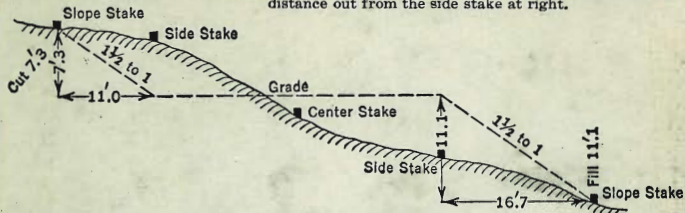


DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1 1/2 to 1.

In the figure below: opposite 7 under "Cut or Fill" and under .3 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7, the distance out from the side stake at right.



Cut or Fill	Distance out from Side or Shoulder Stake										Cut or Fill
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

KEUFFEL & ESSER CO., N. Y.

Book

Handwritten notes and calculations on the right page, including the number 2248 and various arithmetic operations.

The paper in this book No. 373A is made of 50% high grade rag stock with a WATER RESISTING surface sizir g.

West

♀ @ 4'-1"

East

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Piers 1-3-4-6 65'-6" Long

Piers 7 8 10 12 65'-0" Long

8 x 48 = 384

160
544

spaced at 3'-3"

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Piers 2, 5, 8, 11

2 & 5 65'-6"

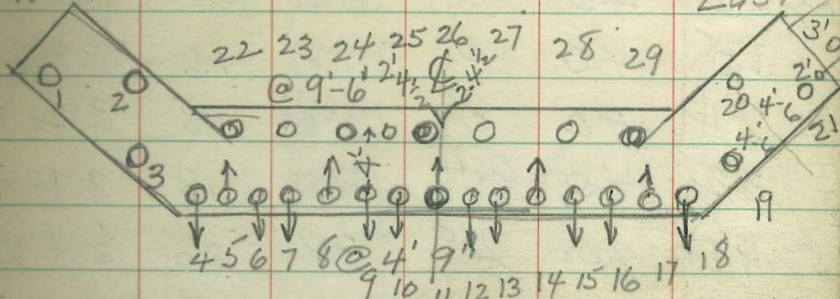
8 & 11 65'-0"

4 x 40 = 160

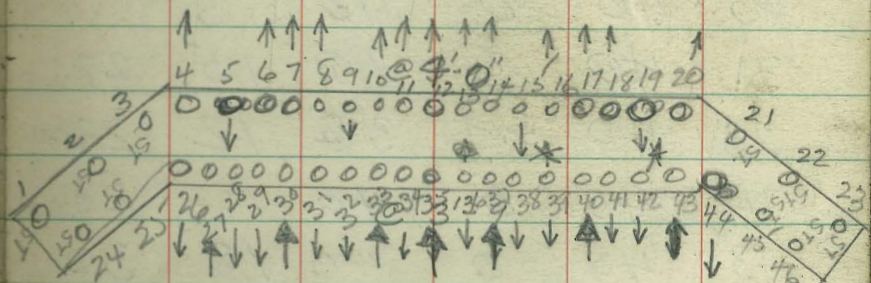
Pile Concrete 14"x14" 2" cham. Piers 5, 40

West

East



NORTH ABT 29 pile



SOUTH ABT 46 PILE

All piers Driven with No. 0 Vulcan

Both Abutments with 61 No. 1 Vulcan

Hammer #0 Vulcan

Wt 7500 stroke 3'-3"

