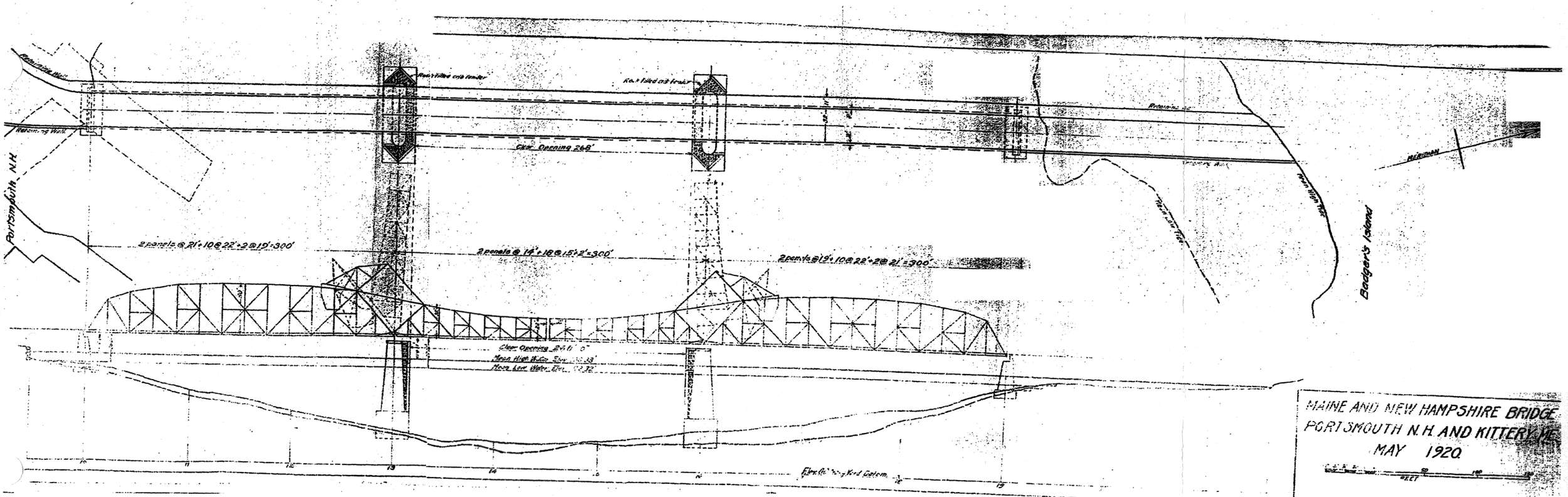
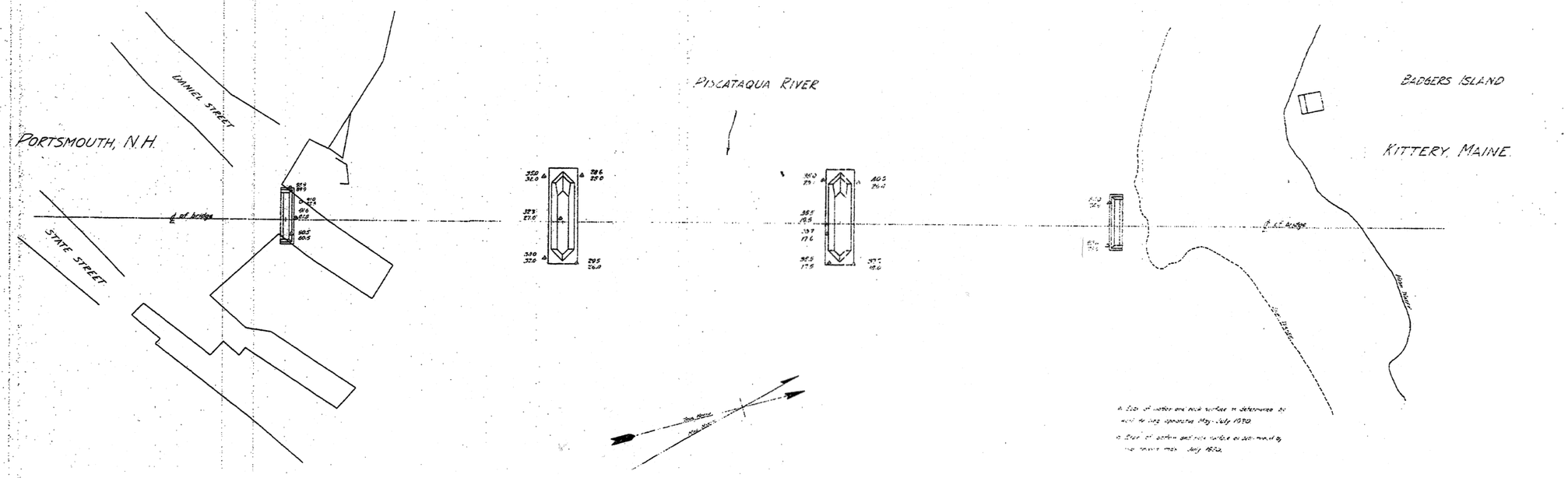
Tab O. Historic Drawings

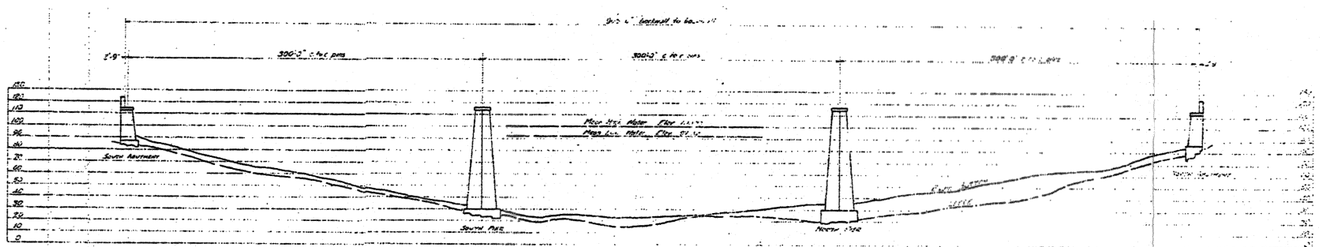
(Note: Unless otherwise indicated all drawings are from NHDOT. Large-format photographic copies of Waddell Plans will be housed at NHDHR -- see NH State No.627).

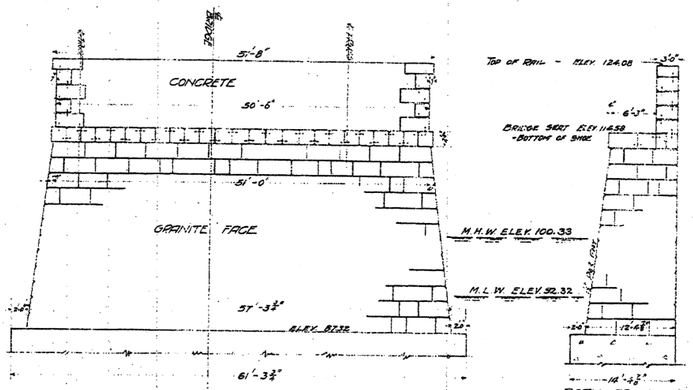
1. 1920 Maine and New Hampshire Bridge [Bascule Design] (Unsigned) (Strawbery Banke)
2. 1920 General Plan and Profile [Abutments and Piers] (Piscataqua River Bridge Commission) August 12, 1920.
3. 1920 North and South Abutments. (Piscataqua River Bridge Commission) August 12, 1920.
4. 1920 North and South Piers. (Piscataqua River Bridge Commission) August 12, 1920.
5. 1920 Fender Piling for North Pier. (Piscataqua River Bridge Commission) August 12, 1920.
6. 1920 Fender Piling for South Pier. (Piscataqua River Bridge Commission) August 12, 1920.
7. 1920 General Layout (Waddell)
8. 1920 Stress Sheet (Waddell)
9. 1920 Stress Sheet (Waddell)
10. 1920 Stress Sheet
11. 1920 General Drawing of Lift Span Sheet 4(Waddell)
12. 1920 Details of Deck and Floor System Sheet 5(Waddell)
13. 1920 Details of Tower Sheaves, Shafts & Bearings Sheet M1 (Waddell)
14. 1920 Equalizers Sheet M2 (Waddell)
15. 1920 General Arrangement Operating Machines Sheet M3 (Waddell)
16. 1921 North Approach- Masonry Plan (unsigned)
17. 1921 North Approach- Superstructure (unsigned)
18. 1921 Portsmouth Approach General Plan (Drawn by C.M. Rundlett)
19. 1922 Portsmouth Approach Detail of Reinforced Concrete (Drawn by C.M. Rundlett)
20. 1923 Record Drawing of South Pier (Drawn by C.M. Rundlett)
21. 1923 Record Drawing of North Pier (Drawn by C.M. Rundlett.)


Portsmouth N.H.
Kittery Me.
Clear Opening 268'
2 panels @ 21'=10 @ 22'=2 @ 19'=300'
2 panels @ 14'=10 @ 15'=2'=300'
2 panels @ 19'=10 @ 22'=2 @ 21'=300'
Clear Opening 246 ft 0"
Mean High Water Elev. 10.13'
Mean Low Water Elev. 0.32'
Elevation of Top of Rail
Badger's Island
MAINE AND NEW HAMPSHIRE BRIDGE
PORTSMOUTH N.H. AND KITTERY ME.
MAY 1920
FEET

O-1

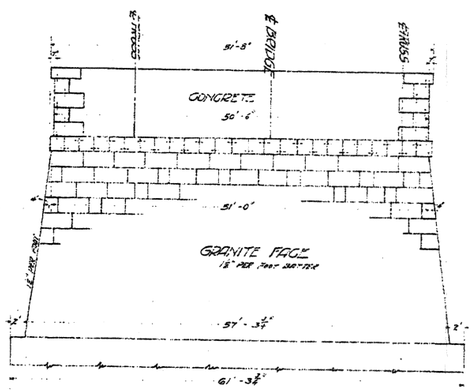

PORTSMOUTH, N.H.
DANIEL STREET
STATE STREET
℄ of bridge
PISCATAQUA RIVER
BADGERS ISLAND
KITTERY, MAINE
℄ U.S. Bridge
John Paul Jones House
Old Block House
Old Well
a. Elev. of water and rock surface as determined by drill at this opening May - July 1920.
b. Elev. of bottom and rock surface as determined by the same drill July 1920.


Mean High Water
Mean Low Water
Elev. 21.4
Elev. 11.4
Elev. 0.0
Elev. -10.0
Elev. -20.0
Elev. -30.0
Elev. -40.0
Elev. -50.0
Elev. -60.0
Elev. -70.0
Elev. -80.0
Elev. -90.0
Elev. -100.0
Elev. -110.0
Elev. -120.0
Elev. -130.0
Elev. -140.0
Elev. -150.0
Elev. -160.0
Elev. -170.0
Elev. -180.0
Elev. -190.0
Elev. -200.0
Elev.

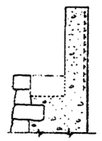


SOUTH ABUTMENT ELEVATION.

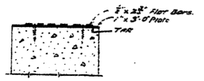
BOTH ABUTMENTS END ELEVATION



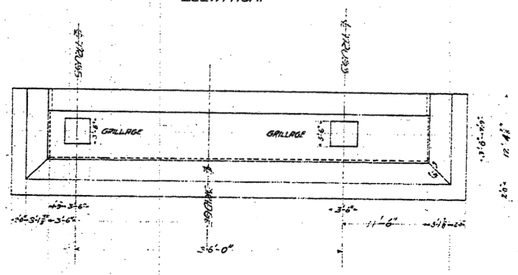
NORTH ABUTMENT ELEVATION



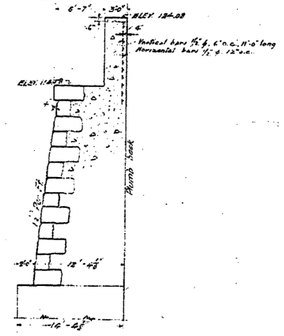
POCKET IN BRIDGE SEAT FOR GRILLAGE



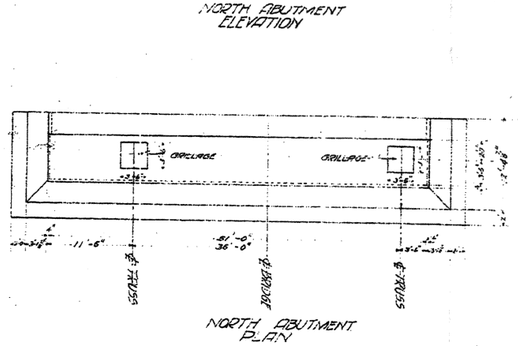
SAFETY TREAD ON TOP PEDESTALS
(To be furnished and set under this contract)



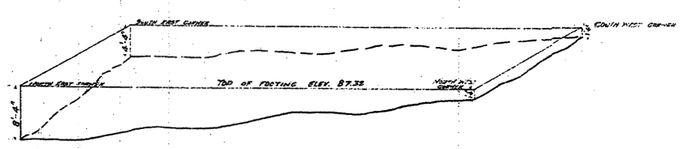
SOUTH ABUTMENT PLAN.



ABUTMENT CROSS SECTION BOTH ABUTMENTS.

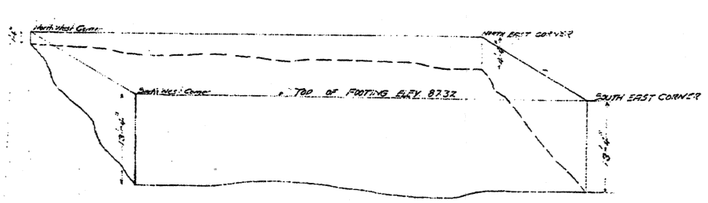


NORTH ABUTMENT PLAN



FOOTING OF SOUTH ABUTMENT

TENTATIVE AVERAGE ELEVATION OF LEDGE BOTTOM 83.50



FOOTING OF NORTH ABUTMENT

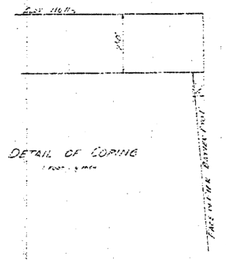
TENTATIVE AVERAGE ELEVATION OF LEDGE BOTTOM 79.25

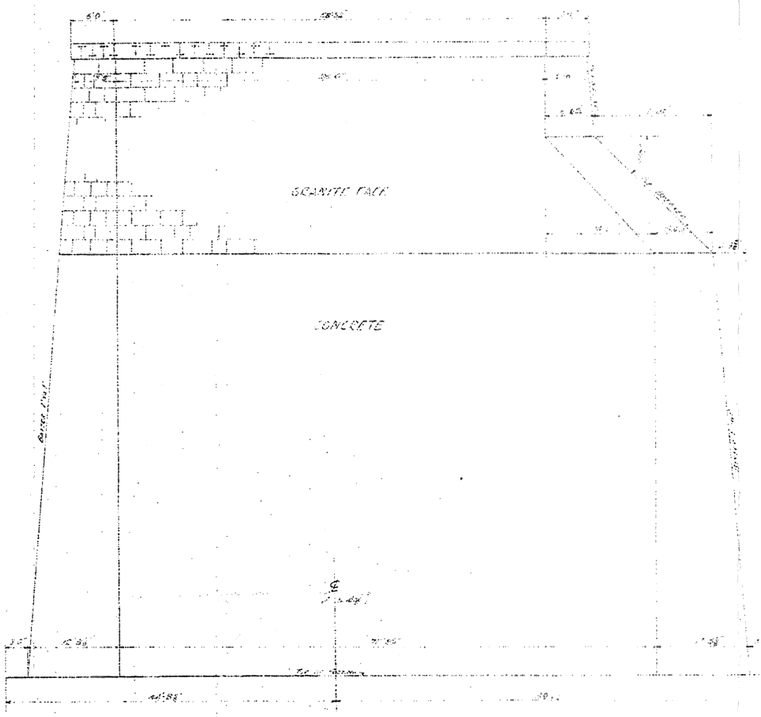
NORTH AND SOUTH ABUTMENTS. Scale 8"=1'

