$, $d_m$, $\Delta_m$, $r_m$, $q_m$, $h_m$, $f_m$, $e_m$, $v_m$, $i_m$ and $W_m$.

| m | $U_m$ | $b_m$ | $d_m$ | $\Delta_m$ | $r_m$ | $q_m$ | $h_m$ | $f_m$ | $e_m$ | $V_m$ | $i_m$ | $W_m$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | – | 18.98 | – | 25.71 | – | – | 17.27 | – | – | – | – | – |
| 1 | 16.60 | 18.01 | 17.27 | 22.29 | 14.06 | 17.12 | 15.78 | 123.72 | 95.86 | 119.63 | 149.33 | 150.30 |
| 2 | 15.97 | 17.09 | 15.94 | 19.20 | 26.78 | 15.32 | 14.32 | 110.60 | 104.61 | 118.41 | 164.94 | 151.23 |
| 3 | 15.39 | 16.23 | 14.96 | 16.42 | 38.16 | 13.61 | 12.90 | 97.00 | 113.83 | 117.00 | 184.46 | 153.31 |
| 4 | 14.84 | 15.44 | 14.26 | 13.98 | 48.20 | 12.01 | 11.55 | 84.07 | 123.98 | 115.72 | 212.45 | 158.41 |
| 5 | 14.35 | 14.72 | 13.80 | 11.86 | 56.90 | 10.54 | 10.27 | 72.39 | 135.20 | 114.38 | 258.03 | 169.12 |
| 6 | 13.91 | 14.09 | 13.52 | 10.07 | 64.27 | 9.23 | 9.10 | 62.79 | 148.06 | 112.96 | 359.86 | 198.13 |
| 7 | 13.54 | 13.58 | 13.38 | 8.61 | 70.29 | 8.10 | 8.08 | 56.44 | 164.23 | 111.73 | 949.25 | 386.46 |
| 8 | 13.23 | 13.18 | 13.34 | 7.46 | 74.98 | 7.19 | 7.22 | 53.71 | 185.24 | 102.27 | –378.81 | –51.22 |
| 9 | 13.00 | 12.91 | 13.40 | 6.65 | 78.32 | 6.52 | 6.57 | 58.14 | 219.12 | 109.06 | –46.46 | 52.93 |
| 10 | 12.84 | 12.77 | 13.57 | 6.16 | 80.33 | 6.12 | 6.16 | 79.10 | 288.89 | 107.75 | 35.21 | 75.49 |
| 11 | 12.76 | – | 13.88 | 6.00 | 81.00 | 6.00 | – | 207.04 | 606.17 | 106.15 | – | – |

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CONSULTING ENGINEER
SEIYU BLDG. TOKIO

CALCULATIONS FOR

Arakawa Bashi for Saitama Ken

37

☐ Find So. for upper chord (where So = stress due to unit load 1 applied)

| Load on \ member | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.237 | 0.529 | 0.894 | 1.351 | 1.924 | 2.637 | 3.506 | 4.514 | 5.600 | 6.629 | 7.438 |
| -6' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.203 | 0.454 | 0.766 | 1.158 | 1.649 | 2.260 | 3.005 | 3.869 | 4.800 | 5.682 | 6.375 |
| -5' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.169 | 0.378 | 0.639 | 0.965 | 1.375 | 1.884 | 2.504 | 3.224 | 4.000 | 4.735 | 5.313 |
| -4' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.136 | 0.302 | 0.511 | 0.772 | 1.100 | 1.507 | 2.003 | 2.579 | 3.200 | 3.788 | 4.250 |
| -3' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.102 | 0.227 | 0.383 | 0.579 | 0.825 | 1.130 | 1.502 | 1.934 | 2.400 | 2.841 | 3.188 |
| -2' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.068 | 0.151 | 0.255 | 0.386 | 0.550 | 0.753 | 1.002 | 1.290 | 1.600 | 1.894 | 2.125 |
| -1' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.034 | 0.076 | 0.128 | 0.193 | 0.275 | 0.377 | 0.501 | 0.645 | 0.800 | 0.947 | 1.063 |
| 0' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.034 | -0.076 | -0.128 | -0.193 | -0.275 | -0.377 | -0.501 | -0.645 | -0.800 | -0.947 | -1.063 |
| 2' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.068 | -0.151 | -0.255 | -0.386 | -0.550 | -0.753 | -1.002 | -1.290 | -1.600 | -1.894 | -2.125 |
| 3' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.102 | -0.227 | -0.383 | -0.579 | -0.825 | -1.130 | -1.502 | -1.934 | -2.400 | -2.841 | -3.188 |
| 4' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.136 | -0.302 | -0.511 | -0.772 | -1.100 | -1.507 | -2.003 | -2.579 | -3.200 | -3.788 | -4.250 |
| 5' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.169 | -0.378 | -0.639 | -0.965 | -1.375 | -1.884 | -2.504 | -3.224 | -4.000 | -4.735 | -5.313 |
| 6' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.203 | -0.454 | -0.766 | -1.158 | -1.649 | -2.260 | -3.005 | -3.869 | -4.800 | -5.682 | -6.375 |
| 7' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.237 | -0.529 | -0.894 | -1.351 | -1.924 | -2.637 | -3.506 | -4.514 | -5.600 | -6.629 | -7.438 |
| 8' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.271 | -0.605 | -1.022 | -1.544 | -2.199 | -3.014 | -4.006 | -5.158 | -6.400 | -7.576 | -8.500 |
| 9' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.305 | -0.680 | -1.149 | -1.737 | -2.474 | -3.390 | -4.507 | -5.803 | -7.200 | -8.523 | -9.563 |
| 10' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.339 | -0.756 | -1.277 | -1.930 | -2.749 | -3.767 | -5.008 | -6.448 | -8.000 | -9.470 | -10.625 |
| 11' | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.373 | -0.832 | -1.405 | -2.123 | -3.024 | -4.144 | -5.509 | -7.093 | -8.800 | -10.417 | -11.688 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.406 | -0.907 | -1.532 | -2.316 | -3.299 | -4.520 | -6.010 | -7.738 | -9.600 | -11.364 | -10.625 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.441 | -0.983 | -1.660 | -2.509 | -3.574 | -4.897 | -6.510 | -8.382 | -10.400 | -10.228 | -9.563 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.474 | -1.058 | -1.788 | -2.702 | -3.849 | -5.274 | -7.011 | -9.027 | -9.245 | -9.091 | -8.500 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.508 | -1.134 | -1.916 | -2.895 | -4.124 | -5.651 | -7.512 | -7.898 | -8.089 | -7.955 | -7.438 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.542 | -1.210 | -2.043 | -3.088 | -4.398 | -6.027 | -6.438 | -6.770 | -6.934 | -6.818 | -6.375 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.576 | -1.285 | -2.171 | -3.281 | -4.673 | -5.023 | -5.365 | -5.642 | -5.778 | -5.682 | -5.313 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.610 | -1.361 | -2.299 | -3.474 | -3.738 | -4.018 | -4.292 | -4.513 | -4.622 | -4.546 | -4.250 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.644 | -1.436 | -2.427 | -2.606 | -2.804 | -3.014 | -3.219 | -3.385 | -3.467 | -3.409 | -3.188 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.677 | -1.512 | -1.618 | -1.737 | -1.869 | -2.009 | -2.146 | -2.257 | -2.311 | -2.273 | -2.125 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.711 | -0.756 | -0.809 | -0.869 | -0.935 | -1.005 | -1.073 | -1.128 | -1.156 | -1.136 | -1.063 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000 | 0 | 0.711 | 0.756 | 0.809 | 0.869 | 0.935 | 1.005 | 1.073 | 1.128 | 1.156 | 1.136 | 1.063 |
| -2 | 0 | 0 | 0 | 0 | 0 | 0.000 | 0.745 | 0 | 1.422 | 1.512 | 1.618 | 1.737 | 1.869 | 2.009 | 2.146 | 2.257 | 2.311 | 2.273 | 2.125 |
| -3 | 0 | 0 | 0 | 0 | 0.000 | 0.832 | 1.490 | 0 | 2.132 | 2.268 | 2.427 | 2.606 | 2.804 | 3.014 | 3.219 | 3.385 | 3.467 | 3.409 | 3.188 |
| -4 | 0 | 0 | 0 | 0.000 | 0.937 | 1.664 | 2.235 | 0 | 2.845 | 3.024 | 3.236 | 3.474 | 3.738 | 4.018 | 4.292 | 4.513 | 4.622 | 4.546 | 4.250 |
| -5 | 0 | 0 | 0.000 | 1.062 | 1.874 | 2.496 | 2.980 | 0 | 3.556 | 3.780 | 4.045 | 4.343 | 4.673 | 5.023 | 5.365 | 5.642 | 5.778 | 5.682 | 5.313 |
| -6 | 0 | 0.000 | 1.210 | 2.124 | 2.811 | 3.328 | 3.725 | 0 | 4.266 | 4.536 | 4.854 | 5.211 | 5.608 | 6.027 | 6.438 | 6.770 | 6.934 | 6.818 | 6.375 |
| -7 | 0.000 | 1.381 | 2.419 | 3.186 | 3.748 | 4.160 | 4.470 | 0.000 | 4.976 | 5.292 | 5.663 | 6.080 | 6.542 | 7.032 | 7.512 | 7.898 | 8.089 | 7.955 | 7.438 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY y.o DATE FILE NO
CHECKED BY DATE PAGE NO 38
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CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken.

Find Yo for lower chord.

| Load Number | -6 | -5 | -4 | -3 | -2 |
|---|---|---|---|---|---|
| -7' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6' | 0 | 0 | 0 | 0 | 0 |
| -5' | 0 | 0 | 0 | 0 | 0 |
| -4' | 0 | 0 | 0 | 0 | 0 |
| -3' | 0 | 0 | 0 | 0 | 0 |
| -2' | 0 | 0 | 0 | 0 | 0 |
| -1' | 0 | 0 | 0 | 0 | 0 |
| 0' | 0 | 0 | 0 | 0 | 0 |
| 1' | 0 | 0 | 0 | 0 | 0 |
| 2' | 0 | 0 | 0 | 0 | 0 |
| 3' | 0 | 0 | 0 | 0 | 0 |
| 4' | 0 | 0 | 0 | 0 | 0 |
| 5' | 0 | 0 | 0 | 0 | 0 |
| 6' | 0 | 0 | 0 | 0 | 0 |
| 7' | 0 | 0 | 0 | 0 | 0 |
| 8' | 0 | 0 | 0 | 0 | 0 |
| 9' | 0 | 0 | 0 | 0 | 0 |
| 10' | 0 | 0 | 0 | 0 | 0 |
| 11' | 0 | 0 | 0 | 0 | 0 |
| 10' | 0 | 0 | 0 | 0 | 0 |
| 9' | 0 | 0 | 0 | 0 | 0 |
| 8' | 0 | 0 | 0 | 0 | 0 |
| 7' | 0 | 0 | 0 | 0 | 0 |
| 6' | 0 | 0 | 0 | 0 | 0 |
| 5' | 0 | 0 | 0 | 0 | 0 |
| 4' | 0 | 0 | 0 | 0 | 0 |
| 3' | 0 | 0 | 0 | 0 | 0 |
| 2' | 0 | 0 | 0 | 0 | 0 |
| 1' | 0 | 0 | 0 | 0 | 0 |
| 0' | 0 | 0 | 0 | 0 | 0 |
| -1' | 0 | 0 | 0 | 0 | 0 |
| -2' | 0 | 0 | 0 | 0 | 0 |
| -3' | 0 | 0 | 0 | 0 | 0 |
| -4' | 0 | 0 | 0 | 0 | 0 |
| -5' | 0 | 0 | 0 | 0 | 0 |
| -6' | 0 | 0 | 0 | 0 | 0 |
| -7' | -1.402 | -2.482 | -3.310 | -3.952 | -4.452 |

| Load Number | -1 | 0 | +0 | +1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|---|
| -7' | 0.000 | 0.000 | 0.000 | -0.257 | -0.567 | -0.943 | -1.405 | -1.975 | -2.675 |
| -6' | 0 | 0 | 0 | -0.220 | -0.486 | -0.809 | -1.204 | -1.693 | -2.293 |
| -5' | 0 | 0 | 0 | -0.184 | -0.405 | 0.674 | -1.004 | -1.410 | -1.911 |
| -4' | 0 | 0 | 0 | -0.147 | -0.324 | 0.539 | -0.803 | -1.129 | -1.528 |
| -3' | 0 | 0 | 0 | -0.110 | -0.243 | -0.404 | -0.602 | -0.846 | -1.146 |
| -2' | 0 | 0 | 0 | -0.073 | -0.162 | -0.270 | -0.401 | -0.564 | -0.764 |
| -1' | 0 | 0 | 0 | -0.037 | -0.081 | -0.135 | -0.201 | -0.282 | -0.382 |
| 0' | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1' | 0 | 0 | 0 | 0.037 | 0.081 | 0.135 | 0.201 | 0.282 | 0.382 |
| 2' | 0 | 0 | 0 | 0.073 | 0.162 | 0.270 | 0.401 | 0.564 | 0.764 |
| 3' | 0 | 0 | 0 | 0.110 | 0.243 | 0.404 | 0.602 | 0.846 | 1.146 |
| 4' | 0 | 0 | 0 | 0.147 | 0.324 | 0.539 | 0.803 | 1.129 | 1.528 |
| 5' | 0 | 0 | 0 | 0.184 | 0.405 | 0.674 | 1.004 | 1.410 | 1.911 |
| 6' | 0 | 0 | 0 | 0.220 | 0.486 | 0.809 | 1.204 | 1.693 | 2.293 |
| 7' | 0 | 0 | 0 | 0.257 | 0.567 | 0.943 | 1.405 | 1.975 | 2.675 |
| 8' | 0 | 0 | 0 | 0.294 | 0.648 | 1.078 | 1.606 | 2.257 | 3.057 |
| 9' | 0 | 0 | 0 | 0.330 | 0.728 | 1.213 | 1.806 | 2.539 | 3.439 |
| 10' | 0 | 0 | 0 | 0.367 | 0.809 | 1.348 | 2.007 | 2.822 | 3.821 |
| 11' | 0 | 0 | 0 | 0.404 | 0.890 | 1.482 | 2.208 | 3.104 | 4.203 |
| 10' | 0 | 0 | 0 | 0.477 | 0.971 | 1.617 | 2.409 | 3.386 | 4.585 |
| 9' | 0 | 0 | 0 | 0.513 | 1.052 | 1.752 | 2.609 | 3.668 | 4.967 |
| 8' | 0 | 0 | 0 | 0.550 | 1.133 | 1.887 | 2.810 | 3.950 | 5.350 |
| 7' | 0 | 0 | 0 | 0.577 | 1.214 | 2.022 | 3.010 | 4.232 | 5.731 |
| 6' | 0 | 0 | 0 | 0.587 | 1.295 | 2.156 | 3.211 | 4.514 | 6.114 |
| 5' | 0 | 0 | 0 | 0.624 | 1.376 | 2.291 | 3.412 | 4.797 | 6.496 |
| 4' | 0 | 0 | 0 | 0.661 | 1.457 | 2.426 | 3.613 | 5.080 | 6.876 |
| 3' | 0 | 0 | 0 | 0.697 | 1.538 | 2.561 | 3.710 | 2.878 | 3.057 |
| 2' | 0 | 0 | 0 | 0.734 | 1.619 | 1.707 | 1.806 | 1.919 | 2.038 |
| 1' | 0 | 0 | 0 | 0.771 | 0.810 | 0.854 | 0.903 | 0.959 | 1.019 |
| 0' | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -1' | 0 | 0 | 0 | -0.738 | -0.810 | -0.854 | -0.903 | -0.959 | -1.019 |
| -2' | 0 | 0 | 0 | -0.738 | -0.711 | -0.810 | -0.903 | -0.959 | -1.019 |
| -3' | 0 | 0 | 0 | -0.738 | -1.542 | -1.619 | -1.707 | -1.806 | -1.919 | -2.038 |
| -4' | 0 | 0 | 0 | -1.477 | -2.315 | -2.428 | -2.561 | -2.710 | -2.878 | -3.057 |
| -5' | 0 | 0 | 0 | -2.215 | -3.084 | -3.238 | -3.415 | -3.613 | -3.837 | -4.076 |
| -6' | 0 | 0 | 0 | -2.953 | -3.855 | -4.047 | -4.268 | -4.516 | -4.797 | -5.095 |
| -7' | 0 | 0 | 0 | -3.691 | -4.626 | -4.856 | -5.122 | -5.419 | -5.756 | -6.114 |
| -8' | 0 | 0 | 0 | -4.430 | -5.397 | -5.666 | -5.976 | -6.322 | -6.715 | -7.133 |

| Load Number | 7 | 8 | 9 | 10 |
|---|---|---|---|---|
| -7' | -3.515 | -4.495 | -5.557 | -6.586 |
| -6' | -3.012 | -3.853 | -4.763 | -5.645 |
| -5' | -2.510 | -3.211 | -3.969 | -4.704 |
| -4' | -2.008 | -2.569 | -3.176 | -3.763 |
| -3' | -1.506 | -1.926 | -2.382 | -2.822 |
| -2' | -1.004 | -1.284 | -1.588 | -1.882 |
| -1' | -0.502 | -0.642 | -0.794 | -0.941 |
| 0' | 0.000 | 0.000 | 0.000 | 0.000 |
| 1' | 0.502 | 0.642 | 0.794 | 0.941 |
| 2' | 1.004 | 1.284 | 1.588 | 1.882 |
| 3' | 1.506 | 1.926 | 2.382 | 2.822 |
| 4' | 2.008 | 2.569 | 3.176 | 3.763 |
| 5' | 2.510 | 3.211 | 3.969 | 4.704 |
| 6' | 3.012 | 3.853 | 4.763 | 5.645 |
| 7' | 3.515 | 4.495 | 5.557 | 6.586 |
| 8' | 4.017 | 5.137 | 6.351 | 7.527 |
| 9' | 4.519 | 5.779 | 7.145 | 8.467 |
| 10' | 5.021 | 6.422 | 7.939 | 9.408 |
| 11' | 5.523 | 7.064 | 8.733 | 10.349 |
| 10' | 6.025 | 7.706 | 9.527 | 11.290 |
| 9' | 6.527 | 8.348 | 10.321 | 10.161 |
| 8' | 7.029 | 8.990 | 9.174 | 9.032 |
| 7' | 7.531 | 7.866 | 8.027 | 7.903 |
| 6' | 6.465 | 6.743 | 6.880 | 6.774 |
| 5' | 5.379 | 5.619 | 5.734 | 5.654 |
| 4' | 4.304 | 4.495 | 4.587 | 4.516 |
| 3' | 3.228 | 3.371 | 3.440 | 3.387 |
| 2' | 2.151 | 2.248 | 2.293 | 2.258 |
| 1' | 1.076 | 1.124 | 1.147 | 1.129 |
| 0' | 0.000 | 0.000 | 0.000 | 0.000 |
| -1' | -1.076 | -1.124 | -1.147 | -1.129 |
| -2' | -2.151 | -2.248 | -2.293 | -2.258 |
| -3' | -3.228 | -3.371 | -3.440 | -3.387 |
| -4' | -4.304 | -4.495 | -4.587 | -4.516 |
| -5' | -5.379 | -5.619 | -5.734 | -5.654 |
| -6' | -6.455 | -6.743 | -6.880 | -6.774 |
| -7' | -7.521 | -7.866 | -8.027 | -7.903 |

-16-

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken.

☐ Find Fo for Diagonals.

| Load on \ number | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | -0.469 | -0.596 | -0.750 | -0.916 | -1.097 | -1.199 | -1.156 | -0.932 |
| -6 | 0 | 0 | 0 | 0 | 0 | 0 | -0.246 | -0.301 | -0.374 | 0 | 0 | -0.402 | -0.511 | -0.643 | -0.794 | -0.940 | -1.028 | -1.000 | -0.799 |
| -5 | 0 | 0 | 0 | 0 | 0 | 0 | -0.211 | -0.258 | -0.320 | 0 | 0 | -0.335 | -0.426 | -0.536 | -0.662 | -0.784 | -0.856 | -0.826 | -0.666 |
| -4 | 0 | 0 | 0 | 0 | 0 | 0 | -0.176 | -0.215 | -0.267 | 0 | 0 | -0.268 | -0.340 | -0.428 | -0.529 | -0.627 | -0.685 | -0.660 | -0.532 |
| -3 | 0 | 0 | 0 | 0 | 0 | 0 | -0.141 | -0.172 | -0.214 | 0 | 0 | -0.201 | -0.255 | -0.321 | -0.397 | -0.470 | -0.514 | -0.495 | -0.399 |
| -2 | 0 | 0 | 0 | 0 | 0 | 0 | -0.106 | -0.129 | -0.160 | 0 | 0 | -0.134 | -0.170 | -0.214 | -0.265 | -0.314 | -0.343 | -0.330 | -0.266 |
| -1 | 0 | 0 | 0 | 0 | 0 | 0 | -0.070 | -0.086 | -0.107 | 0 | 0 | -0.067 | -0.085 | -0.107 | -0.132 | -0.157 | -0.171 | -0.165 | -0.133 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | -0.035 | -0.043 | -0.053 | 0 | 0 | -0.067 | -0.085 | -0.107 | -0.132 | -0.157 | -0.171 | -0.165 | -0.133 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0.035 | 0.043 | 0.053 | 0 | 0 | 0.067 | 0.085 | 0.107 | 0.132 | 0.157 | 0.171 | 0.165 | 0.133 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0.070 | 0.086 | 0.107 | 0 | 0 | 0.134 | 0.170 | 0.214 | 0.265 | 0.314 | 0.343 | 0.330 | 0.266 |
| 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0.106 | 0.129 | 0.160 | 0 | 0 | 0.201 | 0.255 | 0.321 | 0.397 | 0.470 | 0.514 | 0.495 | 0.399 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0.141 | 0.172 | 0.214 | 0 | 0 | 0.268 | 0.340 | 0.428 | 0.529 | 0.627 | 0.685 | 0.660 | 0.532 |
| 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0.176 | 0.215 | 0.267 | 0 | 0 | 0.335 | 0.426 | 0.536 | 0.662 | 0.784 | 0.856 | 0.826 | 0.666 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0.211 | 0.258 | 0.320 | 0 | 0 | 0.402 | 0.511 | 0.643 | 0.794 | 0.940 | 1.028 | 0.990 | 0.799 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0.246 | 0.301 | 0.374 | 0 | 0 | 0.469 | 0.596 | 0.750 | 0.916 | 1.097 | 1.199 | 1.156 | 0.932 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0.282 | 0.344 | 0.427 | 0 | 0 | 0.536 | 0.681 | 0.857 | 1.050 | 1.254 | 1.371 | 1.321 | 1.064 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0.317 | 0.387 | 0.480 | 0 | 0 | 0.604 | 0.766 | 0.964 | 1.182 | 1.411 | 1.542 | 1.486 | 1.197 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0.352 | 0.430 | 0.534 | 0 | 0 | 0.671 | 0.852 | 1.072 | 1.322 | 1.568 | 1.713 | 1.650 | 1.330 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0.387 | 0.474 | 0.587 | 0 | 0 | 0.738 | 0.937 | 1.178 | 1.455 | 1.725 | 1.885 | 1.816 | 1.464 |
| 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0.422 | 0.516 | 0.641 | 0 | 0 | 0.805 | 1.022 | 1.286 | 1.587 | 1.882 | 2.055 | 1.982 | 1.597 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0.457 | 0.560 | 0.694 | 0 | 0 | 0.872 | 1.107 | 1.393 | 1.720 | 2.038 | 2.227 | 2.147 | 1.730 |
| 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0.493 | 0.603 | 0.747 | 0 | 0 | 0.939 | 1.192 | 1.500 | 1.852 | 2.195 | 2.399 | 2.313 | 1.863 |
| 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0.528 | 0.646 | 0.801 | 0 | 0 | 1.006 | 1.277 | 1.607 | 1.984 | 2.352 | 2.571 | 2.479 | 1.997 |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0.563 | 0.689 | 0.854 | 0 | 0 | 1.073 | 1.362 | 1.715 | 2.117 | 2.509 | 2.743 | 2.645 | 2.130 |
| 18 | 0 | 0 | 0 | 0 | 0 | 0 | 0.598 | 0.732 | 0.908 | 0 | 0 | 1.140 | 1.443 | 1.822 | 2.249 | 2.666 | 2.914 | 2.811 | 2.264 |
| 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0.633 | 0.775 | 0.961 | 0 | 0 | 1.207 | 1.524 | 1.929 | 2.381 | 2.823 | 3.085 | 2.976 | 2.397 |
| 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0.669 | 0.817 | 1.014 | 0 | 0 | 1.274 | 1.605 | 2.036 | 2.513 | 2.980 | 3.257 | 3.142 | 2.531 |
| 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0.704 | 0.861 | 1.068 | 0 | 0 | 1.341 | 1.686 | 2.143 | 2.645 | 3.137 | 3.428 | 3.307 | 2.664 |
| 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0.739 | 0.902 | 1.121 | 0 | 0 | 1.408 | 1.767 | 2.250 | 2.777 | 3.294 | 3.600 | 3.473 | 2.798 |
| 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0.774 | 0.946 | 1.174 | 0 | 0 | 1.475 | 1.848 | 2.357 | 2.909 | 3.451 | 3.771 | 3.638 | 2.931 |
| 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0.809 | 0.989 | 1.227 | 0 | 0 | 1.542 | 1.929 | 2.464 | 3.041 | 3.608 | 3.942 | 3.804 | 3.065 |
| 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0.844 | 1.032 | 1.281 | 0 | 0 | 1.609 | 2.010 | 2.571 | 3.173 | 3.765 | 4.114 | 3.969 | 3.198 |
| 26 | 0 | 0 | 0 | 0 | 0 | 0 | 0.880 | 1.075 | 1.334 | 0 | 0 | 1.676 | 2.091 | 2.678 | 3.305 | 3.922 | 4.285 | 4.135 | 3.331 |
| 27 | 0 | 0 | 0 | 0 | 0 | 0 | 0.915 | 1.118 | 1.387 | 0 | 0 | 1.743 | 2.172 | 2.785 | 3.437 | 4.079 | 4.457 | 4.300 | 3.464 |
| 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0.950 | 1.161 | 1.441 | 0 | 0 | 1.810 | 2.253 | 2.892 | 3.569 | 4.236 | 4.628 | 4.466 | 3.597 |
| 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0.985 | 1.204 | 1.494 | 0 | 0 | 1.877 | 2.334 | 2.999 | 3.701 | 4.393 | 4.800 | 4.631 | 3.730 |
| 30 | 0 | 0 | 0 | 0 | 0 | 0 | 1.020 | 1.247 | 1.547 | 0 | 0 | 1.944 | 2.415 | 3.106 | 3.833 | 4.550 | 4.971 | 4.797 | 3.863 |
| 31 | 0 | 0 | 0 | 0 | 0 | 0 | 1.055 | 1.290 | 1.600 | 0 | 0 | 2.011 | 2.496 | 3.213 | 3.965 | 4.707 | 5.143 | 4.962 | 3.996 |
| 32 | 0 | 0 | 0 | 0 | 0 | 0 | 1.091 | 1.333 | 1.654 | 0 | 0 | 2.078 | 2.577 | 3.320 | 4.097 | 4.864 | 5.314 | 5.128 | 4.129 |
| 33 | 0 | 0 | 0 | 0 | 0 | 0 | 1.126 | 1.376 | 1.707 | 0 | 0 | 2.145 | 2.658 | 3.427 | 4.229 | 5.021 | 5.485 | 5.293 | 4.262 |
| 34 | 0 | 0 | 0 | 0 | 0 | 0 | 1.161 | 1.419 | 1.760 | 0 | 0 | 2.212 | 2.739 | 3.534 | 4.361 | 5.178 | 5.657 | 5.459 | 4.395 |
| 35 | 0 | 0 | 0 | 0 | 0 | 0 | 1.196 | 1.462 | 1.814 | 0 | 0 | 2.279 | 2.820 | 3.641 | 4.493 | 5.335 | 5.828 | 5.624 | 4.528 |
| 36 | 0 | 0 | 0 | 0 | 0 | 0 | 1.231 | 1.505 | 1.867 | 0 | 0 | 2.346 | 2.901 | 3.748 | 4.625 | 5.492 | 5.999 | 5.790 | 4.661 |
| 37 | 0 | 0 | 0 | 0 | 0 | 0 | 1.266 | 1.548 | 1.920 | 0 | 0 | 2.413 | 2.982 | 3.855 | 4.757 | 5.649 | 6.171 | 5.955 | 4.794 |
| 38 | 0 | 0 | 0 | 0 | 0 | 0 | 1.301 | 1.591 | 1.974 | 0 | 0 | 2.480 | 3.063 | 3.962 | 4.889 | 5.806 | 6.342 | 6.121 | 4.927 |
| 39 | 0 | 0 | 0 | 0 | 0 | 0 | 1.337 | 1.634 | 2.027 | 0 | 0 | 2.547 | 3.144 | 4.069 | 5.021 | 5.963 | 6.514 | 6.286 | 5.060 |
| 40 | 0 | 0 | 0 | 0 | 0 | 0 | 1.372 | 1.677 | 2.080 | 0 | 0 | 2.614 | 3.225 | 4.176 | 5.153 | 6.120 | 6.685 | 6.452 | 5.193 |
| 41 | 0 | 0 | 0 | 0 | 0 | 0 | 1.407 | 1.720 | 2.134 | 0 | 0 | 2.681 | 3.306 | 4.283 | 5.285 | 6.277 | 6.857 | 6.617 | 5.326 |
| 42 | 0 | 0 | 0 | 0 | 0 | 0 | 1.442 | 1.763 | 2.187 | 0 | 0 | 2.748 | 3.387 | 4.390 | 5.417 | 6.434 | 7.028 | 6.783 | 5.459 |
| 43 | 0 | 0 | 0 | 0 | 0 | 0 | 1.477 | 1.806 | 2.240 | 0 | 0 | 2.815 | 3.468 | 4.497 | 5.549 | 6.591 | 7.200 | 6.948 | 5.592 |
| 44 | 0 | 0 | 0 | 0 | 0 | 0 | 1.512 | 1.849 | 2.294 | 0 | 0 | 2.882 | 3.549 | 4.604 | 5.681 | 6.748 | 7.371 | 7.114 | 5.725 |
| 45 | 0 | 0 | 0 | 0 | 0 | 0 | 1.547 | 1.892 | 2.347 | 0 | 0 | 2.949 | 3.630 | 4.711 | 5.813 | 6.905 | 7.542 | 7.279 | 5.858 |
| 46 | 0 | 0 | 0 | 0 | 0 | 0 | 1.583 | 1.935 | 2.400 | 0 | 0 | 3.016 | 3.711 | 4.818 | 5.945 | 7.062 | 7.714 | 7.445 | 5.991 |
| 47 | 0 | 0 | 0 | 0 | 0 | 0 | 1.618 | 1.978 | 2.454 | 0 | 0 | 3.083 | 3.792 | 4.925 | 6.077 | 7.219 | 7.885 | 7.610 | 6.124 |
| 48 | 0 | 0 | 0 | 0 | 0 | 0 | 1.653 | 2.021 | 2.507 | 0 | 0 | 3.150 | 3.873 | 5.032 | 6.209 | 7.376 | 8.057 | 7.776 | 6.257 |
| 49 | 0 | 0 | 0 | 0 | 0 | 0 | 1.688 | 2.064 | 2.560 | 0 | 0 | 3.217 | 3.954 | 5.139 | 6.341 | 7.533 | 8.228 | 7.941 | 6.390 |
| 50 | 0 | 0 | 0 | 0 | 0 | 0 | 1.723 | 2.107 | 2.614 | 0 | 0 | 3.284 | 4.035 | 5.246 | 6.473 | 7.690 | 8.400 | 8.107 | 6.523 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY J.O. DATE FILE NO

CHECKED BY DATE PAGE NO 40

CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken

Tuid Lo for Vertical load on number

| | -7 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 10' | 9' | 8' | 7' | 6' | 5' | 4' | 3' | 2' | 1' | 0' | -1' | -2' | -3' | -4' | -5' | -6' | -7' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.318 | 0.347 | 0.377 | 0.401 | 0.418 | 0.423 | 0.404 | 0.352 | 0.248 | 0.092 | -0.121 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -5 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.273 | 0.298 | 0.323 | 0.344 | 0.359 | 0.362 | 0.347 | 0.301 | 0.243 | 0.079 | -0.104 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -4 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.227 | 0.248 | 0.269 | 0.287 | 0.299 | 0.302 | 0.289 | 0.251 | 0.202 | 0.065 | -0.087 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -3 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.182 | 0.199 | 0.215 | 0.229 | 0.239 | 0.241 | 0.231 | 0.201 | 0.142 | 0.052 | -0.069 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.136 | 0.149 | 0.161 | 0.172 | 0.179 | 0.181 | 0.173 | 0.151 | 0.106 | 0.039 | -0.052 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -1 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.091 | 0.099 | 0.108 | 0.115 | 0.120 | 0.121 | 0.115 | 0.100 | 0.071 | 0.026 | -0.035 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.045 | 0.050 | 0.054 | 0.057 | 0.060 | 0.060 | 0.058 | 0.050 | 0.035 | 0.013 | -0.018 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1 | -1.000 | -0.955 | -0.868 | -0.763 | -0.638 | -0.500 | -0.318 | -0.273 | -0.227 | -0.182 | -0.136 | -0.091 | -0.045 | 0.000 | 0.045 | 0.091 | 0.136 | 0.182 | 0.227 | 0.273 | 0.318 | 0.364 | 0.409 | 0.455 | 0.500 | 0.545 | 0.591 | 0.636 | 0.682 | 0.727 | 0.773 | 0.818 | 0.864 | 0.909 | 0.955 | 1.000 |
| 2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 3 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 4 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 5 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 6 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 8 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 9 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 10 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 11 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 10' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 9' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 8' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 7' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 6' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 5' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 4' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 3' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 2' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -1' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -2' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -3' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -4' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -5' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -7' | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| load on \ number | -7 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 10' | 9' | 8' | 7' | 6' | 5' | 4' | 3' | 2' | 1' | 0' | -1' | -2' | -3' | -4' | -5' | -6' | -7' |

増田淳氏関係資料
（独立行政法人 土木研究所蔵）

41

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY J. O DATE FILE NO
CHECKED BY DATE PAGE NO 41

CALCULATIONS FOR

# Arakawa Bashi for Saitama-Ken

☐ Find $S_h$

for upper chord

| member | $V_m$ | $g_m$ | $\frac{V_m}{g_m} = S_h$ |
|---|---|---|---|
| $u_1$ | 14.06 | 17.12 | 0.821 |
| $u_2$ | 26.78 | 15.32 | 1.748 |
| $u_3$ | 38.16 | 13.61 | 2.804 |
| $u_4$ | 48.20 | 12.01 | 4.013 |
| $u_5$ | 56.90 | 10.54 | 5.399 |
| $u_6$ | 64.27 | 9.24 | 6.956 |
| $u_7$ | 70.29 | 8.10 | 8.678 |
| $u_8$ | 74.98 | 7.19 | 10.428 |
| $u_9$ | 78.32 | 6.52 | 12.012 |
| $u_{10}$ | 80.33 | 6.12 | 13.126 |
| $u_{11}$ | 81.00 | 6.00 | 13.500 |

for lower chords.

| member | $S_m$ | $V_{m-1}$ | $S_m + V_{m-1}$ | $h_m$ | $\frac{S_m + V_{m-1}}{h_m}$ |
|---|---|---|---|---|---|
| $b_0$ | 25.71 | 0.00 | 25.71 | 17.27 | −1.489 |
| $b_1$ | 22.29 | 14.06 | 36.36 | 15.78 | −2.304 |
| $b_2$ | 19.20 | 26.78 | 45.98 | 14.32 | −3.211 |
| $b_3$ | 16.42 | 38.16 | 54.58 | 12.90 | −4.231 |
| $b_4$ | 13.98 | 48.20 | 62.18 | 11.56 | −5.384 |
| $b_5$ | 11.86 | 56.90 | 68.76 | 10.24 | −6.715 |
| $b_6$ | 10.07 | 64.27 | 74.34 | 9.10 | −8.169 |
| $b_7$ | 8.61 | 70.29 | 78.90 | 8.08 | −9.765 |
| $b_8$ | 7.46 | 74.98 | 82.44 | 7.22 | −11.420 |
| $b_9$ | 6.65 | 78.32 | 84.97 | 6.57 | −12.933 |
| $b_{10}$ | 6.16 | 80.33 | 86.49 | 6.16 | −14.040 |

for diagonals.

| member | $V_m$ | $f_m$ | $\frac{V_m}{f_m} = S_h$ |
|---|---|---|---|
| $d_1$ | 119.63 | 123.72 | −0.967 |
| $d_2$ | 118.41 | 110.60 | −1.071 |
| $d_3$ | 117.00 | 97.00 | −1.206 |
| $d_4$ | 115.72 | 84.07 | −1.377 |
| $d_5$ | 114.38 | 72.39 | −1.581 |
| $d_6$ | 112.96 | 62.79 | −1.799 |
| $d_7$ | 111.73 | 56.44 | −1.980 |
| $d_8$ | 110.27 | 53.71 | −2.053 |
| $d_9$ | 109.06 | 58.14 | −1.876 |
| $d_{10}$ | 107.75 | 79.10 | −1.362 |
| $d_{11}$ | 106.15 | 207.04 | −0.513 |

for Verticals.

| member | $W_m$ | $i_m - i_a$ | $\frac{W_m}{i_m - i_a} = S_h$ |
|---|---|---|---|
| $S_1$ | 150.30 | 136.58 | 1.075 |
| $S_2$ | 151.23 | 139.44 | 1.085 |
| $S_3$ | 153.31 | 146.21 | 1.049 |
| $S_4$ | 158.41 | 161.45 | 0.981 |
| $S_5$ | 169.12 | 194.28 | 0.871 |
| $S_6$ | 198.13 | 283.36 | 0.699 |
| $S_7$ | 386.46 | 860.00 | 0.450 |
| $S_8$ | −51.22 | −480.81 | 0.117 |
| $S_9$ | −52.93 | −161.21 | −0.328 |
| $S_{10}$ | 75.49 | −92.29 | −0.818 |

☐ Find $S_d$ and $S_e$

for upper chord

| | | | |
|---|---|---|---|
| $u_7$ | 0.000 | $u_{-7}'$ | 0.000 |
| $u_6$ | −1.381 | $u_{-6}'$ | 0.000 |
| $u_5$ | −2.419 | $u_{-5}'$ | 0.000 |
| $u_4$ | −3.186 | $u_{-4}'$ | 0.000 |
| $u_3$ | −3.748 | $u_{-3}'$ | 0.000 |
| $u_2$ | −4.160 | $u_{-2}'$ | 0.000 |
| $u_1$ | −4.470 | $u_{-1}'$ | 0.000 |
| $u_1$ | −4.976 | $u_1'$ | −0.237 |
| $u_2$ | −5.292 | $u_2'$ | −0.529 |
| $u_3$ | −5.663 | $u_3'$ | −0.894 |
| $u_4$ | −6.080 | $u_4'$ | −1.351 |
| $u_5$ | −6.542 | $u_5'$ | −1.924 |
| $u_6$ | −7.032 | $u_6'$ | −2.637 |
| $u_7$ | −7.512 | $u_7'$ | −3.506 |
| $u_8$ | −7.898 | $u_8'$ | −4.514 |
| $u_9$ | −8.089 | $u_9'$ | −5.600 |
| $u_{10}$ | −7.955 | $u_{10}'$ | −6.629 |
| $u_{11}$ | −7.438 | $u_{11}'$ | −7.438 |

for lower chords

| | | | |
|---|---|---|---|
| $b_{-6}$ | 1.402 | $b_{-6}'$ | 0.000 |
| $b_{-5}$ | 2.482 | $b_{-5}'$ | 0.000 |
| $b_{-4}$ | 3.310 | $b_{-4}'$ | 0.000 |
| $b_{-3}$ | 3.952 | $b_{-3}'$ | 0.000 |
| $b_{-2}$ | 4.452 | $b_{-2}'$ | 0.000 |
| $b_{-1}$ | 4.842 | $b_{-1}'$ | 0.000 |
| $b_0$ | 5.167 | $b_0'$ | 0.000 |
| $b_0$ | 5.167 | $b_0'$ | 0.000 |
| $b_1$ | 5.397 | $b_1'$ | 0.257 |
| $b_2$ | 5.666 | $b_2'$ | 0.567 |
| $b_3$ | 5.976 | $b_3'$ | 0.943 |
| $b_4$ | 6.322 | $b_4'$ | 1.405 |
| $b_5$ | 6.715 | $b_5'$ | 1.975 |
| $b_6$ | 7.133 | $b_6'$ | 2.675 |
| $b_7$ | 7.531 | $b_7'$ | 3.515 |
| $b_8$ | 7.866 | $b_8'$ | 4.495 |
| $b_9$ | 8.027 | $b_9'$ | 5.557 |
| $b_{10}$ | 7.903 | $b_{10}'$ | 6.586 |

for diagonals

| | | | |
|---|---|---|---|
| $d_{-7}$ | −1.328 | $d_{-7}'$ | 0.000 |
| $d_{-6}$ | −0.937 | $d_{-6}'$ | 0.000 |
| $d_{-5}$ | −0.635 | $d_{-5}'$ | 0.000 |
| $d_{-4}$ | −0.413 | $d_{-4}'$ | 0.000 |
| $d_{-3}$ | −0.253 | $d_{-3}'$ | 0.000 |
| $d_{-2}$ | −0.137 | $d_{-2}'$ | 0.000 |
| $d_{-1}$ | −0.056 | $d_{-1}'$ | 0.000 |
| $d_1$ | 0.474 | $d_1'$ | 0.246 |
| $d_2$ | 0.504 | $d_2'$ | 0.301 |
| $d_3$ | 0.546 | $d_3'$ | 0.374 |
| $d_4$ | 0.592 | $d_4'$ | 0.469 |
| $d_5$ | 0.632 | $d_5'$ | 0.596 |
| $d_6$ | 0.671 | $d_6'$ | 0.750 |
| $d_7$ | 0.655 | $d_7'$ | 0.916 |
| $d_8$ | 0.564 | $d_8'$ | 1.097 |
| $d_9$ | 0.336 | $d_9'$ | 1.199 |
| $d_{10}$ | −0.034 | $d_{10}'$ | 1.156 |
| $d_{11}$ | −0.500 | $d_{11}'$ | 0.932 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY J. O. DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 42

CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken.

☐ Find Id and Ie for Verticals.

| Members. | | | | | | | |
|---|---|---|---|---|---|---|---|
| S-7 | 1.000 | S2 | −0.267 | S-7' | 0.000 | S2' | −0.377 |
| S-6 | 0.955 | S3 | −0.209 | S-6' | 0.000 | S3' | −0.401 |
| S-5 | 0.868 | S4 | −0.134 | S-5' | 0.000 | S4' | −0.418 |
| S-4 | 0.763 | S5 | −0.037 | S-4' | 0.000 | S5' | −0.423 |
| S-3 | 0.651 | S6 | 0.089 | S-3' | 0.000 | S6' | −0.404 |
| S-2 | 0.540 | S7 | 0.248 | S-2' | 0.000 | S7' | −0.352 |
| S-1 | 0.436 | S8 | 0.436 | S-1' | 0.000 | S8' | −0.248 |
| S0 | −6.342 | S9 | 0.645 | S0' | −0.318 | S9' | −0.092 |
| S1 | −0.305 | S10 | 0.846 | S1' | −0.347 | S10' | 0.121 |

☐ Find ΣoIhℓ, ΣoIdℓ and ΣoIeℓ for upper chords.

| Mark | Member | Length | So.1 | Ih | Id | Ie | ΣoIhℓ | ΣoIdℓ | ΣoIeℓ |
|---|---|---|---|---|---|---|---|---|---|
| A | 1 | 16.60 | −0.0339 | 0.821 | −0.237 | −4.976 | −0.46 | 0.13 | 2.80 |
| B | 2 | 15.97 | −0.0756 | 1.748 | −0.529 | −5.292 | −2.11 | 0.64 | 6.39 |
| C | 3 | 15.39 | −0.1277 | 2.804 | −0.894 | −5.663 | −5.51 | 1.76 | 11.13 |
| D | 4 | 14.84 | −0.1930 | 4.013 | −1.351 | −6.080 | −11.49 | 3.87 | 17.41 |
| E | 5 | 14.35 | −0.2749 | 5.399 | −1.924 | −6.542 | −21.30 | 7.59 | 25.81 |
| F | 6 | 13.91 | −0.3767 | 6.956 | −2.637 | −7.032 | −36.45 | 13.82 | 36.85 |
| G | 7 | 13.54 | −0.5008 | 8.678 | −3.506 | −7.512 | −58.84 | 23.77 | 50.94 |
| H | 8 | 13.23 | −0.6448 | 10.428 | −4.514 | −7.898 | −89.71 | 38.51 | 67.38 |
| I | 9 | 13.00 | −0.8000 | 12.012 | −5.600 | −8.089 | −124.92 | 58.24 | 84.13 |
| J | 10 | 12.84 | −0.9470 | 13.126 | −6.629 | −7.955 | −159.61 | 80.61 | 96.73 |
| K | 11 | 12.76 | −1.0625 | 13.500 | −7.438 | −7.438 | −183.03 | 100.84 | 100.84 |
| L | 11 | 12.76 | −1.0625 | 13.500 | −7.438 | −7.438 | −183.03 | 100.84 | 100.84 |
| M | 10 | 12.84 | −1.1364 | 13.126 | −7.955 | −6.629 | −191.53 | 116.07 | 96.73 |
| N | 9 | 13.00 | −1.1556 | 12.012 | −8.089 | −5.600 | −180.45 | 121.52 | 84.13 |
| O | 8 | 13.23 | −1.1284 | 10.428 | −7.898 | −4.514 | −156.99 | 117.91 | 67.39 |
| P | 7 | 13.53 | −1.0731 | 8.678 | −7.512 | −3.506 | −126.09 | 109.15 | 50.94 |
| Q | 6 | 13.91 | −1.0045 | 6.956 | −7.032 | −2.637 | −97.19 | 98.26 | 36.85 |
| R | 5 | 14.35 | −0.9346 | 5.399 | −6.542 | −1.924 | −72.41 | 87.74 | 25.81 |
| S | 4 | 14.84 | −0.8685 | 4.013 | −6.080 | −1.351 | −51.72 | 78.36 | 17.41 |
| T | 3 | 15.39 | −0.8090 | 2.804 | −5.663 | −0.894 | −34.91 | 70.51 | 11.13 |
| U | 2 | 15.97 | −0.7560 | 1.748 | −5.292 | −0.529 | −21.10 | 63.89 | 6.39 |
| V | 1 | 16.60 | −0.7110 | 0.821 | −4.976 | −0.237 | −9.69 | 58.73 | 2.80 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY J. O. DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 43
(47)

CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken

☐ Find $\Sigma o \Sigma h l$ $\Sigma o \Sigma d l$ and $\Sigma o \Sigma e l$ for lower chords.

| mark | member | length | $\Sigma o$ | $\Sigma h$ | $\Sigma d$ | $\Sigma e$ | $\Sigma o \Sigma h l$ | $\Sigma o \Sigma d l$ | $\Sigma o \Sigma e l$ |
|---|---|---|---|---|---|---|---|---|---|
| A | 0 | 18.98 | 0.0000 | -1.489 | 0.000 | 5.167 | 0.000 | 0.00 | 0.00 |
| B | 1 | 18.01 | 0.0367 | -2.304 | 0.257 | 5.397 | -1.52 | 0.17 | 3.57 |
| C | 2 | 17.09 | 0.0809 | -3.211 | 0.567 | 5.664 | -4.44 | 0.78 | 7.83 |
| D | 3 | 16.23 | 0.1348 | -4.231 | 0.943 | 5.976 | -9.26 | 2.06 | 13.07 |
| E | 4 | 15.44 | 0.2007 | -5.384 | 1.405 | 6.322 | -16.68 | 4.35 | 19.59 |
| F | 5 | 14.72 | 0.2822 | -6.715 | 1.975 | 6.715 | -27.89 | 8.20 | 27.89 |
| G | 6 | 14.09 | 0.3821 | -8.169 | 2.675 | 7.133 | -43.98 | 14.40 | 38.40 |
| H | 7 | 13.58 | 0.5021 | -9.765 | 3.515 | 7.531 | -66.58 | 23.97 | 51.35 |
| I | 8 | 13.18 | 0.6422 | -11.420 | 4.495 | 7.866 | -96.66 | 38.05 | 66.58 |
| J | 9 | 12.91 | 0.7939 | -12.933 | 5.557 | 8.027 | -132.55 | 56.95 | 82.27 |
| K | 10 | 12.77 | 0.9439 | -14.040 | 6.586 | 7.903 | -168.68 | 79.12 | 94.95 |
| L | 10 | 12.77 | 1.1290 | -14.040 | 7.903 | 6.586 | -202.42 | 113.94 | 94.95 |
| M | 9 | 12.91 | 1.1468 | -12.933 | 8.027 | 5.557 | -191.48 | 118.84 | 82.27 |
| N | 8 | 13.18 | 1.1238 | -11.420 | 7.866 | 4.495 | -169.15 | 116.51 | 66.58 |
| O | 7 | 13.58 | 1.0759 | -9.765 | 7.531 | 3.515 | -142.67 | 110.03 | 57.36 |
| P | 6 | 14.09 | 1.0190 | -8.169 | 7.133 | 2.675 | -117.29 | 102.41 | 38.41 |
| Q | 5 | 14.72 | 0.9594 | -6.715 | 6.715 | 1.975 | -94.83 | 94.83 | 27.89 |
| R | 4 | 15.44 | 0.9033 | -5.384 | 6.322 | 1.405 | -75.09 | 88.17 | 19.60 |
| S | 3 | 16.23 | 0.8537 | -4.231 | 5.976 | 0.943 | -58.62 | 82.80 | 13.07 |
| T | 2 | 17.09 | 0.8095 | -3.211 | 5.666 | 0.567 | -44.42 | 78.39 | 7.84 |
| U | 1 | 18.01 | 0.7710 | -2.304 | 5.397 | 0.257 | -32.00 | 74.90 | 3.57 |
| V | 0 | 18.98 | 0.0000 | -1.489 | 5.167 | 0.000 | 0.00 | 0.00 | 0.00 |

☐ Find $\Sigma o \Sigma h l$ $\Sigma o \Sigma d l$ and $\Sigma o \Sigma e l$ for diagonals.

| mark | member | length | $\Sigma o$ | $\Sigma h$ | $\Sigma d$ | $\Sigma o \Sigma h l$ | $\Sigma o \Sigma d l$ | $\Sigma o \Sigma e l$ |
|---|---|---|---|---|---|---|---|---|
| A | 1 | 17.27 | 0.0352 | -0.967 | 0.246 | -0.59 | 0.15 | 0.29 |
| B | 2 | 15.94 | 0.0430 | -1.071 | 0.301 | -0.73 | 0.21 | 0.35 |
| C | 3 | 14.96 | 0.0534 | -1.206 | 0.374 | -0.96 | 0.30 | 0.44 |
| D | 4 | 14.26 | 0.0671 | -1.377 | 0.444 | -1.25 | 0.40 | 0.54 |
| E | 5 | 13.80 | 0.0852 | -1.581 | 0.596 | -1.86 | 0.70 | 0.74 |
| F | 6 | 13.52 | 0.1072 | -1.799 | 0.750 | -2.61 | 1.09 | 0.97 |
| G | 7 | 13.38 | 0.1322 | -1.980 | 0.916 | -3.51 | 1.62 | 1.16 |
| H | 8 | 13.34 | 0.1568 | -2.053 | 1.097 | -4.30 | 2.30 | 1.18 |
| I | 9 | 13.40 | 0.1713 | -1.876 | 1.199 | -4.31 | 2.76 | 0.77 |
| J | 10 | 13.57 | 0.1650 | -1.362 | 1.156 | -3.05 | 2.59 | -0.08 |
| K | 11 | 13.88 | 0.1330 | -0.513 | 0.932 | -0.95 | 1.70 | -0.92 |
| L | 11 | 13.88 | -0.0715 | -0.513 | -0.500 | 0.51 | 0.50 | -0.08 |
| M | 10 | 13.57 | -0.0048 | -1.362 | -0.034 | 0.09 | 0.00 | 0.77 |
| N | 9 | 13.40 | 0.0482 | -1.876 | 0.336 | -1.21 | 0.21 | 1.18 |
| O | 8 | 13.34 | 0.0806 | -2.053 | 0.564 | -2.21 | 0.61 | 1.15 |
| P | 7 | 13.38 | 0.0936 | -1.980 | 0.655 | -2.48 | 0.82 | 0.97 |
| Q | 6 | 13.52 | 0.0959 | -1.799 | 0.671 | -2.34 | 0.87 | 0.74 |
| R | 5 | 13.80 | 0.0902 | -1.581 | 0.632 | -1.97 | 0.79 | 0.54 |
| S | 4 | 14.26 | 0.0846 | -1.377 | 0.592 | -1.66 | 0.71 | 0.44 |
| T | 3 | 14.96 | 0.0780 | -1.206 | 0.546 | -1.41 | 0.64 | 0.35 |
| U | 2 | 15.94 | 0.0724 | -1.071 | 0.504 | -1.24 | 0.58 | 0.31 |
| V | 1 | 17.27 | 0.7390 | -0.967 | 0.474 | -12.34 | 6.05 | 3.14 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

# Arakawa Bashi for Saitama-Ken

☐ Find So.1Sh ℓ So.1Sd ℓ and So.1Se ℓ for Verticals

| Mark | member | Length | So.1 | Sh | Sd | Se | So.1Sh ℓ | So.1Sd ℓ | So.1Se ℓ |
|---|---|---|---|---|---|---|---|---|---|
| A | 0 | 25.71 | -0.0454 | 0.000 | -0.318 | -6.342 | 0.000 | 0.37 | 7.40 |
| B | 1 | 22.29 | -0.0496 | 1.075 | -0.347 | -0.305 | -1.19 | 0.38 | 0.34 |
| C | 2 | 19.20 | -0.0538 | 1.085 | -0.377 | -0.267 | -1.12 | 0.39 | 0.28 |
| D | 3 | 16.42 | -0.0574 | 1.049 | -0.401 | -0.209 | -0.99 | 0.38 | 0.20 |
| E | 4 | 13.98 | -0.0598 | 0.981 | -0.418 | -0.134 | -0.82 | 0.35 | 0.10 |
| F | 5 | 11.86 | -0.0604 | 0.871 | -0.423 | -0.037 | -0.62 | 0.30 | 0.03 |
| G | 6 | 10.07 | -0.0578 | 0.699 | -0.404 | 0.089 | -0.41 | 0.24 | -0.05 |
| H | 7 | 8.61 | -0.0502 | 0.450 | -0.352 | 0.248 | -0.19 | 0.15 | -0.11 |
| I | 8 | 7.46 | -0.0354 | 0.117 | -0.248 | 0.436 | -0.03 | 0.07 | -0.12 |
| J | 9 | 6.65 | -0.0131 | -0.328 | -0.092 | 0.645 | 0.03 | 0.01 | -0.06 |
| K | 10 | 6.16 | 0.0173 | -0.818 | 0.121 | 0.846 | -0.09 | 0.01 | +0.09 |
| L | 10 | 6.16 | 0.1210 | -0.818 | 0.846 | 0.121 | -0.61 | 0.63 | 0.09 |
| M | 9 | 6.65 | 0.0942 | -0.328 | 0.645 | -0.092 | -0.21 | 0.40 | -0.06 |
| N | 8 | 7.46 | 0.0623 | 0.117 | 0.436 | -0.248 | 0.05 | 0.20 | -0.12 |
| O | 7 | 8.61 | 0.0354 | 0.450 | 0.248 | -0.352 | 0.14 | 0.08 | -0.11 |
| P | 6 | 10.07 | 0.0127 | 0.699 | 0.089 | -0.404 | 0.09 | 0.01 | -0.05 |
| Q | 5 | 11.86 | -0.0053 | 0.871 | -0.037 | -0.423 | -0.05 | 0.02 | 0.03 |
| R | 4 | 13.98 | -0.0192 | 0.981 | -0.134 | -0.418 | -0.26 | 0.04 | 0.11 |
| S | 3 | 16.42 | -0.0298 | 1.049 | -0.209 | -0.401 | -0.51 | 0.10 | 0.20 |
| T | 2 | 19.20 | -0.0377 | 1.085 | -0.267 | -0.377 | -0.79 | 0.19 | 0.27 |
| U | 1 | 22.29 | -1.0420 | 1.075 | -0.305 | -0.347 | -25.00 | 7.09 | 8.06 |
| V | 0 | 25.71 | -0.9550 | 0.000 | -6.342 | -0.318 | -0.00 | 155.80 | 7.81 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken.

☐ Find $\Sigma h^2 l$, $\Sigma d^2 l$, $\Sigma e^2 l$, $\Sigma h \Sigma d l$, $\Sigma h \Sigma e l$ and $\Sigma d \Sigma e l$ for upper chords

| Member | Length | $\Sigma h$ | $\Sigma d$ | $\Sigma e$ | $\Sigma h^2 l$ | $\Sigma d^2 l = \Sigma e^2 l$ | $\Sigma h \Sigma d l = \Sigma h \Sigma e l$ | $\Sigma d \Sigma e l$ |
|---|---|---|---|---|---|---|---|---|
| -7 | 13.54 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 |
| -6 | 13.91 | 0 | 0 | -1.381 | 0 | 26.53 | 0 | 0 |
| -5 | 14.35 | 0 | 0 | -2.419 | 0 | 83.97 | 0 | 0 |
| -4 | 14.84 | 0 | 0 | -3.186 | 0 | 150.64 | 0 | 0 |
| -3 | 15.39 | 0 | 0 | -3.748 | 0 | 216.19 | 0 | 0 |
| -2 | 15.97 | 0 | 0 | -4.160 | 0 | 276.37 | 0 | 0 |
| -1 | 16.60 | 0 | 0 | -4.470 | 0 | 331.68 | 0.00 | 0 |
| 1 | 16.60 | 0.821 | -0.237 | -4.976 | 11.19 | 411.03 | -67.82 | 19.58 |
| 2 | 15.97 | 1.748 | -0.529 | -5.292 | 48.80 | 447.23 | -147.73 | 44.71 |
| 3 | 15.39 | 2.804 | -0.894 | -5.663 | 121.00 | 493.55 | -244.38 | 77.92 |
| 4 | 14.84 | 4.013 | -1.351 | -6.080 | 238.99 | 548.58 | -362.08 | 121.90 |
| 5 | 14.35 | 5.399 | -1.924 | -6.542 | 418.29 | 614.15 | -506.85 | 180.62 |
| 6 | 13.91 | 6.956 | -2.637 | -7.032 | 673.05 | 687.84 | -680.40 | 257.94 |
| 7 | 13.54 | 8.678 | -3.506 | -7.512 | 1019.67 | 764.06 | -882.66 | 356.60 |
| 8 | 13.23 | 10.428 | -4.514 | -7.898 | 1463.06 | 825.27 | -1098.83 | 471.67 |
| 9 | 13.00 | 12.012 | -5.600 | -8.089 | 1875.75 | 850.61 | -1263.15 | 588.88 |
| 10 | 12.84 | 13.126 | -6.629 | -7.955 | 2212.23 | 812.54 | -1340.07 | 677.10 |
| 11 | 12.76 | 13.500 | -7.438 | -7.438 | 2325.51 | 705.93 | -1281.27 | 705.93 |
| 11 | 12.76 | 13.500 | -7.438 | -7.438 | 2325.51 | 705.93 | -1281.27 (1117.24) | 705.93 |
| 10 | 12.84 | 13.126 | -7.955 | -6.629 | 2212.23 | 564.24 | -874.47 | 677.10 |
| 9 | 13.00 | 12.012 | -8.089 | -5.600 | 1875.75 | 407.68 | -628.02 | 588.88 |
| 8 | 13.23 | 10.428 | -7.898 | -4.514 | 1463.06 | 269.58 | -411.96 | 471.67 |
| 7 | 13.54 | 8.678 | -7.512 | -3.506 | 1019.67 | 166.43 | -255.15 | 356.60 |
| 6 | 13.91 | 6.956 | -7.032 | -2.637 | 673.05 | 96.73 | -149.06 | 257.94 |
| 5 | 14.35 | 5.399 | -6.542 | -1.924 | 418.29 | 53.12 | -80.46 | 180.62 |
| 4 | 14.84 | 4.013 | -6.080 | -1.351 | 238.99 | 27.09 | -38.58 | 121.90 |
| 3 | 15.39 | 2.804 | -5.663 | -0.894 | 121.00 | 12.30 | -14.77 | 77.92 |
| 2 | 15.97 | 1.748 | -5.292 | -0.529 | 48.80 | 4.47 | -3.23 | 44.71 |
| 1 | 16.60 | 0.821 | -4.976 | -0.237 | 11.19 | 0.93 | | 19.58 |
| -1 | 16.60 | 0.000 | -4.470 | 0.000 | 0.00 | 0.00 | 0.00 | 0 |
| -2 | 15.97 | 0 | -4.160 | 0 | 0 | 0 | 0 | 0 |
| -3 | 15.39 | 0 | -3.748 | 0 | 0 | 0 | 0 | 0 |
| -4 | 14.84 | 0 | -3.186 | 0 | 0 | 0 | 0 | 0 |
| -5 | 14.35 | 0 | -2.419 | 0 | 0 | 0 | 0 | 0 |
| -6 | 13.91 | 0 | -1.381 | 0 | 0 | 0 | 0 | 0 |
| -7 | 13.54 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 |
| Summary. | | | | | 20815.08 | 10554.67 | -12729.49 | 7005.70 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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47

CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken.

☐ Find $Th^2l$, $Td^2l$, $Te^2l$, $ThTdl$, $ThTel$ and $TdTel$ for Lower chord.

| member | length | Th | Td | Te | $Th^2l$ | $Td^2l = Te^2l$ | $TdTel$ | $ThTdl = ThTel$ |
|---|---|---|---|---|---|---|---|---|
| −6 | 14.06 | 0,000 | 1,402 | 0,000 | 0,00 | 27.64 | 0.00 | 0,00 |
| −5 | 14.77 | 〃 | 2,482 | 〃 | 〃 | 90.98 | 〃 | 〃 |
| −4 | 15.44 | 〃 | 3.310 | 〃 | 〃 | 169.16 | 〃 | 〃 |
| −3 | 16.23 | 〃 | 3.952 | 〃 | 〃 | 253.49 | 〃 | 〃 |
| −2 | 17.09 | 〃 | 4.452 | 〃 | 〃 | 338.73 | 〃 | 〃 |
| −1 | 18.01 | 〃 | 4.842 | 〃 | 〃 | 422,24 | 〃 | 〃 |
| −0 | 18.98 | 0.000 | 5.167 | 〃 | 〃 | 506.73 | 〃 | 〃 |
| 0 | 18,98 | −1.489 | 5.167 | 〃 | 42,08 | 506.73 | 〃 | −146.03 |
| 1 | 18.01 | −2.304 | 5.397 | 0.257 | 95.60 | 524,59 | 24.98 | −223.95 |
| 2 | 17.09 | −3.211 | 5.666 | 0.567 | 176.21 | 549.65 | 54.90 | −310.93 |
| 3 | 16.23 | −4.231 | 5.976 | 0.943 | 290,54 | 579,62 | 91.46 | −410.37 |
| 4 | 15.44 | −5.384 | 6.322 | 1,405 | 447.57 | 617.10 | 137.14 | −525.54 |
| 5 | 14.72 | −6.715 | 6,715 | 1,975 | 663,74 | 663.74 | 195,22 | −663.74 |
| 6 | 14.09 | −8.169 | 7.133 | 2.675 | 940,26 | 716.90 | 268,85 | −821.02 |
| 7 | 13.58 | −9.765 | 7.531 | 3.515 | 1294.93 | 770,20 | 359.48 | −998.68 |
| 8 | 13.18 | −11.420 | 7.866 | 4.495 | 1718.89 | 815.50 | 466,01 | −1183.96 |
| 9 | 12.91 | −12.933 | 8.027 | 5.557 | 2159.36 | 831,83 | 575.87 | −1340.22 |
| 10 | 12.77 | −14.040 | 7.903 | 6.586 | 2517,25 | 797.58 | 664.67 | −1416.94 |
| 10 | 12.77 | −14.040 | 6.586 | 7.903 | 2517.25 | 553,90 | 664.67 | −1180.81 |
| 9 | 12.91 | −12.933 | 5.557 | 8.027 | 2159.36 | 398.66 | 575.87 | −927.83 |
| 8 | 13.18 | −11.420 | 4.495 | 7.866 | 1718.89 | 266.30 | 466.01 | −676.57 |
| 7 | 13.58 | −9.765 | 3.515 | 7.531 | 1294.93 | 167.78 | 359.48 | −466.12 |
| 6 | 14.09 | −8.169 | 2.675 | 7.133 | 940,26 | 100.82 | 268.85 | −307.90 |
| 5 | 14.72 | −6.715 | 1.975 | 6.715 | 663,74 | 57.42 | 195.22 | −195.22 |
| 4 | 15.44 | −5.384 | 1,405 | 6.322 | 447.57 | 30.48 | 137.14 | −116.80 |
| 3 | 16.23 | −4.231 | 0.943 | 5.976 | 290.54 | 14.43 | 91.46 | −64.76 |
| 2 | 17.09 | −3.211 | 0.567 | 5.666 | 176.21 | 5.49 | 54.90 | −31.11 |
| 1 | 18.01 | −2.304 | 0.257 | 5.397 | 95.60 | 1.19 | 24.98 | −10.66 |
| 0 | 18.98 | −1.489 | 0.000 | 5.167 | 42.08 | 0.00 | 0.00 | 0.00 |
| −0 | 18.98 | 0.000 | 〃 | 4.842 | 0.00 | 〃 | 〃 | 〃 |
| −1 | 18.01 | 〃 | 〃 | 4.452 | 〃 | 〃 | 〃 | 〃 |
| −2 | 17.09 | 〃 | 〃 | 3.952 | 〃 | 〃 | 〃 | 〃 |
| −3 | 16.23 | 〃 | 〃 | 3,310 | 〃 | 〃 | 〃 | 〃 |
| −4 | 15.44 | 〃 | 〃 | 2.482 | 〃 | 〃 | 〃 | 〃 |
| −5 | 14.77 | 〃 | 〃 | 1,402 | 〃 | 〃 | 〃 | 〃 |
| −6 | 14.06 | 0,000 | 0,000 | 0,000 | 0,00 | 0,00 | 0.00 | 0,00 |
| Summary | | | | | 20692,86 | 10777.88 | 5677.16 | −12019.16 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken.

☐ Find $\Sigma h^2 l$, $\Sigma d^2 l$, $\Sigma e^2 l$, $\Sigma h \Sigma d l$, $\Sigma h \Sigma e l$ and $\Sigma d \Sigma e l$ for diagonals.

| Member | Length | $\Sigma h$ | $\Sigma d$ | $\Sigma e$ | $\Sigma h^2 l$ | $\Sigma h \Sigma d l : \Sigma h \Sigma e l$ | $\Sigma d^2 l : \Sigma e^2 l$ | $\Sigma d \Sigma e l$ |
|---|---|---|---|---|---|---|---|---|
| -7 | 13.38 | 0.000 | 0.000 | -1.328 | 0.00 | 0.00 | 25.00 | 0.00 |
| -6 | 13.52 | 0 | 0 | -0.937 | 0 | 0 | 11.47 | 0 |
| -5 | 13.80 | 0 | 0 | -0.635 | 0 | 0 | 5.57 | 0 |
| -4 | 14.26 | 0 | 0 | -0.413 | 0 | 0 | 2.43 | 0 |
| -3 | 14.96 | 0 | 0 | -0.253 | 0 | 0 | 0.96 | 0 |
| -2 | 15.94 | 0 | 0 | -0.137 | 0 | 0 | 0.30 | 0 |
| -1 | 17.27 | 0 | 0 | -0.056 | 0 | 0 | 0.05 | 0 |
| 1 | 17.27 | -0.967 | 0.246 | 0.474 | 16.15 | - 7.92 | 3.88 | 2.01 |
| 2 | 15.94 | -1.071 | 0.301 | 0.504 | 18.27 | - 8.60 | 4.05 | 2.42 |
| 3 | 14.96 | -1.206 | 0.374 | 0.546 | 21.74 | - 9.85 | 4.46 | 3.05 |
| 4 | 14.26 | -1.377 | 0.469 | 0.592 | 27.03 | -11.62 | 5.00 | 3.75 |
| 5 | 13.80 | -1.581 | 0.596 | 0.632 | 34.50 | -13.78 | 5.51 | 5.20 |
| 6 | 13.52 | -1.799 | 0.750 | 0.671 | 43.80 | -16.33 | 6.09 | 6.80 |
| 7 | 13.38 | -1.980 | 0.916 | 0.655 | 52.50 | -17.37 | 5.74 | 8.03 |
| 8 | 13.34 | -2.053 | 1.097 | 0.564 | 56.30 | - 15.46 | 5.25 | 8.26 |
| 9 | 13.40 | -1.876 | 1.199 | 0.336 | 47.15 | — 8.45 | 1.51 | 5.40 |
| 10 | 13.57 | -1.362 | 1.156 | -0.034 | 25.15 | 0.63 | 0.16 | -5.33 |
| 11 | 13.88 | -0.513 | 0.982 | -0.500 | 3.66 | 3.56 | 3.47 | -6.37 |
| 11 | 13.88 | -0.513 | -0.500 | 0.932 | 3.66 | 6.64 | 12.06 | -6.37 |
| 10 | 13.57 | -1.362 | -0.034 | 1.156 | 25.15 | -21.35 | 18.12 | -5.33 |
| 9 | 13.40 | -1.876 | 0.336 | 1.199 | 47.15 | -30.16 | 19.28 | 5.40 |
| 8 | 13.34 | -2.053 | 0.564 | 1.097 | 56.30 | -30.50 | 16.05 | 8.26 |
| 7 | 13.38 | -1.980 | 0.656 | 0.916 | 52.50 | -24.27 | 11.23 | 8.03 |
| 6 | 13.52 | -1.799 | 0.671 | 0.750 | 43.80 | -18.26 | 7.61 | 6.80 |
| 5 | 13.80 | -1.581 | 0.631 | 0.596 | 34.50 | - 13.01 | 4.91 | 5.20 |
| 4 | 14.26 | -1.377 | 0.592 | 0.469 | 27.03 | — 8.72 | 2.81 | 3.75 |
| 3 | 14.96 | -1.206 | 0.546 | 0.374 | 21.74 | - 6.74 | 2.09 | 3.05 |
| 2 | 15.94 | -1.071 | 0.504 | 0.301 | 18.27 | -5.14 | 1.45 | 2.42 |
| 1 | 17.27 | -0.967 | 0.747 | 0.246 | 16.15 | - 4.11 | 1.05 | 2.01 |
| -1 | 17.27 | 0 | -0.056 | 0 | 0 | 0 | 0 | 0 |
| -2 | 15.94 | 0 | -0.137 | 0 | 0 | 0 | 0 | 0 |
| -3 | 14.96 | 0 | -0.253 | 0 | 0 | 0 | 0 | 0 |
| -4 | 14.26 | 0 | -0.413 | 0 | 0 | 0 | 0 | 0 |
| -5 | 13.80 | 0 | -0.635 | 0 | 0 | 0 | 0 | 0 |
| -6 | 13.52 | 0 | -0.921 | 0 | 0 | 0 | 0 | 0 |
| -7 | 13.38 | 0.000 | -1.342 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 |

Summary

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CHECKED BY_____ DATE_____ **PAGE NO** 48

48

CALCULATIONS FOR

Arakawa-Bashi. Saitama Ken

☐ Find $Th^2l$, $Td^2l$, $Te^2l$, $ThTdl$, $ThTel$ and $TdTel$ for Verticals

| member | length | Th | Td | Te | $Th^2l$ | $ThTdl : ThTel$ | $Td^2l = Te^2l$ | $TdTel$ |
|---|---|---|---|---|---|---|---|---|
| -7 | 8.61 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 8.61 | 0.00 |
| -6 | 10.07 | " | " | 0.955 | " | " | 9.18 | " |
| -5 | 11.86 | " | " | 0.868 | " | " | 8.94 | " |
| -4 | 13.98 | " | " | 0.763 | " | " | 8.14 | " |
| -3 | 16.42 | " | " | 0.657 | " | " | 7.09 | " |
| -2 | 19.20 | " | " | 0.540 | " | " | 5.60 | " |
| -1 | 22.29 | " | " | 0.436 | " | " | 4.24 | " |
| -0 | 25.71 | " | -0.318 | -6.342 | " | " | 1034.08 | 51.90 |
| 1 | 22.29 | 1.075 | -0.347 | -0.305 | 25.78 | -7.31 | 2.07 | 2.37 |
| 2 | 19.20 | 1.085 | -0.377 | -0.267 | 22.62 | -5.57 | 1.37 | 1.93 |
| 3 | 16.42 | 1.049 | -0.401 | -0.209 | 18.10 | -3.61 | 0.72 | 1.38 |
| 4 | 13.98 | 0.981 | -0.418 | -0.134 | 13.47 | -1.84 | 0.25 | 0.78 |
| 5 | 11.86 | 0.871 | -0.423 | -0.037 | 9.00 | -0.38 | 0.02 | 0.19 |
| 6 | 10.07 | 0.699 | -0.404 | 0.089 | 4.92 | 0.63 | 0.08 | -0.36 |
| 7 | 8.61 | 0.450 | -0.352 | 0.248 | 1.74 | 0.96 | 0.53 | -0.75 |
| 8 | 7.46 | 0.117 | -0.248 | 0.438 | 0.10 | 0.38 | 1.43 | -0.81 |
| 9 | 6.65 | -0.328 | -0.092 | 0.645 | 0.72 | 1.41 | 2.77 | -0.39 |
| 10 | 6.16 | -0.818 | 0.121 | 0.846 | 4.12 | 4.26 | 4.41 | 0.63 |
| 10 | 6.16 | -0.848 | 0.846 | 0.121 | 4.12 | 0.61 | 0.90 | 0.63 |
| 9 | 6.65 | -0.328 | 0.645 | -0.092 | 0.72 | 0.21 | 0.60 | -0.39 |
| 8 | 7.46 | 0.117 | 0.436 | -0.248 | 0.10 | -0.22 | 0.46 | -0.81 |
| 7 | 8.61 | 0.450 | 0.248 | -0.352 | 1.74 | -1.36 | 1.07 | -0.75 |
| 6 | 10.07 | 0.699 | 0.089 | -0.404 | 4.92 | -2.84 | 1.64 | -0.36 |
| 5 | 11.86 | 0.871 | -0.037 | -0.423 | 9.00 | -4.37 | 2.12 | -0.19 |
| 4 | 13.98 | 0.981 | -0.134 | -0.418 | 13.47 | -5.98 | 2.44 | 0.78 |
| 3 | 16.42 | 1.049 | -0.209 | -0.401 | 18.10 | -6.92 | 2.64 | 1.38 |
| 2 | 19.20 | 1.085 | -0.267 | -0.377 | 22.62 | -7.86 | 2.73 | 1.93 |
| 1 | 22.29 | 1.075 | -0.305 | -0.347 | 25.78 | -8.32 | 2.69 | 2.37 |
| 0 | 25.71 | 0.000 | -6.342 | -0.318 | 0.00 | 0.00 | 2.60 | 51.90 |
| -1 | 22.29 | " | 0.436 | 0.000 | " | " | 0.00 | 0.00 |
| -2 | 19.20 | " | 0.540 | " | " | " | " | " |
| -3 | 16.42 | " | 0.651 | " | " | " | " | " |
| -4 | 13.98 | " | 0.763 | " | " | " | " | " |
| -5 | 11.86 | " | 0.868 | " | " | " | " | " |
| -6 | 10.07 | " | 0.955 | " | " | " | " | " |
| -7 | 8.61 | 1.000 | 1.000 | 0.000 | 0.00 | 0.00 | 0.00 | 0.00 |

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**JIUN MASUDA**
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SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa - Bashi, Saitama - Ken

☐ Find $\Sigma So.m\,Shl$ $\Sigma So.m.\,Sdl$ and $\Sigma So.m\,Sel$ for upper chords.

| Mark. | So.1 Shl | Summary. | So.1 Sdl | Summary. | So.1 Sel | Summary. |
|---|---|---|---|---|---|---|
| A | -0.46 | -0.46 | 0.13 | 0.13 | 2.80 | 2.80 |
| B | -2.11 | -2.57 | 0.64 | 0.77 | 6.39 | 9.19 |
| C | -5.51 | -8.08 | 1.74 | 2.53 | 11.13 | 20.32 |
| D | -11.49 | -19.57 | 3.87 | 6.40 | 17.41 | 37.73 |
| E | -21.30 | -40.87 | 7.59 | 13.99 | 25.81 | 63.54 |
| F | -36.45 | -77.32 | 13.82 | 27.81 | 36.85 | 100.39 |
| G | -58.84 | -136.16 | 23.77 | 51.58 | 50.94 | 151.33 |
| H | -89.71 | -225.87 | 38.51 | 90.09 | 67.38 | 218.71 |
| I | -124.92 | -350.79 | 58.24 | 148.33 | 84.13 | 302.84 |
| J | -159.61 | -510.40 | 80.61 | 228.94 | 96.73 | 399.57 |
| K | -183.03 | -693.43. | 100.84 | 329.78 | 100.84 | 500.41 |
| L | -183.03 | -876.46 | 100.84 | 430.62 | 100.84 | 601.25 |
| M | -191.53 | -1067.99 | 116.07 | 546.69 | 96.73 | 697.98 |
| N | -180.45 | -1248.44 | 121.52 | 668.21 | 84.13 | 782.11 |
| O | -156.99 | -1405.43 | 117.91 | 786.12 | 67.38 | 849.49 |
| P | -126.09 | -1531.52 | 109.15 | 895.27 | 50.94 | 900.43 |
| Q | -97.41 | -1628.93 | 98.26 | 993.53 | 36.85 | 937.28 |
| R | -72.41 | -1701.34 | 87.74 | 1081.27 | 25.81 | 963.09 |
| S | -51.72 | -1753.06 | 78.36 | 1159.63 | 17.41 | 980.50 |
| T | -34.91 | -1787.97 | 70.51 | 1230.14 | 11.13 | 991.63 |
| U | -21.10 | -1809.07 | 63.89 | 1294.03 | 6.39 | 998.02 |
| V | -9.69 | -1818.76 | 58.73 | 1352.76 | 2.80 | 1000.10 |

$\Sigma$ So.m Shl for upper chord.

| Load on. | | | | | | | Summary |
|---|---|---|---|---|---|---|---|
| | 1 | 1 . -1818.76 | = -1818.76 | | | | -1818.76 |
| | 2 | 2 . -1787.97 | = -3575.94 | 20 . -2.57 | = -51.40 | | -3627.34 |
| | 3 | 3 . -1753.06 | = -5259.18 | 19 . -8.08 | = -153.52 | | -5412.70 |
| | 4 | 4 . -1701.34 | = -6805.36 | 18 . -19.57 | = -362.26 | | -7167.62 |
| | 5 | 5 . -1628.93 | = -8144.65 | 17 . -40.87 | = -694.79 | | -8839.44 |
| | 6 | 6 . -1531.52 | = -9189.12 | 16 . -77.32 | = -1237.12 | | -10426.24 |
| | 7 | 7 . -1405.43 | = -9838.01 | 15 . -136.16 | = -2042.40 | | -11880.41 |
| | 8 | 8 . -1248.44 | = -9987.52 | 14 . -225.87 | = -3162.18 | | -13149.70 |
| | 9 | 9 . -1067.99 | = -9611.91 | 13 . -350.79 | = -4560.27 | | -14172.18 |
| | 10 | 10 . -876.46 | = -8764.60 | 12 . -510.40 | = -6124.80 | | -14889.40 |
| | 11 | 11 . -693.43 | = -7627.73 | 11 . -693.43 | = -7627.73 | | -15255.46 |

$\Sigma$ So.m Sdl for upper chord

| Load on | | | | | | | Summary |
|---|---|---|---|---|---|---|---|
| | 1 | 1 . 1352.76 | = 1352.76 | | | | 1352.76 |
| | 2 | 2 . 1230.14 | = 2460.28 | 20 . 9.19 | = 183.80 | | 2644.08 |
| | 3 | 3 . 1159.63 | = 3478.89 | 19 . 20.32 | = 386.08 | | 3864.97 |
| | 4 | 4 . 1081.27 | = 4325.08 | 18 . 37.73 | = 679.14 | | 5004.22 |
| | 5 | 5 . 993.53 | = 4967.65 | 17 . 63.54 | = 1080.18 | | 6047.83 |
| | 6 | 6 . 895.27 | = 5371.62 | 16 . 100.39 | = 1606.24 | | 6977.86 |
| | 7 | 7 . 786.12 | = 5502.84 | 15 . 151.33 | = 2269.95 | | 7772.79 |
| | 8 | 8 . 668.21 | = 5345.68 | 14 . 218.71 | = 3061.94 | | 8407.62 |
| | 9 | 9 . 546.69 | = 4920.21 | 13 . 302.84 | = 3936.92 | | 8857.13 |
| | 10 | 10 . 430.62 | = 4306.20 | 12 . 399.57 | = 4794.84 | | 9101.04 |
| | 11 | 11 . 329.78 | = 3627.58 | 11 . 500.41 | = 5504.51 | | 9132.09 |

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CALCULATIONS FOR

Arakawa-Bashi, Saitama-Ken

Σ So.m Se l for upper chords.

| | | | | | Summary |
|---|---|---|---|---|---|
| Load on. | 1 | 1 . 1000.82 = 1000.82 | | | 1000.82 |
| | 2 | 2 . 991.63 = 1983.26 | 20 . 0.77 = 15.40 | | 1998.66 |
| | 3 | 3 . 980.50 = 2941.50 | 19 . 2.53 = 48.07 | | 2989.57 |
| | 4 | 4 . 963.09 = 3852.36 | 18 . 6.40 = 115.20 | | 3967.56 |
| | 5 | 5 . 937.28 = 4686.40 | 17 . 13.99 = 237.83 | | 4924.23 |
| | 6 | 6 . 900.43 = 5402.58 | 16 . 27.81 = 444.96 | | 5847.54 |
| | 7 | 7 . 849.49 = 5946.43 | 15 . 51.58 = 773.70 | | 6720.13 |
| | 8 | 8 . 782.11 = 6256.88 | 14 . 90.09 = 1261.26 | | 7518.14 |
| | 9 | 9 . 697.98 = 6281.82 | 13 . 148.33 = 1928.29 | | 8210.11 |
| | 10 | 10 . 601.25 = 6012.50 | 12 . 228.94 = 2747.28 | | 8759.78 |
| | 11 | 11 . 500.41 = 5504.51 | 11 . 329.78 = 3627.58 | | 9132.09 |

☐ Find Σ So.m Sh l , Σ So.m Sd l and Σ So.m Se l for Lower chords.

| Mark | member | So.1 Sh l | Summary | So.1 Sd l | Summary | So.1 Se l | Summary |
|---|---|---|---|---|---|---|---|
| A | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| B | 1 | -1.52 | -1.52 | 0.17 | 0.17 | 3.57 | 3.57 |
| C | 2 | -4.44 | -5.96 | 0.78 | 0.95 | 7.83 | 11.40 |
| D | 3 | -9.26 | -15.22 | 2.06 | 3.01 | 13.07 | 24.47 |
| E | 4 | -16.68 | -31.90 | 4.35 | 7.36 | 19.59 | 44.06 |
| F | 5 | -27.89 | -59.79 | 8.20 | 15.56 | 27.89 | 71.95 |
| G | 6 | -43.98 | -103.77 | 14.40 | 29.96 | 38.40 | 110.35 |
| H | 7 | -66.58 | -170.35 | 23.97 | 53.93 | 57.35 | 167.70 |
| I | 8 | -96.66 | -267.01 | 38.05 | 91.98 | 66.58 | 228.28 |
| J | 9 | -132.55 | -399.56 | 56.95 | 148.93 | 82.27 | 310.55 |
| K | 10 | -168.68 | -568.24 | 79.12 | 228.05 | 94.95 | 405.50 |
| L | 10 | -202.42 | -770.66 | 113.94 | 341.99 | 94.95 | 500.45 |
| M | 9 | -191.48 | -962.14 | 118.84 | 460.83 | 82.27 | 582.72 |
| N | 8 | -169.15 | -1131.29 | 116.51 | 577.34 | 66.58 | 649.30 |
| O | 7 | -142.67 | -1373.96 | 110.03 | 687.37 | 57.35 | 706.65 |
| P | 6 | -117.29 | -1391.25 | 102.41 | 789.78 | 38.40 | 739.05 |
| Q | 5 | -94.83 | -1486.08 | 94.83 | 884.61 | 27.89 | 766.94 |
| R | 4 | -75.09 | -1561.17 | 88.17 | 972.78 | 19.59 | 786.53 |
| S | 3 | -58.62 | -1619.79 | 82.80 | 1055.58 | 13.07 | 799.60 |
| T | 2 | -44.42 | -1664.21 | 78.39 | 1133.97 | 7.83 | 807.43 |
| U | 1 | -32.00 | -1696.21 | 74.90 | 1208.87 | 3.57 | 811.00 |
| V | 0 | 0.00 | -1696.21 | 0.00 | 1208.87. | 0.00 | 811.00 |

Σ So.m Sh l for lower chord.

| | | | | | Summary |
|---|---|---|---|---|---|
| Load on | 1 | 1 . -1696.21 = -1696.21 | | | -1696.21 |
| | 2 | 2 . -1664.21 = -3328.42 | 20 . -1.52 = -30.40 | | -3358.82 |
| | 3 | 3 . -1619.79 = -4859.37 | 19 . -5.96 = -113.24 | | -4972.61 |
| | 4 | 4 . -1561.17 = -6244.68 | 18 . -15.22 = -273.96 | | -6518.64 |
| | 5 | 5 . -1486.08 = -7430.40 | 17 . -31.90 = -542.30 | | -7972.70 |
| | 6 | 6 . -1391.25 = -8347.50 | 16 . -59.79 = -956.64 | | -9304.14 |
| | 7 | 7 . -1273.96 = -8917.72 | 15 . -103.77 = -1556.55 | | -10474.27 |
| | 8 | 8 . -1131.29 = -9050.32 | 14 . -170.35 = -2384.90 | | -11435.22 |
| | 9 | 9 . -962.14 = -8659.26 | 13 . -267.01 = -3471.13 | | -12130.39 |
| | 10 | 10 . -770.66 = -7706.60 | 12 . -399.56 = -4794.72 | | -12501.32 |
| | 11 | 11 . -568.24 = -6250.64 | 11 . -568.24 = -6250.64 | | -12501.28 |

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CALCULATIONS FOR

Arakawa-Bashi, Saitama-Ken

Σ So.mSdl for Lower chords.

| | | | | | | Summary |
|---|---|---|---|---|---|---|
| Load on 1 | 1 | 1 × 1208.87 = | 1208.87 | | | 1208.87 |
| 2 | 2 | 2 × 1133.97 = | 2267.94 | 20 × 3.57 = | 71.40 | 2339.34 |
| 3 | 3 | 3 × 1055.58 = | 3166.74 | 19 × 11.40 = | 216.60 | 3383.34 |
| 4 | 4 | 4 × 972.78 = | 3891.12 | 18 × 24.47 = | 440.46 | 4331.58 |
| 5 | 5 | 5 × 884.61 = | 4423.05 | 17 × 44.06 = | 749.02 | 5172.07 |
| 6 | 6 | 6 × 789.78 = | 4738.68 | 16 × 71.95 = | 1151.20 | 5889.88 |
| 7 | 7 | 7 × 687.37 = | 4811.59 | 15 × 110.35 = | 1655.25 | 6466.84 |
| 8 | 8 | 8 × 577.34 = | 4618.72 | 14 × 161.70 = | 2263.80 | 6882.52 |
| 9 | 9 | 9 × 460.83 = | 4147.47 | 13 × 228.28 = | 2967.64 | 7115.11 |
| 10 | 10 | 10 × 341.99 = | 3419.90 | 12 × 310.55 = | 3726.60 | 7146.50 |
| 11 | 11 | 11 × 228.05 = | 2508.55 | 11 × 405.50 = | 4460.50 | 6969.05 |

Σ So.mSel for Lower chords

| | | | | | | Summary |
|---|---|---|---|---|---|---|
| Load on 1 | 1 | 1 × 811.00 = | 811.00 | | | 811.00 |
| 2 | 2 | 2 × 807.43 = | 1614.86 | 20 × 0.17 = | 3.40 | 1618.26 |
| 3 | 3 | 3 × 799.60 = | 2398.80 | 19 × 0.95 = | 18.05 | 2416.85 |
| 4 | 4 | 4 × 786.53 = | 3146.12 | 18 × 3.01 = | 54.18 | 3200.30 |
| 5 | 5 | 5 × 766.94 = | 3834.70 | 17 × 7.36 = | 125.12 | 3959.82 |
| 6 | 6 | 6 × 739.05 = | 4434.30 | 16 × 15.56 = | 248.96 | 4683.26 |
| 7 | 7 | 7 × 700.65 = | 4904.55 | 15 × 29.96 = | 449.40 | 5353.95 |
| 8 | 8 | 8 × 649.30 = | 5194.40 | 14 × 53.93 = | 755.02 | 5949.42 |
| 9 | 9 | 9 × 582.72 = | 5244.48 | 13 × 91.98 = | 1195.74 | 6440.22 |
| 10 | 10 | 10 × 500.45 = | 5004.50 | 12 × 148.93 = | 1787.16 | 6791.66 |
| 11 | 11 | 11 × 405.50 = | 4460.50 | 11 × 228.05 = | 2508.55 | 6969.05 |