striking load 24,375

Hwy Spec formula = $P = \frac{2WL}{5 + 0.1}$

Pier No	Length	12 Cut	Drive pay	Blow	Tons	Tip Elev.	Top Elev.	Driving	Data
✓ 16	40	4.4	36	20	35	-37.1	-1.5	get to 32	1 wood block did not fit steel head crushed Crambles
✓ 15	40	0	40	16	28	-41.5	"	get to 38	2 wood ^{padding} used
✓ 24	40	0	40	18	32	-41.5	"	get to 38	" " "
✓ 32	40	0.4	40	18	32	-41.1	"	get to 37	head crushed " "
✓ 46 ^{1/2}	40	2.0	38	20	35	-39.5	"	get to 36	head crushed
✓ 47 ^{1/2}	40	0	40	18	35	-41.5	"	get to 38	
✓ 46 ^{1/2}	40	0	40	16	28	-41.5	"	get to 38	
✓ 45 ^{1/2}	40	0	40	5		-41.5	"	get to 40	settled to grade
✓ 31	40	0	40	15	27	-41.5	"	get to 38	
✓ 23	40	5.4	35	12	23	-36.1	"	get to 38	top crushed
✓ 14	40	0	40	12	23	-41.5	"	get to 37	Repaired head of hammer
✓ 13	40	0	40	18	32	-41.5	"	get to 36	
✓ 12	40	0	40	10	20	-41.5	"	get to 36	
✓ 11	40	0	40	17	30	-41.5	"	get to 28	
✓ 22	40	0	40	13	25	-41.5	"	get to 35	
✓ 30	40	0	40	14	26	-41.5	"	get to 38	
✓ 44	40	3.4	37	15	27	-38.1	"	get to 38	
✓ 43	40	0	40	13	25	-41.5	"	get to 38	
✓ 42	40	0	40	12	23	-41.5	"	get to 38	
	160		746						

No	#	Length	Cut	Drive Pay	Blows	Tons	Tip Elev	Top Elev	DRIVING DATA
10	✓ 29	40	0	40	16	28	-41.5		set to 38 top of pile
	✓ 41	40	0	40	14	26	-41.5		set to 38
	✓ 9	40	0	40	15	27	-41.5		no set -24 @ 20 ³⁵ - 31 @ 20 ³⁵ 41.5 @ 15 -26 @ 24 ⁴⁰ - 33 @ 12 ²² 27
	✓ 10	40	0	40	15	27	-41.8		no set during night with handle on struck at 8 AM 20 blows drove = 90 tons 3 1/2 min
	✓ 21	40	0	40	19	34	-41.5		set to 35
	✓ 40	40	5.7	34	head crushed filled down		-35.8		set to 3 Blows to -24 -25 to 32 2 blows @ -25 head broke
	✓ 20	40	2.4	38	head crushed		-39.1		set down to plus
	✓ 39	40	(-1.5)	40	21	36	-43.0		100 15 16 24 20 18 21 31 32 34 36 38 40 15 21 27 30 32 34 36 38 40 15 21 set to Top elev -3
	✓ 28	40	6.0	34	17	30	-35.5		set 38 head crushed
	✓ 8	40	(-2.1)	40	21	36	-43.5		set 40 Top Elev -3.5
	✓ 7	40	(-2.0)	40	20	35	-43.5		set 40 Top Elev -3.5
	✓ 6	40	(-1.7)	40	22	37	-42.7		set 40 Top Elev -2.7
	✓ 5	40	(-1.3)	40	20	35	-42.8		set 40 " " -2.8
	✓ 19	40	(-1.0)	40	20	35	-42.5		set 40 " " -2.5
	✓ 38	40	(-1.2)	40	20	35	-42.7		set 40 " " -2.7
	✓ 27	40	(-1.8)	40	20	35	-43.3		set 40 " " -3.3
	✓ 37	40	3.7	36	head crushed		-37.8		set 40 crushed head filled again
	✓ 36	40	(-1.0)	40	18		-42.5		set to 40
	✓ 26	40	(-2.7)	40	20		-44.2		set to 40
		160		742					

No	Length	Cut	Drive Pay	Blows	Tons	Elev Tip	Top Elev	Driving Data
✓ 35	40	(-2.2)	40	20				get to 40
✓ 3	40	(-1.6)	40	24				get to 40
✓ 4	40	0.7	39					get to 40 header crushed re-jetty
✓ 18	40	(-2.0)	40	22		43.5		get to 40
✓ 34	40	(-1.0)	40	20		42.5		get to 38
✓ 33	40	(-1.2)	40	22		42.7		get to 38
✓ 25	40	(-1.0)	40	20		42.5		get to 40
✓ 17	40	(-1.3)	40	20		42.8		get to 40
✓ 2	40	(-0.8)	40	20				get to 40
✓ 1	40	(-0.9)	40	20				get to 40
20-A	40	0	40	18	32	41.5		get to 35
✓ 22 A	40	0	40	19	34	41.5		get to 35
✓ 24 A	40	0	40	12		41.5		get to 40