O-3

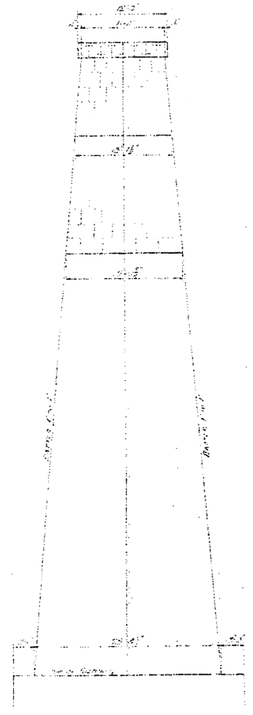
PISCATAQUA RIVER BRIDGE

SHEET 2 OF 5 AUGUST 1920

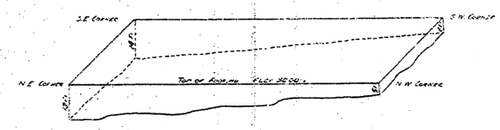




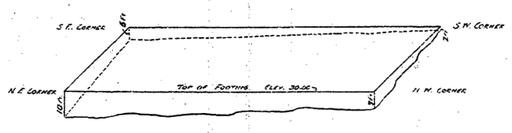
SIDE ELEVATION LOOKING SOUTH



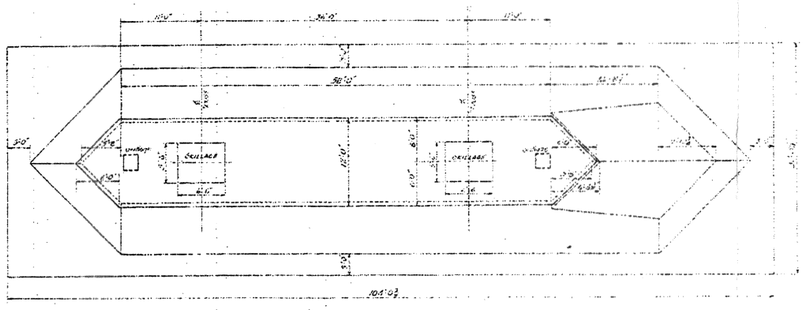
END ELEVATION LOOKING EAST



FOOTING FOR NORTH PIER



FOOTING FOR SOUTH PIER



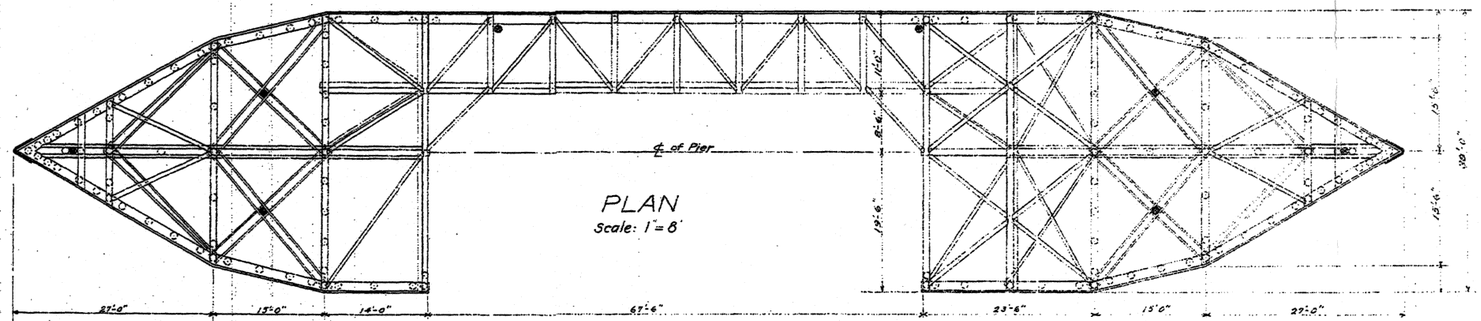
PLAN

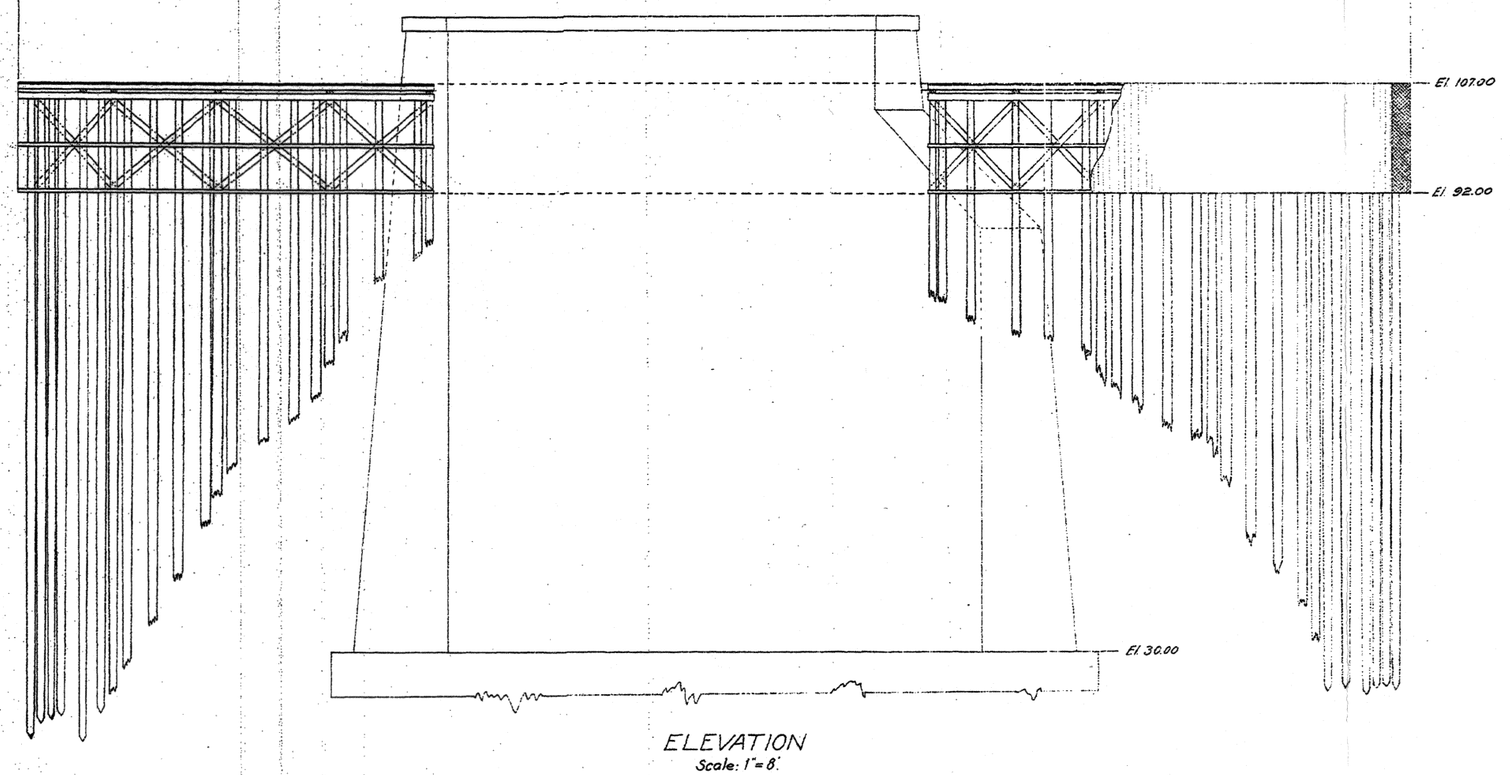
NORTH AND SOUTH PIERS

O-4

PISCATAQUA RIVER BRI

SHEET 3 OF 5 AUGUST 19



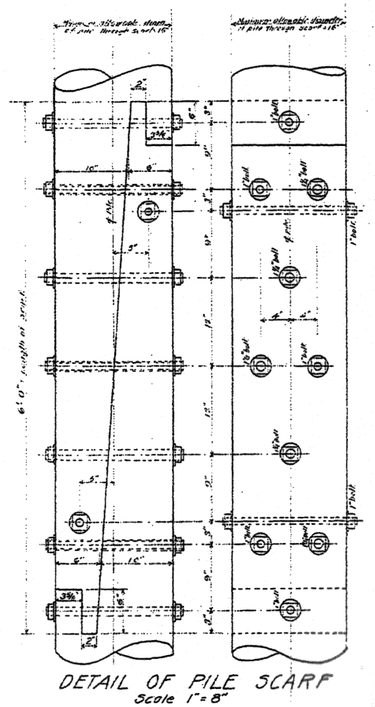


ELEVATION
Scale: 1"=8'

NOTE

Framing, flooring, bollards, vertical planking, fastenings, iron notings and all other construction substantially the same as shown on sheet "5 (Fender piling for South Pier). This construction differs mainly in that a different number and arrangement of piles occurs. The piles are driven (with no crib work or no rap) and the six double sets of cross pile-caps do not occur (being replaced by single caps).

Notes on sheet "5 govern this sheet in so far as applicable.



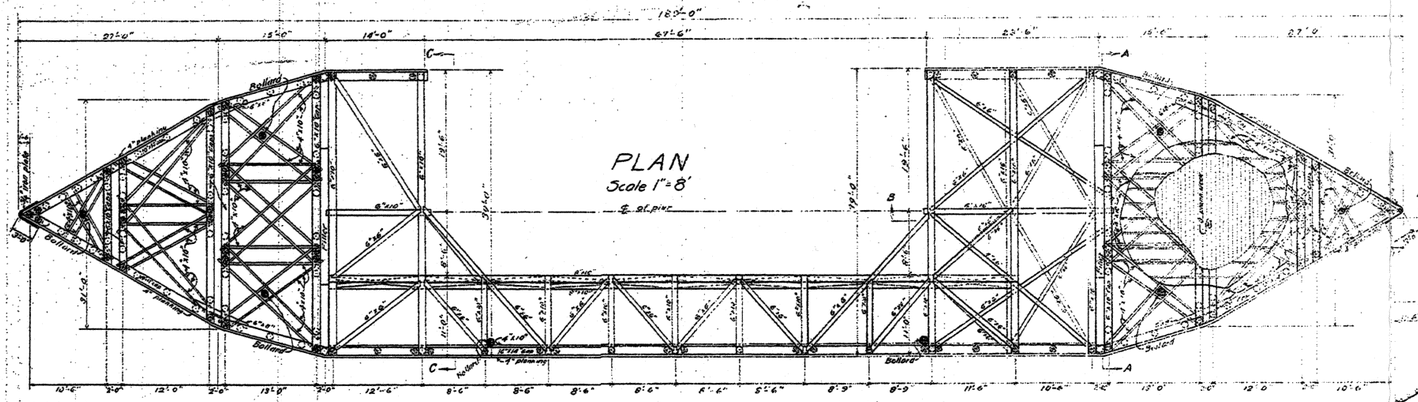
DETAIL OF PILE SCARF
Scale 1"=8"

FENDER PILING FOR NORTH PIER.

PISCATAQUA RIVER BRIDGE

SHEET 4 OF 5 AUGUST 1920

O-5



NOTE:-

FASTENINGS.

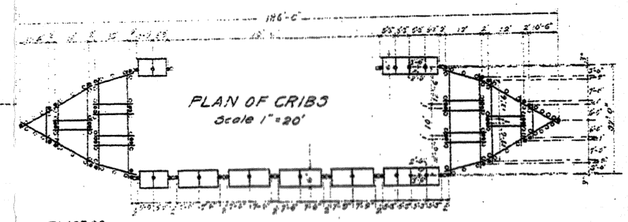
Crib work	1" bolts.
Pile to Pile connections	1½" "
Drift bolts	1" extending 16" into pile.
Framing to hold through 6" or over	¾" bolts.
Framing to hold through less than 6"	⅝" "
Vertical planking	⅝" "

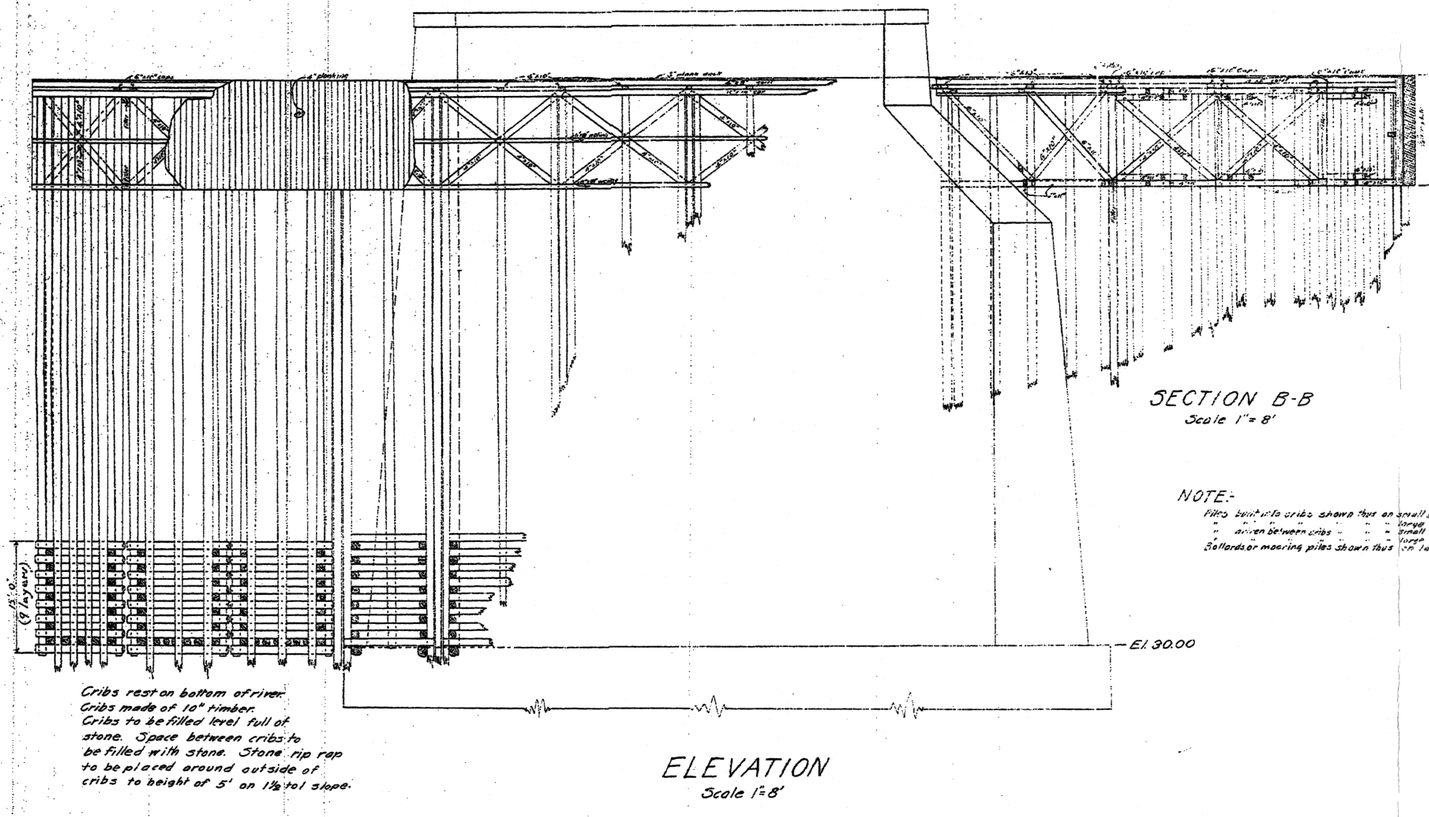
All fastenings subject to approval in details submitted by contractor

PILE SCARFING, as shown on sheet - "4

BRACING.

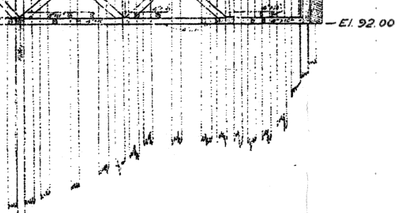
Diagonal bracing both ways in all bents, horizontally at deck and at low water level, vertically on all four sides of bents (three sides of end triangular bents.



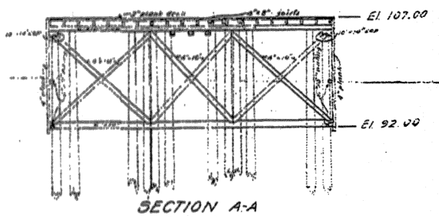


Cribs rest on bottom of river.
Cribs made of 10" timber.
Cribs to be filled level full of stone. Space between cribs to be filled with stone. Stone rip rap to be placed around outside of cribs to height of 5' on 1½ to 1 slope.