☐ Find Σ So.mSkl, Σ So.mSdl and Σ So.mSel for diagonals.

| mark | member | So.1Skl | Summary | So.1Sdl | Summary | So.1Sel | Summary |
|---|---|---|---|---|---|---|---|
| A | 1 | -0.59 | -0.59 | 0.15 | 0.15 | 0.30 | 0.30 |
| B | 2 | -0.73 | -1.32 | 0.21 | 0.36 | 0.35 | 0.65 |
| C | 3 | -0.96 | -2.28 | 0.30 | 0.66 | 0.44 | 1.09 |
| D | 4 | -1.25 | -3.53 | 0.40 | 1.06 | 0.54 | 1.63 |
| E | 5 | -1.86 | -5.39 | 0.70 | 1.76 | 0.74 | 2.37 |
| F | 6 | -2.61 | -8.00 | 1.09 | 2.85 | 0.97 | 3.34 |
| G | 7 | -3.51 | -11.51 | 1.62 | 4.47 | 1.16 | 4.50 |
| H | 8 | -4.30 | -15.81 | 2.30 | 6.77 | 1.18 | 5.68 |
| I | 9 | -4.31 | -20.12 | 2.76 | 9.53 | 0.77 | 6.45 |
| J | 10 | -3.05 | -23.17 | 2.59 | 12.12 | -0.08 | 6.37 |
| K | 11 | -0.95 | -24.12 | 1.70 | 13.82 | -0.92 | 5.45 |
| L | 11 | 0.51 | -23.61 | 0.50 | 14.32 | -0.92 | 4.53 |
| M | 10 | 0.09 | -23.52 | 0.00 | 14.32 | -0.08 | 4.45 |
| N | 9 | -1.21 | -24.73 | 0.21 | 14.53 | 0.77 | 5.22 |
| O | 8 | -2.21 | -26.94 | 0.61 | 15.14 | 1.18 | 6.40 |
| P | 7 | -2.48 | -29.42 | 0.82 | 15.96 | 1.16 | 7.56 |
| Q | 6 | -2.34 | -31.76 | 0.87 | 16.83 | 0.97 | 8.53 |
| R | 5 | -1.97 | -33.73 | 0.79 | 17.62 | 0.74 | 9.27 |
| S | 4 | -1.66 | -35.39 | 0.71 | 18.33 | 0.54 | 9.81 |
| T | 3 | -1.41 | -36.80 | 0.64 | 18.97 | 0.44 | 10.25 |
| U | 2 | -1.24 | -38.04 | 0.58 | 19.55 | 0.35 | 10.60 |
| V | 1 | -12.34 | -50.38 | 6.05 | 25.60 | 3.14 | 13.74 |

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CALCULATIONS FOR

Arakawa-Bashi, Saitama-Ken

Σ So.m Sh l for Diagonals.

| | | | | | | | Summary |
|---|---|---|---|---|---|---|---|
| Load on | 1 | 1 , | -50.38 = | -50.38 | | | -50.38 |
| | 2 | 2 , | -36.80 = | -73.60 | 20 , -1.32 = | -26.40 | -100.00 |
| | 3 | 3 , | -35.39 = | -106.17 | 19 , -2.28 = | -43.32 | -149.50 |
| | 4 | 4 , | -33.73 = | -134.92 | 18 , -3.53 = | -63.54 | -198.46 |
| | 5 | 5 , | -31.76 = | -158.80 | 17 , -5.39 = | -91.63 | -250.43 |
| | 6 | 6 , | -29.42 = | -176.52 | 16 , -8.00 = | -128.00 | -304.52 |
| | 7 | 7 , | -26.94 = | -188.58 | 15 , -11.51 = | -172.65 | -361.23 |
| | 8 | 8 , | -24.73 = | -197.84 | 14 , -15.81 = | -221.34 | -419.18 |
| | 9 | 9 , | -23.52 = | -211.68 | 13 , -20.12 = | -261.56 | -473.25 |
| | 10 | 10 , | -23.61 = | -236.10 | 12 , -23.17 = | -278.04 | -514.14 |
| | 11 | 11 , | -24.12 = | -265.32 | 11 , -24.12 = | -265.32 | -530.64 |

Σ So.m Sd l for Diagonals

| | | | | | | | Summary |
|---|---|---|---|---|---|---|---|
| Load on | 1 | 1 , | 25.60 = | 25.60 | | | 25.60 |
| | 2 | 2 , | 18.97 = | 37.94 | 20 , 0.65 = | 13.00 | 50.94 |
| | 3 | 3 , | 18.33 = | 54.99 | 19 , 1.09 = | 20.71 | 75.70 |
| | 4 | 4 , | 17.62 = | 70.48 | 18 , 1.63 = | 29.34 | 99.82 |
| | 5 | 5 , | 16.83 = | 84.15 | 17 , 2.37 = | 40.29 | 124.44 |
| | 6 | 6 , | 15.96 = | 95.76 | 16 , 3.34 = | 53.44 | 149.20 |
| | 7 | 7 , | 15.14 = | 105.98 | 15 , 4.50 = | 67.50 | 173.48 |
| | 8 | 8 , | 14.53 = | 116.24 | 14 , 5.68 = | 79.52 | 195.76 |
| | 9 | 9 , | 14.32 = | 128.88 | 13 , 6.45 = | 83.85 | 212.73 |
| | 10 | 10 , | 14.32 = | 143.32 | 12 , 6.37 = | 76.44 | 219.76 |
| | 11 | 11 , | 13.83 = | 152.02 | 11 , 5.45 = | 59.95 | 211.97 |

Σ So.m Se l for Diagonals.

| | | | | | | | Summary |
|---|---|---|---|---|---|---|---|
| Load on | 1 | 1 , | 13.74 = | 13.74 | | | 13.74 |
| | 2 | 2 , | 10.25 = | 20.50 | 20 , 0.36 = | 7.20 | 27.70 |
| | 3 | 3 , | 9.81 = | 29.43 | 19 , 0.66 = | 12.54 | 41.97 |
| | 4 | 4 , | 9.27 = | 37.08 | 18 , 1.06 = | 19.08 | 56.16 |
| | 5 | 5 , | 8.53 = | 42.65 | 17 , 1.76 = | 29.92 | 72.57 |
| | 6 | 6 , | 7.56 = | 45.36 | 16 , 2.85 = | 45.60 | 90.96 |
| | 7 | 7 , | 6.40 = | 44.80 | 15 , 4.47 = | 67.05 | 111.85 |
| | 8 | 8 , | 5.22 = | 41.76 | 14 , 6.77 = | 94.78 | 136.54 |
| | 9 | 9 , | 4.45 = | 40.05 | 13 , 9.53 = | 123.89 | 163.94 |
| | 10 | 10 , | 4.53 = | 45.30 | 12 , 12.12 = | 145.44 | 190.74 |
| | 11 | 11 , | 5.45 = | 59.95 | 11 , 13.82 = | 152.02 | 211.97 |

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CALCULATIONS FOR

Arakawa-Bashi, Saitama-Ken

☐ Find $\Sigma$ So.m Sh l , $\Sigma$ So.m Sa l and $\Sigma$ So.m Se l for Verticals.

| Mark | Member | So.1 Sh l | Summary | So.1 Sa l | Summary | So.1 Se l | Summary |
|---|---|---|---|---|---|---|---|
| A | 0 | 0.00 | 0.00 | 0.37 | 0.37 | 7.40 | 7.40 |
| B | 1 | −1.19 | −1.19 | 0.38 | 0.75 | 0.34 | 7.74 |
| C | 2 | −1.12 | −2.31 | 0.39 | 1.14 | 0.28 | 8.02 |
| D | 3 | −0.99 | −3.30 | 0.38 | 1.52 | 0.20 | 8.22 |
| E | 4 | −0.82 | −4.12 | 0.35 | 1.87 | 0.10 | 8.32 |
| F | 5 | −0.62 | −4.74 | 0.30 | 2.17 | 0.03 | 8.35 |
| G | 6 | −0.41 | −5.15 | 0.24 | 2.41 | −0.05 | 8.30 |
| H | 7 | −0.19 | −5.34 | 0.15 | 2.56 | −0.11 | 8.19 |
| I | 8 | −0.03 | −5.37 | 0.07 | 2.63 | −0.12 | 8.07 |
| J | 9 | 0.03 | −5.34 | 0.01 | 2.64 | −0.06 | 8.01 |
| K | 10 | −0.09 | −5.43 | 0.01 | 2.65 | 0.09 | 8.10 |
| L | 10 | −0.61 | −6.04 | 0.63 | 3.28 | 0.09 | 8.19 |
| M | 9 | −0.21 | −6.25 | 0.40 | 3.68 | −0.06 | 8.13 |
| N | 8 | 0.05 | −6.20 | 0.20 | 3.88 | −0.12 | 8.01 |
| O | 7 | 0.14 | −6.06 | 0.08 | 3.96 | −0.11 | 7.90 |
| P | 6 | 0.09 | −5.97 | 0.01 | 3.97 | −0.05 | 7.85 |
| Q | 5 | −0.05 | −6.02 | 0.02 | 3.99 | 0.03 | 7.88 |
| R | 4 | −0.26 | −6.28 | 0.04 | 4.03 | 0.10 | 7.98 |
| S | 3 | −0.51 | −6.79 | 0.10 | 4.13 | 0.20 | 8.18 |
| T | 2 | −0.79 | −7.58 | 0.19 | 4.32 | 0.28 | 8.46 |
| U | 1 | −25.00 | −32.58 | 7.09 | 11.41 | 8.06 | 16.52 |
| V | 0 | 0.00 | −32.58 | 155.80 | 167.21 | 7.81 | 24.33 |

$\Sigma$ So.m Sh l for Verticals.

| | | | | | | | | Summary |
|---|---|---|---|---|---|---|---|---|
| Load on 1 | 1 , | −32.58 | = −32.58 | | | | | −32.58 |
| 2 | 2 , | −6.79 | = −13.58 | 20 , | −2.31 | = −46.20 | | −59.78 |
| 3 | 3 , | −6.28 | = −18.84 | 19 , | −3.30 | = −62.70 | | −81.54 |
| 4 | 4 , | −6.02 | = −24.08 | 18 , | −4.12 | = −74.16 | | −98.24 |
| 5 | 5 , | −5.97 | = −29.85 | 17 , | −4.74 | = −80.58 | | −110.43 |
| 6 | 6 , | −6.06 | = −36.36 | 16 , | −5.15 | = −82.40 | | −118.76 |
| 7 | 7 , | −6.20 | = −43.40 | 15 , | −5.34 | = −80.10 | | −123.50 |
| 8 | 8 , | −6.25 | = −50.00 | 14 , | −5.37 | = −75.18 | | −125.18 |
| 9 | 9 , | −6.04 | = −54.36 | 13 , | −5.34 | = −69.42 | | −123.78 |
| 10 | 10 , | −5.43 | = −54.30 | 12 , | −5.43 | = −65.16 | | −119.46 |
| 11 | 11 , | −5.43 | = −59.73 | 11 , | −5.43 | = −59.73 | | −119.46 |

$\Sigma$ So.m Sa l for Verticals.

| | | | | | | | | Summary |
|---|---|---|---|---|---|---|---|---|
| Load on 1 | 1 , | 167.21 | = 167.21 | 20 | | | | 167.21 |
| 2 | 2 , | 4.13 | = 8.26 | 20 , | 8.02 | = | 160.40 | 168.66 |
| 3 | 3 , | 4.03 | = 12.09 | 19 , | 8.22 | = | 156.18 | 168.27 |
| 4 | 4 , | 3.99 | = 15.96 | 18 , | 8.32 | = | 149.76 | 165.72 |
| 5 | 5 , | 3.97 | = 19.85 | 17 , | 8.35 | = | 141.95 | 161.80 |
| 6 | 6 , | 3.96 | = 23.76 | 16 , | 8.30 | = | 132.80 | 156.56 |
| 7 | 7 , | 3.88 | = 27.16 | 15 , | 8.19 | = | 122.85 | 150.01 |
| 8 | 8 , | 3.68 | = 29.44 | 14 , | 8.07 | = | 112.98 | 142.42 |
| 9 | 9 , | 3.28 | = 29.52 | 13 , | 8.01 | = | 104.13 | 133.65 |
| 10 | 10 , | 2.65 | = 26.50 | 12 , | 8.10 | = | 97.20 | 123.70 |
| 11 | 11 , | 2.65 | = 29.15 | 11 , | 8.10 | = | 89.10 | 118.25 |

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**JIUN MASUDA**
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SEIYU BLDG, TOKIO

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CALCULATIONS FOR

# Arakawa-Bashi, Saitama-Ken

Σ Jo.m Jel for Verticals.

| Load on | | | | | | Summary |
|---|---|---|---|---|---|---|
| 1 | 1, | 24.33 = | 24.33 | | | 24.33 |
| 2 | 2, | 8.18 = | 16.36 | 20, | 1.14 = 22.80 | 39.16 |
| 3 | 3, | 7.98 = | 23.94 | 19, | 1.52 = 28.88 | 52.82 |
| 4 | 4, | 7.88 = | 31.52 | 18, | 1.87 = 33.66 | 65.18 |
| 5 | 5, | 7.85 = | 39.25 | 17, | 2.17 = 36.89 | 76.14 |
| 6 | 6, | 7.90 = | 47.40 | 16, | 2.41 = 38.56 | 85.96 |
| 7 | 7, | 8.01 = | 56.07 | 15, | 2.56 = 38.40 | 94.47 |
| 8 | 8, | 8.13 = | 65.04 | 14, | 2.63 = 36.82 | 101.86 |
| 9 | 9, | 8.19 = | 73.71 | 13, | 2.64 = 34.32 | 108.03 |
| 10 | 10, | 8.10 = | 81.00 | 12, | 2.65 = 31.80 | 112.80 |
| 11 | 11, | 8.10 = | 89.10 | 11, | 2.65 = 29.15 | 118.25 |

☐ Find Σ Jo.m Jhl for all members. put Σ Jo.m Jhl = ξ

| Load on | Upper chord | ½ | Lower chord. | ½ | Diagonals | Verticals | Summary |
|---|---|---|---|---|---|---|---|
| 1 | -1818.76 | -909.38 | -1696.21 | -848.11 | -50.38 | -32.58 | -1840.45 |
| 2 | -3627.34 | -1813.67 | -3358.82 | -1679.41 | -100.00 | -59.78 | -3652.86 |
| 3 | -5412.70 | -2706.35 | -4972.61 | -2486.31 | -149.50 | -81.54 | -5423.70 |
| 4 | -7167.62 | -3583.81 | -6518.64 | -3259.32 | -198.46 | -98.24 | -7139.83 |
| 5 | -8839.44 | -4419.72 | -7972.70 | -3.98635 | -250.43 | -110.43 | -8766.93 |
| 6 | -10426.24 | -5213.12 | -9304.14 | -4652.07 | -304.52 | -118.76 | -10288.47 |
| 7 | -11880.41 | -5940.21 | -10474.27 | -5237.14 | -361.23 | -123.50 | -11662.08 |
| 8 | -13149.70 | -6574.85 | -11435.22 | -5717.61 | -419.18 | -125.18 | -12836.82 |
| 9 | -14172.18 | -7086.09 | -12130.39 | -6065.20 | -473.25 | -123.78 | -13748.32 |
| 10 | -14889.40 | -7444.70 | -12501.32 | -6250.66 | -514.14 | -119.46 | -14328.96 |
| 11. | -15255.46 | -7627.73 | -12501.28 | -6250.64 | -530.64 | -119.46 | -14528.47 |

☐ Find Σ Jo.m Jd l for all members. Σ Jo.m Jd l = η put.

| Load on | Upper chord. | ½ | Lower chord. | ½ | Diagonals | Verticals | Summary |
|---|---|---|---|---|---|---|---|
| 1 | 1352.76 | 676.38 | 1208.87 | 604.44 | 25.60 | 167.21 | 1473.63 |
| 2 | 2644.08 | 1322.04 | 2339.34 | 1169.67 | 50.94 | 168.66 | 2711.31 |
| 3 | 3864.97 | 1932.49 | 3383.34 | 1691.67 | 75.70 | 168.27 | 3868.13 |
| 4 | 5004.22 | 2502.11 | 4331.58 | 2165.79 | 99.82 | 165.22 | 4933.44 |
| 5 | 6047.83 | 3023.92 | 5172.07 | 2586.04 | 124.44 | 161.80 | 5896.20 |
| 6 | 6977.86 | 3488.93 | 5889.88 | 2944.94 | 149.20 | 156.56 | 6739.63 |
| 7 | 7772.79 | 3886.39 | 6466.84 | 3233.42 | 173.48 | 150.01 | 744330 |
| 8 | 8407.62 | 4203.81 | 6882.52 | 3441.26 | 195.76 | 142.42 | 7983.25 |
| 9 | 8857.13 | 4428.57 | 7115.11 | 3552.51 | 212.73 | 133.65 | 8327.46 |
| 10 | 9101.04 | 4550.52 | 7146.50 | 3573.25 | 219.76 | 123.70 | 8467.23 |
| 11. | 9132.09 | 4566.05 | 6969.05 | 3484.53 | 211.97 | 118.25 | 8380.80 |

☐ Find Σ Jo.m Jel for all members Σ Jo.m Jel = ζ

| Load on | Upper chord | ½ | Lower chord. | ½ | Diagonals | Verticals | Summary |
|---|---|---|---|---|---|---|---|
| 1 | 1000.82 | 500.41 | 811.00 | 405.50 | 13.74 | 24.33 | 943.98 |
| 2 | 1998.66 | 999.33 | 1618.26 | 809.13 | 27.70 | 39.16 | 1875.32 |
| 3 | 2989.57 | 1494.79 | 2416.85 | 1208.43 | 41.97 | 52.82 | 3797.91 |
| 4 | 3967.56 | 1983.78 | 3200.30 | 1600.15 | 56.16 | 65.18 | 3705.27 |
| 5 | 4924.23 | 2462.12 | 3959.82 | 1979.91 | 72.57 | 76.14 | 4590.74 |
| 6 | 5847.54 | 2923.77 | 4683.26 | 2341.63 | 90.96 | 85.96 | 5442.32 |
| 7 | 6720.13 | 3360.07 | 5353.95 | 2676.98 | 118.85 | 94.47 | 6250.37 |
| 8 | 7518.14 | 3759.07 | 5949.42 | 2974.71 | 136.54 | 101.86 | 6972.18 |
| 9 | 8210.11 | 4105.06 | 6440.22 | 3220.11 | 163.94 | 108.03 | 7597.14 |
| 10 | 8759.78 | 4379.89 | 6791.66 | 3395.83 | 190.74 | 112.80 | 8079.26 |
| 11. | 9132.09 | 4566.05 | 6969.05 | 3484.53 | 211.97 | 118.25 | 8380.80 |

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CALCULATIONS FOR

# Arakawa-Bashi, Saitama-Ken

Find $\Sigma J_h^2 l$, $\Sigma J_d^2 l$, $\Sigma J_e^2 l$, $\Sigma J_h J_d l$, $\Sigma J_h J_e l$ and $\Sigma J_d J_e l$

| | Upper chord. | ½ | Lower chord. | ½ | Diagonals | Verticals | Summary | Put |
|---|---|---|---|---|---|---|---|---|
| $J_h^2 l$ | 20815.08 | 10407.54 | 20692.86 | 10346.43 | 692.50 | 201.14 | 21,647.61 | $\alpha$ |
| $J_d^2 l$ | 10554.67 | 5277.34 | 10777.88 | 5388.94 | 187.56 | 1118.88 | 11,972.72 | $\beta$ |
| $J_e^2 l$ | 10554.67 | 5277.34 | 10777.88 | 5388.94 | 187.56 | 1118.88 | 11,972.72 | $\beta$ |
| $J_h J_d l$ | -12729.49 | -6364.75 | -12019.16 | -6009.58 | -260.81 | - 48.12 | - 12,683.26 | $\gamma$ |
| $J_h J_e l$ | -12729.49 | -6364.75 | -12019.16 | -6009.58 | -260.81 | - 48.12 | -12,683.26 | $\gamma$ |
| $J_d J_e l$ | 7005.70 | 3502.85 | 5677.16 | 2838.58 | 66.44 | 113.74 | 6,521.61 | $\delta$ |

Equation of 3- unknown

$$\Sigma \rho J_0 J_h + H \Sigma \rho J_h^2 + D \Sigma \rho J_h J_d + E \Sigma \rho J_h J_e = 0$$
$$\Sigma \rho J_0 J_d + H \Sigma \rho J_h J_d + D \Sigma \rho J_d^2 + E \Sigma \rho J_d J_e = 0$$
$$\Sigma \rho J_0 J_e + H \Sigma \rho J_h J_e + D \Sigma \rho J_d J_e + E \Sigma \rho J_e^2 = 0$$

or

$$\xi + \alpha H + \gamma D + \gamma E = 0$$
$$\eta + \gamma H + \beta D + \delta E = 0 \qquad H, D \text{ \& } E \text{ unknown.}$$
$$\zeta + \gamma H + \delta D + \beta E = 0$$

where $\xi = \Sigma J_{0,m} J_h l$
$\eta = \Sigma J_{0,m} J_d l$
$\zeta = \Sigma J_{0,m} J_e l$
$\alpha = \Sigma J_h^2 l$
$\beta = \Sigma J_d^2 l$ or $\Sigma J_e^2 l$
$\gamma = \Sigma J_h J_d l$ or $\Sigma J_h J_e l$
$\delta = \Sigma J_d J_e l$

Solution of equations

$$H = - \frac{(\xi\delta - \eta\gamma)(\gamma\beta - \delta\gamma) - (\xi\beta - \zeta\gamma)(\gamma\delta - \beta\gamma)}{(\alpha\delta - \gamma^2)(\gamma\beta - \delta\gamma) - (\alpha\beta - \gamma^2)(\gamma\delta - \beta\gamma)}$$

$$D = - \frac{(\xi\beta - \zeta\gamma)(\alpha\delta - \gamma^2) - (\xi\delta - \eta\gamma)(\alpha\beta - \gamma^2)}{(\gamma\beta - \delta\gamma)(\alpha\delta - \gamma^2) - (\gamma\delta - \beta\gamma)(\alpha\beta - \gamma^2)}$$

$$E = - \frac{(\xi\gamma - \eta\alpha)(\gamma\delta - \beta\gamma) - (\alpha\beta - \gamma^2)(\eta\gamma - \zeta\gamma)}{(\gamma\beta - \delta\gamma)(\alpha\delta - \gamma^2) - (\gamma\delta - \beta\gamma)(\alpha\beta - \gamma^2)}$$

$(\gamma\beta - \delta\gamma) = \gamma(\beta - \delta) = -12,683.26 (11972.72 - 6521.61) = -69,138,100$
$(\gamma\delta - \beta\gamma) = \gamma(\delta - \beta) = 69,138,100$
$(\alpha\delta - \gamma^2) = 21,647.61 \times 6,521.60 - 12,683.26^2 = -19,689,000$
$(\alpha\beta - \gamma^2) = 21,647.61 \times 11,972.72 - 12,683.26^2 = 98,314,200$

$(\gamma\beta - \delta\gamma)(\alpha\delta - \gamma^2) - (\gamma\delta - \beta\gamma)(\alpha\beta - \gamma^2) = -69,138,100 (98,314,200 - 19,689,000)$
$= -5,436,000,000,000,000$ say.

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CALCULATIONS FOR

Arakawa-Bashi, Saitama-Ken

☐ Find $(\Sigma\delta - \eta\gamma)$ $(\Sigma\beta - \Sigma\gamma)$ $(\eta\gamma - \Sigma\gamma)$ $(\eta\alpha - \Sigma\gamma)$

| Load on | $\Sigma$ | $\delta$ | $\beta$ | $\gamma$ | $\Sigma\delta$ | $\Sigma\beta$ | $\Sigma\gamma$ |
|---|---|---|---|---|---|---|---|
| 1 | -1840.5 | 6521.6 | 11,972.7 | -12,683.3 | -12,003.000 | -22,035,800 | 23,343.600 |
| 2 | -3652.9 | " | " | | -23.822,800 | -43,735,100 | 46,330,800 |
| 3 | -5423.7 | " | " | | -35.371,200 | -64,936,300 | 68,790,400 |
| 4 | -7139.8 | " | " | | -46,562,900 | -85,482.700 | 90,556,200 |
| 5 | -8766.9 | " | " | | -57,174,200 | -104.963,500 | 111,193,200 |
| 6 | -10288.5 | " | " | | -67,097,500 | -123.181.100 | 130,492,100 |
| 7 | -11662.1 | " | " | | -76,055600 | -139.626,800 | 147,913,900 |
| 8 | -12836.8 | " | " | | -83.716,500 | -153.691,200 | 162,813,000 |
| 9 | -13748.3 | " | " | | -89.660.900 | -164,604,300 | 174,373,800 |
| 10 | -14329.0 | " | " | | -93,448,000 | -171.556,800 | 181,739,000 |
| 11. | -14528.5 | " | " | | -94.749,100 | -173,945,400 | 184,269.300 |

| Load on | $\eta$ | $\alpha$ | $\gamma$ | $\eta\alpha$ | $\eta\gamma$ | $\zeta$ | $\Sigma\gamma$ |
|---|---|---|---|---|---|---|---|
| 1 | 1473.6 | 21,647.6 | -12,683.3 | 31,899.900 | -18,690.100 | 944.0 | -11,973,000 |
| 2 | 2711.3 | | | 58,693,100 | -34,388,200 | 1875.3 | -23,785,000 |
| 3 | 3868.1 | | | 83.735,100 | -49.060,300 | 2797.9 | -35,486,600 |
| 4 | 4933.4 | | | 106,796,300 | -62,571,800 | 3705.3 | -46.995,400 |
| 5 | 5896.2 | | | 127,638,600 | -74,783,300 | 4590.7 | -58,225,200 |
| 6 | 6739.6 | | | 145,896,200 | -85,480.400 | 5442.3 | -69.026,300 |
| 7 | 7443.3 | | | 161,129,600 | -94405.600 | 6250.4 | -79.275,700 |
| 8 | 7983.3 | | | 172,819,300 | -101,254,600 | 6972.2 | -88,430,500 |
| 9 | 8327.5 | | | 180,270,400 | -105,620,200 | 7597.1 | -96,356,300 |
| 10 | 8467.2 | | | 183,294,600 | -107392,000 | 8079.3 | -102,472,900 |
| 11. | 8380.8 | | | 181,424,200 | -106,296,200 | 8380.8 | -106,296,200 |

| Load on. | $(\Sigma\delta - \eta\gamma)$ | $(\Sigma\beta - \Sigma\gamma)$ | $(\eta\gamma - \Sigma\gamma)$ | $(\eta\alpha - \Sigma\gamma)$ |
|---|---|---|---|---|
| 1 | 6687.100 | -10.062,800 | -6717,100 | 8556300 |
| 2 | 10565.400 | -19,950,100 | -10,603.200 | 12.362,300 |
| 3 | 13,689.100 | -29,449,700 | -13.573.700 | 14,944,700 |
| 4 | 16,008,900 | -38,487.300 | -15,576,400 | 16,240,100 |
| 5 | 17.609.100 | -46738,300 | -16,558,100 | 16,445,400 |
| 6 | 18,382,900 | -54,154,800 | -16,454,100 | 15,404,100 |
| 7 | 18,350,000 | -60,351,100 | -15,129.900 | 13.215,700 |
| 8 | 17,538,100 | -65,260.700 | -12,824,100 | 10,006.300 |
| 9 | 15,959,300 | -68,248.000 | -9243,900 | 5,896,600 |
| 10 | 13.944,000 | -69,083.900 | -4,919,100 | 1,555.600 |
| 11. | 11,547.100 | -67,649,200 | 0,000,000 | -2,845,100 |

☐ Find H-Surfaces $H = -\dfrac{(\Sigma\delta - \eta\gamma)(\gamma\beta - \delta\gamma) + (\Sigma\beta - \Sigma\gamma)(\beta\gamma - \delta\gamma)}{(\gamma\beta - \delta\gamma)(\alpha\delta - \gamma^2) - (\gamma\delta - \beta\gamma)(\alpha\beta - \gamma^2)}$

| Load on | $(\Sigma\delta - \eta\gamma)(\gamma\beta - \delta\gamma) - (\Sigma\beta - \Sigma\gamma)(\beta\gamma - \delta\gamma)$ | | | $\div$ | H-Surfaces. |
|---|---|---|---|---|---|
| 1 | 6,687,100 | -69,138,100 | -10,062,800 | -3,375,700 | 233,000,000,000 | 0.043 |
| 2 | 10,565,400 | | -19.950,100 | -9,384.700 | 649 " | 0.119 |
| 3 | 13,689,100 | | -29.449,700 | -15,760,600 | 1,089 | 0.200 |
| 4 | 16,008,900 | | -38,487,300 | -22,478,400 | 1,554 | 0.286 |
| 5 | 17,609,100 | | -46738,300 | -29,129,200 | 2.013 | 0.370 |
| 6 | 18,382,900 | | -54,154,800 | -35,771,900 | 2.472 | 0.455 |
| 7 | 18,350,000 | | -60,351,100 | -42,001,100 | 2.903 | 0.534 |
| 8 | 17,538,100 | | -65,260,700 | -47,722,600 | 3.297 | 0.606 |
| 9 | 15,959,300 | | -68,248,000 | -52,288,700 | 3.615 | 0.665 |
| 10 | 13,944,000 | | -69,083,900 | -55,139,900 | 3.810 | 0.700 |
| 11. | 11,547,100 | | -67,649,200 | -56,102,100 | 3.876 | 0.713 |

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CALCULATIONS FOR

Arakawa-Bashi Saitama-Ken

☐ Find H-Surfaces.

| Load on | $(\Sigma\beta - \Sigma\gamma)$ | $(\alpha\delta - \gamma^2)$ | $(\Sigma\delta - \eta\gamma)$ | $(\alpha\beta - \gamma^2)$ | 1,000,000,000,000 | | H-Surfaces |
|---|---|---|---|---|---|---|---|
| 1 | − 10.062,800 | −19,689.000 | 6,687,100 | 98,314,200 | 198 − 657 | −459 | −0.084 |
| 2 | −19,950.100 | " | 10,565.400 | " | 393 − 1,038 | −645 | −0.119 |
| 3 | −29,449,700 | " | 13,689.100 | " | 580 − 1,347 | −767 | −0.141 |
| 4 | −38,487,300 | " | 16,008,900 | " | 758 − 1,573 | −815 | −0.150 |
| 5 | −46,738,300 | " | 17.609,100 | " | 920 − 1,730 | −810 | −0,149 |
| 6 | −54,154,800 | " | 18,382,900 | " | 1,067 − 1,807 | −740 | −0,136 |
| 7 | −60,357,100 | " | 18,350.000 | " | 1,188 − 1,803 | −615 | −0.113 |
| 8 | −65,260,700 | " | 17,538,100 | " | 1,286 − 1,724 | −438 | −0,081 |
| 9 | −68,248,000 | " | 15.959,300 | " | 1,344 − 1,568 | −224 | −0.041 |
| 10 | −69,083,900 | " | 13,944.000 | " | 1,361 − 1,370 | −9 | −0,002 |
| 11. | −67,649,200 | " | 11.547,100 | " | 1,332 − 1,136 | 196 | 0,036 |

☐ Find E-Surfaces

| Load on | $(\Sigma\gamma - \eta\alpha)$ | $(\gamma\delta - \beta\gamma)$ | $(\eta\gamma - \Sigma\beta)$ | $\alpha\beta - \gamma^2$ | 1,000,000,000,000 | | E-Surfaces |
|---|---|---|---|---|---|---|---|
| 1 | − 8,556,300 | 69.138,100 | − 6,717,100 | 98,314,200 | − 591 + 660 | 69 | 0.013 |
| 2 | −12,362,300 | " | −10,603,200 | " | − 854 + 1,042 | 188 | 0.035 |
| 3 | −14,944,700 | " | −13,573,700 | " | −1,033 + 1,333 | 300 | 0.055 |
| 4 | −16,240,100 | " | − 15,576,400 | " | −1,122 + 1,532 | 410 | 0.075 |
| 5 | −16,445,400 | " | −16,558,100 | " | −1,137 + 1,627 | 490 | 0,090 |
| 6 | − 15,404,100 | " | −16,454,100 | " | −1,065 + 1,617 | 552 | 0,102 |
| 7 | −13,215,700 | " | −15,129,900 | " | − 914 + 1,487 | 573 | 0,105 |
| 8 | −10,006,300 | " | −12,824,100 | " | − 691 + 1,260 | 569 | 0,105 |
| 9 | − 5,896,600 | " | − 9,243,900 | " | −408 + 908 | 500 | 0,092 |
| 10 | −1,555,600 | " | − 4,919,100 | " | −107 + 484 | 377 | 0,069 |
| 11. | 2.845,100 | " | 0.000,000 | " | 197 + 0 | 197 | 0,036 |

☐ H, D and E-Surfaces for Side span.

$\Sigma$ So.m Sh l, $\Sigma$ So.m Sd l and $\Sigma$ So.m Se l for upper chord.

| mark | member | So-1 | So-2 | So-3 | So-4 | So-5 | So-6 | So-7 | Sh | Se | Sd | Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| w | -1 | 0.000 | 0.745 | 1.490 | 2.235 | 2.980 | 3.725 | 4.470 | 0 | 0 | -4.470 | 16.60 |
| x | -2 | | | 0.832 | 1.664 | 2.496 | 3.328 | 4.160 | 0 | 0 | -4.160 | 15.97 |
| y | -3 | | | | 0.937 | 1.874 | 2.811 | 3.748 | 0 | 0 | -3.748 | 15.39 |
| z | -4 | | | | | 1.062 | 2.124 | 3.186 | 0 | 0 | -3.186 | 14.84 |
| α | -5 | | | | | | 1.210 | 2.419 | 0 | 0 | -2.419 | 14.35 |
| β | -6 | | | | | | | 1.381 | 0 | 0 | -1.381 | 13.91 |
| γ | -7 | | | | | | | | 0 | 0 | 0.000 | 13.54 |

Find So.m Sd l

| mark | member | So-1 Sd l | So-2 Sd l | So-3 Sd l | So-4 Sd l | So-5 Sd l | So-6 Sd l | So-7 Sd l |
|---|---|---|---|---|---|---|---|---|
| w | -1 | 0.00 | -55,28 | −110.56 | -165,84 | -221.12 | -276.40 | -331.68 |
| x | -2 | | | -55.27 | −110.55 | -165,82 | -221.10 | -276.37 |
| y | -3 | | | | -54.05 | -108.10 | -162.14 | -216.19 |
| z | -4 | | | | | -50.21 | -100.42 | -150.63 |
| α | -5 | | | | | | -42.00 | -84.00 |
| β | -6 | | | | | | | -26.53 |
| γ | -7 | | | | | | | 0.00 |
| Summary | | 0.00 | -55.28 | -165.83 | -330.44 | -545.25 | -802.06 | -1085.40 |

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CALCULATIONS FOR

Arakawa-Bashi, Saitama-Ken

| Load on | ΣJo.mJhl | ΣJo.mJdl | ΣJo.mJel |
|---|---|---|---|
| -1 | 1818.76 | -1352.76 | -1,000.82 |
| -2 | 3637.52 | -2705.52-55.28 = -2760.80 | -2,001.64 |
| -3 | 5456.28 | -4058.28-165.83 = -4224.11 | -3,002.46 |
| -4 | 7275.04 | -5411.04-330.44 = -5741.48 | -4,003.28 |
| -5 | 9093.80 | -6763.80-545.25 = -7309.05 | -5,004.10 |
| -6 | 10912.56 | -8.116.56-802.06 = -8,918.62 | -6,004.92 |
| -7 | 12731.32 | -9,469.32-1,085.40 = -10,554.72 | -7,005.74 |

ΣJo.mJhl, ΣJo.mJdl and ΣJo.mJel for lower chord.

| mark | member | length | Jo.-1 | Jo.-2 | Jo.-3 | Jo.-4 | Jo.-5 | Jo.-6 | Jo.-7 | Jh | Je | Jd |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| w | -0 | 18.98 | -0.738 | -1.477 | -2.215 | -2.953 | -3.691 | -4.430 | -5.167 | 0 | 0 | 5.167 |
| x | -1 | 18.01 | | -0.807 | -1.615 | -2.431 | -3.228 | -4.035 | -4.842 | 0 | 0 | 4.842 |
| y | -2 | 17.09 | | | -0.890 | -1.781 | -2.672 | -3.562 | -4.452 | 0 | 0 | 4.452 |
| z | -3 | 16.23 | | | | -0.988 | -1.977 | -2.965 | -3.952 | 0 | 0 | 3.952 |
| α | -4 | 15.44 | | | | | -1.103 | -2.206 | -3.310 | 0 | 0 | 3.310 |
| β | -5 | 14.72 | | | | | | -1.241 | -2.482 | 0 | 0 | 2.482 |
| γ | -6 | 14.09 | | | | | | | -1.402 | 0 | 0 | 1.402 |

Fwd JomJdl

| mark | member | Jo.-1Jdl | Jo.-2Jdl | Jo.-3Jdl | Jo.-4Jdl | Jo.-5Jdl | Jo.-6Jdl | Jo.-7Jdl |
|---|---|---|---|---|---|---|---|---|
| w | -0 | -72.40 | -144.80 | -217.20 | -289.60 | -362.00 | -434.40 | -506.80 |
| x | -1 | | -70.37 | -140.75 | -211.12 | -281.50 | -351.87 | -422.24 |
| y | -2 | | | -67.72 | -135.43 | -203.30 | -270.86 | -338.73 |
| z | -3 | | | | -63.37 | -126.74 | -190.11 | -253.48 |
| α | -4 | | | | | -56.37 | -112.74 | -165.88 |
| β | -5 | | | | | | -45.34 | -90.68 |
| γ | -6 | | | | | | | -27.70 |
| Summary | | -72.40 | -215.17 | -425.67 | -699.52 | -1029.91 | -1405.32 | -1805.51 |

| Load on | ΣJo.mJhl | ΣJo.mJdl | ΣJo.mJel |
|---|---|---|---|
| -1 | 1,716.99 | -1,281.27-72.40 = -1,353.67 | -811.00 |
| -2 | 3,433.98 | -2,562.54-215.17 = -2,777.71 | -1,622.00 |
| -3 | 5,150.97 | -3,843.81-425.67 = -4269.48 | -2,433.00 |
| -4 | 6,867.96 | -5,125.08-699.52 = -5,824.60 | -3,244.00 |
| -5 | 8,584.95 | -6,406.35-1,029.91 = -7,436.26 | -4,055.00 |
| -6 | 10,301.94 | -7,687.62-1,415.32 = -9,092.94 | -4,866.00 |
| -7 | 12,018.93 | -8,968.89-1,805.51 = -10,774.40 | -5,677.00 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
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CALCULATIONS FOR

Arakawa-Bashi, Saitama-Ken

☐ $\Sigma J_{o.m} J_{d\,l}$, $\Sigma J_{o.m} J_{h\,l}$, and $\Sigma J_{o.m} J_{e\,l}$ for diagonals.

| Mark | member | length | $J_{o.-1}$ | $J_h$ | $J_d$ | $J_e$ | $J_{o-1} J_{L\,l}$ | $J_{o.-1} J_{d\,l}$ | $J_{o.-1} J_{e\,l}$ |
|---|---|---|---|---|---|---|---|---|---|
| A | 1 | 17.27 | -0.0352 | -0.967 | 0.246 | 0.474 | 0.59 | -0.15 | -0.30 |
| B | 2 | 15.94 | -0.0430 | -1.071 | 0.301 | 0.504 | 0.73 | -0.21 | -0.35 |
| C | 3 | 14.96 | -0.0534 | -1.206 | 0.374 | 0.546 | 0.96 | -0.30 | -0.44 |
| D | 4 | 14.26 | -0.0635 | -1.377 | 0.444 | 0.592 | 1.25 | -0.40 | -0.54 |
| E | 5 | 13.80 | -0.0852 | -1.581 | 0.596 | 0.632 | 1.86 | -0.70 | -0.74 |
| F | 6 | 13.52 | -0.1072 | -1.799 | 0.750 | 0.671 | 2.61 | -1.09 | -0.97 |
| G | 7 | 13.38 | -0.1322 | -1.980 | 0.916 | 0.655 | 3.51 | -1.62 | -1.16 |
| H | 8 | 13.34 | -0.1568 | -2.053 | 1.097 | 0.564 | 4.31 (4.30) | -2.30 | -1.18 |
| I | 9 | 13.40 | -0.1713 | -1.876 | 1.199 | 0.336 | 3.05 | -2.76 | -0.77 |
| J | 10 | 13.57 | -0.1650 | -1.362 | 1.156 | -0.034 | 0.95 | -2.59 | 0.08 |
| K | 11 | 13.88 | -0.1330 | -0.513 | 0.932 | -0.500 | -0.51 | -1.70 | 0.92 |
| L | 11 | 13.88 | 0.0715 | -0.573 | -0.500 | 0.932 | -0.09 | -0.50 | 0.92 |
| M | 10 | 13.57 | 0.0048 | -1.362 | -0.034 | 1.156 | 1.21 | 0.00 | 0.08 |
| N | 9 | 13.40 | -0.0482 | -1.876 | 0.336 | 1.199 | 2.21 | -0.21 | -0.77 |
| O | 8 | 13.34 | -0.0806 | -2.053 | 0.564 | 1.097 | 2.48 | -0.61 | -1.18 |
| P | 7 | 13.38 | -0.0936 | -1.980 | 0.655 | 0.916 | 2.34 | -0.82 | -1.16 |
| Q | 6 | 13.52 | -0.0959 | -1.799 | 0.671 | 0.750 | 1.97 | -0.87 | -0.97 |
| R | 5 | 13.80 | -0.0902 | -1.581 | 0.632 | 0.596 | 1.66 | -0.79 | -0.74 |
| S | 4 | 14.26 | -0.0846 | -1.377 | 0.592 | 0.444 | 1.41 | -0.71 | -0.54 |
| T | 3 | 14.96 | -0.0780 | -1.206 | 0.546 | 0.374 | 1.24 | -0.64 | -0.44 |
| U | 2 | 15.94 | -0.0724 | -1.071 | 0.504 | 0.301 | | -0.58 | -0.35 |
| V | 1 | 17.27 | -0.0678 | -0.967 | 0.474 | 0.246 | 1.13 | -0.56 | -0.29 |
| | | | | | | | 39.17 | -10.89 | -20.11 |

$\Sigma J_{o.m} J_{d\,l}$

| Mark | member | length | $J_{o.-1}$ | $J_{o-2}$ | $J_{o-3}$ | $J_{o.-4}$ | $J_{o.-5}$ | $J_{o.-6}$ | $J_{o.-7}$ | $J_h$ | $J_e$ | $J_d$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| w | -1 | 17.27 | 0.672 | 0.569 | 0.467 | 0.364 | 0.261 | 0.159 | 0.056 | 0 | 0 | -0.056 |
| x | -2 | 15.94 | | 0.715 | 0.599 | 0.484 | 0.368 | 0.253 | 0.137 | 0 | 0 | -0.137 |
| y | -3 | 14.96 | | | 0.779 | 0.648 | 0.516 | 0.385 | 0.253 | 0 | 0 | -0.253 |
| z | -4 | 14.26 | | | | 0.868 | 0.716 | 0.565 | 0.413 | 0 | 0 | -0.413 |
| α | -5 | 13.80 | | | | | 0.987 | 0.811 | 0.635 | 0 | 0 | -0.635 |
| β | -6 | 13.52 | | | | | | 1.140 | 0.937 | 0 | 0 | -0.937 |
| γ | -7 | 13.38 | | | | | | | 1.328 | 0 | 0 | -1.328 |

| Mark | member | $J_{o.-1} J_{d\,l}$ | $J_{o-2} J_{d\,l}$ | $J_{o-3} J_{d\,l}$ | $J_{o.-4} J_{d\,l}$ | $J_{o.-5} J_{d\,l}$ | $J_{o.-6} J_{d\,l}$ | $J_{o.-7} J_{d\,l}$ |
|---|---|---|---|---|---|---|---|---|
| w | -1 | -0.650 | -0.557 | -0.457 | -0.352 | -0.253 | -0.153 | -0.054 |
| x | -2 | | -1.561 | -1.309 | -1.056 | -0.804 | -0.551 | -0.299 |
| y | -3 | | | -2.947 | -2.450 | -1.953 | -1.455 | -0.958 |
| z | -4 | | | | -5.110 | -4.218 | -3.325 | -2.432 |
| α | -5 | | | | | -8.650 | -7.107 | -5.565 |
| β | -6 | | | | | | -14.442 | -11.870 |
| γ | -7 | | | | | | | -17.636 |
| Summary | | -0.650 | -2.112 | -4.707 | -8.968 | -15.878 | -27.033 | -38.814 |

| Load on | $\Sigma J_{o.m} J_{h\,l}$ | $\Sigma J_{o.m} J_{d\,l}$ | $\Sigma J_{o.m} J_{e\,l}$ |
|---|---|---|---|
| -1 | 39.17 | -20.11 - 0.65 = -20.76 | -10.89 |
| -2 | 78.34 | -40.22 - 2.11 = -42.33 | -21.78 |
| -3 | 117.51 | -60.33 - 4.71 = -65.04 | -32.67 |
| -4 | 156.68 | -80.44 - 8.97 = -89.41 | -43.56 |
| -5 | 195.85 | -100.55 - 15.88 = -116.43 | -54.45 |
| -6 | 235.02 | -120.66 - 27.03 = -147.69 | -65.34 |
| -7 | 274.19 | -140.77 - 38.81 = -179.58 | -76.23 |

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JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

# Arakawa-Bashi Saitama-Ken

☐ Find. $\Sigma o.m \Sigma h\, l$, $\Sigma o.m \Sigma d\, l$ and $\Sigma o.m \Sigma e\, l$ for Verticals.

| Mark | member | length | $\Sigma o.-1$ | $\Sigma h$ | $\Sigma d$ | $\Sigma e$ | $\Sigma o.-1\, \Sigma h\, l$ | $\Sigma o.-1\, \Sigma d\, l$ | $\Sigma o.-1\, \Sigma e\, l$ |
|---|---|---|---|---|---|---|---|---|---|
| A | 0 | 25.71 | 0.0454 | 0.000 | -0.318 | -6.342 | 0.000 | -0.37 | -7.40 |
| B | 1 | 22.29 | 0.0496 | 1.075 | -0.347 | -0.305 | 1.19 | -0.38 | -0.34 |
| C | 2 | 19.20 | 0.0538 | 1.085 | -0.377 | -0.267 | 1.12 | -0.39 | -0.28 |
| D | 3 | 16.40 | 0.0574 | 1.049 | -0.401 | -0.209 | 0.99 | -0.38 | -0.20 |
| E | 4 | 13.98 | 0.0598 | 0.981 | -0.418 | -0.134 | 0.82 | -0.35 | -0.10 |
| F | 5 | 11.86 | 0.0604 | 0.871 | -0.423 | -0.037 | 0.62 | -0.30 | -0.03 |
| G | 6 | 10.07 | 0.0578 | 0.699 | -0.404 | 0.089 | 0.41 | -0.24 | 0.05 |
| H | 7 | 8.61 | 0.0502 | 0.450 | -0.352 | 0.248 | 0.19 | -0.15 | 0.11 |
| I | 8 | 7.46 | 0.0354 | 0.117 | -0.248 | 0.436 | 0.03 | -0.07 | 0.12 |
| J | 9 | 6.65 | 0.0131 | -0.328 | -0.092 | 0.645 | -0.03 | -0.01 | 0.06 |
| K | 10 | 6.16 | -0.0173 | -0.818 | 0.121 | 0.846 | 0.09 | -0.01 | -0.09 |
| L | 10 | 6.16 | -0.1210 | -0.818 | 0.846 | 0.121 | 0.61 | -0.63 | -0.09 |
| M | 9 | 6.65 | -0.0942 | -0.328 | 0.645 | -0.092 | 0.21 | -0.40 | 0.06 |
| N | 8 | 7.46 | -0.0623 | 0.117 | 0.436 | -0.248 | -0.05 | -0.20 | 0.12 |
| O | 7 | 8.61 | -0.0354 | 0.450 | 0.248 | -0.352 | -0.14 | -0.08 | 0.11 |
| P | 6 | 10.07 | -0.0127 | 0.699 | 0.089 | -0.404 | -0.09 | -0.01 | 0.05 |
| Q | 5 | 11.86 | 0.0053 | 0.871 | -0.037 | -0.423 | 0.05 | -0.02 | -0.03 |
| R | 4 | 13.98 | 0.0192 | 0.981 | -0.134 | -0.418 | 0.26 | -0.04 | -0.10 |
| S | 3 | 16.40 | 0.0298 | 1.049 | -0.209 | -0.401 | 0.51 | -0.10 | -0.20 |
| T | 2 | 19.20 | 0.0377 | 1.085 | -0.267 | -0.377 | 0.79 | -0.19 | -0.28 |
| U | 1 | 22.29 | 0.0436 | 1.075 | -0.305 | -0.347 | 1.04 | -0.30 | -0.34 |
| V | 0 | 25.71 | 0.0480 | 0.000 | -6.342 | -0.318 | 0.00 | — | — |
| | | | | | | | 8.62 | -4.62 | -8.80 |

| Mark | member | length | $\Sigma o.-1$ | $\Sigma o.-2$ | $\Sigma o.-3$ | $\Sigma o.-4$ | $\Sigma o.-5$ | $\Sigma o.-6$ | $\Sigma o.-7$ | $\Sigma h$ | $\Sigma e$ | $\Sigma d$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V | 0 | 25.71 | 0.048 | 1.098 | 2.147 | 3.198 | 4.245 | 5.298 | 6.342 | 0 | -0.318 | -6.342 |
| W | -1 | 22.29 | -1.000 | -0.907 | -0.813 | -0.720 | -0.622 | -0.529 | -0.436 | 0 | 0 | 0.436 |
| X | -2 | 19.20 | | -1.000 | -0.908 | -0.816 | -0.724 | -0.632 | -0.540 | 0 | 0 | 0.540 |
| Y | -3 | 16.40 | | | -1.000 | -0.913 | -0.826 | -0.738 | -0.651 | 0 | 0 | 0.651 |
| Z | -4 | 13.98 | | | | -1.000 | -0.921 | -0.842 | -0.763 | 0 | 0 | 0.763 |
| α | -5 | 11.86 | | | | | -1.000 | -0.934 | -0.868 | 0 | 0 | 0.868 |
| β | -6 | 10.07 | | | | | | -1.000 | -0.955 | 0 | 0 | 0.955 |
| γ | -7 | 8.61 | | | | | | | -1.000 | 0 | 0 | 1.000 |

$\Sigma o.m\, \Sigma e\, l$

| mark | member | $\Sigma o.-1\, \Sigma e\, l$ | $\Sigma o.-2\, \Sigma e\, l$ | $\Sigma o.-3\, \Sigma e\, l$ | $\Sigma o.-4\, \Sigma e\, l$ | $\Sigma o.-5\, \Sigma e\, l$ | $\Sigma o.-6\, \Sigma e\, l$ | $\Sigma o.-7\, \Sigma e\, l$ |
|---|---|---|---|---|---|---|---|---|
| V | 0 | -0.392 | -8.977 | -17.553 | -26.146 | -34.706 | -43.315 | -51.851 |

$\Sigma o.m\, \Sigma d\, l$

| mark | member | $\Sigma o.-1\, \Sigma d\, l$ | $\Sigma o.-2\, \Sigma d\, l$ | $\Sigma o.-3\, \Sigma d\, l$ | $\Sigma o.-4\, \Sigma e\, l$ | $\Sigma o.-5\, \Sigma e\, l$ | $\Sigma o.-6\, \Sigma e\, l$ | $\Sigma o.-7\, \Sigma e\, l$ |
|---|---|---|---|---|---|---|---|---|
| V | 0 | -7.827 | -179.032 | -350.075 | -521.443 | -692.160 | -863.855 | -1034.082 |
| W | -1 | -9.718 | -8.810 | -7.903 | -6.995 | -6.087 | -5.180 | -4.272 |
| X | -2 | | -10.368 | -9.419 | -8.471 | -7.522 | -6.573 | -5.625 |
| Y | -3 | | | -10.689 | -9.757 | -8.825 | -7.893 | -6.961 |
| Z | -4 | | | | -10.667 | -9.824 | -8.982 | -8.139 |
| α | -5 | | | | | -10.294 | -9.619 | -8.943 |
| β | -6 | | | | | | -9.617 | -9.184 |
| γ | -7 | | | | | | | -8.610 |
| Summary | | -17.545 | -198.210 | -378.086 | -557.333 | -734.712 | -911.719 | -1085.816 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Bashi, Saitama-Ken

| Load on | Σ Jo.m Jk l | Σ Jom. Jd l | | Σ Jom. Je l | |
|---|---|---|---|---|---|
| -1 | 8.62 | -4.62 -17.55 = | -22.17 | -8.80 - 0.39 = | - 9.19 |
| -2 | 17.24 | - 9.24 - 198.21 = | -207.45 | - 17.60 - 8.98 = | - 26.58 |
| -3 | 25.86 | - 13.86 - 378.09 = | -392.95 | - 26.40 - 17.55 = | - 43.95 |
| -4 | 34.48 | - 18.48 - 557.33 = | -575.81 | - 35.20 - 26.15 = | - 61.35 |
| -5 | 43.10 | - 23.10 - 734.72 = | -757.81 | - 44.00 - 34.71 = | - 78.71 |
| -6 | 51.72 | - 27.72 - 911.72 = | -939.44 | - 52.80 - 43.32 = | - 96.12 |
| -7 | 60.34 | - 32.34 - 1085.82 = | -1118.16 | - 61.60 - 51.85 = | - 113.45 |

Σ Jo.m Jf l = F

| Load on | Upper chord | 1/2 | Lower chord | 1/2 | Diagonals | Verticals | Summary |
|---|---|---|---|---|---|---|---|
| -1 | 1818.76 | 909.38 | 1716.99 | 858.50 | 39.17 | 8.62 | 1815.67 |
| -2 | 3637.52 | 1,818.76 | 3433.98 | 1716.99 | 78.34 | 17.24 | 3631.34 |
| -3 | 5456.28 | 2728.14 | 5150.97 | 2575.49 | 117.51 | 25.86 | 5447.01 |
| -4 | 7275.04 | 3,637.52 | 6,867.96 | 3433.98 | 156.68 | 34.48 | 7,262.68 |
| -5 | 9,093.80 | 4,546.90 | 8584.95 | 4292.48 | 195.85 | 43.10 | 9,078.35 |
| -6 | 10,912.56 | 5456.28 | 10,301.94 | 5150.97 | 235.02 | 51.72 | 10,894.02 |
| -7 | 12,731.32 | 6,365.66 | 12,018.93 | 6009.47 | 274.19 | 60.34 | 12,709.69 |

Σ Jom. Jd l = η

| Load on | Upper chord | 1/2 | Lower chord | 1/2 | Diagonals | Verticals | Summary |
|---|---|---|---|---|---|---|---|
| -1 | - 1352.76 | - 676.38 | - 1353.67 | - 676.84 | - 20.76 | - 22.17 | - 1396.15 |
| -2 | - 2760.80 | -1380.40 | - 2777.71 | -1388.86 | -42.33 | -207.45 | -3019.04 |
| -3 | -4224.11 | - 2112.06 | -4,269.48 | -2134.74 | - 65.04 | - 392.95 | - 4704.79 |
| -4 | -5741.48 | -2,870.74 | -5,824.60 | -2912.30 | -89.41 | -575.81 | -6448.26 |
| -5 | - 7309.05 | - 3,654.53 | - 7,436.26 | - 3,718.13 | - 116.43 | - 757.81 | - 8246.90 |
| -6 | -8918.62 | - 4.459.32 | - 9.092.94 | - 4,546.47 | - 147.69 | - 939.44 | -10092.92 |
| -7 | -10554.72 | -5,277.36 | -10,774.40 | -5,387.20 | - 179.58 | -1118.16 | -11962.30 |

Σ Jo.m Ja l = ζ

| Load on | Upper chord. | 1/2 | Lower chord. | 1/2 | Diagonals | Verticals | Summary |
|---|---|---|---|---|---|---|---|
| -1 | - 1000.82 | - 500.41 | - 811.00 | - 405.50 | - 10.89 | - 9.19 | - 925.99 |
| -2 | - 2001.64 | -1000.82 | -1622.00 | - 811.00 | - 21.78 | - 26.58 | -1860.18 |
| -3 | - 3002.46 | -1,501.23 | -2433.00 | -1216.50 | - 32.67 | - 43.95 | -2794.35 |
| -4 | -4003.28 | -2.001.64 | -3,244.00 | -1622.00 | -43.56 | - 61.35 | -3,728.55 |
| -5 | -5004.10 | -2,502.05 | -4.055.00 | -2027.50 | -54.45 | - 78.71 | -4.662.71 |
| -6 | -6004.92 | - 3,002.46 | -4.866.00 | -2433.00 | -65.34 | - 96.12 | -5,596.92 |
| -7 | - 7005.74 | -3,502.87 | -5,677.00 | -2.838.50 | - 76.23 | -113.45 | -6,531.05 |

☐ Find (ζδ - ηβ) (ζβ - ζγ) (ηγ - ζγ) (ηα - ζγ)

| Load on | ζ | δ | β | γ | ζδ | ζβ | ζγ |
|---|---|---|---|---|---|---|---|
| -1 | 1815.7 | 6,521.6 | 11,972.7 | -12,683.3 | 11,841,100 | 21,738.800 | - 23,028,700 |
| -2 | 3631.3 | | | | 23,682.200 | 43,476,500 | - 46,057,400 |
| -3 | 5447.0 | | | | 35,523.300 | 65,215,300 | - 69,086,100 |
| -4 | 7262.7 | | | | 47,364.400 | 86,954,100 | - 92,114,800 |
| -5 | 9,078.4 | | | | 59,205,500 | 108,693,000 | - 115,143,500 |
| -6 | 10.894.0 | | | | 71.046.600 | 130,430.600 | - 138,172,200 |
| -7 | 12,709.7 | | | | 82,889.500 | 152,169,400 | - 161,200,900 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 62

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

| Load on | η | α | r | ηα | ηr | ζ | ζr |
|---|---|---|---|---|---|---|---|
| -1 | -1396.2 | 21,647.6 | -12,683 | -30,224,400 | 17,708,400 | -926.0 | 11,744,700 |
| -2 | -3019.0 | | | -65,354,100 | 38,290,900 | -1860.2 | 23,593,500 |
| -3 | -4704.8 | | | -101,847,600 | 59,672,400 | -2794.4 | 35,442,200 |
| -4 | -6448.3 | | | -139,590,200 | 81,785,700 | -3,728.6 | 47,291,000 |
| -5 | -8246.9 | | | -178,525,600 | 104,597,900 | -4,662.7 | 59,138,400 |
| -6 | -10092.9 | | | -218,487,100 | 128,011,300 | -5,596.9 | 70,987,200 |
| -7 | -11,962.3 | | | -258,955,000 | 151,721,400 | -6,531.1 | 82,835,900 |

| Load on | (ξδ-ηr) | (ξβ-ζr) | (ηr-ζr) | (ηα-ζr) |
|---|---|---|---|---|
| -1 | -5,867,300 | 9,994,100 | 5,504,600 | -6,412,000 |
| -2 | -14,608,700 | 19,883,000 | 13,779,100 | -17,729,400 |
| -3 | -24,149,100 | 29,773,100 | 22,852,800 | -30,410,600 |
| -4 | -34,421,300 | 39,663,100 | 32,658,200 | -44,340,800 |
| -5 | -45,392,400 | 49,554,600 | 43,163,800 | -59,463,900 |
| -6 | -56,964,700 | 59,443,400 | 57,024,100 | -80,314,900 |
| -7 | -68,833,700 | 69,333,500 | 65,671,600 | -92,268,700 |

☐ Find H-Surfaces for side span.

| Load on | (ξδ-ηr) | (ξβ-ζr) | (rβ-δr) | $\frac{(\xi\delta-\eta r)(r\beta-\delta r)-(\xi\beta-\zeta r)(r\beta-\delta r)}{1,000,000,000,000}$ | H-Surfaces |
|---|---|---|---|---|---|
| -1 | -5,867,300 | 9,994,100 | -69,138,100 | 285 | 0.046 |
| -2 | -14,608,700 | 19,883,000 | | 365 | 0.061 |
| -3 | -24,149,100 | 29,773,100 | | 389 | 0.066 |
| -4 | -34,421,300 | 39,663,100 | | 362 | 0.061 |
| -5 | -45,392,400 | 49,554,600 | | 288 | 0.047 |
| -6 | -56,964,700 | 59,443,400 | | 171 | 0.025 |
| -7 | -68,833,700 | 69,333,500 | | 34 | 0.000 |

☐ Find D-Surfaces for side span.

| Load on | (ξβ-ζr) | (αδ-r²) | (ξδ-ηr) | (αβ-r²) | $\frac{(\xi\beta-\zeta r)(\alpha\delta-r^2)-(\xi\delta-\eta r)(\alpha\beta-r^2)}{1,000,000,000,000}$ | D-Surfaces |
|---|---|---|---|---|---|---|
| -1 | 9,994,100 | -19,689,000 | -5,867,300 | 98,314,200 | 380 | 0.078 |
| -2 | 19,883,000 | | -14,608,700 | | 1044 | 0.198 |
| -3 | 29,773,100 | | -24,149,100 | | 1,788 | 0.335 |
| -4 | 39,663,100 | | -34,421,300 | | 2,602 | 0.485 |
| -5 | 49,554,600 | | -45,392,400 | | 3,487 | 0.647 |
| -6 | 59,443,400 | | -56,964,700 | | 4,429 | 0.820 |
| -7 | 69,333,500 | | -68,833,700 | | 5402 | 1.000 |

☐ Find E-Surfaces for side span.

| Load on | (ξδ-ηα) | (rδ-βr) | (ηβ-ζr) | (αβ-r²) | $\frac{(\xi\delta-\eta\alpha)(r\delta-\beta r)-(\eta\delta-\zeta r)(\alpha\beta-r^2)}{1,000,000,000,000}$ | E-Surfaces |
|---|---|---|---|---|---|---|
| -1 | 6,412,000 | 69,138,100 | 5,504,600 | 98,314,200 | -98 | -0.018 |
| -2 | 17,729,400 | | 13,779,100 | | -130 | -0.024 |
| -3 | 30,410,600 | | 22,852,800 | | -145 | -0.027 |
| -4 | 44,340,800 | | 32,658,200 | | -147 | -0.027 |
| -5 | 59,463,900 | | 43,163,800 | | -133 | -0.024 |
| -6 | 80,314,900 | | 57,024,100 | | -52 | -0.010 |
| -7 | 92,268,700 | | 65,671,600 | | -20 | 0.000 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 63

CALCULATIONS FOR

# Arakawa Bashi for Saitama-Ken

☐ Find H.Jh for upper chords

| Member | Jh | Load on 1 H=0.043 | 2 0.119 | 3 0.200 | 4 0.286 | 5 0.370 | 6 0.455 | 7 0.534 | 8 0.606 | 9 0.665 | 10 0.700 | 11 0.713 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.821 | 0.035 | 0.098 | 0.164 | 0.235 | 0.304 | 0.374 | 0.439 | 0.498 | 0.546 | 0.575 | 0.586 |
| 2 | 1.748 | 0.075 | 0.208 | 0.350 | 0.500 | 0.647 | 0.796 | 0.934 | 1.060 | 1.163 | 1.224 | 1.247 |
| 3 | 2.804 | 0.121 | 0.334 | 0.561 | 0.802 | 1.037 | 1.276 | 1.497 | 1.699 | 1.864 | 1.962 | 1.998 |
| 4 | 4.013 | 0.173 | 0.478 | 0.803 | 1.148 | 1.485 | 1.826 | 2.143 | 2.432 | 2.668 | 2.810 | 2.862 |
| 5 | 5.399 | 0.232 | 0.642 | 1.080 | 1.544 | 1.998 | 2.457 | 2.883 | 3.272 | 3.590 | 3.779 | 3.849 |
| 6 | 6.956 | 0.299 | 0.828 | 1.391 | 1.989 | 2.574 | 3.165 | 3.715 | 4.215 | 4.626 | 4.869 | 4.960 |
| 7 | 8.678 | 0.373 | 1.033 | 1.736 | 2.482 | 3.211 | 3.948 | 4.634 | 5.259 | 5.771 | 6.075 | 6.187 |
| 8 | 10.428 | 0.448 | 1.241 | 2.086 | 2.982 | 3.858 | 4.745 | 5.569 | 6.319 | 6.935 | 7.300 | 7.435 |
| 9 | 12.012 | 0.517 | 1.429 | 2.402 | 3.435 | 4.444 | 5.465 | 6.414 | 7.279 | 7.988 | 8.408 | 8.565 |
| 10 | 13.126 | 0.564 | 1.562 | 2.625 | 3.754 | 4.857 | 5.972 | 7.009 | 7.954 | 8.729 | 9.188 | 9.388 |
| 11 | 13.500 | 0.581 | 1.607 | 2.700 | 3.861 | 4.995 | 6.143 | 7.209 | 8.181 | 8.978 | 9.450 | 9.626 |

☐ Find H Jh for Lower chords.

| Member | Ja | Load on 1 H=0.043 | 2 0.119 | 3 0.200 | 4 0.286 | 5 0.370 | 6 0.455 | 7 0.534 | 8 0.606 | 9 0.665 | 10 0.700 | 11 0.713 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | -1.489 | -0.064 | -0.117 | -0.298 | -0.426 | -0.551 | -0.678 | -0.801 | -0.903 | -0.991 | -1.042 | -1.062 |
| 1 | -2.304 | -0.099 | -0.274 | -0.461 | -0.659 | -0.853 | -1.048 | -1.230 | -1.396 | -1.532 | -1.612 | -1.642 |
| 2 | -3.211 | -0.138 | -0.382 | -0.642 | -0.918 | -1.188 | -1.461 | -1.714 | -1.945 | -2.135 | -2.247 | -2.288 |
| 3 | -4.231 | -0.182 | -0.503 | -0.846 | -1.210 | -1.565 | -1.925 | -2.259 | -2.564 | -2.814 | -2.962 | -3.017 |
| 4 | -5.384 | -0.232 | -0.641 | -1.077 | -1.540 | -1.992 | -2.450 | -2.875 | -3.263 | -3.580 | -3.769 | -3.839 |
| 5 | -6.715 | -0.289 | -0.799 | -1.343 | -1.920 | -2.485 | -3.055 | -3.586 | -4.069 | -4.465 | -4.701 | -4.788 |
| 6 | -8.169 | -0.351 | -0.972 | -1.634 | -2.336 | -3.023 | -3.717 | -4.362 | -4.950 | -5.432 | -5.718 | -5.824 |
| 7 | -9.765 | -0.420 | -1.162 | -1.953 | -2.793 | -3.613 | -4.443 | -5.215 | -5.918 | -6.494 | -6.836 | -6.962 |
| 8 | -11.420 | -0.491 | -1.359 | -2.284 | -3.266 | -4.225 | -5.196 | -6.098 | -6.921 | -7.594 | -7.994 | -8.142 |
| 9 | -12.933 | -0.556 | -1.539 | -2.587 | -3.699 | -4.785 | -5.885 | -6.906 | -7.837 | -8.600 | -9.053 | -9.221 |
| 10 | -14.040 | -0.604 | -1.671 | -2.808 | -4.015 | -5.195 | -6.388 | -7.497 | -8.508 | -9.337 | -9.828 | -10.011 |
| 11 | | | | | | | | | | | | |

☐ Find H Jh for Diagonals

| Member | Ja | Load on 1 H=0.043 | 2 0.119 | 3 0.200 | 4 0.286 | 5 0.370 | 6 0.455 | 7 0.534 | 8 0.606 | 9 0.665 | 10 0.700 | 11 0.713 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.967 | -0.042 | -0.115 | -0.193 | -0.277 | -0.358 | -0.440 | -0.516 | -0.586 | -0.643 | -0.677 | -0.689 |
| 2 | -1.071 | -0.046 | -0.127 | -0.214 | -0.306 | -0.396 | -0.487 | -0.572 | -0.649 | -0.712 | -0.749 | -0.763 |
| 3 | -1.206 | -0.052 | -0.143 | -0.241 | -0.345 | -0.446 | -0.549 | -0.644 | -0.731 | -0.802 | -0.844 | -0.860 |
| 4 | -1.377 | -0.059 | -0.164 | -0.275 | -0.394 | -0.509 | -0.627 | -0.735 | -0.834 | -0.916 | -0.964 | -0.982 |
| 5 | -1.581 | -0.068 | -0.188 | -0.316 | -0.452 | -0.585 | -0.719 | -0.844 | -0.958 | -1.051 | -1.107 | -1.127 |
| 6 | -1.799 | -0.077 | -0.214 | -0.360 | -0.515 | -0.666 | -0.819 | -0.961 | -1.090 | -1.196 | -1.259 | -1.283 |
| 7 | -1.980 | -0.085 | -0.236 | -0.396 | -0.566 | -0.733 | -0.901 | -1.057 | -1.200 | -1.317 | -1.386 | -1.412 |
| 8 | -2.053 | -0.088 | -0.244 | -0.411 | -0.587 | -0.760 | -0.934 | -1.096 | -1.244 | -1.365 | -1.437 | -1.464 |
| 9 | -1.876 | -0.081 | -0.223 | -0.375 | -0.536 | -0.694 | -0.854 | -1.002 | -1.137 | -1.247 | -1.313 | -1.338 |
| 10 | -1.362 | -0.059 | -0.162 | -0.272 | -0.390 | -0.504 | -0.606 | -0.727 | -0.825 | -0.906 | -0.953 | -0.971 |
| 11 | -0.513 | -0.022 | -0.061 | -0.103 | -0.147 | -0.190 | -0.233 | -0.274 | -0.311 | -0.341 | -0.359 | -0.366 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CHECKED BY _____ DATE _____ PAGE NO 63A

CALCULATIONS FOR

Arakawa-Bashi Saitama-Ken

☐ Find H. Jh for Verticals.

| Member | Jt | load on 1 H=0.043 | 2 0.119 | 3 0.200 | 4 0.286 | 5 0.370 | 6 0.455 | 7 0.534 | 8 0.606 | 9 0.665 | 10 0.700 | 11 0.713 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.075 | 0.046 | 0.128 | 0.215 | 0.307 | 0.398 | 0.489 | 0.574 | 0.651 | 0.714 | 0.753 | 0.766 |
| 2 | 1.085 | 0.047 | 0.129 | 0.217 | 0.310 | 0.401 | 0.494 | 0.580 | 0.658 | 0.721 | 0.760 | 0.774 |
| 3 | 1.049 | 0.045 | 0.125 | 0.210 | 0.300 | 0.388 | 0.477 | 0.560 | 0.636 | 0.698 | 0.734 | 0.748 |
| 4 | 0.981 | 0.042 | 0.117 | 0.196 | 0.281 | 0.363 | 0.446 | 0.524 | 0.594 | 0.652 | 0.686 | 0.700 |
| 5 | 0.871 | 0.037 | 0.104 | 0.174 | 0.249 | 0.322 | 0.396 | 0.465 | 0.528 | 0.579 | 0.610 | 0.621 |
| 6 | 0.699 | 0.029 | 0.083 | 0.134 | 0.191 | 0.247 | 0.304 | 0.357 | 0.405 | 0.445 | 0.468 | 0.477 |
| 7 | 0.450 | 0.019 | 0.054 | 0.090 | 0.129 | 0.167 | 0.205 | 0.240 | 0.273 | 0.299 | 0.315 | 0.321 |
| 8 | 0.117 | 0.005 | 0.014 | 0.023 | 0.033 | 0.044 | 0.053 | 0.062 | 0.071 | 0.078 | 0.082 | 0.083 |
| 9 | -0.328 | -0.014 | -0.039 | -0.065 | -0.094 | -0.121 | -0.149 | -0.175 | -0.199 | -0.218 | -0.230 | -0.234 |
| 10 | -0.818 | -0.035 | -0.097 | -0.164 | -0.234 | -0.303 | -0.372 | -0.437 | -0.496 | -0.544 | -0.573 | -0.583 |

☐ Find DJd for upper chords.

| Members | Jd | load on 7 D=1.000 | -6 0.820 | -5 0.647 | -4 0.485 | -3 0.335 | -2 0.198 | -1 0.078 | 1 -0.084 | 2 -0.119 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.237 | -0.237 | -0.194 | -0.153 | -0.115 | -0.079 | -0.047 | -0.018 | 0.020 | 0.028 |
| 2 | -0.529 | -0.529 | -0.434 | -0.342 | -0.257 | -0.177 | -0.105 | -0.041 | 0.044 | 0.063 |
| 3 | -0.894 | -0.894 | -0.733 | -0.578 | -0.434 | -0.299 | -0.177 | -0.070 | 0.025 | 0.106 |
| 4 | -1.351 | -1.351 | -1.107 | -0.874 | -0.655 | -0.453 | -0.267 | -0.105 | 0.113 | 0.161 |
| 5 | -1.924 | -1.924 | -1.577 | -1.244 | -0.933 | -0.645 | -0.381 | -0.150 | 0.160 | 0.229 |
| 6 | -2.637 | -2.637 | -2.162 | -1.706 | -1.278 | -0.883 | -0.522 | -0.206 | 0.222 | 0.314 |
| 7 | -3.506 | -3.506 | -2.875 | -2.268 | -1.700 | -1.175 | -0.694 | -0.273 | 0.295 | 0.417 |
| 8 | -4.514 | -4.514 | -3.701 | -2.921 | -2.189 | -1.512 | -0.894 | -0.352 | 0.375 | 0.537 |
| 9 | -5.600 | -5.600 | -4.592 | -3.623 | -2.716 | -1.876 | -1.109 | -0.437 | 0.470 | 0.666 |
| 10 | -6.629 | -6.629 | -5.436 | -4.289 | -3.215 | -2.221 | -1.313 | -0.517 | 0.557 | 0.789 |
| 11 | -7.438 | -7.438 | -6.099 | -4.812 | -3.607 | -2.492 | -1.473 | -0.580 | 0.625 | 0.885 |
| 11 | -7.438 | -7.438 | -6.099 | -4.812 | -3.607 | -2.492 | -1.473 | -0.580 | 0.625 | 0.885 |
| 10 | -7.955 | -7.955 | -6.523 | -5.147 | -3.858 | -2.665 | -1.575 | -0.620 | 0.668 | 0.947 |
| 9 | -8.089 | -8.089 | -6.633 | -5.234 | -3.932 | -2.710 | -1.602 | -0.631 | 0.679 | 0.963 |
| 8 | -7.898 | -7.898 | -6.476 | -5.110 | -3.830 | -2.646 | -1.563 | -0.616 | 0.663 | 0.940 |
| 7 | -7.512 | -7.512 | -6.160 | -4.862 | -3.643 | -2.517 | -1.487 | -0.586 | 0.631 | 0.894 |
| 6 | -7.032 | -7.032 | -5.766 | -4.557 | -3.410 | -2.356 | -1.392 | -0.548 | 0.591 | 0.837 |
| 5 | -6.542 | -6.542 | -5.364 | -4.233 | -3.173 | -2.192 | -1.295 | -0.510 | 0.549 | 0.778 |
| 4 | -6.080 | -6.080 | -4.986 | -3.934 | -2.948 | -2.036 | -1.204 | -0.474 | 0.511 | 0.724 |
| 3 | -5.663 | -5.663 | -4.643 | -3.664 | -2.747 | -1.897 | -1.121 | -0.442 | 0.476 | 0.674 |
| 2 | -5.292 | -5.292 | -4.339 | -3.424 | -2.567 | -1.773 | -1.048 | -0.413 | 0.445 | 0.630 |
| 1 | -4.976 | -4.976 | -4.080 | -3.219 | -2.413 | -1.667 | -0.985 | -0.388 | 0.418 | 0.592 |
| -1 | -4.470 | -4.470 | -3.665 | -2.892 | -2.168 | -1.497 | -0.885 | -0.349 | 0.375 | 0.532 |
| -2 | -4.160 | -4.160 | -3.411 | -2.692 | -2.018 | -1.394 | -0.824 | -0.324 | 0.349 | 0.495 |
| -3 | -3.748 | -3.748 | -3.073 | -2.425 | -1.818 | -1.256 | -0.742 | -0.292 | 0.315 | 0.446 |
| -4 | -3.186 | -3.186 | -2.613 | -2.061 | -1.545 | -1.067 | -0.631 | -0.249 | 0.268 | 0.379 |
| -5 | -2.419 | -2.419 | -1.984 | -1.565 | -1.173 | -0.810 | -0.479 | -0.189 | 0.203 | 0.288 |
| -6 | -1.381 | -1.381 | -1.132 | -0.894 | -0.670 | -0.463 | -0.273 | -0.108 | 0.116 | 0.164 |
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
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CALCULATIONS FOR

# Arakawa-Bashi, Saitama-Ken

☐ Find D-Jd for upper chord continued.

| Member | Jd | load on 3 D=-0.141 | 4 -0.150 | 5 -0.149 | 6 -0.136 | 7 -0.113 | 8 -0.081 | 9 -0.041 | 10 -0.002 | 11 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.237 | 0.033 | 0.036 | 0.035 | 0.032 | 0.027 | 0.019 | 0.010 | 0.001 | -0.009 |
| 2 | -0.529 | 0.075 | 0.079 | 0.079 | 0.072 | 0.060 | 0.042 | 0.022 | 0.001 | -0.019 |
| 3 | -0.894 | 0.126 | 0.134 | 0.133 | 0.122 | 0.101 | 0.072 | 0.037 | 0.002 | -0.032 |
| 4 | -1.351 | 0.190 | 0.203 | 0.201 | 0.184 | 0.153 | 0.109 | 0.055 | 0.003 | -0.049 |
| 5 | -1.924 | 0.271 | 0.289 | 0.287 | 0.262 | 0.217 | 0.156 | 0.079 | 0.004 | -0.069 |
| 6 | -2.637 | 0.372 | 0.396 | 0.393 | 0.359 | 0.298 | 0.214 | 0.108 | 0.005 | -0.095 |
| 7 | -3.506 | 0.494 | 0.526 | 0.522 | 0.477 | 0.396 | 0.284 | 0.144 | 0.007 | -0.126 |
| 8 | -4.514 | 0.636 | 0.677 | 0.673 | 0.614 | 0.510 | 0.366 | 0.185 | 0.009 | -0.163 |
| 9 | -5.600 | 0.790 | 0.840 | 0.834 | 0.762 | 0.633 | 0.454 | 0.230 | 0.011 | -0.202 |
| 10 | -6.629 | 0.935 | 0.994 | 0.988 | 0.902 | 0.749 | 0.537 | 0.272 | 0.013 | -0.239 |
| 11 | -7.438 | 1.049 | 1.116 | 1.108 | 1.012 | 0.840 | 0.602 | 0.305 | 0.015 | -0.268 |
| 11 | -7.438 | 1.049 | 1.116 | 1.108 | 1.012 | 0.840 | 0.602 | 0.305 | 0.015 | -0.268 |
| 10 | -7.955 | 1.122 | 1.193 | 1.185 | 1.082 | 0.899 | 0.644 | 0.326 | 0.016 | -0.286 |
| 9 | -8.089 | 1.142 | 1.213 | 1.205 | 1.100 | 0.914 | 0.655 | 0.332 | 0.016 | -0.291 |
| 8 | -7.898 | 1.114 | 1.185 | 1.177 | 1.074 | 0.892 | 0.640 | 0.324 | 0.016 | -0.284 |
| 7 | -7.512 | 1.059 | 1.127 | 1.119 | 1.022 | 0.849 | 0.608 | 0.308 | 0.015 | -0.270 |
| 6 | -7.032 | 0.992 | 1.055 | 1.048 | 0.956 | 0.795 | 0.570 | 0.288 | 0.014 | -0.253 |
| 5 | -6.542 | 0.922 | 0.981 | 0.975 | 0.890 | 0.739 | 0.530 | 0.268 | 0.013 | -0.236 |
| 4 | -6.080 | 0.857 | 0.912 | 0.906 | 0.827 | 0.687 | 0.492 | 0.249 | 0.012 | -0.219 |
| 3 | -5.663 | 0.798 | 0.849 | 0.844 | 0.770 | 0.640 | 0.459 | 0.232 | 0.011 | -0.204 |
| 2 | -5.292 | 0.746 | 0.794 | 0.789 | 0.720 | 0.598 | 0.429 | 0.217 | 0.011 | -0.191 |
| 1 | -4.976 | 0.702 | 0.746 | 0.741 | 0.677 | 0.562 | 0.403 | 0.204 | 0.010 | -0.179 |
| -1 | -4.470 | 0.630 | 0.671 | 0.666 | 0.608 | 0.505 | 0.363 | 0.183 | 0.009 | -0.161 |
| -2 | -4.160 | 0.587 | 0.624 | 0.620 | 0.566 | 0.470 | 0.337 | 0.171 | 0.008 | -0.150 |
| -3 | -3.748 | 0.528 | 0.562 | 0.558 | 0.510 | 0.423 | 0.304 | 0.154 | 0.008 | -0.135 |
| -4 | -3.186 | 0.449 | 0.478 | 0.475 | 0.433 | 0.360 | 0.258 | 0.131 | 0.006 | -0.115 |
| -5 | -2.419 | 0.341 | 0.363 | 0.360 | 0.329 | 0.273 | 0.196 | 0.099 | 0.005 | -0.087 |
| -6 | -1.381 | 0.195 | 0.207 | 0.206 | 0.188 | 0.156 | 0.112 | 0.057 | 0.003 | -0.050 |
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

☐ Find DJd for Lower chords.

| Member | Jd | Load on -7 D=1.000 | -6 0.820 | -5 0.647 | -4 0.485 | -3 0.335 | -2 0.198 | -1 0.078 | 1 -0.084 | 2 -0.119 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1 | 0.257 | 0.257 | 0.211 | 0.166 | 0.125 | 0.086 | 0.051 | 0.020 | -0.022 | -0.031 |
| 2 | 0.567 | 0.567 | 0.465 | 0.367 | 0.275 | 0.190 | 0.112 | 0.044 | -0.048 | -0.068 |
| 3 | 0.943 | 0.943 | 0.773 | 0.610 | 0.457 | 0.316 | 0.187 | 0.074 | -0.079 | -0.112 |
| 4 | 1.405 | 1.405 | 1.152 | 0.909 | 0.681 | 0.471 | 0.278 | 0.110 | -0.118 | -0.167 |
| 5 | 1.975 | 1.975 | 1.620 | 1.278 | 0.958 | 0.662 | 0.391 | 0.154 | -0.166 | -0.235 |
| 6 | 2.675 | 2.675 | 2.194 | 1.731 | 1.297 | 0.896 | 0.530 | 0.209 | -0.225 | -0.318 |
| 7 | 3.515 | 3.515 | 2.882 | 2.274 | 1.705 | 1.178 | 0.696 | 0.274 | -0.295 | -0.418 |
| 8 | 4.495 | 4.495 | 3.686 | 2.908 | 2.180 | 1.506 | 0.890 | 0.351 | -0.378 | -0.535 |
| 9 | 5.557 | 5.557 | 4.557 | 3.595 | 2.695 | 1.862 | 1.100 | 0.433 | -0.467 | -0.661 |
| 10 | 6.586 | 6.586 | 5.401 | 4.261 | 3.194 | 2.206 | 1.304 | 0.514 | -0.553 | -0.784 |
| 10 | 7.903 | 7.903 | 6.480 | 5.113 | 3.833 | 2.648 | 1.565 | 0.616 | -0.664 | -0.940 |
| 9 | 8.027 | 8.027 | 6.582 | 5.193 | 3.893 | 2.689 | 1.589 | 0.626 | -0.674 | -0.955 |
| 8 | 7.866 | 7.866 | 6.450 | 5.089 | 3.815 | 2.635 | 1.557 | 0.614 | -0.661 | -0.936 |
| 7 | 7.531 | 7.531 | 6.175 | 4.873 | 3.653 | 2.523 | 1.491 | 0.587 | -0.633 | -0.896 |
| 6 | 7.133 | 7.133 | 5.849 | 4.615 | 3.460 | 2.390 | 1.412 | 0.556 | -0.599 | -0.849 |
| 5 | 6.715 | 6.715 | 5.506 | 4.345 | 3.257 | 2.250 | 1.330 | 0.524 | -0.564 | -0.799 |
| 4 | 6.322 | 6.322 | 5.184 | 4.090 | 3.066 | 2.118 | 1.252 | 0.493 | -0.531 | -0.752 |
| 3 | 5.976 | 5.976 | 4.900 | 3.866 | 2.898 | 2.002 | 1.183 | 0.466 | -0.502 | -0.711 |
| 2 | 5.666 | 5.666 | 4.646 | 3.666 | 2.748 | 1.898 | 1.122 | 0.442 | -0.476 | -0.674 |
| 1 | 5.397 | 5.397 | 4.426 | 3.492 | 2.618 | 1.808 | 1.069 | 0.421 | -0.453 | -0.642 |

**JIUN MASUDA**
CONSULTING ENGINEER
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CHECKED BY DATE PAGE NO 65

CALCULATIONS FOR

# Arakawa-Bashi, Saitama-Ken

DJd for Lower chord continued.

| Member | Jd | Load on-7. D=1.000 | -6 0.820 | -5 0.647 | -4 0.485 | -3 0.335 | -2 0.198 | -1 0.078 | 1 -0.084 | 2 -0.119 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 5.167 | 5.167 | 4.237 | 3.343 | 2.506 | 1.731 | 1.023 | 0.403 | -0.434 | -0.615 |
| -0 | 5.167 | 5.167 | 4.237 | 3.343 | 2.506 | 1.731 | 1.023 | 0.403 | -0.434 | -0.615 |
| -1 | 4.842 | 4.842 | 3.970 | 3.133 | 2.348 | 1.622 | 0.959 | 0.378 | -0.407 | -0.576 |
| -2 | 4.452 | 4.452 | 3.651 | 2.880 | 2.159 | 1.491 | 0.882 | 0.347 | -0.374 | -0.530 |
| -3 | 3.952 | 3.952 | 3.241 | 2.557 | 1.917 | 1.324 | 0.783 | 0.308 | -0.332 | -0.470 |
| -4 | 3.310 | 3.310 | 2.714 | 2.142 | 1.605 | 1.109 | 0.655 | 0.258 | -0.278 | -0.394 |
| -5 | 2.482 | 2.482 | 2.035 | 1.606 | 1.204 | 0.831 | 0.491 | 0.194 | -0.208 | -0.295 |
| -6 | 1.402 | 1.402 | 1.150 | 0.907 | 0.680 | 0.473 | 0.278 | 0.109 | -0.118 | -0.167 |

| Member | Jd | Load on 3. D=-0.141 | 4 -0.150 | 5 -0.149 | 6 -0.136 | 7 -0.113 | 8. -0.081 | 9. -0.041 | 10 -0.002 | 11 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1 | 0.257 | -0.036 | -0.039 | -0.038 | -0.035 | -0.029 | -0.021 | -0.011 | -0.001 | 0.009 |
| 2 | 0.567 | -0.080 | -0.085 | -0.084 | -0.077 | -0.064 | -0.046 | -0.023 | -0.001 | 0.020 |
| 3 | 0.943 | -0.133 | -0.141 | -0.141 | -0.128 | -0.107 | -0.076 | -0.039 | -0.002 | 0.034 |
| 4 | 1.405 | -0.198 | -0.211 | -0.209 | -0.191 | -0.159 | -0.114 | -0.058 | -0.003 | 0.051 |
| 5 | 1.975 | -0.278 | -0.296 | -0.294 | -0.269 | -0.223 | -0.160 | -0.081 | -0.004 | 0.071 |
| 6 | 2.675 | -0.377 | -0.401 | -0.399 | -0.364 | -0.302 | -0.217 | -0.110 | -0.005 | 0.096 |
| 7 | 3.515 | -0.496 | -0.527 | -0.524 | -0.478 | -0.397 | -0.285 | -0.144 | -0.007 | 0.127 |
| 8 | 4.495 | -0.634 | -0.674 | -0.670 | -0.611 | -0.508 | -0.364 | -0.184 | -0.009 | 0.162 |
| 9 | 5.557 | -0.784 | -0.834 | -0.828 | -0.756 | -0.628 | -0.450 | -0.228 | -0.011 | 0.200 |
| 10 | 6.586 | -0.929 | -0.988 | -0.981 | -0.896 | -0.744 | -0.533 | -0.270 | -0.013 | 0.237 |
| 10 | 7.903 | -1.114 | -1.185 | -1.178 | -1.075 | -0.893 | -0.640 | -0.324 | -0.016 | 0.285 |
| 9 | 8.027 | -1.132 | -1.204 | -1.196 | -1.092 | -0.907 | -0.650 | -0.329 | -0.016 | 0.289 |
| 8 | 7.866 | -1.109 | -1.180 | -1.172 | -1.070 | -0.889 | -0.637 | -0.323 | -0.016 | 0.283 |
| 7 | 7.531 | -1.062 | -1.130 | -1.122 | -1.024 | -0.851 | -0.610 | -0.309 | -0.015 | 0.271 |
| 6 | 7.133 | -1.006 | -1.070 | -1.063 | -0.970 | -0.806 | -0.578 | -0.292 | -0.014 | 0.257 |
| 5 | 6.715 | -0.947 | -1.007 | -1.001 | -0.913 | -0.759 | -0.544 | -0.275 | -0.013 | 0.242 |
| 4 | 6.322 | -0.891 | -0.948 | -0.942 | -0.860 | -0.714 | -0.512 | -0.259 | -0.013 | 0.228 |
| 3 | 5.976 | -0.843 | -0.896 | -0.890 | -0.813 | -0.675 | -0.484 | -0.245 | -0.012 | 0.215 |
| 2 | 5.666 | -0.799 | -0.850 | -0.844 | -0.771 | -0.640 | -0.459 | -0.232 | -0.011 | 0.204 |
| 1 | 5.397 | -0.761 | -0.810 | -0.804 | -0.734 | -0.610 | -0.437 | -0.221 | -0.011 | 0.194 |
| 0 | 5.167 | -0.729 | -0.775 | -0.770 | -0.703 | -0.584 | -0.419 | -0.282 | -0.010 | 0.186 |
| -0 | 5.167 | -0.729 | -0.775 | -0.770 | -0.703 | -0.584 | -0.419 | -0.282 | -0.010 | 0.186 |
| -1 | 4.842 | -0.683 | -0.726 | -0.721 | -0.659 | -0.547 | -0.392 | -0.199 | -0.010 | 0.174 |
| -2 | 4.452 | -0.628 | -0.668 | -0.663 | -0.605 | -0.503 | -0.361 | -0.183 | -0.009 | 0.160 |
| -3 | 3.952 | -0.557 | -0.593 | -0.589 | -0.537 | -0.447 | -0.320 | -0.163 | -0.008 | 0.142 |
| -4 | 3.310 | -0.467 | -0.497 | -0.493 | -0.450 | -0.374 | -0.268 | -0.136 | -0.007 | 0.119 |
| -5 | 2.482 | -0.350 | -0.372 | -0.370 | -0.338 | -0.280 | -0.201 | -0.102 | -0.005 | 0.089 |
| -6 | 1.402 | -0.198 | -0.210 | -0.209 | -0.191 | -0.158 | -0.114 | -0.058 | -0.003 | 0.050 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Bashi, Saitama-Ken