ELEVATION
Scale 1"=8'



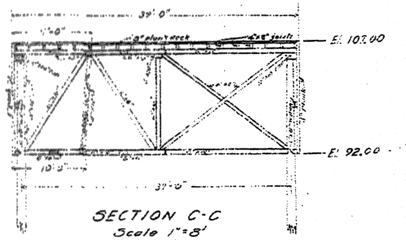
SECTION B-B
Scale 1"=8'



SECTION A-A
Scale 1"=8'

NOTE:-

Piles built into cribs shown thus on small plan ●
" " " " " " large plan ●
" driven between cribs " " small plan ●
" " " " " large plan ●
Bollards or mooring piles shown thus on large plan ●



SECTION C-C
Scale 1"=8'

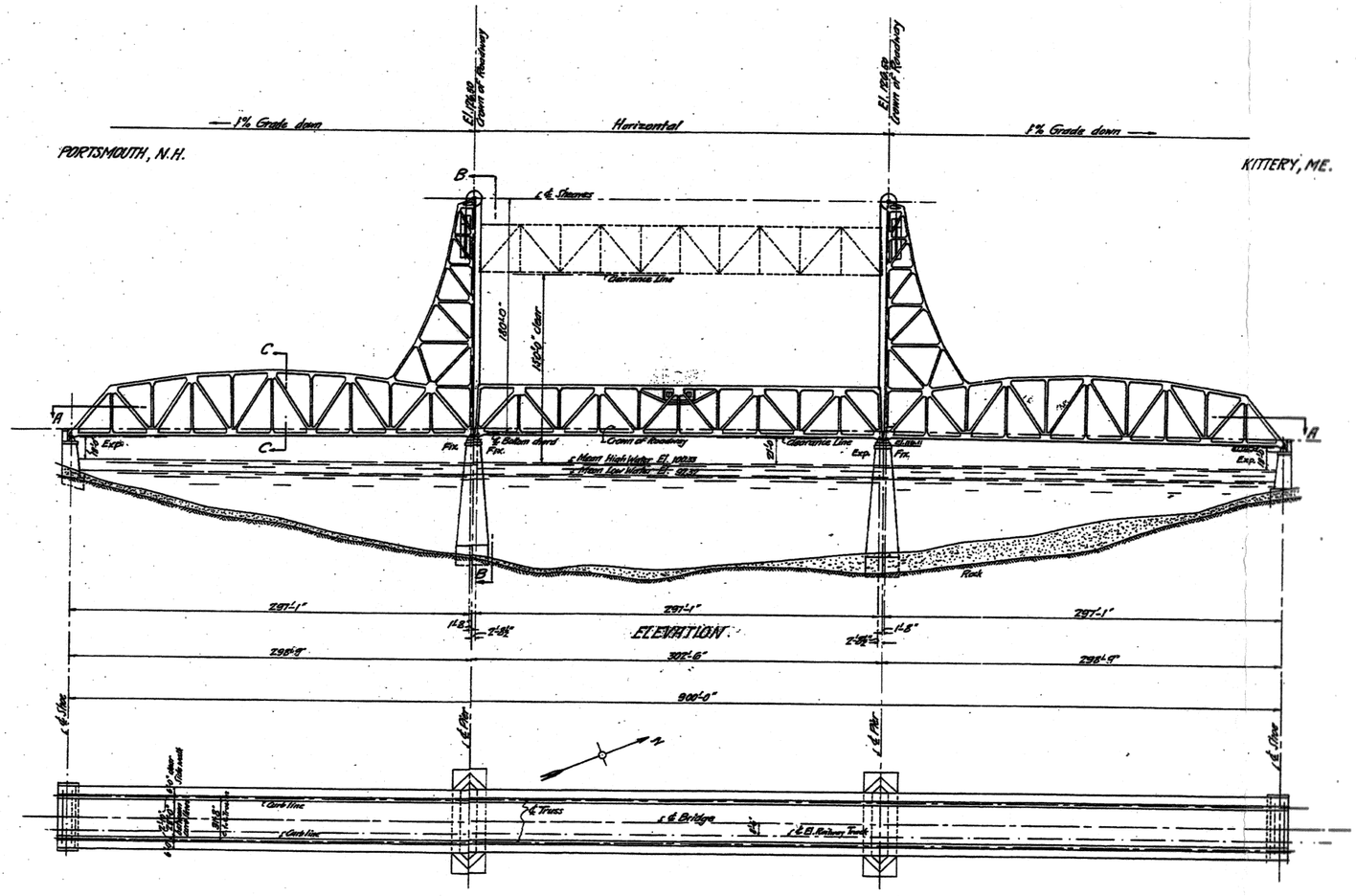
FENDER PILING FOR SOUTH PIER

PISCATAQUA RIVER BRID

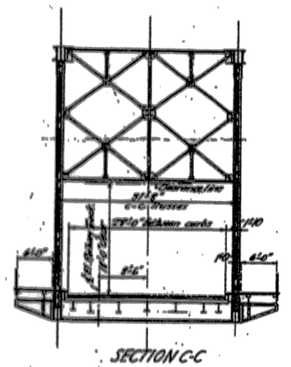
SHEET 5 OF 5

AUGUST 192

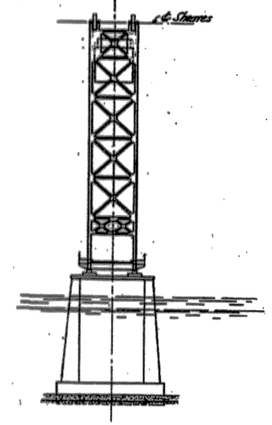
O-6



PLAN. A-A



SECTION C-C



ELEVATION B-B OF TOWER.

WADDELL VERTICAL LIFT BRIDGE
Patented in U. S. A. Aug. 24, 1909; Mar. 22, 1910; Mar. 29, 1910; May 31, 1911.
OTHER PATENTS PENDING
Patented in Canada Feb. 1, 1910; Mar. 8, 1910.

Submitted for Approval: _____ 1920.
Board of Engineers.
Approved and Adopted _____ 1920.
Piscataqua River Bridge Commission
By _____
Secretary.

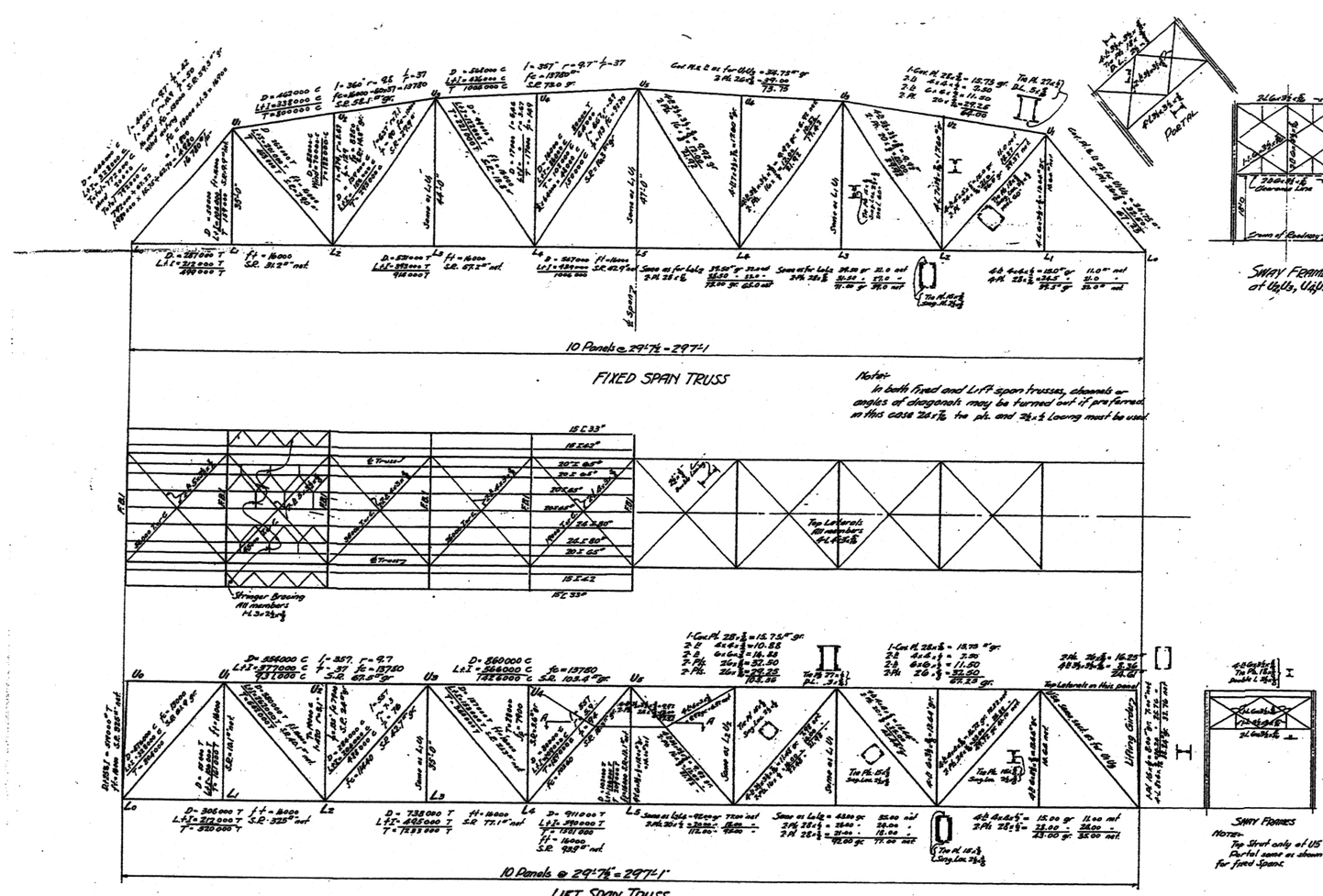
O-7

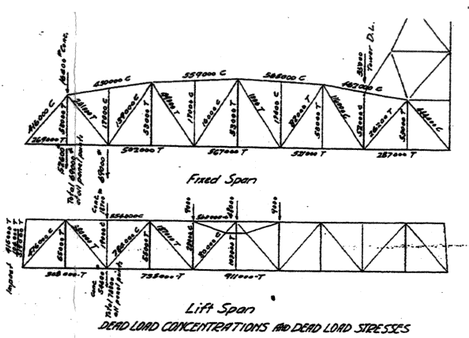
PISCATAQUA RIVER BRIDGE
BETWEEN
PORTSMOUTH, N.H. AND KITTERY, ME.
GENERAL LAYOUT.
Scales 1/16 & 3/16" = 1 Ft.

Made by E.D.S. Date 11-16-20.
Traced by E.D.S. Date 11-17-20
Checked by S.H. Date 12-1-20

J. A. L. WADDELL
Consulting Engineer.
New York City.

Sheet No 1 of



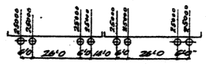


Note:- In both fixed and Lift span trusses, channels or angles of diagonals may be turned out if preferred, in this case 28.8# the pl. and 24.2# Loering must be used.

SPECIFICATIONS FOR DESIGN
Waddell's Bridge Engineering pages 1632-1735

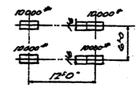
LIVE LOADS:-

Floor System and Truss Hangers:-
Electric Railway Track:-
2-50 ton cars coupled
25000 per axle



Roadway:-
1-20 ton truck or
100# per Sq. Ft.

Sidewalks:-
80# per Sq. Ft.



Trusses
Electric Railway Tracks:-
1200# p.l. Ft. of bridge occupying a space 11'0" wide
Roadway:-
1200# p.l. Ft. of bridge occupying a space 17'0" wide
Sidewalk:-
80# p. Sq. Ft. = 720# p.l. Ft. of Bridge

IMPACT LOADS:-

	Floor system and Truss Hangers:-	Trusses:-
Electric Railway Tracks	30 per cent.	18 per cent
Roadway	30 - -	15 - -
Sidewalks	30 - -	0 - -

PANEL CONCENTRATIONS

D.L.	Fixed Span	Lift Span
Deck	1500# p.l. Ft. Bridge	1500# p.l. Ft. Bridge
Metal	2150 / 3650 p.l. Ft. Bridge	3440 / 4940 p.l. Ft. Bridge

Panel Concents 2325 + 2471 = 67000# 2870 × 29.7 = 73300#
Note:- For Concentration due to machinery and tower see sketch above.

L.L. + I.L.

		East Truss	West Truss
El. R.	1200 × 11.5 = 1380 × 24.33 ÷ 31.67 =	1060	320
Roadway	1200 × 11.5 = 1380 × 10.33 ÷ 31.67 =	450	930
Sidewalk	60 × 12 = 720	360	360
		1870 ✓	1610 ✓

1870 × 29.71 = 55600

SHOES.

Lift Span Expansion Shoes:-
Load:-
D.L. 0
L.+I. 281000#
Total 281000

Pin:- Assume 8" diameter.
Bearing Length reqd:-
281000 ÷ 11×2000 = 1.6" Use 2½" min.
Rocker:-
Use 23" radius.
Length reqd: 281000 ÷ 600 × 23" = 20.4"
Use 32" min.
Bearing on masonry:-
Reqd area: 281000 ÷ 500 = 562 sq. in.
Use min. 24" long × 40" transv. = 960 sq. in.

Lift Span Fixed Shoes:-
Make same as Expansion Shoe except use flat bearing instead of Rocker.

Fixed Span Expansion Shoes - on Abutment:-
Load:-
D.L. 349000#
L.+I. 281000
Total 630000

Pin:- Assume 8" diameter.
Bearing Length reqd 630000 ÷ 22000 = 3.6"
Shear:- f_v = 315000 ÷ 502 = 6300 #/sq. in.
Bending:- M = 315000 × 7.25 = 710000 "#
f_b = 32 × 710000 ÷ 8⁴ = 14200 #/sq. in.
Rollers:- Use segmental rollers 8" × 4½" - 5" dia's.
Length reqd: 630000 ÷ 600 × 1 = 1.12".
Use 5 rollers @ 32" gross, 28" net 5×28 = 140".
Bearing on masonry:-
Reqd area: 630000 ÷ 500 = 1260 sq. in.
Use 38" long × 42" transv. = 1596 sq. in.
Note:-
For Fixed Span Fixed Shoes see Sheet # 3.

FLOOR SYSTEM

Stringers:-

	Max. Moment	Max. End Shear	Floorbeam Concent.
Electric Railway Stringers:-			
D.L. = 33000	4500#		8900#
L+I = 195000	36600		43000
228000	41100		51900

f_b = 16000# S.M. req'd 171.0 Use 24"I @ 80# S.M. = 174.0
Rivets reqd. ⅞" 10 f_v ⅞" web.

Roadway Stringers:-

D.L.	21000	4300	8300
L+I	133000	20700	20700
	154000	24900	29000

f_b = 15000 S.M. req'd. 115.5 Use 20 I @ 65# S.M. = 117.0
Rivets reqd ⅞" 6 f_v ⅞" web.

Inner Sidewalk Stringer:-
D.L. = 12000
L+I = 40000
52000

Use f_b = 12000 on account of shallow depth.
S.M. req'd 69. Use 16"I @ 42# S.M. = 68.9

Outer Sidewalk Stringer:-
D.L. 12000
L+I 220000
40000

f_b = 12000 S.M. req'd 40. Use 15"E @ 33# S.M. = 41.7

Floorbeams:-
Intermediate Floorbeam

D.L. = 23400	28000	Section web reqd.
L+I =		@ f_v = 10000 11.64"
El. Rway 317000	68400	Use 48 ⅞ web = 18.0"
Unit 339000	21600	
390000	112400	

d = 3.75 S = 237000 f_b = 15000 S. reqd 14.8"
½ Web 22.5" net
28 6"×6"×⅞ = 14.72 sq. in. 2.77" "
Total = 15.22" net

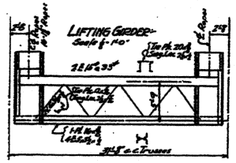
End Floorbeam:-
Make same as intermediate Floorbeam

Sidewalk Cantilevers:-

D.L.	Moment about face of Chord	Shear
Stringers 28500		7200
Cantilever 1800		600
L+I 61600		18500
92200		26300

Transv. in Rivets 2200# max.