Find DSd for Diagonals

| Member. | Sd | Load on -7 D=1.000 | -6 0.820 | -5 0.647 | -4 0.485 | -3 0.335 | -2 0.198 | -1 0.078 | 1 -0.084 | 2 -0.119 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.246 | 0.246 | 0.202 | 0.159 | 0.119 | 0.082 | 0.049 | 0.019 | -0.021 | -0.029 |
| 2 | 0.301 | 0.301 | 0.247 | 0.195 | 0.146 | 0.101 | 0.060 | 0.023 | -0.025 | -0.036 |
| 3 | 0.374 | 0.374 | 0.307 | 0.242 | 0.181 | 0.125 | 0.074 | 0.029 | -0.031 | -0.045 |
| 4 | 0.469 | 0.469 | 0.385 | 0.304 | 0.228 | 0.157 | 0.093 | 0.037 | -0.039 | -0.056 |
| 5 | 0.596 | 0.596 | 0.489 | 0.386 | 0.289 | 0.200 | 0.118 | 0.047 | -0.050 | -0.071 |
| 6 | 0.750 | 0.750 | 0.615 | 0.485 | 0.364 | 0.251 | 0.149 | 0.058 | -0.063 | -0.089 |
| 7 | 0.916 | 0.916 | 0.751 | 0.593 | 0.444 | 0.307 | 0.181 | 0.071 | -0.077 | -0.109 |
| 8 | 1.097 | 1.097 | 0.900 | 0.710 | 0.532 | 0.367 | 0.217 | 0.086 | -0.092 | -0.130 |
| 9 | 1.199 | 1.199 | 0.984 | 0.776 | 0.582 | 0.402 | 0.248 | 0.094 | -0.101 | -0.143 |
| 10 | 1.156 | 1.156 | 0.948 | 0.748 | 0.557 | 0.390 | 0.229 | 0.090 | -0.097 | -0.118 |
| 11 | 0.932 | 0.932 | 0.768 | 0.603 | 0.452 | 0.312 | 0.185 | 0.073 | -0.078 | -0.111 |
| 11 | -0.500 | -0.500 | -0.410 | -0.324 | -0.243 | -0.168 | -0.099 | -0.039 | 0.042 | 0.059 |
| 10 | -0.034 | -0.034 | -0.028 | -0.022 | -0.016 | -0.011 | -0.008 | -0.003 | 0.003 | 0.004 |
| 9 | 0.336 | 0.336 | 0.275 | 0.217 | 0.163 | 0.113 | 0.067 | 0.026 | -0.028 | -0.040 |
| 8 | 0.564 | 0.564 | 0.462 | 0.365 | 0.274 | 0.189 | 0.112 | 0.044 | -0.047 | -0.067 |
| 7 | 0.655 | 0.655 | 0.537 | 0.424 | 0.318 | 0.219 | 0.129 | 0.051 | -0.055 | -0.078 |
| 6 | 0.671 | 0.671 | 0.550 | 0.434 | 0.325 | 0.225 | 0.133 | 0.052 | -0.056 | -0.080 |
| 5 | 0.632 | 0.632 | 0.518 | 0.409 | 0.306 | 0.212 | 0.125 | 0.049 | -0.053 | -0.075 |
| 4 | 0.592 | 0.592 | 0.485 | 0.383 | 0.287 | 0.198 | 0.117 | 0.046 | -0.050 | -0.070 |
| 3 | 0.546 | 0.546 | 0.448 | 0.353 | 0.265 | 0.183 | 0.108 | 0.043 | -0.046 | -0.065 |
| 2 | 0.504 | 0.504 | 0.413 | 0.326 | 0.244 | 0.169 | 0.100 | 0.039 | -0.042 | -0.060 |
| 1 | 0.474 | 0.474 | 0.389 | 0.307 | 0.230 | 0.159 | 0.094 | 0.037 | -0.040 | -0.056 |
| -1 | -0.056 | -0.056 | -0.046 | -0.036 | -0.027 | -0.019 | -0.011 | -0.004 | 0.005 | 0.007 |
| -2 | -0.137 | -0.137 | -0.112 | -0.089 | -0.066 | -0.046 | -0.027 | -0.010 | 0.012 | 0.016 |
| -3 | -0.253 | -0.253 | -0.207 | -0.164 | -0.123 | -0.085 | -0.050 | -0.020 | 0.021 | 0.030 |
| -4 | -0.413 | -0.413 | -0.339 | -0.267 | -0.200 | -0.138 | -0.082 | -0.032 | 0.035 | 0.049 |
| -5 | -0.635 | -0.635 | -0.521 | -0.411 | -0.308 | -0.213 | -0.126 | -0.050 | 0.053 | 0.076 |
| -6 | -0.937 | -0.937 | -0.769 | -0.606 | -0.454 | -0.314 | -0.185 | -0.073 | 0.079 | 0.112 |
| -7 | -1.328 | -1.328 | -1.085 | -0.859 | -0.644 | -0.445 | -0.263 | -0.104 | 0.112 | 0.158 |

| Member | Sd | Load on 3 D=-0.141 | 4 -0.150 | 5 -0.149 | 6 -0.136 | 7 -0.113 | 8 -0.081 | 9 -0.041 | 10 -0.002 | 11 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.246 | -0.035 | -0.037 | -0.037 | -0.033 | -0.028 | -0.020 | -0.010 | -0.001 | 0.009 |
| 2 | 0.301 | -0.042 | -0.045 | -0.045 | -0.041 | -0.034 | -0.024 | -0.012 | -0.001 | 0.011 |
| 3 | 0.374 | -0.053 | -0.056 | -0.056 | -0.051 | -0.042 | -0.030 | -0.015 | -0.001 | 0.013 |
| 4 | 0.469 | -0.066 | -0.070 | -0.070 | -0.064 | -0.053 | -0.038 | -0.019 | -0.001 | 0.017 |
| 5 | 0.596 | -0.084 | -0.089 | -0.089 | -0.081 | -0.067 | -0.048 | -0.024 | -0.001 | 0.021 |
| 6 | 0.750 | -0.105 | -0.113 | -0.112 | -0.107 | -0.084 | -0.060 | -0.031 | -0.002 | 0.027 |
| 7 | 0.916 | -0.129 | -0.137 | -0.136 | -0.125 | -0.104 | -0.074 | -0.038 | -0.002 | 0.033 |
| 8 | 1.097 | -0.155 | -0.165 | -0.163 | -0.149 | -0.124 | -0.089 | -0.045 | -0.002 | 0.040 |
| 9 | 1.199 | -0.169 | -0.180 | -0.179 | -0.163 | -0.135 | -0.097 | -0.049 | -0.002 | 0.043 |
| 10 | 1.156 | *-0.131 | -0.173 | -0.172 | -0.157 | -0.131 | -0.094 | -0.047 | -0.002 | 0.042 |
| 11 | 0.932 | +0.071 | -0.140 | -0.139 | -0.127 | -0.105 | -0.075 | -0.038 | -0.002 | 0.033 |
| 11 | -0.500 | 0.005 | 0.075 | 0.075 | 0.068 | 0.056 | 0.041 | 0.021 | 0.001 | -0.018 |
| 10 | -0.034 | 0.047 | 0.005 | 0.005 | 0.005 | 0.004 | 0.003 | 0.001 | 0.000 | -0.001 |
| 9 | 0.336 | -0.080 | -0.050 | -0.050 | -0.046 | -0.038 | -0.027 | -0.014 | -0.001 | 0.012 |
| 8 | 0.564 | -0.092 | -0.085 | -0.084 | -0.077 | -0.064 | -0.046 | -0.023 | -0.001 | 0.020 |
| 7 | 0.655 | -0.095 | -0.098 | -0.098 | -0.089 | -0.074 | -0.053 | -0.027 | -0.001 | 0.024 |
| 6 | 0.671 | -0.089 | -0.101 | -0.100 | -0.091 | -0.076 | -0.054 | -0.028 | -0.001 | 0.024 |
| 5 | 0.632 | -0.083 | -0.095 | -0.094 | -0.086 | -0.071 | -0.051 | -0.026 | -0.001 | 0.023 |
| 4 | 0.592 | -0.078 | -0.089 | -0.088 | -0.081 | -0.067 | -0.048 | -0.024 | -0.001 | 0.021 |
| 3 | 0.546 | -0.071 | -0.082 | -0.081 | -0.074 | -0.062 | -0.044 | -0.022 | -0.001 | 0.020 |
| 2 | 0.504 | -0.067 | -0.076 | -0.075 | -0.069 | -0.057 | -0.041 | -0.021 | -0.001 | 0.018 |
| 1 | 0.474 | *-0.163 | -0.071 | -0.070 | -0.064 | -0.053 | -0.038 | -0.019 | -0.001 | 0.017 |

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JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO

CHECKED BY DATE PAGE NO 67

CALCULATIONS FOR

Arakawa-Bashi Saitama-Ken

DJd for Diagonals continued.

| Member | Jd | Load on 3 D=-0.141 | 4 -0.150 | 5 -0.149 | 6 -0.136 | 7 -0.113 | 8 -0.081 | 9 -0.041 | 10 -0.002 | 11 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| -1 | -0.056 | 0.008 | 0.008 | 0.008 | 0.008 | 0.006 | 0.005 | 0.002 | 0.000 | -0.002 |
| -2 | -0.137 | 0.019 | 0.021 | 0.020 | 0.019 | 0.015 | 0.011 | 0.006 | 0.000 | -0.005 |
| -3 | -0.253 | 0.036 | 0.038 | 0.038 | 0.034 | 0.029 | 0.020 | 0.010 | 0.001 | -0.009 |
| -4 | -0.413 | 0.058 | 0.062 | 0.062 | 0.056 | 0.047 | 0.033 | 0.017 | 0.001 | -0.015 |
| -5 | -0.635 | 0.089 | 0.095 | 0.095 | 0.086 | 0.072 | 0.051 | 0.026 | 0.001 | -0.023 |
| -6 | -0.937 | 0.132 | 0.141 | 0.140 | 0.127 | 0.106 | 0.076 | 0.038 | 0.002 | -0.034 |
| -7 | -1.328 | 0.187 | 0.199 | 0.198 | 0.181 | 0.150 | 0.108 | 0.054 | 0.003 | -0.048 |

☐ Find DJd for Verticals

| Member | Jd | Load on -7 P=1.000 | -6 0.820 | -5 0.647 | -4 0.485 | -3 0.335 | -2 0.198 | -1 0.078 | 1 -0.084 | 2 -0.119 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | -0.318 | -0.318 | -0.261 | -0.206 | -0.154 | -0.107 | -0.063 | -0.025 | 0.027 | 0.038 |
| 1 | -0.347 | -0.347 | -0.285 | -0.225 | -0.168 | -0.116 | -0.069 | -0.027 | 0.029 | 0.041 |
| 2 | -0.377 | -0.377 | -0.309 | -0.244 | -0.182 | -0.126 | -0.075 | -0.029 | 0.032 | 0.045 |
| 3 | -0.401 | -0.401 | -0.328 | -0.259 | -0.194 | -0.134 | -0.079 | -0.031 | 0.033 | 0.048 |
| 4 | -0.418 | -0.418 | -0.343 | -0.270 | -0.203 | -0.140 | -0.083 | -0.033 | 0.035 | 0.050 |
| 5 | -0.423 | -0.423 | -0.347 | -0.274 | -0.205 | -0.142 | -0.084 | -0.033 | 0.036 | 0.050 |
| 6 | -0.404 | -0.404 | -0.331 | -0.261 | -0.196 | -0.135 | -0.080 | -0.032 | 0.034 | 0.048 |
| 7 | -0.352 | -0.352 | -0.289 | -0.228 | -0.171 | -0.118 | -0.070 | -0.027 | 0.029 | 0.042 |
| 8 | -0.248 | -0.248 | -0.203 | -0.160 | -0.120 | -0.083 | -0.049 | -0.019 | 0.021 | 0.030 |
| 9 | -0.092 | -0.092 | -0.075 | -0.060 | -0.045 | -0.031 | -0.018 | -0.007 | 0.008 | 0.011 |
| 10 | 0.121 | 0.121 | 0.099 | 0.078 | 0.059 | 0.041 | 0.024 | 0.009 | -0.010 | -0.014 |
| 10 | 0.846 | 0.846 | 0.693 | 0.547 | 0.410 | 0.283 | 0.168 | 0.066 | -0.071 | -0.101 |
| 9 | 0.645 | 0.645 | 0.529 | 0.417 | 0.313 | 0.216 | 0.127 | 0.050 | -0.054 | -0.077 |
| 8 | 0.436 | 0.436 | 0.358 | 0.282 | 0.211 | 0.146 | 0.086 | 0.034 | -0.037 | -0.052 |
| 7 | 0.248 | 0.248 | 0.203 | 0.160 | 0.120 | 0.083 | 0.049 | 0.019 | -0.021 | -0.030 |
| 6 | 0.089 | 0.089 | 0.073 | 0.058 | 0.043 | 0.030 | 0.018 | 0.007 | -0.007 | -0.011 |
| 5 | -0.037 | -0.037 | -0.030 | -0.023 | -0.018 | -0.012 | -0.007 | -0.003 | 0.003 | 0.004 |
| 4 | -0.134 | -0.134 | -0.109 | -0.086 | -0.064 | -0.044 | -0.026 | -0.010 | 0.011 | 0.016 |
| 3 | -0.209 | -0.209 | -0.171 | -0.135 | -0.101 | -0.070 | -0.041 | -0.016 | 0.018 | 0.025 |
| 2 | -0.267 | -0.267 | -0.219 | -0.173 | -0.129 | -0.089 | -0.053 | -0.021 | 0.022 | 0.032 |
| 1 | -0.305 | -0.305 | -0.250 | -0.197 | -0.147 | -0.102 | -0.060 | -0.024 | 0.026 | 0.036 |
| 0 | -6.342 | -6.342 | -5.200 | -4.103 | -3.076 | -2.125 | -1.256 | -0.495 | 0.533 | 0.755 |
| -1 | 0.436 | 0.436 | 0.358 | 0.282 | 0.211 | 0.146 | 0.086 | 0.034 | -0.037 | -0.052 |
| -2 | 0.540 | 0.540 | 0.440 | 0.349 | 0.262 | 0.181 | 0.107 | 0.042 | -0.045 | -0.064 |
| -3 | 0.651 | 0.651 | 0.534 | 0.421 | 0.316 | 0.218 | 0.129 | 0.051 | -0.055 | -0.078 |
| -4 | 0.763 | 0.763 | 0.625 | 0.494 | 0.370 | 0.256 | 0.151 | 0.060 | -0.064 | -0.091 |
| -5 | 0.868 | 0.868 | 0.711 | 0.562 | 0.421 | 0.291 | 0.172 | 0.068 | -0.073 | -0.103 |
| -6 | 0.955 | 0.955 | 0.783 | 0.618 | 0.463 | 0.320 | 0.189 | 0.074 | -0.080 | -0.114 |
| -7 | 1.000 | 1.000 | 0.820 | 0.647 | 0.485 | 0.335 | 0.198 | 0.078 | -0.084 | -0.119 |

| Member | Jd | Load on 3 D=-0.141 | 4 -0.151 | 5 -0.149 | 6 -0.136 | 7 -0.113 | 8 -0.081 | 9 -0.041 | 10 -0.002 | 11 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | -0.318 | 0.045 | 0.048 | 0.047 | 0.043 | 0.036 | -0.026 | 0.013 | 0.001 | -0.011 |
| 1 | -0.347 | 0.048 | 0.052 | 0.052 | 0.047 | 0.039 | 0.028 | 0.014 | 0.001 | -0.012 |
| 2 | -0.377 | 0.053 | 0.057 | 0.056 | 0.051 | 0.043 | 0.031 | 0.015 | 0.001 | -0.014 |
| 3 | -0.401 | 0.057 | 0.060 | 0.060 | 0.055 | 0.045 | 0.032 | 0.016 | 0.001 | -0.014 |
| 4 | -0.418 | 0.059 | 0.063 | 0.062 | 0.057 | 0.047 | 0.034 | 0.017 | 0.001 | -0.015 |
| 5 | -0.423 | 0.060 | 0.063 | 0.063 | 0.058 | 0.048 | 0.034 | 0.017 | 0.001 | -0.015 |
| 6 | -0.404 | 0.057 | 0.061 | 0.060 | 0.055 | 0.046 | 0.033 | 0.017 | 0.001 | -0.015 |
| 7 | -0.352 | 0.050 | 0.053 | 0.052 | 0.048 | 0.040 | 0.029 | 0.014 | 0.001 | -0.013 |
| 8 | -0.248 | 0.035 | 0.037 | 0.037 | 0.034 | 0.028 | 0.020 | 0.010 | 0.001 | -0.009 |
| 9 | -0.092 | 0.013 | 0.014 | 0.014 | 0.013 | 0.010 | 0.007 | 0.004 | 0.000 | -0.003 |
| 10 | 0.121 | -0.017 | -0.018 | -0.018 | -0.016 | -0.014 | -0.010 | -0.005 | 0.000 | 0.004 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____

CHECKED BY _____ DATE _____ PAGE NO 68

CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

D.Jd for Verticals continued.

| member | Jd | load on 3 D= | 4 −0.151 | 5 −0.149 | 6 −0.136 | 7 −0.113 | 8 −0.081 | 9 −0.041 | 10 −0.002 | 11 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 0.846 | −0.119 | −0.127 | −0.126 | −0.115 | −0.096 | −0.068 | −0.035 | −0.002 | 0.030 |
| 9 | 0.645 | −0.091 | −0.092 | −0.096 | −0.088 | −0.073 | −0.052 | −0.026 | −0.001 | 0.023 |
| 8 | 0.436 | −0.061 | −0.065 | −0.065 | −0.059 | −0.049 | −0.035 | −0.018 | −0.001 | 0.016 |
| 7 | 0.248 | −0.035 | −0.037 | −0.037 | −0.034 | −0.028 | −0.020 | −0.010 | −0.001 | 0.009 |
| 6 | 0.089 | −0.013 | −0.013 | −0.013 | −0.012 | −0.010 | −0.007 | −0.004 | 0.000 | 0.003 |
| 5 | −0.037 | 0.005 | 0.006 | 0.006 | 0.005 | 0.004 | 0.003 | 0.002 | 0.000 | −0.001 |
| 4 | −0.134 | 0.019 | 0.020 | 0.020 | 0.018 | 0.015 | 0.011 | 0.005 | 0.000 | −0.005 |
| 3 | −0.209 | 0.029 | 0.031 | 0.031 | 0.028 | 0.023 | 0.017 | 0.009 | 0.000 | −0.008 |
| 2 | −0.267 | 0.038 | 0.040 | 0.040 | 0.036 | 0.030 | 0.022 | 0.011 | 0.001 | −0.010 |
| 1 | −0.305 | 0.043 | 0.046 | 0.045 | 0.041 | 0.034 | 0.025 | 0.013 | 0.001 | −0.011 |
| 0 | −6.342 | 0.894 | 0.951 | 0.945 | 0.863 | 0.717 | 0.514 | 0.260 | 0.013 | −0.228 |
| −1 | 0.436 | −0.062 | −0.065 | −0.065 | −0.059 | −0.049 | −0.035 | −0.018 | −0.001 | 0.016 |
| −2 | 0.540 | −0.092 | −0.081 | −0.080 | −0.073 | −0.061 | −0.044 | −0.022 | −0.001 | 0.019 |
| −3 | 0.651 | −0.076 | −0.098 | −0.097 | −0.089 | −0.074 | −0.053 | −0.026 | −0.001 | 0.023 |
| −4 | 0.763 | −0.108 | −0.114 | −0.114 | −0.103 | −0.086 | −0.062 | −0.031 | −0.002 | 0.027 |
| −5 | 0.868 | −0.122 | −0.130 | −0.129 | −0.118 | −0.098 | −0.070 | −0.036 | −0.002 | 0.031 |
| −6 | 0.955 | −0.135 | −0.143 | −0.142 | −0.130 | −0.108 | −0.077 | −0.039 | −0.002 | 0.034 |
| −7 | 1.000 | −0.141 | −0.150 | −0.149 | −0.136 | −0.113 | −0.081 | −0.041 | −0.002 | 0.036 |

☐ Find E Je for Upper chords.

| member | Je | load on −6 E = −0.010 | −5 −0.024 | −4 −0.027 | −3 −0.027 | −2 −0.024 | −1 −0.018 | 1 0.013 | 2 0.035 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | −0.237 | 0.002 | 0.006 | 0.006 | 0.006 | 0.006 | 0.004 | −0.003 | −0.008 |
| 2 | −0.529 | 0.005 | 0.013 | 0.014 | 0.014 | 0.013 | 0.009 | −0.007 | −0.019 |
| 3 | −0.894 | 0.009 | 0.021 | 0.024 | 0.024 | 0.021 | 0.016 | −0.012 | −0.031 |
| 4 | −1.351 | 0.014 | 0.032 | 0.036 | 0.036 | 0.032 | 0.024 | −0.018 | −0.047 |
| 5 | −1.924 | 0.019 | 0.046 | 0.052 | 0.052 | 0.046 | 0.035 | −0.025 | −0.067 |
| 6 | −2.637 | 0.026 | 0.063 | 0.071 | 0.071 | 0.063 | 0.047 | −0.034 | −0.092 |
| 7 | −3.506 | 0.035 | 0.084 | 0.095 | 0.095 | 0.084 | 0.063 | −0.046 | −0.123 |
| 8 | −4.514 | 0.045 | 0.108 | 0.122 | 0.122 | 0.108 | 0.081 | −0.059 | −0.158 |
| 9 | −5.600 | 0.056 | 0.134 | 0.151 | 0.151 | 0.134 | 0.101 | −0.073 | −0.196 |
| 10 | −6.629 | 0.066 | 0.159 | 0.179 | 0.179 | 0.159 | 0.119 | −0.086 | −0.232 |
| 11 | −7.438 | 0.074 | 0.179 | 0.201 | 0.201 | 0.179 | 0.134 | −0.097 | −0.260 |
| 11* | −7.955 | 0.074 | 0.179 | 0.201 | 0.201 | 0.179 | 0.134 | −0.097 | −0.260 |
| 10 | −8.089 | 0.080 | 0.190 | 0.215 | 0.215 | 0.190 | 0.143 | −0.108 | −0.278 |
| 9 | −7.898 | 0.081 | 0.194 | 0.218 | 0.218 | 0.194 | 0.146 | −0.105 | −0.283 |
| 8 | −7.512 | 0.079 | 0.190 | 0.213 | 0.213 | 0.190 | 0.142 | −0.103 | −0.276 |
| 7 | −7.032 | 0.075 | 0.180 | 0.203 | 0.203 | 0.180 | 0.135 | −0.098 | −0.263 |
| 6 | −6.542 | 0.070 | 0.169 | 0.190 | 0.190 | 0.169 | 0.127 | −0.091 | −0.246 |
| 5 | −6.080 | 0.065 | 0.157 | 0.177 | 0.177 | 0.157 | 0.118 | −0.085 | −0.229 |
| 4* | −7.438 | 0.061 | 0.146 | 0.164 | 0.164 | 0.148 | 0.109 | −0.079 | −0.213 |
| 3 | −5.663 | 0.057 | 0.136 | 0.143 | 0.153 | 0.136 | 0.092 | −0.074 | −0.198 |
| 2 | −5.292 | 0.053 | 0.127 | 0.153 | 0.143 | 0.127 | 0.095 | −0.069 | −0.185 |
| 1 | −4.976 | 0.050 | 0.119 | 0.134 | 0.134 | 0.119 | 0.090 | −0.065 | −0.174 |
| −1 | −4.470 | 0.045 | 0.107 | 0.121 | 0.121 | 0.107 | 0.080 | −0.058 | −0.156 |
| −2 | −4.160 | 0.042 | 0.100 | 0.112 | 0.112 | 0.100 | 0.075 | −0.054 | −0.146 |
| −3 | −3.748 | 0.037 | 0.090 | 0.101 | 0.101 | 0.090 | 0.067 | −0.049 | −0.131 |
| −4 | −3.186 | 0.032 | 0.076 | 0.086 | 0.086 | 0.076 | 0.057 | −0.041 | −0.112 |
| −5 | −2.419 | 0.024 | 0.058 | 0.065 | 0.065 | 0.058 | 0.044 | −0.031 | −0.085 |
| −6 | −1.381 | 0.014 | 0.033 | 0.037 | 0.037 | 0.033 | 0.025 | −0.018 | −0.048 |
| −7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO
CHECKED BY DATE PAGE NO 69

CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

Find EJe for upper chord continued,

| member | Je | load on 3 E = 0.055 | 4 0.075 | 5 0.090 | 6 0.102 | 7 0.105 | 8 0.105 | 9 0.092 | 10 0.069 | 11 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.237 | -0.013 | -0.018 | -0.021 | -0.024 | -0.025 | -0.025 | -0.022 | -0.016 | -0.009 |
| 2 | -0.529 | -0.029 | -0.040 | -0.048 | -0.054 | -0.056 | -0.056 | -0.049 | -0.037 | -0.019 |
| 3 | -0.894 | -0.049 | -0.067 | -0.080 | -0.091 | -0.094 | -0.044 | -0.082 | -0.062 | -0.032 |
| 4 | -1.351 | -0.074 | -0.101 | -0.121 | -0.138 | -0.142 | -0.142 | -0.124 | -0.093 | -0.049 |
| 5 | -1.924 | -0.106 | -0.144 | -0.173 | -0.196 | -0.202 | -0.202 | -0.177 | -0.133 | -0.069 |
| 6 | -2.637 | -0.145 | -0.198 | -0.237 | -0.269 | -0.277 | -0.277 | -0.243 | -0.182 | -0.095 |
| 7 | -3.506 | -0.193 | -0.263 | -0.316 | -0.358 | -0.368 | -0.368 | -0.323 | -0.242 | -0.126 |
| 8 | -4.514 | -0.248 | -0.339 | -0.406 | -0.460 | -0.474 | -0.474 | -0.415 | -0.311 | -0.163 |
| 9 | -5.600 | -0.308 | -0.420 | -0.504 | -0.571 | -0.588 | -0.588 | -0.515 | -0.386 | -0.202 |
| 10 | -6.629 | -0.365 | -0.497 | -0.596 | -0.676 | -0.696 | -0.696 | -0.610 | -0.457 | -0.239 |
| 11 | -7.438 | -0.409 | -0.558 | -0.669 | -0.759 | -0.781 | -0.781 | -0.684 | -0.513 | -0.268 |
| 11 | -7.438 | -0.409 | -0.558 | -0.669 | -0.759 | -0.781 | -0.781 | -0.684 | -0.513 | -0.268 |
| 10 | -7.955 | -0.438 | -0.597 | -0.716 | -0.811 | -0.835 | -0.835 | -0.732 | -0.549 | -0.286 |
| 9 | -8.089 | -0.445 | -0.607 | -0.718 | -0.825 | -0.849 | -0.849 | -0.744 | -0.558 | -0.291 |
| 8 | -7.898 | -0.434 | -0.592 | -0.711 | -0.806 | -0.829 | -0.829 | -0.717 | -0.545 | -0.284 |
| 7 | -7.512 | -0.413 | -0.563 | -0.676 | -0.766 | -0.789 | -0.789 | -0.691 | -0.518 | -0.270 |
| 6 | -7.032 | -0.387 | -0.527 | -0.633 | -0.717 | -0.738 | -0.738 | -0.647 | -0.485 | -0.253 |
| 5 | -6.542 | -0.360 | -0.491 | -0.589 | -0.667 | -0.687 | -0.687 | -0.602 | -0.451 | -0.236 |
| 4 | -6.080 | -0.334 | -0.456 | -0.547 | -0.602 | -0.638 | -0.638 | -0.559 | -0.420 | -0.219 |
| 3 | -5.663 | -0.311 | -0.424 | -0.510 | -0.578 | -0.595 | -0.595 | -0.521 | -0.391 | -0.204 |
| 2 | -5.292 | -0.291 | -0.397 | -0.476 | -0.540 | -0.556 | -0.556 | -0.487 | -0.365 | -0.191 |
| 1 | -4.976 | -0.274 | -0.373 | -0.448 | -0.508 | -0.522 | -0.522 | -0.458 | -0.343 | -0.179 |
| -1 | -4.470 | -0.246 | -0.335 | -0.402 | -0.456 | -0.469 | -0.469 | -0.411 | -0.308 | -0.161 |
| -2 | -4.160 | -0.229 | -0.312 | -0.374 | -0.424 | -0.437 | -0.437 | -0.383 | -0.287 | -0.150 |
| -3 | -3.748 | -0.206 | -0.281 | -0.338 | -0.382 | -0.394 | -0.394 | -0.345 | -0.259 | -0.135 |
| -4 | -3.186 | -0.175 | -0.239 | -0.287 | -0.325 | -0.334 | -0.334 | -0.293 | -0.220 | -0.115 |
| -5 | -2.419 | -0.133 | -0.181 | -0.218 | -0.247 | -0.254 | -0.254 | -0.223 | -0.167 | -0.087 |
| -6 | -1.381 | -0.076 | -0.104 | -0.124 | -0.141 | -0.145 | -0.145 | -0.127 | -0.095 | -0.050 |
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

☐ Find EJe for lower chords.

| member | Je | load on -6 E = -0.010 | -5 -0.024 | -4 -0.027 | -3 -0.027 | -2 -0.024 | -1 -0.018 | 1 0.013 | 2 0.035 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.000 | -0.000 | 0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 | 0.000 |
| 1 | 0.257 | -0.003 | -0.006 | -0.007 | -0.007 | -0.006 | -0.005 | 0.003 | 0.009 |
| 2 | 0.567 | -0.006 | -0.014 | -0.015 | -0.015 | -0.014 | -0.010 | 0.007 | 0.020 |
| 3 | 0.943 | -0.009 | -0.023 | -0.025 | -0.025 | -0.023 | -0.017 | 0.012 | 0.033 |
| 4 | 1.405 | -0.014 | -0.034 | -0.038 | -0.038 | -0.034 | -0.025 | 0.018 | 0.049 |
| 5 | 1.975 | -0.020 | -0.047 | -0.053 | -0.053 | -0.047 | -0.036 | 0.026 | 0.069 |
| 6 | 2.675 | -0.027 | -0.064 | -0.072 | -0.072 | -0.064 | -0.048 | 0.035 | 0.094 |
| 7 | 3.515 | -0.035 | -0.084 | -0.095 | -0.095 | -0.084 | -0.063 | 0.046 | 0.123 |
| 8 | 4.495 | -0.045 | -0.108 | -0.121 | -0.121 | -0.108 | -0.081 | 0.058 | 0.157 |
| 9 | 5.557 | -0.056 | -0.133 | -0.150 | -0.150 | -0.133 | -0.100 | 0.072 | 0.194 |
| 10 | 6.586 | -0.066 | -0.158 | -0.178 | -0.178 | -0.158 | -0.119 | 0.086 | 0.231 |
| 10 | 7.903 | -0.079 | -0.190 | -0.213 | -0.213 | -0.190 | -0.142 | 0.103 | 0.277 |
| 9 | 8.027 | -0.080 | -0.193 | -0.217 | -0.217 | -0.193 | -0.144 | 0.104 | 0.281 |
| 8 | 7.866 | -0.079 | -0.189 | -0.212 | -0.212 | -0.189 | -0.142 | 0.102 | 0.275 |
| 7 | 7.531 | -0.075 | -0.181 | -0.203 | -0.203 | -0.181 | -0.136 | 0.098 | 0.264 |
| 6 | 7.133 | -0.071 | -0.171 | -0.193 | -0.193 | -0.171 | -0.128 | 0.093 | 0.250 |
| 5 | 6.715 | -0.067 | -0.161 | -0.181 | -0.181 | -0.161 | -0.121 | 0.087 | 0.235 |
| 4 | 6.322 | -0.063 | -0.152 | -0.171 | -0.171 | -0.152 | -0.114 | 0.082 | 0.221 |
| 3 | 5.976 | -0.060 | -0.143 | -0.161 | -0.161 | -0.143 | -0.108 | 0.074 | 0.209 |
| 2 | 5.666 | -0.057 | -0.136 | -0.153 | -0.153 | -0.136 | -0.102 | 0.074 | 0.198 |
| 1 | 5.397 | -0.054 | -0.130 | -0.146 | -0.146 | -0.130 | -0.097 | 0.070 | 0.189 |

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JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO

CHECKED BY DATE PAGE NO 70

CALCULATIONS FOR

# Arakawa-Bashi, for Saitama-Ken

EJe for lower chords continued.

| member | Je | Load on -6 E= -0.010 | -5 -0.024 | -4 -0.027 | -3 -0.027 | -2 -0.024 | -1 -0.018 | 1 0.013 | 2 0.035 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 5.167 | -0.052 | -0.124 | -0.140 | -0.140 | -0.124 | -0.093 | 0.067 | 0.181 |
| -0 | 5.167 | -0.052 | -0.124 | -0.140 | -0.140 | -0.124 | -0.093 | 0.067 | 0.181 |
| -1 | 4.842 | -0.048 | -0.116 | -0.131 | -0.131 | -0.116 | -0.087 | 0.063 | 0.169 |
| -2 | 4.452 | -0.045 | -0.107 | -0.120 | -0.120 | -0.107 | -0.080 | 0.058 | 0.156 |
| -3 | 3.952 | -0.040 | -0.095 | -0.107 | -0.107 | -0.095 | -0.071 | 0.051 | 0.138 |
| -4 | 3.310 | -0.033 | -0.079 | -0.089 | -0.089 | -0.079 | -0.060 | 0.043 | 0.116 |
| -5 | 2.482 | -0.025 | -0.060 | -0.067 | -0.067 | -0.060 | -0.045 | 0.032 | 0.087 |
| -6 | 1.402 | -0.014 | -0.034 | -0.038 | -0.038 | -0.034 | -0.025 | 0.018 | 0.049 |

| member | Je | Load on 3 E= 0.055 | 4 0.075 | 5 0.090 | 6 0.102 | 7 0.105 | 8 0.105 | 9 0.092 | 10 0.069 | 11 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1 | 0.257 | 0.014 | 0.019 | 0.023 | 0.026 | 0.027 | 0.027 | 0.024 | 0.018 | 0.009 |
| 2 | 0.567 | 0.031 | 0.043 | 0.051 | 0.058 | 0.060 | 0.060 | 0.052 | 0.039 | 0.020 |
| 3 | 0.943 | 0.052 | 0.071 | 0.085 | 0.096 | 0.099 | 0.099 | 0.087 | 0.065 | 0.034 |
| 4 | 1.405 | 0.077 | 0.105 | 0.126 | 0.143 | 0.148 | 0.148 | 0.129 | 0.097 | 0.051 |
| 5 | 1.975 | 0.109 | 0.148 | 0.178 | 0.201 | 0.207 | 0.207 | 0.182 | 0.136 | 0.071 |
| 6 | 2.675 | 0.147 | 0.201 | 0.240 | 0.273 | 0.281 | 0.281 | 0.246 | 0.184 | 0.096 |
| 7 | 3.515 | 0.193 | 0.264 | 0.316 | 0.359 | 0.369 | 0.369 | 0.323 | 0.242 | 0.127 |
| 8 | 4.495 | 0.247 | 0.337 | 0.405 | 0.458 | 0.472 | 0.472 | 0.414 | 0.310 | 0.162 |
| 9 | 5.557 | 0.306 | 0.417 | 0.500 | 0.567 | 0.583 | 0.583 | 0.511 | 0.383 | 0.200 |
| 10 | 6.586 | 0.362 | 0.494 | 0.593 | 0.672 | 0.692 | 0.692 | 0.606 | 0.454 | 0.237 |
| 10 | 7.903 | 0.435 | 0.593 | 0.712 | 0.806 | 0.830 | 0.830 | 0.727 | 0.545 | 0.285 |
| 9 | 8.027 | 0.441 | 0.602 | 0.722 | 0.819 | 0.843 | 0.843 | 0.738 | 0.554 | 0.289 |
| 8 | 7.866 | 0.433 | 0.590 | 0.708 | 0.802 | 0.826 | 0.826 | 0.724 | 0.543 | 0.283 |
| 7 | 7.531 | 0.414 | 0.565 | 0.678 | 0.768 | 0.791 | 0.791 | 0.693 | 0.520 | 0.271 |
| 6 | 7.133 | 0.392 | 0.535 | 0.642 | 0.728 | 0.749 | 0.749 | 0.656 | 0.492 | 0.257 |
| 5 | 6.715 | 0.369 | 0.504 | 0.604 | 0.685 | 0.705 | 0.705 | 0.618 | 0.463 | 0.242 |
| 4 | 6.322 | 0.348 | 0.474 | 0.569 | 0.645 | 0.664 | 0.664 | 0.582 | 0.436 | 0.228 |
| 3 | 5.976 | 0.329 | 0.448 | 0.538 | 0.610 | 0.627 | 0.627 | 0.550 | 0.412 | 0.215 |
| 2 | 5.666 | 0.312 | 0.425 | 0.510 | 0.578 | 0.595 | 0.595 | 0.521 | 0.391 | 0.204 |
| 1 | 5.397 | 0.297 | 0.405 | 0.485 | 0.550 | 0.567 | 0.567 | 0.497 | 0.372 | 0.194 |
| 0 | 5.167 | 0.284 | 0.388 | 0.465 | 0.527 | 0.543 | 0.543 | 0.475 | 0.357 | 0.186 |
| -0 | 5.167 | 0.284 | 0.388 | 0.465 | 0.527 | 0.543 | 0.543 | 0.475 | 0.357 | 0.186 |
| -1 | 4.842 | 0.266 | 0.363 | 0.436 | 0.494 | 0.508 | 0.508 | 0.445 | 0.334 | 0.174 |
| -2 | 4.452 | 0.245 | 0.334 | 0.401 | 0.454 | 0.467 | 0.467 | 0.410 | 0.307 | 0.160 |
| -3 | 3.952 | 0.217 | 0.296 | 0.356 | 0.403 | 0.415 | 0.415 | 0.364 | 0.273 | 0.142 |
| -4 | 3.310 | 0.182 | 0.248 | 0.298 | 0.338 | 0.348 | 0.348 | 0.305 | 0.228 | 0.119 |
| -5 | 2.482 | 0.137 | 0.186 | 0.223 | 0.253 | 0.261 | 0.261 | 0.228 | 0.171 | 0.089 |
| -6 | 1.402 | 0.077 | 0.105 | 0.126 | 0.143 | 0.147 | 0.147 | 0.129 | 0.097 | 0.050 |

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JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____

CHECKED BY _____ DATE _____ PAGE NO 71

CALCULATIONS FOR

# Arakawa-Bashi, for Saitama-Ken

☐ Find EJe for diagonals.

| member | Je | load on -6 E = -0.010 | -5 -0.024 | -4 -0.027 | -3 -0.027 | -2 -0.024 | -1 -0.018 | 1 0.013 | 2 0.025 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.246 | -0.002 | -0.006 | -0.007 | -0.007 | -0.006 | -0.004 | 0.003 | 0.009 |
| 2 | 0.301 | -0.003 | -0.007 | -0.008 | -0.008 | -0.007 | -0.005 | 0.004 | 0.011 |
| 3 | 0.374 | -0.004 | -0.009 | -0.010 | -0.010 | -0.009 | -0.007 | 0.005 | 0.013 |
| 4 | 0.469 | -0.005 | -0.011 | -0.013 | -0.013 | -0.011 | -0.008 | 0.006 | 0.016 |
| 5 | 0.596 | -0.006 | -0.014 | -0.016 | -0.016 | -0.014 | -0.011 | 0.008 | 0.021 |
| 6 | 0.750 | -0.008 | -0.018 | -0.020 | -0.020 | -0.018 | -0.014 | 0.010 | 0.026 |
| 7 | 0.916 | -0.009 | -0.022 | -0.025 | -0.025 | -0.022 | -0.016 | 0.012 | 0.032 |
| 8 | 1.097 | -0.011 | -0.026 | -0.030 | -0.030 | -0.026 | -0.020 | 0.014 | 0.038 |
| 9 | 1.156 | -0.012 | -0.028 | -0.031 | -0.031 | -0.028 | -0.021 | 0.015 | 0.040 |
| 10 | 1.191 | -0.012 | -0.029 | -0.032 | -0.032 | -0.029 | -0.021 | 0.015 | 0.042 |
| 11 | 0.932 | -0.009 | -0.022 | -0.025 | -0.025 | -0.022 | -0.018 | 0.012 | 0.032 |
| 11 | -0.500 | 0.005 | 0.012 | 0.014 | -0.014 | 0.012 | 0.009 | -0.007 | -0.018 |
| 10 | -0.034 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.000 | -0.001 |
| 9 | 0.336 | -0.003 | -0.008 | -0.009 | -0.009 | -0.008 | -0.006 | 0.004 | 0.012 |
| 8 | 0.564 | -0.006 | -0.014 | -0.015 | -0.015 | -0.014 | -0.010 | 0.007 | 0.020 |
| 7 | 0.655 | -0.007 | -0.016 | -0.018 | -0.018 | -0.016 | -0.012 | 0.009 | 0.023 |
| 6 | 0.671 | -0.007 | -0.016 | -0.018 | -0.018 | -0.016 | -0.012 | 0.009 | 0.023 |
| 5 | 0.632 | -0.006 | -0.015 | -0.017 | -0.017 | -0.015 | -0.011 | 0.008 | 0.022 |
| 4 | 0.592 | -0.006 | -0.014 | -0.016 | -0.016 | -0.014 | -0.011 | 0.008 | 0.021 |
| 3 | 0.546 | -0.005 | -0.013 | -0.015 | -0.015 | -0.013 | -0.010 | 0.007 | 0.019 |
| 2 | 0.504 | -0.005 | -0.012 | -0.014 | -0.014 | -0.012 | -0.009 | 0.007 | 0.018 |
| 1 | 0.474 | -0.005 | -0.011 | -0.013 | -0.013 | -0.011 | -0.009 | 0.006 | 0.017 |
| -1 | -0.056 | 0.001 | 0.001 | 0.002 | 0.002 | 0.001 | 0.001 | -0.001 | -0.002 |
| -2 | -0.137 | 0.003 | 0.003 | 0.004 | 0.004 | 0.003 | 0.002 | -0.002 | -0.005 |
| -3 | -0.253 | 0.003 | 0.006 | 0.007 | 0.007 | 0.006 | 0.005 | -0.003 | -0.009 |
| -4 | -0.413 | 0.004 | 0.010 | 0.012 | 0.012 | 0.010 | 0.007 | -0.005 | -0.014 |
| -5 | -0.635 | 0.006 | 0.015 | 0.017 | 0.017 | 0.015 | 0.011 | -0.008 | -0.022 |
| -6 | -0.937 | 0.009 | 0.022 | 0.025 | 0.025 | 0.022 | 0.017 | -0.012 | -0.033 |
| -7 | -1.328 | 0.013 | 0.032 | 0.036 | 0.036 | 0.032 | 0.024 | -0.017 | -0.046 |

| member | Je | load on 3. E = 0.055 | 4 0.075 | 5 0.090 | 6 0.102 | 7 0.105 | 8 0.105 | 9 0.092 | 10 0.069 | 11. 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.246 | 0.014 | 0.018 | 0.022 | 0.025 | 0.026 | 0.026 | 0.023 | 0.017 | 0.009 |
| 2 | 0.301 | 0.017 | 0.023 | 0.027 | 0.031 | 0.032 | 0.032 | 0.028 | 0.021 | 0.011 |
| 3 | 0.374 | 0.021 | 0.028 | 0.034 | 0.038 | 0.039 | 0.039 | 0.034 | 0.026 | 0.013 |
| 4 | 0.469 | 0.026 | 0.035 | 0.042 | 0.048 | 0.049 | 0.049 | 0.043 | 0.032 | 0.017 |
| 5 | 0.596 | 0.033 | 0.045 | 0.054 | 0.061 | 0.063 | 0.063 | 0.055 | 0.041 | 0.021 |
| 6 | 0.750 | 0.041 | 0.056 | 0.068 | 0.077 | 0.079 | 0.079 | 0.069 | 0.052 | 0.027 |
| 7 | 0.916 | 0.050 | 0.069 | 0.082 | 0.093 | 0.096 | 0.096 | 0.084 | 0.063 | 0.033 |
| 8 | 1.097 | 0.060 | 0.083 | 0.100 | 0.112 | 0.115 | 0.115 | 0.101 | 0.076 | 0.040 |
| 9 | 1.156 | 0.063 | 0.087 | 0.104 | 0.118 | 0.121 | 0.121 | 0.106 | 0.080 | 0.042 |
| 10 | 1.191 | 0.066 | 0.089 | 0.107 | 0.121 | 0.125 | 0.125 | 0.110 | 0.082 | 0.043 |
| 11 | 0.932 | 0.051 | 0.070 | 0.084 | 0.095 | 0.098 | 0.098 | 0.086 | 0.064 | 0.034 |
| 11 | -0.500 | -0.028 | -0.038 | -0.045 | -0.051 | -0.053 | -0.053 | -0.046 | -0.035 | -0.018 |
| 10 | -0.034 | -0.002 | -0.003 | 0.003 | -0.003 | -0.004 | -0.004 | -0.003 | -0.002 | -0.001 |
| 9 | 0.336 | 0.018 | 0.025 | 0.030 | 0.034 | 0.035 | 0.035 | 0.031 | 0.023 | -0.012 |
| 8 | 0.564 | 0.031 | 0.042 | 0.051 | 0.058 | 0.059 | 0.059 | 0.052 | 0.039 | 0.020 |
| 7 | 0.655 | 0.036 | 0.049 | 0.059 | 0.067 | 0.069 | 0.069 | 0.060 | 0.045 | 0.024 |
| 6 | 0.671 | 0.037 | 0.050 | 0.060 | 0.068 | 0.070 | 0.070 | 0.062 | 0.046 | 0.024 |
| 5 | 0.632 | 0.035 | 0.047 | 0.057 | 0.064 | 0.066 | 0.066 | 0.058 | 0.044 | 0.023 |
| 4 | 0.592 | 0.033 | 0.044 | 0.053 | 0.060 | 0.062 | 0.062 | 0.054 | 0.041 | 0.021 |
| 3 | 0.546 | 0.030 | 0.041 | 0.049 | 0.056 | 0.057 | 0.057 | 0.050 | 0.038 | 0.020 |
| 2 | 0.504 | 0.028 | 0.038 | 0.045 | 0.051 | 0.053 | 0.053 | 0.046 | 0.035 | 0.018 |
| 1 | 0.474 | 0.026 | 0.036 | 0.043 | 0.048 | 0.050 | 0.050 | 0.044 | 0.033 | 0.017 |

-50-

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 72

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

☐ Find EJe for Verticals.

| member | Je | Load on 6 E= 0.010 | -5 -0.024 | -4 -0.027 | -3 -0.027 | -2 -0.024 | -1 -0.018 | 1 0.013 | 2 0.035 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | -0.318 | 0.003 | 0.008 | 0.009 | 0.009 | 0.008 | 0.006 | -0.004 | -0.011 |
| 1 | -0.347 | 0.003 | 0.008 | 0.009 | 0.009 | 0.008 | 0.006 | -0.005 | -0.012 |
| 2 | -0.377 | 0.004 | 0.009 | 0.010 | 0.010 | 0.009 | 0.007 | -0.005 | -0.013 |
| 3 | -0.401 | 0.004 | 0.010 | 0.011 | 0.011 | 0.010 | 0.007 | -0.005 | -0.014 |
| 4 | -0.418 | 0.004 | 0.010 | 0.011 | 0.011 | 0.010 | 0.008 | -0.005 | -0.015 |
| 5 | -0.423 | 0.004 | 0.010 | 0.011 | 0.011 | 0.010 | 0.008 | -0.005 | -0.015 |
| 6 | -0.404 | 0.004 | 0.010 | 0.011 | 0.011 | 0.010 | 0.007 | -0.005 | -0.014 |
| 7 | -0.352 | 0.004 | 0.008 | 0.010 | 0.010 | 0.008 | 0.006 | -0.005 | -0.012 |
| 8 | -0.248 | 0.002 | 0.006 | 0.007 | 0.007 | 0.006 | 0.004 | -0.003 | -0.009 |
| 9 | -0.092 | 0.001 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | -0.001 | -0.003 |
| 10 | 0.121 | -0.001 | -0.003 | -0.003 | -0.003 | -0.003 | -0.002 | 0.002 | 0.004 |
| 10 | 0.846 | -0.008 | -0.020 | -0.023 | -0.023 | -0.020 | -0.015 | 0.011 | 0.030 |
| 9 | 0.645 | -0.006 | -0.015 | -0.017 | -0.017 | -0.015 | -0.012 | 0.008 | 0.022 |
| 8 | 0.436 | -0.004 | -0.010 | -0.012 | -0.012 | -0.010 | -0.008 | 0.006 | 0.015 |
| 7 | 0.248 | -0.002 | -0.006 | -0.007 | -0.007 | -0.006 | -0.004 | 0.003 | 0.009 |
| 6 | 0.089 | -0.001 | -0.002 | -0.002 | -0.002 | -0.002 | -0.002 | 0.001 | 0.003 |
| 5 | -0.037 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | -0.001 | -0.001 |
| 4 | -0.134 | 0.001 | 0.003 | 0.004 | 0.004 | 0.003 | 0.002 | -0.002 | -0.005 |
| 3 | -0.209 | 0.002 | 0.005 | 0.006 | 0.006 | 0.005 | 0.004 | -0.003 | -0.007 |
| 2 | -0.267 | 0.003 | 0.006 | 0.007 | 0.007 | 0.006 | 0.005 | -0.003 | -0.009 |
| 1 | -0.305 | 0.003 | 0.007 | 0.008 | 0.008 | 0.007 | 0.005 | -0.004 | -0.011 |
| 0 | -6.342 | 0.063 | 0.152 | 0.171 | 0.171 | 0.152 | 0.114 | -0.082 | -0.222 |
| -1 | 0.436 | -0.004 | -0.010 | -0.012 | -0.012 | -0.010 | -0.008 | 0.006 | 0.015 |
| -2 | 0.540 | -0.005 | -0.013 | -0.015 | -0.015 | -0.013 | -0.010 | 0.008 | 0.019 |
| -3 | 0.651 | -0.007 | -0.016 | -0.018 | -0.018 | -0.016 | -0.012 | 0.008 | 0.023 |
| -4 | 0.763 | -0.008 | -0.018 | -0.021 | -0.021 | -0.018 | -0.014 | 0.010 | 0.027 |
| -5 | 0.868 | -0.009 | -0.021 | -0.023 | -0.023 | -0.021 | -0.016 | 0.011 | 0.030 |
| -6 | 0.955 | -0.010 | -0.023 | -0.026 | -0.026 | -0.023 | -0.017 | 0.012 | 0.033 |
| -7 | 1.000 | -0.010 | -0.024 | -0.027 | -0.027 | -0.024 | -0.018 | 0.013 | 0.035 |

| member | Je | 3 E=0.055 | 4 0.075 | 5 0.090 | 6 0.102 | 7 0.105 | 8 0.105 | 9 0.092 | 10 0.069 | 11. 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | -0.318 | -0.017 | -0.024 | -0.029 | -0.032 | -0.033 | -0.033 | -0.029 | -0.022 | -0.011 |
| 1 | -0.347 | -0.019 | -0.026 | -0.031 | -0.035 | -0.036 | -0.036 | -0.032 | -0.024 | -0.012 |
| 2 | -0.377 | -0.021 | -0.028 | -0.034 | -0.038 | -0.040 | -0.040 | -0.035 | -0.026 | -0.014 |
| 3 | -0.401 | -0.022 | -0.030 | -0.036 | -0.041 | -0.042 | -0.042 | -0.037 | -0.028 | -0.014 |
| 4 | -0.418 | -0.023 | -0.031 | -0.038 | -0.043 | -0.044 | -0.044 | -0.038 | -0.029 | -0.015 |
| 5 | -0.423 | -0.023 | -0.032 | -0.038 | -0.043 | -0.044 | -0.044 | -0.039 | -0.029 | -0.015 |
| 6 | -0.404 | -0.022 | -0.031 | -0.036 | -0.041 | -0.042 | -0.042 | -0.037 | -0.028 | -0.015 |
| 7 | -0.352 | -0.019 | -0.026 | -0.032 | -0.036 | -0.037 | -0.037 | -0.032 | -0.024 | -0.013 |
| 8 | -0.248 | -0.014 | -0.019 | -0.022 | -0.025 | -0.026 | -0.026 | -0.023 | -0.017 | -0.009 |
| 9 | -0.092 | -0.005 | -0.007 | -0.008 | -0.009 | -0.010 | -0.010 | -0.008 | -0.006 | -0.003 |
| 10 | 0.121 | 0.007 | 0.009 | 0.011 | 0.012 | 0.013 | 0.013 | 0.011 | 0.008 | 0.005 |
| 10 | 0.846 | 0.047 | 0.063 | 0.076 | 0.086 | 0.089 | 0.089 | 0.078 | 0.058 | 0.030 |
| 9 | 0.645 | 0.035 | 0.048 | 0.058 | 0.066 | 0.068 | 0.068 | 0.059 | 0.045 | 0.023 |
| 8 | 0.436 | 0.024 | 0.033 | 0.039 | 0.044 | 0.046 | 0.046 | 0.040 | 0.030 | 0.016 |
| 7 | 0.248 | 0.014 | 0.019 | 0.022 | 0.025 | 0.026 | 0.026 | 0.023 | 0.017 | 0.009 |
| 6 | 0.089 | 0.005 | 0.007 | 0.008 | 0.009 | 0.009 | 0.009 | 0.008 | 0.006 | 0.003 |
| 5 | -0.037 | -0.002 | -0.003 | -0.003 | -0.004 | -0.004 | -0.004 | -0.004 | -0.003 | -0.001 |
| 4 | -0.134 | -0.007 | -0.010 | -0.012 | -0.014 | -0.014 | -0.014 | -0.012 | -0.009 | -0.005 |
| 3 | -0.209 | -0.011 | -0.016 | -0.019 | -0.021 | -0.022 | -0.022 | -0.019 | -0.014 | -0.008 |
| 2 | -0.267 | -0.014 | -0.020 | -0.024 | -0.027 | -0.028 | -0.028 | -0.025 | -0.018 | -0.010 |
| 1 | -0.305 | -0.017 | -0.023 | -0.027 | -0.031 | -0.032 | -0.032 | -0.028 | -0.021 | -0.011 |
| 0 | -6.342 | -0.349 | -0.476 | -0.571 | -0.647 | -0.666 | -0.666 | -0.583 | -0.438 | -0.228 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

ESe for Verticals continued.

| Member | Se | F= 3 0.055 | 4 0.075 | 5 0.090 | 6 0.102 | 7 0.105 | 8 0.105 | 9 0.092 | 10 0.069 | 11 0.036 |
|---|---|---|---|---|---|---|---|---|---|---|
| -1 | 0.436 | 0.024 | 0.033 | 0.039 | 0.044 | 0.046 | 0.046 | 0.040 | 0.030 | 0.016 |
| -2 | 0.540 | 0.030 | 0.041 | 0.049 | 0.055 | 0.057 | 0.057 | 0.050 | 0.037 | 0.019 |
| -3 | 0.651 | 0.036 | 0.049 | 0.059 | 0.066 | 0.068 | 0.068 | 0.060 | 0.045 | 0.023 |
| -4 | 0.763 | 0.042 | 0.057 | 0.069 | 0.078 | 0.080 | 0.080 | 0.070 | 0.053 | 0.027 |
| -5 | 0.868 | 0.048 | 0.065 | 0.078 | 0.089 | 0.091 | 0.091 | 0.080 | 0.060 | 0.031 |
| -6 | 0.955 | 0.053 | 0.072 | 0.086 | 0.097 | 0.100 | 0.100 | 0.088 | 0.066 | 0.034 |
| -7 | 1.000 | 0.055 | 0.075 | 0.090 | 0.102 | 0.105 | 0.105 | 0.092 | 0.069 | 0.036 |

JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-ken

Influence Surfaces and Dead load stresses for Upper chord.

| load on | Member U-6 - U-5 D.Jd | Jo. | H.Jk | E.Je | Summary | D.L.S. | Member U-5 - U-4 Jo | H.Jk | DJd | E.Je | Summary | D.L.S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 |
| -6 | 0.014 | " | " | " | 0.014 | 350 | " | " | 0.024 | " | 0.024 | 590 |
| -5 | 0.033 | | | | 0.033 | 840 | | | 0.058 | | 0.058 | 1470 |
| -4 | 0.037 | | | | 0.037 | 960 | | | 0.065 | | 0.065 | 1720 |
| -3 | 0.037 | | | | 0.037 | 1040 | | | 0.065 | | 0.065 | 1830 |
| -2 | 0.033 | | | | 0.033 | 990 | | | 0.058 | | 0.058 | 1740 |
| -1 | 0.025 | | | | 0.025 | 800 | | | 0.044 | | 0.044 | 1410 |
| 0 | 0.000 | | | | 0.000 | 000 | | | 0.000 | | 0.000 | 000 |
| 1 | - 0.018 | | | | - 0.018 | - 610 | | | - 0.031 | | - 0.031 | - 1,050 |
| 2 | - 0.048 | | | | - 0.048 | - 1520 | | | - 0.085 | | - 0.085 | - 2690 |
| 3 | - 0.076 | | | | - 0.076 | - 2260 | | | - 0.133 | | - 0.133 | - 3950 |
| 4 | - 0.104 | | | | - 0.104 | - 2890 | | | - 0.181 | | - 0.181 | - 5030 |
| 5 | - 0.124 | | | | - 0.124 | - 3320 | | | - 0.218 | | - 0.218 | - 5840 |
| 6 | - 0.141 | | | | - 0.141 | - 3610 | | | - 0.247 | | - 0.247 | - 6320 |
| 7 | - 0.145 | | | | - 0.145 | - 3570 | | | - 0.254 | | - 0.254 | - 6250 |
| 8 | - 0.145 | | | | - 0.145 | - 3490 | | | - 0.254 | | - 0.254 | - 6150 |
| 9 | - 0.127 | | | | - 0.127 | - 2960 | | | - 0.223 | | - 0.223 | - 5200 |
| 10 | - 0.095 | | | | - 0.095 | - 2190 | | | - 0.167 | | - 0.167 | - 3860 |
| 11 | - 0.050 | | | | - 0.050 | - 1160 | | | - 0.087 | | - 0.087 | - 2010 |
| 10 | 0.003 | | | | 0.003 | 100 | | | 0.005 | | 0.005 | 120 |
| 9 | 0.057 | | | | 0.057 | 1330 | | | 0.099 | | 0.099 | 2310 |
| 8 | 0.112 | | | | 0.112 | 2700 | | | 0.196 | | 0.196 | 4740 |
| 7 | 0.156 | | | | 0.156 | 3840 | | | 0.273 | | 0.273 | 6720 |
| 6 | 0.188 | | | | 0.188 | 4810 | | | 0.329 | | 0.329 | 8420 |
| 5 | 0.206 | | | | 0.206 | 5520 | | | 0.360 | | 0.360 | 9650 |
| 4 | 0.207 | | | | 0.207 | 5750 | | | 0.363 | | 0.363 | 10090 |
| 3 | 0.195 | | | | 0.195 | 5790 | | | 0.341 | | 0.341 | 10120 |
| 2 | 0.164 | | | | 0.164 | 5180 | | | 0.288 | | 0.288 | 9110 |
| 1 | 0.116 | | | | 0.116 | 3940 | | | 0.203 | | 0.203 | 6900 |
| 0 | 0.000 | | | | 0.000 | 0000 | | | 0.000 | | 0.000 | 0000 |
| -1 | - 0.108 | | | | - 0.108 | - 3460 | | | - 0.189 | | - 0.189 | - 6050 |
| -2 | - 0.273 | | | | - 0.273 | - 8190 | | | - 0.479 | | - 0.479 | - 14370 |
| -3 | - 0.463 | | | | - 0.463 | - 13060 | | | - 0.810 | | - 0.810 | - 22840 |
| -4 | - 0.670 | | | | - 0.670 | - 17,690 | " | | - 1.173 | | - 1.173 | - 30970 |
| -5 | - 0.894 | " | | | - 0.894 | - 22,710 | 0.000 | | - 1.565 | | - 1,565 | - 39750 |
| -6 | - 1.132 | 0.000 | " | " | - 1.132 | - 27,960 | 1.210 | " | - 1.984 | " | - 0.774 | - 19120 |
| -7 | - 1.381 | 1.381 | 0.000 | 0.000 | 0.000 | 000 | 2.419 | 0.000 | - 2.419 | 0.000 | 0.000 | 000 |
| | | | Summary | | - 1.583 | 38,190 | | | | | 2.771 | 76,940 |
| | | | | | - 4.613 | - 120,650 | | | | | - 6.870 | - 181,450 |
| | | | | | | - 82,460 | | | | | | - 104,510 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 75

CALCULATIONS FOR

Arakawa-Bashi for Saitama-ken

| Load on. | Member U-4-U-3. Jo | HJu | DJd | EJe | Sum. | D.L.S. | Member U-3-U-2 Jo | HJu | DJd | EJe | Sum. | D.L.S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 |
| -6 | " | " | 0.032 | " | 0.032 | 790 | " | " | 0.037 | " | 0.037 | 910 |
| -5 | | | 0.076 | | 0.076 | 1930 | | | 0.090 | | 0.090 | 2290 |
| -4 | | | 0.086 | | 0.086 | 2270 | | | 0.101 | | 0.101 | 2670 |
| -3 | | | 0.086 | | 0.086 | 2430 | | | 0.101 | | 0.101 | 2850 |
| -2 | | | 0.076 | | 0.076 | 2280 | | | 0.090 | | 0.090 | 2700 |
| -1 | | | 0.057 | | 0.057 | 1,820 | | | 0.067 | | 0.067 | 2140 |
| 0 | | | 0.000 | | 0.000 | 000 | | | 0.000 | | 0.000 | 000 |
| 1 | | | -0.041 | | -0.041 | -1,390 | | | -0.049 | | -0.049 | -1670 |
| 2 | | | -0.112 | | -0.112 | -3540 | | | -0.131 | | -0.131 | -4140 |
| 3 | | | -0.175 | | -0.175 | -5200 | | | -0.206 | | -0.206 | -6120 |
| 4 | | | -0.239 | | -0.239 | -6640 | | | -0.281 | | -0.281 | -7810 |
| 5 | | | -0.287 | | -0.287 | -7690 | | | -0.338 | | -0.338 | -9060 |
| 6 | | | -0.325 | | -0.325 | -8320 | | | -0.382 | | -0.382 | -9780 |
| 7 | | | -0.334 | | -0.334 | -8220 | | | -0.394 | | -0.394 | -9690 |
| 8 | | | -0.334 | | -0.334 | -8050 | | | -0.394 | | -0.394 | -9500 |
| 9 | | | -0.293 | | -0.293 | -6830 | | | -0.345 | | -0.345 | -8040 |
| 10 | | | -0.220 | | -0.220 | -5080 | | | -0.259 | | -0.259 | -5980 |
| 11 | | | -0.115 | | -0.115 | -2660 | | | -0.135 | | -0.135 | -3120 |
| 10 | | | 0.006 | | 0.006 | 140 | | | 0.008 | | 0.008 | 180 |
| 9 | | | 0.131 | | 0.131 | 3050 | | | 0.154 | | 0.154 | 3590 |
| 8 | | | 0.258 | | 0.258 | 6220 | | | 0.304 | | 0.304 | 7330 |
| 7 | | | 0.360 | | 0.360 | 8860 | | | 0.423 | | 0.423 | 10410 |
| 6 | | | 0.433 | | 0.433 | 11080 | | | 0.510 | | 0.510 | 13060 |
| 5 | | | 0.475 | | 0.475 | 12730 | | | 0.558 | | 0.558 | 14950 |
| 4 | | | 0.478 | | 0.478 | 13,290 | | | 0.562 | | 0.562 | 15620 |
| 3 | | | 0.449 | | 0.449 | 13340 | | | 0.528 | | 0.528 | 15680 |
| 2 | | | 0.379 | | 0.379 | 11980 | | | 0.446 | | 0.446 | 14160 |
| 1 | | | 0.268 | | 0.268 | 9110 | | | 0.315 | | 0.315 | 10710 |
| 0 | | | 0.000 | | 0.000 | 000 | | | 0.000 | | 0.000 | 000 |
| -1 | | | -0.249 | | -0.249 | -7970 | | | -0.292 | | -0.292 | -9340 |
| -2 | | | -0.631 | | -0.631 | -18930 | | | -0.742 | | -0.742 | -22260 |
| -3 | " | | -1.067 | | -1.067 | -30090 | 0.000 | | -1.256 | | -1.256 | -35420 |
| -4 | 0.000 | | -1.545 | | -1.545 | -40790 | 0.937 | | -1.818 | | -0.881 | -23260 |
| -5 | 1.062 | | -2.061 | | -0.999 | -25370 | 1.874 | | -2.425 | | -0.544 | -13820 |
| -6 | 2.124 | " | -2.613 | " | -0.489 | -12080 | 2.811 | " | -3.073 | " | -0.262 | -6470 |
| -7 | 3.186 | 0.000 | -3.186 | 0.000 | 0.000 | 000 | 3.748 | 0.000 | -3.748 | 0.000 | 0.000 | 000 |
| | | Summary. | | | 3.650 | 101,320 | | | | | 4.296 | 119,270 |
| | | | | | -7.455 | -198,870 | | | | | -6,891 | -185.480 |
| | | | | | | -97,550 | | | | | | -66,210 |

JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 76

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

| Member U-2 - U-1 | | | | | | | Member U-1 - U0 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load on. | To | H.JL | DJd | EJe | Sum. | D.L.S | To | HJL | DJd | EJe | Sum. | D.L.S |
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 | 000 |
| -6 | " | " | 0.042 | " | 0.042 | 1040 | " | " | 0.045 | " | 0.045 | 1120 |
| -5 | | | 0.100 | | 0.100 | 2540 | | | 0.107 | | 0.107 | 2720 |
| -4 | | | 0.112 | | 0.112 | 2960 | | | 0.121 | | 0.121 | 3190 |
| -3 | | | 0.112 | | 0.112 | 3160 | | | 0.121 | | 0.121 | 3410 |
| -2 | | | 0.100 | | 0.100 | 3000 | | | 0.107 | | 0.107 | 3210 |
| -1 | | | 0.075 | | 0.075 | 2400 | | | 0.080 | | 0.080 | 2560 |
| 0 | | | 0.000 | | 0.000 | 000 | | | 0.000 | | 0.000 | 000 |
| 1 | | | -0.054 | | -0.054 | -1840 | | | -0.058 | | -0.058 | -1970 |
| 2 | | | -0.146 | | -0.146 | -4610 | | | -0.156 | | -0.156 | -4930 |
| 3 | | | -0.229 | | -0.229 | -6800 | | | -0.246 | | -0.246 | -7310 |
| 4 | | | -0.312 | | -0.312 | -8670 | | | -0.335 | | -0.335 | -9310 |
| 5 | | | -0.374 | | -0.374 | -10400 | | | -0.402 | | -0.402 | -10770 |
| 6 | | | -0.424 | | -0.424 | -10850 | | | -0.456 | | -0.456 | -11670 |
| 7 | | | -0.437 | | -0.437 | -10750 | | | -0.469 | | -0.469 | -11540 |
| 8 | | | -0.437 | | -0.437 | -10530 | | | -0.469 | | -0.469 | -11300 |
| 9 | | | -0.383 | | -0.383 | -8920 | | | -0.411 | | -0.411 | -9580 |
| 10 | | | -0.287 | | -0.287 | -6630 | | | -0.308 | | -0.308 | -7110 |
| 11 | | | -0.150 | | -0.150 | -3470 | | | -0.161 | | -0.161 | -3720 |
| 10 | | | 0.008 | | 0.008 | 180 | | | 0.009 | | 0.009 | 210 |
| 9 | | | 0.171 | | 0.171 | 3980 | | | 0.183 | | 0.183 | 4260 |
| 8 | | | 0.337 | | 0.337 | 8120 | | | 0.362 | | 0.362 | 8720 |
| 7 | | | 0.470 | | 0.470 | 11560 | | | 0.505 | | 0.505 | 12420 |
| 6 | | | 0.566 | | 0.566 | 14490 | | | 0.608 | | 0.608 | 15560 |
| 5 | | | 0.620 | | 0.620 | 17240 | | | 0.666 | | 0.666 | 17850 |
| 4 | | | 0.624 | | 0.624 | 17350 | | | 0.671 | | 0.671 | 18650 |
| 3 | | | 0.587 | | 0.587 | 17430 | | | 0.630 | | 0.630 | 18710 |
| 2 | | | 0.495 | | 0.495 | 15640 | | | 0.532 | | 0.532 | 16810 |
| 1 | | | 0.349 | | 0.349 | 11730 | | | 0.375 | | 0.375 | 12750 |
| 0 | | | 0.000 | | 0.000 | 000 | " | | 0.000 | | 0.000 | 000 |
| -1 | " | | -0.324 | | -0.324 | -10370 | 0.000 | | -0.349 | | -0.349 | -11170 |
| -2 | 0.000 | | -0.824 | | -0.824 | -24720 | 0.745 | | -0.885 | | -0.140 | -4200 |
| -3 | 0.832 | | -1.394 | | -0.562 | -15850 | 1.490 | | -1.497 | | -0.007 | -200 |
| -4 | 1.664 | | -2.018 | | -0.354 | -9350 | 2.235 | | -2.168 | | 0.067 | 1770 |
| -5 | 2.496 | | -2.692 | | -0.196 | -4980 | 2.980 | | -2.892 | | 0.088 | 2240 |
| -6 | 3.328 | " | -3.411 | " | -0.083 | -2050 | 3.725 | " | -3.665 | " | 0.060 | 1480 |
| -7 | 4.160 | 0.000 | -4.160 | 0.000 | 0.000 | 000 | 4.470 | 0.000 | -4.470 | 0.000 | 0.000 | 000 |
| | | | | | 4.764 | 132,820 | | | | | 5.337 | 147,630 |
| | | | | | -5.576 | -150,790 | | | | | -3,967 | -104,780 |
| | | | | | | -17,970 | | | | | | 42,850 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 77

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

| Load on. | Member $U_0$-$U_1$ So | HSh | DSd | ESe | Sum. | D.L.S. | Member $U_1$-$U_2$ So. | HSh | DSd | ESe | Sum | D.L.S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.237 | 0.000 | 0.000 | -0.237 | 0.000 | 0.000 | 0.529 | 0.000 | 0.000 | -0.529 | 0.000 | 000 |
| -6 | 0.203 | " | 0.050 | -0.194 | 0.059 | 1460 | 0.454 | " | 0.053 | -0.434 | 0.073 | 1800 |
| -5 | 0.169 | " | 0.119 | -0.153 | 0.135 | 3430 | 0.378 | " | 0.127 | -0.342 | 0.163 | 4140 |
| -4 | 0.136 | " | 0.134 | -0.115 | 0.155 | 4090 | 0.302 | " | 0.143 | -0.257 | 0.188 | 4960 |
| -3 | 0.102 | " | 0.134 | -0.079 | 0.157 | 4430 | 0.227 | " | 0.143 | -0.177 | 0.183 | 5160 |
| -2 | 0.068 | " | 0.119 | -0.047 | 0.140 | 4200 | 0.151 | " | 0.127 | -0.105 | 0.173 | 5190 |
| -1 | 0.034 | " | 0.090 | -0.018 | 0.106 | 3390 | 0.076 | " | 0.095 | -0.041 | 0.130 | 4160 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 |
| 1 | -0.034 | 0.035 | -0.065 | 0.020 | -0.044 | -1500 | -0.076 | 0.075 | -0.069 | 0.044 | -0.026 | -880 |
| 2 | -0.068 | 0.098 | -0.174 | 0.028 | -0.116 | -3670 | -0.151 | 0.208 | -0.185 | 0.063 | -0.065 | -2050 |
| 3 | -0.102 | 0.164 | -0.247 | 0.033 | -0.152 | -4510 | -0.227 | 0.350 | -0.291 | 0.075 | -0.093 | -2760 |
| 4 | -0.136 | 0.235 | -0.373 | 0.036 | -0.238 | -6620 | -0.302 | 0.500 | -0.397 | 0.079 | -0.120 | -3340 |
| 5 | -0.169 | 0.304 | -0.448 | 0.035 | -0.278 | -7450 | -0.378 | 0.647 | -0.476 | 0.079 | -0.128 | -3430 |
| 6 | -0.203 | 0.374 | -0.508 | 0.032 | -0.305 | -7810 | -0.454 | 0.796 | -0.540 | 0.072 | -0.126 | -3230 |
| 7 | -0.237 | 0.439 | -0.522 | 0.027 | -0.293 | -7210 | -0.529 | 0.934 | -0.556 | 0.060 | -0.091 | -2240 |
| 8 | -0.271 | 0.498 | -0.522 | 0.019 | -0.276 | -6650 | -0.605 | 1.060 | -0.556 | 0.042 | -0.059 | -1420 |
| 9 | -0.305 | 0.546 | -0.458 | 0.010 | -0.207 | -4820 | -0.680 | 1.163 | -0.487 | 0.022 | 0.018 | 420 |
| 10 | -0.339 | 0.575 | -0.343 | 0.001 | -0.106 | -2450 | -0.756 | 1.224 | -0.365 | 0.001 | 0.104 | 2400 |
| 11 | -0.373 | 0.586 | -0.179 | -0.009 | 0.025 | 580 | -0.832 | 1.247 | -0.191 | -0.019 | 0.205 | 4740 |
| 10 | -0.406 | 0.575 | 0.010 | -0.016 | 0.163 | 3770 | -0.907 | 1.224 | 0.011 | -0.037 | 0.291 | 6720 |
| 9 | -0.441 | 0.546 | 0.204 | -0.022 | 0.287 | 6690 | -0.983 | 1.163 | 0.217 | -0.049 | 0.348 | 8110 |
| 8 | -0.474 | 0.498 | 0.403 | -0.025 | 0.402 | 9690 | -1.058 | 1.060 | 0.429 | -0.056 | 0.375 | 9040 |
| 7 | -0.508 | 0.439 | 0.562 | -0.025 | 0.468 | 11510 | -1.134 | 0.934 | 0.598 | -0.056 | 0.342 | 8410 |
| 6 | -0.542 | 0.374 | 0.677 | -0.024 | 0.485 | 12420 | -1.210 | 0.796 | 0.720 | -0.054 | 0.252 | 6450 |
| 5 | -0.576 | 0.304 | 0.741 | -0.021 | 0.448 | 12010 | -1.285 | 0.647 | 0.789 | -0.048 | 0.103 | 2760 |
| 4 | -0.610 | 0.235 | 0.746 | -0.018 | 0.353 | 9810 | -1.361 | 0.500 | 0.794 | -0.040 | -0.107 | -2970 |
| 3 | -0.644 | 0.164 | 0.702 | -0.013 | 0.209 | 6210 | -1.436 | 0.350 | 0.746 | -0.029 | -0.369 | -10,900 |
| 2 | -0.677 | 0.098 | 0.592 | -0.008 | 0.005 | 160 | -1.512 | 0.208 | 0.630 | -0.019 | -0.693 | -21900 |
| 1 | -0.711 | 0.035 | 0.418 | -0.003 | -0.261 | -8870 | -0.756 | 0.075 | 0.445 | -0.007 | -0.243 | -8260 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 |
| -1 | 0.711 | " | -0.388 | 0.004 | 0.327 | 10460 | 0.756 | " | -0.413 | 0.009 | 0.334 | 10690 |
| -2 | 1.422 | " | -0.985 | 0.006 | 0.443 | 13290 | 1.512 | " | -1.048 | 0.013 | 0.477 | 14310 |
| -3 | 2.132 | " | -1.667 | 0.006 | 0.471 | 13280 | 2.268 | " | -1.773 | 0.014 | 0.509 | 14350 |
| -4 | 2.845 | " | -2.413 | 0.006 | 0.438 | 11560 | 3.024 | " | -2.567 | 0.014 | 0.471 | 12430 |
| -5 | 3.556 | " | -3.219 | 0.006 | 0.343 | 8710 | 3.780 | " | -3.424 | 0.013 | 0.369 | 9370 |
| -6 | 4.266 | " | -4.080 | 0.002 | 0.188 | 4640 | 4.536 | " | -4.339 | 0.005 | 0.202 | 4990 |
| -7 | 4.976 | 0.000 | -4.976 | 0.000 | 0.000 | 000 | 5.292 | 0.000 | -5.292 | 0.000 | 0.000 | 000 |
| | | | | | 5.807 | 155,790 | | | | | 5.310 | 140,600 |
| | | | | | -2.276 | -61,560 | | | | | -2.120 | -63.380 |
| | | | | | | 94,230 | | | | | | 77,220 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 78

CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

| Member U2-U3 | | | | | | | Member U3-U4 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load on | To | H.Jt | DJd | EJe | Sum. | D.L.S. | To. | H.Jt | DJd | EJe | Sum | D.L.S |
| -7 | 0.894 | 0.000 | 0.000 | -0.894 | 0.000 | 000 | 1.351 | 0.000 | 0.000 | -1.351 | 0.000 | 0.000 |
| -6 | 0.766 | " | 0.057 | -0.733 | 0.090 | 2220 | 1.158 | " | 0.061 | -1.107 | 0.112 | 2770 |
| -5 | 0.639 | " | 0.136 | -0.578 | 0.197 | 5000 | 0.965 | " | 0.146 | -0.874 | 0.235 | 5970 |
| -4 | 0.511 | " | 0.153 | -0.434 | 0.230 | 6070 | 0.772 | " | 0.164 | -0.655 | 0.281 | 7420 |
| -3 | 0.383 | " | 0.153 | -0.299 | 0.237 | 6680 | 0.579 | " | 0.164 | -0.453 | 0.290 | 8180 |
| -2 | 0.255 | " | 0.136 | -0.177 | 0.214 | 6420 | 0.386 | " | 0.146 | -0.267 | 0.265 | 7950 |
| -1 | 0.128 | " | 0.102 | -0.070 | 0.160 | 5120 | 0.193 | " | 0.109 | -0.105 | 0.197 | 6300 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.006 | 000 |
| 1 | -0.128 | 0.121 | -0.074 | 0.075 | -0.006 | -200 | -0.193 | 0.173 | -0.079 | 0.113 | 0.014 | 480 |
| 2 | -0.255 | 0.334 | -0.198 | 0.106 | -0.013 | -4110 | -0.386 | 0.478 | -0.213 | 0.161 | 0.040 | 1260 |
| 3 | -0.383 | 0.561 | -0.311 | 0.126 | -0.007 | -216 | -0.579 | 0.803 | -0.334 | 0.190 | 0.080 | 2380 |
| 4 | -0.511 | 0.802 | -0.424 | 0.134 | 0.001 | +30 | -0.772 | 1.148 | -0.456 | 0.203 | 0.123 | 3420 |
| 5 | -0.639 | 1.037 | -0.510 | 0.133 | 0.021 | 560 | -0.965 | 1.485 | -0.547 | 0.201 | 0.174 | 4660 |
| 6 | -0.766 | 1.276 | -0.578 | 0.122 | 0.054 | 1380 | -1.158 | 1.826 | -0.602 | 0.184 | 0.250 | 6400 |
| 7 | -0.894 | 1.497 | -0.595 | 0.101 | 0.109 | 2680 | -1.351 | 2.143 | -0.638 | 0.153 | 0.307 | 7550 |
| 8 | -1.022 | 1.699 | -0.595 | 0.072 | 0.154 | 3710 | -1.544 | 2.432 | -0.638 | 0.109 | 0.359 | 8650 |
| 9 | -1.149 | 1.864 | -0.521 | 0.037 | 0.231 | 5380 | -1.737 | 2.668 | -0.559 | 0.055 | 0.427 | 9950 |
| 10 | -1.277 | 1.962 | -0.391 | 0.002 | 0.296 | 6840 | -1.930 | 2.810 | -0.420 | 0.003 | 0.463 | 10700 |
| 11 | -1.405 | 1.998 | -0.204 | -0.032 | 0.357 | 8250 | -2.123 | 2.862 | -0.219 | -0.049 | 0.471 | 10880 |
| 10 | -1.532 | 1.962 | 0.011 | -0.062 | 0.379 | 8750 | -2.316 | 2.810 | 0.012 | -0.093 | 0.413 | 9540 |
| 9 | -1.660 | 1.864 | 0.232 | -0.082 | 0.354 | 8250 | -2.509 | 2.668 | 0.249 | -0.124 | 0.284 | 6620 |
| 8 | -1.788 | 1.699 | 0.459 | -0.094 | 0.276 | 6650 | -2.702 | 2.432 | 0.492 | -0.142 | 0.080 | 1930 |
| 7 | -1.916 | 1.497 | 0.640 | -0.094 | 0.127 | 3120 | -2.895 | 2.143 | 0.687 | -0.142 | -0.207 | -5090 |
| 6 | -2.043 | 1.276 | 0.770 | -0.091 | -0.088 | -2250 | -3.088 | 1.826 | 0.827 | -0.138 | -0.573 | -14670 |
| 5 | -2.171 | 1.037 | 0.844 | -0.080 | -0.370 | -9920 | -3281 | 1.485 | 0.906 | -0.121 | -1.011 | -27.090 |
| 4 | -2.299 | 0.802 | 0.849 | -0.067 | -0.715 | -19880 | -3.474 | 1.148 | 0.912 | -0.101 | -1.515 | -42.120 |
| 3 | -2.427 | 0.562 | 0.798 | -0.049 | -1.117 | -33.170 | -2.606 | 0.803 | 0.857 | -0.074 | -1.020 | -30.290 |
| 2 | -1.618 | 0.334 | 0.674 | -0.031 | -0.641 | -20,260 | -1.737 | 0.478 | 0.724 | -0.047 | -0.582 | -18.390 |
| 1 | -0.809 | 0.121 | 0.476 | -0.012 | -0.224 | -7620 | -0.869 | 0.173 | 0.511 | -0.018 | -0.203 | -6900 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 |
| -1 | 0.809 | " | -0.442 | 0.016 | 0.383 | 12260 | 0.869 | " | -0.474 | 0.024 | 0.419 | 13410 |
| -2 | 1.618 | " | -1.121 | 0.021 | 0.518 | 15540 | 1.736 | " | -1.204 | 0.032 | 0.565 | 16950 |
| -3 | 2.427 | " | -1.897 | 0.024 | 0.554 | 15,620 | 2.606 | " | -2.036 | 0.036 | 0.606 | 17090 |
| -4 | 3.236 | " | -2.747 | 0.024 | 0.513 | 13,540 | 3.474 | " | -2.948 | 0.036 | 0.562 | 14840 |
| -5 | 4.045 | " | -3.664 | 0.021 | 0.402 | 10210 | 4.343 | " | -3.934 | 0.032 | 0.441 | 12200 |
| -6 | 4.854 | " | -4.643 | 0.009 | 0.220 | 5430 | 5.211 | " | -4.986 | 0.014 | 0.239 | 5900 |
| -7 | 5.663 | 0.000 | -5.663 | 0.000 | 0.000 | 000 | 6.080 | 0.000 | -6.080 | 0.000 | 0.000 | 000 |
| | | | | | 6.077 | 159,710 | | | | | 7.697 | 202,400 |
| | | | | | -3.181 | -97,620 | | | | | -5.111 | -144,550 |
| | | | | | | 62,090 | | | | | | 57,850 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY Y.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 79

CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

| Load on | Member $U_4$-$U_5$ $J_o$ | H.$J_L$ | D.$J_d$ | E.$J_e$ | Sum. | D.L.S. | Member $U_5$-$U_6$ $J_o$ | H.$J_L$ | D.$J_d$ | E.$J_e$ | Sum. | D.L.S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 1.924 | 0.000 | 0.000 | -1.924 | 0.000 | 000 | 2.637 | 0.000 | 0.000 | -2.637 | 0.000 | 000 |
| -6 | 1.649 | " | 0.065 | -1.577 | 0.137 | 3380 | 2.260 | " | 0.070 | -2.162 | 0.168 | 4150 |
| -5 | 1.375 | " | 0.157 | -1.244 | 0.288 | 7320 | 1.884 | " | 0.169 | -1.706 | 0.347 | 8810 |
| -4 | 1.100 | " | 0.177 | -0.933 | 0.344 | 9080 | 1.507 | " | 0.190 | -1.278 | 0.419 | 11060 |
| -3 | 0.825 | " | 0.177 | -0.645 | 0.357 | 10070 | 1.130 | " | 0.190 | -0.883 | 0.437 | 12320 |
| -2 | 0.550 | " | 0.157 | -0.381 | 0.326 | 9780 | 0.753 | " | 0.169 | -0.522 | 0.429 | 12870 |
| -1 | 0.275 | " | 0.118 | -0.150 | 0.243 | 7780 | 0.377 | " | 0.127 | -0.206 | 0.298 | 9540 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 |
| 1 | -0.275 | 0.232 | -0.085 | 0.160 | 0.032 | 1090 | -0.377 | 0.299 | -0.091 | 0.222 | 0.053 | 1800 |
| 2 | -0.550 | 0.642 | -0.229 | 0.229 | 0.092 | 2910 | -0.753 | 0.828 | -0.246 | 0.314 | 0.143 | 4520 |
| 3 | -0.825 | 1.080 | -0.360 | 0.271 | 0.166 | 4930 | -1.130 | 1.391 | -0.387 | 0.372 | 0.246 | 7300 |
| 4 | -1.100 | 1.544 | -0.491 | 0.289 | 0.242 | 6730 | -1.507 | 1.989 | -0.527 | 0.396 | 0.351 | 9760 |
| 5 | -1.375 | 1.998 | -0.589 | 0.287 | 0.321 | 8600 | -1.884 | 2.574 | -0.633 | 0.393 | 0.450 | 12060 |
| 6 | -1.649 | 2.457 | -0.667 | 0.262 | 0.403 | 10320 | -2.260 | 3.165 | -0.717 | 0.359 | 0.547 | 14000 |
| 7 | -1.924 | 2.883 | -0.687 | 0.217 | 0.489 | 12030 | -2.637 | 3.715 | -0.738 | 0.298 | 0.638 | 15690 |
| 8 | -2.199 | 3.272 | -0.687 | 0.156 | 0.542 | 13060 | -3.014 | 4.215 | -0.738 | 0.214 | 0.677 | 16320 |
| 9 | -2.474 | 3.590 | -0.602 | 0.079 | 0.593 | 13820 | -3.390 | 4.626 | -0.647 | 0.108 | 0.697 | 16240 |
| 10 | -2.749 | 3.779 | -0.451 | 0.004 | 0.583 | 13470 | -3.767 | 4.869 | -0.485 | 0.005 | 0.622 | 14370 |
| 11 | -3.024 | 3.849 | -0.236 | -0.069 | 0.520 | 12120 | -4.144 | 4.960 | -0.253 | -0.095 | 0.468 | 10810 |
| 10 | -3.299 | 3.779 | 0.013 | -0.133 | 0.360 | 8320 | -4.520 | 4.869 | 0.014 | -0.182 | 0.181 | 4180 |
| 9 | -3.574 | 3.590 | 0.268 | -0.177 | 0.107 | 2490 | -4.897 | 4.626 | 0.288 | -0.243 | -0.226 | -5270 |
| 8 | -3.849 | 3.272 | 0.530 | -0.202 | -0.249 | -6000 | -5.274 | 4.215 | 0.570 | -0.277 | -0.766 | -18460 |
| 7 | -4.124 | 2.883 | 0.739 | -0.202 | -0.704 | -17320 | -5.651 | 3.715 | 0.795 | -0.277 | -1.418 | -34,880 |
| 6 | -4.398 | 2.457 | 0.890 | -0.196 | -1.247 | -31,920 | -6.027 | 3.165 | 0.956 | -0.269 | -2.175 | -55,420 |
| 5 | -4.673 | 1.998 | 0.975 | -0.173 | -1.873 | -50,200 | -5.023 | 2.574 | 1.048 | -0.237 | -1.638 | -43,900 |
| 4 | -3.738 | 1.544 | 0.981 | -0.144 | -1.357 | -37,720 | -4.018 | 1.989 | 1.055 | -0.198 | -1.172 | -32,580 |
| 3 | -2.804 | 1.080 | 0.922 | -0.106 | -0.908 | -26,820 | -3.014 | 1.391 | 0.992 | -0.145 | -0.776 | -23,050 |
| 2 | -1.869 | 0.642 | 0.778 | -0.067 | -0.516 | -16.310 | -2.009 | 0.828 | 0.837 | -0.092 | -0.436 | -13,780 |
| 1 | -0.935 | 0.232 | 0.549 | -0.025 | -0.179 | -6,090 | -1.005 | 0.299 | 0.591 | -0.034 | -0.149 | -5070 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 |
| -1 | 0.935 | " | -0.510 | 0.035 | 0.460 | 14,720 | 1.005 | " | -0.548 | 0.047 | 0.504 | 16130 |
| -2 | 1.869 | " | -1.295 | 0.046 | 0.620 | 18,600 | 2.009 | " | -1.392 | 0.063 | 0.680 | 20400 |
| -3 | 2.804 | " | -2.192 | 0.052 | 0.664 | 18,720 | 3.014 | " | -2.356 | 0.071 | 0.729 | 20560 |
| -4 | 3.738 | " | -3.173 | 0.052 | 0.617 | 16,290 | 4.018 | " | -3.410 | 0.071 | 0.679 | 17.930 |
| -5 | 4.673 | " | -4.233 | 0.046 | 0.486 | 12 340 | 5.023 | " | -4.557 | 0.063 | 0.529 | 13440 |
| -6 | 5.608 | " | -5.364 | 0.019 | 0.263 | 6,500 | 6.027 | " | -5.766 | 0.026 | 0.287 | 7.090 |
| -7 | 6.542 | 0.000 | -6.542 | 0.000 | 0.000 | 000 | 7.032 | 0.000 | -7.032 | 0.000 | 0.000 | 000 |
| | | | | | 9.255 | 244,360 | | | | | 10.579 | 281,350 |
| | | | | | -7,033 | -192,380 | | | | | -8.756 | -232.410 |
| | | | | | | 51,980 | | | | | | 48,940 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO
CHECKED BY DATE PAGE NO 80

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

| Load on | Member U6-U7 So | H.Jt | D.Jd | E.Je | Sum. | D.L.S. | Member U7-U8 So. | H.Jt | D.Ja | E.Je | Sum. | D.L.S. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 3.506 | 0.000 | 0.000 | -3.506 | 0.000 | 000 | 4.514 | 0.000 | 0.000 | -4.514 | 0.000 | 000 |
| -6 | 3.005 | " | 0.075 | -2.875 | 0.205 | 5060 | 3.869 | " | 0.079 | -3.701 | 0.247 | 6100 |
| -5 | 2.504 | " | 0.180 | -2.268 | 0.416 | 10570 | 3.224 | " | 0.190 | -2.921 | 0.493 | 12520 |
| -4 | 2.003 | " | 0.203 | -1.700 | 0.506 | 13360 | 2.579 | " | 0.213 | -2.189 | 0.603 | 15920 |
| -3 | 1.502 | " | 0.203 | -1.175 | 0.530 | 14950 | 1.934 | " | 0.213 | -1.512 | 0.635 | 17910 |
| -2 | 1.002 | " | 0.180 | -0.694 | 0.488 | 14640 | 1.290 | " | 0.190 | -0.894 | 0.586 | 17580 |
| -1 | 0.501 | " | 0.135 | -0.273 | 0.363 | 11620 | 0.645 | " | 0.142 | -0.352 | 0.435 | 13920 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 |
| 1 | -0.501 | 0.373 | -0.098 | 0.295 | 0.069 | 2350 | -0.645 | 0.448 | -0.103 | 0.379 | 0.079 | 2690 |
| 2 | -1.002 | 1.033 | -0.263 | 0.417 | 0.185 | 5850 | -1.290 | 1.241 | -0.276 | 0.537 | 0.212 | 6700 |
| 3 | -1.502 | 1.736 | -0.413 | 0.494 | 0.315 | 9360 | -1.934 | 2.086 | -0.434 | 0.636 | 0.354 | 10510 |
| 4 | -2.003 | 2.482 | -0.563 | 0.526 | 0.442 | 12290 | -2.579 | 2.982 | -0.592 | 0.677 | 0.488 | 13570 |
| 5 | -2.504 | 3.211 | -0.676 | 0.522 | 0.553 | 14820 | -3.224 | 3.858 | -0.711 | 0.673 | 0.596 | 15970 |
| 6 | -3.005 | 3.948 | -0.766 | 0.477 | 0.654 | 16740 | -3.869 | 4.745 | -0.806 | 0.614 | 0.684 | 17510 |
| 7 | -3.506 | 4.634 | -0.789 | 0.396 | 0.735 | 18080 | -4.514 | 5.569 | -0.829 | 0.510 | 0.736 | 18110 |
| 8 | -4.006 | 5.259 | -0.789 | 0.284 | 0.738 | 17790 | -5.158 | 6.319 | -0.829 | 0.366 | 0.698 | 16820 |
| 9 | -4.507 | 5.771 | -0.691 | 0.144 | 0.717 | 16710 | -5.803 | 6.935 | -0.717 | 0.185 | 0.600 | 13980 |
| 10 | -5.008 | 6.075 | -0.518 | 0.007 | 0.556 | 12840 | -6.448 | 7.300 | -0.545 | 0.009 | 0.316 | 7300 |
| 11 | -5.509 | 6.187 | -0.270 | -0.126 | 0.282 | 6510 | -7.093 | 7.435 | -0.284 | -0.163 | -0.105 | -2430 |
| 10 | -6.010 | 6.075 | 0.015 | -0.242 | -0.162 | -3740 | -7.738 | 7.300 | -0.016 | -0.311 | -0.765 | -17670 |
| 9 | -6.510 | 5.771 | 0.308 | -0.323 | -0.754 | -17570 | -8.382 | 6.935 | 0.324 | -0.415 | -1.538 | -35840 |
| 8 | -7.011 | 5.259 | 0.608 | -0.368 | -1.512 | -36440 | -9.027 | 6.319 | 0.640 | -0.474 | -2.542 | -61260 |
| 7 | -7.512 | 4.634 | 0.849 | -0.368 | -2.397 | -58970 | -7.898 | 5.569 | 0.892 | -0.474 | -1.911 | -47010 |
| 6 | -6.438 | 3.948 | 1.022 | -0.358 | -1.826 | -46750 | -6.770 | 4.745 | 1.074 | -0.460 | -1.411 | -36120 |
| 5 | -5.365 | 3.211 | 1.119 | -0.316 | -1.351 | -36210 | -5.642 | 3.858 | 1.177 | -0.406 | -1.013 | -27150 |
| 4 | -4.292 | 2.482 | 1.127 | -0.263 | -0.946 | -26300 | -4.513 | 2.982 | 1.185 | -0.339 | -0.685 | -19040 |
| 3 | -3.219 | 1.736 | 1.059 | -0.193 | -0.617 | -18320 | -3.385 | 2.086 | 1.114 | -0.248 | -0.433 | -12860 |
| 2 | -2.146 | 1.033 | 0.894 | -0.123 | -0.342 | -10.810 | -2.257 | 1.241 | 0.940 | -0.158 | -0.234 | -7390 |
| 1 | -1.073 | 0.373 | 0.631 | -0.046 | -0.115 | -3910 | -1.128 | 0.448 | 0.663 | -0.059 | 0.076 | -2580 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 000 |
| -1 | 1.073 | " | -0.586 | 0.063 | 0.550 | 17600 | 1.128 | " | -0.616 | 0.081 | 0.593 | 18980 |
| -2 | 2.146 | " | -1.487 | 0.084 | 0.743 | 22290 | 2.257 | " | -1.563 | 0.108 | 0.802 | 24060 |
| -3 | 3.219 | " | -2.517 | 0.095 | 0.797 | 22480 | 3.385 | " | -2.646 | 0.122 | 0.861 | 24280 |
| -4 | 4.292 | " | -3.643 | 0.095 | 0.744 | 19640 | 4.513 | " | -3.830 | 0.122 | 0.805 | 21250 |
| -5 | 5.365 | " | -4.862 | 0.084 | 0.587 | 14910 | 5.642 | " | -5.116 | 0.108 | 0.640 | 16260 |
| -6 | 6.438 | " | -6.160 | 0.035 | 0.313 | 7730 | 6.770 | " | -6.476 | 0.045 | 0.339 | 8370 |
| -7 | 7.512 | 0.000 | -7.512 | 0.000 | 0.000 | 000 | 7.898 | 0.000 | -7.898 | 0.000 | 0.000 | 000 |
| | | | Summary | | 11.488 | 308200 | | | | | 11.802 | 320310 |
| | | | | | -10.022 | -259020 | | | | | -10.713 | -269350 |
| | | | | | | 49180 | | | | | | 50960 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 81

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

| Member $U_8-U_9$ | | | | | | | Member $U_9-U_{10}$ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load on | $\Sigma\varphi_0$ | $H\varphi_h$ | $D\varphi_d$ | $E\varphi_e$ | Sum. | D.L.S | $\varphi_0$ | $H\varphi_h$ | $D\varphi_d$ | $E\varphi_e$ | Sum. | D.L.S |
| -7 | 5.600 | 0.000 | 0.000 | -5.600 | 0.000 | 0.000 | 6.629 | 0.000 | 0.000 | -6.629 | 0.000 | 0.000 |
| -6 | 4.800 | " | 0.081 | -4.592 | 0.289 | 7.140 | 5.682 | " | 0.080 | -5.436 | 0.326 | 8.050 |
| -5 | 4.000 | " | 0.194 | -3.623 | 0.571 | 14.500 | 4.735 | " | 0.190 | -4.289 | 0.636 | 16.150 |
| -4 | 3.200 | " | 0.218 | -2.716 | 0.702 | 18.530 | 3.788 | " | 0.215 | -3.215 | 0.788 | 20.800 |
| -3 | 2.400 | " | 0.218 | -1.876 | 0.742 | 20.920 | 2.841 | " | 0.215 | -2.221 | 0.835 | 23.550 |
| -2 | 1.600 | " | 0.194 | -1.109 | 0.685 | 20.550 | 1.894 | " | 0.190 | -1.313 | 0.771 | 23.130 |
| -1 | 0.800 | " | 0.146 | -0.437 | 0.509 | 16.290 | 0.947 | " | 0.143 | -0.517 | 0.573 | 18.340 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1 | -0.800 | 0.517 | -0.105 | 0.470 | 0.082 | 2.790 | -0.947 | 0.564 | -0.105 | 0.557 | 0.049 | 1.670 |
| 2 | -1.600 | 1.429 | -0.283 | 0.666 | 0.212 | 6.700 | -1.894 | 1.562 | -0.283 | 0.789 | 0.174 | 5.500 |
| 3 | -2.400 | 2.402 | -0.445 | 0.790 | 0.347 | 10.310 | -2.841 | 2.625 | -0.438 | 0.935 | 0.281 | 8.350 |
| 4 | -3.200 | 3.435 | -0.607 | 0.840 | 0.468 | 13.010 | -3.788 | 3.754 | -0.597 | 0.994 | 0.363 | 10.090 |
| 5 | -4.000 | 4.444 | -0.718 | 0.834 | 0.560 | 15.010 | -4.735 | 4.857 | -0.716 | 0.988 | 0.394 | 10.560 |
| 6 | -4.800 | 5.465 | -0.825 | 0.762 | 0.602 | 15.410 | -5.682 | 5.972 | -0.811 | 0.902 | 0.381 | 9.750 |
| 7 | -5.600 | 6.414 | -0.849 | 0.633 | 0.598 | 14.710 | -6.629 | 7.009 | -0.835 | 0.749 | 0.294 | 7.230 |
| 8 | -6.400 | 7.279 | -0.849 | 0.454 | 0.484 | 11.600 | -7.576 | 7.954 | -0.835 | 0.537 | 0.080 | 1.930 |
| 9 | -7.200 | 7.988 | -0.744 | 0.230 | 0.274 | 6.380 | -8.523 | 8.729 | -0.732 | 0.272 | -0.254 | -5.920 |
| 10 | -8.000 | 8.408 | -0.558 | 0.011 | -0.139 | -3.210 | -9.470 | 9.188 | -0.549 | 0.013 | -0.818 | -18.900 |
| 11 | -8.800 | 8.565 | -0.291 | -0.202 | -0.728 | -16.820 | -10.477 | 9.388 | -0.286 | -0.239 | -1.554 | -35.900 |
| 10 | -9.600 | 8.408 | 0.016 | -0.386 | -1.562 | -36.080 | -11.364 | 9.188 | 0.016 | -0.457 | -2.617 | -60.450 |
| 9 | -10.400 | 7.988 | 0.332 | -0.515 | -2.595 | -60.460 | -10.228 | 8.729 | 0.326 | -0.610 | -1.783 | -41.540 |
| 8 | -9.245 | 7.279 | 0.655 | -0.588 | -1.899 | -45.770 | -9.091 | 7.954 | 0.644 | -0.696 | -1.189 | -28.650 |
| 7 | -8.089 | 6.414 | 0.914 | -0.588 | -1.349 | -33.190 | -7.955 | 7.009 | 0.899 | -0.696 | -0.743 | -18.380 |
| 6 | -6.934 | 5.465 | 1.100 | -0.571 | -0.940 | -24.060 | -6.818 | 5.972 | 1.082 | -0.676 | -0.440 | -11.260 |
| 5 | -5.778 | 4.444 | 1.205 | -0.504 | -0.633 | -16.960 | -5.682 | 4.857 | 1.185 | -0.596 | -0.236 | -6.320 |
| 4 | -4.622 | 3.435 | 1.213 | -0.420 | -0.394 | -10.950 | -4.546 | 3.754 | 1.193 | -0.497 | -0.096 | -2.670 |
| 3 | -3.467 | 2.402 | 1.144 | -0.308 | -0.232 | -6.890 | -3.409 | 2.625 | 1.122 | -0.365 | -0.027 | 0.800 |
| 2 | -2.311 | 1.429 | 0.963 | -0.196 | -0.115 | -3.630 | -2.273 | 1.562 | 0.947 | -0.232 | 0.004 | 0.130 |
| 1 | -1.156 | 0.517 | 0.679 | -0.073 | -0.033 | -1.120 | -1.136 | 0.564 | 0.668 | -0.086 | 0.010 | 0.340 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -1 | 1.156 | " | -0.631 | 0.101 | 0.626 | 20.030 | 1.136 | " | 0.620 | 0.119 | 0.635 | 20.320 |
| -2 | 2.311 | " | -1.602 | 0.134 | 0.843 | 25.290 | 2.237 | " | 1.575 | 0.159 | 0.857 | 25.710 |
| -3 | 3.467 | " | -2.710 | 0.151 | 0.908 | 25.610 | 3.409 | " | 2.665 | 0.179 | 0.923 | 26.030 |
| -4 | 4.622 | " | -3.932 | 0.151 | 0.841 | 22.200 | 4.546 | " | 3.858 | 0.179 | 0.867 | 22.890 |
| -5 | 5.778 | " | -5.234 | 0.134 | 0.678 | 17.220 | 5.682 | " | 5.147 | 0.159 | 0.694 | 17.630 |
| -6 | 6.934 | " | -6.633 | 0.056 | 0.357 | 8.820 | 6.818 | " | 6.523 | 0.066 | 0.361 | 8.920 |
| -7 | 8.089 | 0.000 | -8.089 | 0.000 | 0.000 | 0.000 | 7.955 | 0.000 | 7.955 | 0.000 | 0.000 | 0.000 |
| | | | | Summary | 11.378 | 313.080 | | | | | 10.296 | 287.870 |
| | | | | | -10.619 | -259.140 | | | | | -9.751 | -229.990 |
| | | | | | | 53.940 | | | | | | 57.880 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 82

CALCULATIONS FOR

Arakawa. Bashi for Saitama-Ken

2

Member U10 - U11

| Load on | $\mathcal{G}_o$ | $H\mathcal{G}_h$ | $D\mathcal{G}_d$ | $E\mathcal{G}_e$ | Sum. | DL.S | J | H | D | E | S | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 7.438 | 0.000 | 0.000 | -7.438 | 0.000 | 0,000 | | | | | | |
| -6 | 6.375 | 〃 | 0.074 | -6.099 | 0.350 | 8,650 | | | | | | |
| -5 | 5.313 | 〃 | 0.178 | -4.812 | 0.680 | 17,270 | | | | | | |
| -4 | 4.250 | 〃 | 0.201 | -3.607 | 0.844 | 22,280 | | | | | | |
| -3 | 3.188 | 〃 | 0.201 | -2.492 | 0.897 | 25,300 | | | | | | |
| -2 | 2.125 | 〃 | 0.179 | -1.473 | 0.831 | 24,930 | | | | | | |
| -1 | 1.063 | 〃 | 0.134 | -0.580 | 0.617 | 19,740 | | | | | | |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0,000 | | | | | | |
| 1 | -1.063 | 0.581 | -0.097 | 0.625 | 0.046 | 1,560 | | | | | | |
| 2 | -2.125 | 1.607 | -0.260 | 0.885 | 0.107 | 3,380 | | | | | | |
| 3 | -3.188 | 2.700 | -0.409 | 1.049 | 0.152 | 4,510 | | | | | | |
| 4 | -4.250 | 3.861 | -0.558 | 1.116 | 0.169 | 4,700 | | | | | | |
| 5 | -5.313 | 4.995 | -0.669 | 1.108 | 0.121 | 3,240 | | | | | | |
| 6 | -6.375 | 6.143 | -0.759 | 1.012 | 0.021 | ,540 | | | | | | |
| 7 | -7.438 | 7.209 | -0.781 | 0.840 | -0.170 | -4,182 | | | | | | |
| 8 | -8.500 | 8.181 | -0.781 | 0.602 | -0.480 | -11,570 | | | | | | |
| 9 | -9.563 | 8.978 | -0.684 | 0.305 | -0.964 | -22,460 | | | | | | |
| 10 | -10.625 | 9.450 | -0.513 | 0.015 | -1.673 | -38,650 | | | | | | |
| 11 | -11.688 | 9.626 | -0.268 | -0.268 | -2.598 | -60,010 | | | | | | |
| 10 | -10.625 | | 0.015 | 0.513 | | | | | | | | |
| 9 | -9.563 | | 0.305 | 0.684 | | | | | | | | |
| 8 | -8.500 | | 0.602 | 0.781 | | | | | | | | |
| 7 | -7.438 | | 0.840 | 0.781 | | | | | | | | |
| 6 | -6.375 | | 1.012 | 0.759 | | | | | | | | |
| 5 | -5.313 | | 1.108 | 0.669 | | | | | | | | |
| 4 | -4.250 | | 1.116 | 0.558 | | | | | | | | |
| 3 | -3.188 | | 1.049 | 0.409 | | | | | | | | |
| 2 | -2.125 | | 0.885 | 0.260 | | | | | | | | |
| 1 | -1.063 | | 0.625 | 0.097 | | | | | | | | |
| 0 | 0.000 | | 0.000 | 0.000 | | | | | | | | |
| -1 | 1.063 | | 0.580 | 0.134 | | | | | | | | |
| -2 | 2.125 | | 1.473 | 0.179 | | | | | | | | |
| -3 | 3.188 | | 2.492 | 0.201 | | | | | | | | |
| -4 | 4.250 | | 3.607 | 0.201 | | | | | | | | |
| -5 | 5.313 | | 4.812 | 0.179 | | | | | | | | |
| -6 | 6.375 | | 6.099 | 0.074 | | | | | | | | |
| -7 | 7.438 | | 7.438 | 0.000 | | | | | | | | |
| | | | Summary | | 9.670 | 272,300 | | | | | | |
| | | | | | -9.172 | -213,730 | | | | | | |
| | | | | | | 58,570 | | | | | | |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 83

CALCULATIONS FOR
Arakawa-Bashi
Influence Surfaces for Lower Chords

3

| | Member L-6 - L-7 | | | | | | Member L-5 - L-6 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load on | $\eta_o$ | $H\eta_h$ | $D\eta_d$ | $E\eta_e$ | Sum | D.L.S | $\eta_o$ | $H\eta_h$ | $D\eta_d$ | $E\eta_e$ | Sum. | D.L.S |
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6 | | | -0.014 | | -0.014 | -0.350 | | | -0.025 | | -0.025 | -0.620 |
| -5 | | | -0.034 | | -0.034 | -0.860 | | | -0.060 | | -0.060 | -1.520 |
| -4 | | | -0.038 | | -0.038 | -1.000 | | | -0.067 | | -0.067 | -1.770 |
| -3 | | | -0.038 | | -0.038 | -1.070 | | | -0.067 | | -0.067 | -1.890 |
| -2 | | | -0.034 | | -0.034 | -1.020 | | | -0.060 | | -0.060 | -1.800 |
| -1 | | | -0.025 | | -0.025 | -0.800 | | | -0.045 | | -0.045 | -1.440 |
| 0 | | | 0.000 | | 0.000 | 0.000 | | | 0.000 | | 0.000 | 0.000 |
| 1 | | | 0.018 | | 0.018 | 0.610 | | | 0.032 | | 0.032 | 1.090 |
| 2 | | | 0.049 | | 0.049 | 1.550 | | | 0.087 | | 0.087 | 2.750 |
| 3 | | | 0.077 | | 0.077 | 2.290 | | | 0.137 | | 0.137 | 4.070 |
| 4 | | | 0.105 | | 0.105 | 2.920 | | | 0.186 | | 0.186 | 5.170 |
| 5 | | | 0.126 | | 0.126 | 3.380 | | | 0.223 | | 0.223 | 5.980 |
| 6 | | | 0.143 | | 0.143 | 3.660 | | | 0.253 | | 0.253 | 6.480 |
| 7 | | | 0.147 | | 0.147 | 3.620 | | | 0.261 | | 0.261 | 6.420 |
| 8 | | | 0.147 | | 0.147 | 3.540 | | | 0.261 | | 0.261 | 6.290 |
| 9 | | | 0.129 | | 0.129 | 3.010 | | | 0.228 | | 0.228 | 5.310 |
| 10 | | | 0.097 | | 0.097 | 2.240 | | | 0.171 | | 0.171 | 3.950 |
| 11 | | | 0.050 | | 0.050 | 1.160 | | | 0.089 | | 0.089 | 2.060 |
| 10 | | | -0.003 | | -0.003 | -0.070 | | | -0.005 | | -0.005 | -0.120 |
| 9 | | | -0.058 | | -0.058 | -1.350 | | | -0.102 | | -0.102 | -2.380 |
| 8 | | | -0.114 | | -0.114 | -2.750 | | | -0.201 | | -0.201 | -4.840 |
| 7 | | | -0.158 | | -0.158 | -3.890 | | | -0.280 | | -0.280 | -6.890 |
| 6 | | | -0.191 | | -0.191 | -4.890 | | | -0.338 | | -0.338 | -8.650 |
| 5 | | | -0.209 | | -0.209 | -5.600 | | | -0.370 | | -0.370 | -9.920 |
| 4 | | | -0.210 | | -0.210 | -5.840 | | | -0.372 | | -0.372 | -10.340 |
| 3 | | | -0.198 | | -0.198 | -5.880 | | | -0.350 | | -0.350 | -10.400 |
| 2 | | | -0.167 | | -0.167 | -5.280 | | | -0.295 | | -0.295 | -9.320 |
| 1 | | | -0.118 | | -0.118 | -4.210 | | | -0.208 | | -0.208 | -7.070 |
| 0 | | | 0.000 | | 0.000 | 0.000 | | | 0.000 | | 0.000 | 0.000 |
| -1 | | | 0.109 | | 0.109 | 3.490 | | | 0.194 | | 0.194 | 6.210 |
| -2 | | | 0.278 | | 0.278 | 8.340 | | | 0.491 | | 0.491 | 14.730 |
| -3 | | | 0.470 | | 0.470 | 13.250 | | | 0.831 | | 0.831 | 23.430 |
| -4 | | | 0.680 | | 0.680 | 17.930 | | | 1.204 | | 1.204 | 31.790 |
| -5 | | | 0.907 | | 0.907 | 23.040 | 0.000 | | 1.606 | | 1.606 | 40.790 |
| -6 | 0.000 | | 1.150 | | 1.150 | 28.410 | -1.241 | | 2.035 | | 0.744 | 18.380 |
| -7 | -1.402 | 0.000 | 1.402 | 0.000 | 0.000 | 0.000 | -2.482 | 0.000 | 2.482 | 0.000 | 0.000 | 0.000 |
| | | | Summary | | -1.609 | 122.460 | | | | | -2.845 | 184.900 |
| | | | | | 4.682 | -38.820 | | | | | 6.998 | -78.970 |
| | | | | | | 83.640 | | | | | | 105.930 |

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**JIUN MASUDA**
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY U.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 84

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

4

| | Member | L-4-L-5 | | | | | Member | L-3-L-4 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Loading | $\gamma_o$ | $H\gamma_h$ | $D\gamma_d$ | $E\gamma_e$ | Sum. | D.L.S. | $\gamma_o$ | $H\gamma_h$ | $D\gamma_d$ | $E\gamma_e$ | Sum. | D.L.S. |
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0,000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0,000 |
| -6 | | | -0.033 | | -0.033 | -0,820 | | | -0.040 | | -0.040 | -0.990 |
| -5 | | | -0.079 | | -0.079 | -2,010 | | | -0.095 | | -0.095 | -2,410 |
| -4 | | | -0.089 | | -0.089 | -2,350 | | | -0.107 | | -0.107 | -2,820 |
| -3 | | | -0.089 | | -0.089 | -2,510 | | | -0.107 | | -0.107 | -3,020 |
| -2 | | | -0.079 | | -0.079 | -2,370 | | | -0.095 | | -0.095 | -2,850 |
| -1 | | | -0.060 | | -0.060 | -1,920 | | | -0.071 | | -0.071 | -2,270 |
| 0 | | | 0.000 | | 0.000 | 0,000 | | | 0.000 | | 0.000 | 0,000 |
| 1 | | | 0.032 | | 0.032 | 1,090 | | | 0.051 | | 0.051 | 1,730 |
| 2 | | | 0.087 | | 0.087 | 2,750 | | | 0.138 | | 0.138 | 4,360 |
| 3 | | | 0.182 | | 0.182 | 5,410 | | | 0.217 | | 0.217 | 6,440 |
| 4 | | | 0.248 | | 0.248 | 6,890 | | | 0.296 | | 0.296 | 8,230 |
| 5 | | | 0.298 | | 0.298 | 7,990 | | | 0.356 | | 0.356 | 9,540 |
| 6 | | | 0.338 | | 0.338 | 8,650 | | | 0.403 | | 0.403 | 10,320 |
| 7 | | | 0.348 | | 0.348 | 8,530 | | | 0.415 | | 0.415 | 10,210 |
| 8 | | | 0.348 | | 0.348 | 8,390 | | | 0.415 | | 0.415 | 10,000 |
| 9 | | | 0.305 | | 0.305 | 7,110 | | | 0.364 | | 0.364 | 8,480 |
| 10 | | | 0.228 | | 0.228 | 5,270 | | | 0.273 | | 0.273 | 6,300 |
| 11 | | | 0.119 | | 0.119 | 2,750 | | | 0.142 | | 0.142 | 3,280 |
| 10 | | | -0.007 | | -0.007 | -0,160 | | | -0.008 | | -0.008 | -0,180 |
| 9 | | | -0.136 | | -0.136 | -3,170 | | | -0.162 | | -0.162 | -3,770 |
| 8 | | | -0.268 | | -0.268 | -6,460 | | | -0.320 | | -0.320 | -7,710 |
| 7 | | | -0.374 | | -0.374 | -9,160 | | | -0.447 | | -0.447 | -11,000 |
| 6 | | | -0.450 | | -0.450 | -11,520 | | | -0.537 | | -0.537 | -13,750 |
| 5 | | | -0.493 | | -0.493 | -13,210 | | | -0.589 | | -0.589 | -15,790 |
| 4 | | | -0.497 | | -0.497 | -13,820 | | | -0.593 | | -0.593 | -16,490 |
| 3 | | | -0.467 | | -0.467 | -13,870 | | | -0.557 | | -0.557 | -16,540 |
| 2 | | | -0.394 | | -0.394 | -12,450 | | | -0.470 | | -0.470 | -14,850 |
| 1 | | | -0.278 | | -0.278 | -9,450 | | | -0.332 | | -0.332 | -11,290 |
| 0 | | | 0.000 | | 0.000 | 0,000 | | | 0.000 | | 0.000 | 0,000 |
| -1 | | | 0.258 | | 0.258 | 8,260 | | | 0.308 | | 0.308 | 9,860 |
| -2 | | | 0.655 | | 0.655 | 19,650 | | | 0.783 | | 0.783 | 23,490 |
| -3 | | | 1.109 | | 1.109 | 31,270 | | | 1.324 | | 1.324 | 37,340 |
| -4 | 0.000 | | 1.605 | | 1.605 | 42,370 | -0.988 | | 1.917 | | 0.929 | 24,530 |
| -5 | -1.103 | | 2.142 | | 1.039 | 26,390 | -1.977 | | 2.557 | | 0.580 | 14,730 |
| -6 | -2.206 | | 2.714 | | 0.508 | 12,550 | -2.965 | | 3.241 | | 0.276 | 6,820 |
| -7 | -3.310 | 0.000 | 3.310 | 0.000 | 0.000 | 0,000 | -3.952 | 0.000 | 3.952 | 0.000 | 0.000 | 0.000 |
| | | | | | -3.793 | 205,320 | | | | | -4.530 | 195,660 |
| | | | | | +7.707 | -105,250 | | | | | +7.270 | -125,730 |
| | | | | | | 100,070 | | | | | | 69,930 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 85

CALCULATIONS FOR

Arakawa-Bashi for Saitama-ken



| Load on | Member $L_2$-$L_3$ $\delta_o$ | $H\delta_h$ | $D\delta_d$ | $E\delta_e$ | Sum. | D.L.S | Member $L_1$-$L_2$ $\delta_o$ | $H\delta_h$ | $D\delta_d$ | $E\delta_e$ | Sum. | D.L.S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6 | | | -0.045 | | -0.045 | -1,110 | | | -0.048 | | -0.048 | -1190 |
| -5 | | | -0.107 | | -0.107 | -2,720 | | | -0.116 | | -0.116 | -2,950 |
| -4 | | | -0.120 | | -0.120 | -3,170 | | | -0.131 | | -0.131 | -3,460 |
| -3 | | | -0.120 | | -0.120 | -3,380 | | | -0.131 | | -0.131 | -3,690 |
| -2 | | | -0.107 | | -0.107 | -3,210 | | | -0.116 | | -0.116 | -3,480 |
| -1 | | | -0.080 | | -0.080 | -2,560 | | | -0.087 | | -0.087 | -2,780 |
| 0 | | | 0.000 | | 0.000 | 0,000 | | | 0.000 | | 0.000 | 0,000 |
| 1 | | | 0.058 | | 0.058 | 1,970 | | | 0.063 | | 0.063 | 2,140 |
| 2 | | | 0.156 | | 0.156 | 4,930 | | | 0.169 | | 0.169 | 5,340 |
| 3 | | | 0.245 | | 0.245 | 7,280 | | | 0.266 | | 0.266 | 7,900 |
| 4 | | | 0.334 | | 0.334 | 9,290 | | | 0.363 | | 0.363 | 10,090 |
| 5 | | | 0.401 | | 0.401 | 10,750 | | | 0.436 | | 0.436 | 11,680 |
| 6 | | | 0.454 | | 0.454 | 11,620 | | | 0.494 | | 0.494 | 12,650 |
| 7 | | | 0.467 | | 0.467 | 11,490 | | | 0.508 | | 0.508 | 12,500 |
| 8 | | | 0.467 | | 0.467 | 11,250 | | | 0.508 | | 0.508 | 12,240 |
| 9 | | | 0.410 | | 0.410 | 9,550 | | | 0.445 | | 0.445 | 10,370 |
| 10 | | | 0.307 | | 0.307 | 7,090 | | | 0.334 | | 0.334 | 7,720 |
| 11 | | | 0.160 | | 0.160 | 3,700 | | | 0.174 | | 0.174 | 4,020 |
| 10 | | | -0.009 | | -0.009 | -0,210 | | | -0.010 | | -0.010 | -0,230 |
| 9 | | | -0.183 | | -0.183 | -4,260 | | | -0.199 | | -0.199 | -4,640 |
| 8 | | | -0.361 | | -0.361 | -8,700 | | | -0.392 | | -0.392 | -9,450 |
| 7 | | | -0.503 | | -0.503 | -12,370 | | | -0.547 | | -0.547 | -13,460 |
| 6 | | | -0.605 | | -0.605 | -15,490 | | | -0.659 | | -0.659 | -16,870 |
| 5 | | | -0.663 | | -0.663 | -17,770 | | | -0.721 | | -0.721 | -19,320 |
| 4 | | | -0.668 | | -0.668 | -18,570 | | | -0.726 | | -0.726 | -20,180 |
| 3 | | | -0.628 | | -0.628 | -18,650 | | | -0.683 | | -0.683 | -20,290 |
| 2 | | | -0.530 | | -0.530 | -16,750 | | | -0.576 | | -0.576 | -18,200 |
| 1 | | | -0.374 | | -0.374 | -12,720 | | | -0.407 | | -0.407 | -13,840 |
| 0 | | | 0.000 | | 0.000 | 0,000 | | | 0.000 | | 0.000 | 0,000 |
| -1 | | | 0.347 | | 0.347 | 11,100 | 0.000 | | 0.378 | | 0.378 | 12,100 |
| -2 | 0.000 | | 0.882 | | 0.882 | 26,460 | -0.807 | | 0.959 | | 0.152 | 4,560 |
| -3 | -0.890 | | 1.491 | | 0.601 | 16,590 | -1.615 | | 1.622 | | 0.007 | 0,200 |
| -4 | -1.781 | | 2.159 | | 0.378 | 9,980 | -2.431 | | 2.346 | | 0.083 | -2,190 |
| -5 | -2.672 | | 2.880 | | 0.208 | 5,280 | -3.228 | | 3.133 | | 0.095 | -2,410 |
| -6 | -3.562 | | 3.651 | | 0.089 | 2,200 | -4.035 | | 3.970 | | 0.065 | -1,610 |
| -7 | -4.452 | 0.000 | 4.452 | 0.000 | 0.000 | 0.000 | -4.842 | 0.000 | 4.842 | 0.000 | 0.000 | -0.000 |
| | | | Summary | | -5.103 | 160,890 | | | | | -5.792 | 124,350 |
| | | | | | 5.964 | -141,640 | | | | | 4.298 | -160,240 |
| | | | | | | 19,250 | | | | | | -35,890 |

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JIUN MASUDA
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____

CHECKED BY _____ DATE _____ PAGE NO 86

CALCULATIONS FOR

Arakawa-Bashi for Daitama-Sen

6

| Member | | | Lo-L-1 | | | |
|---|---|---|---|---|---|---|
| Loadcm | Lo | Hlh | Dld | Ele | Sum. | D.L.S. |
| -7 | 0.000 | 0000 | 0.000 | 0.000 | 0000 | 0.000 |
| -6 | | | -0.052 | | -0.052 | -1,280 |
| -5 | | | -0.124 | | -0.124 | -3,150 |
| -4 | | | -0.140 | | -0.140 | -3,700 |
| -3 | | | -0.140 | | -0.140 | -3,950 |
| -2 | | | -0.124 | | -0.124 | -3,720 |
| -1 | | | -0.093 | | -0.093 | -2,980 |
| 0 | | | 0.000 | | 0.000 | 0,000 |
| 1 | | | 0.067 | | 0.067 | 2,280 |
| 2 | | | 0.181 | | 0.181 | 5,720 |
| 3 | | | 0.284 | | 0.284 | 8,430 |
| 4 | | | 0.388 | | 0.388 | 10,790 |
| 5 | | | 0.465 | | 0.465 | 12,730 |
| 6 | | | 0.527 | | 0.527 | 13,490 |
| 7 | | | 0.543 | | 0.543 | 13,360 |
| 8 | | | 0.543 | | 0.543 | 13,090 |
| 9 | | | 0.475 | | 0.475 | 11,070 |
| 10 | | | 0.357 | | 0.357 | 8,250 |
| 11 | | | 0.186 | | 0.186 | 4,300 |
| 10 | | | -0.010 | | -0.010 | -0,230 |
| 9 | | | -0.282 | | -0.282 | -6,570 |
| 8 | | | -0.419 | | -0.419 | -10,100 |
| 7 | | | -0.584 | | -0.584 | -14,370 |
| 6 | | | -0.703 | | -0.703 | -18,000 |
| 5 | | | -0.770 | | -0.770 | -20,640 |
| 4 | | | -0.775 | | -0.775 | -21,550 |
| 3 | | | -0.729 | | -0.729 | -21,650 |
| 2 | | | -0.615 | | -0.615 | -19,430 |
| 1 | | | -0.434 | | -0.434 | -14,760 |
| 0 | | | 0.000 | | 0.000 | 0,000 |
| -1 | -0.738 | | 0.403 | | -0.335 | -10,720 |
| -2 | -1.477 | | 1.023 | | -0.454 | -13,620 |
| -3 | -2.215 | | 1.731 | | -0.484 | -13,650 |
| -4 | -2.953 | | 2.506 | | -0.447 | -11,800 |
| -5 | -3.691 | | 3.343 | | -0.348 | -8,840 |
| -6 | -4.430 | | 4.237 | | -0.193 | -4,770 |
| -7 | -5.167 | 0.000 | 5.167 | 0.000 | 0.000 | 0.000 |
| | | | | | -8.255 | 103,510 |
| | | | | | +4.016 | -215,050 |
| | | | | | | -111,540 |

JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO

CHECKED BY DATE PAGE NO 87

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

7

| Load on | Member $L_0-L_1$ So | H℄ | D℄ | E℄e | Sum. | D.L.S | Member $L_1-L_2$ So | H℄ | D℄ | E℄e | Sum. | D.L.S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | -0.257 | 0.000 | 0.000 | 0.257 | 0.000 | 0 |
| -6 | | 〃 | -0.052 | | -0.052 | -1,280 | -0.220 | 〃 | -0.054 | 0.211 | -0.063 | -1,560 |
| -5 | | 〃 | -0.124 | | -0.124 | -3,150 | -0.184 | 〃 | -0.130 | 0.166 | -0.148 | -3,760 |
| -4 | | 〃 | -0.140 | | -0.140 | -3,700 | -0.147 | 〃 | -0.146 | 0.125 | -0.168 | -4,440 |
| -3 | | 〃 | -0.140 | | -0.140 | -3,950 | -0.110 | 〃 | -0.146 | 0.086 | -0.170 | -4,790 |
| -2 | | 〃 | -0.124 | | -0.124 | -3,720 | -0.073 | 〃 | -0.130 | 0.051 | -0.152 | -4,560 |
| -1 | | 〃 | -0.093 | | -0.093 | -2,980 | -0.073 | 〃 | -0.097 | 0.020 | -0.114 | -3,650 |
| 0 | | 0.000 | 0.000 | | 0.000 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| 1 | | -0.064 | 0.067 | | 0.003 | 0.100 | 0.037 | -0.099 | 0.070 | -0.022 | -0.014 | -480 |
| 2 | | -0.177 | 0.181 | | 0.004 | 0.130 | 0.073 | -0.274 | 0.189 | -0.031 | -0.043 | -1,360 |
| 3 | | -0.298 | 0.284 | | -0.014 | -0.420 | 0.110 | -0.461 | 0.297 | -0.036 | -0.090 | -2,670 |
| 4 | | -0.426 | 0.388 | | -0.038 | -1.060 | 0.147 | -0.659 | 0.405 | -0.039 | -0.146 | -4,060 |
| 5 | | -0.551 | 0.465 | | -0.086 | -2,300 | 0.184 | -0.853 | 0.485 | -0.038 | -0.222 | -5,950 |
| 6 | | -0.678 | 0.527 | | -0.151 | -3,870 | 0.220 | -1.048 | 0.550 | -0.035 | -0.313 | -8,010 |
| 7 | | -0.801 | 0.543 | | -0.258 | -6,350 | 0.257 | -1.230 | 0.567 | -0.029 | -0.435 | -10,700 |
| 8 | | -0.903 | 0.543 | | -0.360 | -8,680 | 0.294 | -1.396 | 0.567 | -0.021 | -0.556 | -13,400 |
| 9 | | -0.991 | 0.475 | | -0.516 | -12,020 | 0.330 | -1.532 | 0.497 | -0.011 | -0.716 | -16,680 |
| 10 | | -1.042 | 0.357 | | -0.685 | -15,820 | 0.367 | -1.612 | 0.372 | -0.001 | -0.874 | -20,190 |
| 11 | | -1.062 | 0.186 | | -0.876 | -20,240 | 0.404 | -1.642 | 0.194 | 0.009 | -1.035 | -23,910 |
| 10 | | -1.042 | -0.010 | | -1.052 | -24,300 | 0.477 | -1.612 | -0.011 | 0.018 | -1.128 | -26,060 |
| 9 | | -0.991 | -0.282 | | -1.273 | -29,660 | 0.513 | -1.532 | -0.221 | 0.024 | -1.216 | -28,330 |
| 8 | | -0.903 | -0.419 | | -1.322 | -31,860 | 0.550 | -1.396 | -0.437 | 0.027 | -1.256 | -30,270 |
| 7 | | -0.801 | -0.584 | | -1.385 | -34,070 | 0.577 | -1.230 | -0.610 | 0.027 | -1.236 | -30,410 |
| 6 | | -0.678 | -0.703 | | -1.381 | -35,350 | 0.587 | -1.048 | -0.734 | 0.026 | -1.169 | -29,930 |
| 5 | | -0.551 | -0.770 | | -1.321 | -35,400 | 0.624 | -0.853 | -0.804 | 0.023 | -1.010 | -27,070 |
| 4 | | -0.426 | -0.775 | | -1.201 | -33,390 | 0.661 | -0.659 | -0.810 | 0.019 | -0.789 | -21,930 |
| 3 | | -0.298 | -0.729 | | -1.027 | -30,500 | 0.697 | -0.461 | -0.761 | 0.014 | -0.511 | -15,180 |
| 2 | | -0.177 | -0.615 | | -0.792 | -25,030 | 0.734 | -0.274 | -0.642 | 0.009 | -0.173 | -5,470 |
| 1 | | -0.064 | -0.434 | | -0.498 | -16,930 | 0.771 | -0.099 | -0.453 | 0.003 | 0.222 | 7,550 |
| 0 | 0.000 | 0.000 | 0.000 | | 0.000 | 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| -1 | -0.738 | 〃 | 0.403 | | -0.335 | -10,720 | -0.771 | 〃 | 0.421 | -0.005 | -0.355 | -11,360 |
| -2 | -1.477 | 〃 | 1.023 | | -0.454 | -13,620 | -1.542 | 〃 | 1.069 | -0.006 | -0.479 | -14,370 |
| -3 | -2.215 | 〃 | 1.731 | | -0.484 | -13,650 | -2.313 | 〃 | 1.808 | -0.007 | -0.512 | -14,440 |
| -4 | -2.953 | 〃 | 2.506 | | -0.447 | -11,800 | -3.084 | 〃 | 2.618 | -0.007 | -0.473 | -12,480 |
| -5 | -3.691 | 〃 | 3.343 | | -0.348 | -8,840 | -3.855 | 〃 | 3.492 | -0.006 | -0.369 | -9,370 |
| -6 | -4.430 | 〃 | 4.234 | | -0.193 | -4,770 | -4.626 | 〃 | 4.426 | -0.003 | -0.203 | -5,010 |
| -7 | -5.167 | 0.000 | 5.167 | 0.000 | 0.000 | 0.000 | -5.397 | 0.000 | 5.397 | 0.000 | 0.000 | 0 |
| | | | | Summary | -17.170 | 0.230 | | | | | -16.525 | 7,550 |
| | | | | | 0.007 | -449.430 | | | | | 0.222 | -411,850 |
| | | | | | | -449,200 | | | | | | -404,300 |

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**JIUN MASUDA**
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 88

CALCULATIONS FOR

Arakawa-Bashi for Saitama Ken

| | Member L2-L3 | | | | | | Member L3-L4 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Loadon | Yo | Hyh | Dyd | Eye | Sum | D.L.S. | Yo | Hyh | Dyd | Eye | Sum | D.L.S. |
| -7 | -0.567 | 0000 | 0.000 | 0.567 | 0.000 | 0.000 | -0.943 | 0.000 | 0.000 | 0.943 | 0.000 | 0.000 |
| -6 | -0.486 | 0 | -0.057 | 0.465 | -0.078 | -1,930 | -0.809 | 0 | -0.060 | 0.773 | -0.096 | -2,370 |
| -5 | -0.405 | 0 | -0.136 | 0.367 | -0.174 | -4,420 | -0.674 | 0 | -0.143 | 0.610 | -0.207 | -5,260 |
| -4 | -0.324 | 0 | -0.153 | 0.275 | -0.202 | -5,330 | -0.539 | 0 | -0.161 | 0.457 | -0.243 | -6,420 |
| -3 | -0.243 | 0 | -0.153 | 0.190 | -0.206 | -5,810 | -0.404 | 0 | -0.161 | 0.316 | -0.249 | -7,020 |
| -2 | -0.162 | 0 | -0.136 | 0.112 | -0.186 | -5,580 | -0.270 | 0 | -0.143 | 0.187 | -0.226 | -6,780 |
| -1 | -0.081 | 0 | -0.102 | 0.044 | -0.139 | -4,450 | -0.135 | 0 | 0.108 | 0.074 | -0.169 | -5,410 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0,000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0,000 |
| 1 | 0.081 | -0.138 | 0.074 | -0.048 | -0.031 | -1,540 | 0.135 | -0.182 | 0.078 | -0.079 | -0.048 | -1,630 |
| 2 | 0.162 | -0.382 | 0.198 | -0.068 | -0.090 | -2,840 | 0.270 | -0.503 | 0.209 | -0.112 | -0.136 | -4,300 |
| 3 | 0.243 | -0.642 | 0.312 | -0.080 | -0.167 | -4,960 | 0.404 | -0.846 | 0.329 | -0.133 | -0.246 | -7,310 |
| 4 | 0.324 | -0.918 | 0.425 | -0.085 | -0.254 | -7,060 | 0.539 | -1.210 | 0.448 | -0.141 | -0.364 | -10,120 |
| 5 | 0.405 | -1.188 | 0.510 | -0.084 | -0.357 | -9,570 | 0.674 | -1.565 | 0.538 | -0.141 | -0.444 | -11,900 |
| 6 | 0.486 | -1.461 | 0.578 | -0.077 | -0.474 | -12,130 | 0.809 | -1.925 | 0.610 | -0.128 | -0.634 | -16,230 |
| 7 | 0.567 | -1.714 | 0.595 | -0.064 | -0.616 | -15,090 | 0.943 | -2.259 | 0.627 | -0.107 | -0.796 | -19,580 |
| 8 | 0.648 | -1.945 | 0.595 | -0.046 | -0.748 | -18,030 | 1.078 | -2.564 | 0.627 | -0.076 | -0.935 | -22,530 |
| 9 | 0.728 | -2.135 | 0.521 | -0.023 | -0.909 | -21,180 | 1.213 | -2.814 | 0.550 | -0.039 | -1.090 | -25,400 |
| 10 | 0.809 | -2.247 | 0.391 | -0.001 | -1.048 | -24,210 | 1.348 | -2.962 | 0.412 | -0.002 | -1.204 | -27,810 |
| 11 | 0.890 | 2.288 | 0.204 | 0.020 | -1.174 | -27,120 | 1.482 | -3.017 | 0.215 | 0.034 | -1.286 | -29,710 |
| 10 | 0.971 | -2.247 | 0.011 | 0.039 | -1.248 | -26,520 | 1.617 | -2.962 | 0.012 | 0.065 | -1.268 | -29,290 |
| 9 | 1.052 | -2.135 | -0.232 | 0.052 | -1.263 | -29,430 | 1.752 | -2.814 | -0.245 | 0.087 | -1.220 | -28,430 |
| 8 | 1.133 | -1.945 | -0.459 | 0.060 | -1.211 | -29,190 | 1.887 | -2.564 | -0.484 | 0.099 | -1.062 | -25,590 |
| 7 | 1.214 | -1.714 | -0.640 | 0.060 | -1.080 | -26,460 | 2.022 | -2.259 | -0.675 | 0.099 | -0.813 | -20,000 |
| 6 | 1.295 | -1.461 | -0.771 | 0.058 | -0.879 | -22,500 | 2.156 | -1.925 | -0.813 | 0.096 | -0.486 | -12,440 |
| 5 | 1.376 | -1.188 | -0.844 | 0.051 | -0.605 | -16,210 | 2.291 | -1.565 | -0.890 | 0.085 | -0.079 | - 2,120 |
| 4 | 1.457 | -0.918 | -0.850 | 0.043 | -0.268 | -7,450 | 2.426 | -1.210 | -0.896 | 0.071 | 0.391 | 10,870 |
| 3 | 1.538 | -0.642 | -0.799 | 0.031 | 0.128 | 3,800 | 2.561 | -0.846 | -0.843 | 0.052 | 0.924 | 27,440 |
| 2 | 1.619 | -0.382 | -0.674 | 0.020 | 0.583 | 18,420 | 1.707 | -0.503 | -0.711 | 0.033 | 0.526 | 16,620 |
| 1 | 0.810 | -0.138 | -0.476 | 0.007 | 0.203 | 6,900 | 0.854 | -0.182 | -0.502 | 0.012 | 0.182 | 6,190 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | -0.810 | 0. | 0.442 | -0.010 | -0.378 | -12.100 | -0.854 | 0 | 0.466 | -0.017 | -0.405 | -12,960 |
| -2 | -1.619 | 0 | 1.122 | -0.014 | -0.511 | -15.330 | -1.707 | 0 | 1.183 | -0.023 | -0.547 | -16,410 |
| -3 | -2.428 | 0 | 1.898 | -0.015 | -0.545 | -15.370 | -2.561 | 0 | 2.002 | -0.025 | -0.584 | -16,470 |
| -4 | -3.238 | 0 | 2.748 | -0.015 | -0.505 | -13.330 | -3.415 | 0 | 2898 | -0.025 | -0.542 | -14,310 |
| -5 | -4.047 | 0 | 3.666 | -0.014 | -0.395 | -10.030 | -4.268 | 0 | 3.866 | -0.023 | -0.425 | -10,800 |
| -6 | -4.856 | 0 | 4.646 | -0.006 | -0.216 | -5.340 | -5.122 | 0 | 4.900 | -0.009 | 0.231 | - 5,710 |
| -7 | -5.666 | 0 | 5.666 | 0.000 | 0.000 | 0.000 | -5.976 | 0 | 5.976 | 0 | 0 | 0 |
| | | | | | -15.957 | 29,120 | | | | | -16.035 | 61.120 |
| | | | | | +0.914 | 400.510 | | | | | +2.023 | -402.310 |
| | | | | | | -371.390 | | | | | | -341.190 |

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JIUN MASUDA
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 89

CALCULATIONS FOR

Arakawa Bashi for Saitama-ken

9

| Member | L4-L5 | | | | | | Member | L5-L6 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load on. | Yo | Hyh | Dyd | Eye | sum. | D.L.S. | Yo | Hyh | Dyd | Eye | sum. | D.L.S. |
| -7 | -1.405 | 0.000 | 0.000 | 1.405 | 0.000 | 0.000 | -1.975 | 0.000 | 0.000 | 1.975 | 0.000 | 0.000 |
| -6 | -1.204 | 〃 | -0.063 | 1.152 | -0.115 | -2.840 | -1.693 | 〃 | -0.067 | 1.620 | -0.140 | -3.460 |
| -5 | -1.004 | 〃 | -0.152 | 0.909 | -0.247 | -6.270 | -1.410 | 〃 | -0.161 | 1.278 | -0.293 | -7.440 |
| -4 | -0.803 | 〃 | -0.171 | 0.681 | -0.293 | -7.740 | -1.129 | 〃 | -0.181 | 0.958 | -0.352 | -9.290 |
| -3 | -0.602 | 〃 | -0.171 | 0.471 | -0.302 | -8.520 | -0.846 | 〃 | -0.181 | 0.662 | -0.365 | -10.290 |
| -2 | -0.401 | 〃 | -0.152 | 0.278 | -0.275 | -8.250 | -0.564 | 〃 | -0.161 | 0.391 | -0.344 | -10.020 |
| -1 | -0.201 | 〃 | -0.114 | 0.110 | -0.205 | -8.000 | -0.282 | 〃 | -0.121 | 0.154 | -0.249 | -7.970 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | -0.000 | 0.000 |
| 1 | 0.201 | -0.232 | 0.082 | -0.118 | -0.067 | -2.280 | 0.282 | -0.289 | 0.087 | -0.166 | -0.086 | -2.920 |
| 2 | 0.401 | -0.641 | 0.221 | -0.167 | -0.186 | -5.880 | 0.564 | -0.799 | 0.235 | -0.235 | -0.235 | -7.430 |
| 3 | 0.602 | -1.077 | 0.348 | -0.198 | -0.325 | -9.650 | 0.846 | -1.343 | 0.369 | -0.278 | -0.406 | -12.060 |
| 4 | 0.803 | -1.540 | 0.474 | -0.211 | -0.474 | -13.180 | 1.129 | -1.920 | 0.504 | -0.296 | -0.583 | -16.210 |
| 5 | 1.004 | -1.992 | 0.569 | -0.209 | -0.628 | -16.830 | 1.410 | -2.485 | 0.604 | -0.294 | -0.735 | -19.700 |
| 6 | 1.204 | -2.450 | 0.645 | -0.191 | -0.792 | -20.280 | 1.693 | -3.055 | 0.685 | -0.269 | -0.946 | -24.220 |
| 7 | 1.405 | -2.875 | 0.664 | -0.159 | -0.965 | -23.740 | 1.975 | -3.586 | 0.705 | -0.223 | -1.129 | -27.770 |
| 8 | 1.606 | -3.263 | 0.664 | -0.114 | -1.107 | -26.680 | 2.257 | -4.069 | 0.705 | -0.160 | -1.267 | -30.530 |
| 9 | 1.806 | -3.580 | 0.582 | -0.058 | -1.250 | -29.130 | 2.539 | -4.465 | 0.618 | -0.081 | -1.389 | -32.360 |
| 10 | 2.007 | -3.769 | 0.436 | -0.003 | -1.329 | -30.700 | 2.822 | -4.701 | 0.463 | -0.041 | -1.457 | -33.660 |
| 11 | 2.208 | -3.839 | 0.228 | 0.051 | -1.352 | -31.230 | 3.104 | -4.788 | 0.242 | 0.071 | -1.371 | -31.670 |
| 10 | 2.409 | -3.769 | -0.013 | 0.097 | -1.276 | -29.480 | 3.386 | -4.701 | -0.013 | 0.136 | -1.192 | -27.540 |
| 9 | 2.609 | -3.580 | -0.259 | 0.129 | -1.101 | -25.650 | 3.668 | -4.465 | -0.275 | 0.182 | -0.890 | -20.740 |
| 8 | 2.810 | -3.263 | -0.512 | 0.148 | -0.817 | -19.690 | 3.950 | -4.069 | -0.544 | 0.207 | -0.456 | -10.990 |
| 7 | 3.010 | -2.875 | -0.714 | 0.148 | -0.431 | -10.600 | 4.232 | -3.586 | -0.759 | 0.207 | 0.094 | 2.310 |
| 6 | 3.211 | -2.450 | -0.860 | 0.143 | 0.044 | 1.130 | 4.514 | -3.055 | -0.913 | 0.201 | 0.747 | 19.120 |
| 5 | 3.412 | -1.992 | -0.942 | 0.126 | 0.604 | 16.190 | 4.797 | -2.485 | -1.001 | 0.178 | 1.489 | 39.910 |
| 4 | 3.613 | -1.540 | -0.948 | 0.105 | 1.230 | 34.190 | 3.837 | -1.920 | -1.007 | 0.148 | 1.058 | 29.410 |
| 3 | 2.710 | -1.077 | -0.891 | 0.077 | 0.819 | 24.320 | 2.878 | -1.343 | -0.947 | 0.109 | 0.697 | 20.700 |
| 2 | 1.806 | -0.641 | -0.752 | 0.049 | 0.462 | 14.600 | 1.919 | -0.799 | -0.799 | 0.069 | 0.390 | 12.320 |
| 1 | 0.903 | -0.232 | -0.531 | 0.018 | 0.158 | 5.370 | 0.959 | -0.289 | -0.564 | 0.026 | 0.132 | 4.490 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -1 | -0.903 | 〃 | 0.493 | -0.025 | -0.435 | -13.920 | -0.959 | 〃 | 0.524 | -0.036 | -0.471 | -15.070 |
| -2 | -1.806 | 〃 | 1.252 | -0.034 | -0.588 | -17.640 | -1.919 | 〃 | 1.330 | -0.047 | -0.636 | -19.080 |
| -3 | -2.710 | 〃 | 2.118 | -0.038 | -0.630 | -17.770 | -2.878 | 〃 | 2.250 | -0.053 | -0.681 | -19.200 |
| -4 | -3.613 | 〃 | 3.066 | -0.038 | -0.585 | -15.440 | -3.837 | 〃 | 3.257 | -0.053 | -0.633 | -16.710 |
| -5 | -4.516 | 〃 | 4.090 | -0.034 | -0.460 | -11.680 | -4.797 | 〃 | 4.345 | -0.047 | -0.499 | -12.670 |
| -6 | -5.419 | 〃 | 5.184 | -0.014 | -0.249 | -6.150 | -5.756 | 〃 | 5.506 | -0.020 | -0.270 | -6.670 |
| -7 | -6.322 | 0.000 | 6.322 | -0.000 | 0.000 | 0.000 | -6.715 | 0.000 | 6.715 | 0.000 | 0.000 | 0.000 |
| | | | | | -16.484 | 95.800 | | | | | -17.065 | 128.260 |
| | | | | | 3.317 | -419.220 | | | | | 4.607 | -436.170 |
| | | | | | | -323.420 | | | | | | -307.910 |

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**JIUN MASUDA**
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
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CALCULATIONS FOR

Arakawa-Bashi for Saitama-ken

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| | Member L6-L7 | | | | | | Member L7-L8 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Load on | Yo | H.Yh | D.Yd | E.Ye | Sum | D.L.S. | Yo | H.Yh | D.Yd | E.Ye | Sum | D.L.S (out) |
| -7 | -2.675 | 0 | 0 | 2.675 | 0 | 0 | -3.515 | 0.000 | 0.000 | 3.515 | 0.000 | 0 |
| -6 | -2.293 | 0 | -0.071 | 2.194 | -0.170 | -4,200 | -3.012 | 0.000 | -0.075 | 2.882 | -0.205 | 5,060 |
| -5 | -1.911 | 0 | -0.171 | 1.731 | -0.351 | -8,920 | -2.510 | 0.000 | -0.181 | 2.274 | -0.417 | -10,590 |
| -4 | -1.528 | 0 | -0.193 | 1.297 | -0.424 | -11,190 | -2.008 | 0 | -0.203 | 1.705 | -0.506 | -13,360 |
| -3 | -1.146 | 0 | -0.193 | 0.896 | -0.443 | -12,490 | -1.506 | 0 | -0.203 | 1.178 | -0.531 | -14,970 |
| -2 | -0.764 | 0 | -0.171 | 0.530 | -0.405 | 12,150 | -1.004 | 0 | -0.181 | 0.696 | -0.489 | -14,670 |
| -1 | -0.382 | 0 | -0.128 | 0.209 | -0.301 | 9,030 | -0.502 | 0 | -0.136 | 0.274 | -0.364 | -11,650 |
| 0 | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0.382 | -0.351 | 0.093 | -0.225 | -0.101 | -3,430 | 0.502 | -0.420 | 0.098 | -0.295 | -0.115 | -3,910 |
| 2 | 0.764 | -0.972 | 0.250 | -0.318 | -0.276 | -8,720 | 1.004 | -1.162 | 0.264 | -0.418 | -0.312 | -9,860 |
| 3 | 1.146 | -1.634 | 0.392 | -0.377 | -0.473 | -13,050 | 1.506 | -1.953 | 0.414 | -0.496 | -0.529 | -15,710 |
| 4 | 1.528 | -2.336 | 0.535 | -0.401 | -0.674 | -18,740 | 2.008 | -2.793 | 0.565 | -0.527 | -0.747 | -20,770 |
| 5 | 1.911 | -3.023 | 0.642 | -0.399 | -0.869 | -23,290 | 2.510 | -3.613 | 0.678 | -0.524 | -0.949 | -25,430 |
| 6 | 2.293 | -3.717 | 0.728 | -0.364 | -1.060 | -27,140 | 3.012 | -3.012 (4443) | 0.768 | -0.478 | -1.141 | -29,210 |
| 7 | 2.675 | -4.362 | 0.749 | -0.302 | -1.240 | -30,500 | 3.515 | -5.215 | 0.791 | -0.397 | -1.306 | -32,130 |
| 8 | 3.057 | -4.950 | 0.749 | -0.217 | -1.361 | -32,800 | 4.017 | -5.918 | 0.791 | -0.285 | -1.396 | -33,640 |
| 9 | 3.439 | -5.432 | 0.656 | -0.110 | -1.447 | -33,720 | 4.519 | -6.494 | 0.693 | -0.144 | -1.426 | -33,230 |
| 10 | 3.821 | -5.718 | 0.492 | -0.005 | -1.410 | -32,570 | 5.021 | -6.836 | 0.520 | -0.007 | -1.302 | -30,080 |
| 11 | 4.203 | -5.824 | 0.257 | -0.096 | -1.272 | 29,380 | 5.523 | -6.962 | 0.271 | 0.127 | -1.031 | -23,820 |
| 10 | 4.585 | -5.718 | -0.014 | 0.184 | -0.963 | 22,250 | 6.025 | -6.836 | -0.015 | 0.242 | -0.584 | -13,490 |
| 9 | 4.967 | -5.432 | -0.292 | 0.246 | -0.511 | 11,910 | 6.527 | -6.494 | -0.309 | 0.323 | 0.047 | 1,100 |
| 8 | 5.350 | -4.950 | -0.578 | 0.281 | 0.103 | 2,480 | 7.029 | -5.918 | -0.610 | 0.369 | 0.870 | 20,970 |
| 7 | 5.732 | -4.360 | -0.806 | 0.281 | 0.847 | 20,840 | 7.531 | -5.215 | -0.851 | 0.369 | 1.834 | 45,120 |
| 6 | 6.114 | -3.717 | -0.970 | 0.273 | 1.700 | 43,520 | 6.455 | -4.443 | -1.024 | 0.359 | 1.347 | 34,480 |
| 5 | 5.095 | -3.023 | -1.063 | 0.240 | 1.249 | 33,470 | 5.379 | -3.613 | -1.122 | 0.316 | 0.960 | 25,730 |
| 4 | 4.076 | -2.336 | -1.070 | 0.201 | 0.871 | 24,210 | 4.304 | -2.793 | -1.130 | 0.264 | 0.645 | 17,930 |
| 3 | 3.057 | -1.634 | -1.006 | 0.147 | 0.564 | 16,750 | 3.228 | -1.953 | -1.062 | 0.193 | 0.406 | 12,060 |
| 2 | 2.038 | -0.972 | -0.849 | 0.094 | 0.311 | 9,830 | 2.151 | -1.162 | -0.896 | 0.123 | 0.216 | 6,830 |
| 1 | 1.019 | -0.351 | -0.599 | 0.035 | 0.104 | 3,540 | 1.076 | -0.420 | -0.633 | 0.046 | 0.069 | 2,350 |
| 0 | 0 | 0 | 0 | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | -1.019 | 0 | 0.556 | -0.048 | -0.511 | -17,630 | -1.076 | 0 | 0.587 | -0.063 | -0.552 | -17,660 |
| -2 | -2.038 | 0 | 1.412 | -0.064 | -0.690 | -20,700 | -2.150 | 0 | 1.491 | -0.084 | -0.744 | -22,320 |
| -3 | -3.057 | 0 | 2.390 | -0.072 | -0.739 | -20,840 | -3.228 | 0 | 2.523 | -0.095 | -0.800 | -22,560 |
| -4 | -4.076 | 0 | 3.460 | -0.072 | -0.688 | -18,160 | -4.304 | 0 | 3.653 | -0.095 | -0.746 | -19,690 |
| -5 | -5.095 | 0 | 4.615 | -0.064 | -0.543 | -13,790 | -5.379 | 0 | 4.873 | -0.084 | -0.590 | -14,990 |
| -6 | -6.114 | 0 | 5.849 | -0.027 | -0.292 | -7,210 | -6.455 | 0 | 6.175 | -0.035 | -0.315 | -7,780 |
| -7 | -7.133 | 0 | 7.133 | 0.000 | 0.000 | 0.000 | -7.531 | 0 | 0 | 0 | 0 | 0 |
| | | | | | -17.214 | 154,640 | | | | | -17.097 | 166,570 |
| | | | | | 5.749 | -445,410 | | | | | 6391 | -446,580 |
| | | | | | | -290,770 | | | | | | -280,010 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY Y.O DATE _____ FILE NO _____
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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-ken

## Member $L_8 - L_9$

| Loodon | $S_o$ | $H S_h$ | $D S_d$ | $E S_e$ | Sum. | D.L.S. |
|---|---|---|---|---|---|---|
| -7 | -4.495 | 0.000 | 0.000 | 4.495 | 0.000 | 0,000 |
| -6 | -3.853 | 〃 | -0.079 | 3.686 | -0.246 | -6,080 |
| -5 | -3.211 | 〃 | -0.189 | 2.908 | -0.492 | -12,500 |
| -4 | -2.569 | 〃 | -0.212 | 2.180 | -0.601 | -15,870 |
| -3 | -1.926 | 〃 | -0.212 | 1.506 | -0.632 | -17,820 |
| -2 | -1.284 | 〃 | -0.189 | 0.890 | -0.583 | -17,490 |
| -1 | -0.642 | 〃 | -0.142 | 0.351 | -0.433 | -13,860 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| 1 | 0.642 | -0.491 | 0.102 | -0.378 | -0.125 | -4,250 |
| 2 | 1.284 | -1.359 | 0.275 | -0.535 | -0.335 | -10,570 |
| 3 | 1.926 | -2.284 | 0.433 | -0.634 | -0.559 | -16,600 |
| 4 | 2.569 | -3.266 | 0.590 | -0.674 | -0.481 | -21,710 |
| 5 | 3.211 | -4.225 | 0.708 | -0.670 | -0.976 | -26,160 |
| 6 | 3.853 | -5.196 | 0.802 | -0.611 | -1.152 | -29,490 |
| 7 | 4.495 | -6.098 | 0.826 | -0.508 | -1.285 | -31,610 |
| 8 | 5.137 | -6.921 | 0.826 | -0.364 | -1.322 | -31,860 |
| 9 | 5.779 | -7.594 | 0.724 | -0.184 | -1.275 | -29,710 |
| 10 | 6.422 | -7.994 | 0.543 | -0.009 | -1.038 | -23,980 |
| 11 | 7.064 | -8.142 | 0.283 | 0.162 | -0.633 | -14,620 |
| 10 | 7.706 | -7.994 | -0.016 | 0.310 | 0.006 | 1,390 |
| 9 | 8.348 | -7.594 | -0.323 | 0.414 | 0.845 | 19,690 |
| 8 | 8.990 | -6.921 | -0.637 | 0.472 | 1.909 | 45,890 |
| 7 | 7.866 | -6.098 | -0.889 | 0.472 | 1.351 | 33,230 |
| 6 | 6.743 | -5.196 | -1.070 | 0.458 | 0.935 | 23,930 |
| 5 | 5.619 | -4.225 | -1.172 | 0.405 | 0.627 | 16,800 |
| 4 | 4.495 | -3.266 | -1.180 | 0.337 | 0.386 | 10,730 |
| 3 | 3.371 | -2.284 | -1.109 | 0.247 | 0.225 | 6,680 |
| 2 | 2.248 | -1.359 | -0.936 | 0.157 | 0.110 | 3,480 |
| 1 | 1.124 | -0.491 | -0.661 | 0.058 | 0.030 | 1,020 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| -1 | -1.124 | 〃 | 0.614 | -0.081 | -0.591 | -18,910 |
| -2 | -2.248 | 〃 | 1.557 | -0.108 | -0.799 | -23,970 |
| -3 | -3.371 | 〃 | 2.635 | -0.121 | -0.857 | -24,170 |
| -4 | -4.495 | 〃 | 3.815 | -0.121 | -0.801 | -21,150 |
| -5 | -5.619 | 〃 | 5.089 | -0.108 | -0.638 | -16,210 |
| -6 | -6.743 | 〃 | 6.450 | -0.045 | -0.338 | 8,350 |
| -7 | -7.866 | 0.000 | 7.866 | 0.000 | 0.000 | 0 |
| | | | Summary | | -16.492 | -436,960 |
| | | | | | 6.419 | 162,840 |
| | | | | | | -274,120 |

## Member $L_9 - L_{10}$

| $S_o$ | $H S_h$ | $D S_d$ | $E S_e$ | Sum | D.L.S. |
|---|---|---|---|---|---|
| -5.557 | 0.000 | 0.000 | 5.557 | 0.000 | 0 |
| -4.763 | 〃 | -0.080 | 4.557 | -0.286 | -7,060 |
| -3.969 | 〃 | -0.193 | 3.595 | -0.567 | -14,400 |
| -3.176 | 〃 | -0.217 | 2.695 | -0.698 | -18,430 |
| -2.382 | 〃 | -0.217 | 1.862 | -0.737 | -20,780 |
| -1.588 | 〃 | -0.193 | 1.100 | -0.681 | -20,430 |
| -0.794 | 〃 | -0.144 | 0.433 | -0.505 | -16,160 |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| 0.794 | -0.556 | 0.104 | -0.467 | -0.125 | -4,250 |
| 1.588 | -1.539 | 0.281 | -0.661 | -0.331 | -10,460 |
| 2.382 | -2.587 | 0.441 | -0.784 | -0.548 | -16,270 |
| 3.176 | -3.699 | 0.602 | -0.834 | -0.755 | -20,990 |
| 3.969 | -4.785 | 0.722 | -0.828 | -0.922 | -24,710 |
| 4.763 | -5.885 | 0.819 | -0.756 | -1.059 | -27,100 |
| 5.557 | -6.906 | 0.843 | -0.628 | -1.134 | -27,900 |
| 6.351 | -7.837 | 0.843 | -0.450 | -1.093 | -26,340 |
| 7.145 | -8.600 | 0.738 | -0.228 | -0.945 | -22,020 |
| 7.939 | -9.053 | 0.554 | -0.011 | -0.571 | -13,190 |
| 8.733 | -9.221 | 0.289 | 0.200 | 0.001 | 20 |
| 9.527 | -9.053 | -0.016 | 0.383 | 0.841 | 19,430 |
| 10.321 | -8.600 | -0.329 | 0.511 | 1.903 | 44,340 |
| 9.174 | -7.837 | -0.650 | 0.583 | 1.270 | 30,610 |
| 8.027 | -6.906 | -0.907 | 0.583 | 0.797 | 19,610 |
| 6.880 | -5.885 | -1.092 | 0.567 | 0.470 | 12,030 |
| 5.734 | -4.785 | -1.197 | 0.500 | 0.253 | 6,780 |
| 4.587 | -3.699 | -1.204 | 0.417 | 0.101 | 2,810 |
| 3.440 | -2.587 | -1.132 | 0.306 | 0.027 | 800 |
| 2.293 | -1.539 | -0.955 | 0.194 | -0.007 | -220 |
| 1.147 | -0.556 | -0.674 | 0.072 | -0.011 | -370 |
| 0.000 | 〃 | 0.000 | 0.000 | 0.000 | 0 |
| -1.147 | 〃 | 0.626 | -0.100 | -0.621 | -19,870 |
| -2.293 | 〃 | 1.589 | -0.133 | -0.837 | -25,110 |
| -3.440 | 〃 | 2.689 | -0.150 | -0.901 | -25,410 |
| -4.587 | 〃 | 3.893 | -0.150 | -0.844 | -22,280 |
| -5.734 | 〃 | 5.193 | -0.133 | -0.674 | -17,120 |
| -6.880 | 〃 | 6.582 | -0.056 | -0.354 | 8,740 |
| -8.027 | 0.000 | 8.027 | 0.000 | 0.000 | 0 |
| | | | | -15.206 | -409,620 |
| | | | | 5.663 | 136,430 |
| | | | | | -273,190 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 92

CALCULATIONS FOR

Arakawa-Bashi for Saitama-ken

12

Member L10 - L11

| Loadon | So | HSh | DSd | ESe | Sum. | D.L.S. |
|---|---|---|---|---|---|---|
| -7 | -6.586 | 0.000 | 0.000 | 6.586 | 0.000 | 0.000 |
| -6 | -5.645 | 〃 | -0.079 | 5.401 | -0.323 | -7.980 |
| -5 | -4.704 | 〃 | -0.190 | 4.261 | -0.633 | -16.080 |
| -4 | -3.763 | 〃 | -0.213 | 3.194 | -0.782 | -20.650 |
| -3 | -2.822 | 〃 | -0.213 | 2.206 | -0.829 | -23.380 |
| -2 | -1.882 | 〃 | -0.190 | 1.304 | -0.768 | -23.040 |
| -1 | -0.941 | 〃 | -0.142 | 0.514 | -0.569 | -18.210 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| 1 | 0.941 | -0.604 | 0.103 | -0.553 | -0.113 | -3.840 |
| 2 | 1.882 | -1.671 | 0.277 | -0.784 | -0.296 | -9.350 |
| 3 | 2.822 | -2.808 | 0.435 | -0.929 | -0.480 | -14.260 |
| 4 | 3.763 | -4.015 | 0.593 | -0.988 | -0.647 | -17.990 |
| 5 | 4.704 | -5.195 | 0.712 | -0.981 | -0.760 | -20.370 |
| 6 | 5.645 | -6.388 | 0.806 | -0.896 | -0.833 | -21.320 |
| 7 | 6.586 | -7.497 | 0.830 | -0.744 | -0.825 | -20.300 |
| 8 | 7.527 | -8.508 | 0.830 | -0.533 | -0.684 | -16.480 |
| 9 | 8.467 | -9.337 | 0.727 | -0.270 | -0.413 | -9.620 |
| 10 | 9.408 | -9.828 | 0.545 | -0.013 | 0.112 | 2.590 |
| 11 | 10.349 | -10.011 | 0.285 | 0.237 | 0.860 | 19.870 |
| 10 | 11.290 | -9.828 | -0.016 | 0.454 | 1.900 | 43.890 |
| 9 | 10.161 | -9.337 | -0.324 | 0.606 | 1.106 | 25.770 |
| 8 | 9.032 | -8.508 | -0.640 | 0.692 | 0.575 | 13.860 |
| 7 | 7.903 | -7.497 | -0.893 | 0.692 | 0.205 | 5.040 |
| 6 | 6.774 | -6.388 | -1.075 | 0.672 | -0.017 | -0.440 |
| 5 | 5.654 | -5.195 | -1.178 | 0.593 | -0.126 | -3.380 |
| 4 | 4.516 | -4.015 | -1.185 | 0.494 | -0.190 | -5.280 |
| 3 | 3.387 | -2.808 | -1.114 | 0.362 | -0.173 | -5.140 |
| 2 | 2.258 | -1.671 | -0.940 | 0.231 | -0.122 | -3.860 |
| 1 | 1.129 | -0.604 | -0.664 | 0.086 | -0.053 | -1.800 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0 |
| -1 | -1.129 | 〃 | 0.616 | -0.119 | -0.532 | -17.020 |
| -2 | -2.258 | 〃 | 1.565 | -0.158 | -0.851 | -25.530 |
| -3 | -3.387 | 〃 | 2.648 | -0.178 | -0.917 | -25.860 |
| -4 | -4.516 | 〃 | 3.833 | -0.178 | -0.861 | -22.730 |
| -5 | -5.654 | 〃 | 5.113 | -0.158 | -0.699 | -17.750 |
| -6 | -6.774 | 〃 | 6.480 | -0.066 | -0.360 | -8.890 |
| -7 | -7.903 | 0.000 | 7.903 | 0.000 | 0.000 | 0 |
| | | | | Summary | -13.856 | -380.500 |
| | | | | | 4.768 | 111.020 |
| | | | | | | -269.480 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY Y.O DATE _____ FILE NO _____

CHECKED BY _____ DATE _____ PAGE NO 93

CALCULATIONS FOR

*Influence Surface for Diagonal*

| Loadon | Member D-6 - D-7 So | HSh | DSd | ESe | Sum. D | Member D-5 - D-6 So | HSh | DSd | ESe | Sum. D |
|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6 | | | 0.013 | | 0.013 | | | 0.009 | | 0.009 |
| -5 | | | 0.032 | | 0.032 | | | 0.022 | | 0.022 |
| -4 | | | 0.036 | | 0.036 | | | 0.025 | | 0.025 |
| -3 | | | 0.036 | | 0.036 | | | 0.025 | | 0.025 |
| -2 | | | 0.032 | | 0.032 | | | 0.022 | | 0.022 |
| -1 | | 0.024 | | | 0.024 | | 0.017 | | | 0.017 |
| 0 | | 0.000 | | | 0.000 | | 0.000 | | | 0.000 |
| 1 | | -0.017 | | | -0.017 | | -0.012 | | | -0.012 |
| 2 | | -0.046 | | | -0.046 | | -0.033 | | | -0.033 |
| 3 | | -0.073 | | | -0.073 | | -0.051 | | | -0.051 |
| 4 | | -0.100 | | | -0.100 | | -0.070 | | | -0.070 |
| 5 | | -0.119 | | | -0.119 | | -0.084 | | | -0.084 |
| 6 | | -0.135 | | | -0.135 | | -0.096 | | | -0.096 |
| 7 | | -0.139 | | | -0.139 | | -0.098 | | | -0.098 |
| 8 | | -0.139 | | | -0.139 | | -0.098 | | | -0.098 |
| 9 | | -0.122 | | | -0.122 | | -0.086 | | | -0.086 |
| 10 | | -0.092 | | | -0.092 | | -0.065 | | | -0.065 |
| 11 | | -0.048 | | | -0.048 | | -0.034 | | | -0.034 |
| 10 | | 0.003 | | | 0.003 | | 0.002 | | | 0.002 |
| 9 | | 0.054 | | | 0.054 | | 0.038 | | | 0.038 |
| 8 | | 0.108 | | | 0.108 | | 0.076 | | | 0.076 |
| 7 | | 0.150 | | | 0.150 | | 0.106 | | | 0.106 |
| 6 | | 0.181 | | | 0.181 | | 0.127 | | | 0.127 |
| 5 | | 0.198 | | | 0.198 | | 0.140 | | | 0.140 |
| 4 | | 0.199 | | | 0.199 | | 0.141 | | | 0.141 |
| 3 | | 0.187 | | | 0.187 | | 0.132 | | | 0.132 |
| 2 | | 0.158 | | | 0.158 | | 0.112 | | | 0.112 |
| 1 | | 0.112 | | | 0.112 | | 0.079 | | | 0.079 |
| 0 | | 0.000 | | | 0.000 | | 0.000 | | | 0.000 |
| -1 | | -0.104 | | | -0.104 | | -0.073 | | | -0.073 |
| -2 | | -0.263 | | | -0.263 | | -0.185 | | | -0.185 |
| -3 | | -0.445 | | | -0.445 | | -0.314 | | | -0.314 |
| -4 | | -0.644 | | | -0.644 | | -0.454 | | | -0.454 |
| -5 | | -0.859 | | | -0.859 | 0.000 | -0.606 | | | -0.606 |
| -6 | 0.000 | -1.085 | | | -1.085 | 0.140 | -0.769 | | | 0.371 |
| -7 | 1.328 | 0.000 | -1.328 | 0.000 | 0.000 | 0.937 | 0.000 | -0.937 | | 0.000 |
| | | | | Summary | 1.523 | | | | | 1.444 |
| | | | | | -4.430 | | | | | -2.359 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
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CALCULATIONS FOR

Arakawa-Bashi for Saitama-ken

| Load on | Member D-4 - D-5 So | HSh | DSd | ESe | Sum. | Member D-3 - D-4 So | HSh | DSd | ESe | Sum. |
|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6 | | | 0.006 | | 0.006 | | | 0.004 | | 0.004 |
| -5 | | | 0.015 | | 0.015 | | | 0.010 | | 0.010 |
| -4 | | | 0.017 | | 0.017 | | | 0.012 | | 0.012 |
| -3 | | | 0.017 | | 0.017 | | | 0.012 | | 0.012 |
| -2 | | | 0.015 | | 0.015 | | | 0.010 | | 0.010 |
| -1 | | | 0.011 | | 0.011 | | | 0.007 | | 0.007 |
| 0 | | | 0.000 | | 0.000 | | | 0.000 | | 0.000 |
| 1 | | | -0.008 | | -0.008 | | | -0.005 | | -0.005 |
| 2 | | | -0.022 | | -0.022 | | | -0.014 | | -0.014 |
| 3 | | | -0.035 | | -0.035 | | | -0.023 | | -0.023 |
| 4 | | | -0.048 | | -0.048 | | | -0.031 | | -0.031 |
| 5 | | | -0.057 | | -0.057 | | | -0.037 | | -0.037 |
| 6 | | | -0.065 | | -0.065 | | | -0.042 | | -0.042 |
| 7 | | | -0.067 | | -0.067 | | | -0.043 | | -0.043 |
| 8 | | | -0.067 | | -0.067 | | | -0.043 | | -0.043 |
| 9 | | | -0.058 | | -0.058 | | | -0.038 | | -0.038 |
| 10 | | | -0.044 | | -0.044 | | | -0.028 | | -0.028 |
| 11 | | | -0.023 | | -0.023 | | | -0.015 | | -0.015 |
| 10 | | | 0.001 | | 0.001 | | | 0.001 | | 0.001 |
| 9 | | | 0.026 | | 0.026 | | | 0.017 | | 0.017 |
| 8 | | | 0.051 | | 0.051 | | | 0.033 | | 0.033 |
| 7 | | | 0.072 | | 0.072 | | | 0.047 | | 0.047 |
| 6 | | | 0.086 | | 0.086 | | | 0.056 | | 0.056 |
| 5 | | | 0.095 | | 0.095 | | | 0.062 | | 0.062 |
| 4 | | | 0.095 | | 0.095 | | | 0.062 | | 0.062 |
| 3 | | | 0.089 | | 0.089 | | | 0.058 | | 0.058 |
| 2 | | | 0.076 | | 0.076 | | | 0.049 | | 0.049 |
| 1 | | | 0.053 | | 0.053 | | | 0.035 | | 0.035 |
| 0 | | | 0.000 | | 0.000 | | | 0.000 | | 0.000 |
| -1 | | | -0.050 | | -0.050 | | | -0.032 | | -0.032 |
| -2 | | | -0.126 | | -0.126 | | | -0.082 | | -0.082 |
| -3 | | | -0.213 | | -0.213 | 0.000 | | -0.138 | | -0.138 |
| -4 | 0.000 | | -0.308 | | -0.308 | 0.868 | | -0.200 | | 0.668 |
| -5 | 0.987 | | -0.411 | | 0.576 | 0.716 | | -0.267 | | 0.449 |
| -6 | 0.811 | | -0.521 | | 0.290 | 0.565 | | -0.339 | | 0.226 |
| -7 | 0.635 | 0.000 | -0.635 | | 0.000 | 0.413 | 0.000 | -0.413 | 0.000 | 0.000 |
| | | | Summary | | 1.591 | | | | | 1.818 |
| | | | | | -1.119 | | | | | -0.561 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

15

Member D-2 - D-3

| Load on | $\delta_o$ | $H\delta_n$ | $D\delta_d$ | $E\delta_e$ | Sum. D |
|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6 | | | 0.003 | | 0.003 |
| -5 | | | 0.006 | | 0.006 |
| -4 | | | 0.007 | | 0.007 |
| -3 | | | 0.007 | | 0.007 |
| -2 | | | 0.006 | | 0.006 |
| -1 | | | 0.005 | | 0.005 |
| 0 | | | 0.000 | | 0.000 |
| 1 | | | -0.003 | | -0.003 |
| 2 | | | -0.009 | | -0.009 |
| 3 | | | -0.014 | | -0.014 |
| 4 | | | -0.019 | | -0.019 |
| 5 | | | -0.023 | | -0.023 |
| 6 | | | -0.026 | | -0.026 |
| 7 | | | -0.027 | | -0.027 |
| 8 | | | -0.027 | | -0.027 |
| 9 | | | -0.023 | | -0.623 |
| 10 | | | -0.017 | | -0.017 |
| 11 | | | -0.009 | | -0.009 |
| 10 | | | 0.001 | | 0.001 |
| 9 | | | 0.010 | | 0.010 |
| 8 | | | 0.020 | | 0.020 |
| 7 | | | 0.029 | | 0.029 |
| 6 | | | 0.034 | | 0.034 |
| 5 | | | 0.038 | | 0.038 |
| 4 | | | 0.038 | | 0.038 |
| 3 | | | 0.036 | | 0.036 |
| 2 | | | 0.030 | | 0.030 |
| 1 | | | 0.021 | | 0.021 |
| 0 | | | 0.000 | | 0.000 |
| -1 | | | -0.020 | | -0.020 |
| -2 | | | -0.050 | | -0.050 |
| -3 | 0.779 | | -0.085 | | 0.694 |
| -4 | 0.648 | | -0.123 | | 0.525 |
| -5 | 0.516 | | -0.164 | | 0.352 |
| -6 | 0.385 | | -0.207 | | 0.178 |
| -7 | 0.253 | 0.000 | -0.253 | 0.000 | 0.000 |
| | | | Summary | | 2.048 |
| | | | | | -0.267 |

Member D-1 - D-2

| $\delta_o$ | $H\delta_n$ | $D\delta_d$ | $E\delta_e$ | Sum. D |
|---|---|---|---|---|
| 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | | 0.001 | | 0.001 |
| | | 0.003 | | 0.003 |
| | | 0.004 | | 0.004 |
| | | 0.004 | | 0.004 |
| | | 0.003 | | 0.003 |
| | | 0.002 | | 0.002 |
| | | 0.000 | | 0.000 |
| | | -0.002 | | -0.002 |
| | | -0.005 | | -0.005 |
| | | -0.007 | | -0.007 |
| | | -0.010 | | -0.010 |
| | | -0.012 | | -0.012 |
| | | -0.014 | | -0.014 |
| | | -0.014 | | -0.014 |
| | | -0.014 | | -0.014 |
| | | -0.013 | | -0.013 |
| | | -0.009 | | -0.009 |
| | | -0.005 | | -0.005 |
| | | 0.000 | | 0.000 |
| | | 0.006 | | 0.006 |
| | | 0.011 | | 0.011 |
| | | 0.015 | | 0.015 |
| | | 0.019 | | 0.019 |
| | | 0.020 | | 0.020 |
| | | 0.021 | | 0.021 |
| | | 0.019 | | 0.019 |
| | | 0.016 | | 0.016 |
| | | 0.012 | | 0.012 |
| | | 0.000 | | 0.000 |
| | | -0.010 | | -0.010 |
| 0.715 | | -0.027 | | 0.688 |
| 0.599 | | -0.046 | | 0.553 |
| 0.484 | | -0.066 | | 0.418 |
| 0.368 | | -0.089 | | 0.279 |
| 0.253 | | -0.112 | | 0.141 |
| 0.137 | 0.000 | -0.137 | 0.000 | 0.000 |
| | | | | 2.235 |
| | | | | -0.115 |