LIFTING GIRDER- Scale ½"=1'-0"



Load to lift per corner D+I = 523000#
Max. moment 523000 × 2.67 = 1400000"#
d = 54.9" S = 2440000 f_b = 16000# S.R. 15.3" net
Use 2-E 15"@ 33# = 19.30 - (4×4.40 + 4×4.24) = 1570" net.
Compression flange:- I = 380 r = 6.67 $\frac{l}{r}$ = 57 f_c = 12580# laterally
I = 380, r = 6.67 $\frac{l}{r}$ = 57 f_b = 12580# S.R. = 11.6"
I = 180, r = 2.85 $\frac{l}{r}$ = 63 f_c = 11800# S.R. = 12.6"

Ml. Web ⅞	6.00	-0.38 - 5.62
4 L 5"×3½"×½		
Total =	14.00	21.62

9 1" drawn bolts

SUBMITTED FOR APPROVAL _____ 1920
_____
_____ } BOARD OF ENGINEERS
_____
APPROVED AND ADOPTED _____ 1920
PISCATAQUA RIVER BRIDGE COMMISSION
BY _____
SECRETARY

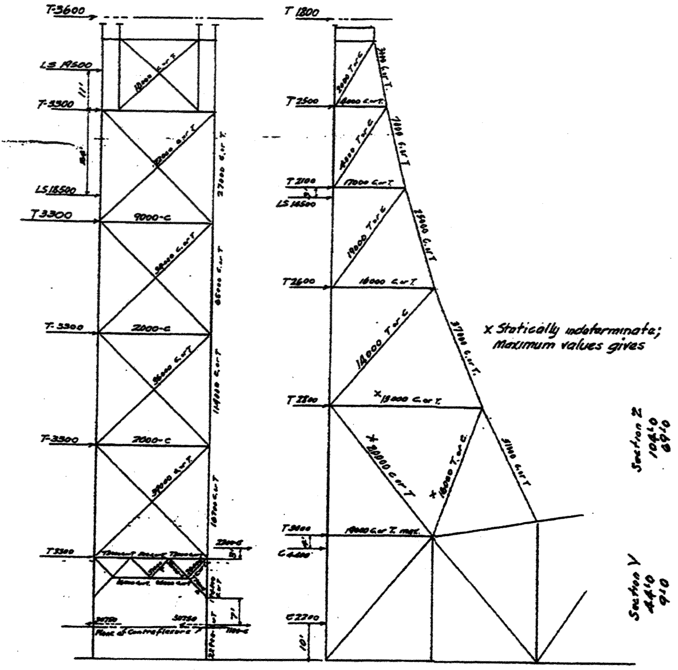
PISCATAQUA RIVER BRIDGE
BETWEEN
PORTSMOUTH, N.H. AND KITTERY, ME.
STRESS SHEET
Scale ½" = 1 FT.

J.A.L. WADDELL
Consulting Engineer
NEW YORK CITY

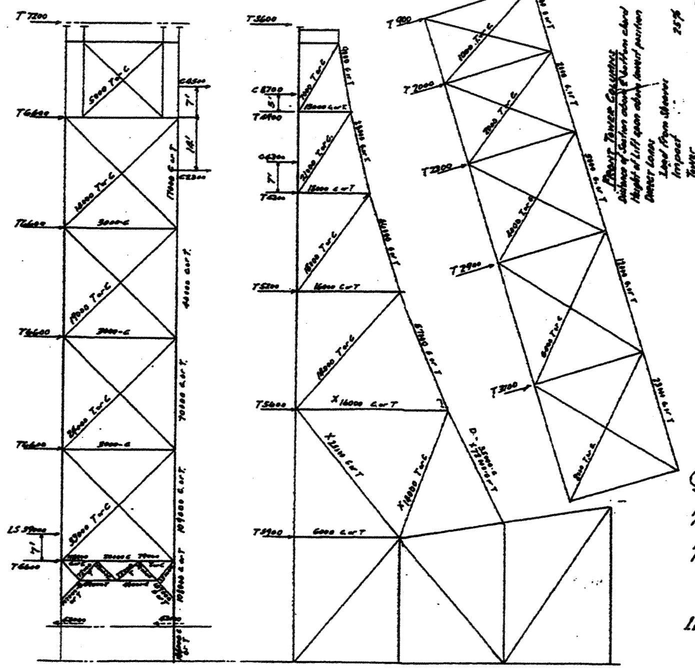
Work by R.D.S. Date 11-23-20
Traced by J.C.E. Date 11-24-20
Checked by S.H. Date 12-1-20

Sheet No 2 of

O-8



WIND STRESSES SPAN UP 129'0"



WIND STRESSES SPAN DOWN

Note

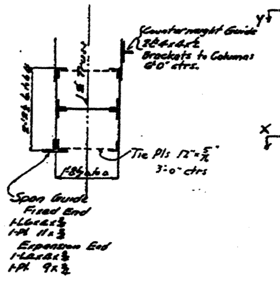
T6600 etc. = Stresses from wind pressure on Tower

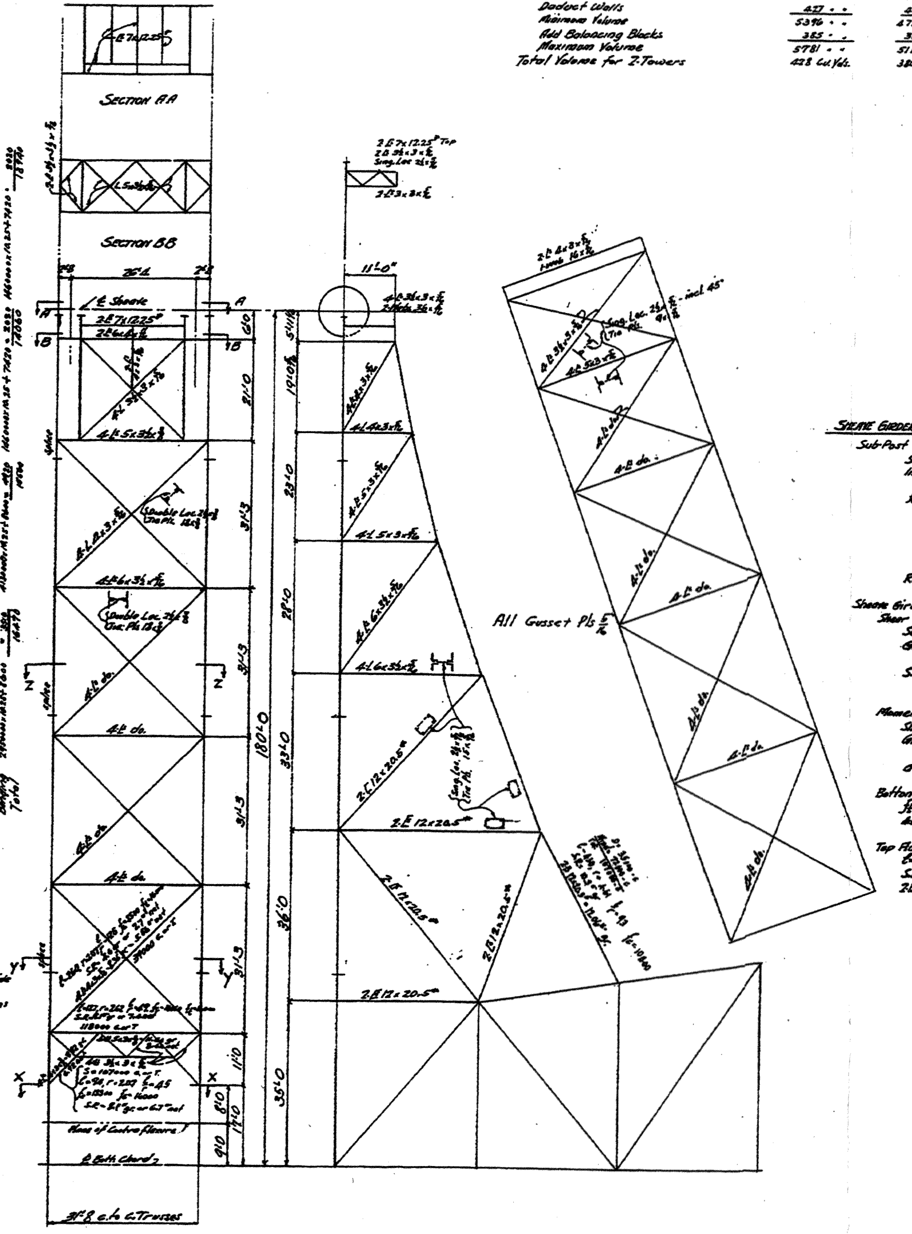
LS39000 etc. = " " " " Lift Span

C4500 etc. = " " " " Counterweight

FRONT TOWER COLUMNS

	Section X	Section X	Section Y	Section Z
Distance of Section above ℄ bottom chord	17'0	17'0	44'0	104'0
Height of Lift span above lowest position	129'0	0'0	9'0	69'0
Direct Loads				
Load from Sheaves	895000-c	895000c	895000c	896000c
Impact	25% 224000-c	0	25% 224000c	25% 224000c
Tower	150000-c	150000c	120000c	80000c
Total without Wind	1269000-c	1045000	1239000c	1199000c
Transferred Wind	229000-c	186000	45000T	16000T
Total with Wind	1498000-c	1231000	1194000c	1183000c
Moment from Wind	30750×96=2950000-c	43000×96=4130000	19500×875÷5=1460000"#	1460000"#
Section assumed	8-∠s 4×4×3/4 = 43.52 1-Pl 18×3/4 = 13.50 4-Pls 26×1/2 = 58.50 Total 115.52	115.52	8∠s 4×4×3/4 = 43.52 1-Pl 18×3/4 = 13.50 2-Pls 26×13/16 = 42.25 99.27	99.27
	l=420, r=7.5, l/r=56		l=432, r=7.5, l/r=58	l=396, r=7.5 l/r=53
Allowable Unit Stresses				
Wind not acting 16000-60 l/r	12640	12640	12520	12820
Wind acting 1.3(16000-60 l/r)	16430	16430	16280	16660
Actual Unit Stresses				
Wind not acting	1269000÷115.52=11000	1045000÷115.52=9040	1239000÷99.27=12480	1199000÷99.27=12080
Wind acting				
Direct	1498000÷115.52=12960	1231000÷115.52=10660	1194000÷99.27=12040	1183000÷99.27=11920
Bending	2950000×10.25÷8600=3510	4130000×10.25÷8600=4920	1460000×10.25÷7420=2020	1460000×10.25÷7420=2020
Total	16470	15580	14060	13940





TOWER SHOES:-

Loads:-

D.L.

Tower: 1060000#

Span: 349000

1409000

I+I: 281000

1690000

Transferred Wind: 186000

1876000

Moment at ℄ Pin 43000×135 = 5800000"#

Pin:- Assume 14" diameter.

Loads on one end of pin

Total without wind: 845000

Transferred wind: 93000

Wind Moment 5800000÷19 = 305000

1243000

Pin cont'd:-

Bearing per end of pin:- Length req'd:-

Wind not acting @ 22000#/□" 2.74"

Wind acting @ 28600#/□" 3.1"

Shear:-

Wind not acting: 845000÷154□" = 5500#/□"

Wind acting: 1243000÷154 = 8100#/□"

Bending:-

Wind not acting M = 2960000 f = 11000#/□"

Wind acting M = 4350000 f = 16200#/□"

Bearing on Masonry:-

Assume base 50" long × 72" transverse.

Wind not acting 1690000÷3600 = 470#/□"

Wind acting:-

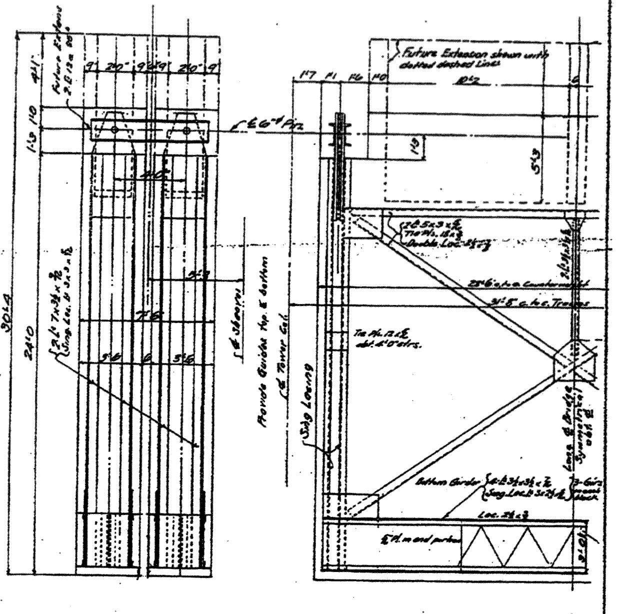
Direct: 1876000÷3600 = 520#/□"

Bending: 6×5800000÷50×72² = 134 "

Total 654#/□"

COUNTERWEIGHT:-

Required Weight	Plank Floor	Creosoted Block Pavement
Weights of Lift Span		
Deck	450000	260000
Structural Metal	1160000	1160000
Machinery and Motors	60000	60000
House and Walkways	40000	40000
Total	1710000	1520000
Equalizers and Counterweight Steel	90000	90000
Required weights of Counterweights	1620000	1430000
or, per Tower	810000	715000
Required Volume per Tower		
Wells filled with balance blocks		
& concrete 160# per Cu.Ft.	5750 Cu.Ft.	5110 Cu.Ft.
Wells empty, concrete 150# per Cu.Ft.	5400 " "	4770 " "
Actual Volume per Tower:		
Solid Concrete		
Bottom Block	4790 Cu.Ft.	4790 Cu.Ft.
Top Block	1033 " "	368 " "
Total	5823 " "	5158 " "
Deduct Walls	427 " "	427 " "
Minimum Volume	5396 " "	4731 " "
Add Balancing Blocks	385 " "	385 " "
Maximum Volume	5781 " "	5116 " "
Total Volume for 2 Towers	428 Cu.Yds.	380 Cu.Yds.



COUNTERWEIGHT
Scale 1/4"=1 Ft.

SHEAVE GIRDER AND SUB-POSTS

Sub-Post

Sheave Load		448000
Impact	25%	112000
		560000

fc=14000 S.R.=40.□"gr.

4-∠s 4×4×3/8 = 11.44

2-Pls 26×7/16 = 22.75

4-∠s 3½×3½×3/8 = 9.92

1-Pl 9×3/8 = 3.38

Total = 47.49

Rivets req'd. 560000÷6010 = 94. S.S. 7/8"

Sheave Girder

Shear

Sub-Post Load	560000
Girder	10000
	570000

S.R. Webs = 570000÷10000 = 57□"gr.

2 Webs 260×3/8 = 195□"gr.

Moment

Shear Load 2×560000×2.67 = 3000000

Girders 80000

3080000

d=20.8 Stress = 148000#

Bottom Flange

ft=16000 S.R.=9.2□" net Rivets req'd f.S.S. 7/8"

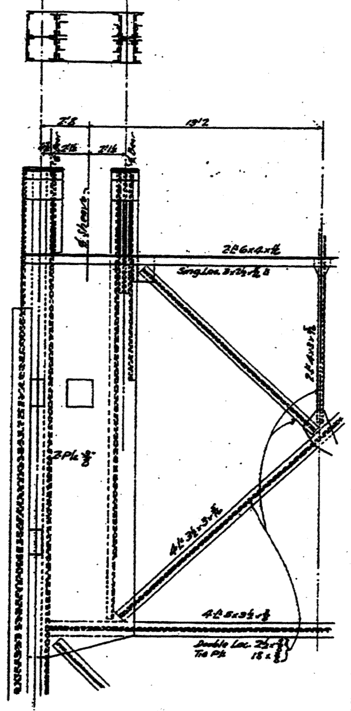
4∠s 5×3½×3/8 = 12.20□"gr. = 9.20□" net.

Top Flange

l=126 r=1.89 l/r=67. fc=12000

S.R.=12.3□"gr. Rivets req'd 31 f.S.S. 7/8"

2∠s 6×4×11/16 = 12.80□"gr.



SHEAVE GIRDER
Scale 1/2"=1 Ft

O-9

SUBMITTED FOR APPROVAL ______________ 1920

____
______________ } BOARD OF ENGINEERS
____

APPROVED AND ADOPTED ______________ 1920

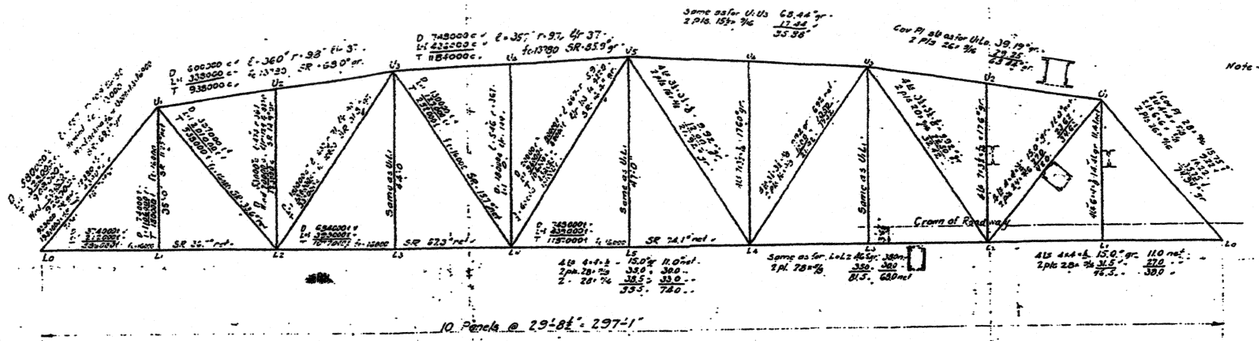
PISCATAQUA RIVER BRIDGE COMMISSION

BY ______________
SECRETARY

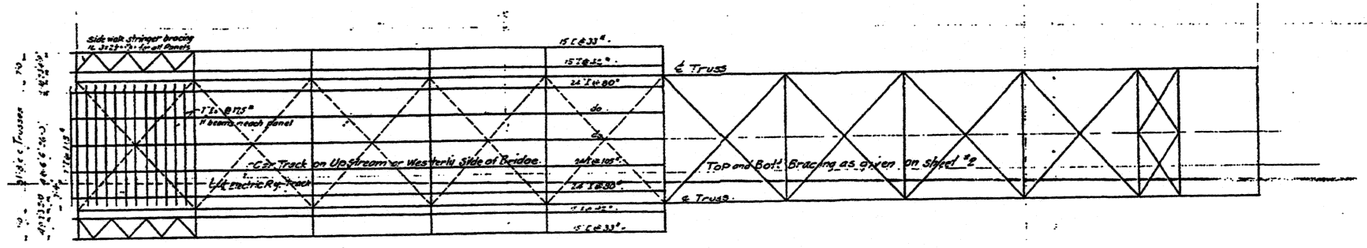
PISCATAQUA RIVER BRIDGE
BETWEEN
PORTSMOUTH, N.H. AND KITTERY, ME.
STRESS SHEET
Scale 1/16"=1-Ft.

J.A.L. WADDELL
Consulting Engineer
NEW YORK CITY

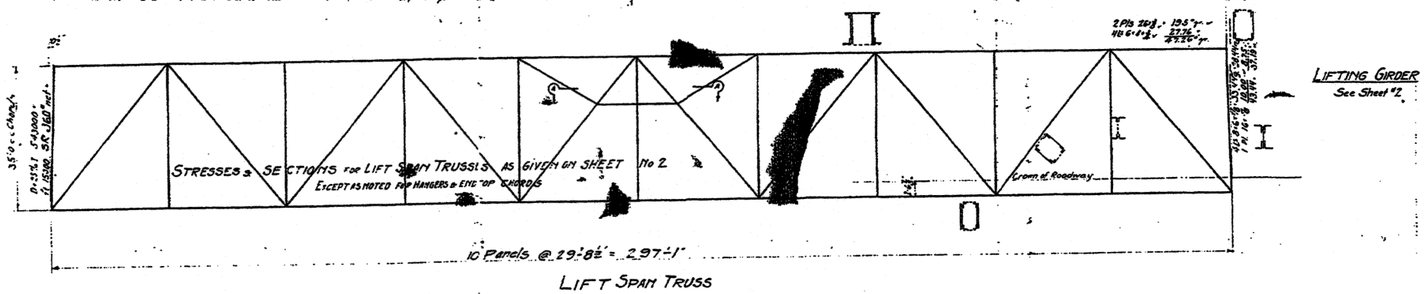
Made by J.L.R. Date 12-2-20
Traced by J.L.R. Date 12-3-20
checked by S.H. Date 12-6-20



FIXED SPAN TRUSS



FLOOR PLAN - FIXED SPANS



LIFT SPAN TRUSS

LIFTING GIRDER
See Sheet #2

FLOOR SYSTEM for FIXED SPAN

TRANSVERSE BEAMS -

Moments. D.L. 1300
L-I (Five Pos.) 11300
Total 12600

S.M. Reqd 12600 ÷ 12 ÷ 16000 = .95.
Use 7"I @ 17.5# S.M. = 14.2

STRINGERS -

Electric Ry. Stringers -

	Moments	End Shears	Floor Beam Concent
D.L.	79000	10700	21400
L-I	139000	45100	33030
	218000	55800	54470

For 4 Cons S.M. Reqd = 228 Use 24" I @ 105# S.M. = 234.8 Rivets reqd 8 - ⅞" I2 lb ⅜ web. 7 Stays to ½ Girth

Int. Roadway Stringers -

D.L.	75000	10100	20200
L-I	133000	22300	42300
	208000	32400	

I₀ 16000 S.M. Reqd = 15.6 Use 24" I @ 80# S.M. 17.4

¾" Rivets Reqd - 12 F.B. ⅝" thk. 6 Stays to 1" web.

Electric Ry & Roadway Stringers at Curbs -
Make same as Int. Roadway Stringers.

INT. FLOOR BEAMS -

	Moments	Shears
D.L.	92000	30400
L-I	165080	97400
	257080	127800

Web Area reqd @ 10000 = 13.8 sq. in.
use 48 - ⅝ = 18.0 sq. in.

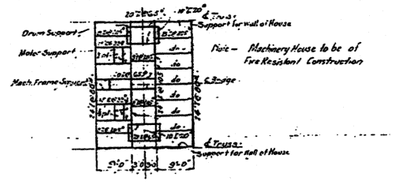
d = 37.5" S = 287000 I₀ = 16000 SR = 17.9" net

Use 2 Pls 60 × ⅝ = 16.88 sq. in. 15.38" net

⅝" web	2.75	2.25
	19.13	17.63

END FLOOR BEAMS -
Make same as Int. Floor Beams.

SIDEWALK STRINGERS & CANTILEVERS - see Sheet #2.



MACHINERY SUPPORTS AND FLOOR STRINGERS
SECTION A-A

SPECIFICATIONS FOR DESIGN - see Sheet #2.

LIVE LOADS - see Sheet #2.

IMPACT LOADS - see Sheet #2.

PANEL CONCENTRATIONS

	Fixed Span	Lift Span
D.L.		
Deck	2720 per Half Bridge	1390 Per Ft. of Bridge
Metal	3422	3430
	6200	4810
Panel Conc.	3100 × 29.7 = 92000#	2412 × 29.7 = 71600#
	Extra Conc. at U2 35000	Extra Conc. at U2 12000#
		" " U3 12000#
		" " U5 62000#

L.L. - I.L. See Sheet #2.

SHOES.

FIXED SPANS

FIXED SHOE - UPPER TOWER

Load -
D.L. - Tower 1060000
Span 461000
1521000
L-I 781000
2302000
Transmitted 1854000
1304000
Mom. at Pin 5800000

Pin - assume 14" ϕ.
Loads on one end of pin
Total without wind - 92000
Transferred wind - 37000
Wind on moment Stringers 32000
Bearing per end of pin-length reqd
Total net acting 2294
Wind acting @ 20lbs 3.29

Shear -
Wind not acting -
2302000 ÷ 5280 = 436 sq. in.
Wind acting -
1304000 ÷ 8550 = 153 sq. in.

Bending -
Wind not acting Mom. 1854000
I/c = 6250
Wind acting Mom. 2580000
I/c = 11000

Bearing on Masonry -
Assuming Resp. 5280 - 5280
Total net acting 1052 + 3292 = 4344
Wind acting -
Direct 1988 ÷ 3292 = 531 sq. in.
Bending 1300000 ÷ 720 = 177 sq. in.
Total 708 sq. in.

EXPANSION SHOE - ON ABUTMENT

Load - DL 461000
L-I 281000
742000

Pin - assume 8" diameter -
Bearing Length Reqd: 742000 ÷ 16000 ÷ 8 = 5.8"
Shear - 742000 ÷ 16 ÷ 8 ÷ 2 = 2900 sq. in.
Bending - M - 371000 × 2.25 = 835000
I/c = 835000 ÷ 11.8 = 15600

Rollers - Use Segmental Rollers 8" ϕ
Length reqd 742000 ÷ 400 = 1855"
Use 6 Rollers @ 32.5" Net Length 195"

Bearing on masonry -
Reqd area - 742000 ÷ 500 = 1484
Use 38.5 × 47 = 1786

LIFT SPAN

See Sheet #2

NOTE, - Information given on this sheet supersedes corresponding information given on Sheet No. 2.

CONCRETE DECK DESIGN
PISCATAQUA RIVER BRIDGE
BETWEEN
PORTSMOUTH, N.H. AND KITTERY, ME.
STRESS SHEET
Seal

O-10

FRONT ELEVATION AND SECTION A-A

"10 Panels @ 29'-8½" = 297'-1"

302'-6" c-c. Piers

HALF TOP VIEW AND HALF SECTION C-C

VIEW B-B OF TOWER

TOP VIEW OF TOWER

WADDELL VERTICAL LIFT BRIDGE
Patented in U.S.A. Aug. 24, 1909; Mar. 22, 1910; Mar. 29, 1910; May 31, 1911
OTHER PATENTS PENDING
Patented in Canada Feb. 1, 1910; Mar. 8, 1910

SUBMITTED FOR APPROVAL _____ 1920

_____ } BOARD OF ENGINEERS

APPROVED AND ADOPTED _____ 1920

PISCATAQUA RIVER BRIDGE COMMISSION

BY _____

SECRETARY

PISCATAQUA RIVER BRIDGE

BETWEEN

PORTSMOUTH, N.H. AND KITTERY, ME.

GENERAL DETAILS OF LIFT SPAN

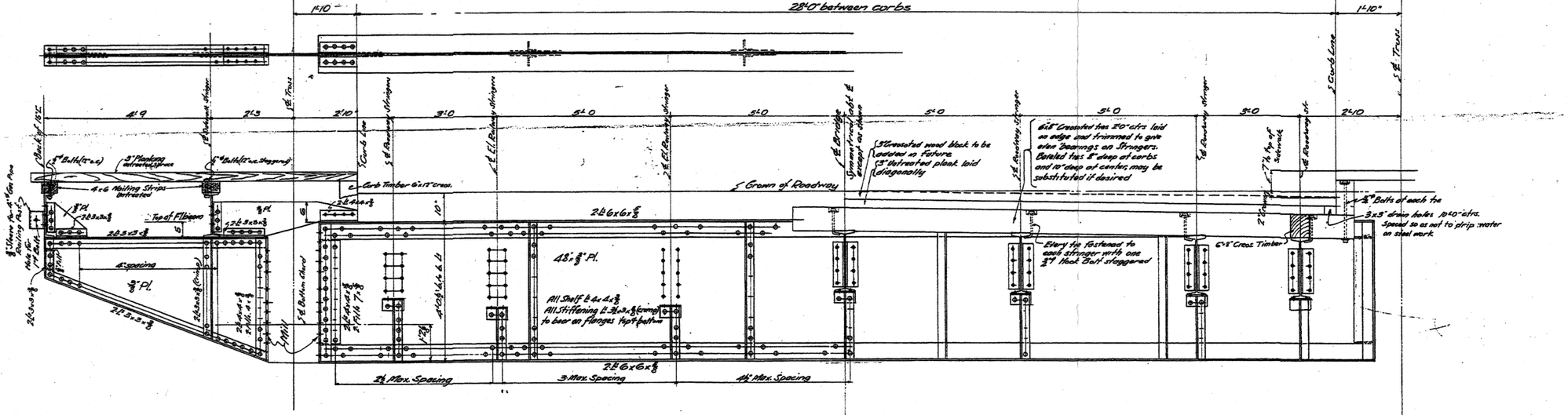
Scale ½" = 1'-0"

J. A. L. WADDELL
Consulting Engineer
New York City

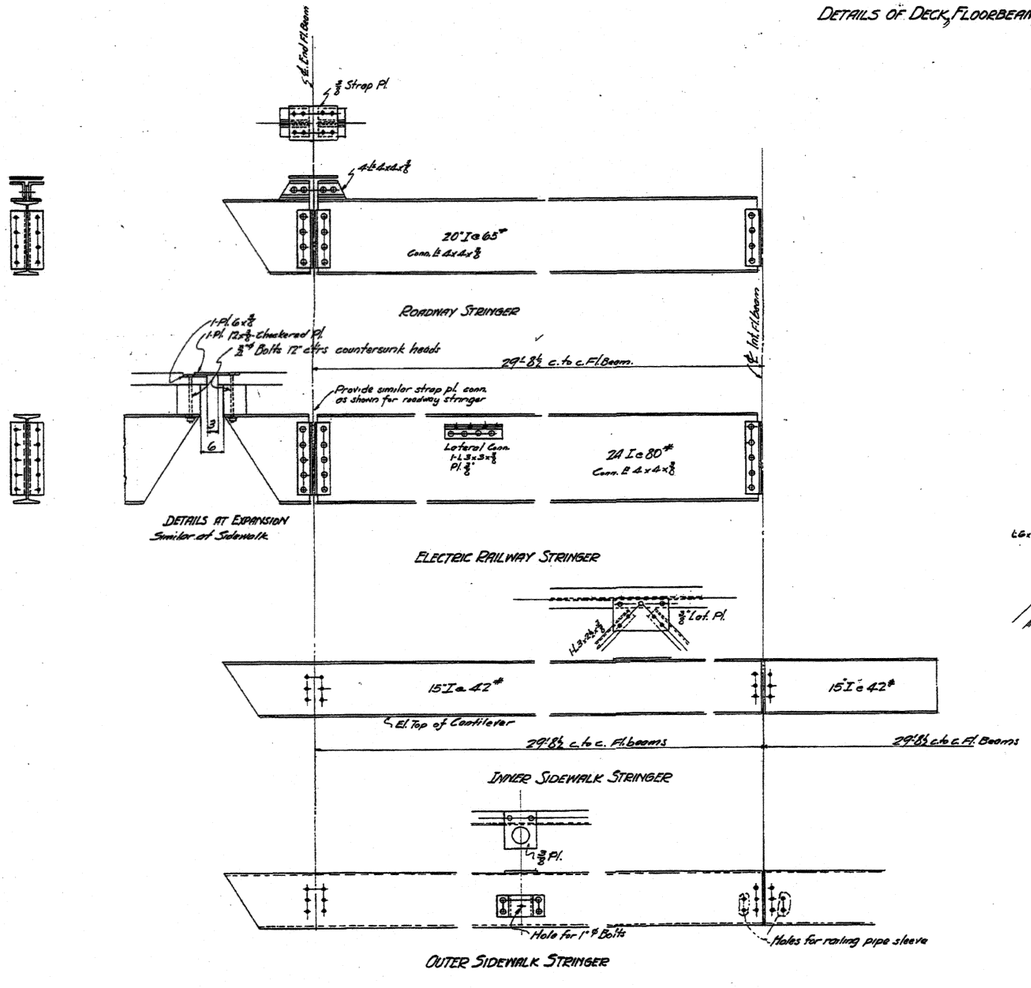
Made by F.D.E. Date 12-5-20
Traced by F.D.L.M.K. Date 12-7-20
Checked by S.H. Date 12-9-20

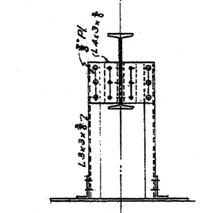
Sheet No. 4 of 4 Sheets

O-11

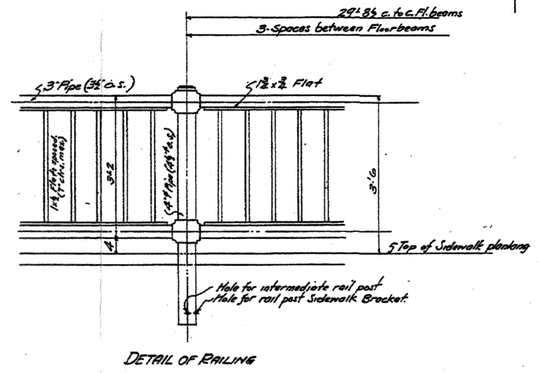


DETAILS OF DECK, FLOORBEAM, AND SIDEWALK BRACKET





SUPPORT FOR BOTT'M LATERALS AT CENTER OF PANEL



DETAIL OF RAILING

SUBMITTED FOR APPROVAL _____ 1920

_____ BOARD OF ENGINEERS

_____

_____

APPROVED AND ADOPTED _____ 1920

PISCATAQUA RIVER BRIDGE COMMISSION

BY _____

SECRETARY

O-12

PISCATAQUA RIVER BRIDGE

BETWEEN

PORTSMOUTH, N.H. AND KITTERY, ME.