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JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M. O DATE _____ FILE NO _____
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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

16

Member Do - D-1

| Loadon | So | HSh | DSd | ESe | Sum. |
|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6 | | | 0.001 | | 0.001 |
| -5 | | | 0.001 | | 0.001 |
| -4 | | | 0.002 | | 0.002 |
| -3 | | | 0.002 | | 0.002 |
| -2 | | | 0.001 | | 0.001 |
| -1 | | | 0.001 | | 0.001 |
| 0 | | | 0.000 | | 0.000 |
| 1 | | | -0.001 | | -0.001 |
| 2 | | | -0.002 | | -0.002 |
| 3 | | | -0.003 | | -0.003 |
| 4 | | | -0.004 | | -0.004 |
| 5 | | | -0.005 | | -0.005 |
| 6 | | | -0.006 | | -0.006 |
| 7 | | | -0.006 | | -0.006 |
| 8 | | | -0.006 | | -0.006 |
| 9 | | | -0.005 | | -0.005 |
| 10 | | | -0.004 | | -0.004 |
| 11 | | | -0.002 | | -0.002 |
| 10 | | | 0.000 | | 0.000 |
| 9 | | | 0.002 | | 0.002 |
| 8 | | | 0.005 | | 0.005 |
| 7 | | | 0.006 | | 0.006 |
| 6 | | | 0.008 | | 0.008 |
| 5 | | | 0.008 | | 0.008 |
| 4 | | | 0.008 | | 0.008 |
| 3 | | | 0.008 | | 0.008 |
| 2 | | | 0.007 | | 0.007 |
| 1 | | | 0.005 | | 0.005 |
| 0 | 0.000 | | 0.000 | | 0.000 |
| -1 | 0.672 | | -0.004 | | 0.668 |
| -2 | 0.569 | | -0.011 | | 0.558 |
| -3 | 0.467 | | -0.019 | | 0.448 |
| -4 | 0.364 | | -0.027 | | 0.337 |
| -5 | 0.261 | | -0.036 | | 0.225 |
| -6 | 0.159 | | -0.046 | | 0.113 |
| -7 | 0.056 | 0.000 | -0.056 | 0.000 | 0.000 |
| | | | | | 2.414 |
| | | | | | -0.044 |

JIUN MASUDA
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-ken

17
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| Member Do-D1 | | | | | | Member D1-D2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loadon. | Go | HGh | DGd | EGe | Sum. | Go | HGh | DGd | EGe | Sum. |
| -7 | -0.246 | 0.000 | 0.000 | 0.246 | 0.000 | -0.301 | 0 | 0 | 0.301 | 0 |
| -6 | -0.211 | 0 | -0.005 | 0.202 | -0.014 | -0.258 | 0 | -0.005 | 0.247 | -0.016 |
| -5 | -0.176 | 0 | -0.011 | 0.159 | -0.028 | -0.215 | 0 | -0.012 | 0.195 | -0.032 |
| -4 | -0.141 | 0 | -0.013 | 0.119 | -0.035 | -0.172 | 0 | -0.014 | 0.146 | -0.040 |
| -3 | -0.106 | 0 | -0.013 | 0.082 | -0.037 | -0.129 | 0 | -0.014 | 0.101 | -0.042 |
| -2 | -0.070 | 0 | -0.011 | 0.049 | -0.032 | -0.086 | 0 | -0.012 | 0.060 | -0.038 |
| -1 | -0.035 | 0 | -0.009 | 0.019 | -0.025 | -0.043 | 0 | -0.009 | 0.023 | -0.029 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0.035 | -0.042 | 0.006 | -0.021 | -0.022 | 0.043 | -0.046 | 0.007 | -0.025 | -0.021 |
| 2 | 0.070 | -0.115 | 0.017 | -0.029 | -0.057 | 0.086 | -0.127 | 0.018 | -0.036 | -0.059 |
| 3 | 0.106 | -0.193 | 0.026 | -0.035 | -0.096 | 0.129 | -0.214 | 0.028 | -0.042 | -0.099 |
| 4 | 0.141 | -0.277 | 0.036 | -0.037 | -0.137 | 0.172 | -0.306 | 0.038 | -0.045 | -0.141 |
| 5 | 0.176 | -0.358 | 0.043 | -0.037 | -0.176 | 0.215 | -0.396 | 0.045 | -0.045 | -0.181 |
| 6 | 0.211 | -0.440 | 0.048 | -0.033 | -0.214 | 0.258 | -0.487 | 0.051 | -0.041 | -0.219 |
| 7 | 0.246 | -0.516 | 0.050 | -0.028 | -0.248 | 0.301 | -0.572 | 0.053 | -0.034 | -0.252 |
| 8 | 0.282 | -0.586 | 0.050 | -0.020 | -0.274 | 0.344 | -0.649 | 0.053 | -0.024 | -0.276 |
| 9 | 0.317 | -0.643 | 0.044 | 0.010 | -0.292 | 0.387 | -0.712 | 0.046 | -0.012 | -0.291 |
| 10 | 0.352 | -0.677 | 0.033 | -0.001 | -0.293 | 0.430 | -0.749 | 0.035 | -0.001 | -0.285 |
| 11 | 0.387 | -0.689 | 0.017 | 0.009 | -0.276 | 0.474 | -0.763 | 0.018 | 0.011 | -0.260 |
| 10 | 0.422 | -0.677 | -0.001 | 0.017 | -0.239 | 0.516 | -0.749 | -0.001 | 0.021 | -0.215 |
| 9 | 0.457 | -0.643 | -0.019 | 0.023 | -0.182 | 0.560 | -0.712 | -0.021 | 0.028 | -0.145 |
| 8 | 0.493 | -0.586 | -0.038 | 0.026 | -0.105 | 0.603 | -0.649 | -0.041 | 0.032 | -0.055 |
| 7 | 0.528 | -0.516 | -0.053 | 0.026 | -0.015 | 0.646 | -0.572 | -0.057 | 0.032 | 0.049 |
| 6 | 0.563 | -0.440 | -0.064 | 0.025 | 0.084 | 0.689 | -0.487 | -0.069 | 0.031 | 0.164 |
| 5 | 0.598 | -0.358 | -0.070 | 0.022 | 0.192 | 0.732 | -0.396 | -0.075 | 0.027 | 0.288 |
| 4 | 0.633 | -0.277 | -0.071 | 0.018 | 0.303 | 0.775 | -0.306 | -0.076 | 0.023 | 0.416 |
| 3 | 0.669 | -0.193 | -0.067 | 0.014 | 0.423 | 0.817 | -0.214 | -0.071 | 0.071 | 0.549 |
| 2 | 0.704 | -0.115 | -0.056 | 0.009 | 0.542 | 0.861 | -0.127 | -0.060 | 0.011 | 0.685 |
| 1 | 0.739 | -0.042 | -0.040 | 0.003 | 0.660 | 0.072 | -0.046 | -0.042 | 0.004 | -0.012 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | -0.068 | 0 | 0.037 | -0.004 | -0.035 | -0.072 | 0 | 0.039 | -0.005 | -0.038 |
| -2 | -0.136 | 0 | 0.094 | -0.006 | -0.048 | -0.144 | 0 | 0.100 | -0.007 | -0.051 |
| -3 | -0.203 | 0 | 0.159 | -0.007 | -0.051 | -0.216 | 0 | 0.169 | -0.008 | -0.055 |
| -4 | -0.271 | 0 | 0.230 | -0.007 | -0.048 | -0.288 | 0 | 0.244 | -0.008 | -0.052 |
| -5 | -0.339 | 0 | 0.307 | -0.006 | -0.038 | -0.360 | 0 | 0.326 | -0.007 | -0.041 |
| -6 | -0.407 | 0 | 0.389 | -0.002 | -0.020 | -0.432 | 0 | 0.413 | -0.003 | -0.022 |
| -7 | -0.474 | 0 | 0.474 | 0 | 0 | -0.504 | 0 | 0.504 | 0 | 0 |
| | | | | | -3.037 | | | | | -2.967 |
| | | | | | 2.204 | | | | | 2.151 |

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JIUN MASUDA
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO

CHECKED BY DATE PAGE NO 98

CALCULATIONS FOR

Arakawa. Bashi for Saitama-ken 18

Member D2-D3

| Load on | Yo | Hyh | Dyd | Eye | Sum. |
|---|---|---|---|---|---|
| -7 | -0374 | 0.000 | 0.000 | 0.374 | 0.000 |
| -6 | -0.320 | 0 | -0.005 | 0.307 | -0.018 |
| -5 | -0.267 | 0 | -0.013 | 0.242 | -0.038 |
| -4 | -0.214 | 0 | -0.015 | 0.181 | -0.048 |
| -3 | -0.160 | 0 | -0.015 | 0.125 | -0.050 |
| -2 | -0.107 | 0 | -0.013 | 0.074 | -0.046 |
| -1 | -0.053 | 0 | -0.010 | 0.029 | -0.034 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0.053 | -0.052 | 0.007 | -0.031 | -0.023 |
| 2 | 0.107 | -0.143 | 0.019 | -0.045 | -0.062 |
| 3 | 0.160 | -0.241 | 0.031 | -0.053 | -0.104 |
| 4 | 0.214 | -0.345 | 0.041 | -0.056 | -0.146 |
| 5 | 0.267 | -0.446 | 0.049 | -0.056 | -0.186 |
| 6 | 0.320 | -0.549 | 0.056 | -0.051 | -0.224 |
| 7 | 0.374 | -0.644 | 0.057 | -0.042 | -0.255 |
| 8 | 0.427 | -0.731 | 0.057 | -0.030 | -0.277 |
| 9 | 0.480 | -0.802 | 0.050 | -0.015 | -0.287 |
| 10 | 0.534 | -0.844 | 0.038 | -0.001 | -0.273 |
| 11 | 0.587 | -0.860 | 0.020 | 0.013 | -0.240 |
| 10 | 0.641 | -0.844 | -0.001 | 0.026 | -0.178 |
| 9 | 0.694 | -0.802 | -0.022 | 0.034 | -0.096 |
| 8 | 0.747 | -0.731 | -0.044 | 0.039 | 0.013 |
| 7 | 0.801 | -0.644 | -0.062 | 0.039 | 0.134 |
| 6 | 0.854 | -0.549 | -0.074 | 0.038 | 0.269 |
| 5 | 0.908 | -0.446 | -0.081 | 0.034 | 0.415 |
| 4 | 0.961 | -0.345 | -0.082 | 0.028 | 0.562 |
| 3 | 1.014 | -0.241 | -0.078 | 0.021 | 0.716 |
| 2 | 0.156 | -0.143 | -0.065 | 0.013 | 0.039 |
| 1 | 0.078 | -0.052 | -0.046 | 0.005 | 0.015 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | -0.078 | 0 | 0.043 | -0.007 | -0.042 |
| -2 | -0.156 | 0 | 0.108 | -0.009 | -0.057 |
| -3 | -0.234 | 0 | 0.183 | -0.010 | -0.061 |
| -4 | -0.312 | 0 | 0.265 | -0.010 | -0.057 |
| -5 | -0.390 | 0 | 0.353 | -0.009 | -0.046 |
| -6 | -0.468 | 0 | 0.448 | -0.004 | -0.024 |
| -7 | -0.546 | 0 | 0.546 | 0 | 0 |

-2.926
2.109

JIUN MASUDA
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO
CHECKED BY DATE PAGE NO 99

CALCULATIONS FOR

Arakawa-Bashi for Saitama-ken

19

| | Member D3-D4 | | | | | Member D4-D5 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Load on | $y_o$ | $H_{yh}$ | $D_{yd}$ | $E_{ye}$ | Sum. | $y_o$ | $H_{yh}$ | $D_{yd}$ | $E_{ye}$ | Sum. |
| -7 | -0.469 | 0.000 | 0.000 | 0.469 | 0.000 | -0.596 | 0.000 | 0.000 | 0.596 | 0.000 |
| -6 | -0.402 | 0 | -0.006 | 0.385 | -0.022 | -0.511 | 0 | -0.006 | 0.489 | -0.028 |
| -5 | -0.335 | 0 | -0.014 | 0.304 | -0.045 | -0.426 | 0 | -0.015 | 0.386 | -0.055 |
| -4 | -0.268 | 0 | -0.016 | 0.228 | -0.056 | -0.340 | 0 | -0.017 | 0.289 | -0.068 |
| -3 | -0.201 | 0 | -0.016 | 0.157 | -0.060 | -0.255 | 0 | -0.017 | 0.200 | -0.072 |
| -2 | -0.134 | 0 | -0.014 | 0.093 | -0.055 | -0.170 | 0 | -0.015 | 0.118 | -0.067 |
| -1 | -0.067 | 0 | -0.011 | 0.037 | -0.041 | 0.085 | 0 | -0.011 | 0.047 | -0.049 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0.067 | -0.059 | 0.008 | -0.039 | -0.023 | 0.085 | -0.068 | 0.008 | -0.050 | -0.025 |
| 2 | 0.134 | -0.164 | 0.021 | -0.056 | -0.065 | 0.170 | -0.188 | 0.022 | -0.071 | -0.067 |
| 3 | 0.201 | -0.275 | 0.033 | -0.066 | -0.107 | 0.255 | -0.316 | 0.035 | -0.084 | -0.100 |
| 4 | 0.268 | -0.394 | 0.044 | -0.070 | -0.152 | 0.340 | -0.452 | 0.047 | -0.089 | -0.154 |
| 5 | 0.335 | -0.509 | 0.053 | -0.070 | -0.191 | 0.426 | -0.585 | 0.057 | -0.089 | -0.191 |
| 6 | 0.402 | -0.627 | 0.060 | -0.064 | -0.229 | 0.511 | -0.719 | 0.064 | -0.081 | -0.225 |
| 7 | 0.469 | -0.735 | 0.062 | -0.053 | -0.257 | 0.596 | -0.844 | 0.066 | -0.067 | -0.249 |
| 8 | 0.536 | -0.834 | 0.062 | -0.038 | -0.274 | 0.681 | -0.958 | 0.066 | -0.048 | -0.259 |
| 9 | 0.604 | -0.916 | 0.054 | -0.019 | -0.277 | 0.766 | -1.051 | 0.058 | -0.024 | -0.251 |
| 10 | 0.671 | -0.964 | 0.041 | -0.001 | -0.253 | 0.852 | -1.107 | 0.044 | -0.001 | -0.212 |
| 11 | 0.738 | -0.982 | 0.021 | 0.017 | -0.206 | 0.937 | -1.127 | 0.023 | +0.021 | -0.146 |
| 10 | 0.805 | -0.964 | -0.001 | 0.032 | -0.128 | 1.022 | -1.107 | -0.001 | 0.041 | -0.045 |
| 9 | 0.872 | -0.916 | -0.024 | 0.043 | -0.025 | 1.107 | -1.051 | -0.026 | 0.055 | 0.085 |
| 8 | 0.939 | -0.834 | -0.048 | 0.049 | +0.106 | 1.192 | -0.958 | -0.051 | 0.063 | 0.246 |
| 7 | 1.006 | -0.735 | -0.067 | 0.049 | 0.253 | 1.277 | -0.844 | -0.071 | 0.063 | 0.425 |
| 6 | 1.073 | -0.627 | -0.081 | 0.048 | 0.413 | 1.362 | -0.719 | -0.086 | 0.061 | 0.618 |
| 5 | 1.140 | -0.509 | -0.088 | 0.042 | 0.585 | 1.443 | -0.585 | -0.094 | 0.054 | 0.818 |
| 4 | 1.207 | -0.394 | -0.089 | 0.035 | 0.759 | 0.361 | -0.452 | -0.095 | 0.045 | -0.141 |
| 3 | 0.254 | -0.275 | -0.083 | 0.026 | -0.078 | 0.270 | -0.316 | -0.089 | 0.033 | -0.102 |
| 2 | 0.169 | -0.164 | -0.070 | 0.016 | -0.049 | 0.180 | -0.188 | -0.075 | 0.021 | -0.062 |
| 1 | 0.085 | -0.059 | -0.050 | 0.006 | -0.018 | 0.090 | -0.068 | -0.053 | 0.008 | -0.023 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | -0.085 | 0 | 0.046 | -0.008 | -0.047 | -0.090 | 0 | 0.049 | -0.011 | -0.052 |
| -2 | -0.169 | 0 | 0.117 | -0.011 | -0.063 | -0.180 | 0 | 0.125 | -0.014 | -0.069 |
| -3 | -0.254 | 0 | 0.198 | -0.013 | -0.069 | -0.270 | 0 | 0.212 | -0.016 | -0.074 |
| -4 | -0.338 | 0 | 0.287 | -0.013 | -0.064 | -0.361 | 0 | 0.306 | -0.016 | -0.071 |
| -5 | -0.423 | 0 | 0.383 | -0.011 | -0.051 | -0.451 | 0 | 0.409 | -0.014 | -0.056 |
| -6 | -0.507 | 0 | 0.485 | 0.005 | -0.027 | -0.541 | 0 | 0.518 | -0.006 | -0.029 |
| -7 | -0.592 | 0 | 0.592 | 0 | 0 | -0.632 | 0 | 0.632 | 0.000 | 0.000 |
| | | | | | -2.932 | | | | | -2.942 |
| | | | | | 2.116 | | | | | 2.192 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO
CHECKED BY DATE PAGE NO 100

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

| Member D5 - D6 | | | | | | Member D6 - D7 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Loadon | Yo | HYh | DYd | EYe | Sum. | Yo | HYh | DYd | EYe | Sum. |
| -7 | -0.750 | 0.000 | 0.000 | 0.750 | -0.000 | -0.916 | 0.000 | 0.000 | 0.916 | -0.000 |
| -6 | -0.643 | 〃 | -0.007 | 0.615 | -0.035 | -0.794 | 〃 | -0.007 | 0.751 | -0.050 |
| -5 | -0.536 | 〃 | -0.016 | 0.485 | -0.067 | -0.662 | 〃 | -0.016 | 0.593 | -0.085 |
| -4 | -0.428 | 〃 | -0.018 | 0.364 | -0.082 | -0.529 | 〃 | -0.018 | 0.444 | -0.103 |
| -3 | -0.321 | 〃 | -0.018 | 0.251 | -0.088 | -0.397 | 〃 | -0.018 | 0.307 | -0.108 |
| -2 | -0.214 | 〃 | -0.016 | 0.149 | -0.081 | -0.265 | 〃 | -0.016 | 0.181 | -0.100 |
| -1 | -0.107 | 〃 | -0.017 | 0.058 | -0.066 | -0.132 | 〃 | -0.012 | 0.071 | -0.073 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | -0.000 |
| 1 | 0.107 | -0.077 | 0.009 | -0.063 | -0.024 | 0.132 | -0.085 | 0.009 | -0.077 | -0.021 |
| 2 | 0.214 | -0.214 | 0.023 | -0.089 | -0.066 | 0.265 | -0.236 | 0.023 | -0.109 | -0.057 |
| 3 | 0.321 | -0.360 | 0.037 | -0.105 | -0.107 | 0.397 | -0.396 | 0.036 | -0.129 | -0.092 |
| 4 | 0.428 | -0.515 | 0.050 | -0.113 | -0.150 | 0.529 | -0.566 | 0.049 | -0.137 | -0.125 |
| 5 | 0.536 | -0.666 | 0.060 | -0.112 | -0.182 | 0.662 | -0.733 | 0.059 | -0.136 | -0.148 |
| 6 | 0.643 | -0.819 | 0.068 | -0.102 | -0.210 | 0.794 | -0.901 | 0.067 | -0.125 | -0.165 |
| 7 | 0.750 | -0.961 | 0.070 | -0.084 | -0.225 | 0.916 | -1.057 | 0.069 | -0.104 | -0.176 |
| 8 | 0.857 | -1.090 | 0.070 | -0.060 | -0.223 | 1.058 | -1.200 | 0.069 | -0.074 | -0.147 |
| 9 | 0.964 | -1.196 | 0.062 | -0.031 | -0.201 | 1.190 | -1.317 | 0.060 | -0.038 | -0.105 |
| 10 | 1.072 | -1.259 | 0.046 | -0.002 | -0.143 | 1.322 | -1.386 | 0.045 | -0.002 | -0.021 |
| 11 | 1.178 | -1.283 | 0.024 | 0.027 | -0.054 | 1.455 | -1.412 | 0.024 | 0.033 | -0.100 |
| 10 | 1286 | -1.259 | -0.001 | 0.052 | 0.078 | 1.587 | -1.386 | -0.001 | 0.063 | 0.263 |
| 9 | 1.393 | -1.196 | -0.028 | 0.069 | 0.238 | 1.720 | -1.317 | -0.027 | 0.084 | 0.460 |
| 8 | 1.500 | -1.090 | -0.054 | 0.079 | 0.435 | 1.852 | -1.200 | -0.053 | 0.096 | 0.695 |
| 7 | 1.607 | -0.961 | -0.076 | 0.079 | 0.649 | 1.984 | -1.057 | -0.074 | 0.096 | 0.949 |
| 6 | 1.715 | -0.819 | -0.091 | 0.077 | 0.882 | 0.562 | -0.901 | -0.089 | 0.093 | -0.335 |
| 5 | 0.480 | -0.666 | -0.100 | 0.068 | -0.216 | 0.468 | -0.733 | -0.098 | 0.082 | -0.281 |
| 4 | 0.384 | -0.515 | -0.101 | 0.056 | -0.176 | 0.375 | -0.566 | -0.098 | 0.069 | -0.220 |
| 3 | 0.288 | -0.360 | -0.095 | 0.041 | -0.127 | 0.281 | -0.396 | -0.092 | 0.050 | -0.157 |
| 2 | 0.192 | -0.214 | -0.080 | 0.026 | -0.076 | 0.187 | -0.236 | -0.078 | 0.032 | -0.095 |
| 1 | 0.096 | -0.077 | -0.056 | 0.010 | -0.027 | 0.094 | -0.085 | -0.055 | 0.012 | -0.034 |
| 0 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -1 | -0.096 | 〃 | 0.052 | -0.014 | -0.058 | -0.094 | 〃 | 0.051 | -0.016 | -0.059 |
| -2 | -0.192 | 〃 | 0.133 | -0.018 | -0.077 | -0.187 | 〃 | 0.129 | -0.022 | -0.080 |
| -3 | -0.288 | 〃 | 0.225 | -0.020 | -0.083 | -0.281 | 〃 | 0.219 | -0.025 | -0.087 |
| -4 | -0.384 | 〃 | 0.325 | -0.020 | -0.079 | -0.375 | 〃 | 0.318 | -0.025 | -0.082 |
| -5 | -0.480 | 〃 | 0.434 | -0.018 | -0.064 | -0.468 | 〃 | 0.424 | -0.022 | -0.066 |
| -6 | -0.577 | 〃 | 0.550 | -0.008 | -0.025 | -0.562 | 〃 | 0.537 | -0.009 | -0.034 |
| -7 | -0.671 | 0.000 | 0.671 | 0.000 | 0.000 | -0.655 | 0.000 | 0.655 | 0.000 | 0.000 |
| | | | | | -3.022 | | | | | -3.106 |
| | | | | | 2.282 | | | | | 2.467 |

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**JIUN MASUDA**
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 101

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

21

| | Member D7-D8 | | | | | Member D8-D9 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Load on. | Yo | Hyh | Dyd | Eye | Sum | Yo | Hyh | Dyd | Eye | Sum. |
| -7 | -1.097 | 0.000 | 0.000 | 1.097 | 0.000 | -1.199 | 0.000 | 0.000 | 1.199 | 0.000 |
| -6 | -0.940 | 0 | -0.006 | 0.900 | -0.046 | -1.028 | 0 | -0.003 | 0.984 | -0.047 |
| -5 | -0.784 | 0 | -0.014 | 0.710 | -0.088 | -0.856 | 0 | -0.008 | 0.776 | -0.088 |
| -4 | -0.627 | 0 | -0.015 | 0.532 | -0.110 | -0.685 | 0 | -0.009 | 0.582 | -0.112 |
| -3 | -0.470 | 0 | -0.015 | 0.367 | -0.118 | -0.514 | 0 | -0.009 | 0.402 | -0.121 |
| -2 | -0.314 | 0 | -0.014 | 0.217 | -0.111 | -0.343 | 0 | -0.008 | 0.248 | -0.103 |
| -1 | -0.157 | 0 | -0.010 | 0.086 | -0.081 | -0.171 | 0 | -0.006 | 0.094 | -0.083 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0.157 | -0.088 | 0.007 | -0.092 | -0.016 | 0.171 | -0.081 | 0.004 | -0.101 | -0.007 |
| 2 | 0.314 | -0.244 | 0.020 | -0.130 | -0.040 | 0.343 | -0.223 | 0.012 | -0.143 | -0.011 |
| 3 | 0.470 | -0.411 | 0.031 | -0.155 | -0.065 | 0.514 | -0.375 | 0.018 | -0.168 | -0.012 |
| 4 | 0.627 | -0.587 | 0.042 | -0.165 | -0.083 | 0.685 | -0.536 | 0.025 | -0.180 | -0.006 |
| 5 | 0.784 | -0.760 | 0.051 | -0.163 | -0.088 | 0.856 | -0.694 | 0.030 | -0.179 | -0.013 |
| 6 | 0.940 | -0.934 | 0.058 | -0.149 | -0.085 | 1.028 | -0.854 | 0.034 | -0.163 | 0.045 |
| 7 | 1.097 | -1.096 | 0.059 | -0.124 | -0.064 | 1.199 | -1.002 | 0.035 | -0.135 | 0.097 |
| 8 | 1.253 | -1.244 | 0.059 | -0.089 | -0.021 | 1.371 | -1.137 | 0.035 | -0.097 | 0.172 |
| 9 | 1.411 | -1.365 | 0.052 | -0.045 | 0.053 | 1.542 | -1.247 | 0.031 | -0.049 | 0.277 |
| 10 | 1.568 | -1.437 | 0.039 | -0.002 | 0.168 | 1.713 | -1.313 | 0.023 | -0.002 | 0.421 |
| 11 | 1.725 | -1.464 | 0.020 | 0.040 | 0.312 | 1.885 | -1.338 | 0.012 | 0.043 | 0.602 |
| 10 | 1.882 | -1.437 | -0.001 | 0.076 | 0.520 | 2.055 | -1.313 | -0.001 | 0.080 | 0.821 |
| 9 | 2.038 | -1.365 | -0.023 | 0.101 | 0.751 | 2.227 | -1.247 | -0.014 | 0.106 | 1.072 |
| 8 | 2.195 | -1.244 | -0.046 | 0.115 | 1.020 | 0432 | -1.137 | -0.027 | 0.121 | -0.611 |
| 7 | 0.564 | -1.096 | -0.064 | 0.115 | -0.481 | 0.336 | -1.002 | -0.038 | 0.121 | -0.583 |
| 6 | 0.484 | -0.934 | -0.077 | 0.112 | -0.415 | 0.288 | -0.854 | -0.046 | 0.118 | -0.494 |
| 5 | 0.403 | -0.760 | -0.084 | 0.100 | -0.341 | 0.240 | -0.694 | -0.050 | 0.104 | -0.400 |
| 4 | 0.323 | -0.587 | 0.085 | 0.083 | -0.266 | 0.192 | -0.536 | -0.050 | 0.087 | -0.307 |
| 3 | 0.242 | -0.411 | -0.080 | 0.060 | -0.189 | 0.144 | -0.375 | 0.047 | 0.063 | -0.215 |
| 2 | 0.161 | -0.244 | -0.067 | 0.040 | -0.110 | 0.096 | 0.223 | 0.040 | 0.040 | -0.127 |
| 1 | 0.081 | -0.088 | -0.047 | 0.015 | -0.039 | 0.048 | 0.081 | 0.028 | 0.015 | -0.046 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | -0.081 | 0 | 0.044 | -0.021 | -0.058 | -0.048 | 0 | 0.026 | -0.021 | -0.043 |
| -2 | -0.161 | 0 | 0.112 | -0.028 | -0.077 | -0.096 | 0 | 0.067 | -0.028 | -0.057 |
| -3 | -0.242 | 0 | 0.189 | -0.031 | -0.084 | -0.144 | 0 | 0.133 | -0.031 | -0.062 |
| -4 | -0.323 | 0 | 0.274 | -0.031 | -0.080 | -0.192 | 0 | 0.163 | -0.031 | -0.060 |
| -5 | -0.403 | 0 | 0.365 | -0.028 | -0.066 | -0.240 | 0 | 0.217 | -0.028 | -0.051 |
| -6 | -0.484 | 0 | 0.462 | -0.012 | -0.034 | -0.288 | 0 | 0.275 | -0.012 | -0.025 |
| -7 | -0.564 | 0 | 0.564 | 0 | 0 | -0.336 | 0 | 0.336 | 0 | 0 |
| | | | | | -3.256 | | | | | -3.671 |
| | | | | | 2.833 | | | | | 3.520 |

JIUN MASUDA
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 102

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

22

| Member D9-D10 | | | | | | Member D10-D11 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Load on | Go | Hgh | Dgd | Ege | sum. | Go | Hgh | Dgd | Ege | sum. |
| -7 | -1.156 | 0.000 | 0.000 | 1.156 | 0.000 | -0932 | 0.000 | 0.000 | 0.932 | 0.000 |
| -6 | -0.990 | 0 | 0 | 0.948 | -0.042 | -0.799 | 0 | 0.005 | 0.768 | -0.026 |
| -5 | -0.826 | 0 | 0.001 | 0.748 | -0.077 | -0.666 | 0 | 0.012 | 0.603 | -0.051 |
| -4 | -0.660 | 0 | 0.001 | 0.557 | -0.102 | -0.532 | 0 | 0.014 | 0.452 | -0.066 |
| -3 | -0.495 | 0 | 0.001 | 0.390 | -0.104 | -0.399 | 0 | 0.014 | 0.312 | -0.073 |
| -2 | -0.330 | 0 | 0.001 | 0.229 | -0.100 | -0.266 | 0 | 0.012 | 0.185 | -0.069 |
| -1 | -0.165 | 0 | 0.001 | 0.090 | -0.074 | -0.133 | 0 | 0.009 | 0.073 | -0.051 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0.165 | -0.059 | -0.001 | -0.097 | 0.008 | 0.133 | -0.022 | -0.007 | -0.078 | 0.026 |
| 2 | 0.330 | -0.162 | -0.002 | -0.118 | 0.048 | 0.266 | -0.061 | -0.018 | -0.111 | 0.076 |
| 3 | 0.495 | -0.272 | -0.003 | -0.163 | 0.057 | 0.399 | -0.103 | -0.028 | -0.131 | 0.137 |
| 4 | 0.660 | -0.390 | -0.003 | -0.173 | 0.094 | 0.532 | -0.147 | -0.038 | -0.140 | 0.207 |
| 5 | 0.826 | -0.504 | -0.003 | -0.172 | 0.147 | 0.666 | -0.190 | -0.045 | -0.139 | 0.292 |
| 6 | 0.990 | -0.606 | -0.004 | -0.157 | 0.223 | 0.799 | -0.233 | -0.051 | -0.127 | 0.388 |
| 7 | 1.156 | -0.727 | -0.004 | -0.131 | 0.294 | 0.932 | -0.274 | -0.053 | -0.105 | 0.500 |
| 8 | 1.321 | -0.825 | -0.003 | -0.094 | 0.399 | 1.064 | -0.311 | -0.053 | -0.075 | 0.625 |
| 9 | 1.486 | -0.906 | -0.002 | -0.047 | 0.531 | 1.197 | -0.341 | -0.046 | -0.038 | 0.772 |
| 10 | 1.650 | -0.953 | -0.001 | -0.002 | 0.694 | 1.330 | -0.359 | -0.035 | 0.002 | 0.938 |
| 11 | 1.816 | -0.971 | 0 | 0.042 | 0.887 | 1464 | -0366 | -0.018 | 0.033 | 1.113 |
| 10 | 1.982 | -0.953 | 0.001 | 0.082 | 1.112 | -0.715 | -0.359 | 0.001 | 0.064 | -1.009 |
| 9 | -0.043 | -0.906 | 0.003 | 0.110 | -0.836 | -0.644 | -0.341 | 0.021 | 0.086 | -0.878 |
| 8 | -0.039 | -0.825 | 0.004 | 0.125 | -0.735 | -0.572 | -0.311 | 0.041 | 0.098 | -0.734 |
| 7 | -0.034 | -0.727 | 0.005 | 0.125 | -0.631 | -0.500 | -0.274 | 0.056 | 0.098 | -0.620 |
| 6 | -0.029 | -0.606 | 0.005 | 0.121 | -0.509 | -0.429 | -0.233 | 0.068 | 0.095 | -0.499 |
| 5 | -0.024 | -0.504 | 0.005 | 0.107 | -0.416 | -0.358 | -0.190 | 0.075 | 0.084 | -0.389 |
| 4 | -0.019 | -0.390 | 0.005 | 0.089 | -0.315 | -0.286 | -0.147 | 0.075 | 0.070 | -0.288 |
| 3 | -0.015 | -0.272 | 0.004 | 0.066 | -0.217 | -0.215 | -0.103 | 0.071 | 0.051 | -0.196 |
| 2 | -0.010 | -0.162 | 0.004 | 0.042 | -0.126 | -0.143 | -0.061 | 0.059 | 0.032 | -0.113 |
| 1 | -0.005 | -0.005 | 0.003 | 0.015 | -0.046 | -0.072 | -0.022 | 0.042 | 0.012 | -0.040 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | 0.005 | 0 | -0.003 | -0.021 | -0.019 | 0.072 | 0 | -0.039 | -0.018 | 0.015 |
| -2 | 0.010 | 0 | -0.008 | -0.029 | -0.027 | 0.143 | 0 | -0.099 | -0.022 | 0.022 |
| -3 | 0.015 | 0 | -0.011 | -0.032 | -0.028 | 0.215 | 0 | -0.168 | -0.025 | 0.022 |
| -4 | 0.019 | 0 | -0.016 | -0.032 | -0.029 | 0.286 | 0 | -0.243 | -0.025 | 0.018 |
| -5 | 0.024 | 0 | -0.022 | -0.029 | -0.027 | 0.358 | 0 | -0.324 | -0.022 | 0.012 |
| -6 | 0.029 | 0 | -0.028 | -0.012 | -0.011 | 0.429 | 0 | -0.410 | 0.009 | 0.010 |
| -7 | 0.034 | 0 | -0.034 | 0 | 0 | 0.500 | 0 | -0.500 | 0 | 0 |
| | | | | | -4.471 | | | | | -5.102 |
| | | | | | +4.494 | | | | | 5.074 |

**JIUN MASUDA**
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa - Bashi for Saitama-ken

23

| | Member S7 | | | | | Member S6 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Load on. | So | Hsh | Dsd | Ese | Sum. | So | Hsh | Dsd | Ese | Sum. |
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6 | | | -0.010 | | -0.010 | | | -0.010 | | -0.010 |
| -5 | | | -0.024 | | -0.024 | | | -0.023 | | -0.023 |
| -4 | | | -0.027 | | -0.027 | | | -0.026 | | -0.026 |
| -3 | | | -0.027 | | -0.027 | | | -0.026 | | -0.026 |
| -2 | | | -0.024 | | -0.024 | | | -0.023 | | -0.023 |
| -1 | | | -0.018 | | -0.018 | | | -0.017 | | -0.017 |
| 0 | | | 0 | | 0 | | | 0 | | 0 |
| 1 | | | 0.013 | | 0.013 | | | 0.012 | | + 0.012 |
| 2 | | | 0.035 | | 0.035 | | | 0.033 | | 0.033 |
| 3 | | | 0.055 | | 0.055 | | | 0.053 | | 0.053 |
| 4 | | | 0.075 | | 0.075 | | | 0.072 | | 0.072 |
| 5 | | | 0.090 | | 0.090 | | | 0.086 | | 0.086 |
| 6 | | | 0.102 | | 0.102 | | | 0.097 | | 0.097 |
| 7 | | | 0.105 | | 0.105 | | | 0.100 | | 0.100 |
| 8 | | | 0.105 | | 0.105 | | | 0.100 | | 0.100 |
| 9 | | | 0.092 | | 0.092 | | | 0.088 | | 0.088 |
| 10 | | | 0.069 | | 0.069 | | | 0.066 | | 0.066 |
| 11 | | | 0.036 | | 0.036 | | | 0.034 | | 0.034 |
| 10 | | | -0.002 | | -0.002 | | | -0.002 | | -0.002 |
| 9 | | | -0.041 | | -0.041 | | | -0.039 | | -0.039 |
| 8 | | | -0.081 | | -0.081 | | | -0.077 | | -0.077 |
| 7 | | | -0.113 | | -0.113 | | | -0.108 | | -0.108 |
| 6 | | | -0.136 | | -0.136 | | | -0.130 | | -0.130 |
| 5 | | | -0.149 | | -0.149 | | | -0.142 | | -0.142 |
| 4 | | | -0.150 | | -0.150 | | | -0.143 | | -0.143 |
| 3 | | | -0.141 | | -0.141 | | | -0.135 | | -0.135 |
| 2 | | | -0.119 | | -0.119 | | | -0.114 | | -0.114 |
| 1 | | | -0.084 | | -0.084 | | | -0.080 | | -0.080 |
| 0 | | | 0 | | 0 | | | 0 | | 0 |
| -1 | | | 0.078 | | 0.078 | | | 0.074 | | 0.074 |
| -2 | | | 0.198 | | 0.198 | | | 0.189 | | 0.189 |
| -3 | | | 0.335 | | 0.335 | | | 0.320 | | 0320 |
| -4 | | | 0.485 | | 0.485 | | | 0.463 | | 0.463 |
| -5 | | | 0.647 | | 0.647 | 0.000 | | 0.618 | | 0.618 |
| -6 | 0.000 | | 0.820 | 0 | 0.820 | -1.000 | | 0.783 | | -0.217 |
| -7 | 1.000 | 0.000 | 1.000 | 0.000 | 0.000 | -0.955 | 0.000 | 0.955 | 0.000 | 0.000 |
| | | | | | -1.146 | | | | | -1.312 |
| | | | | | 3.340 | | | | | 2.405 |

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**JIUN MASUDA**
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

24

| Member 55 | | | | | | Member 5454 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Load on | Yo | Hyh | Dyd | Eye | Sum | Yo | Hyh | Dyd | Eye | Sum |
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6 | | | -0.009 | | -0.009 | | | -0.008 | | -0.008 |
| -5 | | | -0.021 | | -0.021 | | | -0.018 | | -0.018 |
| -4 | | | -0.023 | | -0.023 | | | -0.021 | | -0.021 |
| -3 | | | -0.023 | | -0.023 | | | -0.021 | | -0.021 |
| -2 | | | -0.021 | | -0.021 | | | -0.018 | | -0.018 |
| -1 | | | -0.016 | | -0.016 | | | -0.014 | | -0.014 |
| 0 | | | 0 | | 0 | | | 0 | | 0 |
| 1 | | | 0.011 | | 0.011 | | | 0.010 | | 0.010 |
| 2 | | | 0.030 | | 0.030 | | | 0.027 | | 0.027 |
| 3 | | | 0.048 | | 0.048 | | | 0.042 | | 0.042 |
| 4 | | | 0.065 | | 0.065 | | | 0.057 | | 0.057 |
| 5 | | | 0.078 | | 0.078 | | | 0.069 | | 0.069 |
| 6 | | | 0.089 | | 0.089 | | | 0.078 | | 0.078 |
| 7 | | | 0.091 | | 0.091 | | | 0.080 | | 0.080 |
| 8 | | | 0.091 | | 0.091 | | | 0.080 | | 0.080 |
| 9 | | | 0.080 | | 0.080 | | | 0.070 | | 0.070 |
| 10 | | | 0.060 | | 0.060 | | | 0.053 | | 0.053 |
| 11 | | | 0.031 | | 0.031 | | | 0.027 | | 0.027 |
| 10 | | | -0.002 | | -0.002 | | | -0.002 | | -0.002 |
| 9 | | | -0.036 | | -0.036 | | | -0.031 | | -0.031 |
| 8 | | | -0.070 | | -0.070 | | | -0.062 | | -0.062 |
| 7 | | | -0.098 | | -0.098 | | | -0.086 | | -0.086 |
| 6 | | | -0.118 | | -0.118 | | | -0.103 | | -0.103 |
| 5 | | | -0.129 | | -0.129 | | | -0.114 | | -0.114 |
| 4 | | | -0.130 | | -0.130 | | | -0.114 | | -0.114 |
| 3 | | | -0.122 | | -0.122 | | | -0.108 | | -0.108 |
| 2 | | | -0.103 | | -0.103 | | | -0.091 | | -0.091 |
| 1 | | | -0.073 | | -0.073 | | | -0.064 | | -0.064 |
| 0 | | | 0 | | 0 | | | 0 | | 0 |
| -1 | | | 0.068 | | 0.068 | | | 0.060 | | 0.060 |
| -2 | | | 0.172 | | 0.172 | | | 0.151 | | 0.151 |
| -3 | | | 0.291 | | 0.291 | 0.000 | | 0.256 | | 0.256 |
| -4 | 0.000 | | 0.421 | | 0.421 | -1.000 | | 0.370 | | -0.630 |
| -5 | -1.000 | | 0.562 | | -0.438 | -0.921 | | 0.494 | | -0.427 |
| -6 | -0.934 | | 0.711 | | -0.223 | -0.842 | | 0.625 | | -0.217 |
| -7 | -0.868 | 0.000 | 0.868 | 0.000 | 0.000 | -0.763 | 0.000 | 0.763 | 0.000 | 0.000 |
| | | | | | -1.655 | | | | | -2.149 |
| | | | | | 1.626 | | | | | 1.060 |

JIUN MASUDA
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SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

| | Member 53 | | | | | Member 52 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Load on | Go | Hgh | Dgd | Ege | Sum. | Go | Hgh | Dgd | Ege | Sum. |
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6 | | | -0.007 | | -0.007 | | | -0.005 | | -0.005 |
| -5 | | | -0.016 | | -0.016 | | | -0.013 | | -0.013 |
| -4 | | | -0.018 | | -0.018 | | | -0.015 | | -0.015 |
| -3 | | | -0.018 | | -0.018 | | | -0.015 | | -0.015 |
| -2 | | | -0.016 | | -0.016 | | | -0.013 | | -0.013 |
| -1 | | | -0.012 | | -0.012 | | | -0.010 | | -0.010 |
| 0 | | | 0 | | 0 | | | 0 | | 0 |
| 1 | | | 0.008 | | 0.008 | | | 0.007 | | 0.007 |
| 2 | | | 0.023 | | 0.023 | | | 0.019 | | 0.019 |
| 3 | | | 0.036 | | 0.036 | | | 0.030 | | 0.030 |
| 4 | | | 0.049 | | 0.049 | | | 0.041 | | 0.041 |
| 5 | | | 0.059 | | 0.059 | | | 0.049 | | 0.049 |
| 6 | | | 0.066 | | 0.066 | | | 0.055 | | 0.055 |
| 7 | | | 0.068 | | 0.068 | | | 0.057 | | 0.057 |
| 8 | | | 0.068 | | 0.068 | | | 0.057 | | 0.057 |
| 9 | | | 0.060 | | 0.060 | | | 0.050 | | 0.050 |
| 10 | | | 0.045 | | 0.045 | | | 0.037 | | 0.037 |
| 11 | | | 0.023 | | 0.023 | | | 0.019 | | 0.019 |
| 10 | | | -0.001 | | -0.001 | | | -0.001 | | -0.001 |
| 9 | | | -0.026 | | -0.026 | | | -0.022 | | -0.022 |
| 8 | | | -0.053 | | -0.053 | | | -0.044 | | -0.044 |
| 7 | | | -0.074 | | -0.074 | | | -0.061 | | -0.061 |
| 6 | | | -0.089 | | -0.089 | | | -0.073 | | -0.073 |
| 5 | | | -0.097 | | -0.097 | | | -0.080 | | -0.080 |
| 4 | | | -0.098 | | -0.098 | | | -0.081 | | -0.081 |
| 3 | | | -0.092 | | -0.092 | | | -0.076 | | -0.076 |
| 2 | | | -0.078 | | -0.078 | | | -0.064 | | -0.064 |
| 1 | | | -0.055 | | -0.055 | | | -0.045 | | -0.045 |
| 0 | | | 0 | | 0 | | | 0 | | 0 |
| -1 | | | 0.051 | | 0.051 | | | 0.042 | | 0.042 |
| -2 | 0.000 | | 0.129 | | 0.129 | -1.000 | | 0.107 | | -0.893 |
| -3 | -1.000 | | 0.218 | | -0.782 | -0.908 | | 0.181 | | -0.727 |
| -4 | -0.913 | | 0.316 | | -0.597 | -0.816 | | 0.262 | | -0.554 |
| -5 | -0.826 | | 0.421 | | -0.405 | -0.724 | | 0.349 | | -0.375 |
| -6 | -0.738 | | 0.534 | | -0.204 | -0.632 | | 0.440 | | -0.192 |
| -7 | -0.651 | 0.000 | 0.651 | 0.000 | 0.000 | -0.540 | 0.000 | 0.540 | 0.000 | 0.000 |
| | | | | | -2.738 | | | | | -3.359 |
| | | | | | 0.685 | | | | | 0.463 |

JIUN MASUDA
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Bashi, for Saitama-Ken

6

Member S-1

| Load on. | 9o | Hgh | Dgd | Egs | Sum. |
|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| -6 | | | -0.004 | | -0.004 |
| -5 | | | -0.010 | | -0.010 |
| -4 | | | -0.012 | | -0.012 |
| -3 | | | -0.012 | | -0.012 |
| -2 | | | -0.010 | | -0.010 |
| -1 | | | -0.008 | | -0.008 |
| 0 | | | 0 | | 0 |
| 1 | | | 0.006 | | 0.006 |
| 2 | | | 0.015 | | 0.015 |
| 3 | | | 0.024 | | 0.024 |
| 4 | | | 0.033 | | 0.033 |
| 5 | | | 0.039 | | 0.039 |
| 6 | | | 0.044 | | 0.044 |
| 7 | | | 0.046 | | 0.046 |
| 8 | | | 0.046 | | 0.046 |
| 9 | | | 0.040 | | 0.040 |
| 10 | | | 0.030 | | 0.030 |
| 11 | | | 0.016 | | 0.016 |
| 10 | | | -0.001 | | -0.001 |
| 9 | | | -0.018 | | -0.018 |
| 8 | | | -0.035 | | -0.035 |
| 7 | | | -0.049 | | -0.049 |
| 6 | | | -0.059 | | -0.059 |
| 5 | | | -0.065 | | -0.065 |
| 4 | | | -0.065 | | -0.065 |
| 3 | | | -0.062 | | -0.062 |
| 2 | | | -0.052 | | -0.052 |
| 1 | | | -0.037 | | -0.037 |
| 0 | | | 0 | | 0 |
| -1 | -1.000 | | 0.034 | | -0.966 |
| -2 | -0.907 | | 0.086 | | -0.821 |
| -3 | -0.813 | | 0.146 | | -0.667 |
| -4 | -0.720 | | 0.211 | | -0.509 |
| -5 | -0.622 | | 0.282 | | -0.340 |
| -6 | -0.529 | | 0.358 | | -0.171 |
| -7 | -0.436 | 0.000 | 0.436 | 0.000 | 0.000 |
| | | | | | -3.973 |
| | | | | | 0.339 |

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**JIUN MASUDA**
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
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CALCULATIONS FOR

Arakawa- Bashi for Saitama-Ken

27

| Load on. | Member | 50 | | | | Member | 51. | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mo | Hoh | Dyd | Eye | Sum. | Mo | Hoh | Dyd | Eye | Sum. |
| -7 | 0318 | 0.000 | 0.000 | -0.318 | 0.000 | 0347 | 0.000 | 0.000 | -0347 | 0.000 |
| -6 | 0.273 | 0 | 0.063 | -0261 | 0075 | 0.298 | 0 | 0.003 | -0.285 | 0.016 |
| -5 | 0.227 | 0 | 0.152 | -0.206 | 0.173 | 0.248 | 0 | 0.007 | -0.225 | 0.030 |
| -4 | 0.182 | 0 | 0.171 | -0.154 | 0.199 | 0.199 | 0 | 0.008 | -0.168 | 0.039 |
| -3 | 0.136 | 0 | 0.171 | -0.107 | 0.200 | 0.149 | 0 | 0.008 | -0.116 | 0.041 |
| -2 | 0.091 | 0 | 0.152 | -0.063 | 0.180 | 0.099 | 0 | 0.007 | -0.069 | 0.037 |
| -1 | 0.045 | 0 | 0.114 | -0025 | 0.134 | 0.050 | 0 | 0.005 | -0.027 | 0.028 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | -0.045 | | -0.082 | 0.027 | -0.100 | -0.050 | 0.046 | -0.004 | 0.029 | 0.021 |
| 2 | -0.091 | | -0.222 | 0.038 | -0275 | -0.099 | 0.128 | -0.011 | 0.041 | 0.059 |
| 3 | -0.136 | | -0349 | 0045 | -0440 | -0.149 | 0.215 | -0.017 | 0.048 | 0.097 |
| 4 | -0.182 | | -0476 | 0.048 | -0610 | -0.199 | 0.307 | -0.023 | 0.052 | 0.137 |
| 5 | -0.227 | | -0571 | 0.047 | -0751 | -0.248 | 0398 | -0027 | 0.052 | 0.175 |
| 6 | -0273 | | -0647 | 0.043 | -0877 | -0.298 | 0.489 | -0.031 | 0.047 | 0.207 |
| 7 | -0.318 | | -0666 | 0.036 | -0948 | -0347 | 0.574 | -0.032 | 0.039 | 0.234 |
| 8 | -0364 | | -0666 | 0.026 | -1.004 | -0397 | 0.651 | -0.032 | 0.028 | 0.250 |
| 9 | -0409 | | -0583 | 0.013 | -0979 | -0.447 | 0.714 | -0.028 | 0.014 | 0.253 |
| 10 | -0454 | | -0438 | 0.001 | -0891 | -0.496 | 0.753 | -0.021 | 0.001 | 0.237 |
| 11 | -0500 | | -0228 | -0.011 | -0739 | -0.546 | 0.766 | -0.011 | -0.012 | 0.197 |
| 10 | -0.546 | | 0.013 | -0.022 | -0555 | -0.597 | 0.753 | 0.001 | -0.024 | 0.133 |
| 9 | -0.591 | | 0260 | -0.029 | -0360 | -0647 | 0.714 | 0.013 | -0.032 | 0.048 |
| 8 | -0.636 | | 0514 | -0.033 | -0.155 | -0.695 | 0.651 | 0.025 | -0.036 | -0.055 |
| 7 | -0.682 | | 0717 | -0.033 | 0.002 | -0745 | 0.574 | 0.034 | -0.036 | -0.173 |
| 6 | -0727 | | 0863 | -0.032 | 0.104 | -0.794 | 0489 | 0.041 | -0.035 | -0.299 |
| 5 | -0.773 | | 0945 | -0.029 | 0.143 | -0844 | 0.398 | 0.045 | -0.031 | -0.432 |
| 4 | -0.818 | | 0951 | -0.024 | 0.109 | -0893 | 0.307 | 0.046 | -0.026 | -0566 |
| 3 | -0.864 | | 0894 | -0.017 | 0.013 | -0943 | 0.215 | 0.043 | -0.019 | -0.704 |
| 2 | -0.909 | | 0755 | -0.011 | -0.165 | -0993 | 0.128 | 0.036 | -0.012 | -0.841 |
| 1 | -0955 | | 0533 | -0.004 | -0426 | -1.042 | 0.046 | 0.026 | -0.005 | -0.975 |
| 0 | -1.000 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | 0.048 | | -0495 | 0.006 | -0441 | 0.044 | 0 | -0.024 | 0.006 | 0.026 |
| -2 | 1.098 | | -1256 | 0.008 | -0.150 | 0.087 | 0 | -0.060 | 0.008 | 0.035 |
| -3 | 2.147 | | -2156 | 0.009 | 0.000 | 0.131 | 0 | -0.102 | 0.009 | 0.038 |
| -4 | 3.198 | | -3076 | 0009 | 0.131 | 0.174 | 0 | -0.147 | 0.009 | 0.036 |
| -5 | 4298 | | -4103 | 0.008 | 0.203 | 0.218 | 0 | -0.197 | 0.008 | 0.029 |
| -6 | 5298 | | -5200 | 0.003 | 0.101 | 0.262 | 0 | -0.250 | 0.003 | 0.015 |
| -7 | 6342 | 0.000 | -6342 | 0.000 | 0.000 | 0.305 | 0 | -0.305 | 0 | 0 |
| | | | | | 1.767 | | | | | 2418 |
| | | | | | -9866 | | | | | -4.045 |

84

**JIUN MASUDA**
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 108

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken.

28

| Load on | Member 52 Go | Hoh | Dod | Ege | Sum. | Member 53 Go | Hoh | Dod | Ege | Sum. |
|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.377 | 0.000 | 0.000 | -0.377 | 0.000 | 0.401 | 0.000 | 0.000 | -0.401 | 0.000 |
| -6 | 0.323 | 0 | 0.003 | -0.309 | 0.017 | 0.344 | 0 | 0.002 | -0.328 | 0.018 |
| -5 | 0.269 | 0 | 0.006 | -0.244 | 0.031 | 0.287 | 0 | 0.005 | -0.259 | 0.033 |
| -4 | 0.215 | 0 | 0.007 | -0.182 | 0.040 | 0.229 | 0 | 0.006 | -0.194 | 0.041 |
| -3 | 0.161 | 0 | 0.007 | -0.126 | 0.042 | 0.172 | 0 | 0.006 | -0.134 | 0.044 |
| -2 | 0.108 | 0 | 0.006 | -0.075 | 0.039 | 0.115 | 0 | 0.005 | -0.079 | 0.041 |
| -1 | 0.054 | 0 | 0.005 | -0.029 | 0.030 | 0.057 | 0 | 0.004 | -0.031 | 0.031 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | -0.054 | 0.047 | -0.003 | 0.032 | 0.022 | -0.057 | 0.045 | -0.003 | 0.033 | 0.018 |
| 2 | -0.108 | 0.129 | -0.009 | 0.045 | 0.057 | -0.115 | 0.125 | -0.007 | 0.048 | 0.051 |
| 3 | -0.161 | 0.217 | -0.014 | 0.053 | 0.095 | -0.172 | 0.210 | -0.011 | 0.057 | 0.084 |
| 4 | -0.215 | 0.310 | -0.020 | 0.057 | 0.132 | -0.229 | 0.300 | -0.016 | 0.060 | 0.115 |
| 5 | -0.269 | 0.401 | -0.024 | 0.056 | 0.164 | -0.287 | 0.388 | -0.019 | 0.060 | 0.142 |
| 6 | -0.323 | 0.494 | -0.027 | 0.051 | 0.195 | -0.344 | 0.477 | -0.021 | 0.055 | 0.167 |
| 7 | -0.377 | 0.580 | -0.028 | 0.043 | 0.218 | -0.401 | 0.560 | -0.022 | 0.045 | 0.182 |
| 8 | -0.430 | 0.658 | -0.028 | 0.031 | 0.231 | -0.459 | 0.636 | -0.022 | 0.032 | 0.187 |
| 9 | -0.484 | 0.721 | -0.025 | 0.015 | 0.227 | -0.516 | 0.698 | -0.019 | 0.016 | 0.179 |
| 10 | -0.538 | 0.760 | -0.018 | 0.001 | 0.205 | -0.574 | 0.734 | -0.014 | 0.001 | 0.147 |
| 11 | -0.592 | 0.774 | -0.0100 | -0.014 | 0.158 | -0.621 | 0.748 | -0.008 | -0.014 | 0.105 |
| 10 | -0.646 | 0.760 | 0.001 | -0.026 | 0.089 | -0.689 | 0.734 | 0.000 | -0.028 | 0.017 |
| 9 | -0.700 | 0.721 | 0.011 | -0.035 | -0.003 | -0.746 | 0.698 | 0.009 | -0.037 | -0.076 |
| 8 | -0.753 | 0.658 | 0.022 | -0.040 | -0.113 | -0.804 | 0.636 | 0.017 | -0.042 | -0.193 |
| 7 | -0.807 | 0.580 | 0.030 | -0.040 | -0.237 | -0.861 | 0.560 | 0.023 | -0.042 | -0.320 |
| 6 | -0861 | 0.494 | 0.036 | -0.038 | -0.369 | -0.918 | 0.477 | 0.028 | -0.041 | -0.454 |
| 5 | -0.914 | 0.401 | 0.040 | -0.034 | -0.507 | -0.976 | 0.388 | 0.031 | -0.036 | -0.593 |
| 4 | -0.968 | 0.310 | 0.040 | -0.028 | -0.646 | -1.032 | 0.300 | 0.031 | -0.030 | -0.731 |
| 3 | -1.022 | 0.217 | 0.038 | -0.021 | -0.788 | -1.090 | 0.210 | 0.029 | -0.022 | -0.873 |
| 2 | -1.075 | 0.129 | 0.032 | -0.013 | -0.927 | -0.060 | 0.125 | 0.025 | -0.014 | 0.076 |
| 1 | -0.038 | 0.047 | 0.022 | -0.005 | 0.026 | -0.030 | 0.045 | 0.018 | -0.005 | 0.028 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | 0.038 | 0 | -0.021 | 0.007 | 0.024 | 0.030 | 0 | -0.016 | 0.007 | 0.021 |
| -2 | 0.076 | 0 | -0.053 | 0.009 | 0.032 | 0.060 | 0 | -0.041 | 0.010 | 0.029 |
| -3 | 0.114 | 0 | -0.089 | 0.010 | 0.035 | 0.090 | 0 | -0.070 | 0.011 | 0.031 |
| -4 | 0.153 | 0 | -0.129 | 0.010 | 0.034 | 0.119 | 0 | -0.101 | 0.011 | 0.029 |
| -5 | 0.191 | 0 | -0.173 | 0.009 | 0.027 | 0.149 | 0 | -0.135 | 0.010 | 0.024 |
| -6 | 0.229 | 0 | -0.219 | 0.004 | 0.014 | 0.179 | 0 | -0.171 | 0.004 | 0.012 |
| -7 | 0.267 | 0 | -0.267 | 0.000 | 0.000 | 0.209 | 0 | -0.209 | 0 | 0 |
| | | | | | 2.184 | | | | | 1.851 |
| | | | | | -3.590 | | | | | -3.240 |

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JIUN MASUDA
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO

CHECKED BY DATE PAGE NO 109

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

-9

| Member 54 | | | | | | Member 55 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Load on | Yo | Hyh | Dyd | Eye | Sum. | Yo | Hyh | Dyd | Eye | Sum. |
| -7 | 0.418 | 0.000 | 0.000 | -0.418 | 0.000 | 0.423 | 0.000 | 0.000 | 0.423 | 0.000 |
| -6 | 0.359 | 0 | 0.001 | 0.343 | 0.017 | 0.362 | 0 | 0 | 0.347 | 0.015 |
| -5 | 0.299 | 0 | 0.003 | 0.270 | 0.032 | 0.302 | 0 | 0.001 | 0.274 | 0.029 |
| -4 | 0.239 | 0 | 0.004 | 0.203 | 0.040 | 0.241 | 0 | 0.001 | 0.205 | 0.037 |
| -3 | 0.179 | 0 | 0.004 | 0.140 | 0.043 | 0.181 | 0 | 0.001 | 0.142 | 0.040 |
| -2 | 0.120 | 0 | 0.003 | 0.083 | 0.040 | 0.121 | 0 | 0.001 | 0.084 | 0.038 |
| -1 | 0.060 | 0 | 0.002 | 0.033 | 0.029 | 0.060 | 0 | 0.001 | 0.033 | 0.028 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | -0.060 | 0.042 | -0.002 | 0.035 | 0.015 | -0.060 | 0.037 | -0.001 | 0.036 | 0.012 |
| 2 | -0.120 | 0.117 | -0.005 | 0.050 | 0.042 | -0.121 | 0.104 | -0.001 | 0.050 | 0.032 |
| 3 | -0.179 | 0.196 | -0.007 | 0.059 | 0.069 | -0.181 | 0.174 | -0.002 | 0.060 | 0.051 |
| 4 | -0.239 | 0.281 | -0.010 | 0.063 | 0.095 | -0.241 | 0.249 | -0.003 | 0.063 | 0.068 |
| 5 | -0.299 | 0.363 | -0.012 | 0.062 | 0.114 | -0.302 | 0.322 | -0.003 | 0.063 | 0.080 |
| 6 | -0.359 | 0.446 | -0.014 | 0.057 | 0.130 | -0.362 | 0.396 | -0.004 | 0.058 | 0.088 |
| 7 | -0.418 | 0.524 | -0.014 | 0.047 | 0.139 | -0.423 | 0.465 | -0.004 | 0.048 | 0.086 |
| 8 | -0.478 | 0.594 | -0.014 | 0.034 | 0.136 | -0.483 | 0.528 | -0.004 | 0.034 | 0.075 |
| 9 | -0.538 | 0.652 | -0.012 | 0.017 | 0.119 | -0.543 | 0.579 | -0.004 | 0.017 | 0.049 |
| 10 | -0.598 | 0.686 | -0.009 | 0.001 | 0.080 | -0.604 | 0.610 | -0.003 | 0.001 | 0.004 |
| 11 | -0.658 | 0.700 | -0.005 | -0.015 | 0.022 | -0.664 | 0.621 | -0.001 | 0.015 | -0.059 |
| 10 | -0.718 | 0.686 | 0.000 | -0.029 | -0.061 | -0.725 | 0.610 | 0.000 | 0.029 | -0.144 |
| 9 | -0.778 | 0.652 | 0.005 | -0.038 | -0.159 | -0.785 | 0.579 | 0.002 | 0.039 | -0.243 |
| 8 | -0.837 | 0.594 | 0.011 | -0.044 | -0.298 | -0.845 | 0.528 | 0.003 | 0.044 | -0.358 |
| 7 | -0.897 | 0.524 | 0.015 | -0.044 | -0.402 | -0.906 | 0.465 | 0.004 | 0.044 | -0.481 |
| 6 | -0.957 | 0.446 | 0.018 | -0.043 | -0.536 | -0.966 | 0.396 | 0.005 | 0.043 | -0.608 |
| 5 | -1.017 | 0.363 | 0.020 | -0.038 | -0.672 | -1.027 | 0.322 | 0.006 | 0.038 | -0.737 |
| 4 | -1.077 | 0.281 | 0.020 | -0.031 | -0.807 | -0.021 | 0.249 | 0.006 | 0.032 | 0.202 |
| 3 | -0.057 | 0.196 | 0.019 | -0.023 | 0.153 | -0.016 | 0.174 | 0.005 | 0.023 | 0.140 |
| 2 | -0.038 | 0.117 | 0.016 | -0.015 | 0.080 | -0.011 | 0.104 | 0.004 | 0.015 | 0.082 |
| 1 | -0.019 | 0.042 | 0.011 | -0.005 | 0.029 | -0.005 | 0.037 | 0.003 | 0.005 | 0.030 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | 0.019 | 0 | -0.010 | 0.008 | 0.017 | 0.005 | 0 | -0.003 | 0.008 | 0.010 |
| -2 | 0.038 | 0 | -0.026 | 0.010 | 0.022 | 0.011 | 0 | -0.007 | 0.010 | 0.014 |
| -3 | 0.057 | 0 | -0.044 | 0.011 | 0.024 | 0.016 | 0 | -0.012 | 0.011 | 0.015 |
| -4 | 0.077 | 0 | -0.064 | 0.011 | 0.024 | 0.021 | 0 | -0.018 | 0.011 | 0.014 |
| -5 | 0.096 | 0 | -0.086 | 0.010 | 0.020 | 0.026 | 0 | -0.023 | 0.010 | 0.013 |
| -6 | 0.115 | 0 | -0.109 | 0.004 | 0.010 | 0.032 | 0 | -0.030 | 0.004 | 0.006 |
| -7 | 0.134 | 0 | -0.134 | 0 | 0 | 0.037 | 0 | -0.037 | 0 | 0 |
| | | | | | 1.541 | | | | | 1.258 |
| | | | | | -2.935 | | | | | -2.630 |

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**JIUN MASUDA**
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 110

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

30

| | Member 56 | | | | | Member 57 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Load on | Yo | Hyh | Dyd | Eye | Sum. | Yo | Hyh | Dyd | Eye | Sum. |
| -7 | 0.404 | 0.000 | 0.000 | -0.404 | 0.000 | 0.352 | 0.000 | 0.000 | -0.352 | 0.000 |
| -6 | 0.347 | 0 | -0.001 | -0.331 | 0.015 | 0.301 | 0 | -0.002 | -0.289 | 0.010 |
| -5 | 0.289 | 0 | -0.002 | -0.261 | 0.026 | 0.251 | 0 | -0.006 | -0.228 | 0.017 |
| -4 | 0.231 | 0 | -0.002 | -0.196 | 0.033 | 0.201 | 0 | -0.007 | -0.171 | 0.023 |
| -3 | 0.173 | 0 | -0.002 | -0.135 | 0.036 | 0.151 | 0 | -0.007 | -0.118 | 0.026 |
| -2 | 0.115 | 0 | -0.002 | -0.080 | 0.033 | 0.100 | 0 | -0.006 | -0.070 | 0.024 |
| -1 | 0.058 | 0 | -0.002 | -0.032 | 0.024 | 0.050 | 0 | -0.004 | -0.027 | 0.019 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | -0.058 | 0.029 | 0.001 | 0.034 | 0.006 | -0.050 | 0.019 | 0.003 | 0.029 | 0.001 |
| 2 | -0.115 | 0.083 | 0.003 | 0.048 | 0.019 | -0.100 | 0.054 | 0.009 | 0.042 | 0.005 |
| 3 | -0.173 | 0.134 | 0.005 | 0.057 | 0.023 | -0.151 | 0.090 | 0.014 | 0.050 | 0.003 |
| 4 | -0.231 | 0.191 | 0.007 | 0.061 | 0.028 | -0.201 | 0.129 | 0.019 | 0.053 | 0.000 |
| 5 | -0.289 | 0.247 | 0.008 | 0.060 | 0.026 | -0.251 | 0.167 | 0.022 | 0.052 | -0.010 |
| 6 | -0.347 | 0.304 | 0.009 | 0.055 | 0.021 | -0.301 | 0.205 | 0.025 | 0.048 | -0.023 |
| 7 | -0.404 | 0.357 | 0.009 | 0.046 | 0.008 | -0.352 | 0.240 | 0.026 | 0.040 | -0.048 |
| 8 | -0.462 | 0.405 | 0.009 | 0.033 | -0.015 | -0.402 | 0.273 | 0.026 | 0.029 | -0.074 |
| 9 | -0.520 | 0.445 | 0.008 | 0.017 | -0.050 | -0.452 | 0.299 | 0.023 | 0.014 | -0.116 |
| 10 | -0.578 | 0.468 | 0.006 | 0.001 | -0.103 | -0.502 | 0.315 | 0.017 | 0.001 | -0.169 |
| 11 | -0.635 | 0.477 | 0.003 | -0.015 | -0.170 | -0.552 | 0.321 | 0.009 | -0.013 | -0.235 |
| 10 | -0.693 | 0.468 | 0.000 | -0.028 | -0.253 | -0.602 | 0.315 | -0.001 | -0.024 | -0.312 |
| 9 | -0.751 | 0.445 | -0.004 | -0.037 | -0.347 | -0.653 | 0.299 | -0.010 | -0.032 | -0.396 |
| 8 | -0.808 | 0.405 | -0.007 | -0.042 | -0.452 | -0.703 | 0.273 | -0.020 | -0.037 | -0.487 |
| 7 | -0.866 | 0.357 | -0.010 | -0.042 | -0.561 | -0.753 | 0.240 | -0.028 | -0.037 | -0.578 |
| 6 | -0.924 | 0.304 | -0.012 | -0.041 | -0.673 | -0.212 | 0.205 | -0.034 | -0.036 | 0.347 |
| 5 | 0.064 | 0.247 | -0.013 | -0.036 | 0.262 | -0.177 | 0.167 | -0.037 | -0.032 | 0.275 |
| 4 | 0.051 | 0.191 | -0.013 | -0.031 | 0.198 | 0.141 | 0.129 | -0.037 | -0.026 | 0.207 |
| 3 | 0.038 | 0.134 | -0.013 | -0.022 | 0.137 | 0.106 | 0.090 | -0.035 | -0.019 | 0.142 |
| 2 | 0.025 | 0.083 | -0.011 | -0.014 | 0.083 | 0.071 | 0.054 | -0.030 | -0.012 | 0.083 |
| 1 | 0.013 | 0.029 | -0.007 | -0.005 | 0.030 | 0.035 | 0.019 | -0.021 | -0.005 | 0.028 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | -0.013 | 0 | 0.007 | 0.007 | 0.001 | -0.035 | 0 | 0.019 | 0.006 | -0.010 |
| -2 | -0.025 | 0 | 0.018 | 0.010 | 0.003 | -0.071 | 0 | 0.049 | 0.008 | -0.014 |
| -3 | -0.038 | 0 | 0.030 | 0.011 | 0.003 | -0.106 | 0 | 0.083 | 0.010 | -0.013 |
| -4 | -0.051 | 0 | 0.043 | 0.011 | 0.003 | -0.141 | 0 | 0.120 | 0.010 | -0.011 |
| -5 | -0.064 | 0 | 0.058 | 0.010 | 0.004 | -0.177 | 0 | 0.160 | 0.008 | -0.009 |
| -6 | -0.076 | 0 | 0.073 | 0.004 | 0.001 | -0.212 | 0 | 0.203 | 0.004 | -0.005 |
| -7 | -0.089 | 0 | 0.089 | 0 | 0 | -0.248 | 0 | 0.248 | 0 | 0 |
| | | | | | 1.004 | | | | | 1.210 |
| | | | | | -2.624 | | | | | -2.510 |

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**JIUN MASUDA**
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO
CHECKED BY DATE PAGE NO 111

CALCULATIONS FOR

Arakawa-Bashi for Saitama-ken

31

| Member 58 | | | | | | Member 59 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Load on. | Yo | Hyh | Dyd | Eye | Sum. | Yo | Hyh | Dyd | Eye | Sum. |
| -7 | 0.248 | 0.000 | 0.000 | -0.248 | 0.000 | 0.092 | 0.000 | -0.000 | -0.092 | 0.000 |
| -6 | 0.213 | 0 0 | -0.004 | -0.203 | 0.006 | 0.079 | 0 | -0.006 | 0.075 | -0.002 |
| -5 | 0.177 | 0 | -0.010 | -0.160 | 0.007 | 0.065 | 0 | -0.015 | 0.060 | -0.010 |
| -4 | 0.142 | 0 | -0.012 | -0.120 | 0.010 | 0.052 | 0 | -0.017 | 0.045 | -0.010 |
| -3 | 0.106 | 0 | -0.012 | -0.083 | 0.011 | 0.039 | 0 | -0.017 | 0.031 | -0.009 |
| -2 | 0.071 | 0 | -0.010 | -0.049 | 0.012 | 0.026 | 0 | -0.015 | 0.018 | -0.007 |
| -1 | 0.035 | 0 | -0.008 | -0.019 | 0.008 | 0.013 | 0 | -0.012 | -0.007 | -0.006 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | -0.035 | 0.005 | 0.006 | 0.021 | -0.003 | -0.013 | -0.014 | 0.008 | 0.008 | -0.011 |
| 2 | -0.071 | 0.014 | 0.015 | 0.030 | -0.012 | -0.026 | -0.039 | 0.022 | 0.011 | -0.032 |
| 3 | -0.106 | 0.023 | 0.024 | 0.035 | -0.024 | -0.039 | -0.065 | 0.035 | 0.013 | -0.056 |
| 4 | -0.142 | 0.033 | 0.033 | 0.037 | -0.039 | -0.052 | -0.094 | 0.048 | 0.014 | -0.084 |
| 5 | -0.177 | 0.044 | 0.039 | 0.037 | -0.057 | -0.065 | -0.121 | 0.058 | 0.014 | -0.114 |
| 6 | -0.213 | 0.053 | 0.044 | 0.034 | -0.082 | -0.079 | -0.149 | 0.066 | 0.013 | -0.149 |
| 7 | -0.248 | 0.062 | 0.046 | 0.028 | -0.112 | -0.092 | -0.175 | 0.068 | 0.010 | -0.189 |
| 8 | -0.284 | 0.071 | 0.046 | 0.020 | -0.147 | -0.105 | -0.199 | 0.068 | 0.007 | -0.226 |
| 9 | -0.319 | 0.078 | 0.040 | 0.010 | -0.190 | -0.118 | -0.218 | 0.059 | 0.004 | -0.273 |
| 10 | -0.354 | 0.082 | 0.030 | 0.001 | -0.241 | -0.131 | -0.230 | 0.045 | 0.000 | -0.316 |
| 11 | -0.380 | 0.083 | 0.016 | -0.009 | -0.298 | -0.144 | -0.234 | 0.023 | -0.003 | -0.358 |
| 10 | -0.425 | 0.082 | -0.001 | -0.017 | -0.361 | -0.157 | -0.230 | -0.001 | -0.006 | -0.394 |
| 9 | -0.461 | 0.078 | -0.018 | -0.023 | -0.424 | -0.170 | -0.218 | -0.026 | -0.008 | -0.422 |
| 8 | -0.496 | 0.071 | -0.035 | -0.026 | -0.486 | 0.738 | -0.199 | -0.052 | -0.010 | 0.477 |
| 7 | 0.436 | 0.062 | -0.049 | -0.026 | 0.423 | 0.654 | -0.175 | -0.073 | -0.010 | 0.396 |
| 6 | 0.374 | 0.053 | -0.059 | -0.025 | 0.343 | 0.553 | -0.149 | -0.088 | -0.009 | 0.307 |
| 5 | 0.311 | 0.044 | -0.065 | -0.022 | 0.268 | 0.461 | -0.121 | -0.096 | -0.008 | 0.236 |
| 4 | 0.249 | 0.033 | -0.065 | -0.019 | 0.198 | 0.369 | -0.094 | -0.097 | -0.007 | 0.171 |
| 3 | 0.187 | 0.023 | -0.061 | -0.014 | 0.135 | 0.277 | -0.065 | -0.091 | -0.005 | 0.116 |
| 2 | 0.125 | 0.014 | -0.052 | -0.009 | 0.078 | 0.184 | -0.039 | -0.077 | -0.003 | 0.065 |
| 1 | 0.062 | 0.005 | -0.037 | -0.003 | 0.027 | 0.094 | -0.014 | -0.054 | -0.001 | 0.025 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | -0.062 | 0 | 0.034 | 0.004 | -0.024 | -0.094 | 0 | 0.050 | 0.002 | -0.042 |
| -2 | -0.125 | 0 | 0.086 | 0.006 | -0.033 | -0.184 | 0 | 0.127 | 0.002 | -0.055 |
| -3 | -0.187 | 0 | 0.146 | 0.007 | -0.034 | -0.277 | 0 | 0.216 | 0.002 | -0.059 |
| -4 | -0.249 | 0 | 0.211 | 0.007 | -0.031 | -0.369 | 0 | 0.313 | 0.002 | -0.054 |
| -5 | -0.311 | 0 | 0.282 | 0.006 | -0.023 | -0.461 | 0 | 0.417 | 0.002 | -0.042 |
| -6 | -0.374 | 0 | 0.358 | 0.002 | -0.014 | -0.553 | 0 | 0.529 | 0.001 | -0.023 |
| -7 | -0.436 | 0 | 0.436 | 0 | 0 | -0.645 | 0 | 0.645 | 0.000 | 0.000 |
| | | | | | 1.526 | | | | | -2.943 |
| | | | | | -2.636 | | | | | 1.793 |

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JIUN MASUDA
CONSULTIEG ENGINEER
SEIYU BLDG, TOKIO

MADE BY M. @ DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 112

CALCULATIONS FOR

Arakawa-Bashi Yo Saitama-Ken

32

Member S10.

| Load on | $y_0$ | $Hy_n$ | $Dy_d$ | $Ey_e$ | Sum |
|---|---|---|---|---|---|
| -7 | -0.121 | 0.000 | 0.000 | 0.121 | 0.000 |
| -6 | -0.104 | 0 | -0.008 | 0.099 | -0.013 |
| -5 | -0.087 | 0 | -0.020 | 0.078 | -0.029 |
| -4 | -0.069 | 0 | 0.023 | 0.059 | -0.033 |
| -3 | -0.052 | 0 | 0.023 | 0.041 | -0.034 |
| -2 | -0.035 | 0 | 0.020 | 0.024 | -0.031 |
| -1 | -0.017 | 0 | 0.015 | 0.009 | -0.023 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0.017 | -0.035 | 0.011 | -0.010 | -0.017 |
| 2 | 0.035 | -0.097 | 0.030 | -0.014 | -0.046 |
| 3 | 0.052 | -0.164 | 0.047 | -0.017 | -0.082 |
| 4 | 0.069 | -0.234 | 0.063 | -0.018 | -0.120 |
| 5 | 0.087 | -0.303 | 0.076 | -0.018 | -0.158 |
| 6 | 0.104 | -0.372 | 0.086 | -0.016 | -0.198 |
| 7 | 0.121 | -0.437 | 0.089 | -0.014 | -0.241 |
| 8 | 0.139 | -0.496 | 0.089 | -0.010 | -0.278 |
| 9 | 0.156 | -0.544 | 0.078 | -0.005 | -0.315 |
| 10 | 0.173 | -0.573 | 0.058 | 0.000 | -0.342 |
| 11 | 0.191 | -0.583 | 0.030 | 0.004 | -0.358 |
| 10 | 0.208 | -0.573 | -0.002 | 0.008 | -0.359 |
| 9 | 1.208 | -0.544 | -0.035 | 0.011 | 0.640 |
| 8 | 0.966 | -0.496 | -0.068 | 0.013 | 0.415 |
| 7 | 0.846 | -0.437 | -0.096 | 0.013 | 0326 |
| 6 | 0.725 | -0.372 | -0.115 | 0.012 | 0.250 |
| 5 | 0.604 | -0.303 | -0.126 | 0.011 | 0.186 |
| 4 | 0.483 | -0.234 | -0.127 | 0.009 | 0.131 |
| 3 | 0.363 | -0.164 | -0.119 | 0.007 | 0.087 |
| 2 | 0.242 | -0.097 | -0.101 | 0.004 | 0.048 |
| 1 | 0.121 | -0.035 | -0.071 | 0.002 | 0.017 |
| 0 | 0 | 0 | 0 | 0 | 0 |
| -1 | -0.121 | 0 | 0.066 | -0.002 | -0.057 |
| -2 | -0.242 | 0 | 0.168 | -0.003 | -0.077 |
| -3 | -0.363 | 0 | 0.283 | -0.003 | -0.083 |
| -4 | -0.483 | 0 | 0.410 | -0.003 | -0.076 |
| -5 | -0.604 | 0 | 0.547 | -0.003 | -0.060 |
| -6 | -0.725 | 0 | 0.693 | -0.001 | -0.033 |
| -7 | -0.846 | 0 | 0.846 | 0 | 0 |

-3.063
2.100

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
CHECKED BY _____ DATE _____ PAGE NO 113

CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

☐ Stress of each member for upper chord.

| member | +A | -A | Sum | D.L.S | L.L.S | Total stress. | Adjust. stress | S.R. |
|---|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0,000 | 0 |
| -6 | 1,583 | -4.613 | -3,030 | -82,500 | -34.600 | -117,100 | -117,100 | 8.4 gr. □" |
| -5 | 2.771 | -6.870 | -4,099 | -104,500 | -51.500 | -156,000 | -156,000 | 11.2 |
| -4 | 3.650 | -7.455 | -3.805 | -97,600 | -55,900 | -153,500 | -153,500 | 11.0 |
| -3 | 4.296 | -6,891 | -2,595 | -66,200 | -51,700 | -117,900 | -117,900 | 8.4 |
| -2 | 4.764 | -5,576 | -0.812 | -18,000 | -41,800 | -59,800 | -59,800 | 4.3 |
| -1 | 5.337 | -3.967 | 1,370 | 42,900 | 40,000 | 82,900 | 82,900 | 4.9 net. |
| 1 | 5.807 | -2.276 | 3,531 | 94,200 | 43,600 | 137,800 | 137,800 | 8.1 |
| 2 | 5.310 | -2.120 | 3.190 | 77,200 | 39,800 | 117,000 | 117,000 | 7.0 |
| 3 | 6.077 | -3.181 | 2.896 | 62,100 | 45,600 | 107,700 | 107,700 | 6.3 |
| 4 | 7.697 | -5,111 | 2.586 | 58,900 | 57,700 | 116,600 | 116,600 | 6.9 |
| 5 | 9.255 | -7.033 | 2.222 | 52,000 | 69.400 | 121,400 | 121,400 | 7.2 |
| 6 | 10.579 | -8.756 | 1,823 | 48,900 | 79,400) -65,700 | 128,300 (-16,800) | 136,700 | 8.1 |
| 7 | 11.488 | -10.022 | 1,466 | 49,200 | 86,200) -75,000 | 135,400 (-25,800) | 148,300 | 8.7 |
| 8 | 11,802 | -10.713 | 1,089 | 51,000 | 88,500) -80,300 | 139,500 (-29,300) | 154,200 | 9.1 |
| 9 | 11,378 | -10.619 | 0.759 | 53,900 | 85,300) -79,600 | 139,200 (-25,700) | 152,000 | 9.0 |
| 10 | 10.296 | -9.757 | 0,539 | 57,400 | 77,200) -73,200 | 135,100 (-15,300) | 142,800 | 8.4 |
| 11. | 9,670 | -9.172 | 0.498 | 58,600 | 72,500) -68,800 | 131,100 (-10,200) | 136,200 | 8.0 |

☐ Stress of each member for lower chord.

| member | +A | -A | Sum. | D.L.S. | L.L.S. | Total stress. | S.R |
|---|---|---|---|---|---|---|---|
| -6 | 4,682 | -1,609 | 3,073 | 83,600 | 35,100 | 118,700 | 7.0 net □" |
| -5 | 6.998 | -2.845 | 4,153 | 105,900 | 52.500 | 158,400 | 9.3 |
| -4 | 7.707 | -3.793 | 3,914 | 100,100 | 57,800 | 157,900 | 9.3 |
| -3 | 7,270 | -4530 | 2,740 | 69.900 | 54,600 | 124,500 | 7.3 |
| -2 | 5,964 | -5,103 | 0,861 | 19,300 | 44,700 (-38,300) | 73,500 | 4.3 |
| -1 | 4,298 | -5,792 | -1,494 | -35,900 | -43,500 | -79,400 | 5.7 gr. |
| -0 | 4,016 | -8,255 | -4,239 | -111,500 | -61,900 | -173,400 | 12.4 |
| 0 | 0,007 | -17,170 | -17,163 | -449,200 | -128,800 | -578,000 | 41.3 |
| 1 | 0,222 | -16,525 | -16,303 | -404,300 | -123,900 | -528,200 | 37.7 |
| 2 | 0,914 | -15,957 | -15,043 | -371,400 | -119,700 | -491,100 | 35.1 |
| 3 | 2.013 | -16,035 | -14,012 | -341,200 | -120,200 | -461,400 | 33.0 |
| 4 | 3,317 | -16,484 | -13,167 | -323,400 | -123,700 | -447,100 | 32.0 |
| 5 | 4,607 | -17,065 | -12,458 | -307,900 | -128,000 | -435,900 | 31.2 |
| 6 | 5,749 | -17,214 | -11,465 | -290,800 | -129,100 | -419,900 | 30.0 |
| 7 | 6,391 | -17,097 | -10,706 | -280,000 | -128,200 | -408,200 | 29.2 |
| 8 | 6,419 | -16,492 | -10,073 | -274,100 | -123,700 | -397,800 | 28.4 |
| 9 | 5,663 | -15,206 | -9,543 | -273,200 | -114,000 | -387,200 | 27.7 |
| 10 | 4,768 | -13,856 | -9,088 | -269,500 | -103,900 | -373,400 | 26.7 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-ken

## Stress of each member for Diagonals.

| member | +A | -A | Sum | D.L.S | L.L.S. | T.S. | Adj. S. | S.R |
|---|---|---|---|---|---|---|---|---|
| -7 | 1,523 | -4,430 | -2.907 | -79,900 | -33,200 | -113,100 | -113,100 | 8.1 gr. |
| -6 | 1,440 | -2.359 | -0,915 | -25,200 | -17,700 | -42,900 | -42,900 | 3.1 |
| -5 | 1,591 | -1.119 | 0.372 | 10,200 | 11.900 (8,400) | 22.100 | 22,100 | 1,3 |
| -4 | 1,818 | -0.561 | 1,257 | 34,600 | 13,600 | 48,200 | 48,200 | 2.8 |
| -3 | 2.040 | -0.267 | 1,773 | 48,800 | 15,300 | 64,100 | 64,100 | 3,8 |
| -2 | 2.235 | -0.115 | 2,120 | 58,300 | 16,800 | 75,100 | 75,100 | 4,4 |
| -1 | 2,414 | -0.044 | 2.370 | 65,200 | 18,100 | 83,300 | 83,300 | 4,9 |
| 1 | 2.204 | -3.037 | -0.833 | -22,900 | -22,800 | -45,700 | -45,700 | 3.3 |
| 2 | 2,151 | -2.967 | -0,858 | -23,600 | -22,200 | -45,800 | -45,800 | 3,3 |
| 3 | 2.109 | -2.926 | -0,817 | -22,500 | -21,900 | -44,400 | -44,400 | 3,2 |
| 4 | 2,116 | -2.932 | -0,816 | -22,400 | -22,000 | -44,400 | -44,400 | 3,2 |
| 5 | 2,192 | -2.942 | -0.750 | -20,600 | -22,100 (16,400) | -42,700 | -42,700 | 3,1 |
| 6 | 2,282 | -3,022 | -0.740 | -20,400 | -22,700 (17,100) | -43,100 | -43,100 | 3,1 |
| 7 | 2,467 | -3,106 | -0,639 | -17,600 | -23,300 (18,500) | -40,900 | -40,900 | 2.9 |
| 8 | 2,833 | -3,256 | -0,423 | -11,600 | -24,400 (21,200) | -36,000 (9,600) | -40,800 | 2.9 |
| 9 | 3,520 | -3,671 | -0,151 | -4,200 | -27,500 (26,400) | -31,700 (22,200) | -42,800 | 3.1 net |
| 10 | 4,494 | -4,471 | 0,023 | 600 | 33,700 (-33,500) | +34,300 (-32,900) | 50,800 (-49,400) | 3.0 gr 3.6 |
| 11 | 5,074 | -5,102 | -0,028 | -800 | -38,300 (38,000) | -39,100 (37,200) | -57,700 (55,800) | 4.1 gr 3.3 net |

## Stress of each member for Verticals.

| member | +A | -A | Sum. | D.L.S | L.L.S | Total stress | S.R |
|---|---|---|---|---|---|---|---|
| -7 | 3,340 | -1,146 | 2,194 | 60,300 | 25,100 | 85,400 | 5,0 net |
| -6 | 2,405 | -1,312 | 1,093 | 30,000 | 18,000 | 48,000 | 2.8 |
| -5 | 1,626 | -1,655 | -0,029 | -800 | -12,400 (12,200) | -13,200 -18,900 | 1.4 gr. |
| -4 | 1,060 | -2,149 | -1,089 | -29,900 | -16,100 | 11,400 -46,000 | 3.3 |
| -3 | 0,685 | -2,738 | -2,053 | -56,500 | -20,600 | -77,100 | 5.5 |
| -2 | 0,463 | -3,359 | -2,896 | -79,600 | -25,200 | -104,800 | 7.5 |
| -1 | 0,339 | -3,973 | -3,634 | -99,900 | -29,800 | -129,700 | 9.3 |
| 0 | 1,767 | -9,866 | -8,099 | -222,700 | -74,000 | -296,700 | 21.2 |
| 1 | 2,418 | -4,045 | -1,627 | -44,700 | -30,400 | -75,100 | 5.4 |
| 2 | 2,184 | -3,590 | -1,406 | -38,700 | -26,900 | -65,600 | 4.7 |
| 3 | 1,851 | -3,240 | -1,389 | -38,200 | -24,300 | -62,500 | 4.5 |
| 4 | 1,541 | -2,935 | -1,394 | -38,300 | -22,000 | -60,300 | 4.3 |
| 5 | 1,258 | -2,630 | -1,372 | -37,700 | -19,700 | -57,400 | 4.1 |
| 6 | 1,004 | -2,624 | -1,620 | -44,600 | -19,700 | -64,300 | 4.6 |
| 7 | 1,210 | -2,510 | -1,300 | -35,800 | -18,800 | -54,600 | 3.9 |
| 8 | 1,526 | -2,636 | -1,110 | -30,500 | -19,800 | -50,300 | 3.6 |
| 9 | 1,793 | -2,943 | -1,150 | -31,600 | -22,100 | -53,700 | 3.8 |
| 10 | 2,100 | -3,063 | -0,963 | -26,500 | -23,000 | -49,500 | 3.5 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken.