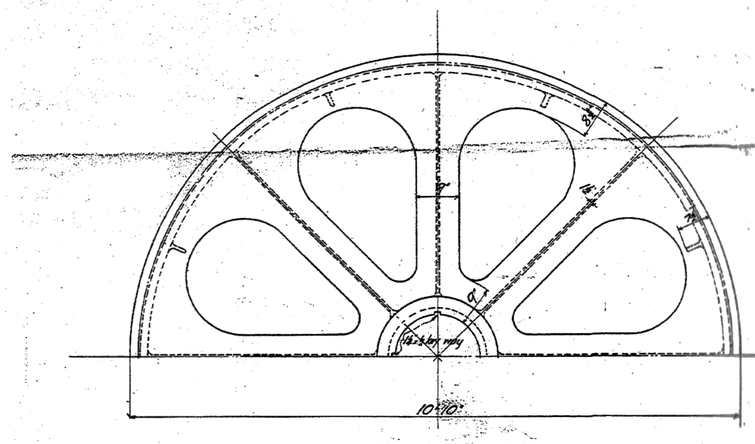
DETAILS OF DECK AND FLOOR SYSTEM

Scale 3/4" = 1'-0"

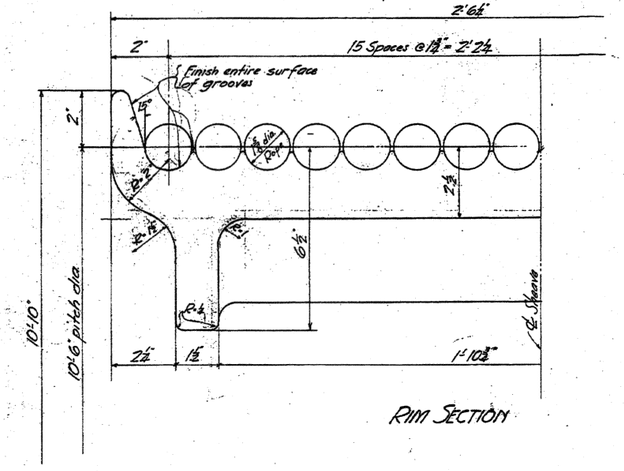
J.A.L. WADDELL
Consulting Engineer
NEW YORK CITY

Made by R.D.S. Date 11-26-20
Traced by J.A.R. Date 11-30-20
Checked by S.M. Date 12-1-20

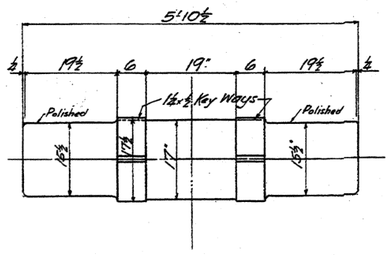
Sheet No. 5 of



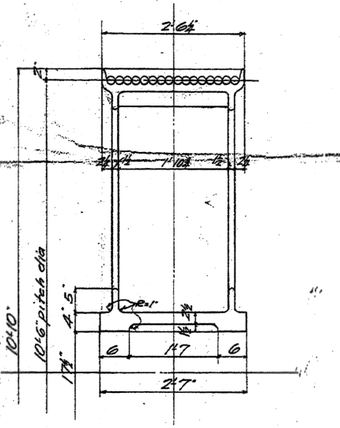
TOWER SHEAVE M1-1
4 Rodd Steel Casting Scale 1"=1Ft

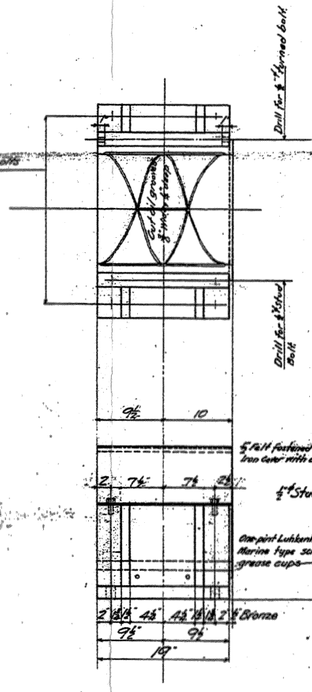


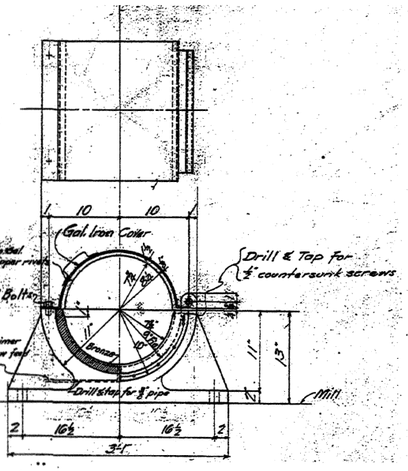
RIM SECTION



TOWER SHEAVE SHAFT M1-2
4 Rod. Steel Forging
Scale 1"=1Ft.







TOWER BEARING M-1-3
8 Rodd Steel Casting and as specified
Scale 1½"=1Ft

SUBMITTED FOR APPROVAL 1920
..... } BOARD OF ENGINEERS
APPROVED AND ADOPTED 1920
PISCATAQUA RIVER BRIDGE COMMISSION
BY .....
SECRETARY

WADDELL VERTICAL LIFT BRIDGE
Patented in U. S. A. Aug. 24, 1909; Mar. 22, 1910; Mar. 29, 1910; May 31, 1911.
OTHER PATENTS PENDING
Patented in Canada Feb. 1, 1910; Mar. 8, 1910.

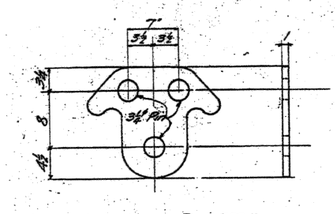
O-13

PISCATAQUA RIVER BRIDGE
BETWEEN
PORTSMOUTH, N.H. AND KITTERY, ME.
DETAILS OF TOWER SHEAVES, SHAFTS & BEARINGS
Scales 1 & 1½ = 1 Ft

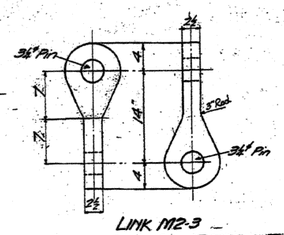
J. A. L. WADDELL
Consulting Engineer
New York City

Made by F.D.S. Date 11-19-20
Traced by W.L.R. Date 11-23-20
Checked by S.H. Date 12-1-20

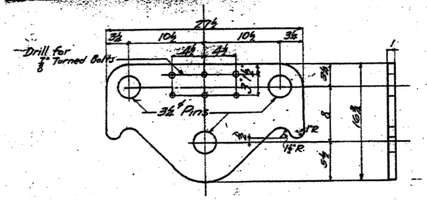
Sheet 11 of 11 Sheets



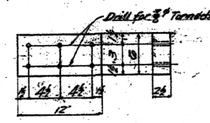
BAR M2-1
32 Req'd Medium Steel



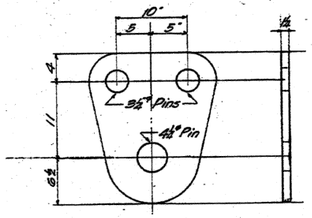
LINK M2-3
32 REQ'D STEEL FORGING



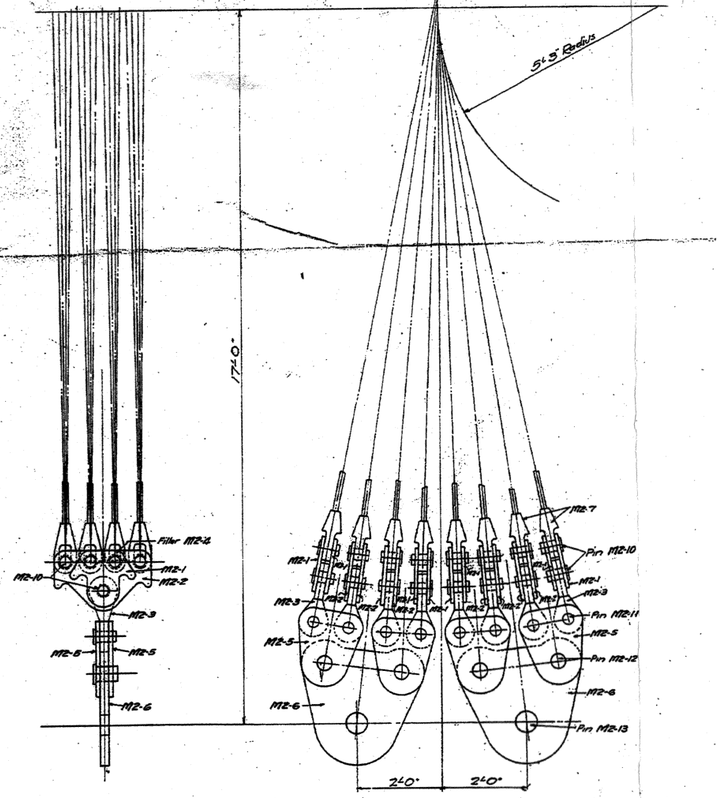
BAR M2-2
32 REQ'D. MEDIUM STEEL



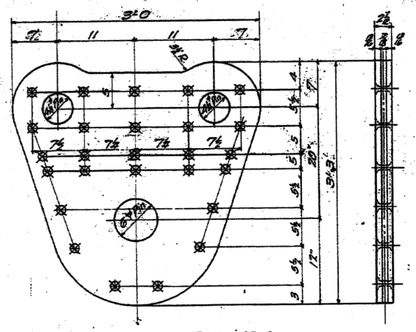
FILLER M2-4
16 REQ'D. MEDIUM STEEL



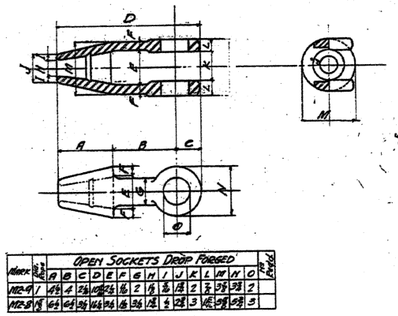
BAR M2-5
32 REQ'D MEDIUM STEEL



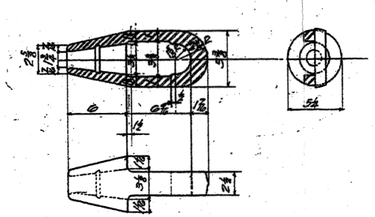
ASSEMBLY OF EQUALIZER
4 SETS REQ'D COMPLETE
Scale ⅜" = 1'-0"



BAR M2-6
8 REQ'D MEDIUM STEEL



Mark	Req'd	OPEN SOCKETS DROP FORGED																Pins Req'd
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O		
M2-9	1	4½	4	2½	10½	2½	½	2	1½	⅜	1⅛	2	⅞	1⅜	3½	2		
M2-8	1	6½	6½	3½	14½	3½	½	2½	2	½	1½	2½	1	2	4½	3		



CLOSED SOCKET M2-7
64 REQ'D. DROP FORGED WELDLESS STEEL

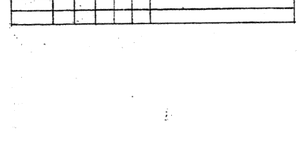
SUBMITTED FOR APPROVAL 1920

..... } BOARD OF ENGINEERS

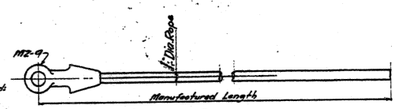
APPROVED AND ADOPTED 1920

DISCATAQUA RIVER BRIDGE COMMISSION

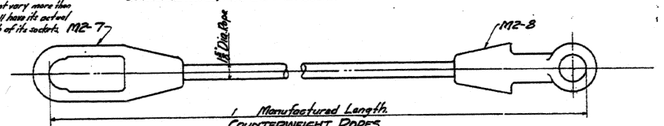
BY ..... SECRETARY



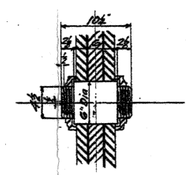
NOTE:- Operating ropes composed of 6 strands of 19 wires each and hemp center.
Counterweight ropes composed of 6 strands of 19 wires each and hemp center.
All wire rope to be of Improved Plough Steel.
Counterweight ropes must not vary more than ½" from the length given, and each shall have its actual measured length stamped on both of its sockets.



OPERATING ROPES
8 UPHAUL ROPES, WITH ONE OPEN SOCKET — 325'-0"
8 DOWNHAUL ROPES, WITH ONE OPEN SOCKET — 320'-0"



COUNTERWEIGHT ROPES
40 - ROPES — 172'-8½"
24 - ROPES — 170'-3½"



PIN M2-13
8 REQ'D STEEL FORGING
Provide Nuts & Cotters

WADDELL VERTICAL LIFT BRIDGE
Patented in U.S.A. Aug. 24, 1909; Mar. 22, 1910: Mar. 29, 1910; May 31, 1911.
OTHER PATENTS PENDING
Patented in Canada Feb. 1, 1910: Mar. 5, 1910.

PISCATAQUA RIVER BRIDGE
BETWEEN
PORTSMOUTH, N.H. AND KITTERY, ME.

EQUALIZERS

Scales ⅜ & 1½ = 1'-0"

J.A.L. WADDELL
Consulting Engineer
New York City.

Made by T.E.B. Date 11-9-20
Traced by W.R. Date 11-26-20
Checked by S.H. Date 12-1-20

Sheet No. M2.

O-14

Aerial Cable between Towers

Pier Lights on South Pier

Rail Lights on Roadway Center

Pier Lights on North Pier

Trolley on Lift Span

Green

Red

Navigation Lights

Automatic Push Button

Electric Siren

Roadway Signal Bell

Full Reversing Magnetic Contactor Controller for two 100 H.P. Motors (Westinghouse Type K, Form D or equivalent,) with overload relay, low voltage relay, and accelerating relays.

Maximum Torque Push Button

Master Switch

Limit Switch to cut off current near each end of travel. Spring Switch to short circuit limit switch, normally open

Indicating Watt Metre

Volt Metre

WIRING DIAGRAM

Solenoid Brake Westinghouse Type PL No 300, or equivalent.

100 HP - Wound Rotor Induction Motor, 12 Pole, 530 R.P.M., 3 Phase 60 Cycle, 440 Volts, Westinghouse Type C.S. Frame No 768-R, or equivalent

Full Load Running Torque 905 lbs
Max. Starting " 1810 "
" Running " 2050 "

CUTLER-HAMMER LIMIT SWITCH DESCRIBED IN PAGE 1 BULLETIN 1032 MARCH, 1916, OR EQUIVALENT

Abt 1'-0

Abt 2'-1

Transverse of Lift Span

To ℄ Truss - 1'-3

MG-3a

MG-1 This side MG-2 Other side of Long ℄

MG-1 This side MG-2 other side of Long ℄

MG-1

MG-3

MG-4

MG-4a

¾" Top Screws

Pulley on Casing for Indicator Cord

Drum & die-Groove for Indicator Cord

MS-8

31.83'

MS-2

¾" Wire Cable

MS-9a

MS-9

MS-7

MS-6

MS-5

MS-3

MT-3

MT-2

MT-4

MT-5

MT-6

MT-7

MS-10

MS-1

MS-4

MS-11

MA-1

MA-2

MA-20

MA-19

MA-14

MS-12

MS-13

MS-14

MS-15

MS-16

MS-17

MS-18

MS-19

MS-20

Long ℄ of Bridge

Future Shaft & Barrelow Gear for attachment of Futura Gas Engine

Motor Shaft

Top of Floor of Machinery House

Trap Door Clear Opening 3'0

Lower Trap Door

Hand Brake

Master Switch

Pulley

Indicator Board

Machinery House Wall

Trap Door 3'0" x 2'0 in Clear

¾" Rod

Ball Crank

¾" Hook Bolts

Slot 4½ long overall

12.89'

6'-10½"

Plan of Capstan.

Transverse Section on ℄ of Bridge Showing Emergency Capstan in Operating Position

Capstan Head

Collar

1"ϕ Pin with Cutters

3" Shaft

Plank Notched for Removable Cover Plate ½ thick

Top of Roadway Plank

¼" Steel Block Bored for 3" Shaft.

9" ℄

20 I.G.S.

3" Ex. Strong Gas Pipe 1'10 Long over-all

1'-3½ c℄c

2½" Nut-Face to ½" Thick.

1⅝" Turned Bolts Driving Fit.

1" for Shims

Cast Steel Bearing

1" For Shims

Key

Set Screw

2½" Nut-Face to 1⅝" Thick.

1⅛" Pin

1½" Hex. Nuts.

Set Screw

Key.

4 Bars 2½" Ex. Strong Gas Pipe Cabt 6'0 Long over all MA8-6

2 Bars 3" Ex. Strong Gas Pipe Cabt 1'10 Long over all, including forged end Fittings similar to MA8-6

Forged Steel End-Welded to Pipe

O-15

WADDELL VERTICAL LIFT BRIDGE
Patented in U.S.A. Aug. 24, 1909; Mar. 22, 1910; Mar. 29, 1910; May 31, 1911
OTHER PATENTS PENDING
Patented in Canada Feb. 1, 1910; Mar. 8, 1910.

SUBMITTED FOR APPROVAL _____ 1920

_____ BOARD OF ENGINEERS

APPROVED AND ADOPTED _____ 1920

PISCATAQUA RIVER BRIDGE COMMISSION.

BY. _____ SECRETARY

PISCATAQUA RIVER BRIDGE

BETWEEN

PORTSMOUTH, N.H. AND KITTERY, ME.

GENERAL ARRANGEMENT OPERATING MACHINERY

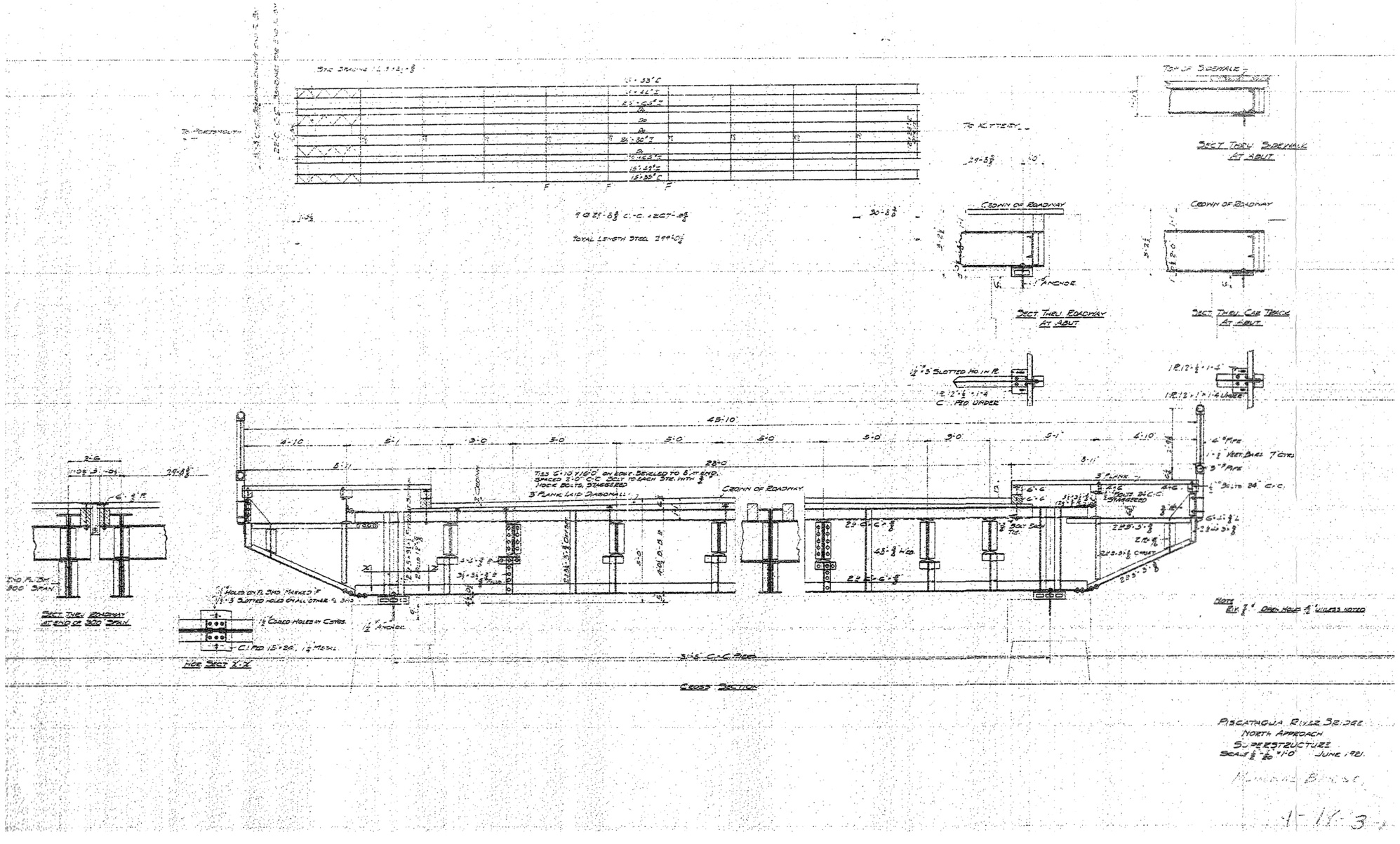
Scale 1" = 1-Ft.

Made by T.E.B. Date 12-6-20
Traced by T.E.B. Date 12-6-20
Checked by S.H. Date 12-7-20

J.A.L. WADDELL
Consulting Engineer
New York City.

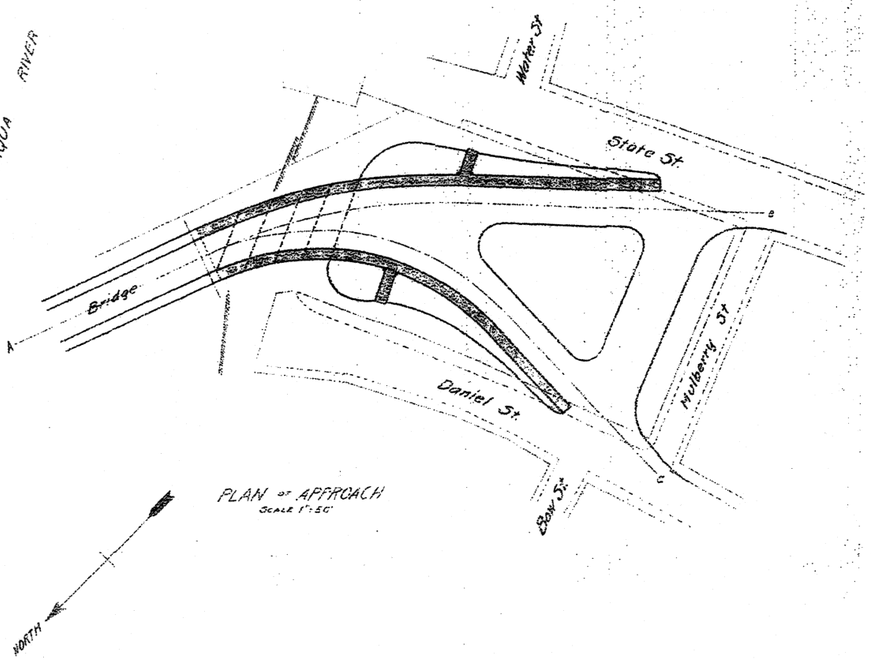
Sheet No 13 of

PISCATAQUA RIVER BRIDGE
NORTH APPROACH
MASONRY PLAN
SCALE 1/4"=1'-0" OCT. 1921.

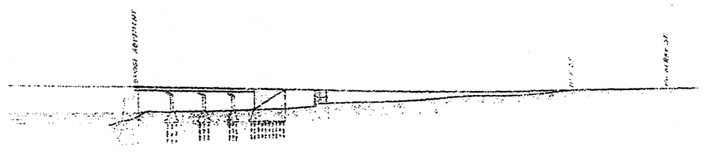


PISCATAQUA RIVER BRIDGE
NORTH APPROACH
SUPERSTRUCTURE
SCALE 1/2" = 1'-0" JUNE, 1921.

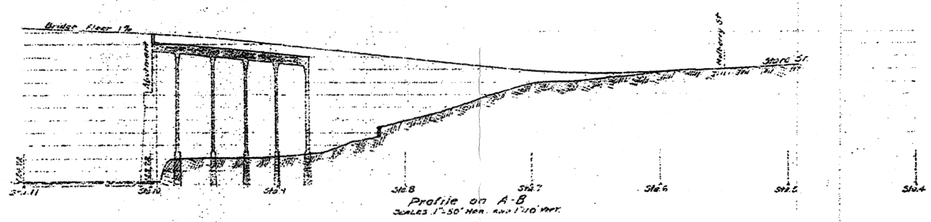
Approved
1-18-3



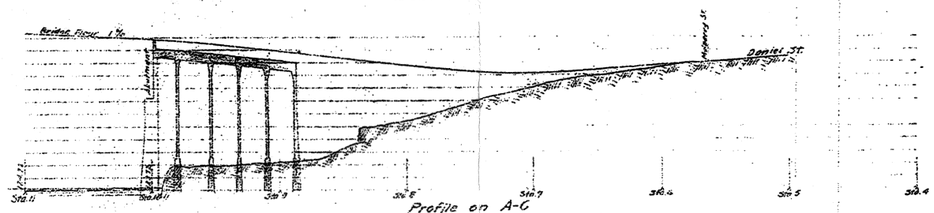
PLAN OF APPROACH
SCALE 1"=50'



SIDE VIEW OF APPROACH
Scale 1"=50'



Profile on A-B
Scales 1"=50' Hor. and 1"=10' Vert.



Profile on A-C
Scales 1"=50' Hor. and 1"=10' Vert.

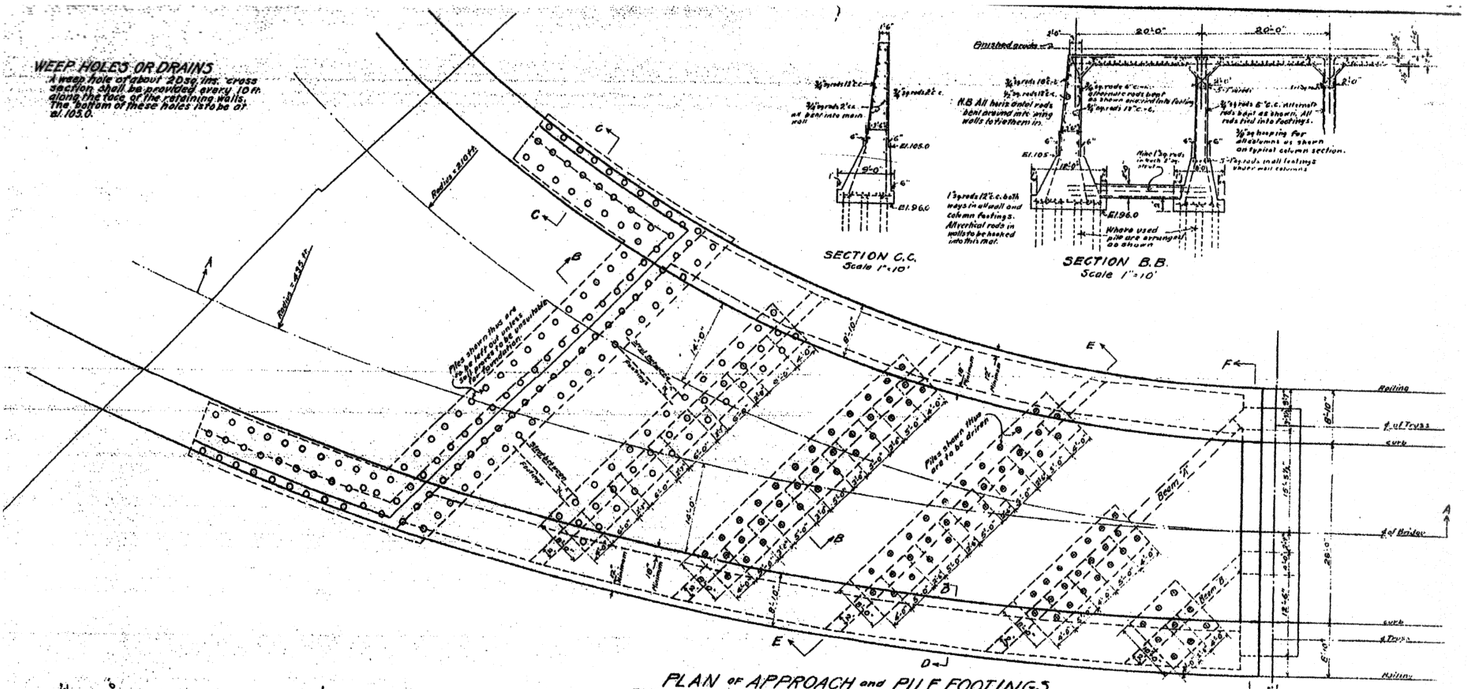
PISCATAQUA RIVER BRIDGE

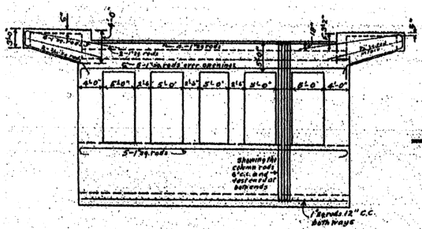
PORTSMOUTH APPROACH

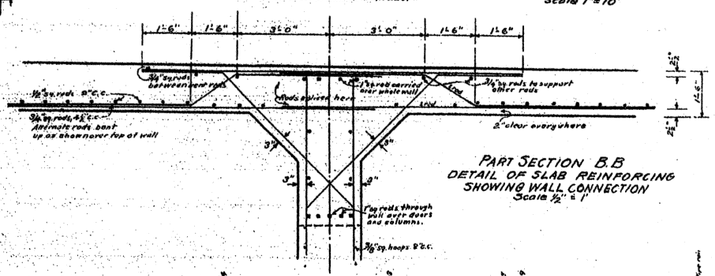
GENERAL PLAN

Scales 1"=50' Hor. and 1"=10' Vert. December 1921

Sheet No. 68



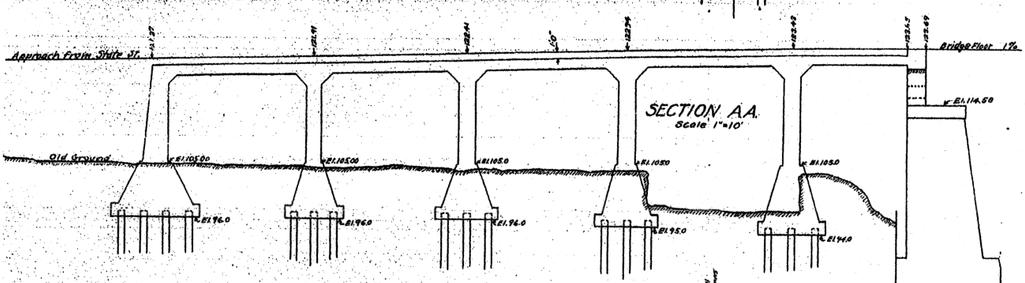


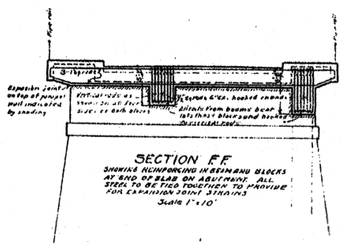


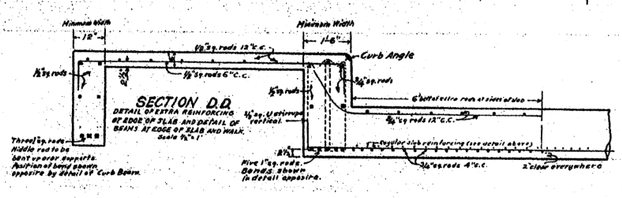
EXPANSION JOINT.
Two 8" channels under the end beam of the slab and two on top of the abutment will provide for expansion of the slab at this point. Under the end of each of the two beams, two plates shall be used. These plates shall have straps riveted to them to properly transfer the stress to the concrete. They shall then be dressed or planed to the correct size to provide true smooth sliding surfaces.