☐ Find ΣJhℓ/A, ΣJdℓ/A and ΣJeℓ/A for upper chord.

| mark | member | Area | ΣJhℓ | ΣJdℓ | ΣJeℓ | ΣJhℓ/A | ΣJdℓ/A | ΣJeℓ/A |
|---|---|---|---|---|---|---|---|---|
| A | 1 | 21.18 | - 0.46 | 0.13 | 2.80 | - 0.02 | 0.01 | 0.13 |
| B | 2 | " | -2.11 | 0.64 | 6.39 | - 0.10 | 0.03 | 0.30 |
| C | 3 | " | - 5.51 | 1.76 | 11.13 | - 0.26 | 0.08 | 0.52 |
| D | 4 | " | - 11.49 | 3.87 | 17.41 | - 0.54 | 0.18 | 0.82 |
| E | 5 | " | - 21.30 | 7.59 | 25.81 | - 1.01 | 0.36 | 1.22 |
| F | 6 | " | - 36.45 | 13.82 | 36.85 | - 1.72 | 0.65 | 1.74 |
| G | 7 | " | - 58.84 | 23.77 | 50.94 | - 2.78 | 1.12 | 2.41 |
| H | 8 | " | - 89.71 | 38.51 | 67.38 | - 4.23 | 1.82 | 3.18 |
| I | 9 | " | - 124.92 | 58.24 | 84.13 | - 5.90 | 2.75 | 3.97 |
| J | 10 | " | - 159.61 | 80.61 | 96.73 | - 7.53 | 3.81 | 4.57 |
| K | 11 | " | - 183.03 | 100.84 | 100.84 | - 8.64 | 4.77 | 4.77 |
| L | 11 | " | - 183.03 | 100.84 | 100.84 | - 8.64 | 4.77 | 4.77 |
| M | 10 | " | - 191.53 | 116.07 | 96.73 | - 9.04 | 5.48 | 4.57 |
| N | 9 | " | - 180.45 | 121.52 | 84.13 | - 8.51 | 5.74 | 3.97 |
| O | 8 | " | - 156.99 | 117.91 | 67.39 | - 7.49 | 5.57 | 3.18 |
| P | 7 | " | - 126.09 | 109.15 | 50.94 | - 5.95 | 5.15 | 2.41 |
| Q | 6 | " | - 97.19 | 98.26 | 36.85 | - 4.59 | 4.64 | 1.74 |
| R | 5 | " | - 72.41 | 87.74 | 25.80 | - 3.42 | 4.14 | 1.22 |
| S | 4 | " | - 51.72 | 78.36 | 17.41 | - 2.44 | 3.70 | 0.82 |
| T | 3 | " | - 34.91 | 70.51 | 11.13 | - 1.65 | 3.33 | 0.52 |
| U | 2 | " | - 21.10 | 63.89 | 6.39 | - 1.00 | 3.02 | 0.30 |
| V | 1 | " | - 9.69 | 58.73 | 2.80 | - 0.46 | 2.77 | 0.13 |

☐ Find ΣJhℓ/A, ΣJdℓ/A and ΣJeℓ/A for lower chord.

| mark | member | Area | ΣJhℓ | ΣJdℓ | ΣJeℓ | ΣJhℓ/A | ΣJdℓ/A | ΣJeℓ/A |
|---|---|---|---|---|---|---|---|---|
| A | 0 | 43.58 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| B | 1 | " | - 1.52 | 0.17 | 3.57 | - 0.03 | 0.00 | 0.08 |
| C | 2 | " | - 4.44 | 0.78 | 7.83 | - 0.10 | 0.02 | 0.18 |
| D | 3 | " | - 9.26 | 2.06 | 13.07 | - 0.21 | 0.05 | 0.30 |
| E | 4 | " | - 16.68 | 4.35 | 19.59 | - 0.38 | 0.10 | 0.45 |
| F | 5 | " | - 27.89 | 8.20 | 27.89 | - 0.64 | 0.19 | 0.64 |
| G | 6 | " | - 43.98 | 14.40 | 38.40 | - 1.01 | 0.33 | 0.88 |
| H | 7 | 33.26 | - 66.58 | 23.97 | 51.35 | - 2.00 | 0.72 | 1.54 |
| I | 8 | " | - 96.66 | 38.05 | 66.58 | - 2.91 | 1.14 | 2.00 |
| J | 9 | " | - 132.55 | 56.95 | 82.27 | - 3.99 | 1.71 | 2.47 |
| K | 10 | " | - 168.68 | 79.12 | 94.95 | - 5.07 | 2.38 | 2.85 |
| L | 10 | " | - 202.42 | 113.94 | 94.95 | - 6.09 | 3.43 | 2.85 |
| M | 9 | " | - 191.48 | 118.84 | 82.27 | - 5.76 | 3.57 | 2.47 |
| N | 8 | " | - 169.15 | 116.51 | 66.58 | - 5.09 | 3.51 | 2.00 |
| O | 7 | " | - 142.67 | 110.03 | 51.36 | - 4.29 | 3.31 | 1.54 |
| P | 6 | 43.58 | - 117.29 | 102.41 | 38.41 | - 2.69 | 2.35 | 0.88 |
| Q | 5 | " | - 94.83 | 94.83 | 27.89 | - 2.18 | 2.18 | 0.64 |
| R | 4 | " | - 75.09 | 88.17 | 19.60 | - 1.72 | 2.02 | 0.45 |
| S | 3 | " | - 58.62 | 82.80 | 13.09 | - 1.34 | 1.90 | 0.30 |
| T | 2 | " | - 44.42 | 78.39 | 7.84 | - 1.02 | 1.80 | 0.18 |
| U | 1 | " | - 32.00 | 74.90 | 3.57 | - 0.73 | 1.72 | 0.08 |
| V | 0 | " | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

☐ Find ΣoJhℓ/A, ΣoJdℓ/A and ΣoJeℓ/A for Diagonals.

| mark | member | Area | ΣoJhℓ | ΣoJdℓ | ΣoJeℓ | ΣoJhℓ/A | ΣoJdℓ/A | ΣoJeℓ/A |
|---|---|---|---|---|---|---|---|---|
| A | 1 | 9.92 | -0.59 | 0.15 | 0.29 | -0.06 | 0.02 | 0.03 |
| B | 2 | " | -0.73 | 0.21 | 0.35 | -0.07 | 0.02 | 0.04 |
| C | 3 | " | -0.96 | 0.30 | 0.44 | -0.10 | 0.03 | 0.04 |
| D | 4 | " | -1.32 | 0.43 | 0.57 | -0.13 | 0.04 | 0.06 |
| E | 5 | " | -1.86 | 0.70 | 0.74 | -0.19 | 0.07 | 0.07 |
| F | 6 | " | -2.61 | 1.09 | 0.97 | -0.26 | 0.11 | 0.10 |
| G | 7 | " | -3.51 | 1.62 | 1.16 | -0.35 | 0.16 | 0.12 |
| H | 8 | " | -4.30 | 2.30 | 1.18 | -0.43 | 0.23 | 0.12 |
| I | 9 | " | -4.31 | 2.76 | 0.77 | -0.43 | 0.28 | 0.08 |
| J | 10 | " | -3.05 | 2.59 | -0.08 | -0.31 | 0.26 | -0.01 |
| K | 11 | " | -0.95 | 1.70 | -0.92 | -0.10 | 0.17 | -0.09 |
| L | 11 | " | 0.51 | 0.50 | -0.92 | 0.05 | 0.05 | -0.09 |
| M | 10 | " | 0.09 | 0.00 | -0.08 | 0.01 | 0.00 | -0.01 |
| N | 9 | " | -1.21 | 0.21 | 0.77 | -0.12 | 0.02 | 0.08 |
| O | 8 | " | -2.21 | 0.61 | 1.18 | -0.22 | 0.06 | 0.12 |
| P | 7 | " | -2.48 | 0.82 | 1.16 | -0.25 | 0.08 | 0.12 |
| Q | 6 | " | -2.34 | 0.87 | 1.15 | -0.24 | 0.09 | 0.10 |
| R | 5 | " | -1.97 | 0.79 | 0.97 | -0.20 | 0.08 | 0.07 |
| S | 4 | " | -1.66 | 0.71 | 0.57 | -0.17 | 0.07 | 0.06 |
| T | 3 | " | -1.41 | 0.64 | 0.44 | -0.14 | 0.06 | 0.04 |
| U | 2 | " | -1.24 | 0.58 | 0.35 | -0.13 | 0.06 | 0.04 |
| V | 1 | " | -12.34 | 6.05 | 3.14 | -1.24 | 0.61 | 0.32 |

☐ Find ΣoJhℓ/A, ΣoJdℓ/A, and ΣoJeℓ/A for Verticals.

| mark | member | Area | ΣoJhℓ | ΣoJdℓ | ΣoJeℓ | ΣoJhℓ/A | ΣoJdℓ/A | ΣoJeℓ/A |
|---|---|---|---|---|---|---|---|---|
| A | 0 | 27.38 | 0.00 | 0.37 | 7.40 | 0.00 | 0.01 | 0.27 |
| B | 1 | 11.39 | -1.19 | 0.38 | 0.34 | -0.11 | 0.03 | 0.03 |
| C | 2 | " | -1.12 | 0.39 | 0.28 | -0.10 | 0.03 | 0.02 |
| D | 3 | " | -0.99 | 0.38 | 0.20 | -0.09 | 0.03 | 0.02 |
| E | 4 | " | -0.82 | 0.35 | 0.10 | -0.07 | 0.03 | 0.01 |
| F | 5 | " | -0.62 | 0.30 | 0.03 | -0.06 | 0.03 | 0.00 |
| G | 6 | " | -0.42 | 0.24 | -0.05 | -0.04 | 0.02 | 0.00 |
| H | 7 | " | -0.19 | 0.15 | -0.11 | -0.02 | 0.01 | -0.01 |
| I | 8 | " | -0.03 | 0.07 | -0.12 | -0.00 | 0.01 | -0.01 |
| J | 9 | " | 0.03 | 0.01 | -0.06 | 0.00 | 0.00 | -0.01 |
| K | 10 | " | -0.09 | 0.01 | 0.09 | -0.01 | 0.00 | 0.01 |
| L | 10 | " | -0.61 | 0.63 | 0.09 | -0.05 | 0.06 | 0.01 |
| M | 9 | " | -0.21 | 0.40 | -0.06 | -0.02 | 0.04 | -0.01 |
| N | 8 | " | 0.05 | 0.20 | -0.12 | 0.00 | 0.02 | -0.01 |
| O | 7 | " | 0.14 | 0.08 | -0.11 | 0.01 | 0.01 | -0.01 |
| P | 6 | " | 0.09 | 0.01 | -0.05 | 0.01 | 0.00 | 0.00 |
| Q | 5 | " | -0.05 | 0.02 | 0.03 | 0.00 | 0.00 | 0.00 |
| R | 4 | " | -0.26 | 0.04 | 0.10 | -0.02 | 0.00 | 0.01 |
| S | 3 | " | -0.51 | 0.10 | 0.20 | -0.05 | 0.01 | 0.02 |
| T | 2 | " | -0.79 | 0.19 | 0.28 | -0.07 | 0.02 | 0.02 |
| U | 1 | " | -25.00 | 7.09 | 8.06 | -2.22 | 0.63 | 0.72 |
| V | 0 | 27.38 | 0.00 | 155.80 | 7.81 | 0.00 | 5.70 | 0.29 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

# Arakawa-Baoshi for Saitama-ken

□ $\Sigma h^2 l/A$, $\Sigma d^2 l/A$, $\Sigma e^2 l/A$, $\Sigma h\Sigma d l/A$, $\Sigma h\Sigma e l/A$ and $\Sigma d\Sigma e l/A$ for upper chord.

| member | $\Sigma h^2 l$ | $\Sigma d^2 l : \Sigma e^2 l$ | $\Sigma h\Sigma d l : \Sigma h\Sigma e l$ | $\Sigma d\Sigma e l$ | Area | $\Sigma h^2 l/A$ | $\Sigma d^2 l/A$ | $\Sigma h\Sigma d l/A$ | $\Sigma d\Sigma e l/A$ |
|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.00 | 0.00 | 0.00 | 0.00 | 21.18 | 0.00 | 0.00 | 0.00 | 0.00 |
| -6 | " | 26.53 | " | " | " | " | 1.25 | " | " |
| -5 | " | 83.97 | " | " | " | " | 3.96 | " | " |
| -4 | " | 150.64 | " | " | " | " | 7.11 | " | " |
| -3 | " | 216.19 | " | " | " | " | 10.20 | " | " |
| -2 | " | 276.37 | " | " | " | " | 13.03 | " | " |
| -1 | 0.00 | 331.68 | 0.00 | 0.00 | " | 0.00 | 15.65 | 0.00 | 0.00 |
| 1 | 11.19 | 411.03 | - 67.82 | 19.58 | " | 0.53 | 19.39 | - 3.20 | 0.92 |
| 2 | 48.80 | 447.23 | - 147.73 | 44.71 | " | 2.20 | 21.10 | - 6.97 | 2.11 |
| 3 | 121.00 | 493.55 | - 244.38 | 77.92 | " | 5.71 | 23.30 | - 11.53 | 3.68 |
| 4 | 238.99 | 548.58 | - 362.08 | 121.90 | " | 11.27 | 25.90 | - 17.07 | 5.76 |
| 5 | 418.29 | 614.15 | - 506.85 | 180.62 | " | 19.23 | 29.00 | - 23.92 | 8.52 |
| 6 | 673.05 | 687.84 | - 680.40 | 257.94 | " | 31.75 | 32.45 | - 32.10 | 12.17 |
| 7 | 1019.67 | 764.06 | - 882.66 | 356.60 | " | 48.10 | 36.05 | - 41.65 | 16.83 |
| 8 | 1463.06 | 825.27 | - 1098.83 | 471.67 | " | 69.10 | 38.93 | - 51.90 | 22.25 |
| 9 | 1875.75 | 850.61 | - 1263.15 | 588.88 | " | 88.50 | 40.15 | - 59.60 | 27.80 |
| 10 | 2212.23 | 812.54 | - 1340.07 | 677.10 | " | 104.40 | 38.35 | - 63.30 | 31.95 |
| 11 | 2325.51 | 705.93 | - 1281.27 | 705.93 | " | 109.70 | 33.32 | - 60.50 | 33.32 |
| 11 | 2325.51 | 705.93 | - 1281.27 | 705.93 | " | 109.70 | 33.32 | - 60.50 | 33.32 |
| 10 | 2212.23 | 564.24 | - 1117.24 | 677.10 | " | 104.40 | 26.62 | - 52.70 | 31.95 |
| 9 | 1875.75 | 407.68 | - 874.47 | 588.88 | " | 88.50 | 19.23 | - 41.30 | 27.80 |
| 8 | 1463.06 | 269.58 | - 628.02 | 471.67 | " | 69.10 | 12.73 | - 29.63 | 22.25 |
| 7 | 1019.67 | 166.43 | - 411.96 | 356.60 | " | 48.10 | 7.86 | - 19.43 | 16.83 |
| 6 | 673.05 | 96.73 | - 255.15 | 257.94 | " | 31.75 | 4.56 | - 12.04 | 12.17 |
| 5 | 418.29 | 53.12 | - 149.06 | 180.62 | " | 19.73 | 2.51 | - 7.04 | 8.52 |
| 4 | 238.99 | 27.09 | - 80.46 | 121.90 | " | 11.27 | 1.28 | - 3.80 | 5.76 |
| 3 | 121.00 | 12.30 | - 38.58 | 77.92 | " | 5.71 | 0.58 | - 1.82 | 3.68 |
| 2 | 48.80 | 4.47 | - 14.77 | 44.71 | " | 2.20 | 0.21 | - 0.70 | 2.11 |
| 1 | 11.19 | 0.93 | - 3.23 | 19.58 | " | 0.53 | 0.04 | - 0.15 | 0.92 |
| -1 | 0.00 | 0.00 | 0.00 | 0.00 | " | 0.00 | 0.00 | 0.00 | 0.00 |
| -2 | " | " | " | " | " | " | " | " | " |
| -3 | " | " | " | " | " | " | " | " | " |
| -4 | " | " | " | " | " | " | " | " | " |
| -5 | " | " | " | " | " | " | " | " | " |
| -6 | " | " | " | " | " | " | " | " | " |
| -7 | 0.00 | 0.00 | 0.00 | 0.00 | " | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | $\Sigma = 981.98$ | $\Sigma = 498.08$ | $\Sigma = -600.85$ | $\Sigma = 330.62$ |

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JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

Find $\Sigma h^2 l/A$, $\Sigma d^2 l/A$ $\Sigma e^2 l/A$, $\Sigma h \Sigma d l/A$, $\Sigma h \Sigma e l/A$, and $\Sigma d \Sigma e l/A$ for Lower chord.

| member | Area. | $\Sigma h^2 l$ | $\Sigma h^2 l/A$ | $\Sigma d^2 l$ / $\Sigma e^2 l$ | $\Sigma d^2 l/A$ / $\Sigma e^2 l/A$ | $\Sigma h \Sigma d l$ / $\Sigma h \Sigma e l$ | $\Sigma h \Sigma d l/A$ / $\Sigma h \Sigma e l/A$ | $\Sigma d \Sigma e l$ | $\Sigma d \Sigma e l/A$ |
|---|---|---|---|---|---|---|---|---|---|
| -7 | | | | | | | | | |
| -6 | 21.18 | 0.00 | 0.00 | 27.64 | 1.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| -5 | 〃 | 〃 | 〃 | 90.98 | 4.29 | 〃 | 〃 | 〃 | 〃 |
| -4 | 〃 | 〃 | 〃 | 169.16 | 7.99 | 〃 | 〃 | 〃 | 〃 |
| -3 | 〃 | 〃 | 〃 | 253.49 | 11.96 | 〃 | 〃 | 〃 | 〃 |
| -2 | 〃 | 〃 | 〃 | 338.73 | 15.97 | 〃 | 〃 | 〃 | 〃 |
| -1 | 〃 | 〃 | 〃 | 422.24 | 19.92 | 〃 | 〃 | 〃 | 〃 |
| -0 | 〃 | 0.00 | 0.00 | 506.73 | 23.90 | 0.00 | 0.00 | 〃 | 〃 |
| 0 | 43.58 | 42.08 | 0.96 | 506.73 | 11.63 | -146.03 | -3.35 | 0.00 | 0.00 |
| 1 | 〃 | 95.60 | 2.19 | 524.59 | 12.04 | -223.95 | -5.14 | 24.98 | 0.57 |
| 2 | 〃 | 176.21 | 4.04 | 548.65 | 12.59 | -310.93 | -7.14 | 54.90 | 1.26 |
| 3 | 〃 | 290.54 | 6.66 | 579.62 | 13.30 | -410.37 | -9.41 | 91.46 | 2.10 |
| 4 | 〃 | 447.57 | 10.27 | 617.10 | 14.17 | -525.54 | -12.06 | 137.14 | 3.15 |
| 5 | 〃 | 663.74 | 15.23 | 663.74 | 15.23 | -663.74 | -15.23 | 195.22 | 4.48 |
| 6 | 〃 | 940.26 | 21.58 | 716.90 | 16.45 | -821.02 | -18.83 | 268.85 | 6.17 |
| 7 | 33.26 | 1294.93 | 38.92 | 770.20 | 23.15 | -998.68 | -30.00 | 359.48 | 10.81 |
| 8 | 〃 | 1718.89 | 51.70 | 815.50 | 24.50 | -1183.96 | -35.60 | 466.01 | 14.02 |
| 9 | 〃 | 2159.36 | 64.90 | 831.83 | 25.00 | -1340.22 | -40.30 | 575.87 | 17.32 |
| 10 | 〃 | 2517.25 | 75.70 | 797.58 | 23.98 | -1416.94 | -42.60 | 664.67 | 19.98 |
| 10 | 〃 | 2517.25 | 75.70 | 553.90 | 16.65 | -1180.81 | -35.50 | 664.67 | 19.98 |
| 9 | 〃 | 2159.36 | 64.90 | 398.66 | 11.98 | -927.83 | -27.90 | 575.87 | 17.32 |
| 8 | 〃 | 1718.89 | 51.70 | 266.30 | 8.00 | -676.57 | -20.34 | 466.01 | 14.02 |
| 7 | 〃 | 1294.93 | 38.92 | 167.78 | 5.05 | -466.12 | -14.00 | 359.48 | 10.81 |
| 6 | 43.58 | 940.26 | 21.58 | 100.82 | 2.31 | -307.90 | -7.07 | 268.85 | 6.17 |
| 5 | 〃 | 663.74 | 15.23 | 57.42 | 1.32 | -195.22 | -4.48 | 195.22 | 4.48 |
| 4 | 〃 | 447.57 | 10.27 | 30.48 | 0.70 | -116.80 | -2.68 | 137.14 | 3.15 |
| 3 | 〃 | 290.54 | 6.66 | 14.43 | 0.33 | -64.76 | -1.48 | 91.46 | 2.10 |
| 2 | 〃 | 176.21 | 4.04 | 5.49 | 0.13 | -31.11 | -0.71 | 54.90 | 1.26 |
| 1 | 〃 | 95.60 | 2.19 | 1.19 | 0.03 | -10.66 | -0.24 | 24.98 | 0.57 |
| 0 | 〃 | 42.08 | 0.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| -0 | 21.18 | 0.00 | 0.00 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -1 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -2 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -3 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -4 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -5 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -6 | 〃 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | Σ = 584.30 | | Σ = 323.87 | | Σ = -334.06 | | Σ = 159.72 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa Bashi for Saitama-Ken

Find $\Sigma h^2 l/A$, $\Sigma d^2 l/A$ $\Sigma e^2 l/A$, $\Sigma h\Sigma d l/A$, $\Sigma h\Sigma e l/A$ and $\Sigma d\Sigma e l/A$ for diagonals

| member | Area. | $\Sigma h^2 l$ | $\Sigma h^2 l/A$ | $\Sigma d^2 l, \Sigma e^2 l$ | $\Sigma d^2 l/A, \Sigma e^2 l/A$ | $\Sigma h\Sigma d l, \Sigma h\Sigma e l$ | $\Sigma h\Sigma d l/A, \Sigma h\Sigma e l/A$ | $\Sigma d\Sigma e l$ | $\Sigma d\Sigma e l/A$ |
|---|---|---|---|---|---|---|---|---|---|
| -7 | 9.92 | 0.00 | 0.00 | 25.00 | 2.52 | 0.00 | 0.00 | 0.00 | 0.00 |
| -6 | " | " | " | 11.47 | 1.16 | " | " | " | " |
| -5 | " | " | " | 5.57 | 0.56 | " | " | " | " |
| -4 | " | " | " | 2.43 | 0.24 | " | " | " | " |
| -3 | " | " | " | 0.96 | 0.10 | " | " | " | " |
| -2 | " | " | " | 0.30 | 0.03 | " | " | " | " |
| -1 | " | 0.00 | 0.00 | 0.05 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1 | " | 16.15 | 1.63 | 3.88 | 0.39 | -7.92 | -0.80 | 2.01 | 0.21 |
| 2 | " | 18.27 | 1.84 | 4.05 | 0.41 | -8.60 | -0.87 | 2.42 | 0.24 |
| 3 | " | 21.74 | 2.19 | 4.46 | 0.45 | -9.85 | -0.99 | 3.05 | 0.31 |
| 4 | " | 27.03 | 2.73 | 5.00 | 0.50 | -11.62 | -1.17 | 3.96 | 0.40 |
| 5 | " | 34.50 | 3.48 | 5.51 | 0.56 | -13.78 | -1.39 | 5.20 | 0.53 |
| 6 | " | 43.80 | 4.42 | 6.09 | 0.61 | -16.33 | -1.65 | 6.80 | 0.69 |
| 7 | " | 52.50 | 5.29 | 5.74 | 0.58 | -17.37 | -1.75 | 8.03 | 0.82 |
| 8 | " | 56.30 | 5.68 | 5.25 | 0.53 | -15.46 | -1.56 | 8.26 | 0.84 |
| 9 | " | 47.15 | 4.75 | 1.51 | 0.15 | -8.45 | -0.85 | 5.40 | 0.55 |
| 10 | " | 25.15 | 2.54 | 0.16 | 0.02 | 0.63 | 0.06 | -5.33 | -0.55 |
| 11 | " | 3.66 | 0.37 | 3.46 | 0.35 | 3.56 | 0.36 | -6.37 | -0.65 |
| 11 | " | 3.66 | 0.37 | 12.06 | 1.21 | 6.64 | 0.67 | -6.37 | -0.65 |
| 10 | " | 25.15 | 2.54 | 18.12 | 1.82 | -21.35 | -2.15 | -5.33 | -0.55 |
| 9 | " | 47.15 | 4.75 | 19.28 | 1.93 | -30.16 | -3.03 | 5.40 | 0.55 |
| 8 | " | 56.30 | 5.68 | 16.05 | 1.61 | -30.50 | -3.07 | 8.26 | 0.84 |
| 7 | " | 52.50 | 5.29 | 11.23 | 1.12 | -24.27 | -2.45 | 8.03 | 0.82 |
| 6 | " | 43.80 | 4.42 | 7.61 | 0.77 | -18.26 | -1.84 | 6.80 | 0.69 |
| 5 | " | 34.50 | 3.48 | 4.91 | 0.49 | -13.01 | -1.31 | 5.20 | 0.53 |
| 4 | " | 27.03 | 2.73 | 3.14 | 0.31 | -9.21 | -0.93 | 3.96 | 0.40 |
| 3 | " | 21.74 | 2.19 | 2.09 | 0.21 | -6.74 | -0.68 | 3.05 | 0.31 |
| 2 | " | 18.27 | 1.84 | 1.45 | 0.15 | -5.14 | -0.51 | 2.42 | 0.24 |
| 1 | " | 16.15 | 1.63 | 1.05 | 0.11 | -4.11 | -0.41 | 2.01 | 0.21 |
| -1 | " | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| -2 | " | " | " | " | " | " | " | " | " |
| -3 | " | " | " | " | " | " | " | " | " |
| -4 | " | " | " | " | " | " | " | " | " |
| -5 | " | " | " | " | " | " | " | " | " |
| -6 | " | " | " | " | " | " | " | " | " |
| -7 | " | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | $\Sigma = 69.84$ | | $\Sigma = 18.90$ | | $\Sigma = -26.32$ | | $\Sigma = 6.78$ | |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

Find $\Sigma h^2 l/A$, $\Sigma d^2 l/A$, $\Sigma e^2 l/A$, $\Sigma h\Sigma d\, l/A$, $\Sigma h\Sigma e\, l/A$ and $\Sigma d\Sigma e\, l/A$ for Verticals

| member | Area | $\Sigma h^2 l$ | $\Sigma h^2 l/A$ | $\Sigma d^2 l$, $\Sigma e^2 l$ | $\Sigma d^2 l/A$ $\Sigma e^2 l/A$ | $\Sigma h\Sigma d\, l$ $\Sigma h\Sigma e\, l$ | $\Sigma h\Sigma d\, l/A$ $\Sigma h\Sigma e\, l/A$ | $\Sigma d\Sigma e\, l$ | $\Sigma d\Sigma e\, l/A$ |
|---|---|---|---|---|---|---|---|---|---|
| -7 | 11.39 | 0.00 | 0.00 | 8.61 | 0.76 | 0.00 | 0.00 | 0.00 | 0.00 |
| -6 | 〃 | 〃 | 〃 | 9.18 | 0.81 | 〃 | 〃 | 〃 | 〃 |
| -5 | 〃 | 〃 | 〃 | 8.94 | 0.78 | 〃 | 〃 | 〃 | 〃 |
| -4 | 〃 | 〃 | 〃 | 8.14 | 0.71 | 〃 | 〃 | 〃 | 〃 |
| -3 | 〃 | 〃 | 〃 | 7.09 | 0.62 | 〃 | 〃 | 〃 | 〃 |
| -2 | 〃 | 〃 | 〃 | 5.60 | 0.49 | 〃 | 〃 | 〃 | 〃 |
| -1 | 〃 | 〃 | 〃 | 4.24 | 0.37 | 〃 | 〃 | 〃 | 〃 |
| -0 | 27.38 | 0.00 | 0.00 | 1034.08 | 37.74 | 0.00 | 0.00 | 51.90 | 4.55 |
| 1 | 11.39 | 25.78 | 2.35 | 2.07 | 0.18 | -7.31 | -0.64 | 2.37 | 0.21 |
| 2 | 〃 | 22.62 | 1.98 | 1.37 | 0.12 | -5.57 | -0.49 | 1.93 | 0.17 |
| 3 | 〃 | 18.10 | 1.59 | 0.72 | 0.06 | -3.61 | -0.32 | 1.38 | 0.12 |
| 4 | 〃 | 13.47 | 1.18 | 0.25 | 0.02 | -1.84 | -0.14 | 0.78 | 0.07 |
| 5 | 〃 | 9.00 | 0.79 | 0.02 | 0.00 | -0.38 | -0.03 | 0.19 | 0.02 |
| 6 | 〃 | 4.92 | 0.43 | 0.08 | 0.01 | 0.63 | 0.06 | -0.36 | -0.03 |
| 7 | 〃 | 1.74 | 0.15 | 0.53 | 0.05 | 0.96 | 0.08 | -0.75 | -0.07 |
| 8 | 〃 | 0.10 | 0.01 | 1.43 | 0.13 | 0.38 | 0.03 | -0.81 | -0.07 |
| 9 | 〃 | 0.72 | 0.06 | 2.77 | 0.24 | 1.41 | 0.12 | -0.39 | -0.03 |
| 10 | 〃 | 4.12 | 0.36 | 4.41 | 0.39 | 4.26 | 0.37 | 0.63 | 0.06 |
| 10 | 〃 | 4.12 | 0.36 | 0.90 | 0.08 | 0.61 | 0.05 | 0.63 | 0.06 |
| 9 | 〃 | 0.72 | 0.06 | 0.06 | 0.01 | 0.21 | 0.02 | -0.39 | -0.03 |
| 8 | 〃 | 0.10 | 0.01 | 0.46 | 0.04 | -0.22 | -0.02 | -0.81 | -0.07 |
| 7 | 〃 | 1.74 | 0.15 | 1.07 | 0.09 | -1.36 | -0.12 | -0.75 | -0.07 |
| 6 | 〃 | 4.92 | 0.43 | 1.64 | 0.14 | -2.84 | -0.25 | -0.36 | -0.03 |
| 5 | 〃 | 9.00 | 0.79 | 2.12 | 0.19 | -4.37 | -0.38 | 0.19 | 0.02 |
| 4 | 〃 | 13.47 | 1.18 | 2.44 | 0.21 | -5.98 | -0.52 | 0.78 | 0.07 |
| 3 | 〃 | 18.10 | 1.58 | 2.64 | 0.23 | -6.92 | -0.61 | 1.38 | 0.12 |
| 2 | 〃 | 22.62 | 1.98 | 2.73 | 0.24 | -7.86 | -0.69 | 1.93 | 0.17 |
| 1 | 〃 | 25.78 | 2.35 | 2.69 | 0.24 | -8.32 | -0.73 | 2.37 | 0.21 |
| 0 | 27.38 | 0.00 | 0.00 | 2.60 | 0.10 | 0.00 | 0.00 | 51.90 | 4.55 |
| -1 | 11.39 | 〃 | 〃 | 0.00 | 0.00 | 0.00 | 〃 | 0.00 | 0.00 |
| -2 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -3 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -4 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -5 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -6 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 | 〃 |
| -7 | 〃 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | $\Sigma = 17.80$ | | $\Sigma = 45.05$ | | $\Sigma = -4.21$ | | $\Sigma = 10.00$ |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

Find $\Sigma$ Jou. Jh l/A, $\Sigma$ Jou. Jd l/A and $\Sigma$ Jou Je l/A for upper chord.

| Mark | Jo1. Jh l/A | Summary | Jo1. Jd l/A | Summary | Jo1. Je l/A | Summary |
|---|---|---|---|---|---|---|
| A | -0.02 | -0.02 | 0.01 | 0.01 | 0.13 | 0.13 |
| B | -0.10 | -0.12 | 0.03 | 0.04 | 0.30 | 0.43 |
| C | -0.26 | -0.38 | 0.08 | 0.12 | 0.52 | 0.95 |
| D | -0.54 | -0.92 | 0.18 | 0.30 | 0.82 | 1.77 |
| E | -1.01 | -1.93 | 0.36 | 0.66 | 1.22 | 2.99 |
| F | -1.72 | -3.65 | 0.65 | 1.31 | 1.74 | 4.73 |
| G | -2.78 | -6.43 | 1.12 | 2.43 | 2.41 | 7.14 |
| H | -4.23 | -10.66 | 1.82 | 4.25 | 3.68 | 10.32 |
| I | -5.90 | -16.56 | 2.75 | 7.00 | 3.97 | 14.29 |
| J | -7.53 | -24.09 | 3.81 | 10.81 | 4.57 | 18.86 |
| K | -8.64 | -32.73 | 4.77 | 15.58 | 4.77 | 23.63 |
| L | -8.64 | -41.36 | 4.77 | 20.35 | 4.77 | 28.40 |
| M | -9.04 | -50.40 | 5.48 | 25.83 | 4.57 | 32.97 |
| N | -8.51 | -58.91 | 5.74 | 31.57 | 3.97 | 36.94 |
| O | -7.49 | -66.40 | 5.57 | 37.14 | 3.18 | 40.12 |
| P | -5.95 | -72.35 | 5.15 | 42.29 | 2.41 | 42.53 |
| Q | -4.59 | -76.94 | 4.64 | 46.93 | 1.74 | 44.27 |
| R | -3.42 | -80.36 | 4.14 | 51.07 | 1.22 | 45.49 |
| S | -2.44 | -82.80 | 3.70 | 54.77 | 0.82 | 46.31 |
| T | -1.65 | -84.45 | 3.33 | 58.10 | 0.52 | 46.83 |
| U | -1.00 | -85.45 | 3.02 | 61.12 | 0.30 | 47.13 |
| V | -0.46 | -85.91 | 2.77 | 63.89 | 0.13 | 47.26 |

$\Sigma$ Jou. Jh l/A.

| | | | | | | | Summary |
|---|---|---|---|---|---|---|---|
| Load on 1 | 1 | × -85.91 | = -85.91 | | | | -85.91 |
| 2 | 2 | × -84.45 | = -168.90 | 20 | × -0.12 | = -2.40 | -171.30 |
| 3 | 3 | × -82.80 | = -248.40 | 19 | × -0.38 | = -7.22 | -255.62 |
| 4 | 4 | × -80.36 | = -321.44 | 18 | × -0.92 | = -14.76 | -336.20 |
| 5 | 5 | × -76.94 | = -384.70 | 17 | × -1.93 | = -32.81 | -417.51 |
| 6 | 6 | × -72.35 | = -434.10 | 16 | × -3.65 | = -58.40 | -492.50 |
| 7 | 7 | × -66.40 | = -464.80 | 15 | × -6.43 | = -96.45 | -561.25 |
| 8 | 8 | × -58.91 | = -471.28 | 14 | × -10.66 | = -149.24 | -620.52 |
| 9 | 9 | × -50.40 | = -453.60 | 13 | × -16.56 | = -215.28 | -668.88 |
| 10 | 10 | × -41.36 | = -413.36 | 12 | × -24.09 | = -289.08 | -702.44 |
| 11 | 11 | × -32.73 | = -360.03 | 11 | × -32.73 | = -360.03 | -720.06 |

$\Sigma$ Jou. Jd l/A

| | | | | | | | Summary |
|---|---|---|---|---|---|---|---|
| Load on 1 | 1 | × 63.89 | = 63.89 | | | | 63.89 |
| 2 | 2 | × 58.10 | = 116.20 | 20 | × 0.43 | = 8.60 | 124.80 |
| 3 | 3 | × 54.77 | = 164.31 | 19 | × 0.95 | = 18.05 | 182.36 |
| 4 | 4 | × 51.07 | = 204.28 | 18 | × 1.77 | = 31.86 | 236.14 |
| 5 | 5 | × 46.93 | = 234.65 | 17 | × 2.99 | = 50.83 | 285.48 |
| 6 | 6 | × 42.29 | = 253.74 | 16 | × 4.73 | = 75.68 | 329.42 |
| 7 | 7 | × 37.14 | = 259.98 | 15 | × 7.14 | = 107.10 | 367.08 |
| 8 | 8 | × 31.57 | = 252.56 | 14 | × 10.32 | = 144.48 | 397.04 |
| 9 | 9 | × 25.83 | = 232.47 | 13 | × 14.29 | = 185.77 | 418.24 |
| 10 | 10 | × 20.35 | = 203.50 | 12 | × 18.86 | = 226.32 | 429.82 |
| 11 | 11 | × 15.58 | = 171.38 | 11 | × 23.63 | = 259.93 | 431.31 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

Σ Tom. Tel/A

| Load on | | | | | Summary |
|---|---|---|---|---|---|
| 1 | 1 × 47.26 = | 47.26 | | | 47.26 |
| 2 | 2 × 46.83 = | 93.66 | 20 × 0.04 = | 0.80 | 94.46 |
| 3 | 3 × 46.31 = | 138.93 | 19 × 0.12 = | 2.28 | 141.21 |
| 4 | 4 × 45.49 = | 181.96 | 18 × 0.30 = | 5.40 | 187.36 |
| 5 | 5 × 44.27 = | 221.35 | 17 × 0.66 = | 11.22 | 232.57 |
| 6 | 6 × 42.53 = | 255.18 | 16 × 1.31 = | 20.96 | 276.14 |
| 7 | 7 × 40.12 = | 280.84 | 15 × 2.43 = | 36.45 | 317.29 |
| 8 | 8 × 36.94 = | 295.52 | 14 × 4.25 = | 59.50 | 355.02 |
| 9 | 9 × 32.97 = | 296.73 | 13 × 7.00 = | 91.00 | 387.73 |
| 10 | 10 × 28.40 = | 284.00 | 12 × 10.81 = | 129.72 | 413.72 |
| 11 | 11 × 23.63 = | 259.93 | 11 × 15.58 = | 171.38 | 431.31 |

☐ Find Σ Tom Thl/A , Σ Tom Tdl/A and Σ Tom Tel/A for Lower chord.

| Mark | member | Tot. Thl/A | Summary | Tot. Tdl/A | Summary | Tot. Tel/A | Summary |
|---|---|---|---|---|---|---|---|
| A | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| B | 1 | -0.03 | -0.03 | 0.00 | 0.00 | 0.08 | 0.08 |
| C | 2 | -0.10 | -0.13 | 0.02 | 0.02 | 0.18 | 0.26 |
| D | 3 | -0.21 | -0.34 | 0.05 | 0.07 | 0.30 | 0.56 |
| E | 4 | -0.38 | -0.72 | 0.10 | 0.17 | 0.45 | 1.01 |
| F | 5 | -0.64 | -1.36 | 0.19 | 0.36 | 0.64 | 1.65 |
| G | 6 | -1.01 | -2.37 | 0.33 | 0.69 | 0.88 | 2.53 |
| H | 7 | -2.00 | -4.37 | 0.72 | 1.41 | 1.54 | 4.07 |
| I | 8 | -2.91 | -7.28 | 1.14 | 2.55 | 2.00 | 6.07 |
| J | 9 | -3.99 | -11.27 | 1.71 | 4.26 | 2.47 | 8.54 |
| K | 10 | -5.07 | -16.34 | 2.38 | 6.64 | 2.85 | 11.39 |
| L | 10 | -6.09 | -22.43 | 3.43 | 10.07 | 2.85 | 14.24 |
| M | 9 | -5.76 | -28.19 | 3.57 | 13.64 | 2.47 | 16.71 |
| N | 8 | -5.09 | -33.28 | 3.51 | 17.15 | 2.00 | 18.71 |
| O | 7 | -4.29 | -37.57 | 3.31 | 20.46 | 1.54 | 20.25 |
| P | 6 | -2.69 | -40.26 | 2.35 | 22.81 | 0.88 | 21.13 |
| Q | 5 | -2.18 | -42.44 | 2.18 | 24.99 | 0.64 | 21.77 |
| R | 4 | -1.72 | -44.16 | 2.02 | 27.01 | 0.45 | 22.22 |
| S | 3 | -1.34 | -45.50 | 1.90 | 28.91 | 0.30 | 22.52 |
| T | 2 | -1.02 | -46.52 | 1.80 | 30.71 | 0.18 | 22.70 |
| U | 1 | -0.73 | -47.25 | 1.72 | 32.43 | 0.08 | 22.78 |
| V | 0 | 0.00 | -47.25 | 0.00 | 32.43 | 0.00 | 22.78 |

Σ Tom. Thl/A

| Load on | | | | | Summary |
|---|---|---|---|---|---|
| 1 | 1 × -47.25 = | -47.25 | | | -47.25 |
| 2 | 2 × -46.52 = | -93.04 | 20 × -0.03 = | -0.60 | -93.64 |
| 3 | 3 × -45.50 = | -136.50 | 19 × -0.13 = | -2.47 | -138.97 |
| 4 | 4 × -44.16 = | -176.64 | 18 × -0.34 = | -6.12 | -182.76 |
| 5 | 5 × -42.44 = | -212.20 | 17 × -0.72 = | -12.24 | -224.44 |
| 6 | 6 × -40.26 = | -241.56 | 16 × -1.36 = | -21.76 | -263.32 |
| 7 | 7 × -37.57 = | -262.99 | 15 × -2.37 = | -37.92 | -300.91 |
| 8 | 8 × -33.28 = | -266.24 | 14 × -4.37 = | -61.18 | -327.42 |
| 9 | 9 × -28.19 = | -253.71 | 13 × -7.28 = | -94.64 | -348.35 |
| 10 | 10 × -22.43 = | -224.30 | 12 × -11.27 = | -135.24 | -359.54 |
| 11 | 11 × -16.34 = | -179.74 | 11 × -16.34 = | -179.74 | -359.48 |

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CALCULATIONS FOR

Arakawa. Bashi for Saitama-Ken.

Σ Tom. Td l/A

| Load on | | | | | | | Summary |
|---|---|---|---|---|---|---|---|
| 1 | 1 | × 32.43 | = 32.43 | | | | 32.43 |
| 2 | 2 | × 30.71 | = 61.42 | 20 | × 0.08 | = 1.60 | 63.02 |
| 3 | 3 | × 28.91 | = 86.73 | 19 | × 0.26 | = 2.34 | 89.07 |
| 4 | 4 | × 27.01 | = 108.04 | 18 | × 0.56 | = 10.08 | 118.12 |
| 5 | 5 | × 24.99 | = 124.95 | 17 | × 1.01 | = 17.17 | 142.12 |
| 6 | 6 | × 22.81 | = 136.86 | 16 | × 1.65 | = 26.40 | 163.26 |
| 7 | 7 | × 20.46 | = 143.22 | 15 | × 2.53 | = 37.95 | 181.17 |
| 8 | 8 | × 17.15 | = 137.20 | 14 | × 4.07 | = 56.98 | 194.18 |
| 9 | 9 | × 13.64 | = 122.76 | 13 | × 6.07 | = 78.91 | 201.67 |
| 10 | 10 | × 10.07 | = 100.70 | 12 | × 8.54 | = 102.48 | 203.18 |
| 11 | 11 | × 6.64 | = 73.04 | 11 | × 11.39 | = 125.29 | 198.33 |

Σ Tom. Td l/A

| Load on | | | | | | | Summary |
|---|---|---|---|---|---|---|---|
| 1 | 1 | × 22.78 | = 22.78 | | | | 22.78 |
| 2 | 2 | × 22.70 | = 45.40 | 20 | × 0.00 | = 0.00 | 45.40 |
| 3 | 3 | × 22.52 | = 67.56 | 19 | × 0.02 | = 0.38 | 67.94 |
| 4 | 4 | × 22.22 | = 88.88 | 18 | × 0.07 | = 1.26 | 90.14 |
| 5 | 5 | × 21.77 | = 108.85 | 17 | × 0.17 | = 2.89 | 111.74 |
| 6 | 6 | × 21.13 | = 126.78 | 16 | × 0.36 | = 5.76 | 132.54 |
| 7 | 7 | × 20.25 | = 141.75 | 15 | × 0.69 | = 10.35 | 152.10 |
| 8 | 8 | × 18.71 | = 149.68 | 14 | × 1.41 | = 19.74 | 169.42 |
| 9 | 9 | × 16.71 | = 150.39 | 13 | × 2.55 | = 33.15 | 183.54 |
| 10 | 10 | × 14.24 | = 142.40 | 12 | × 4.26 | = 51.12 | 193.52 |
| 11 | 11 | × 11.39 | = 125.29 | 11 | × 6.64 | = 73.04 | 198.33 |

☐ Find Σ Tom Thl/A , Σ Tom. Tdl/A and Σ Tom Tel/A for diagonals

| Mark | member | Tor. Thl/A | Summary | Tor. Tdl/A | Summary | Tor. Tel/A | Summary |
|---|---|---|---|---|---|---|---|
| A | 1 | -0.06 | -0.06 | 0.02 | 0.02 | 0.03 | 0.03 |
| B | 2 | -0.07 | -0.13 | 0.02 | 0.04 | 0.04 | 0.07 |
| C | 3 | -0.10 | -0.23 | 0.03 | 0.07 | 0.04 | 0.11 |
| D | 4 | -0.13 | -0.36 | 0.04 | 0.11 | 0.06 | 0.17 |
| E | 5 | -0.19 | -0.55 | 0.07 | 0.18 | 0.07 | 0.24 |
| F | 6 | -0.26 | -0.81 | 0.11 | 0.29 | 0.10 | 0.34 |
| G | 7 | -0.35 | -1.11 | 0.16 | 0.45 | 0.12 | 0.46 |
| H | 8 | -0.43 | -1.59 | 0.23 | 0.68 | 0.12 | 0.58 |
| I | 9 | -0.43 | -2.02 | 0.28 | 0.96 | 0.08 | 0.66 |
| J | 10 | -0.31 | -2.33 | 0.26 | 1.22 | -0.01 | 0.65 |
| K | 11 | -0.10 | -2.43 | 0.17 | 1.39 | -0.09 | 0.56 |
| L | 11 | 0.05 | -2.38 | 0.05 | 1.44 | -0.09 | 0.47 |
| M | 10 | 0.01 | -2.37 | 0.00 | 1.44 | -0.01 | 0.46 |
| N | 9 | -0.12 | -2.49 | 0.02 | 1.46 | 0.08 | 0.54 |
| O | 8 | -0.22 | -2.71 | 0.06 | 1.52 | 0.12 | 0.66 |
| P | 7 | -0.25 | -2.96 | 0.08 | 1.60 | 0.12 | 0.78 |
| Q | 6 | -0.24 | -3.20 | 0.09 | 1.69 | 0.10 | 0.88 |
| R | 5 | -0.20 | -3.40 | 0.08 | 1.77 | 0.07 | 0.95 |
| S | 4 | -0.17 | -3.57 | 0.07 | 1.84 | 0.06 | 1.01 |
| T | 3 | -0.14 | -3.71 | 0.06 | 1.90 | 0.04 | 1.05 |
| U | 2 | -0.13 | -3.84 | 0.06 | 1.96 | 0.04 | 1.09 |
| V | 1 | -1.24 | -5.08 | 0.61 | 2.57 | 0.32 | 1.41 |

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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken.

Σ Tom. Th l/A

| | | | | | | Summary |
|---|---|---|---|---|---|---|
| Load on 1 | 1, | -5,08 = | -5,08 | | | -5.08 |
| 2 | 2, | -3.71 = | -7.42 | 20, | -0,13 = -2,60 | -10.00 |
| 3 | 3, | -3.57 = | -10.71 | 19, | -0.23 = -4.37 | -15.08 |
| 4 | 4, | -3.40 = | -13.60 | 18, | -0.36 = -6.48 | -20.08 |
| 5 | 5, | -3.20 = | -16.00 | 17, | -0.55 = -9.35 | -25.35 |
| 6 | 6, | -2.96 = | -17.76 | 16, | -0.81 = -12.96 | -30.72 |
| 7 | 7, | -2.71 = | -18.97 | 15, | -1.11 = -16.65 | -35.62 |
| 8 | 8, | -2.49 = | -19.92 | 14, | -1.59 = -22.26 | -42.18 |
| 9 | 9, | -2.37 = | -21.33 | 13, | -2.02 = -26.26 | -47.59 |
| 10 | 10, | -2.38 = | -23.80 | 12, | -2.33 = -27.96 | -51.76 |
| 11 | 11, | -2.43 = | -26.73 | 11, | -2.43 = -26.73 | -53.46 |

Σ Tom. Td l/A

| | | | | | | Summary |
|---|---|---|---|---|---|---|
| Load on 1 | 1, | 2,57 = | 2,57 | | | 2,57 |
| 2 | 2, | 1,90 = | 3.80 | 20, | 0,07 = 1,40 | 5.20 |
| 3 | 3, | 1,84 = | 5,52 | 19, | 0.11 = 2,09 | 7,61 |
| 4 | 4, | 1,77 = | 7,08 | 18, | 0.17 = 3,06 | 10.14 |
| 5 | 5, | 1,69 = | 8.45 | 17, | 0.24 = 4,08 | 12,53 |
| 6 | 6, | 1,60 = | 9,60 | 16, | 0,34 = 5,44 | 15.04 |
| 7 | 7, | 1,52 = | 10,64 | 15, | 0.46 = 7,02 | 17,66 |
| 8 | 8, | 1,46 = | 11,68 | 14, | 0,58 = 8,12 | 19,80 |
| 9 | 9, | 1,44 = | 12,96 | 13, | 0,66 = 8,58 | 21,54 |
| 10 | 10, | 1,44 = | 14,40 | 12, | 0,65 = 7,80 | 22,20 |
| 11 | 11, | 1,39 = | 15,29 | 11, | 0,56 = 6,16 | 21,45 |

Σ Tom. Te l/A

| | | | | | | Summary |
|---|---|---|---|---|---|---|
| load on 1 | 1, | 1,41 = | 1,41 | | | 1,41 |
| 2 | 2, | 2,05 = | 2,10 | 20, | 0,04 = 0,80 | 2,90 |
| 3 | 3, | 1,01 = | 3,03 | 19, | 0,07 = 1,33 | 4,36 |
| 4 | 4, | 0,95 = | 3,80 | 18, | 0,11 = 1,98 | 5,78 |
| 5 | 5, | 0,880 = | 4,40 | 17, | 0,18 = 3,06 | 7,46 |
| 6 | 6, | 0,78 = | 4,68 | 16, | 0,29 = 4,64 | 9,32 |
| 7 | 7, | 0,66 = | 4,62 | 15, | 0,45 = 6,75 | 11,37 |
| 8 | 8, | 0,54 = | 4,32 | 14, | 0,68 = 9,52 | 13,84 |
| 9 | 9, | 0,46 = | 4,14 | 13, | 0,96 = 12,48 | 16,62 |
| 10 | 10, | 0,47 = | 4,70 | 12, | 1,22 = 14,64 | 19,34 |
| 11 | 11, | 0,56 = | 6,16 | 11, | 1,39 = 15,29 | 21,45 |

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**JIUN MASUDA**
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SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Bashi for Saitama-ken

Find Σ Jou. Thl/A, Σ Jou. Tdl/A and Σ Jou. Tel/A for Verticals.

| Mark | member | Jo. Thl/A | Summary | Jo. Tdl/A | Summary | Jo. Tel/A | Summary |
|---|---|---|---|---|---|---|---|
| A | 0 | 0.00 | 0.00 | 0.01 | 0.01 | 0.27 | 0.27 |
| B | 1 | -0.11 | -0.11 | 0.03 | 0.04 | 0.03 | 0.30 |
| C | 2 | -0.10 | -0.21 | 0.03 | 0.07 | 0.02 | 0.32 |
| D | 3 | -0.09 | -0.30 | 0.03 | 0.10 | 0.02 | 0.34 |
| E | 4 | -0.07 | -0.37 | 0.03 | 0.13 | 0.01 | 0.35 |
| F | 5 | -0.06 | -0.43 | 0.03 | 0.16 | 0.00 | 0.35 |
| G | 6 | -0.04 | -0.47 | 0.02 | 0.18 | 0.00 | 0.35 |
| H | 7 | -0.02 | -0.49 | 0.01 | 0.19 | -0.01 | 0.34 |
| I | 8 | -0.00 | -0.49 | 0.01 | 0.20 | -0.01 | 0.33 |
| J | 9 | 0.00 | -0.49 | 0.00 | 0.20 | -0.01 | 0.32 |
| K | 10 | -0.01 | -0.50 | 0.00 | 0.20 | 0.01 | 0.33 |
| L | 10 | -0.05 | -0.55 | 0.06 | 0.26 | 0.01 | 0.34 |
| M | 9 | -0.02 | -0.57 | 0.04 | 0.30 | -0.01 | 0.33 |
| N | 8 | 0.00 | -0.57 | 0.02 | 0.32 | -0.01 | 0.32 |
| O | 7 | 0.01 | -0.56 | 0.01 | 0.33 | -0.01 | 0.31 |
| P | 6 | 0.01 | -0.55 | 0.00 | 0.33 | 0.00 | 0.31 |
| Q | 5 | 0.00 | -0.55 | 0.00 | 0.33 | 0.00 | 0.31 |
| R | 4 | -0.02 | -0.57 | 0.00 | 0.33 | 0.01 | 0.32 |
| S | 3 | -0.05 | -0.62 | 0.01 | 0.34 | 0.02 | 0.34 |
| T | 2 | -0.07 | -0.69 | 0.02 | 0.36 | 0.02 | 0.36 |
| U | 1 | -2.22 | -2.91 | 0.63 | 0.99 | 0.72 | 1.08 |
| V | 0 | 0.00 | -2.91 | 5.70 | 6.69 | 0.29 | 1.37 |

Σ Jou. Thl/A

| | | | | | | | | Summary |
|---|---|---|---|---|---|---|---|---|
| load on 1 | 1 | -2.91 | = -2.91 | | | | | -2.91 |
| 2 | 2 | -0.62 | = -1.24 | 20 | -0.21 | = -4.20 | | -5.44 |
| 3 | 3 | -0.57 | = -1.71 | 19 | -0.30 | = -5.70 | | -7.41 |
| 4 | 4 | -0.55 | = -2.20 | 18 | -0.37 | = -6.66 | | -8.86 |
| 5 | 5 | -0.55 | = -2.75 | 17 | -0.43 | = -7.31 | | -10.06 |
| 6 | 6 | -0.56 | = -3.36 | 16 | -0.47 | = -7.52 | | -10.88 |
| 7 | 7 | -0.57 | = -3.99 | 15 | -0.49 | = -7.35 | | -11.34 |
| 8 | 8 | -0.57 | = -4.56 | 14 | -0.49 | = -6.86 | | -11.42 |
| 9 | 9 | -0.55 | = -4.95 | 13 | -0.49 | = -6.37 | | -11.32 |
| 10 | 10 | -0.50 | = -5.00 | 12 | -0.50 | = -6.00 | | -11.00 |
| 11 | 11 | -0.49 | = -5.39 | 11 | -0.55 | = -6.05 | | -11.44 |

Σ Jou. Tdl/A

| | | | | | | | | Summary |
|---|---|---|---|---|---|---|---|---|
| Load on 1 | 1 | 6.69 | = 6.69 | | | | | 6.69 |
| 2 | 2 | 0.34 | = 0.68 | 20 | 0.32 | = 6.40 | | 7.08 |
| 3 | 3 | 0.33 | = 0.99 | 19 | 0.34 | = 6.46 | | 7.45 |
| 4 | 4 | 0.33 | = 1.32 | 18 | 0.35 | = 6.30 | | 7.62 |
| 5 | 5 | 0.33 | = 1.65 | 17 | 0.35 | = 5.95 | | 7.60 |
| 6 | 6 | 0.33 | = 1.98 | 16 | 0.35 | = 5.60 | | 7.58 |
| 7 | 7 | 0.32 | = 2.24 | 15 | 0.34 | = 5.10 | | 7.34 |
| 8 | 8 | 0.30 | = 2.40 | 14 | 0.33 | = 4.62 | | 7.02 |
| 9 | 9 | 0.26 | = 2.34 | 13 | 0.32 | = 4.16 | | 6.50 |
| 10 | 10 | 0.20 | = 2.00 | 12 | 0.33 | = 3.96 | | 5.96 |
| 11 | 11 | 0.20 | = 2.20 | 11 | 0.33 | = 3.63 | | 5.83 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

Σ Tom Tel/A

| Load on | | | | | Summary |
|---|---|---|---|---|---|
| 1 | 1, 1.37 = 1.37 | | | | 1.37 |
| 2 | 2, 0.34 = 0.68 | 20, | 0.07 = 1.40 | | 2.08 |
| 3 | 3, 0.32 = 0.96 | 19, | 0.10 = 1.90 | | 2.86 |
| 4 | 4, 0.31 = 1.26 | 18, | 0.13 = 2.34 | | 3.56 |
| 5 | 5, 0.31 = 1.55 | 17, | 0.16 = 2.72 | | 4.27 |
| 6 | 6, 0.31 = 1.86 | 16, | 0.18 = 2.88 | | 4.74 |
| 7 | 7, 0.32 = 2.24 | 15, | 0.19 = 2.85 | | 5.09 |
| 8 | 8, 0.33 = 2.64 | 14, | 0.20 = 2.80 | | 5.44 |
| 9 | 9, 0.34 = 3.06 | 13, | 0.20 = 2.60 | | 5.66 |
| 10 | 10, 0.33 = 3.30 | 12, | 0.20 = 2.40 | | 5.70 |
| 11 | 11, 0.33 = 3.63 | 11, | 0.20 = 2.20 | | 5.83 |

☐ Find Σ Tom. Th l/A for all members put ξ

| Load on | Upper chord | Lower chord | Diagonals | Verticals | Summary |
|---|---|---|---|---|---|
| 1 | -85.91 | -47.25 | -5.08 | -2.91 | -141.15 |
| 2 | -171.30 | -93.64 | -10.00 | -5.44 | -280.38 |
| 3 | -255.62 | -138.97 | -15.08 | -7.41 | -417.08 |
| 4 | -336.20 | -182.76 | -20.08 | -8.86 | -547.90 |
| 5 | -477.51 | -224.44 | -25.35 | -10.06 | -677.36 |
| 6 | -492.50 | -263.32 | -30.72 | -10.88 | -797.42 |
| 7 | -561.25 | -300.91 | -35.62 | -11.34 | -909.12 |
| 8 | -620.52 | -327.42 | -42.18 | -11.42 | -1001.54 |
| 9 | -668.08 | -348.35 | -47.59 | -11.32 | -1076.14 |
| 10 | -702.44 | -359.54 | -51.76 | -11.00 | -1124.74 |
| 11 | -720.06 | -359.48 | -53.46 | -11.44 | -1144.44 |

☐ Find Σ Tom. Td l/A for all members put η

| Load on | Upper chord | Lower chord | Diagonals | Verticals | Summary |
|---|---|---|---|---|---|
| 1 | 63.89 | 32.43 | 2.57 | 6.69 | 105.58 |
| 2 | 124.80 | 63.02 | 5.20 | 7.08 | 200.10 |
| 3 | 182.36 | 89.07 | 7.61 | 7.45 | 286.49 |
| 4 | 236.14 | 118.12 | 10.14 | 7.62 | 372.02 |
| 5 | 285.48 | 142.12 | 12.53 | 7.60 | 447.73 |
| 6 | 329.42 | 163.26 | 15.04 | 7.58 | 515.30 |
| 7 | 367.08 | 181.17 | 17.66 | 7.34 | 573.25 |
| 8 | 397.04 | 194.18 | 19.80 | 7.02 | 618.04 |
| 9 | 418.24 | 201.67 | 21.54 | 6.50 | 647.95 |
| 10 | 429.82 | 203.18 | 22.20 | 5.96 | 661.16 |
| 11 | 431.31 | 198.33 | 21.45 | 5.83 | 656.92 |

☐ Find Σ Tom. Tel/A for all members put ζ

| Load on | Upper chord | Lower chord | Diagonals | Verticals | Summary |
|---|---|---|---|---|---|
| 1 | 47.26 | 22.78 | 1.41 | 1.37 | 72.82 |
| 2 | 94.46 | 45.40 | 2.90 | 2.08 | 144.84 |
| 3 | 141.21 | 67.94 | 4.36 | 2.86 | 216.37 |
| 4 | 187.36 | 90.14 | 5.78 | 3.58 | 286.86 |
| 5 | 232.57 | 111.74 | 7.46 | 4.27 | 356.04 |
| 6 | 276.14 | 132.54 | 9.32 | 4.74 | 422.74 |
| 7 | 317.29 | 152.10 | 11.37 | 5.09 | 485.85 |
| 8 | 355.02 | 169.42 | 13.84 | 5.44 | 543.72 |
| 9 | 387.73 | 183.54 | 16.62 | 5.66 | 593.55 |
| 10 | 413.72 | 193.52 | 19.34 | 5.70 | 632.28 |
| 11 | 431.31 | 198.33 | 21.45 | 5.83 | 656.92 |

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JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO
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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

☐ Find $\Sigma J_h^2 l/A$, $\Sigma J_d^2 l/A$, $\Sigma J_e^2 l/A$, $\Sigma J_h J_d l/A$, $\Sigma J_h J_e l/A$ and $\Sigma J_d J_e l/A$ for all members

| | upper chord | lower chord | Diagonals | Verticals | Summary | put |
|---|---|---|---|---|---|---|
| $J_h^2 l/A$ | 981.98 | 584.30 | 69.84 | 17.80 | 1653.92 | $\alpha$ |
| $J_d^2 l/A$ | 498.08 | 323.87 | 18.90 | 45.05 | 885.90 | $\beta$ |
| $J_e^2 l/A$ | 498.08 | 323.87 | 18.90 | 45.05 | 885.90 | $\beta$ |
| $J_h J_d l/A$ | -600.85 | -334.06 | -26.32 | -4.21 | -965.44 | $\gamma$ |
| $J_h J_e l/A$ | -600.85 | -334.06 | -26.32 | -4.21 | -965.44 | $\gamma$ |
| $J_d J_e l/A$ | -330.62 | 159.72 | 6.78 | 10.00 | 507.12 | $\delta$ |

$(\gamma\beta - \delta\gamma) = \gamma(\beta - \delta) = -965.44\ (885.90 - 507.12) = -965.44 \times 378.78 = -365,700$

$(\gamma\delta - \beta\gamma) = -\gamma(\beta - \delta) = 365,700$

$(\alpha\delta - \gamma^2) = 1653.92 \times 507.12 - 965.44^2 = 838,700 - 932,100 = -93,400$

$(\alpha\beta - \gamma^2) = 1653.92 \times 885.90 - 932,100 = 1,465,200 - 932,100 = 533,100$

$(\gamma\beta - \delta\gamma)(\alpha\delta - \gamma^2) - (\gamma\delta - \beta\gamma)(\alpha\beta - \gamma^2) = -365,700\ (-93,400 + 533,100) = -160,798,300,000$

☐ Find $(\xi\delta - \eta\gamma)$ $(\xi\beta - \xi\gamma)$ $(\eta\gamma - \xi\gamma)$ $(\eta\alpha - \xi\gamma)$

| Load on | $\xi$ | $\delta$ | $\beta$ | $\gamma$ | $\xi\delta$ | $\xi\beta$ | $\xi\gamma$ | $\eta$ | $\eta\gamma$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | -141.15 | 507.12 | 885.900 | -965.44 | -71,600 | -125,000 | 136,300 | 72.82 | -70,300 |
| 2 | -280.38 | | | | -142,200 | -248,400 | 270,700 | 144.84 | -139,800 |
| 3 | -417.08 | | | | -211,500 | -369,500 | 402,700 | 216.37 | -208,900 |
| 4 | -547.90 | | | | -277,900 | -485,400 | 529,000 | 286.86 | -276,900 |
| 5 | -677.36 | | | | -343,500 | -600,100 | 654,000 | 356.04 | -343,700 |
| 6 | -797.42 | | | | -404,400 | -706,400 | 769,900 | 422.74 | -408,100 |
| 7 | -909.12 | | | | -461,000 | -805,400 | 877,700 | 485.85 | -469,100 |
| 8 | -1001.54 | | | | -507,900 | -887,300 | 966,900 | 543.72 | -524,900 |
| 9 | -1076.14 | | | | -545,700 | -953,400 | 1038,900 | 593.55 | -573,000 |
| 10 | -1124.74 | | | | -570,400 | -996,400 | 1085,900 | 632.28 | -610,400 |
| 11 | -1144.44 | | | | -580,400 | -1013,900 | 1104,900 | 686.92 | -634,200 |

| Load on | $\eta$ | $\alpha$ | $\gamma$ | $\eta\alpha$ | $\eta\gamma$ |
|---|---|---|---|---|---|
| 1 | 105.58 | 1653.92 | -965.44 | 174,600 | -101,900 |
| 2 | 200,10 | | | 330,900 | -193,200 |
| 3 | 286,49 | | | 473,800 | -276,600 |
| 4 | 372,02 | | | 615,300 | -359,200 |
| 5 | 447,73 | | | 740,500 | -432,300 |
| 6 | 515.30 | | | 852,300 | -497,500 |
| 7 | 573,25 | | | 948,100 | -553,400 |
| 8 | 618.04 | | | 1022,200 | -596,700 |
| 9 | 647,95 | | | 1071,700 | -625,600 |
| 10 | 661,16 | | | 1093,500 | -638,300 |
| 11. | 659.92 | | | 1086.500 | -634,200 |

| Load on | $\xi\delta$ | $\eta\gamma$ | $\xi\delta - \eta\gamma$ | $\xi\beta$ | $\xi\gamma$ | $\xi\beta - \xi\gamma$ | $\eta\gamma - \xi\gamma$ | $\eta\alpha$ | $\xi\gamma$ | $\eta\alpha - \xi\gamma$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -71.600 | -101,900 | 30,300 | -125,000 | -70,300 | -54700 | -31,600 | 174,600 | 136,300 | 38300 |
| 2 | -142,200 | -193,200 | 57,000 | -248,400 | -139,800 | -108,600 | -53,400 | 330,900 | 270,700 | 60,200 |
| 3 | -211,500 | -276,600 | 65,100 | -369,500 | -208,900 | -160,600 | -67,700 | 473,800 | 402,700 | 71,100 |
| 4 | -277,900 | -359,200 | 81.300 | -485,400 | -276,900 | -208,500 | -82,300 | 615,300 | 529,000 | 86,300 |
| 5 | -343,500 | -432,300 | 88,800 | -600,100 | -343,700 | -256,400 | -88,600 | 740,500 | 654,000 | 85,500 |
| 6 | -404.400 | -497,500 | 93,100 | -706,400 | -408,100 | -298,300 | -89,400 | 852,300 | 769,900 | 82,400 |
| 7 | -461.000 | -553,400 | 92,400 | -805.400 | -469,100 | -336,300 | -84,300 | 948,100 | 877.700 | 70,400 |
| 8 | -507,900 | -596,700 | 88,800 | -887,400 | -524,900 | -362,500 | -71,800 | 1022,200 | 966,900 | 55,300 |
| 9 | -545.700 | -625.600 | 79,900 | -953.400 | -573,000 | -380,400 | -52.600 | 1071,700 | 1038,900 | 32,800 |
| 10 | -570,400 | -638.300 | 67,900 | -996,400 | -610.400 | -386,000 | -27.900 | 1093,500 | 1085,900 | 7.600 |
| 11. | -580,400 | -634,200 | 53,800 | -1013,900 | -634,200 | -379,700 | 0.000 | 1086,700 | 1104,900 | -18,200 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken.

Fund H, D & E-Surfaces

| Load on | $(\xi\delta-\eta\beta)(\beta\beta-\delta\beta)+(\xi\beta-\eta\gamma)(\beta\beta-\delta\beta)$ | H-Surfaces |
|---|---|---|
| 1 | 30,300 −367,500 −54,700 −24,400 | 0,056 |
| 2 | 57,000 −108,600 −57,600 | 0,132 |
| 3 | 65,100 −160,600 −95,500 | 0,218 |
| 4 | 81,300 −208,500 −127,200 | 0,290 |
| 5 | 88,800 −256,400 −167,200 | 0,382 |
| 6 | 93,100 −298,300 −205,200 | 0,468 |
| 7 | 92,400 −336,300 −243,900 | 0,557 |
| 8 | 88,800 −362,500 −273,700 | 0,625 |
| 9 | 79,900 −380,400 −300,500 | 0,686 |
| 10 | 67,900 −386,000 −318,100 | 0,726 |
| 11 | 53,800 −379,700 −325,900 | 0,745 |

$-(\beta\beta-\delta\beta)(\alpha\delta-\beta^2)-(\beta\delta-\beta\beta)(\alpha\beta-\beta^2)$ = 160,798,000,000 $\quad \frac{-367,500}{160,798,000,000} = -0,00002283$

| Load on | $(\xi\beta-\eta\beta)(\alpha\delta-\beta^2)$ | $(\xi\delta-\eta\beta)(\alpha\beta-\beta^2)$ | $(\xi\beta-\eta\beta)(\alpha\delta-\beta^2)-(\xi\delta-\eta\beta)(\alpha\beta-\beta^2)$ | D-Surfaces |
|---|---|---|---|---|
| 1 | −54,700 −93,400 5,109,000,000 | 30,300 533,100 16,153,000,000 | −11,044,000,000 | −0,069 |
| 2 | −108,600 10,143,000,000 | 57,000 27,188,000,000 | −17,045,000,000 | −0,106 |
| 3 | −160,600 15,000,000 | 65,100 34,705,000,000 | −19,705,000,000 | −0,122 |
| 4 | −208,500 19,474,000,000 | 81,300 43,341,000,000 | −23,867,000,000 | −0,148 |
| 5 | −256,400 23,948,000,000 | 88,800 47,339,000,000 | −23,391,000,000 | −0,145 |
| 6 | −298,300 27,861,000,000 | 93,100 49,632,000,000 | −21,771,000,000 | −0,135 |
| 7 | −336,300 31,410,000,000 | 92,400 49,258,000,000 | −17,848,000,000 | −0,111 |
| 8 | −362,500 33,858,000,000 | 88,800 47,339,000,000 | −13,481,000,000 | −0,084 |
| 9 | −380,400 35,529,000,000 | 79,900 42,595,000,000 | −7,066,000,000 | −0,043 |
| 10 | −386,000 36,052,000,000 | 67,900 36,197,000,000 | −145,000,000 | −0,001 |
| 11 | −379,700 35,464,000,000 | 53,800 28,681,000,000 | 6,783,000,000 | 0,042 |

| Load on | $(\xi\beta-\eta\alpha)$ | $(\beta\delta-\beta\beta)$ | $(\eta\beta-\eta\gamma)$ | $(\alpha\beta-\beta^2)$ | $(\xi\beta-\eta\alpha)(\beta\delta-\beta\beta)-(\eta\beta-\eta\gamma)(\alpha\beta-\beta^2)$ = | | | E-Surfaces |
|---|---|---|---|---|---|---|---|---|
| 1 | −38,300 | 365,700 | −31,600 | 533,100 | −14,006,000,000 | −16,850,000,000 | 2,844,000,000 | 0,018 |
| 2 | 60,200 | | −53,400 | | −22,015 | −28,468 | 6,453 | 0,040 |
| 3 | 71,100 | | −67,700 | | −26,001 | −36,091 | 10,090 | 0,063 |
| 4 | 86,300 | | −82,300 | | −31,560 | −43,874 | 12,314 | 0,077 |
| 5 | 85,500 | | −88,600 | | −31,267 | −47,233 | 15,966 | 0,099 |
| 6 | 82,400 | | −89,400 | | −30,134 | −47,659 | 17,525 | 0,109 |
| 7 | 70,400 | | −84,300 | | −25,745 | −44,940 | 19,195 | 0,119 |
| 8 | 53,300 | | −71,800 | | −20,223 | −38,277 | 18,054 | 0,112 |
| 9 | 32,800 | | −52,600 | | −11,995 | −28,041 | 16,046 | 0,100 |
| 10 | 7,600 | | −27,900 | | −2,779 | −14,873 | 12,094 | 0,075 |
| 11 | −18,200 | | 0,000 | | 6,656 | 0,000 | 6,656 | 0,042 |

Comparison H, D and E-Surfaces

| Load on | H-Surfaces preliminary | H-Surfaces Secondary | Ratio | D-Surfaces preliminary | D-Surfaces Secondary | E-Surfaces preliminary | E-Surfaces Secondary |
|---|---|---|---|---|---|---|---|
| 1 | 0,043 | 0,056 | 1,30 | −0,084 | −0,069 | 0,013 | 0,018 |
| 2 | 0,119 | 0,132 | 1,11 | −0,119 | −0,106 | 0,035 | 0,040 |
| 3 | 0,200 | 0,218 | 1,09 | −0,141 | −0,122 | 0,055 | 0,063 |
| 4 | 0,286 | 0,290 | 1,01 | −0,150 | −0,148 | 0,075 | 0,077 |
| 5 | 0,370 | 0,382 | 1,03 | −0,149 | −0,145 | 0,090 | 0,099 |
| 6 | 0,455 | 0,468 | 1,03 | −0,136 | −0,135 | 0,102 | 0,109 |
| 7 | 0,534 | 0,557 | 1,04 | −0,113 | −0,111 | 0,105 | 0,119 |
| 8 | 0,606 | 0,625 | 1,03 | −0,081 | −0,084 | 0,105 | 0,112 |
| 9 | 0,665 | 0,686 | 1,03 | −0,041 | −0,043 | 0,092 | 0,100 |
| 10 | 0,700 | 0,726 | 1,04 | −0,002 | −0,001 | 0,069 | 0,075 |
| 11 | 0,713 | 0,745 | 1,04 | 0,036 | 0,042 | 0,036 | 0,042 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken.

## Effect of temperature change

find $\Sigma \varepsilon t l I_h E$, $\Sigma \varepsilon t l I_d E$, and $\Sigma \varepsilon t l I_e E$ for upper chord.

$\varepsilon$ = elongation of steel = 0,000 012 per 1° C.
$t$ = range of temperature change = ± 30° C
$E$ = modulus of elasticity of steel = 30,000,000 lbs per Sq. inches
$\varepsilon t E$ = ± 0,000 012 × 30 × 30,000,000 = ± 10800 · 10,000 say for simplicity.

| Member | length | $I_h$ | $\varepsilon t l I_h E$ | $I_d$ or $I_e$ | $\varepsilon t l I_d E$ or $\varepsilon t l I_e E$ |
|---|---|---|---|---|---|
| 1 | 16.60 | 0,821 | 136,300 | −0.237 | − 39,300 |
| 2 | 15.97 | 1,748 | 279,200 | −0.529 | − 84,500 |
| 3 | 15.39 | 2,804 | 435,400 | −0.894 | −137,600 |
| 4 | 14.84 | 4.013 | 595,500 | −1.351 | − 200,500 |
| 5 | 14.35 | 5.399 | 774,800 | −1.924 | − 276,100 |
| 6 | 13.91 | 6.956 | 967,600 | − 2.637 | − 366,800 |
| 7 | 13.54 | 8.678 | 1175,000 | − 3.504 | −474,700 |
| 8 | 13.23 | 10.428 | 1379,600 | − 4.514 | −597,200 |
| 9 | 13.00 | 12.012 | 1561,600 | −5.600 | − 728,000 |
| 10 | 12.84 | 13.126 | 1685,400 | −6.629 | − 851,200 |
| 11 | 12.76 | 13.500 | 1722,600 | − 7.438 | − 949,100 |
| 11 | 12.76 | 13.500 | 1722,600 | − 7.438 | − 949,100 |
| 10 | 12.84 | 13.126 | 1685,400 | − 7.955 | −1021,500 |
| 9 | 13.00 | 12.012 | 1561,600 | − 8.089 | −1051,600 |
| 8 | 13.23 | 10.428 | 1379,600 | − 7.898 | −1044,900 |
| 7 | 13.54 | 8.678 | 1175,000 | − 7.512 | −1017.100 |
| 6 | 13.91 | 6.956 | 967.600 | − 7.032 | − 978,200 |
| 5 | 14.35 | 5.399 | 774,800 | − 6.542 | − 938,800 |
| 4 | 14.84 | 4.013 | 595,500 | −6,080 | − 902,300 |
| 3 | 15.39 | 2,804 | 435,400 | −5.663 | − 871,500 |
| 2 | 15.97 | 1,748 | 279,200 | −5.292 | − 904,400 |
| 1 | 16.60 | 0,821 | 136,300 | −4.976 | − 826,000 |
| −1 | 16.60 | 0.000 | 0,000 | −4.470 | − 742,000 |
| −2 | 15.97 | 〃 | 〃 | −4.160 | − 664,400 |
| −3 | 15,39 | 〃 | 〃 | − 3,748 | − 576,800 |
| −4 | 14.84 | 〃 | 〃 | −3,186 | − 472,800 |
| −5 | 14,35 | 〃 | 〃 | − 2.419 | − 347,100 |
| − 6 | 13.91 | 〃 | 〃 | − 1,381 | −192,100 |
| − 7 | 13.54 | 0.000 | 0,000 | 0.000 | 0,000 |

$\Sigma$ = 21,426,000 $\Sigma$ = − 18,205,600

find $\Sigma \varepsilon t l I_h E$, $\Sigma \varepsilon t l I_d E$ and $\Sigma \varepsilon t l I_e E$ for Lower chord.

| Member | Length | $I_h$ | $\varepsilon t l I_h E$ | $I_d$ or $I_e$ | $\varepsilon t l I_d E$ or $\varepsilon t l I_e E$ |
|---|---|---|---|---|---|
| a | 18.98 | −1.489 | − 282,600 | 0.000 | 0,000 |
| 1 | 18.01 | − 2.304 | −415,000 | 0,257 | 46,300 |
| 2 | 17.09 | − 3.211 | − 548.800 | 0.567 | 96,900 |
| 3 | 16,23 | − 4231 | − 686,700 | 0,943 | 153,000 |
| 4 | 15.44 | −5.384 | − 841,300 | 1,405 | 216,900 |
| 5 | 14.72 | − 6,715 | −988,400 | 1,975 | 290,700 |
| 6 | 14,09 | − 8.169 | −1151, 000 | 2.675 | 376.900 |
| 7 | 13.58 | −9,765 | −1326,100 | 3,515 | 477,300 |
| 8 | 13.18 | −11.420 | −1505,200 | 4,495 | 592,400 |
| 9 | 12.91 | −12.933 | −1669,700 | 5.557 | 717,400 |
| 10 | 12.77 | −14.040 | −1792,900 | 6,586 | 841,000 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

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CALCULATIONS FOR

Arakawa-Baski for Saitama-Ken

| member | length | Th | etl Th E | Td or Te | etl Td E or etl Te E |
|---|---|---|---|---|---|
| 10 | 12.77 | −14.040 | −1792.900 | 7.903 | 1009.200 |
| 9 | 12.91 | −12.933 | −1669.700 | 8.027 | 1036.300 |
| 8 | 13.18 | −11.420 | −1505.200 | 7.866 | 1036.700 |
| 7 | 13.58 | −9.765 | −1326.100 | 7.531 | 1022.700 |
| 6 | 14.09 | −8.169 | −1151.000 | 7.133 | 1005.000 |
| 5 | 14.72 | −6.715 | −988.400 | 6.715 | 988.400 |
| 4 | 15.44 | −5.384 | −841.300 | 6.322 | 976.100 |
| 3 | 16.23 | −4.231 | −686.700 | 5.976 | 969.900 |
| 2 | 17.09 | −3.211 | −548.800 | 5.666 | 968.300 |
| 1 | 18.01 | −2.304 | −415.000 | 5.397 | 972.000 |
| 0 | 18.98 | −1.489 | −282.600 | 5.167 | 980.700 |
| −0 | 18.98 | 0.000 | 0.000 | 5.167 | 980.700 |
| −1 | 18.01 | " | " | 4.842 | 872.000 |
| −2 | 17.09 | " | " | 4.452 | 760.800 |
| −3 | 16.23 | " | " | 3.952 | 641.400 |
| −4 | 15.44 | " | " | 3.310 | 511.000 |
| −5 | 14.72 | " | " | 2.482 | 365.400 |
| −6 | 14.09 | 0.000 | 0.000 | 1.402 | 197.500 |
| | | | Σ = −22415.400 | | Σ = 19103.900 |

☐ Find Σ Th etl E, Σ etl Td E and Σ etl Te E for Diagonals.

| member | length | Th | etl Th E | Td or Te | etl Td E or etl Te E |
|---|---|---|---|---|---|
| 1 | 17.27 | −0.967 | −167.000 | 0.246 | 42.500 |
| 2 | 15.94 | −1.071 | −170.700 | 0.301 | 48.000 |
| 3 | 14.96 | −1.206 | −180.400 | 0.374 | 56.000 |
| 4 | 14.26 | −1.377 | −196.400 | 0.444 | 63.300 |
| 5 | 13.80 | −1.581 | −218.200 | 0.596 | 82.200 |
| 6 | 13.52 | −1.799 | −243.200 | 0.750 | 101.400 |
| 7 | 13.38 | −1.980 | −264.900 | 0.916 | 122.600 |
| 8 | 13.34 | −2.053 | −273.900 | 1.097 | 146.300 |
| 9 | 13.40 | −1.876 | −251.400 | 1.199 | 160.700 |
| 10 | 13.57 | −1.362 | −184.800 | 1.156 | 156.900 |
| 11 | 13.88 | −0.513 | −71.200 | 0.932 | 129.400 |
| 11 | 13.88 | −0.573 | −71.200 | −0.500 | −69.400 |
| 10 | 13.57 | −1.362 | −184.800 | −0.034 | −4.600 |
| 9 | 13.40 | −1.876 | −251.400 | 0.336 | 45.000 |
| 8 | 13.34 | −2.053 | −273.900 | 0.564 | 75.200 |
| 7 | 13.38 | −1.980 | −264.900 | 0.655 | 87.600 |
| 6 | 13.52 | −1.799 | −243.200 | 0.671 | 90.700 |
| 5 | 13.80 | −1.581 | −218.200 | 0.632 | 87.200 |
| 4 | 14.26 | −1.377 | −196.400 | 0.592 | 84.400 |
| 3 | 14.96 | −1.206 | −180.400 | 0.546 | 81.700 |
| 2 | 15.94 | −1.071 | −170.700 | 0.504 | 80.300 |
| 1 | 17.27 | −0.967 | −167.000 | 0.474 | 81.900 |
| −1 | 17.27 | 0.000 | 0.000 | −0.056 | −9.700 |
| −2 | 15.94 | " | " | −0.137 | −40.300 |
| −3 | 14.96 | " | " | −0.253 | −37.800 |
| −4 | 14.26 | " | " | −0.413 | −58.900 |
| −5 | 13.80 | " | " | −0.635 | −87.600 |
| −6 | 13.52 | " | " | −0.937 | −126.700 |
| −7 | 13.38 | 0.000 | 0.000 | −1.328 | −177.700 |
| | | | Σ = −4444.200 | | Σ = 1210.600 |

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**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE _____ FILE NO _____
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CALCULATIONS FOR

Arakawa-Bashi for Saitama-ken

☐ find $\Sigma Jh\,etl\,E$, $\Sigma etl\,Jd\,E$ and $\Sigma etl\,Je\,E$ for Verticals.

| member | length | Jh | etl Jh E | Jd or Je | etl Jd E or etl Je E |
|---|---|---|---|---|---|
| 0 | 25.71 | 0,000 | 0,000 | − 0,318 | − 81,800 |
| 1 | 22.29 | 1,075 | 239,600 | −0,347 | - 77,300 |
| 2 | 19.20 | 1,085 | 208,300 | −0,377 | − 72,400 |
| 3 | 16.42 | 1,049 | 172,200 | −0,401 | - 65,800 |
| 4 | 13.98 | 0,981 | 137,100 | −0,418 | - 58,400 |
| 5 | 11.86 | 0,871 | 103,300 | −0,423 | - 50,200 |
| 6 | 10.07 | 0,699 | 70400 | −0,404 | - 40,700 |
| 7 | 8.61 | 0,450 | 38,700 | −0,352 | - 30,300 |
| 8 | 7.46 | 0,117 | 8.700 | −0,248 | −18,500 |
| 9 | 6.65 | −0,328 | - 21,800 | −0,092 | - 6,100 |
| 10 | 6.16 | -0.818 | - 50,400 | 0.121 | 7,500 |
| 10 | 6.16 | −0,818 | - 50,400 | 0,846 | 52,100 |
| 9 | 6,65 | −0,328 | - 21,800 | 0,645 | 42,900 |
| 8 | 7.46 | 0,117 | 8,700 | 0,436 | 32,500 |
| 7 | 8,61 | 0,450 | 38,700 | 0,248 | 21,400 |
| 6 | 10,07 | 0,699 | 70,400 | 0,089 | 9,000 |
| 5 | 11,86 | 0,871 | 103,300 | −0,037 | −4,400 |
| 4 | 13,98 | 0,981 | 137,100 | −0,134 | −18,700 |
| 3 | 16,42 | 1,049 | 172,200 | −0.209 | - 34,300 |
| 2 | 19,20 | 1,085 | 208,300 | −0,267 | −51,300 |
| 1 | 22.29 | 1,075 | 239,600 | −0,305 | - 68,000 |
| 0 | 25.71 | 0,000 | 0,000 | - 6,342 | −1630,500 |
| −1 | 22,29 | " | " | 0,436 | 97,200 |
| −2 | 19.20 | " | " | 0,540 | 103,700 |
| −3 | 16,42 | " | " | 0,651 | 106,900 |
| −4 | 13,98 | " | " | 0,763 | 106,700 |
| −5 | 11,86 | " | " | 0,868 | 102,900 |
| −6 | 10,07 | " | " | 0,955 | 96,200 |
| −7 | 8,61 | 0,000 | 0,000 | 1,000 | 86,100 |
| | | | Σ= 1,812,200 | | Σ= − 1443,600 |

☐ $\Sigma etl\,Jh\,E$, $\Sigma etl\,Jd\,E$ and $\Sigma etl\,Je\,E$ for all members.

| | upper chord | lower chord | Diagonals | Verticals | Summary | put |
|---|---|---|---|---|---|---|
| $\Sigma etl\,Jh\,E$ | 21426,000 | − 22,415,400 | − 4,444,200 | 1,812,200 | ∓ 3621,400 | $\xi'$ |
| $\Sigma etl\,Jd\,E$ | −18,205,600 | 19,103,900 | 1,210,600 | −1,443,600 | ± 665,300 | $\eta'$ |
| $\Sigma etl\,Je\,E$ | −18,205,600 | 19,103,900 | 1,210,600 | −1,443,600 | ± 665,300 | $\zeta'$ |

| $\xi'$ | $\delta$ | $\beta$ | $\gamma$ | $\xi'\delta$ | $\xi'\beta$ | $\xi'\gamma$ |
|---|---|---|---|---|---|---|
| ∓ 3621,400 | 507.12 | 885.90 | −965.44 | ∓ 1,836,480,000 | ∓ 3,208,200,000 | ± 3,496,240,000 |

| $\eta'$ | $\alpha$ | $\gamma$ | $\eta'\alpha$ | $\eta'\gamma = \zeta'\gamma$ |
|---|---|---|---|---|
| ± 665,300 | 1653.92 | − 965,44 | ± 1,100,350,000 | ∓ 642,310,000 |

$(\xi'\delta - \eta'\gamma) = (\mp 1,836,480,000) - (\mp 642,310,000) = \mp\ 1,194,170,000$
$(\xi'\beta - \zeta'\gamma) = (\mp 3,208,200,000) - (\mp 642,310,000) = \mp\ 2,565,890,000$
$(\eta'\gamma - \zeta'\gamma) = 0$
$(\eta'\alpha - \zeta'\gamma) = (\pm 1,100,350,000 - (\pm 3,496,240,000) = \pm\ 2,395,890,000$

$(\xi'\delta - \eta'\gamma)(\gamma\beta - \delta\gamma) + (\xi'\beta - \zeta'\gamma)(\beta\gamma - \delta\gamma) = \mp\ 1,381,822,000,000,000$
$-(\gamma\beta - \delta\gamma)(\alpha\delta - \gamma^2) - (\gamma\delta - \beta\gamma)(\alpha\beta - \gamma^2) = 160,798,300,000$

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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken.

$$H = \mp \frac{1381,822,000,000,000}{160,798,300,000} = \pm 8600 \text{ say}$$

$$(\xi'\beta - \zeta'\gamma)(\alpha\delta - \gamma^2) - (\xi'\delta - \eta'\gamma)(\alpha\beta - \gamma^2) = \pm 876,266,160,000,000$$

$$D = \pm \frac{876,266,160,000,000}{160,798,300,000} = \pm 5500 \text{ say}$$

$$(\xi'\gamma - \eta'\alpha)(\beta\delta - \beta\gamma) - (\eta'\gamma - \zeta'\gamma)(\alpha\beta - \gamma^2) = \mp 876,177,000,000,000$$

$$E = \mp \frac{876,177,000,000,000}{160,798,300,000} = \mp 5500 \text{ say}$$

☐ Temperature Stress for Lower chord ±30° C

| member | Jh | H.Jh | Ja | Je | Jd-Je | DJd+EJe | Summary |
|---|---|---|---|---|---|---|---|
| -6 | 0,000 | 0,000 | 1,402 | 0,000 | 1,402 | 7,700 | ± 7,700 |
| -5 | " | " | 2.482 | " | 2.482 | 13,700 | 13,700 |
| -4 | " | " | 3.310 | " | 3.310 | 18.200 | 18,200 |
| -3 | " | " | 3.952 | " | 3.952 | 21.700 | 21,700 |
| -2 | " | " | 4.452 | " | 4.452 | 24.500 | 24,500 |
| -1 | " | " | 4.842 | " | 4,842 | 26,600 | 26,600 |
| -0 | 0.000 | 0.000 | 5.167 | " | 5,167 | 28,400 | 28,400 |
| 0 | -1,489 | ±12,800 | 5.167 | 0,257 | 4.910 | 27.000 | 39,800 |
| 1 | -2.304 | 19,800 | 5.397 | 0,567 | 4.830 | 26,600 | 46,400 |
| 2 | -3,211 | 27,600 | 5.666 | 0,943 | 4,723 | 26,000 | 53,600 |
| 3 | -4.231 | 36,400 | 5.976 | 1,405 | 4,571 | 25,100 | 61,500 |
| 4 | -5.384 | 46,300 | 6,322 | 1,975 | 4,347 | 23,900 | 70,200 |
| 5 | -6.715 | 57,800 | 6.715 | 2675 | 4,040 | 22,200 | 80,000 |
| 6 | -8,169 | 70,300 | 7,133 | 3.515 | 3.618 | 19.900 | 90,200 |
| 7 | -9.765 | 84,000 | 7.581 | 4.495 | 3,036 | 16,700 | 100,700 |
| 8 | -11.420 | 98,200 | 7.866 | 5.557 | 2.309 | 12,700 | 110,900 |
| 9 | -12.938 | 111,200 | 8.027 | 6,586 | 1,441 | 7,800 | 119,000 |
| 10 | -14.040 | ±120,700 | 7,903 | 7,903 | 0,000 | 0,000 | ± 120,700 |

☐ Temperature Stress for Upper chord.

| member | Jh | H.Jh | Ja | Je | Jd-Je | DJd+EJe | Summary |
|---|---|---|---|---|---|---|---|
| -6 | 0,000 | 0,000 | -1,381 | 0.000 | -1,381 | ± 7,600 | ± 7,600 |
| -5 | " | " | - 2.419 | " | 2.419 | 13,300 | 13,300 |
| -4 | " | " | - 3.186 | " | 3.186 | 17,500 | 17,500 |
| -3 | " | " | - 3,748 | " | 3,748 | 20,600 | 20,600 |
| -2 | " | " | - 4,160 | " | 4.160 | 22,900 | 22,900 |
| -1 | " | " | - 4,470 | " | 4,470 | 24,600 | 24,600 |
| 1 | 0.821 | ± 7,100 | - 4,976 | - 0,237 | 4,742 | 26,100 | 33,200 |
| 2 | 1,748 | 15,000 | - 5,292 | - 0,529 | 4763 | 26,200 | 41,200 |
| 3 | 2.804 | 24,100 | - 5,663 | - 0,894 | 4,769 | 26,200 | 50,300 |
| 4 | 4,013 | 34,500 | - 6,080 | - 1,357 | 4,729 | 26,000 | 60,500 |
| 5 | 5,399 | 46,400 | - 6,542 | - 1,924 | 4,618 | 25,400 | 71,800 |
| 6 | 6,956 | 59,800 | - 7,032 | - 2,637 | 4,395 | 24,200 | 84,000 |
| 7 | 8,678 | 74,600 | - 7,512 | - 3,506 | 4,006 | 22,000 | 96,600 |
| 8 | 10,428 | 89,700 | - 7,898 | - 4,574 | 3,384 | 18,600 | 108,300 |
| 9 | 12,012 | 103,300 | - 8,089 | - 5,600 | 2,489 | 13,700 | 117,000 |
| 10 | 13,126 | 112,900 | - 7,955 | - 6,629 | 1,326 | 7,300 | 120,200 |
| 11 | 13,500 | 116,100 | - 7,438 | - 7,438 | 0,000 | 0,000 | ± 116,100 |

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken.