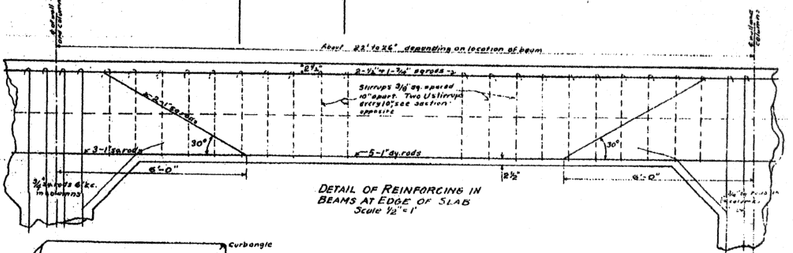
RAILING:-
Railing shall conform to that used on the bridge except lamp posts will be left out.

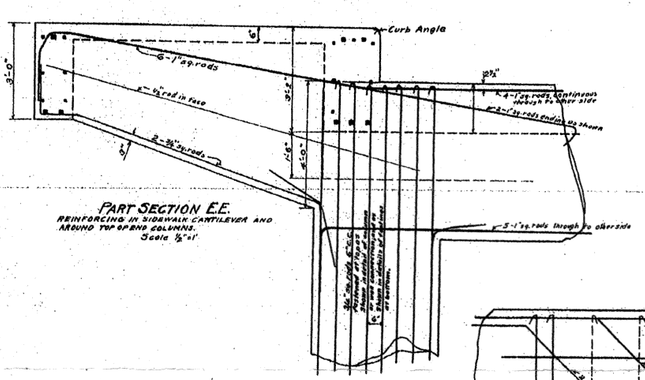
REINFORCING:-
No reinforcing steel shall be less than 2" from the surface of the concrete.

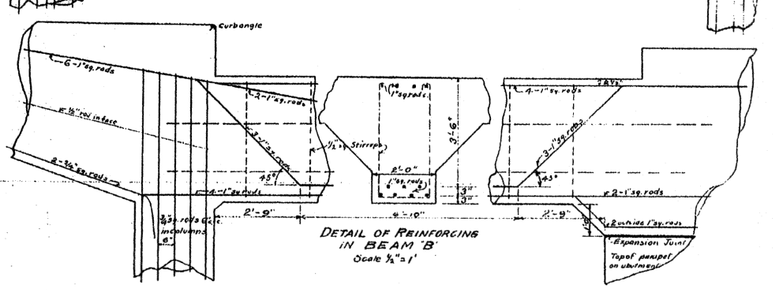


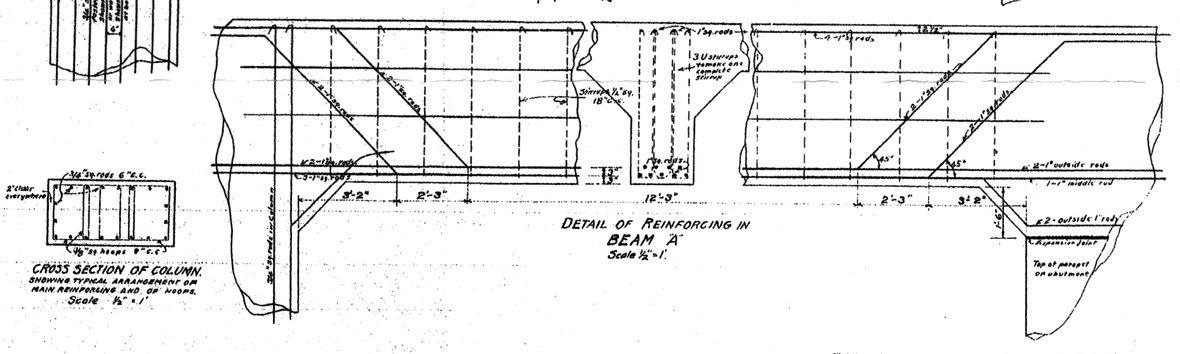












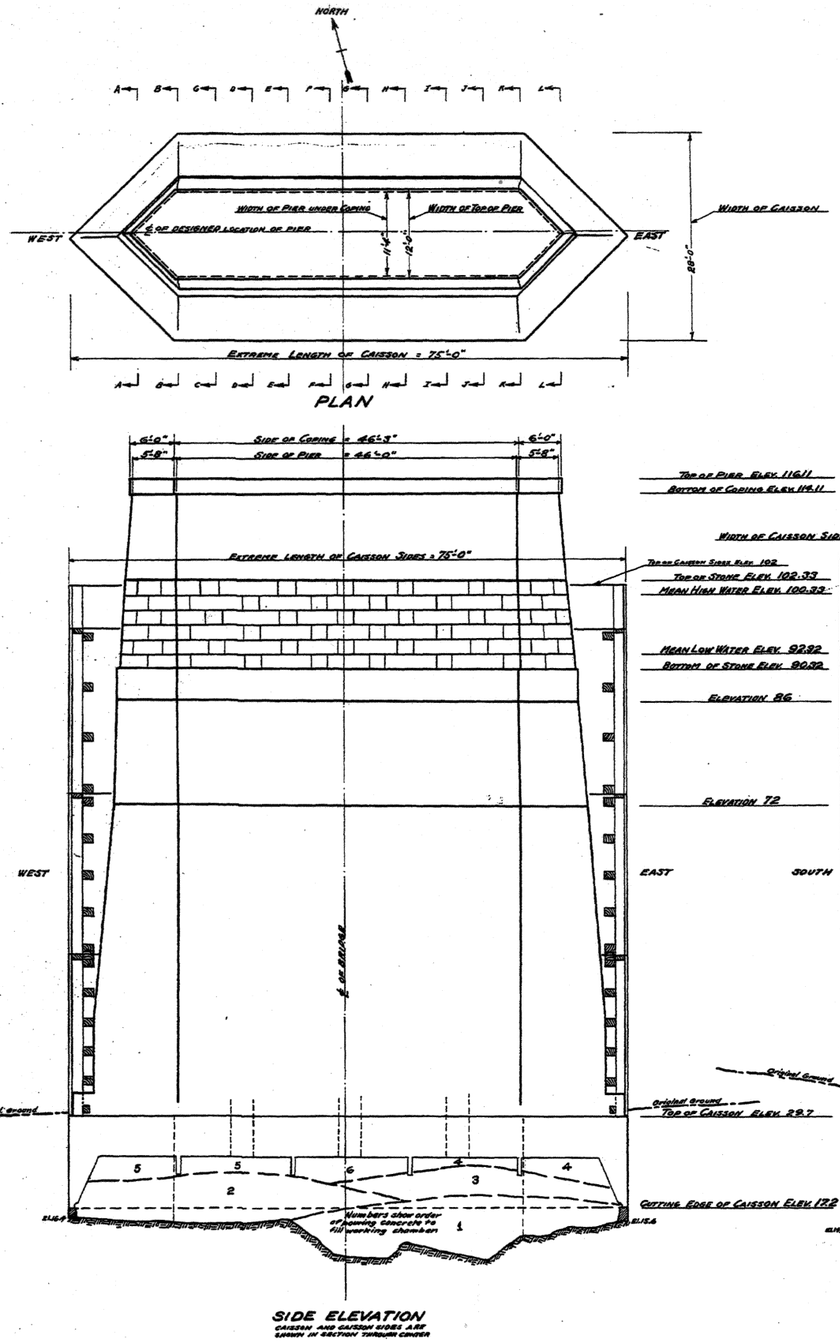
PISCATAQUA RIVER BRIDGE
PORTSMOUTH APPROACH
DETAIL OF REINFORCED CONCRETE

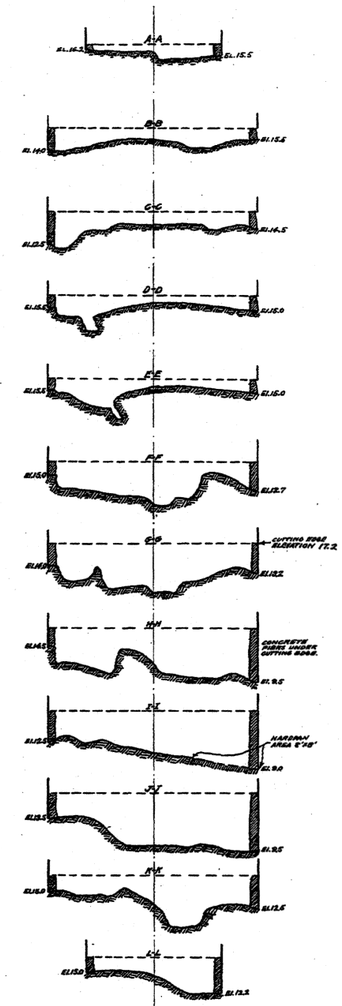
Scales 1"=10' and ½"=1'

February 1922

Revised and retraced Feb. 7, 1922. G.H.R.

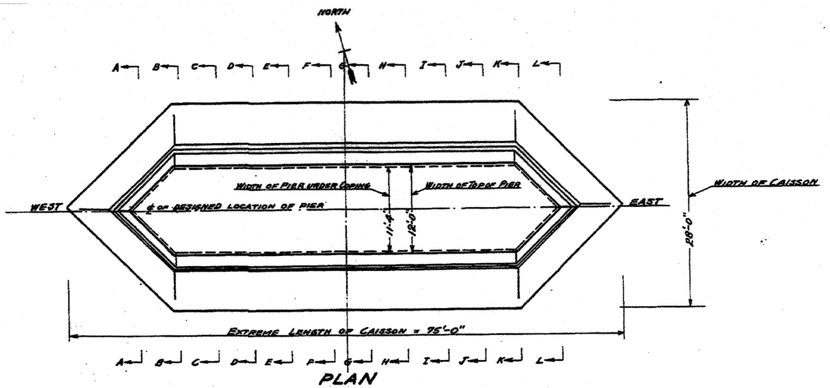
40



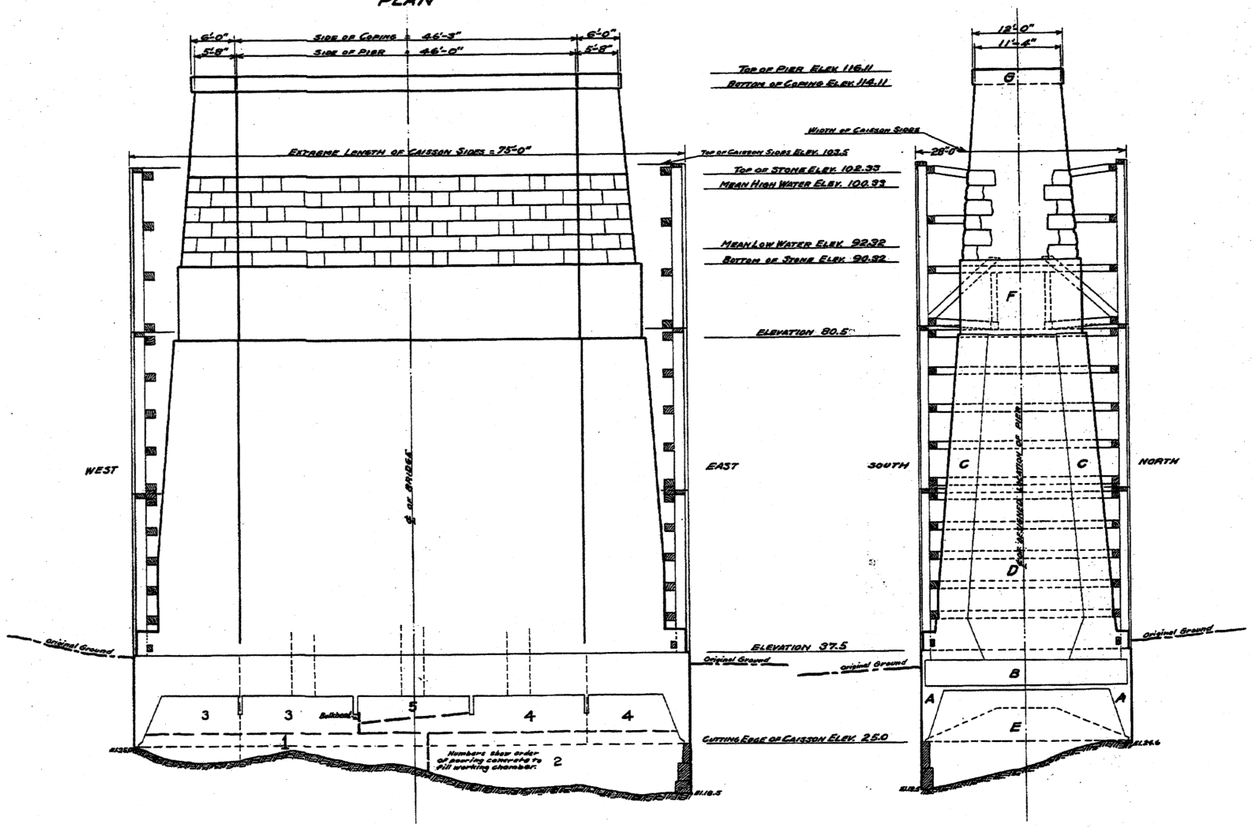


SECTIONS OF LEDGE UNDER PIER

PISCATAQUA RIVER BRIDGE
RECORD DRAWING
SOUTH PIER
SCALE 1/8 IN. = 1 FT. DATE MARCH 1923
DRAWN BY C.M.P.
67-8
SHEET 3 OF 6
Div. T Office File 51-20c



PLAN

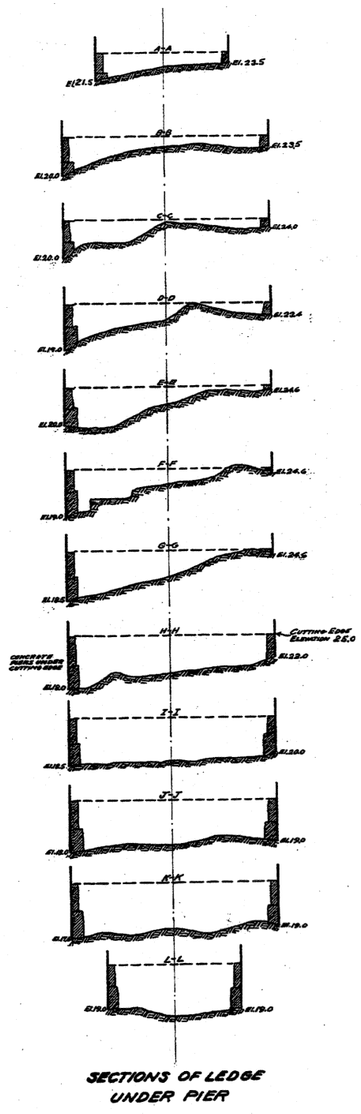


SIDE ELEVATION

CAISSON AND CAISSON SIDES ARE SHOWN IN SECTION THROUGH CENTER

SECTION G-G

1. STEEL SHEETING TO BE CONCRETED.
2. REINFORCED BANDING.
3. CAISSON SIDES.
4. END AND CROSS WALLS.
5. CONCRETE PROTECTING PILLARS.
6. WORKING CHAMBER.
7. FILLED FROM BOTTOM TO COPING WITH STONE.
8. COPING.



SECTIONS OF LEDGE UNDER PIER

PISCATAQUA RIVER BRIDGE
RECORD DRAWING
NORTH PIER
SCALE 1/8 in = 1 ft. DATE MARCH 1923.
DRAWN BY C.M.R.

SHEET 4 OF 6

Div. 7 Office File 31-20 D