## Temperature stress for Diagonals.

| Member | Th | HTh | Td | Te | Td-Te | DTd + ETe | Summary |
|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | -1.328 | 0.000 | -1.328 | ± 7,300 | ± 7,300 |
| -6 | " | " | -0.937 | " | -0.937 | 5,200 | 5,200 |
| -5 | " | " | -0.635 | " | -0.635 | 3,500 | 3,500 |
| -4 | " | " | -0.413 | " | -0.413 | 2,300 | 2,300 |
| -3 | " | " | -0.253 | " | -0.253 | 1,400 | 1,400 |
| -2 | " | " | -0.137 | " | -0.137 | 800 | 800 |
| -1 | " | " | -0.056 | " | -0.056 | 300 | 300 |
| 1 | -0.967 | ± 8,300 | 0.474 | 0.246 | 0.228 | ∓ 1,300 | 9,600 |
| 2 | -1.071 | 9,200 | 0.504 | 0.301 | 0.203 | 1,100 | 10,300 |
| 3 | -1.206 | 10,370 | 0.546 | 0.374 | 0.172 | 900 | 11,300 |
| 4 | -1.377 | 11,800 | 0.592 | 0.469 | 0.123 | 700 | 12,500 |
| 5 | -1.581 | 13,600 | 0.632 | 0.596 | 0.036 | 200 | 13,800 |
| 6 | -1.799 | 15,500 | 0.671 | 0.750 | -0.079 | 400 | 15,900 15100 |
| 7 | -1.980 | 17,000 | 0.655 | 0.916 | -0.261 | 1,400 | 18,400 15,600 |
| 8 | -2.053 | 17,700 | 0.564 | 1.097 | -0.534 | 2,900 | 20,600 11,400 |
| 9 | -1.876 | 16,100 | 0.334 | 1.199 | -0.865 | 4,800 | 20,900 11,400 |
| 10 | -1.362 | 11,700 | -0.034 | 1.156 | -1.190 | 6,500 | 18,200 5,200 |
| 11 | -0.513 | 4,400 | -0.500 | 0.932 | -1.432 | 7,900 | 12,300 3,500 |

## Temperature Stress for Verticals.

| member | Th | H.Th | Td | Te | Td-Te | DTd+ETe | Summary |
|---|---|---|---|---|---|---|---|
| -7 | 0.000 | 0.000 | 1.000 | 0.000 | 1.000 | ± 5,500 | ± 5,500 |
| -6 | " | " | 0.955 | " | 0.955 | 5,300 | 5,300 |
| -5 | " | " | 0.868 | " | 0.868 | 4,800 | 4,800 |
| -4 | " | " | 0.763 | " | 0.763 | 4,200 | 4,200 |
| -3 | " | " | 0.651 | " | 0.651 | 3,400 | 3,400 |
| -2 | " | " | 0.540 | " | 0.540 | 3,000 | 3,000 |
| -1 | " | " | 0.436 | " | 0.436 | 2,400 | 2,400 |
| 0 | " | " | -6.342 | -0.318 | -6.024 | 33,100 | 33,100 |
| 1 | 1.075 | -9.200 | -0.305 | -0.347 | +0.042 | 200 | 9,400 9,000 |
| 2 | 1.085 | -9.300 | -0.267 | -0.377 | 0.110 | 600 | 9,900 8,700 |
| 3 | 1.049 | -9.000 | -0.209 | -0.401 | 0.192 | 1,100 | 10,100 7.900 |
| 4 | 0.981 | -8.400 | -0.134 | -0.418 | 0.284 | 1,600 | 10,000 6.800 |
| 5 | 0.871 | -7.500 | -0.037 | -0.423 | 0.386 | 2,100 | 9,600 5.600 |
| 6 | 0.699 | -6.000 | 0.089 | -0.404 | 0.493 | 2,700 | 8,700 3.300 |
| 7 | 0.450 | -3.900 | 0.248 | -0.352 | 0.600 | 3,300 | 7,200 600 |
| 8 | 0.117 | -1.000 | 0.436 | -0.248 | 0.684 | 3,800 | 4,800 2,800 |
| 9 | -0.328 | +2.800 | 0.645 | -0.092 | 0.737 | 4,100 | 6,900 |
| 10 | -0.818 | +7.000 | 0.846 | 0.121 | 0.725 | 4,000 | 11,000 |

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

Deflection of Truss.

find $\frac{S.l}{A}$ So for Upper chord, Lower chord, Diagonals and verticals.

Upper chord

| member | S. | l | A. | S.l/A |
|---|---|---|---|---|
| -7 | 0 | 13.54 | 21.18 | 0 |
| -6 | -82.500 | 13.91 | " | -54.167 |
| -5 | -104.500 | 14.35 | " | -70,780 |
| -4 | -97,600 | 14.84 | " | -68,364 |
| -3 | -66,200 | 15.39 | " | -48,088 |
| -2 | -18,000 | 15.97 | " | -13.568 |
| -1 | 42,900 | 16.60 | " | 33.613 |
| 1 | 94,200 | 16.60 | " | 73.808 |
| 2 | 77,200 | 15.97 | " | 58.192 |
| 3 | 62,100 | 15.39 | " | 45,110 |
| 4 | 58,900 | 14.84 | " | 41,256 |
| 5 | 52,000 | 14.35 | " | 35,221 |
| 6 | 48.900 | 13.91 | " | 32,105 |
| 7 | 49,200 | 13.54 | " | 31.443 |
| 8 | 51.000 | 13.23 | " | 31,847 |
| 9 | 53.900 | 13.00 | " | 33.073 |
| 10 | 57.900 | 12.84 | " | 35,090 |
| 11. | 58.600 | 12.76 | " | 35,293 |

Lower chord.

| member | S. | l | A | S.l/A |
|---|---|---|---|---|
| -6 | 83.600 | 14.06 | 21.18 | 55,480 |
| -5 | 105,900 | 14.77 | " | 73,827 |
| -4 | 100.100 | 15.44 | " | 72.949 |
| -3 | 69.900 | 16.23 | " | 53.547 |
| -2 | 19.300 | 17.09 | " | 15,568 |
| -1 | -35,900 | 18.01 | " | -30,518 |
| -0 | -111,500 | 18.98 | " | -99.888 |
| 0 | -449,200 | 18.98 | 43.58 | -196,094 |
| 1 | -404,300 | 18.01 | " | -167,472 |
| 2 | -371,400 | 17,09 | " | -145,986 |
| 3 | -341,200 | 16.23 | " | -127,366 |
| 4 | -323.400 | 15.44 | " | -114,846 |
| 5 | -307,900 | 14.72 | " | -104,243 |
| 6 | -290,800 | 14.09 | " | -94,240 |
| 7 | -280,000 | 13.58 | 33.26 | -114,072 |
| 8 | -274,100 | 13.18 | " | -108,379 |
| 9 | -273,200 | 12.91 | " | -105,810 |
| 10 | -269.500 | 12.77 | " | -103,245 |

Diagonals.

| member | S. | l | A | S.l/A |
|---|---|---|---|---|
| -7 | -79.900 | 13.38 | 9.92 | -107,761 |
| -6 | -25,200 | 13.52 | " | -34,343 |
| -5 | 10,200 | 13.80 | " | 14,189 |
| -4 | 34,600 | 14.26 | " | 49,735 |
| -3 | 48.800 | 14.96 | " | 73.589 |
| -2 | 58,300 | 15.94 | " | 93,673 |
| -1 | 65,200 | 17.27 | " | 113,500 |
| 1 | -22.900 | 17.27 | " | -39,865 |
| 2 | -23,600 | 15.94 | " | -37.919 |
| 3 | -22.500 | 14.96 | " | -33.929 |
| 4 | -22,400 | 14.26 | " | -32,198 |
| 5 | -20,600 | 13.80 | " | -28,655 |
| 6 | -20,400 | 13.52 | " | -27.802 |
| 7 | -17,600 | 13.38 | " | -23,737 |
| 8 | -11,600 | 13.34 | " | -15,598 |
| 9 | -4200 | 13.40 | " | -5.673 |
| 10 | 600 | 13.57 | " | 821 |
| 11 | -800 | 13.88 | " | -1.119 |

Verticals.

| member | S. | l | A | S.l/A |
|---|---|---|---|---|
| -7 | 60,300 | 8.61 | 11.39 | 45,584 |
| -6 | 30,000 | 10.07 | " | 26.524 |
| -5 | -800 | 11.86 | " | -833 |
| -4 | -29.900 | 13.98 | " | -36,700 |
| -3 | -56,500 | 16.42 | " | -81.455 |
| -2 | -79,600 | 19.20 | " | -134,185 |
| -1 | -99.900 | 22.29 | " | -195,510 |
| 0 | -222,700 | 25.71 | 27.38 | -208.985 |
| 1 | -44,700 | 22.29 | 11.39 | -87,480 |
| 2 | -38,700 | 19.20 | " | -65,239 |
| 3 | -38,200 | 16.42 | " | -55,072 |
| 4 | -38,300 | 13.98 | " | -47,011 |
| 5 | -37,700 | 11.86 | " | -39,257 |
| 6 | -44,600 | 10.07 | " | -39,433 |
| 7 | -35,800 | 8.61 | " | -27,063 |
| 8 | -30,500 | 7.46 | " | -19,977 |
| 9 | -31.600 | 6.65 | " | -18,450 |
| 10 | -26,500 | 6.16 | " | -14,332 |

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

So.m. for Upper chord.

| Member | So.-5 | So.-5' | Sum. | So.-3. | So.-3' | Sum. | So.-1 | So.-1' | Sum. | So.1 | So.1' | Sum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0 | 0 | 0 | 0 | 0 | 0 | 0. | 0 | 0 | 0 | 0 | 0 |
| -6 | 0.033 | -0.894 | -0.861 | 0.037 | -0.463 | -0.426 | 0.025 | -0.108 | -0.083 | -0.018 | 0.116 | 0.098 |
| -5 | 0.058 | -1.565 | -1.567 | 0.065 | -0.810 | -0.745 | 0.044 | -0.189 | -0.145 | -0.031 | 0.263 | 0.172 |
| -4 | 0.076 | -0.999 | -0.923 | 0.086 | -1.067 | -0.981 | 0.057 | -0.249 | -0.192 | -0.041 | 0.268 | 0.227 |
| -3 | 0.090 | -0.544 | -0.454 | 0.101 | -1.256 | -1.155 | 0.067 | -0.292 | -0.225 | -0.049 | 0.315 | 0.266 |
| -2 | 0.100 | -0.196 | -0.096 | 0.112 | -0.562 | -0.450 | 0.075 | -0.324 | -0.249 | -0.054 | 0.349 | 0.295 |
| -1 | 0.107 | 0.088 | 0.195 | 0.121 | -0.007 | 0.114 | 0.080 | -0.349 | -0.268 | -0.058 | 0.375 | 0.317 |
| 1 | 0.135 | 0.343 | 0.478 | 0.157 | 0.471 | 0.628 | 0.106 | 0.327 | 0.433 | -0.044 | -0.261 | -0.305 |
| 2 | 0.163 | 0.369 | 0.532 | 0.183 | 0.509 | 0.692 | 0.130 | 0.334 | 0.464 | -0.026 | -0.243 | -0.269 |
| 3 | 0.197 | 0.402 | 0.599 | 0.237 | 0.554 | 0.791 | 0.160 | 0.383 | 0.543 | -0.006 | -0.224 | -0.230 |
| 4 | 0.235 | 0.441 | 0.676 | 0.290 | 0.606 | 0.896 | 0.197 | 0.419 | 0.616 | 0.014 | -0.203 | -0.189 |
| 5 | 0.288 | 0.486 | 0.774 | 0.357 | 0.664 | 1.021 | 0.243 | 0.460 | 0.703 | 0.032 | -0.179 | -0.147 |
| 6 | 0.347 | 0.529 | 0.872 | 0.437 | 0.729 | 1.166 | 0.298 | 0.504 | 0.802 | 0.053 | -0.149 | -0.096 |
| 7 | 0.416 | 0.587 | 1.003 | 0.530 | 0.797 | 1.327 | 0.363 | 0.550 | 0.913 | 0.069 | -0.115 | -0.046 |
| 8 | 0.493 | 0.640 | 1.133 | 0.635 | 0.861 | 1.496 | 0.435 | 0.593 | 1.028 | 0.079 | -0.076 | 0.003 |
| 9 | 0.571 | 0.678 | 1.249 | 0.742 | 0.908 | 1.650 | 0.509 | 0.626 | 1.135 | 0.082 | -0.033 | 0.049 |
| 10 | 0.636 | 0.694 | 1.330 | 0.835 | 0.923 | 1.758 | 0.573 | 0.635 | 1.208 | 0.049 | 0.010 | 0.059 |
| 11. | 0.680 | 0.680 | 1.360 | 0.897 | 0.897 | 1.794 | 0.617 | 0.617 | 1.234 | 0.046 | 0.046 | 0.092 |

| Member | So.3 | So.3' | Sum | So.5 | So.5' | Sum | So.7 | So.7' | Sum. | So.9 | So.9' | Sum | So.11 | Sum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0 | 0. | 0 | 0 | 0 | 0 | 0. | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -6 | -0.076 | 0.195 | 0.119 | -0.124 | 0.206 | 0.082 | -0.145 | 0.156 | 0.011 | -0.127 | 0.057 | -0.070 | -0.050 | -0.100 |
| -5 | -0.133 | 0.341 | 0.208 | -0.218 | 0.360 | 0.142 | -0.254 | 0.273 | 0.019 | -0.223 | 0.099 | -0.124 | -0.087 | -0.174 |
| -4 | -0.175 | 0.449 | 0.274 | -0.287 | 0.475 | 0.188 | -0.334 | 0.360 | 0.026 | -0.293 | 0.131 | -0.162 | -0.115 | -0.230 |
| -3 | -0.206 | 0.528 | 0.322 | -0.338 | 0.558 | 0.220 | -0.394 | 0.423 | 0.029 | -0.345 | 0.154 | -0.191 | -0.135 | -0.270 |
| -2 | -0.229 | 0.587 | 0.358 | -0.374 | 0.620 | 0.246 | -0.437 | 0.470 | 0.033 | -0.383 | 0.171 | -0.212 | -0.150 | -0.300 |
| -1 | -0.246 | 0.630 | 0.384 | -0.402 | 0.666 | 0.264 | -0.469 | 0.505 | 0.036 | -0.411 | 0.183 | -0.228 | -0.161 | -0.322 |
| 1 | -0.152 | -0.209 | -0.361 | -0.278 | 0.448 | 0.170 | -0.293 | 0.468 | 0.175 | -0.207 | 0.287 | 0.080 | 0.025 | 0.050 |
| 2 | -0.093 | -0.369 | -0.462 | -0.128 | 0.103 | -0.025 | -0.091 | 0.342 | 0.251 | 0.018 | 0.348 | 0.366 | 0.205 | 0.410 |
| 3 | -0.007 | -1.117 | -1.124 | 0.021 | -0.370 | -0.349 | 0.109 | 0.127 | 0.236 | 0.231 | 0.354 | 0.585 | 0.357 | 0.714 |
| 4 | 0.080 | -1.020 | -0.940 | 0.174 | -1.011 | -0.837 | 0.307 | -0.207 | 0.100 | 0.427 | 0.284 | 0.711 | 0.471 | 0.942 |
| 5 | 0.166 | -0.908 | -0.742 | 0.321 | -1.873 | -1.552 | 0.489 | -0.704 | -0.215 | 0.593 | 0.107 | 0.700 | 0.520 | 1.040 |
| 6 | 0.246 | -0.776 | -0.530 | 0.450 | -1.638 | -1.188 | 0.638 | -1.418 | -0.780 | 0.697 | -0.226 | 0.471 | 0.468 | 0.936 |
| 7 | 0.315 | -0.617 | -0.302 | 0.553 | -1.351 | -0.798 | 0.735 | -2.397 | -1.662 | 0.717 | -0.754 | -0.037 | 0.282 | 0.564 |
| 8 | 0.354 | -0.433 | -0.079 | 0.596 | -1.013 | -0.417 | 0.736 | -1.911 | -1.175 | 0.600 | -1.538 | -0.938 | -0.105 | -0.210 |
| 9 | 0.347 | -0.232 | 0.115 | 0.560 | -0.633 | -0.073 | 0.598 | -1.349 | -0.751 | 0.274 | -2.595 | -2.321 | -0.728 | -1.456 |
| 10 | 0.281 | -0.027 | 0.254 | 0.394 | -0.236 | 0.158 | 0.294 | -0.743 | -0.449 | -0.254 | -1.783 | -2.037 | -1.554 | -3.108 |
| 11. | 0.152 | 0.152 | 0.304 | 0.121 | 0.121 | 0.242 | -0.170 | -0.170 | -0.340 | -0.964 | -0.964 | -1.928 | -2.598 | -5.196 |

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CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

So.m. for Lower chord.

| member | So.-5 | So.-5' | Sum | So.-3 | So.-3' | Sum | So.-1 | So.-1' | Sum | So.1 | So.1' | Sum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -6 | -0.034 | 0.907 | 0.873 | -0.038 | 0.470 | 0.432 | -0.025 | 0.109 | 0.084 | 0.018 | -0.118 | -0.100 |
| -5 | -0.060 | 1.606 | 1.546 | -0.067 | 0.831 | 0.764 | -0.045 | 0.194 | 0.149 | 0.032 | -0.208 | -0.176 |
| -4 | -0.079 | 1.039 | 0.960 | -0.089 | 1.109 | 1.020 | -0.060 | 0.258 | 0.198 | 0.032 | -0.278 | -0.246 |
| -3 | -0.095 | 0.580 | 0.485 | -0.107 | 1.324 | 1.217 | -0.071 | 0.308 | 0.237 | 0.051 | -0.332 | -0.281 |
| -2 | -0.107 | 0.208 | 0.101 | -0.120 | 0.601 | 0.481 | -0.080 | 0.347 | 0.267 | 0.058 | -0.374 | -0.318 |
| -1 | -0.116 | 0.095 | -0.021 | -0.131 | 0.007 | -0.124 | -0.087 | 0.378 | 0.291 | 0.063 | -0.407 | -0.344 |
| -0 | -0.124 | -0.348 | -0.472 | -0.140 | -0.484 | -0.624 | -0.093 | -0.335 | -0.428 | 0.067 | -0.434 | -0.367 |
| 0 | -0.124 | -0.348 | -0.472 | -0.140 | -0.484 | -0.624 | -0.093 | -0.335 | -0.428 | 0.003 | -0.498 | -0.495 |
| 1 | -0.148 | -0.369 | -0.517 | -0.170 | -0.512 | -0.682 | -0.114 | -0.355 | -0.469 | -0.014 | 0.222 | 0.208 |
| 2 | -0.174 | -0.395 | -0.569 | -0.206 | -0.545 | -0.751 | -0.139 | -0.378 | -0.517 | -0.031 | 0.203 | 0.172 |
| 3 | -0.207 | -0.460 | -0.632 | -0.249 | -0.584 | -0.833 | -0.169 | -0.405 | -0.574 | -0.048 | 0.182 | 0.134 |
| 4 | -0.247 | -0.425 | -0.707 | -0.302 | -0.630 | -0.932 | -0.205 | -0.435 | -0.640 | -0.067 | 0.158 | 0.091 |
| 5 | -0.293 | -0.499 | -0.792 | -0.365 | -0.681 | -1.046 | -0.249 | -0.471 | -0.720 | -0.086 | 0.132 | 0.046 |
| 6 | -0.351 | -0.543 | -0.894 | -0.443 | -0.739 | -1.182 | -0.301 | -0.511 | -0.812 | -0.101 | 0.104 | 0.003 |
| 7 | -0.417 | -0.590 | -1.007 | -0.531 | -0.800 | -1.332 | -0.364 | -0.552 | -0.916 | -0.115 | 0.069 | -0.046 |
| 8 | -0.492 | -0.638 | -1.130 | -0.632 | -0.857 | -1.489 | -0.433 | -0.591 | -1.024 | -0.125 | 0.030 | -0.095 |
| 9 | -0.567 | -0.674 | -1.241 | -0.737 | -0.901 | -1.638 | -0.505 | -0.621 | -1.126 | -0.125 | -0.011 | -0.136 |
| 10 | -0.633 | -0.699 | -1.332 | -0.829 | -0.917 | -1.746 | -0.569 | -0.532 | -1.101 | -0.113 | -0.053 | -0.166 |

| member | So.3 | So.3' | Sum | So.5 | So.5' | Sum | So.7 | So.7 | Sum | So.9 | So.9' | Sum | So.11 | Sum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -6 | 0.077 | -0.198 | -0.121 | 0.126 | -0.209 | -0.084 | 0.147 | -0.158 | -0.011 | 0.129 | -0.058 | 0.071 | 0.050 | 0.100 |
| -5 | 0.137 | -0.350 | -0.213 | 0.223 | -0.370 | -0.147 | 0.261 | -0.280 | -0.019 | 0.228 | -0.102 | 0.126 | 0.089 | 0.178 |
| -4 | 0.182 | -0.467 | -0.285 | 0.298 | -0.493 | -0.195 | 0.348 | -0.374 | -0.026 | 0.305 | -0.136 | 0.169 | 0.119 | 0.238 |
| -3 | 0.217 | -0.557 | -0.340 | 0.356 | -0.589 | -0.233 | 0.415 | -0.447 | -0.032 | 0.364 | -0.162 | 0.202 | 0.142 | 0.284 |
| -2 | 0.245 | -0.628 | -0.383 | 0.401 | -0.663 | -0.262 | 0.467 | -0.503 | -0.036 | 0.410 | -0.183 | 0.227 | 0.160 | 0.320 |
| -1 | 0.266 | -0.683 | -0.417 | 0.436 | -0.721 | -0.285 | 0.508 | -0.547 | -0.039 | 0.445 | -0.199 | 0.246 | 0.174 | 0.348 |
| -0 | 0.284 | -0.729 | -0.445 | 0.465 | -0.770 | -0.305 | 0.543 | -0.584 | -0.041 | 0.475 | -0.282 | 0.193 | 0.186 | 0.372 |
| 0 | -0.014 | -1.027 | -1.041 | -0.086 | -1.321 | -1.407 | -0.258 | -1.385 | -1.643 | -0.516 | -1.273 | -1.789 | -0.876 | -1.752 |
| 1 | -0.090 | -0.511 | -0.601 | -0.222 | -1.010 | -1.232 | -0.435 | -1.236 | -1.671 | -0.716 | -1.216 | -1.932 | -1.035 | -2.070 |
| 2 | -0.167 | 0.128 | -0.039 | -0.357 | -0.605 | -0.962 | -0.616 | -1.080 | -1.696 | -0.909 | -1.263 | -2.172 | -1.174 | -2.348 |
| 3 | -0.246 | 0.924 | 0.494 | -0.444 | -0.079 | -0.523 | -0.796 | -0.813 | -1.609 | -1.090 | -1.220 | -2.310 | -1.286 | -2.572 |
| 4 | -0.325 | 0.819 | 0.678 | -0.628 | 0.604 | -0.024 | -0.965 | -0.431 | -1.396 | -1.250 | -1.101 | -2.351 | -1.352 | -2.704 |
| 5 | -0.406 | 0.697 | 0.291 | -0.735 | 1.489 | 0.754 | 1.129 | 0.094 | -1.035 | -1.389 | -0.890 | -2.279 | -1.371 | -2.742 |
| 6 | -0.473 | 0.564 | -0.091 | -0.869 | 1.249 | 0.380 | -1.240 | 0.847 | -0.393 | -1.447 | -0.511 | -1.958 | -1.272 | -2.544 |
| 7 | -0.529 | 0.406 | -0.123 | -0.949 | 0.960 | 0.011 | -1.306 | 1.834 | 0.528 | -1.426 | 0.047 | -1.379 | -1.031 | -2.062 |
| 8 | -0.559 | 0.225 | -0.334 | -0.976 | 0.627 | -0.349 | -1.285 | 1.351 | 0.066 | -1.275 | 0.845 | -0.430 | -0.633 | -1.266 |
| 9 | -0.548 | 0.027 | -0.521 | -0.922 | 0.253 | -0.669 | -1.134 | 0.797 | -0.337 | -0.945 | 1.903 | 0.958 | 0.001 | 0.002 |
| 10 | -0.480 | -0.173 | -0.653 | -0.760 | -0.126 | -0.886 | -0.825 | 0.205 | -0.620 | -0.413 | 1.106 | 0.693 | 0.860 | 1.720 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY MO DATE FILE NO

CHECKED BY DATE PAGE NO 137

CALCULATIONS FOR

Arakawa-Bashi for Saitama-Ken

Som. for diagonals.

| member | So.-5 | So-5' | Sum. | So.-3 | So-3' | Sum. | So-1. | So.-1' | Sum | So.1 | So.1' | Sum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.032 | -0.859 | -0.827 | 0.036 | -0.445 | -0.409 | 0.024 | -0.104 | -0.080 | -0.017 | 0.112 | 0.095 |
| -6 | 0.022 | -0.606 | -0.584 | 0.025 | -0.314 | -0.289 | 0.017 | -0.073 | -0.056 | -0.012 | 0.079 | 0.067 |
| -5 | 0.015 | 0.576 | 0.591 | 0.017 | -0.213 | -0.196 | 0.011 | -0.050 | -0.039 | -0.008 | 0.053 | 0.045 |
| -4 | 0.010 | 0.449 | 0.459 | 0.012 | -0.138 | -0.126 | 0.007 | -0.032 | -0.025 | -0.005 | 0.035 | 0.030 |
| -3 | 0.006 | 0.352 | 0.358 | 0.007 | 0.694 | 0.701 | 0.005 | -0.020 | -0.015 | -0.003 | 0.021 | 0.018 |
| -2 | 0.003 | 0.279 | 0.282 | 0.004 | 0.553 | 0.557 | 0.002 | -0.010 | -0.008 | -0.002 | 0.012 | 0.010 |
| -1 | 0.001 | 0.225 | 0.226 | 0.002 | 0.448 | 0.450 | 0.001 | 0.668 | 0.669 | -0.001 | 0.005 | 0.004 |
| 1 | -0.028 | -0.038 | -0.066 | -0.037 | -0.051 | -0.088 | -0.025 | -0.835 | -0.060 | -0.022 | 0.660 | 0.638 |
| 2 | -0.032 | -0.041 | -0.073 | -0.042 | -0.055 | -0.097 | -0.029 | -0.038 | -0.067 | -0.021 | -0.012 | -0.033 |
| 3 | -0.038 | -0.046 | -0.084 | -0.050 | -0.061 | -0.111 | -0.034 | -0.042 | -0.076 | -0.023 | -0.015 | -0.038 |
| 4 | -0.045 | -0.051 | -0.096 | -0.060 | -0.069 | -0.129 | -0.041 | -0.047 | -0.088 | -0.023 | -0.018 | -0.041 |
| 5 | -0.055 | -0.056 | -0.111 | -0.072 | -0.074 | -0.146 | -0.049 | -0.052 | -0.101 | -0.025 | -0.023 | -0.048 |
| 6 | -0.067 | -0.064 | -0.131 | -0.088 | -0.083 | -0.171 | -0.066 | -0.058 | -0.124 | -0.024 | -0.027 | -0.051 |
| 7 | -0.085 | -0.066 | -0.151 | -0.108 | -0.087 | -0.195 | -0.073 | -0.059 | -0.132 | -0.021 | -0.034 | -0.055 |
| 8 | -0.088 | -0.066 | -0.154 | -0.118 | -0.084 | -0.202 | -0.081 | -0.058 | -0.139 | -0.016 | -0.039 | -0.054 |
| 9 | -0.088 | -0.051 | -0.139 | -0.121 | -0.062 | -0.183 | -0.083 | -0.043 | -0.126 | -0.007 | -0.046 | -0.053 |
| 10 | -0.077 | -0.027 | -0.099 | -0.104 | -0.028 | -0.132 | -0.074 | -0.019 | -0.093 | 0.008 | -0.046 | -0.038 |
| 11 | -0.051 | 0.012 | -0.039 | -0.073 | 0.022 | -0.051 | -0.051 | 0.015 | -0.036 | 0.026 | -0.040 | -0.014 |

| member | So.3 | So.3' | Sum. | So.5 | So.5' | Sum | So.7 | So.7' | Sum. | So.9 | So.9' | Sum | So.11 | Sum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | -0.073 | 0.187 | 0.114 | -0.119 | 0.198 | 0.079 | -0.139 | 0.150 | 0.011 | -0.122 | 0.054 | -0.068 | -0.048 | -0.096 |
| -6 | -0.051 | 0.132 | 0.081 | -0.084 | 0.140 | 0.056 | -0.098 | 0.106 | 0.008 | -0.086 | 0.038 | -0.048 | -0.034 | -0.068 |
| -5 | -0.035 | 0.089 | 0.054 | -0.057 | 0.095 | 0.038 | -0.067 | 0.072 | 0.005 | -0.058 | 0.026 | -0.032 | -0.023 | -0.046 |
| -4 | -0.023 | 0.058 | 0.035 | -0.037 | 0.062 | 0.025 | -0.043 | 0.047 | 0.004 | -0.038 | 0.017 | -0.021 | -0.015 | -0.030 |
| -3 | -0.014 | 0.036 | 0.022 | -0.023 | 0.038 | 0.015 | -0.027 | 0.029 | 0.002 | -0.023 | 0.010 | -0.013 | -0.009 | -0.018 |
| -2 | -0.007 | 0.019 | 0.012 | -0.012 | 0.020 | 0.008 | -0.014 | 0.015 | 0.001 | -0.013 | 0.006 | -0.007 | -0.005 | -0.010 |
| -1 | -0.003 | 0.008 | 0.005 | -0.005 | 0.008 | 0.003 | -0.006 | 0.006 | 0.000 | -0.005 | 0.002 | -0.003 | -0.002 | -0.004 |
| 1 | -0.096 | 0.423 | 0.327 | -0.176 | 0.192 | 0.016 | -0.248 | -0.015 | -0.263 | -0.292 | -0.182 | -0.474 | -0.276 | -0.552 |
| 2 | -0.099 | 0.548 | 0.449 | -0.181 | 0.288 | 0.107 | -0.252 | 0.049 | -0.203 | -0.291 | -0.145 | -0.436 | -0.260 | -0.520 |
| 3 | -0.104 | 0.716 | 0.612 | -0.186 | 0.415 | 0.229 | -0.255 | 0.134 | -0.121 | -0.287 | -0.096 | -0.383 | -0.240 | -0.480 |
| 4 | -0.107 | -0.078 | -0.185 | -0.191 | 0.585 | 0.394 | -0.257 | 0.253 | -0.004 | -0.277 | -0.025 | -0.302 | -0.206 | -0.412 |
| 5 | -0.100 | -0.102 | -0.202 | -0.191 | 0.818 | 0.627 | -0.249 | 0.425 | 0.176 | -0.251 | 0.085 | -0.166 | -0.146 | -0.292 |
| 6 | -0.107 | -0.127 | -0.234 | -0.182 | -0.216 | -0.398 | -0.225 | 0.649 | 0.424 | -0.201 | 0.238 | 0.037 | -0.054 | -0.108 |
| 7 | -0.092 | -0.157 | -0.249 | -0.148 | -0.281 | -0.429 | -0.176 | 0.949 | 0.773 | -0.105 | 0.460 | 0.355 | -0.100 | -0.200 |
| 8 | -0.065 | -0.189 | -0.254 | -0.088 | -0.341 | -0.429 | -0.064 | -0.481 | -0.545 | 0.053 | 0.751 | 0.698 | 0.312 | 0.624 |
| 9 | -0.012 | -0.215 | -0.203 | -0.013 | -0.400 | -0.413 | 0.097 | -0.583 | -0.486 | 0.277 | 1.072 | 1.349 | 0.602 | 1.204 |
| 10 | 0.057 | -0.217 | -0.160 | 0.147 | -0.416 | -0.269 | 0.294 | -0.631 | -0.337 | 0.531 | -0.836 | -0.305 | 0.887 | 1.774 |
| 11 | 0.137 | -0.196 | -0.059 | 0.292 | -0.389 | -0.097 | 0.500 | -0.620 | -0.120 | 0.772 | -0.878 | -0.106 | 1.113 | 2.226 |

JIUN MASUDA
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO

CHECKED BY DATE PAGE NO 138

CALCULATIONS FOR

Arakawa-Bashi for Daitama-Line

Sum for Verticals.

| number | No.-5 | No.-5' | Sum. | No.-3 | No.-3' | Sum. | No.-1 | No.-1' | Sum. | No.1 | No.1' | Sum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | -0.024 | 0.647 | 0.623 | -0.027 | 0.335 | 0.308 | -0.018 | 0.078 | 0.060 | 0.013 | -0.084 | -0.071 |
| -6 | -0.023 | 0.618 | 0.595 | -0.026 | 0.320 | 0.294 | -0.017 | 0.074 | 0.057 | 0.012 | -0.080 | -0.068 |
| -5 | -0.021 | -0.438 | -0.359 | -0.023 | 0.291 | 0.268 | -0.016 | 0.068 | 0.052 | 0.011 | -0.073 | -0.062 |
| -4 | -0.018 | -0.427 | -0.445 | -0.021 | 0.256 | 0.235 | -0.014 | 0.060 | 0.046 | 0.010 | -0.064 | -0.054 |
| -3 | -0.016 | -0.405 | -0.421 | -0.018 | -0.782 | -0.800 | -0.012 | 0.051 | 0.039 | 0.008 | -0.055 | -0.047 |
| -2 | -0.013 | -0.375 | -0.388 | -0.015 | -0.727 | -0.742 | -0.010 | 0.042 | 0.032 | 0.007 | -0.045 | -0.038 |
| -1 | -0.010 | -0.340 | -0.350 | -0.012 | -0.667 | -0.679 | -0.008 | -0.966 | -0.974 | 0.006 | -0.037 | -0.031 |
| 0 | 0.173 | 0.203 | 0.376 | 0.200 | 0.000 | 0.200 | 0.134 | -0.441 | -0.307 | -0.100 | -0.426 | -0.526 |
| 1 | 0.030 | 0.029 | 0.059 | 0.041 | 0.038 | 0.079 | 0.028 | 0.026 | 0.054 | 0.021 | -0.975 | -0.954 |
| 2 | 0.031 | 0.027 | 0.058 | 0.042 | 0.035 | 0.077 | 0.030 | 0.024 | 0.054 | 0.022 | 0.026 | 0.048 |
| 3 | 0.033 | 0.024 | 0.057 | 0.044 | 0.031 | 0.075 | 0.031 | 0.021 | 0.052 | 0.018 | 0.028 | 0.046 |
| 4 | 0.032 | 0.020 | 0.052 | 0.043 | 0.024 | 0.067 | 0.029 | 0.017 | 0.046 | 0.015 | 0.029 | 0.044 |
| 5 | 0.029 | 0.013 | 0.042 | 0.040 | 0.015 | 0.055 | 0.028 | 0.010 | 0.038 | 0.012 | 0.030 | 0.042 |
| 6 | 0.026 | 0.004 | 0.030 | 0.036 | 0.003 | 0.039 | 0.024 | 0.001 | 0.025 | 0.006 | 0.030 | 0.036 |
| 7 | 0.017 | -0.009 | 0.008 | 0.026 | -0.013 | 0.013 | 0.019 | -0.010 | 0.009 | 0.001 | 0.028 | 0.029 |
| 8 | 0.007 | -0.023 | -0.016 | 0.011 | -0.034 | -0.023 | 0.008 | -0.024 | -0.016 | -0.003 | 0.027 | 0.024 |
| 9 | -0.010 | -0.042 | -0.052 | -0.009 | -0.059 | -0.068 | -0.006 | -0.042 | -0.048 | -0.011 | 0.025 | 0.014 |
| 10 | -0.029 | -0.060 | -0.089 | -0.034 | -0.083 | -0.117 | -0.023 | -0.057 | -0.080 | -0.017 | 0.017 | 0.000 |

| Member | No.3. | No.3' | Sum. | No.5 | No.5' | Sum | No.7 | No.7' | Sum. | No.9 | No.9' | Sum. | No.11 | Sum. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0.055 | -0.141 | -0.086 | 0.090 | -0.149 | -0.059 | 0.105 | -0.113 | -0.008 | 0.092 | -0.041 | 0.051 | 0.036 | 0.072 |
| -6 | 0.053 | -0.135 | -0.082 | 0.086 | -0.142 | -0.056 | 0.100 | -0.108 | -0.008 | 0.088 | -0.039 | 0.049 | 0.034 | 0.068 |
| -5 | 0.048 | -0.122 | -0.074 | 0.078 | -0.129 | -0.051 | 0.091 | -0.098 | -0.007 | 0.080 | -0.036 | 0.044 | 0.031 | 0.062 |
| -4 | 0.042 | -0.108 | -0.066 | 0.069 | -0.114 | -0.045 | 0.080 | -0.086 | -0.006 | 0.070 | -0.031 | 0.039 | 0.027 | 0.054 |
| -3 | 0.036 | -0.092 | -0.057 | 0.059 | -0.097 | -0.038 | 0.068 | -0.074 | -0.006 | 0.060 | -0.026 | 0.034 | 0.023 | 0.046 |
| -2 | 0.030 | -0.076 | -0.047 | 0.049 | -0.080 | -0.031 | 0.057 | -0.061 | -0.004 | 0.050 | -0.022 | 0.028 | 0.019 | 0.038 |
| -1 | 0.024 | -0.062 | -0.038 | 0.039 | -0.065 | -0.026 | 0.046 | -0.049 | -0.003 | 0.040 | -0.018 | 0.022 | 0.016 | 0.032 |
| 0 | -0.440 | 0.013 | -0.427 | -0.751 | 0.143 | -0.608 | -0.948 | 0.002 | -0.946 | -0.979 | -0.360 | -1.339 | -0.739 | -1.478 |
| 1 | 0.097 | -0.704 | -0.607 | 0.175 | -0.432 | -0.257 | 0.234 | -0.173 | 0.061 | 0.253 | 0.048 | 0.301 | 0.197 | 0.394 |
| 2 | 0.095 | -0.788 | -0.693 | 0.164 | -0.507 | -0.343 | 0.218 | -0.237 | -0.019 | 0.227 | -0.003 | 0.224 | 0.158 | 0.316 |
| 3 | 0.084 | -0.873 | -0.789 | 0.142 | -0.593 | -0.451 | 0.182 | -0.320 | -0.138 | 0.179 | -0.076 | 0.103 | 0.105 | 0.210 |
| 4 | 0.069 | 0.153 | 0.222 | 0.114 | -0.672 | -0.558 | 0.139 | -0.402 | -0.263 | 0.119 | -0.159 | -0.040 | 0.022 | 0.044 |
| 5 | 0.051 | 0.140 | 0.191 | 0.080 | -0.737 | -0.657 | 0.086 | -0.481 | -0.395 | 0.049 | -0.243 | -0.194 | -0.059 | -0.118 |
| 6 | 0.023 | 0.137 | 0.160 | 0.026 | 0.262 | 0.288 | 0.008 | -0.561 | -0.553 | -0.050 | -0.347 | -0.397 | -0.170 | -0.340 |
| 7 | 0.003 | 0.142 | 0.145 | -0.010 | 0.275 | 0.265 | -0.048 | -0.578 | -0.626 | -0.116 | -0.396 | -0.512 | -0.235 | -0.470 |
| 8 | -0.024 | 0.135 | 0.111 | -0.057 | 0.268 | 0.211 | -0.112 | 0.423 | 0.311 | -0.190 | -0.424 | -0.614 | -0.298 | -0.596 |
| 9 | -0.056 | 0.116 | 0.060 | -0.114 | 0.236 | 0.122 | -0.189 | 0.396 | 0.207 | -0.273 | -0.422 | -0.695 | -0.358 | -0.716 |
| 10 | -0.082 | 0.087 | 0.005 | -0.158 | 0.186 | 0.028 | -0.241 | 0.326 | 0.085 | -0.315 | 0.640 | 0.325 | -0.358 | -0.716 |

**JIUN MASUDA**
CONSULTING ENGINEER
SEIYU BLDG, TOKIO

MADE BY M.O DATE FILE NO
CHECKED BY DATE PAGE NO 139

CALCULATIONS FOR

Arakawa-Bashi for Saitama-ken

$\frac{S.l}{A}$ No. for Upper chords.

| member | S.l/A | No.-5 | No.-3 | No.-1 | No.1 | No.3 | No.5 | No.7 | No.9 | No.11 |
|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -6 | -54,167 | +46,640 | 23,080 | 4,500 | -5,310 | -4,440 | -6,450 | -600 | 3790 | 5,420 |
| -5 | -70,780 | 106,670 | 52,730 | 10,260 | -12,170 | -10,050 | -14,720 | -1340 | 8.780 | 12,320 |
| -4 | -68,364 | 63,100 | 67.070 | 13,130 | -15,520 | -12,850 | -18,730 | -1,780 | 11.070 | 15,720 |
| -3 | -48,088 | 21,830 | 55,540 | 10,820 | -12,790 | -10,580 | -15,480 | -1,400 | 9,180 | 12,980 |
| -2 | -13,568 | 1,300 | 6,110 | 3,360 | -4,000 | -3,340 | -4,860 | -450 | 2,880 | 4,070 |
| -1 | 33,613 | 6,550 | 3,830 | -9,010 | 10,660 | 8,870 | 12,910 | 1,210 | -7,660 | -10,820 |
| 1 | 73,808 | 35,280 | 46,350 | 31,960 | -22,510 | 12,550 | -26,640 | 12,920 | 5,900 | 3,690 |
| 2 | 58,192 | 30,960 | 40,270 | 27,000 | -15,650 | -1,450 | -26,880 | 14,610 | 21,300 | 23,860 |
| 3 | 45,110 | 27,020 | 35,680 | 24,490 | -10,380 | -15,740 | -50,700 | 10,650 | 26,390 | 32,210 |
| 4 | 41,256 | 27,890 | 36,970 | 25,410 | -7,800 | -34,530 | -38,780 | 4,130 | 29,330 | 38,860 |
| 5 | 35,221 | 27,260 | 35,960 | 24,760 | -5,180 | -54,660 | -26,130 | -7,570 | 24,650 | 36,630 |
| 6 | 32,105 | 28,120 | 37,430 | 25,750 | -3,080 | -38,140 | -17,020 | -23,040 | 13,126 | 30,050 |
| 7 | 31,443 | 31,540 | 41,720 | 28,710 | -1,450 | -25,090 | -9,500 | -52,260 | -1,160 | 17,730 |
| 8 | 31,847 | 36,080 | 47,640 | 32,740 | 100 | -13,280 | -2,520 | -37,420 | -29,870 | -6,690 |
| 9 | 33,073 | 41,310 | 54,570 | 37,540 | 1,620 | -2,410 | 3,800 | -24,840 | -76,760 | -48,150 |
| 10 | 35,090 | 46,670 | 61,690 | 42,390 | 2,070 | 5,540 | 8,910 | -15,760 | -71,480 | -109,060 |
| 11 | 35,293 | 48,000 | 63,320 | 43,530 | 3,250 | 8,540 | 10,730 | -12,000 | -68,040 | -183,380 |
| Summary | | 626,220 | 709,960 | 377,360 | -98,140 | -191,060 | -222,060 | -136,940 | -96,580 | -124,990 |

$\frac{S.l}{A}$ No for Lower chords.

| member | S.l/A | No.-5 | No.-3 | No.-1 | No.1 | No.3 | No.5 | No.7 | No.9 | No.11 |
|---|---|---|---|---|---|---|---|---|---|---|
| -6 | 55,480 | 48,430 | 23,970 | 4,660 | -5,550 | -4,710 | -4,660 | -610 | 3,940 | 5,556 |
| -5 | 73,827 | 114,140 | 56,400 | 11,000 | -12,990 | -15,720 | -10,850 | -1,400 | 9,300 | 13,140 |
| -4 | 72,949 | 70,030 | 74,400 | 14,400 | -17,950 | -20,790 | -14,230 | -1,900 | 12,330 | 17,360 |
| -3 | 53,547 | 25,970 | 65,170 | 12,690 | -15,050 | -18,210 | -12,480 | -1,710 | 10,820 | 15210 |
| -2 | 15,568 | 1,570 | 7,490 | 4,160 | -4,950 | -5,960 | -4080 | -560 | 3,530 | 4,980 |
| -1 | -30,578 | 640 | 3,780 | -8,880 | 10,500 | 12,730 | 8,700 | 1,200 | -7,570 | -10,620 |
| -0 | -99,888 | 47,150 | 62,330 | 42,750 | 36,660 | 44,450 | 30,470 | 4,100 | -19,280 | -37,160 |
| 0 | -196,094 | 92,560 | 122,360 | 83,930 | 97,070 | 204,130 | 275,900 | 322,186 | 350,810 | 343,560 |
| 1 | -167,472 | 86,580 | 114,220 | 78,540 | -34,830 | 100,680 | 206,330 | 279,850 | 323,560 | 346,670 |
| 2 | -145,986 | 83,070 | 109,640 | 75,470 | -25,110 | 5,690 | 140,440 | 247,590 | 317,080 | 342,780 |
| 3 | -127,366 | 80,500 | 106,100 | 73,110 | -17,070 | -62,920 | 66,610 | 204,930 | 294,220 | 327,590 |
| 4 | -114,846 | 81,200 | 70,360 | 73,500 | -4,510 | -77,870 | 2,760 | 160,330 | 270,000 | 310,540 |
| 5 | -104,243 | 82,560 | 109,040 | 75,050 | -4,800 | -30,330 | -78,600 | 107,890 | 237,570 | 285,830 |
| 6 | -94,240 | 84,250 | 111,390 | 76,520 | -280 | 8,580 | -35,810 | 32,040 | 184,520 | 239,750 |
| 7 | -114,072 | 114,870 | 151,830 | 104,490 | 5,250 | 14,030 | -1,250 | -60,230 | 157,310 | 235,220 |
| 8 | -108,379 | 122,470 | 161,380 | 110,980 | 10,300 | 36,200 | 37,820 | -7,150 | 46,600 | 137,210 |
| 9 | -105,810 | 131,310 | 173,320 | 119,140 | 14,390 | 55,130 | 70,790 | 35,660 | -101,370 | -210 |
| 10 | -103,245 | 137,520 | 180,270 | 113,670 | 17,140 | 67,420 | 91,480 | 64,010 | -71,550 | -177,580 |
| Summary | | 1404,820 | 1703,450 | 1065,220 | 48,220 | 310,500 | 769,340 | 1386,220 | 2021,880 | 2399,820 |

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CALCULATIONS FOR

# Arakawa-Bashi for Saitama-Ken

## $\frac{Sl}{A}$ So for Diagonals

| Member | Sl/A | So,-5 | So,-3 | So,-1 | So1. | So,3 | So,5 | So,7 | So,9 | So.11 |
|---|---|---|---|---|---|---|---|---|---|---|
| -7 | -107,761 | 89,120 | 44070 | 8,620 | -10,240 | -12280 | -8,810 | -1,190 | 7,330 | 10,350 |
| -6 | -34,343 | 20,660 | 9,930 | 1,920 | -2,300 | -2,780 | -1,920 | -270 | 1,650 | 2,340 |
| -5 | 14189 | 8,390 | -2,780 | -550 | 640 | 780 | 540 | 70 | -450 | -650 |
| -4 | 49,735 | 22,830 | -6,270 | -1,240 | 1,490 | 1,740 | 1,240 | 200 | -1,040 | -1,490 |
| -3 | 73,589 | 26,340 | 51,590 | -1,100 | 1,320 | 1,620 | 1,100 | 150 | -960 | -1,320 |
| -2 | 93,673 | 26,420 | 52,180 | -750 | 940 | 1,120 | 750 | 90 | -650 | -940 |
| -1 | 113,500 | 25,650 | 57,080 | 75,930 | 450 | 570 | 340 | 0 | -340 | -450 |
| 1 | -39,865 | 2,630 | 3,510 | 2,390 | -25430 | -13,640 | -640 | 1,650 | 18,900 | 22,010 |
| 2 | -37,919 | 2,770 | 3,680 | 2,540 | 1,250 | -17,030 | -4,660 | 2,700 | 16,530 | 19,720 |
| 3 | -33,929 | 2,850 | 3,770 | 2,580 | 1,290 | -20,760 | -7,770 | 4,110 | 12,990 | 16,290 |
| 4 | -32,198 | 3090 | 4,150 | 2,830 | 1,320 | 5,960 | -12,690 | 130 | 9,720 | 13,270 |
| 5 | -28,655 | 3,180 | 4,180 | 2,890 | 1,380 | 5,790 | -7,970 | -5,040 | 4,760 | 8,370 |
| 6 | -27,802 | 3,640 | 4,750 | 3,450 | 1,400 | 6,570 | 11,070 | -11,790 | -1,030 | 3,000 |
| 7 | -23,737 | 3,580 | 4,630 | 3,130 | 1,310 | 5,910 | 10,180 | -18,350 | -8,430 | 4,750 |
| 8 | -15,598 | 2,400 | 3,150 | 2,170 | 840 | 3,960 | 6,690 | 8,500 | -10,890 | -9,730 |
| 9 | -5,673 | 790 | 1,040 | 710 | 300 | 1,150 | 2,344 | 2,760 | -7,650 | -6,830 |
| 10 | 821 | -80 | -110 | -80 | -30 | -130 | -220 | -286 | -250 | 1,460 |
| 11 | -1,119 | 40 | 60 | 40 | 20 | 70 | 110 | 130 | 120 | -2,490 |
| Summary | | 243,700 | 232,610 | 105,480 | -25,050 | -30,840 | -19,420 | -11,400 | 40,310 | 77,660 |

## $\frac{Sl}{A}$ So for Verticals.

| members | Sl/A | So,-5 | So,-3 | So.-1 | So1. | So,3 | So,5 | So,7 | So,9 | So.11 |
|---|---|---|---|---|---|---|---|---|---|---|
| -7 | 45,584 | 28,400 | 14,040 | 2,740 | -3,240 | -3,920 | -2,690 | -360 | 2,320 | 3,280 |
| -6 | 26,524 | 15,780 | 7,800 | 1,570 | -1,800 | -2,170 | -1,490 | -210 | 1,300 | 1,800 |
| -5 | -833 | 300 | -220 | -40 | 50 | 60 | 40 | 10 | -40 | -50 |
| -4 | -36,700 | 16,330 | -8,620 | -1,690 | 1,980 | 2,420 | 1,650 | 220 | -1,430 | -1,980 |
| -3 | -81,455 | 34290 | 65,160 | -3,180 | 3,830 | 4,640 | 3,100 | 490 | -2,770 | -3,750 |
| -2 | -134,185 | 52,060 | 99,570 | -4,290 | 5,100 | 6,170 | 4,160 | 540 | -3,760 | -5,100 |
| -1 | -195,570 | 68,430 | 132,750 | 190,430 | 6,060 | 7,430 | 5,080 | 590 | -4,300 | -6,260 |
| 0 | -208,985 | -78,580 | -41,800 | 64,160 | 109,930 | 89,240 | 127,060 | 197,700 | 279,830 | 308,880 |
| 1 | -87,480 | -5,160 | -6,910 | -4,720 | 83,460 | 53,100 | 22,480 | -5,260 | -26,330 | -34,470 |
| 2 | -65,239 | -3,780 | -5,020 | -3,520 | -3,130 | 45,210 | 22,380 | 1,240 | -14,610 | -20,620 |
| 3 | -55,072 | -3,140 | -4,130 | -2,860 | -2,530 | 43,450 | 24,840 | 7,600 | -5,670 | -11,570 |
| 4 | -47,011 | -2,440 | -3,150 | -2,160 | -2,070 | -10,440 | 26,230 | 12,360 | 1,880 | -2,070 |
| 5 | -39,257 | -1,650 | -2,160 | -1,490 | -1,650 | -7,500 | 25,790 | 15,570 | -7,620 | 4,630 |
| 6 | -39,433 | -1,180 | -1,540 | -990 | -1,420 | -6,310 | -11,360 | 21,810 | 15,650 | 13,410 |
| 7 | -27,063 | -220 | -350 | -240 | -780 | -3,920 | -7,170 | 16,940 | 13,860 | 12,720 |
| 8 | -19,977 | 320 | 460 | 320 | -480 | -2,220 | -4,220 | -6,210 | 12,270 | 11,910 |
| 9 | -18,456 | 960 | 1,250 | 890 | -260 | -1,110 | -2,250 | -3,820 | 12,820 | 13,210 |
| 10 | -14,332 | 1,280 | 1,680 | 1,150 | 0 | -70 | -400 | -1,220 | -4,660 | 10,260 |
| Summary. | | 122,000 | 248,810 | 236,020 | 183,050 | 214,060 | 233,230 | 257,930 | 283,980 | 294,230 |

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**JIUN MASUDA**
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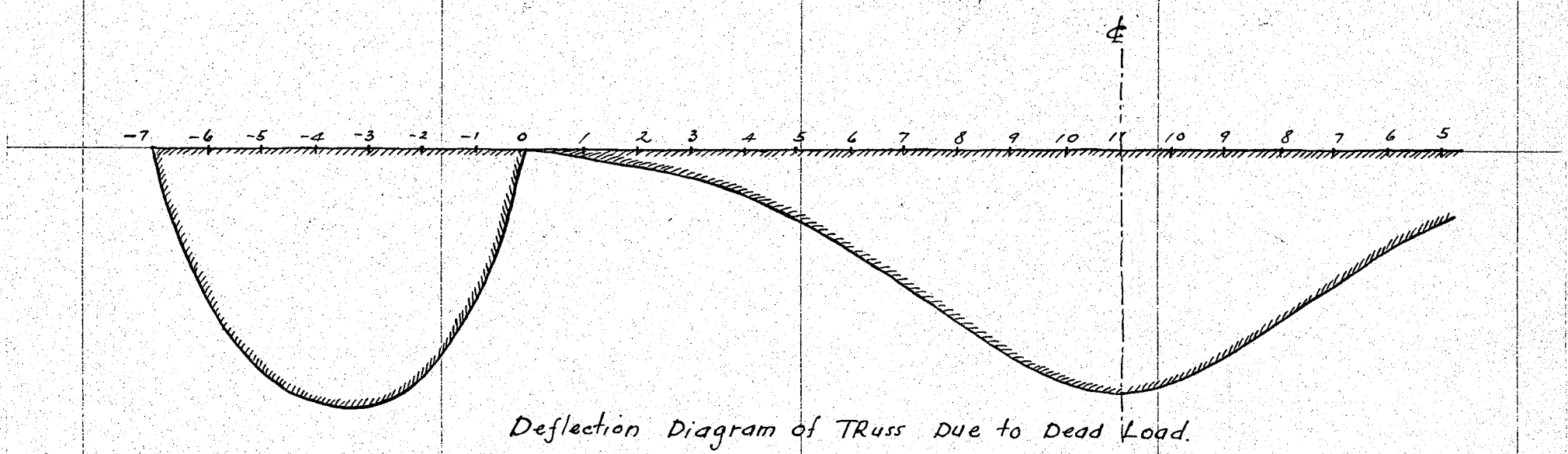
CALCULATIONS FOR

# Arakawa-Bashi for Daitama-Sen

S.l/A So for all members.

| | panel -5 | -3 | -1 | 1 | 3 | 5 | 7 | 9 | 11 |
|---|---|---|---|---|---|---|---|---|---|
| upper chord. | 626,220 | 709,960 | 377,360 | -98,140 | -222,060 | -191,060 | -136,940 | -96,580 | -124,990 |
| lower chord. | 1404,820 | 1703,450 | 1065,220 | 48,220 | 310,500 | 769,340 | 1386,220 | 2021,880 | 2399,820 |
| digonals. | 243,700 | 232,610 | 105,480 | -25,050 | -30,840 | -19,420 | -11,400 | 40,310 | 77,660 |
| Verticals. | 122,000 | 248,810 | 236,020 | 183,050 | 214,060 | 233,230 | 257,930 | 283,980 | 294,230 |
| Summary | 2396,740 | 2894,830 | 1784,080 | 108,080 | 271,660 | 792,090 | 1495,810 | 2249,590 | 2646,720 |
| deflection in feet. | 0.07989 | 0.09649 | 0.05947 | 0.00360 | 0.00906 | 0.02640 | 0.04986 | 0.07499 | 0.08822 |
| deflection in inch | 15/16" | 1 1/8" | 11/16" | 1/16" | 1/8" | 5/16" | 5/8" | 7/8" | 1 1/16" |




Deflection Diagram of Truss Due to Dead Load.

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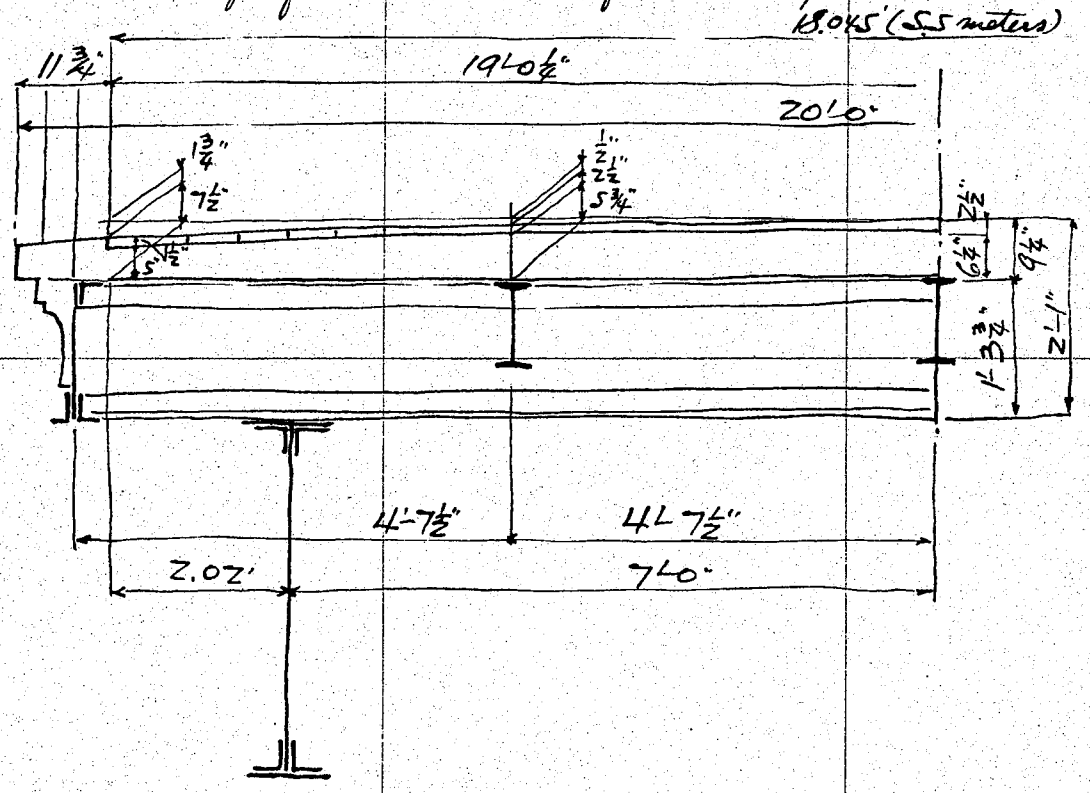
CALCULATIONS FOR

Design of Arakawa-Bashi for Saitamaken

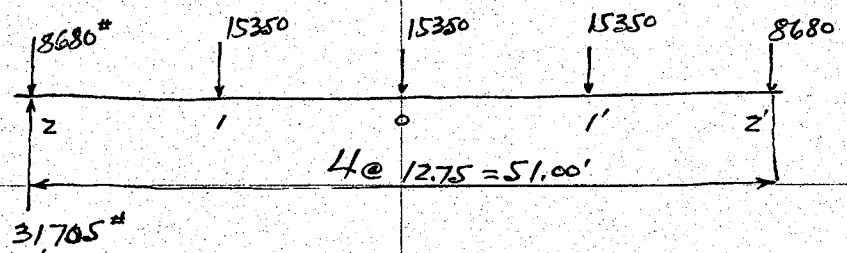
Design of Girder span span length 51'-0" c to c of bearings.
Cross Section of floor same as for Arch span.




Design of Main girders

Dead Load concentrations from Int. floor beam
" Floor, stringers etc 14890# (see PS)
Floor beam 460
15,350#

from end floor beam.
1068 × 14.7 / 12.75 = 8220
460
8680#




Reaction = 31,705# End shear 23075#

D.L. m at 0. 31705 × 25.5 = 808,000'#
less 15350 × 12.75 = -195,700
" 8680 × 25.50 = -221,200
391,100'#

D.L. m at 1. 31,705
8,680
23,025 × 12.75 = 293,500'#

End Shear 31705 − 8680 = 23,025#
Shear 2−1 23,025#
" 1−0 23025 − 15350 = 7675#

D.L. moment due to girder's own weight
Dead wt. of main girder assumed 220#/ft
lateral bracing say 40
total 260#/ft.

moment at 0 $\frac{260 \times 51^2}{8}$ = 84,600'#

" " 1. $\frac{260 \times 12.75 \times 38.25}{2}$ = 63,400'#

End shear 260 × 25.5 = 6,630#
Shear at 1 260 × 12.75 = 3320#
" 0 0.

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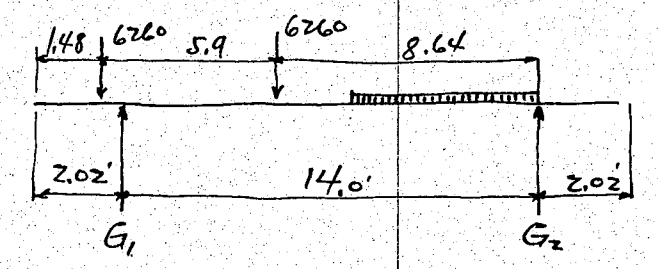
CALCULATIONS FOR

Design of Arakawa Bashi for Saitama Ken.

Live Load motor truck loading
Max wheel load on main girder.



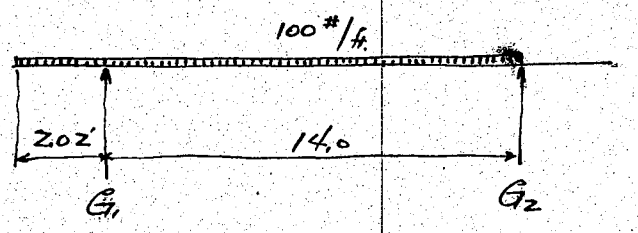

Impact $\frac{20}{60+\frac{51}{3.28}} = 26.5\%$

Rear wheel concentration 4,950
Impact $4950 \times .265 =$ 1,310
6,260 #

Front wheel $\frac{1}{3} \times 6260 =$ 2,090 #

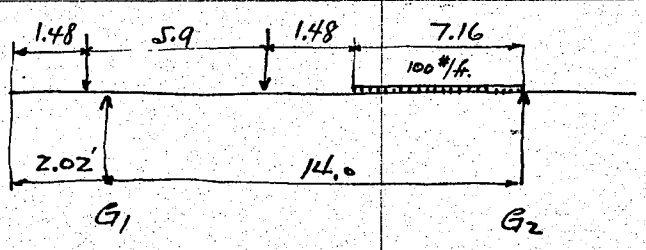
Max wheel load on G1. girder
$6260 \times 8.64 =$ 54,050
$6260 \times 14.54 =$ 91,000
145,050 ÷14 = 10,370 # rear wheel conc.
$10370 \times \frac{1}{3} =$ 3,460 front " "

Unif. live load on main girder



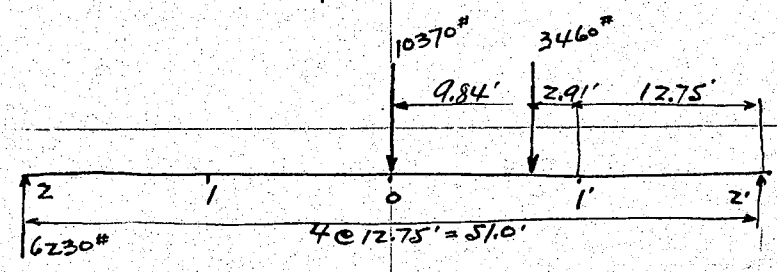

Unif. load on roadway $W = \frac{100,000}{170 + \frac{51}{3.28}} = 539$ use $500\,kg/m = 100\,\#/ft.$

Unif. load on G1. Girder.
$\frac{100 \times 16.02 \times 8.01}{14} = 916\,\#/ft$ of main girder
call this 920 #/ft.



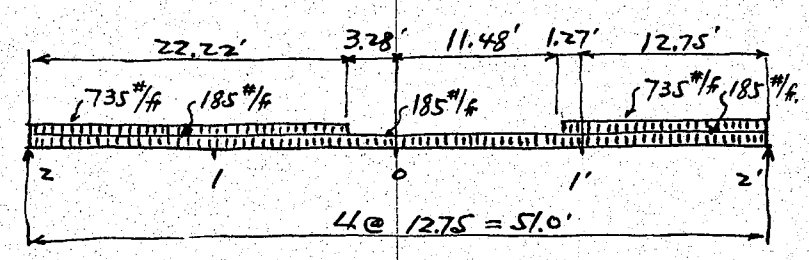

Uniform load on side of motor truck.
$\frac{100 \times 7.16 \times 3.58}{14} = 183\,\#/ft$ of main girder
Call this 185 #/ft.

Live load moment




Panel point 0. Center of span
Wheel load
reaction $10,370 \times 25.50 =$ 264,000
$3,460 \times 15.66 =$ 54,200
318,200 ÷51 = 6,230 #

End Shear =
moment at 0 $6230 \times 25.5 =$ 159,000 '#
" 1. $6,230 \times 12.75 =$ 79,500 '#




Unif. load 185 #/ft load fully loaded.
moment at 0. $\frac{185 \times 51^2}{8} =$ 60,200 '#
" 1. $\frac{185 \times 12.75 \times 38.25}{2} =$ 45,100 '#

End shear $185 \times 22.5 =$ 4,720 #
Shear at 1 $185 \times 12.75 =$ 2,360 #
" " 0 0.

Unif. load 735 # load partially loaded
reaction $735 \times 22.22 \times 39.89 =$ 658,000
$735 \times 14.02 \times 7.01 =$ 72,200
51 ) 730,200
Reaction = 14,320 #

End Shear 14,320 #
Shear at 1. 14,320
$735 \times 12.75 =$ -9360
4,960 #

Shear at 0 14,320
$735 \times 22.22 =$ -16,320
-2,000 #

moment at 0 $14,320 \times 25.5 =$ 365,000
$735 \times 22.22 \times 14.39 =$ -235,000
130,000 '#

moment at 1. $14320 \times 12.75 =$ 182,500
$735 \times 12.75 \times 6.38 =$ -59,800
122,700 '#

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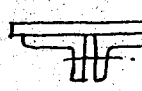
CALCULATIONS FOR

Design of Arakawa Bashi for Saitama Ken.

Summary of moments and shears.

| | Moments Panel pt. 1 | Panel pt 0. | Shears End shear | Panel pt 1. | Panel pt 0. |
|---|---|---|---|---|---|
| D.L. flooring etc. | 293,500'# | 391,100 | 23,025# | 23,025# | 7,675# |
| " wt. of main girder | 63,400 | 84,600 | 6,630 | 3,320 | 0 |
| L.L. wheel | 79,500 | 159,000 | 6,230 | 6,230 | 6,230 |
| " Unif. load | 45100 | 60,200 | 4,720 | 2,360 | 0 |
| " " | 122,700 | 130 000 | 14,320 | 4,960 | −2000 |
| | 604,200 '# | 824,900 '# | 54,925 # | 39,895# | 13,905 # |

Assumed section at mid span.




| | | |
|---|---|---|
| 1Pl. | 5.06 × .19 = | 0.961 |
| ZLs | 9.50 × 1.35 = | 12.830 |
| | 14.56" | 13.791 |

$\frac{13.791}{14.56} = 0.95" = .08'$

ZLs 6"×4"×½" = 9.50 − 2.00 = 7.50"net
1 Cov pl. 13½"×⅜" = 5.06 / 14.56"gr − 0.75 = 4.31 / 11.81"net.

Depth of girder 48½" b to b of Flg. Ls.
Use Web pl. 48"×⅜" = 18"gr. ⅛ web area = 2.25"
effective depth = 4.04 + .06 − .16 = 3.94'
Flange stress = $\frac{824,900}{3.94}$ = 209,200#

Flange area req'd = $\frac{209,200}{17,000}$ = 12.32"net.

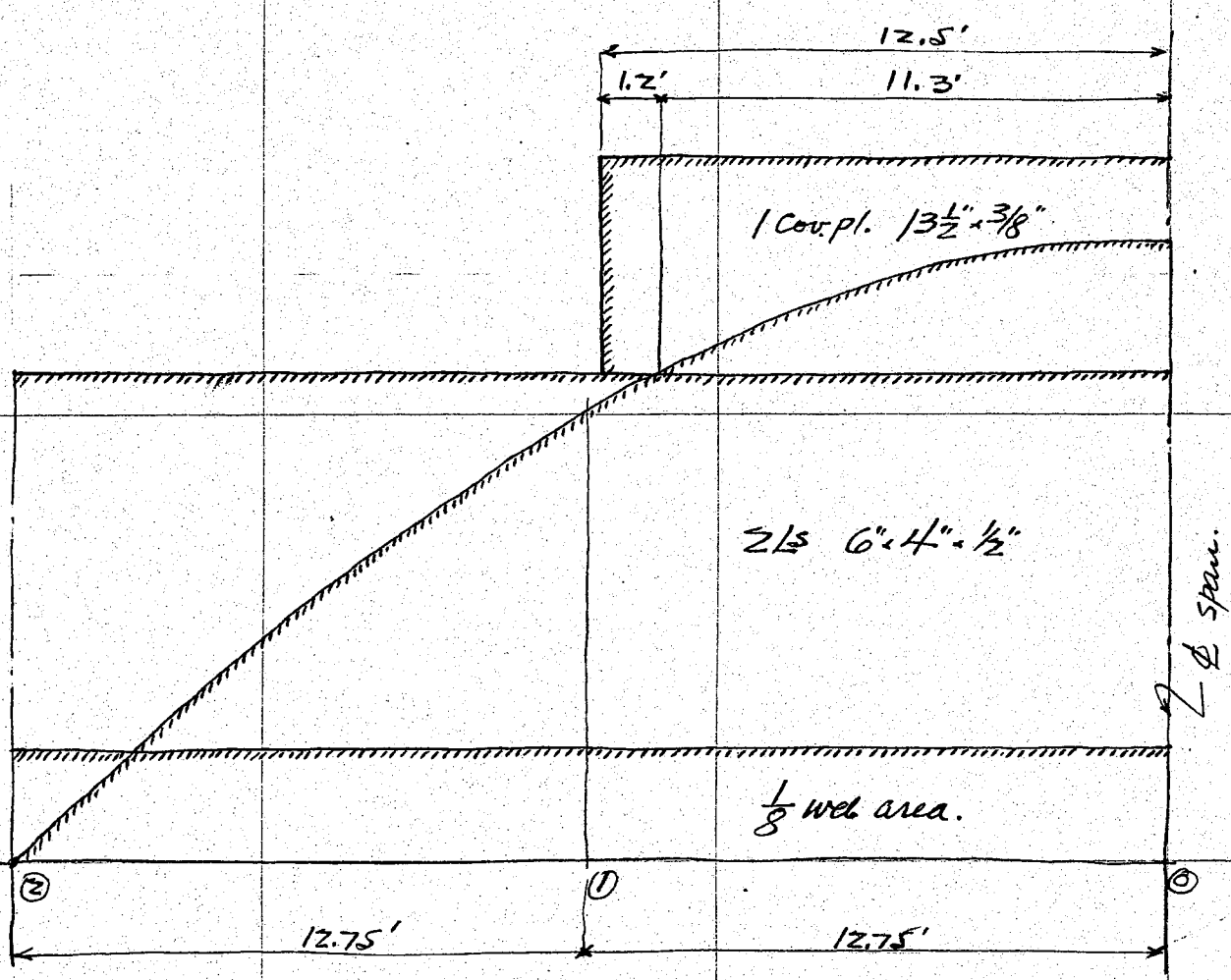
⅛ web = 2.25 / 10.02"net for bottom flange. ok

Allowable unit stress for top flange
$17,000\left(1-0.012\times\frac{12.75}{1.125}\right) = 14680$#/"

Flange area req'd = $\frac{209200}{14680}$ = 14.28"gross.

⅛ web area = 2.25 / 12.03"gross for top flange. ok.

Assumed flange section is ample.




Scale of moment 1寸 = 300,000 '#
Scale of space 1:50

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CALCULATIONS FOR

Design of Arakawa Bashi for Saitama Ken.

Lateral Bracings.

Lateral bracing for floor shall be used the same details as for arch span.

Bottom lateral bracing:—

Moving wind load of 140# per lin ft of ~~one~~ girder.

panel load = 140 × 12.75 = 1,785# call this 1,800#

Earthquake acceleration 2,000 mm/sec² or K = 0.2

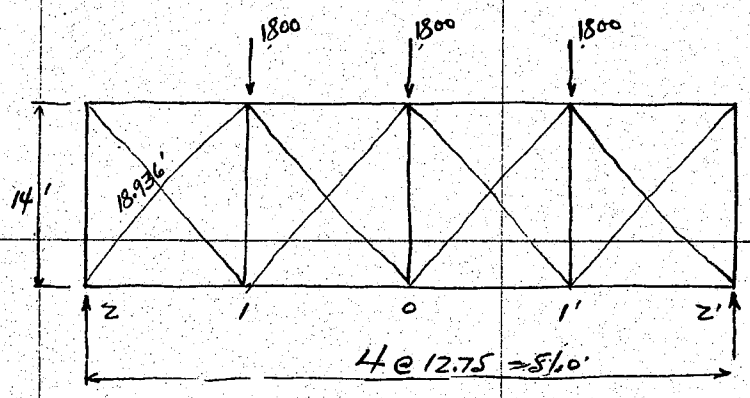
Dead panel load — Floor beam concentration = 15,350#
Weight of girder 260 × 12.75 = 3,320
18,670 × 2 = 37,340#

Seismic panel load = 37,340 × 0.2 = 7470#

Assume this panel load be resisted by both lateral bracings at the ratio of 2:1 and $\frac{1}{3}$ be taken by bottom lateral bracing.

Seismic panel load for bottom lateral = $\frac{1}{3}$ × 7470 = 2490# call this 2,500#

2500 ÷ 1.8 = 1,400# or all members shall be proportioned to 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

Reaction 1800 × 1.5 = 2,700# End shear.

Shear 1—0.

$\frac{1,800 \times 3}{4}$ = 1,350#

Diagonal. 2—1.

Sectional area reqd = $\frac{3660}{17000}$ = 0.22" net

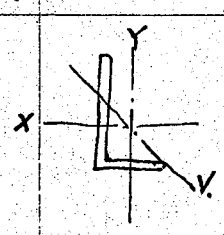
Use $1L\ 5'' \times 3'' \times \frac{2.4}{8}$" = 2.40 − .27 = 2.15" net

length 18.5' say = 222"

radius of gyration.

$r_x$ = 1.60" $\frac{l}{r_x}$ = 222 ÷ 1.6 = 139. ok

$r_y$ = .65 $\frac{l}{r_y}$ = 111 ÷ 0.65 = 170. ok.




Rivet no for connection use 2 − 3/4" rivets.

use same details for diagonal 1—0.

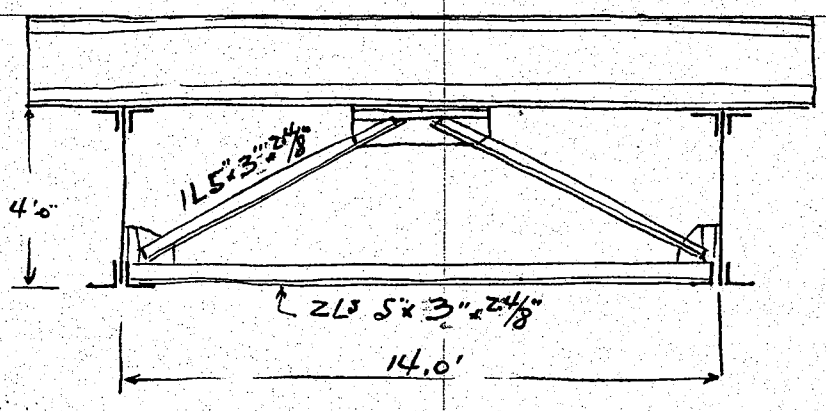
Diagonal Stress 2—1.

2,700 × 1.353 = 3,660#

" " 1—0

1350 × 1.353 = 1,830#

End cross frame on abutment.




Wind load 405# × 25.5 = 10,330#

Effective depth say 3.8'

reaction $\frac{10330 \times 3.8}{14.0}$ = ± 2,810#

Diagonal stress = 2810 × 1.36 = 3820#

Chord stress = $\frac{2,810 \times 7}{3.8}$ = 5170#

Use

for diagonal 1L 5" × 3" × 2 4/8"

" chord 2L 5" × 3" × 2 4/8"

Intermediate sway bracing: use same details as above.

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CALCULATIONS FOR

5

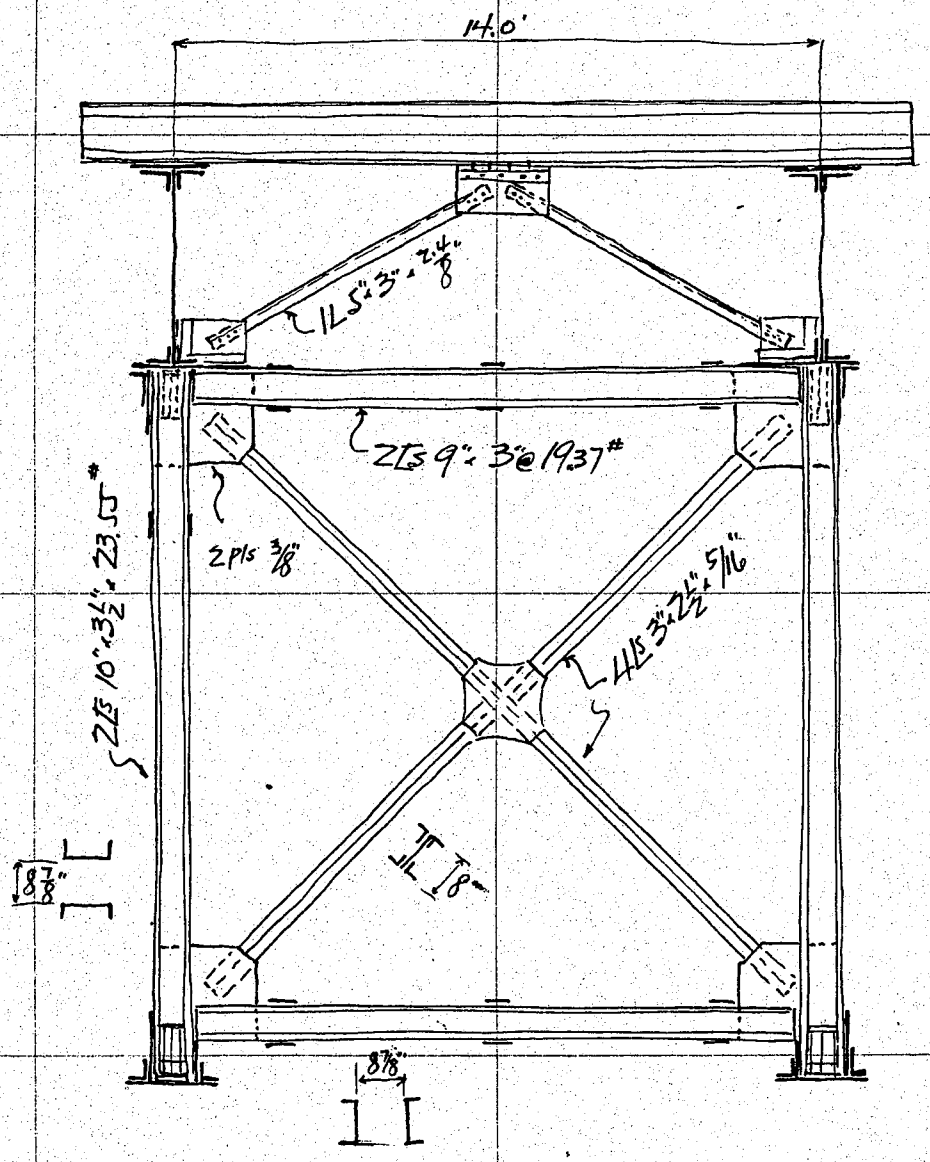
Design of Arakawa Bashi for Saitamaken.

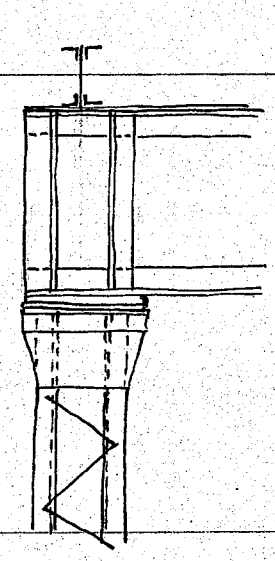
Pier columns. Max. load on shoe.

| | | | |
|---|---|---|---|
| D.L | Flooring &c. | 23025# | |
| | Wt. of main girder | 6630 | |
| | wt of Column say | 945 | |
| | | 30,600# | |
| L.L. | Wheel Concentrations | 6,230 | |
| | Unif. load | 4,720 | |
| | " | 14320 | |
| | | 25270# call this 25300 | |
| | Total | 55,900# | |

Area of Bed pl. req'd
$= \frac{55900}{500} = 112^{0''}$

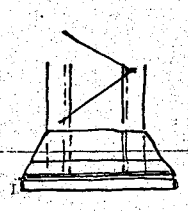
Steel Bent on pier.



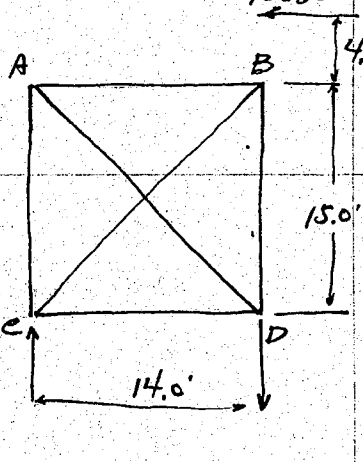
top brace
diagonal length
$7.0^2 = 49.0$
$3.8^2 = \frac{14.44}{63.44}$
$\sqrt{63.44} = 7.96'$

Diagonal stress
$\frac{10330}{2} \times \frac{7.96}{7.0} = 5890\#$ Com't.
use L 5" × 3" × 2.4/8"



Wind pressure on Bent $= \frac{405 \times 25.5}{5160 \times 2} = 10,320\#$ Call this 10,350#

$AC = \sqrt{15.0^2 + 14.0^2} = 20.5'$
$\sec\theta = \frac{20.5}{15.0} = 1.366$




Reaction $= \pm \frac{10350 \times 19}{14} = \pm 14,100\#$

Stress $AD + CB = \frac{10350 \times 1.366}{2} = 7070\#$ T or C.

| max load on column | | min load on column |
|---|---|---|
| D.L. | 30,600 | 30600 |
| L.L. | 25770 | |
| Wind | 14,100 | −14100 |
| | 69970# C | 16,500# C |

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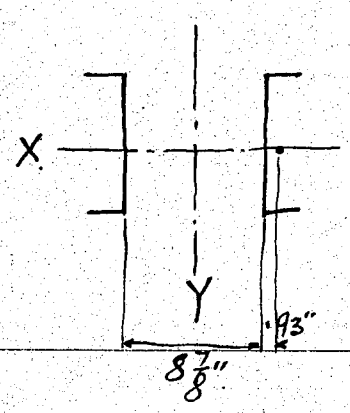
Design of Arakawa Bashi for Saitamaken. 6

Bent Column. max load = 69970# C length 15.0'

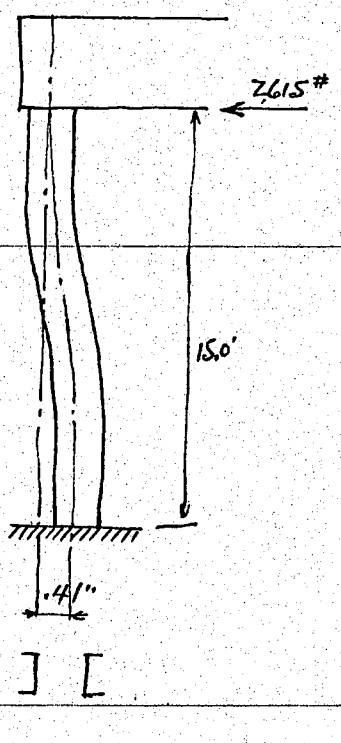
Least radius of gyration req'd = $\frac{15\times12}{120} = 1.5"$ for $\frac{l}{r} = 120$




Try 2 [ 10" × 3½" @ 23.55# = 6.925 × 2 = 13.85 □" gross.
radius of gy. $r_x$ = 3.85"
allowable fibre stress $21{,}300\left(1-0.0055\frac{180}{3.85}\right) = 15820$ #/□" use 14,000 #/□" max.
Allowance for wind load 25%
3500
17,500 #/□"

Sectional area req'd = $\frac{69970}{17500} = 4.0$ □"

Effect of temperature change.
moment of inertia Iy 2 [ 7.19 × 2 = 14.38 + 13.85 × 5.37² = 413.4 "⁴
Amount of expansion of girder for ± 50° F
= 51'-12" × 0.000,0067 × 100° = 0.41"




Equation to deflection $\Delta = \frac{W\cdot l^3}{3EI}$ or $W = \frac{3\Delta EI}{l^3} = \frac{3\times.41\times30{,}000{,}000\times413.4}{180^3}$

= 2,615#

Bending moment on column due to temperature change.
Temperature thrust = 2615# × 180" = 471,000 "#
Superimposed load 69,900 × .41" = 28,700
499,700 "#

Bending stress on column = $\frac{499.700\times5.37}{413.4} = 6{,}490$ #/□" T or C.

Direct stress = $\frac{69900}{13.85} = 5{,}050$
total = 11,540 #/□" C OK < 17,500 #/□"

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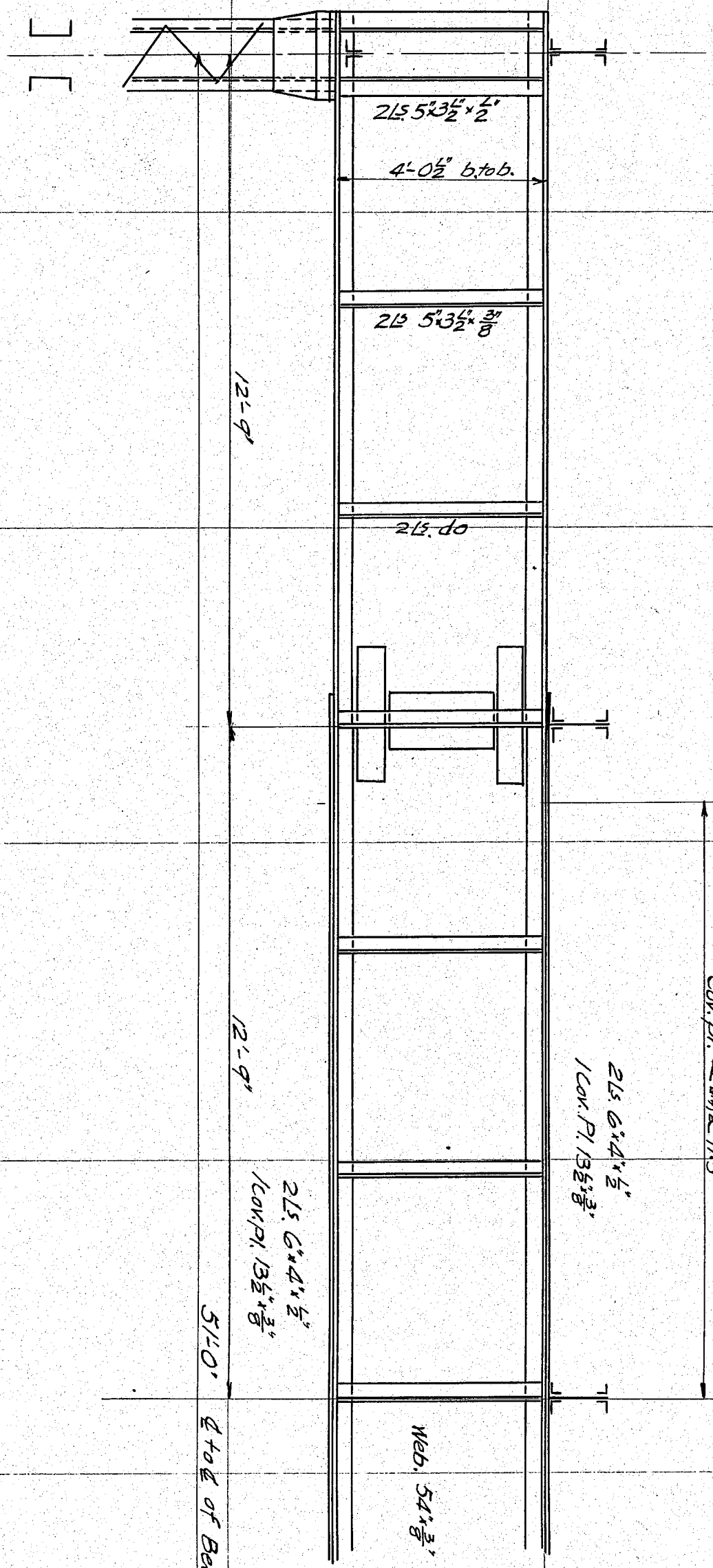
Design of Arakawa Bashi for Saitama Ken.
General sketch of main girder.



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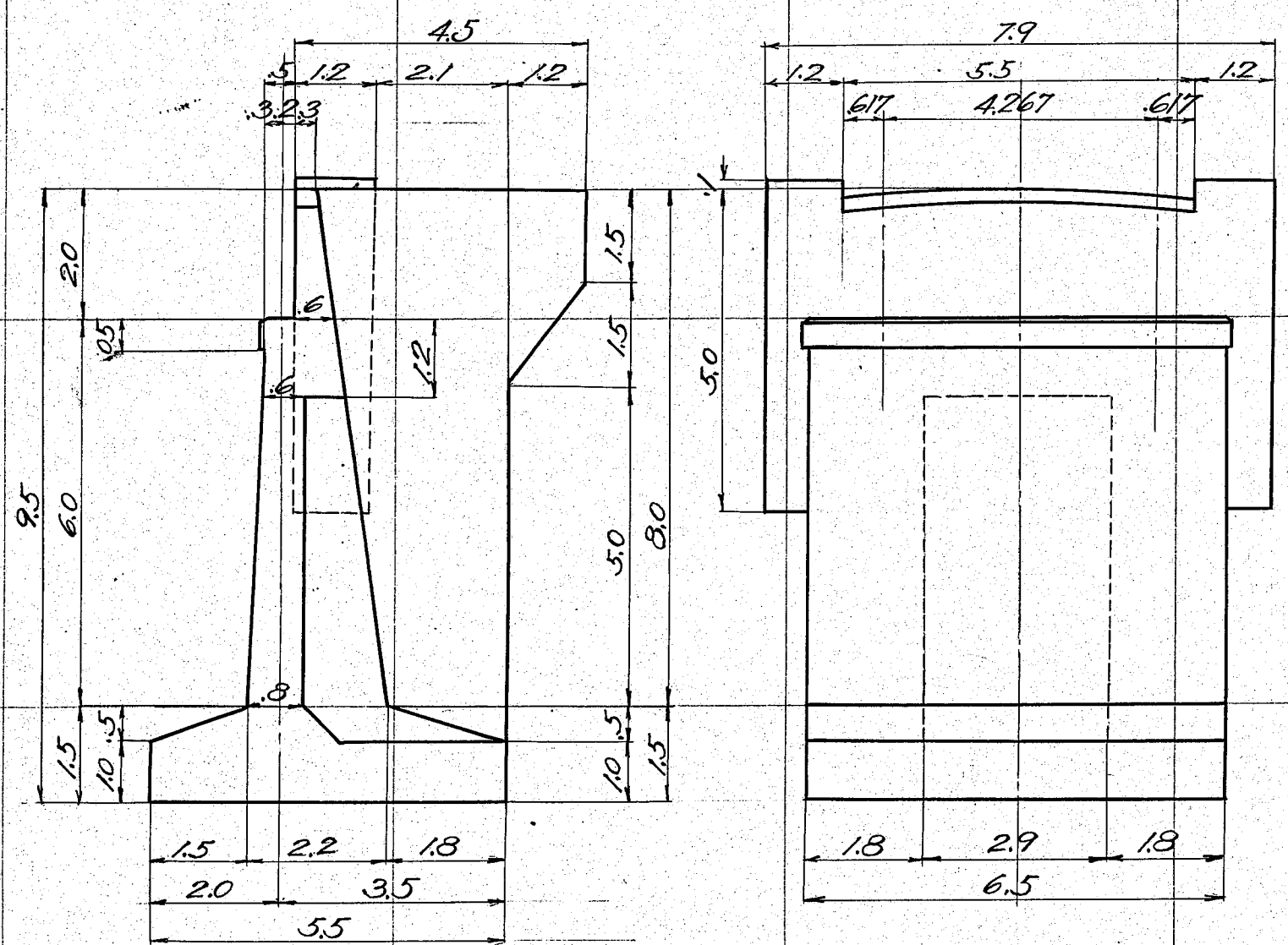
Design of Arakawa-Bashi for Saitama Ken.
Design of Abutment for Approach Girder span.

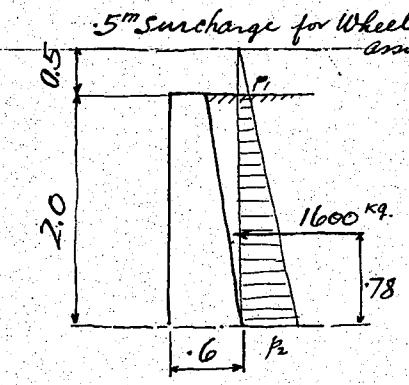



Parapet wall. Case 1. Stability at Normal state.

$p_1 = .5 \times 1600 \times \frac{1}{3} = 267$ kg/cm²

$p_2 = 2.5 \times 1600 \times \frac{1}{3} = 1333$

$1600 \times \frac{2}{2} = 1600$ kg. total earth pressure.




Point of application of earth pres.

$x = \frac{2.0}{3} \times \frac{1333+533}{1333+267} = .78$ m

Overturning moment at bottom section

$m = 1600 \times .78 = 1247$ kgm per meter strip.

Effective depth say 57 cm.

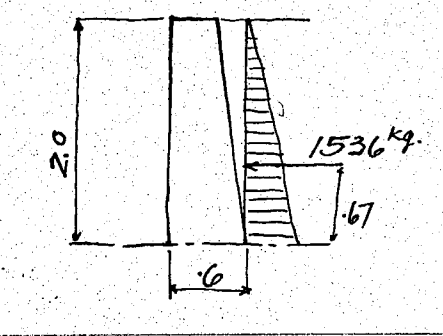
Steel area required $= \frac{1247 \times 100}{1200 \times \frac{7}{8} \times 57} = 2.08$ cm²

Use 1/2" ϕ (1.27 cm ϕ)

Spacing $= \frac{100 \times 1.27}{2.08} = 61$ cm use 45 cm spacing.

Case 2. Stability during Earthquake. Acceleration assumed 2000 mm/sec²

Earth pressure $E = .48 \frac{wh^2}{2} = .24 \times 1600 \times 2.0^2 = 1536$ kg.




moment $= 1536 \times .67 = 1030$ kgm < 1247 for case 1

assumed section is ample.

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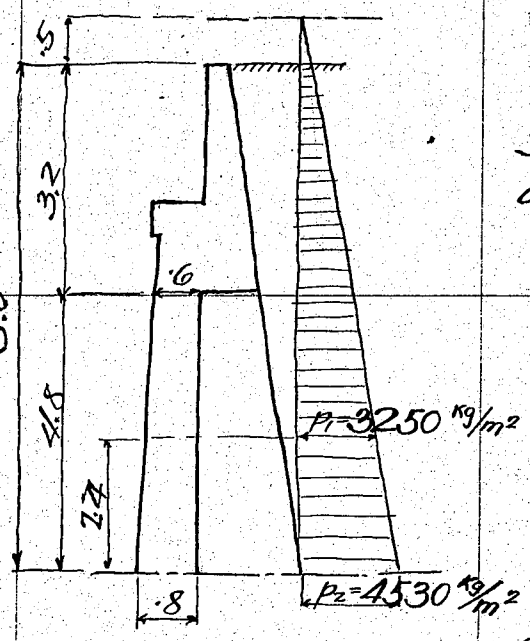
(2)

Design of Arakawa-Bashi for Saitama Ken.

Abutment continued.

Curtain wall. Case 1. Normal state.




Unit earthpressure at bottom = $\frac{1600 \times 8.5}{3}$ = 4530 kg/m²

" at 2.4m above bottm. = $\frac{1600 \times 6.1}{3}$ = 3250 "

Span of curtain wall assumed 3.5 m.

at bottom section.

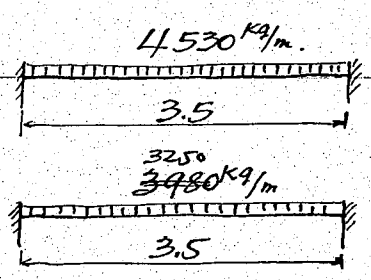
$m = \frac{4530 \times 3.5^2}{10}$ = 5550 kg.m.

Effective depth say 75 cm.

Steel area req'd = $\frac{5550 \times 100}{1200 \times \frac{7}{8} \times 75}$ = 7.06 cm² per meter strip.

use 5/8"φ (1.588 cm²φ)

Spacing = $\frac{100 \times 1.979}{7.06}$ = 28.1 cm




At section 2.4m above bottom. $m = \frac{3250 \text{ kg} \times 3.5^2}{10}$ = 3,980 kgm

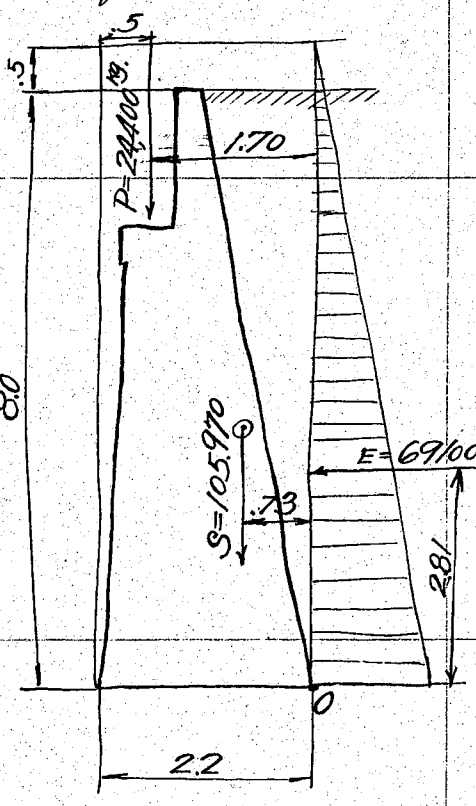
Effective depth say 70 - 5 = 65 cm.

Steel area required = $\frac{3980 \times 100}{1200 \times \frac{7}{8} \times 65}$ = 5.84 cm² per meter strip.

use 5/8"φ (1.588 cm²φ)

Spacing = $\frac{100 \times 1.979}{5.84}$ = 34 cm

Shaft.




Case 1. Stability at Normal state.

Super imposed Loads.

D.L. = 30,600 # = 13,900 kg = D

L.L. = 25,300 = 10500 "

24,400 kg on one shoe = P.

Center of gravity of Shaft for one half of abutment Center of moment at O.

| Section | Length | vol. | unit wt. | total wt. | hor. lever arm m | vert. lever arm m | |
|---|---|---|---|---|---|---|---|
| parapet wall | .45×2.0×2.75 = 2.475 | @2400 = | | 5,940 kg | 1.27 | 7,590 | 6.9 | 41,000 |
| Hor. beam | 1.2×1.2×3.25 = 4.68 | @ " = | | 11,230 | 1.40 | 15,740 | 5.4 | 60,700 |
| Curtain wall | .7×4.8×1.45 = 4.87 | @ " = | | 11,700 | 1.75 | 20,470 | 2.28 | 26,670 |
| Shaft | 1.75×4.8×1.8 = 15.12 | @ " = | | 36,300 | 1.30 | 47,200 | 2.18 | 79,100 |
| Column | 1.2×1.2×2.1 = 3.03 | @ " = | | 7,270 | 0.9 | 6,540 | 7.05 | 51,200 |
| " | 1.2×.7×3.0 = 2.52 | @ " = | | 6,050 | 0.9 | 5,450 | 4.5 | 27,500 |
| Wing wall | .6×2.1×8.0 = 10.10 | @ " = | | 24,240 | -0.75 | -18,170 | 3.62 | 87,700 |
| " | 5×2.25×1.2 = 1.35 | @ " = | | 3,240 | -2.3 | -7460 | 6.70 | 21,700 |
| | 44.145 | | | 105,970 kg | | 77,360 | | 395,570 |

Position of Center of gravity $x = \frac{77360}{105,970}$ = 0.73 m hor. dist. from O

$y = \frac{395,570}{105,970}$ = 3.74 vert. " "

$x = \frac{8}{3} \times \frac{534+4533}{267+4533}$ = 2.81

Earthpressure $p_1 = \frac{1600 \times .5}{3}$ = 267 kg/m², $p_2 = \frac{1600 \times 8.5}{3}$ = 4,533 kg/m²

Earth pressure $E = \frac{267+4,533}{2} \times 8 \times 3.6$ = 69,100 kg mean width of abutment say 7.2 m

Taking moment about O

| | | | | |
|---|---|---|---|---|
| Superimp. load | P = 24,400 kg | × 1.70 = | 41,500 | |
| wt. of shaft | S = 105,970 | × 0.73 = | 77,400 | |
| Earth pressure | E = 69,100 | × 2.81 = | 194,000 | |
| | ΣV = 130,370 kg | ΣH = 69,100 kg | 312,900 kgm | |

Dist. of result. force from O = $\frac{312,900}{130,370}$ = 2.40 m

Excentricity = 2.40 - 1.10 = 1.30 m left.

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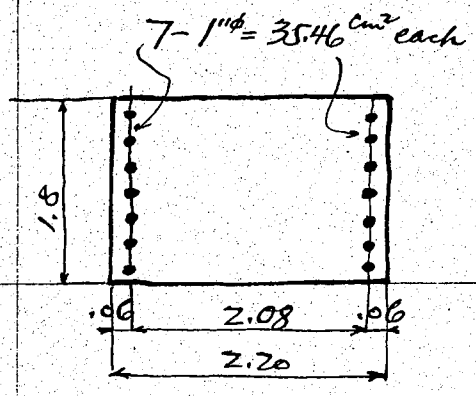
CALCULATIONS FOR

Design of Arakawa-Bashi for Saitamaken.

Assumed Section




Bending moment at bottom section = 130,370 × 1.30 = 169,500 kgm

$\frac{d'}{h} = \frac{6}{220} = 0.0273$, $\frac{e}{h} = \frac{1.30}{2.2} = 0.591$

Use 7-1"φ (2.54 cmφ) = 35.46 cm²

$p_0 = 2p = \frac{35.46 \times 2}{180 \times 220} = 0.00182$

$K = 0.305$, $L = 0.082$

$f_c = \frac{M}{Lbh^2} = \frac{169,500 \times 100}{0.082 \times 180 \times 220^2} = 23.7$ kg/cm² Ok

$f_s = nf_c\left(\frac{d}{kh} - 1\right) = 15 \times 23.7\left(\frac{2.14}{.305 \times 2.2} - 1\right) = 778$ kg/cm² Ok

Unit shear $= \frac{69100}{180 \times .95 \times 220} = 1.84$ kg/cm² Ok < 4.0 Unit bond $= \frac{69100}{7.98 \times 7 \times .95 \times 220} = 5.92 < 6.0$ Ok

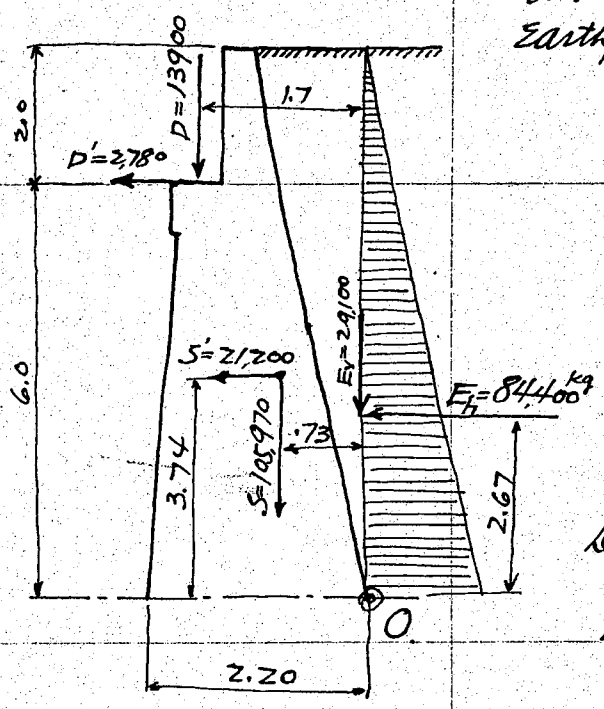
## Case 2. Stability of Shaft during earthquake K=0.2

Superimposed dead load = 13,900 kg Seismic force = 13,900 × .2 = 2,780 kg

Wt. of shaft = 105,970 " = 105,970 × .2 = 21,200 "

Earthpress. hor. comp. = .229 × 1600 × 8² × 3.6 = 84,400 kg

vert. comp = .079 × 1600 × 8² × 3.6 = 29,100 kg




Taking moment about O.

| forces. | Hor forces | vert. forces | Lev.arm | Moment |
|---|---|---|---|---|
| D | | 13,900 | × 1.70 = | 23,600 |
| D' | 2,780 | | × 6.00 = | 16,700 |
| S | | 105,970 | × 0.73 = | 77,400 |
| S' | 21,200 | | × 3.74 = | 79,300 |
| Eh | 84,400 | | × 2.67 = | 225,500 |
| Ev | | 29,100 | × 0 = | 0 |
| | ΣH=108,380 | ΣV=148,970 | | ΣM=422,500 |

Dist. of Resultant force $= \frac{422,500}{148,970} = 2.84$ m from O.

Eccentricity = 2.84 − 1.1 = 1.74 m left.

Bending moment at bottom section

m = 148,970 × 1.74 = 259,000 kgm.

$d/h = 0.0273$, $e/h = 1.74/2.2 = 0.791$, $p_0 = 0.00182$

$K = .245$ $L = .077$

$f_c = \frac{259000 \times 100}{.077 \times 180 \times 220^2} = 38.6$ kg/cm² Ok < 63

$f_s = 15 \times 38.6\left(\frac{2.14}{.245 \times 220} - 1\right) = 1,720$ kg/cm² Ok < 2160

Unit shear $= \frac{108,380}{180 \times 95 \times 220} = 2.88$ kg/cm² Ok < 7.2

Unit bond $= \frac{108.380}{7.98 \times 7 \times .95 \times 220} = 9.29$ kg/cm² < 10.8 kg/cm²

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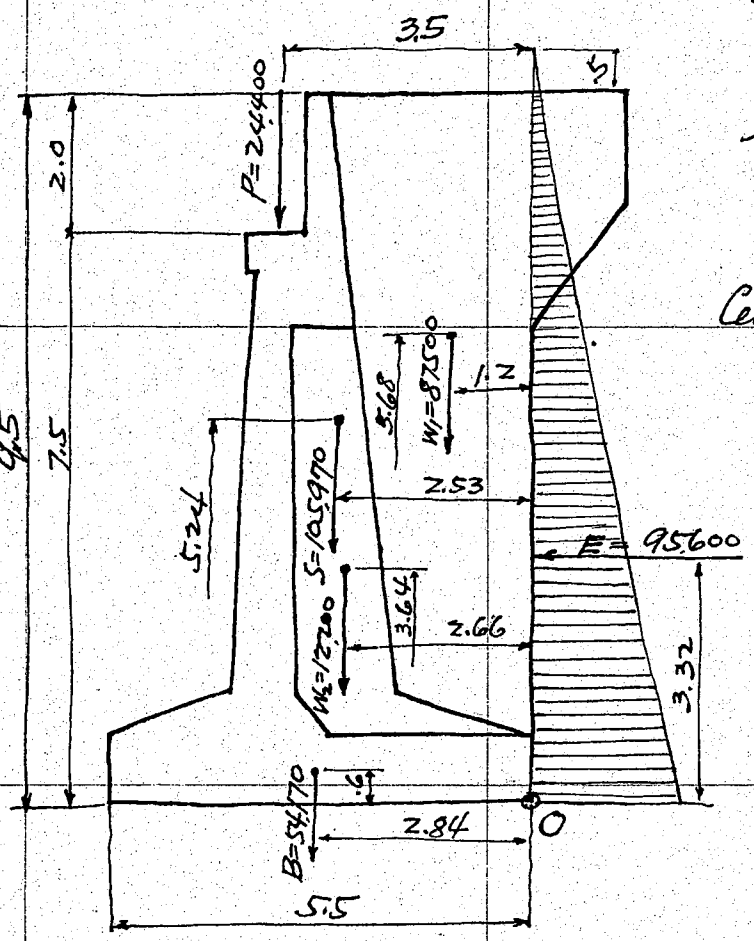
CALCULATIONS FOR

# Design of Arakawa-Bashi for Saitama Ken.

## Stability of abutment at bottom of base.

### Case 1. At Normal state




Wt. of earth behind the Shaft $\frac{3+1.8}{2} \times 8.3 \times 2.75 = 54.7$ @ 1600 = 87,500 kg

" " between shafts $\frac{.7+1.4}{2} \times 5 \times 1.45 = 7.61$ @ 1600 = 12,200 "

Weight of base $5.5 \times 1.35 \times 1.8$ @ 2400 = 32,100 kg
" " " $2.8 \times .3 \times 1.45$ @ " = 2,920
" " " $5.5 \times 1.0 \times 1.45$ @ " = 19,150
54,170 kg

| Center of grav. of base. | hor. arm | | vert. arm | |
|---|---|---|---|---|
| 32,100 | × 2.8 | = 89,500 | × .6 | = 19,200 |
| 2,920 | × 3.9 | = 11,380 | × 1.2 | = 3,500 |
| 19,150 | × 2.75 | = 52,600 | × .5 | = 9,580 |
| | $M_h$ = | 153,480 kgm | $\Sigma V$ = | 32,280 kgm |

C.g. hor. dist from O. $= \frac{153480}{54170} = 2.84$ m

Vert. " " " $= \frac{32280}{54170} = 0.60$ m

Earth pressure $p_1 = 267$, $p_2 = \frac{1600 \times 10}{3} = 5,333$ kg/m²

$E = \frac{267+5333}{2} \times 9.5 \times 3.6 = 95,600$ kg

Taking moment about O.

| Forces | Hor forces | Vert. forces | lev. arm | moment |
|---|---|---|---|---|
| P | | 24,400 | 3.5 | 85,400 |
| S | | 105,970 | 2.53 | 268,000 |
| $W_1$ | | 87,500 | 1.20 | 105,000 |
| $W_2$ | | 12,200 | 2.66 | 32,450 |
| B | | 54,170 | 2.84 | 153,800 |
| E | 95,600 | | 3.32 | 317,500 |

$\Sigma H$ = 95,600 $\Sigma V$ = 284,240 $\Sigma m$ = 962,150 kgm

Dist. of resultant force from O. $= \frac{962150}{284240} = 3.385$ m

Eccentricity $\varepsilon = 3.385 - 2.75 = 0.635$ m left.
Resultant force within middle third.

Max toe pressure
$= \frac{284,240}{5.5 \times 3.25}\left(1 \pm \frac{6 \times .635}{5.5}\right)$
$= 26,950$ kg/m² C (2.47 tons/ft²) Ok
or 4,880 " C

Sliding effect.
ratio $\frac{H}{V} = \frac{95600}{284,240} = 0.337$ Ok.

### Case 2. Stability during Earthquake, Reffering to the sketch above.

Taking moment about point O.

| Loads | Hor. force | vert. force | lev. arm | moment |
|---|---|---|---|---|
| D | | 13,900 | × 3.5 | 48,700 |
| D' | 2,780 | | × 7.5 | 20,800 |
| S | | 105,970 | × 2.53 | 268,000 |
| S' | 21,200 | | × 5.24 | 111,000 |
| $W_1$ | | 87,500 | × 1.2 | 105,000 |
| $W_1'$ | 17,500 | | × 5.68 | 99,400 |
| $W_2$ | | 12,200 | × 2.66 | 32,500 |
| $W_2'$ | 2,440 | | × 3.64 | 8,900 |
| B | | 54,170 | × 2.84 | 153,800 |
| B' | 10,830 | | × 0.60 | 6,500 |
| Ev | | 41,000 | × 0 | 0 |
| $E_h$ | 119,000 | | × 3.32 | 395000 |

$\Sigma H$ = 173,750 kg $\Sigma V$ = 314,740 kg $\Sigma M$ = 1,249,600 kgm

Dist. of resultant force from O.
$= \frac{1,249,600}{314,740} = 3.97$ m

Eccentricity $\varepsilon = 3.97 - 2.75 = 1.22$ m left
Resultant force out of middle third
pressure area = $5.5 - 3.97 = 1.53$ m × 3 = 4.59 m

Superimp. D.L. D = 13,900 kg × .2 = 2780 kg = D'
Shaft S = 105,970 S' = 21200
Earth fill $W_1 = 87,500 \times .2 = 17500 = W_1'$
Earth fill $W_2 = 12,200 \times .2 = 2440 = W_2'$
Base B = 54,170 × .2 = 10830 = B'
Earth pres. hor. comp = $.229 \times 1600 \times 9.5^2 \times 3.6 = 119000$ kg
" vert. " = $.079 \times 1600 \times 9.5^2 \times 3.6 = 41,000$

Neglecting tension
max toe pressure = $\frac{314,740 \times 2}{4.59 \times 3.25} = 42200$ kg/m²
(= 3.86 tons/ft²) Ok

Sliding
$\frac{H}{V} = \frac{173,750}{314,740} = 0.552$ Ok.

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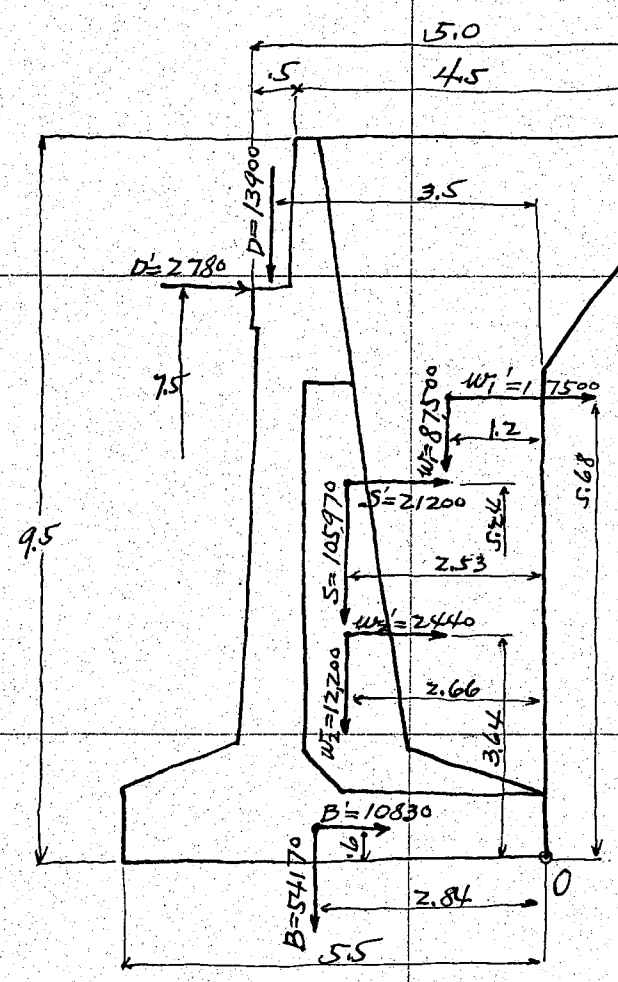
CALCULATIONS FOR

# Design of Arakawa Bashi for Saitamaken

## Case 3. Stability during Earthquake.

Seismic forces acting rear side.
Coefficient $K = 0.20$




Taking moment about point O.

| Loads | Hor. forces | vert. forces | lev. arm. | | moment |
|---|---|---|---|---|---|
| D | | 13,900 | × − 3.5 | = − | 48,700 |
| D' | 2,780 | | × + 7.5 | = + | 20,800 |
| S | | 105970 | × − 2.53 | = − | 268,000 |
| S' | 21,200 | | × + 5.24 | = + | 111,000 |
| $W_1$ | | 87,500 | × − 1.2 | = − | 105,000 |
| $W_1'$ | 17,500 | | × + 5.68 | = + | 99,400 |
| $W_2$ | | 17,200 | × − 2.66 | = − | 32,500 |
| $W_2'$ | 2440 | | × + 3.64 | = + | 8,900 |
| B | | 54,170 | × − 2.84 | = − | 153,800 |
| B' | 10,830 | | × + 0.60 | = + | 6,500 |
| | ΣH = 54,750 | ΣV = 273,740 | | ΣM = | − 361,400 kgm |

Distance of resultant force from point O.

$$= \frac{-361,400}{273,740} = 1.32^{m}$$

Eccentricity $= 2.75 - 1.32 = 1.43^{m}$ right.

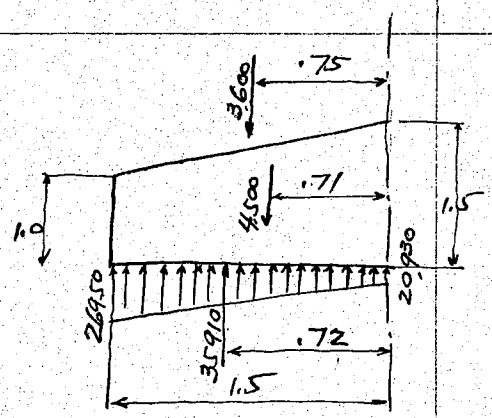
pressure area $= 1.32 \times 3 = 3.96^{m}$

$$\text{max toe pressure} = \frac{273,740 \times 2}{3.96 \times 3.25} = 42,550^{kg/m^2}$$

$$= (3.89 \text{ tons/ft}^2) \text{ OK}$$

## Design of Cantilever footings

Toe.




max toe pressure = 26950 kg/m² at normal state
or = 42550 " during earthquake.

Normal case governs the section.

| | | |
|---|---|---|
| Upward pressure | $\frac{26950+20930}{2} \times 1.5 = +35910$ | $\times .72 = +25,850$ |
| Wt. of footing | $1.25 \times 1.5 @ 2400 = -4,500$ | $\times .71 = -3,200$ |
| Earth filling | $1.5 \times 1.5 @ 1600 = -3600$ | $\times .75 = -2,700$ |
| | +27,810 kg | +19,950 kgm |

$$\text{Steel req'd} = \frac{19,950 \times 100}{1200 \times \frac{7}{8} \times 145} = 13.1^{cm}$$

Use 5-7/8"ϕ (22.22 cm ϕ) bars $= 19.4^{cm^2}$

$$\text{Steel ratio} = \frac{19.4}{100 \times 145} = .00134, \quad j = .94, \quad K = 0.177$$

$$f_s = \frac{19,950 \times 100}{19.4 \times .94 \times 145} = 755^{kg/cm^2} < 1200 \text{ OK}$$

$$f_c = \frac{f_s k}{n(1-k)} = \frac{755 \times .177}{15(1-.177)} = 10.83^{kg/cm^2} < 45 \text{ OK}$$

$$\text{Unit shear } v = \frac{27810}{100 \times .94 \times 145} = 2.04^{kg/cm^2} < 4.0 \text{ OK}$$

$$\text{Unit bond } u = \frac{27810}{6.98 \times 5 \times .94 \times 145} = 5.85^{kg/cm^2} < 6.0 \text{ OK}$$

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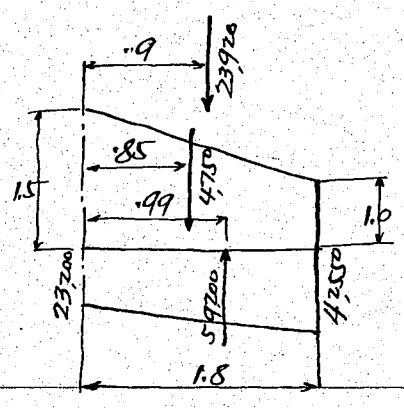
CALCULATIONS FOR

Design of Arakawa Bashi for Saitamaken.

Footing at heel.




Max. heel pressure 42,550 kg/m² during earthquake Case 3.

| | | |
|---|---|---|
| Upward pressure | $\frac{42550+23200}{2}\times 1.8 = 59200$ kg | $\times .99 = 58,600$ ✓ |
| wt. of footing | $1.1\times 1.8 @ 2400 = -4750$ | $\times .85 = -4,040$ ✓ |
| wt. of earth filling | $8.25\times 1.8 @ 1600 = -23920$ ✓ | $\times .90 = -21,500$ ✓ |
| | $+30,530$ kg/m ✓ | 33,060 kgm/m strip |

Assumed the total shear and moment to be resisted by the footing 1.8m wide.

Total shear for the section $V = 30530 \times 1.8 = 55,000$ kg

" moment " " $m = 33060 \times 1.8 = 59,500$ kgm

Steel area reqd $= \frac{59500\times 100}{1200\times 1.8\times \frac{7}{8}\times 145} = 21.7$ cm²

Use 7- 7/8"φ (2.22 cm φ) = 27.16 cm²

Steel ratio $p = \frac{27.16}{180\times 145} = 0.00104$ $\quad k = .156$, $j' = .948$

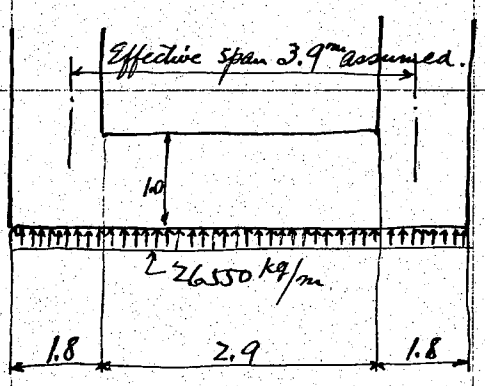
$f_s = \frac{59500\times 100}{27.16\times .948\times 145} = 1,600$ kg/cm² Ok < 2160

$f_c = \frac{1600\times .156}{15(1-.156)} = 19.7$ kg/cm² Ok < 81.0

Unit shear $v = \frac{55000}{180\times .948\times 145} = 2.22$ " Ok < 7.2

Unit bond $u = \frac{55.000}{6.98\times 7\times .948\times 145} = 8.2$ " Ok < 10.8

Footing between 2 shafts.




Effective span say 3.9m

Upward pressure = 42,550 kg/m²

wt. of footing = − 2,400

wt. of earth filling = − 13600 (.85 × 1600 = 13,600 kg/m²)

+ 26,550 kg/m²

Moment on beam $= \frac{26,550\times 3.9^2}{10} = 40400$ kgm/m strip

max End shear $= 26500\times 1.45 = 38,400$ kg/m strip.

Steel area req'd $= \frac{40400\times 100}{1,200\times 1.8\times \frac{7}{8}\times 95} = 22.5$ cm²

Use 6- 7/8"φ = 23.28 cm²

Steel ratio $p = \frac{23.28}{100\times 95} = .00245$ $\quad k = .233$, $j' = .925$

$f_s = \frac{40400\times 100}{23.28\times .925\times 95} = 1,980$ kg/cm² < 2160 Ok

$f_c = \frac{1980\times .233}{15(1-.233)} = 40.1$ kg/cm² < 81 Ok

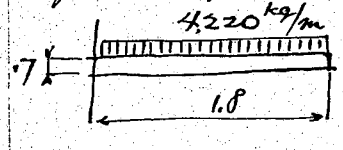
$v = \frac{38,400}{100\times .925\times 95} = 4.38$ " < 7.2 Ok

$u = \frac{38,400}{6.982\times 6\times .925\times 95} = 10.45$ " < 10.8 Ok

Wing wall.

Bottom section

Span length 1.8m say




Effective depth = 65 cm say

Normal state controls the section

Earth pressure $.33\times 1,600\times 8.0 = 4220$ kg/m²

max moment $m = \frac{4220\times 1.8^2}{2} = 6,830$ kgm

End shear $v = 4220\times 1.8 = 7,600$ kg

Steel area req'd $= \frac{6830\times 100}{1200\times \frac{7}{8}\times 65} = 10.0$ cm²

Use 3/4"φ at intervals of 35 cm c to c. $v = \frac{7600}{100\times \frac{7}{8}\times 65} = 1.35$ kg/m² Ok

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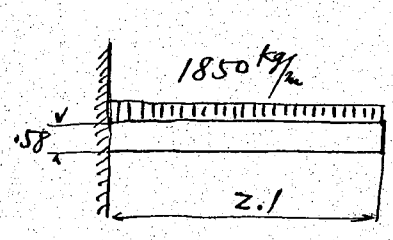
CALCULATIONS FOR

(7)

Design of Arakawa Bashi for Saitama Ken

Wing wall 3.0m from top. Span length 2.1m thickness of wall = .58m effective depth = 53cm




Earth pressure = .33 × 1600 × 3.5m = 1850 kg/m² including surcharge.

Moment $m = \frac{1850 \times 2.1^2}{2} = 4{,}080$ kgm

End shear $v = 1850 \times 2.1 = 3{,}890$ kg

Steel area reqd $= \frac{4080 \times 100}{1200 \times \frac{7}{8} \times 53} = 7.35$ cm²

use $\frac{5}{8}$" bars 26cm c to c = 7.62 cm²

Shear $= \frac{3890}{100 \times \frac{7}{8} \times 53} = 0.83$ kg/cm² OK.

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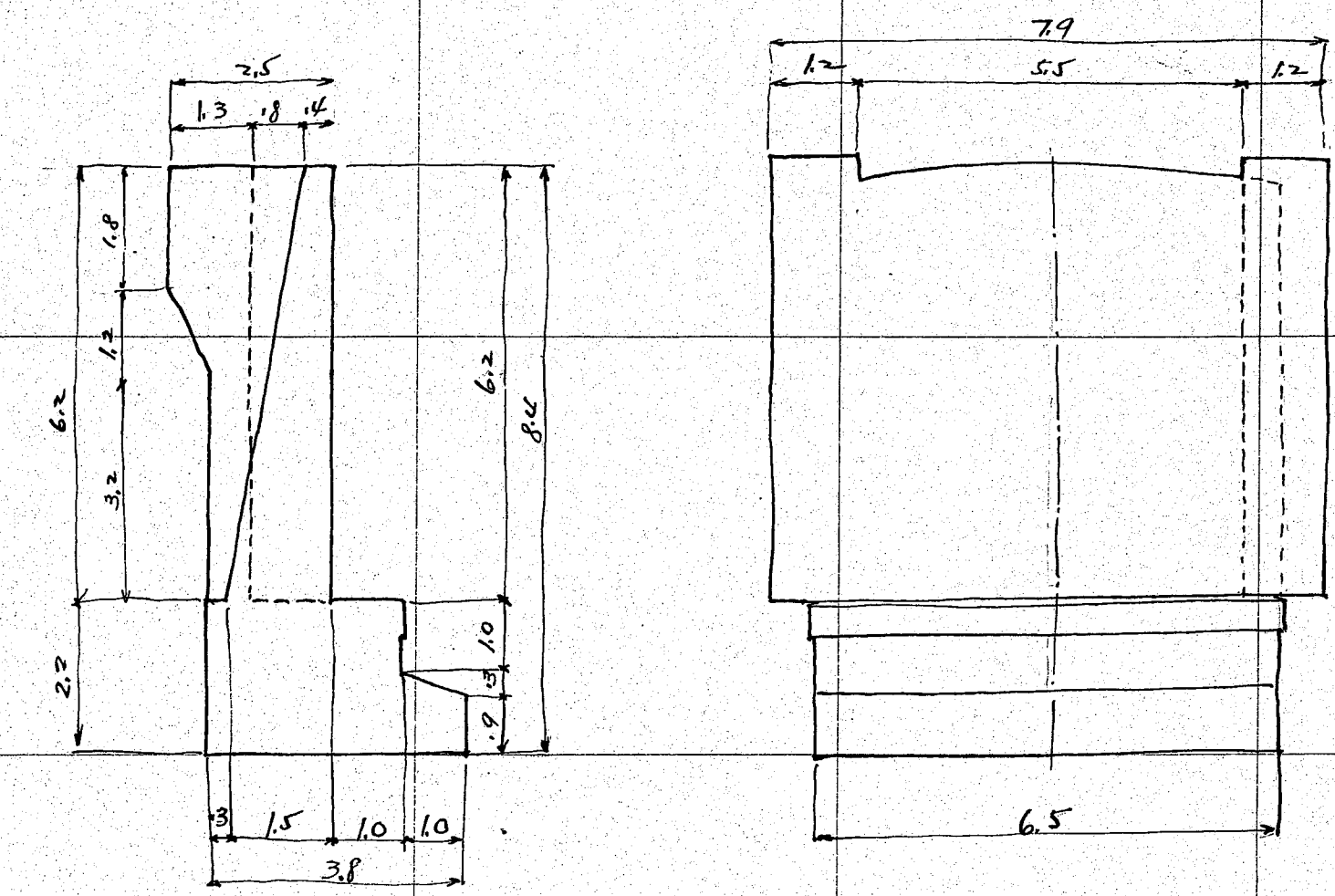
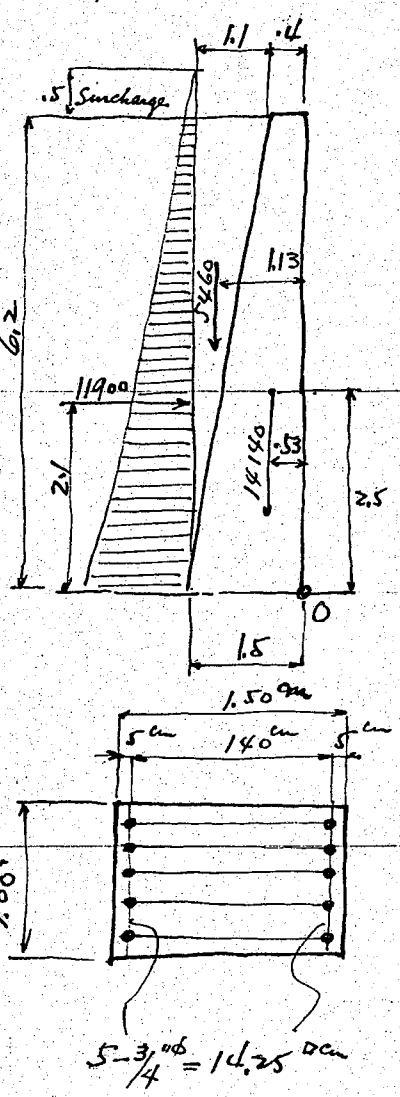
CALCULATIONS FOR

Design of Arakawa Bashi for Saitama Ken. (8)

Design of Abutment for Arch Span. (East abutment AA)




Parapet wall Case 1. Stability at normal state




Earth pressure $p_1 = .5 \times 1600 \times \frac{1}{3} = 267$

$p_2 = 6.2 \times 1600 \times \frac{1}{3}$ 3570

$3837 \div 2 = 1919 \times 6.2 =$ 11900 kg per meter strip

Weight of wall $\frac{.4+1.5}{2} \times 6.2 @ 2400 =$ 14140 kg per meter strip

Wt. of earth fill $\frac{1.1}{2} \times 6.2 @ 1600 =$ 5460 kg "

Taking moment about O.

| | | | | |
|---|---|---|---|---|
| Earth pressure | 11900 | × 2.1 | = | 25,000 kgm |
| wt. of wall | 14140 | × -.53 | = | -7,500 |
| " " earth fill | 5460 | × -1.13 | = | -6,180 |
| | ΣH = 11,900 kg | ΣV = 19600 kg | | ΣM = +11,320 kgm |

Distance of resultant force from O $= \frac{11320}{19600} = 0.577$ m

Eccentricity $\varepsilon = 0.75 + 0.577 = 1.327$ m

Bending moment on wall = $19600 \times 1.327 =$ 26,000 kgm per meter strip

Use 5-3/4" ø = 14.25 cm² on both sides

$p_0 = 2p = \frac{14.25 \times 2}{100 \times 150} = .0019$ $\quad d'/h = \frac{5}{150} = 0.033$, $\varepsilon/h = \frac{1.327}{1.8} = .885$

$K = .23$, $L = .076$, $j = .93$ ok

$f_c = \frac{26,000 \times 100}{100 \times .076 \times 150^2} = 15.2$ kg/cm² ok

$f_s = 15 \times 15.2 \left(\frac{145}{.23 \times 150} - 1\right) = 730$ kg/cm² ok

$v = \frac{11900}{100 \times .93 \times 145} = 0.88$ kg/cm² ok

$u = \frac{11900}{5.98 \times 5 \times .93 \times 145} = 2.95$ " ok

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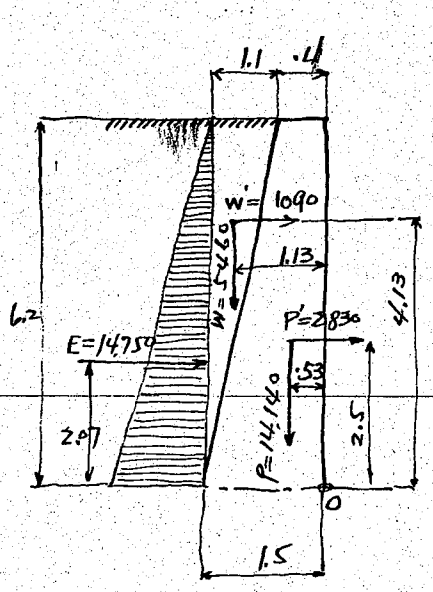
CALCULATIONS FOR

Design of Arakawa Bashi for Saitama Ken (9)

Case 2. Stability of Parapet wall during Earthquake $k = 0.2$




Earth pressure $E = .48\frac{wh^2}{2} = .24 \times 1600 \times 6.2^2 = 14750$ kg per meter strip

Taking moment about O.

| Loads | Hor. forces | vert forces | lev. arm | moment |
|---|---|---|---|---|
| P | | 14,140 | × − .53 | = − 7,500 |
| P' | 2,830 | | × + 2.5 | = + 7070 |
| W | | 5,460 | × − 1.13 | = − 6,170 |
| W' | 1,090 | | × + 4.13 | = + 4,500 |
| E | 14,750 | | × + 2.07 | = + 30,550 |
| | ΣH = 18,670 kg | ΣV = 19,600 kg | | ΣM = + 28,450 kgm |

Distance of resultant force from O $= \frac{28450}{19,600} = 1.45$ m right of O.

Eccentricity $\varepsilon = 1.45 + 0.75 = 2.20$ m

Bending moment $= 19600 \times 2.2 = 43,100$ kgm

$p_0 = 0.0019$, $d'/h = 0.033$, $\varepsilon/h = 2.2/1.5 = 1.47$

$k = 0.193$ $L = .075$ $j = .94$

$f_c = \frac{43,100 \times 100}{100 \times .075 \times 150^2} = 25.6$ kg/cm² ok

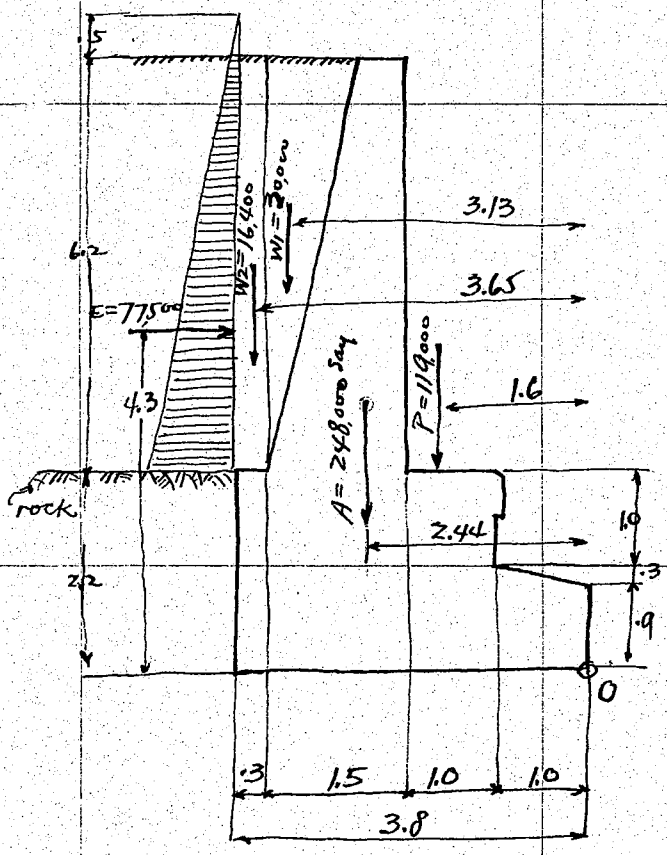
$f_s = 25.6 \times 15\left(\frac{145}{.193 \times 150} - 1\right) = 1540$ kg/cm² ok

Unit shear $v = \frac{18,670}{100 \times .94 \times 145} = 1.4$

Unit bond $u = \frac{18670}{5.98 \times 5 \times .94 \times 145} = 4.6$

Stability of Abutment as a whole

Case 1.




Center of gravity of abutment

| | | | | vert. lev. m | hor. lever m |
|---|---|---|---|---|---|
| parapet wall | $\frac{.4+1.5}{2} \times 6.2 \times 5.5 = 32.4$ @ 2400 = | 77800 kg | × 4.7 | 365500 | 2.53 196800 |
| Column | $1.2 \times 1.2 \times 6.2 \times 2 = 17.85$ @ " = | 42,900 | × 5.3 | 227300 | 2.6 111,500 |
| Wing wall | $.55 \times 1.3 \times 1.8 \times 2 = 2.57$ @ " = | 6,170 | × 7.5 | 46,300 | 3.85 28,900 |
| " | $.6 \times 1.0 \times 1.2 \times 2 = 1.44$ @ " = | 3,460 | × 6.1 | 21,100 | 3.8 13,200 |
| " | $.65 \times .5 \times 3.2 \times 2 = 2.08$ @ " = | 5,000 | × 3.8 | 19,000 | 3.5 17,500 |
| Shaft & base | $2.2 \times 2.8 \times 6.5 = 40.8$ @ " = | 96,200 | × 1.1 | 105,800 | 2.4 231,000 |
| " | $1.05 \times 1.0 \times 6.5 = 6.83$ @ " = | 16,400 | × .55 | 9000 | .6 9,800 |
| | 103.97 m³ | 247,930 kg | | 794,000 | 608,700 |

Center of gravity from O

Hor. distance $= \frac{608,700}{247,930} = 2.44$ m

Vert. distance $= \frac{794,000}{247,930} = 3.19$ "

Earth pressure $= 11900 \times 6.5 = 77,500$ kg

Taking moment about O.

| Load | Hor. force | vert force | lev. arm | moment |
|---|---|---|---|---|
| P | | 119,000 | × − 1.6 | = − 190,500 |
| A | | 248,000 | × − 2.44 | = − 605,000 |
| $W_1$ | | 30,000 | × − 3.13 | = − 93,900 |
| $W_2$ | | 16,400 | × − 3.65 | = − 59,800 |
| E | 77,500 | | × + 4.3 | = + 333,000 |
| | ΣH = 77,500 kg | ΣV = 413,400 kg | | − 616,200 kgm |

Distance of resultant force from O $= \frac{-616,200}{413,400} = -1.49$ m

Eccentricity $\varepsilon = 1.9 - 1.49 = 0.41$

max. toe pressure $= \frac{413,400}{3.8 \times 6.5}\left(1 \pm \frac{6 \times .41}{3.8}\right) = 27,600$ kg/m² C = (2.52 tons/ft²) heel

" $= 5870$ " C = (.535 " ) toe.

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CALCULATIONS FOR

(10)

Design of Arakawa-Bashi Saitamaken.

Case 2. Stability of Abutment during Earthquake. (Forward thrust)

Earth pressure = 1475 × 6.5 = 95,600 kg.

Taking moment of several forces about point O.

| Loads | Hor. forces | Vert forces | lev. arm | moment. |
|---|---|---|---|---|
| D | | 54,600 | × − 1.6 | − 87,400 |
| D' | 10,900 | | × + 2.63 | + 28,700 |
| A | | 248,000 | × − 2.44 | − 605,000 |
| A' | 49,600 | | × + 3.19 | + 158,200 |
| $W_1$ | | 30,000 | × − 3.13 | − 93,900 |
| $W_1'$ | 6,000 | | × + 6.33 | + 38,000 |
| $W_2$ | | 16,400 | × − 3.65 | − 59,800 |
| $W_2'$ | 3300 | | × + 5.3 | + 17,500 |
| E | 95,600 | | × + 4.27 | + 408,000 |
| | ΣH = 165,400 kg | ΣV = 349,000 kg | | ΣM = − 195,700 kgm |

Distance of resultant force from O = $\frac{-195,700}{349,000}$ = 0.56 m left of O.

Eccentricity = 1.9 − .56 = 1.34

Resultant force out of middle third (.633 m out)

Tension at heel will be taken into account for the lower part of the abutment will be cast in the rock which will cause the resisting frictional couple.

max. bearing pressure = $\frac{349000}{3.8 \times 6.5}\left(1 \pm \frac{6 \times 1.34}{3.8}\right)$ = 44,100 kg/m² C = (4.03 tons/□')

σ = 15,800 " T = (1.45 tons/□')

Frictional resistance of rear surface of abutment against rock

= $\frac{7900 \times 2.54}{2.87}$ = 6,990 kg per meter strip

Unit friction = $\frac{6,990}{2.2}$ = 3,180 kg/m² = (650 #/□') ok

Case 3. Stability of abutment during earthquake (Backward thrust)

Taking moment about O.

| Loads | Hor. forces | vert. forces | lev. arm | moment |
|---|---|---|---|---|
| D | | 54,600 | − 1.6 | − 87,400 |
| D' | 10,900 | | − 2.63 | − 28,700 |
| A | | 248,000 | − 2.44 | − 605,000 |
| A' | 49,600 | | − 3.19 | − 158,200 |
| $W_1$ | | 30,000 | − 3.13 | − 93,900 |
| $W_2$ | | 16,400 | − 3.65 | − 59,800 |
| | ΣH = 60,500 kg | ΣV = 349,000 kg | | ΣM = − 1,033,000 kgm |

Distance of resultant forces from O = $\frac{-1,033,000}{349,000}$ = 2.96 m left of O.

Eccentricity = 2.96 − 1.9 = 1.06 m left

max bearing pres. = $\frac{349,000}{3.8 \times 6.5}\left(1 \pm \frac{6 \times 1.06}{3.8}\right)$ = 37,700 kg/m² C (3.45 tons/□')

9,520 " T (0.87 ")

Friction on front face of abutment footing

= $\frac{3850 \times 2.54}{2.81}$ = 3480 kg/meter strip

Unit friction = $\frac{3480}{0.9}$ = 3,870 kg/m² = (792 #/□')

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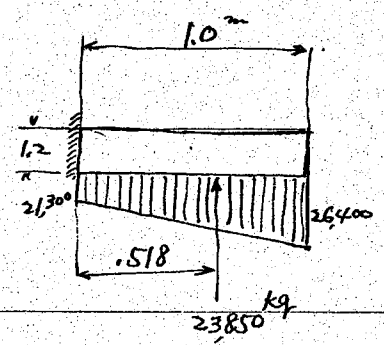
CALCULATIONS FOR

Arakawa-Bashi for Saitamaken. (11)

Cantilever footing




Upward pressure = 26,400 kg/m² for case 1. normal state
= 44,100 " for case 2 earthquake.

Case 1. controls the section

moment = 23850 × .518 = 12,300 kgm

Steel req'd. for moment = $\frac{12,300 \times 100}{1200 \times \frac{7}{8} \times 115}$ = 10.20 cm²/meter strip

Use 7/8" 40cm spacing = 9.71 cm² per meter strip

steel ratio = $\frac{9.71}{100 \times 115}$ = 0.000844

k = .147, j = 0.95

$f_s = \frac{12300 \times 100}{9.71 \times .95 \times 115}$ = 1160 kg/cm² ok

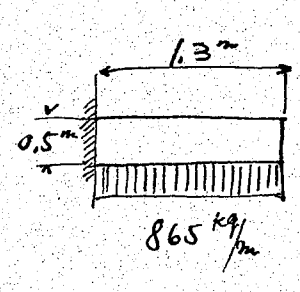
$f_c = \frac{1160 \times .147}{15(1-.147)}$ = 13.3 kg/cm² ok

$v = \frac{23850}{100 \times .95 \times 115}$ = 2.18 " ok

$u = \frac{23850}{6.98 \times 2.5 \times .95 \times 115}$ = 12.5 kg/cm² over

Use 7/8" 20 cm ctoC for bond stress.

Wing wall. 1.8m from top




Earth pressure $\frac{1}{2} \times 1600 \times \frac{1.8^2}{2}$ = 865 kg

moment = $\frac{1}{2} \times 865 \times 1.3^2$ = 731 kgm

steel req'd = $\frac{731 \times 100}{1200 \times \frac{7}{8} \times 45}$ = 1.55 cm² per meter strip

Use $\frac{1}{2}$" bars 0.5 m spacing = 2.53 cm² ok

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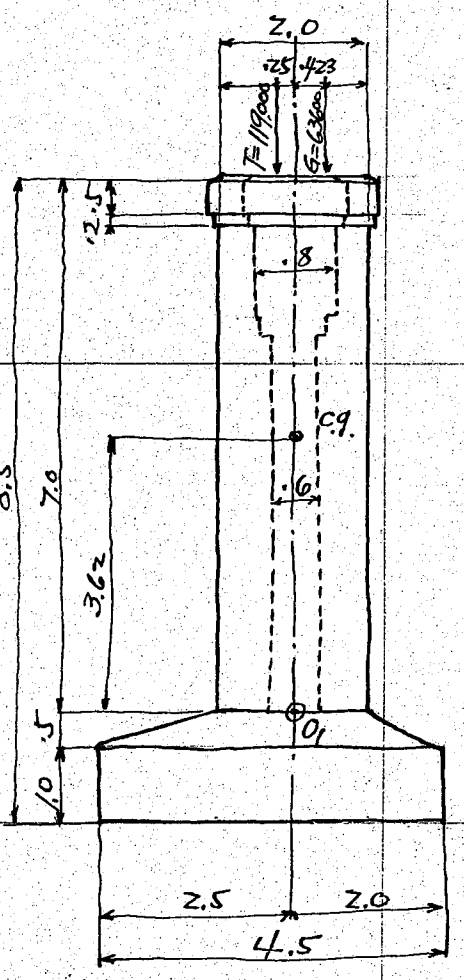
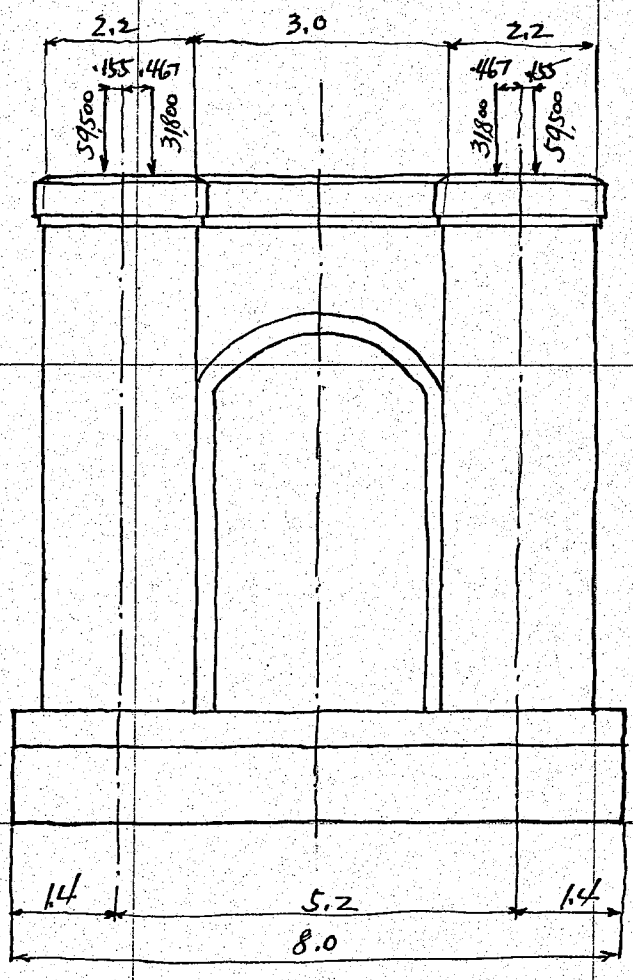
CALCULATIONS FOR

Design of Arakawa Bashi for Saitama Ken.
Design of Pier between Truss and girder Spans (P/G)
Case I.




| | from truss span | from girder span |
|---|---|---|
| Super imposed D.L. | 60,000 | 30,600 |
| " L.L. | 47,000 | 25,270 |
| wind L. | 24200 | 14,100 |
| | 131,200 # | 69,970 # |
| | or 59,500 kg | or 31,800 kg |

Weight of Shaft.

| | | | | | | vert. lev. arm | | moment |
|---|---|---|---|---|---|---|---|---|
| Coping | 2.2×0.7×2.4×2 = 7.38 m³ | @2,400 | = 17,700 kg | × | 6.65 m | = | 117,700 |
| " | 1.2×0.7×3.0×1 = 2.52 | @ " | = 6,050 | × | 6.65 | = | 40,200 |
| Column | 2.0×2.2×6.3×2 = 55.40 | @ " | = 133,000 | × | 3.15 | = | 419,000 |
| wall | 0.8×1.0×3.0×1 = 2.40 | @ " | = 5,760 | × | 5.80 | = | 33,400 |
| " | 0.6×3.0×5.3×1 = 9.54 | @ " | = 22,900 | × | 2.65 | = | 60,700 |
| " | 0.15×0.1×4.9×4 = 0.29 | @ " | = 700 | × | 2.45 | = | 1,700 |
| | 77.53 m³ (12.9 t/m) | | 186,110 kg | | | | 672,700 kgm ÷ 186,100 kg = 3.62 m |

Taking moment about O1.

| | | | | |
|---|---|---|---|---|
| Loads from truss span | 119,000 | × −0.25 | = | − 29800 |
| " " girder | 63,600 | × +0.423 | = | + 26,900 |
| wt. of Shaft. | 186,100 | × 0 | = | 0 |
| | 368,700 kg | | | − 2,900 kgm ÷ 368,700 = 0.008 m left side of ℄. |

$$f_c = \frac{368{,}700}{2.2\times 2\times 2.2}\left(1 \pm \frac{6\times .008}{2.0}\right) = 42{,}900\ \text{kg/m}^2 = 4.2\ \text{kg/cm}^2 \quad \text{ok.}$$

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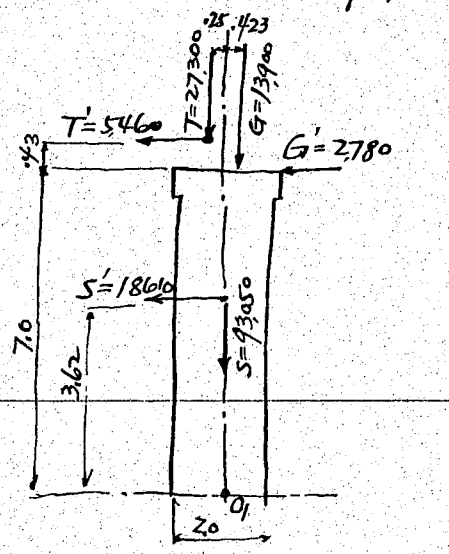
CALCULATIONS FOR

(13)

Design of Arakawa Bashi for Saitama Ken.

Case 2. Stability of shaft during earthquake.




| | Super imp. Load on one shaft | | Seismic force. |
|---|---|---|---|
| D.L. from girder span | 30600# = 13900 kg | × .2 = | 2,780 kg |
| " " Truss " | 60000 = 27300 | × .2 = | 5,460 |
| wt. of shaft | 186100 ÷ 2 = 93050 kg | × .2 = | 18,610 |

Taking moment about O1

| Load | Vert. force | Hor. force | Lev. arm | | moment |
|---|---|---|---|---|---|
| T | 27,300 | | × + 0.25 | = + | 6,820 kgm |
| T' | | 5460 | × + 7.43 | = + | 40,550 |
| G | 13,900 | | × −0.423 | = − | 5,880 |
| G' | | 2780 | × + 7.0 | = + | 19,450 |
| S | 93,050 | | × 0 | = | 0 |
| S' | | 18,610 | × + 3.62 | = + | 67,400 |
| | ΣV = 134,250 | ΣH = 26,850 | | ΣM = + | 128,340 |

Eccentricity $\varepsilon = \frac{128,340}{134,250} = 0.956^m$

Try 6 - 7/8" bars on both sides = 2@23.28 = 46.6 cm²

steel ratio $p_0 = \frac{46.6}{200 \times 220} = 0.0011$

$d'/h = \frac{0.1}{2.0} = 0.05$ $\quad \varepsilon/h = \frac{0.956}{2.0} = 0.48$

from prepared diagram $k = 0.305$, $L = 0.072$

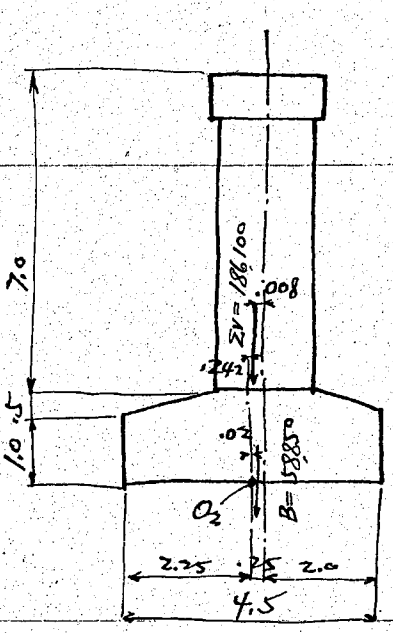
$f_c = \frac{M}{Lbh^2} = \frac{128,340 \times 100}{0.072 \times 220 \times 200^2} = 20.3$ kg/cm² ok

$f_s = n f_c \left(\frac{d}{kh} - 1\right) = 15 \times 20.3 \left(\frac{0.1}{0.305 \times 2.0} - 1\right) = 195$ kg/cm² ok

$v = \frac{26,850}{220 \times \frac{7}{8} \times 190} = 0.74$ kg/cm² ok

$u = \frac{26850}{6 \times 6.98 \times \frac{7}{8} \times 190} = 3.9$ kg/cm² ok.

Stability of Pier as a whole.
Case 1. at normal state.




wt. of base

| | | | | |
|---|---|---|---|---|
| 1.0 × 1.25 = 1.25 × 4.0 = | 5.00 cub.m @ 2,400 = | 12,000 kg | lev. arm × .53 = | moment 6,360 |
| 2.0 × 1.5 = 3.00 × 4.0 = | 12.00 @ " = | 28,800 | × 2.0 = | 57,500 |
| 1.5 × 1.25 = 1.88 × 4.0 = | 7.52 @ " = | 18050 | × 3.71 = | 67,000 |
| | 24.52 m³ (4.09 t) | 58,850 kg | | 130,860 |

C.g. of gravity $\frac{130860}{58850} = 2.23^m$ from right end.

Taking moment about $O_2$ (Centr of base)

Total load from shaft. ΣV = 186100 × (−.242) = − 45,000 kgm

wt. of base B = 58850 × (−0.02) = − 1,200

ΣV = 244,950 kg − 46,200 kgm

Eccentricity $\varepsilon = \frac{-46,200}{244,950} = 0.19^m$ right.

Resultant force within middle third

max toe pressure = $\frac{244,950}{4.5 \times 4.0}\left(1 \pm \frac{6 \times 0.19}{4.5}\right) = 17,050$ kg/m² = 1.56 t/m² C ok

$\sigma_2 = 10,170$ " = 0.93" C ok.

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CALCULATIONS FOR

Design of Arakawa Bashi for Saitama Ken.

Case 2. Stability of Pier during earthquake (Seismic forces toward river center).

Taking moment about point $O_2$, Center of base

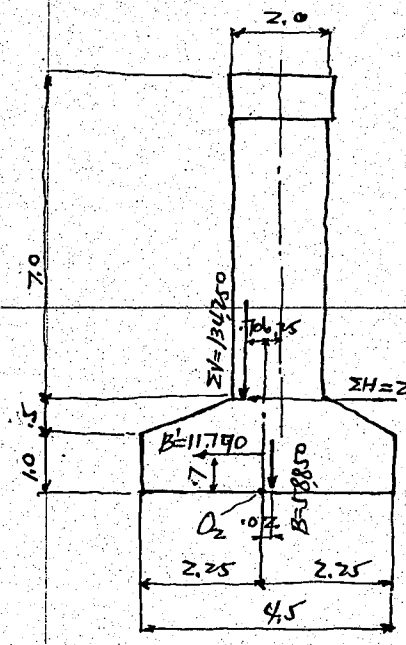
| | | | | |
|---|---|---|---|---|
| ΣV. from Shaft | 134,250 | × 0.706 | = | 94,800 |
| ΣH " " | 26850 | × 1.50 | = | 40,300 |
| B | 58,850 | × -0.02 | = | − 1,180 |
| B' | 11,770 | × 0.70 | = | 8,240 |
| | ΣV = 193,100 | ΣH = 38,620 kg | | 142,160 kgm |

Eccentricity $\varepsilon = \frac{142,160}{193,100} = 0.737^{m}$ left.

Resultant force within middle third.

max. toe pressure $= \frac{193,100}{4.5 \times 4.0}\left(1 \pm \frac{6 \times 0.737}{4.5}\right) = 21,300^{kg/m^2} = (1.95^{tons/ft^2})$ ok

or = 183 " = (0.017 ")




Case 3. do. Seismic forces toward approach

| | |
|---|---|
| ΣV from Shaft | = −94,800 |
| ΣH " | = −40,300 |
| B | = − 1,180 |
| B' | = − 8,240 |
| | = −144,520 |

Eccentricity $\varepsilon = \frac{144,520}{193,100} = 0.75^{m}$ right

Resultant forces just on the middle third point.

max. toe pressure $= \frac{2 \times 193,100}{4.0 \times 4.5} = 21500^{kg/m^2} = (1.96^{tons/ft^2})$ ok.

or = 0.

Cantilever footing

Upward pressure = 17,250 kg/m² at normal state

Cantilever moment

| | | | |
|---|---|---|---|
| 23,850 | × 0.765 | = + | 18,250 |
| − 4,500 | × 0.7 | = − | 3150 |
| 19,350 | | | 15,100 kgm per meter strip |

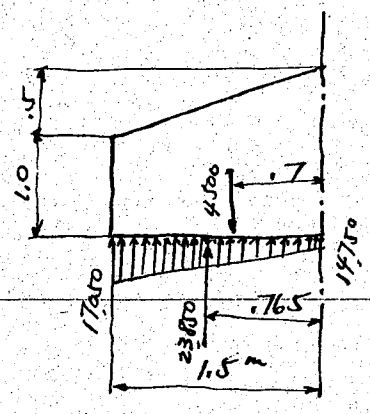
Steel req'd $= \frac{15,100 \times 100}{1200 \times \frac{7}{8} \times 140} = 10.3^{cm^2}$

Use 3/4" ϕ bars 2.85 cm²

Spacing $= \frac{2.85}{10.3} = 27.6^{cm}$ use 20 cm etc.

Shear $= \frac{19350}{100 \times \frac{7}{8} \times 140} = 1.58^{kg/cm^2}$ ok

Bond stress $= \frac{19350}{5.984 \times 5 \times \frac{7}{8} \times 140} = 5.3^{kg/cm^2}$ ok



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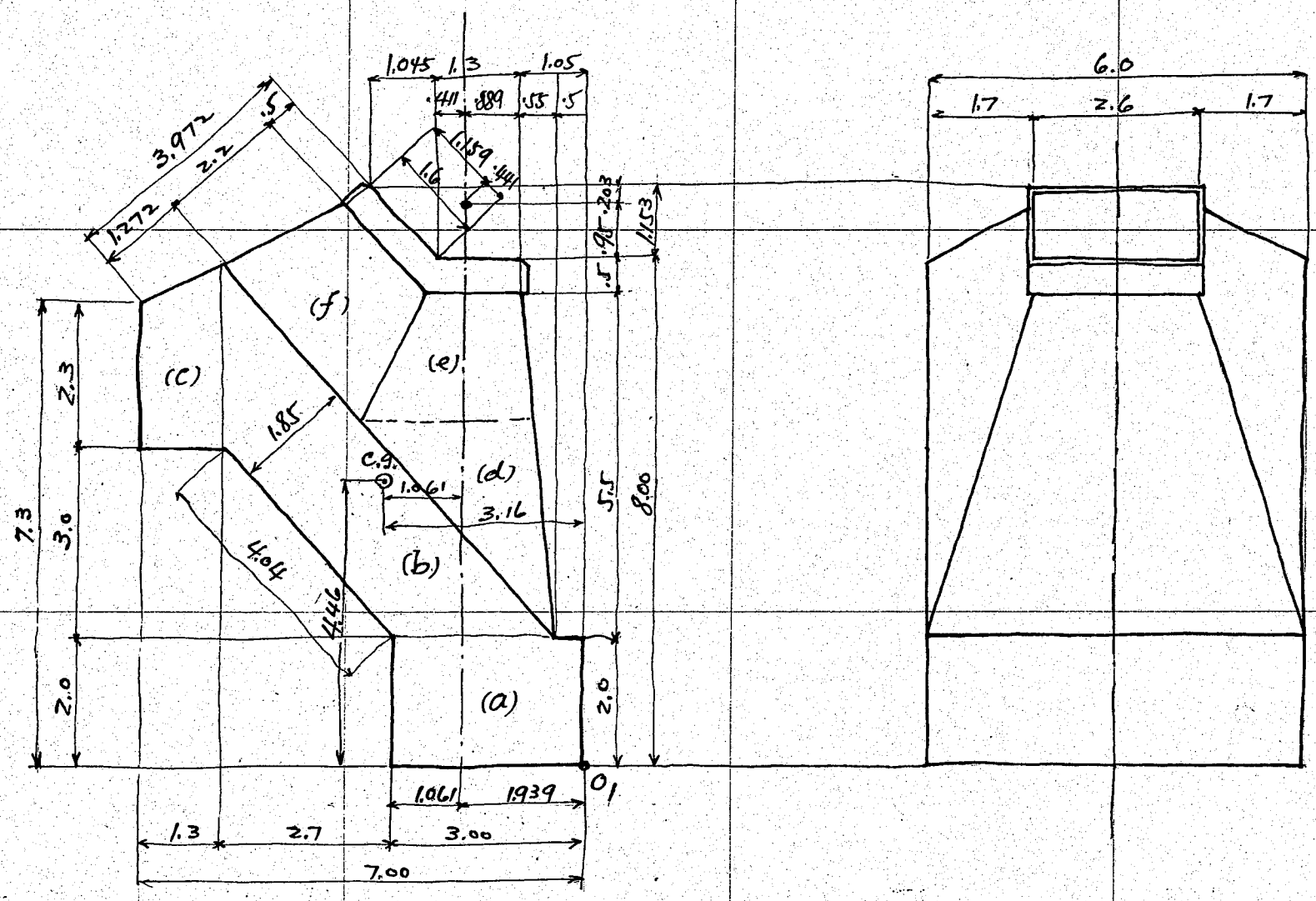
CALCULATIONS FOR

(15)

Design of Arakawa-Bashi for Saitama Ken.
Design of Pier for Arch Span.




Center of gravity of Pier Taking moment about $O_1$.

| | Section | Length | Vol | unit wt | total wt | hor. lev. arm $m_1$ | | vert. lev. arm | $m_v$ |
|---|---|---|---|---|---|---|---|---|---|
| Base | a | 2.0m × 3.0m × 6.0m = | 36.0 | @ 2,400kg | = 86,400 × 1.5 | 129,500 kgm | | 1.0 | 86,400 kgm |
| " | b | 1.85 × 6.0 × 6.0 = | 66.6 | @ " | = 159,800 × 3.7 | 591,500 | | 4.2 | 671,500 |
| " | c | 1.3 × 2.25 × 6.0 = | 19.9 | @ " | = 47,700 × 6.3 | 300,500 | | 6.2 | 296,000 |
| Body | d | 1.4 × 3.4 × 5.5 = | 26.2 | @ " | = 62,900 × 1.6 | 100,600 | | 4.2 | 264,000 |
| " | e | 2.05 × 2.6 × 3.3 = | 17.6 | @ " | = 42,200 × 2.0 | 84,400 | | 6.5 | 274,000 |
| " | f | 2.4 × 2.7 × 4.3 = | 27.8 | @ " | = 66,700 × 4.0 | 266,700 | | 7.4 | 487,000 |
| | | | 194.1 m³ | | 465,700 kg | 3.16m | 1,473,200 kgm | 4.46m | 2,078,900 kgm |

Super imposed Loads on pier

(1)

V = 289,500#
Shoe 70,000 say
359,500#
or 163000kg

Hmax = 286600# or 130,000kg

(2)

Vmax = 297600
Shoe 70,000 say
367,600#
or 167,000kg

H = 280,000# abt
or 127,000kg

(3)

V = 216700
Shoe = 70,000 say
286,700#
or 130,000kg

Hmin = 215,000
or 98000kg

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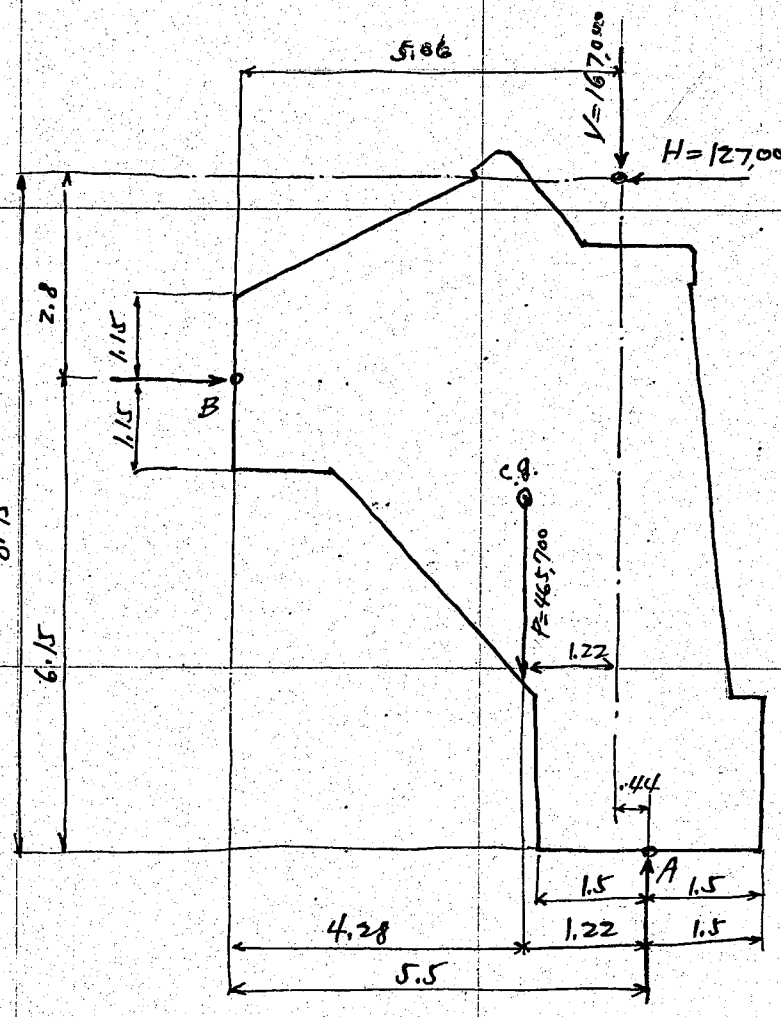
CALCULATIONS FOR

Design of Arakawa-Bashi for Saitama Ken. (16)

Stability of Pier for Arch span.

Case 1. Stability at normal state




Taking moment about Point A.

| | | | | |
|---|---|---|---|---|
| V = | 167000 kg | × 0.44 | = | 73,500 kgm |
| H = | 127,000 | × 8.95 | = | 1,137,000 |
| P = | 465,700 | × 1.22 | = | 1568,000 |
| | | | | 1,778,500 kgm |

Reaction at B = $\frac{1,778,500}{6.15}$ = 289,000 kg

Unit bearing pressure at B.

= $\frac{289000}{2.3 \times 6}$ = 20,900 kg/m² (≈ 1.92 tons/ft²)

Taking moment about B.

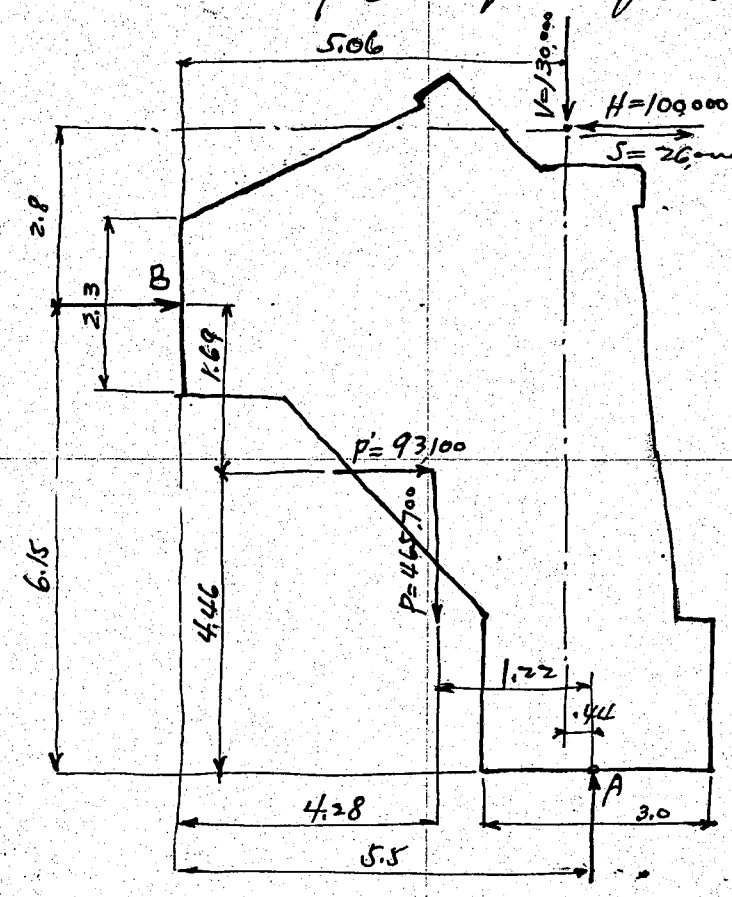
| | | | | |
|---|---|---|---|---|
| V = | 167,000 | × 5.06 | = | +845,000 |
| H = | 127,000 | × −2.80 | = | −355,000 |
| P = | 465,700 | × 4.28 | = | +1,995,000 |
| | | | | +2,485,000 kgm |

Reaction at A = $\frac{2485.000}{5.5}$ = 452,000 kg

Unit bearing pressure at A

= $\frac{452000}{3.0 \times 6.0}$ = 25,100 kg/m² (2.3 tons/ft²)

Case 2. Stability during earthquake (Forward seismic thrust)




Taking moment about A.

| | | | | |
|---|---|---|---|---|
| V | 130,000 | × 0.44 | = | 57,200 |
| H | 100,000 | × 8.95 | = | 895,000 |
| S | −26,000 | × 8.95 | = | −232,500 |
| P | 465,700 | × 1.22 | = | 568,000 |
| P' | −93,100 | × 4.46 | = | −415,000 |
| | | | | +972,700 kgm |

Reaction at B = $\frac{972.700}{6.15}$ = 158,000 kg

Unit bearing pressure at B

= $\frac{15.800}{2.3 \times 6}$ = 11,450 kg/m² = (1.05 tons/ft²)

Taking moment about B.

| | | | | |
|---|---|---|---|---|
| V | 130,000 | × 5.06 | = + | 658,000 |
| H | 100,000 | × −2.80 | = − | 280,000 |
| S | −26,000 | × −2.80 | = + | 72,800 |
| P | 465,700 | × 4.28 | = + | 1,995,000 |
| P' | −93,100 | × 1.69 | = − | 157300 |
| | | | | +2,288,500 kgm |

Reaction at A = $\frac{2,288,500}{5.5}$ = 415,000 kg

Unit bearing pressure at A = $\frac{415000}{3.0 \times 6.0}$ = 23,100 kg/m² = (2.11 tons/ft²)

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CALCULATIONS FOR

(17)

Design of Arakawa Bashi for Saitama Ken.

Stability of pier for arch span continued
Case 3. Stability during Earthquake (Backward seismic thrust).
Reffer to the figure for case 2.

Taking moment about A

| | | | | | |
|---|---|---|---|---|---|
| V | 130,000 | × | 0.44 | = + | 57,200 |
| H | 100,000 | × | 8.95 | = + | 895,000 |
| S | 26,000 | × | 8.95 | = + | 232,500 |
| P | 465,700 | × | 1.22 | = + | 568000 |
| P' | 93,100 | × | 4.46 | = + | 415.000 |
| | | | | + | 2,167,700 |

Taking moment about B.

| | | | | | |
|---|---|---|---|---|---|
| V | 130,000 | × | 5.06 | = + | 658,000 |
| H | 100,000 | × | 2.8 | = − | 280,000 |
| S | 26,000 | × | 2.8 | = − | 72,800 |
| P | 465,700 | × | 4.28 | = + | 1,995,000 |
| P' | 93,100 | × | 1.69 | = + | 157.300 |
| | | | | + | 2,457,500 |

Reaction at $B = \frac{2,167,700}{6.15} = 353,000$ kg

Reaction at $A = \frac{2,457,500}{5.5} = 446,500$ kg

Unit bearing pressure at $B = \frac{353000}{2.3 \times 6} = 25,500$ kg/m² or (2.34 tons/ft²)

Unit bearing pressure at $A = \frac{446.500}{3.0 \times 6.0} = 24,800$ kg/m² or (2.27 tons/ft²)