28
24 20-A
20 → used
22A 30
22 22A used
12.6

520
2042 1 ✓
519
2007 2008

520 742
760 746
700 519
2042 2007

	Elev	Bottom	Footing	Mess below Top of Pile
15 ^{-0.6}	14 ^{0.6}	43 ^{0.7}	8 ^{0.2}	18 ^{0.2} 33.09
24 ^{0.4}	13 ^{0.6}	10 ^{0.8}	7 ^{0.2}	26 ^{0.2} 34.13
32 ^{1.5}	45 ^{0.7}	21 ^{1.0}	39 ^{0.3}	35 ^{0.3} 2
48 ^{-2.4}	31 ^{0.6}	42 ^{1.1}	38 ^{0.5}	3 ^{1.5} 28
47 ^{0.8}	22 ^{0.5}	29 ^{1.3}	27 ^{0.5}	1 ^{1.2} 29
	12 ^{0.5}	41 ^{1.2}	19 ^{1.4}	2 ^{1.1} 29
	11 ^{0.7}	20 ^{1.5}	6 ^{0.6}	17 ^{1.1} 29
			5 ^{0.5}	25 ^{1.7} 30

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	24
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
	33	33	33	37	39	41	42	43	44	45	46	47	48	49	50	51
	34	36	36	40	42	43	44	45	46	47	48	49	50	51	52	53

PIER NO	Length	Cut	Drive Pay	Blows	Tons	El. Tip	Jet To	ReJet at	
✓ 16	40	0	40	26	43	41.5	-38	-30	
✓ 15	40	0	40	23	40	41.5	-38	-25	
✓ 24	40	0	40	25	42	41.5	-40		
✓ 32	40	0	40	24	41	41.5	-38	-26	
✓ 48	40	0	40	32	51	41.5	-38		Above 20 to 30 blows per ft last 5 ft.
✓ 47	40	0	40	24	41	41.5	-40		
✓ 46	40	0	40	25	42	41.5	-40		12 to 18 - 4 ft above light sand
✓ 45	40	0	40	22	38	-41.5	-40		
✓ 31	40	0	40	42	63	41.5	-40		Last 10' = 20 to 40 Blows
✓ 2	40	0	40	17	30	41.5	-40		
✓ 1	40	3,2	37	Jet to place		38.3	-38	-34	Head crushed jettied to place. Disturbed sand by Jet on #1
✓ 17	40	0	40	18	31	41.5	-40		
✓ 25	40	0	40	25	42	41.5	-37		
✓ 33	40	0	40	26	43	41.5	-38		
✓ 34	40	0	40	32	51	41.5	-38		
✓ 35	40	0	40	28	47	41.5	-38		12 to 15 blows to 39 to 40 then tightens
✓ 26	40	0	40	28	47	41.5	-38		
✓ 18	40	0	40	26	43	41.5	-38		
✓ 4	40	0	40	23	40	41.5	-38		
	760		757						

No.	PIER 10 Length Cut	Drive	Blows	Tons	Elev Top	Elev Top	Jet to	Releta
✓ 3 ¹⁵	40	0	40	36	56	41.5	-38	
✓ 6	40	0	40	23	40	41.5	-38	
✓ 5	40	0	40	24	41	41.5	-38	
✓ 19	40	0	40	38	59	41.5	-38	
✓ 27	40	0	40	32	48	41.5	-38	
✓ 38	40	0	40	29	51	41.5	-38	
✓ 37	40	0	40	29	51	41.5	-38	
✓ 36	40	0	40	36	56	41.5	-38	
✓ 39	40	1.4	39	Jet to Place		39.1	-38	Head Brake to place
✓ 40	40	0	40	38	59	41.5	-38	15 to 30 blows below -28
✓ 28	40	0	40	40	61	41.5	-38	
✓ 20	40	0	40	27	45	41.5	-38	
✓ 7	40	0	40	32	48	41.5	-38	Tighten in Last 2 ft.
✓ 8	40	2.0	38	Head Crushed		39.5	-38	Hose Broke -24 to -39 Drove to -24 +10 blows to -23 20 blows -24
✓ 10	40	0	40	23	40	41.5	-38	
✓ 9	40	0	40	31	49	41.5	-38	
✓ 21	40	2.3	38	Head crushed as it lightened		39.2	-38	
✓ 29	40	0	40	30	48	41.5	-38	
✓ 41	40	0	40	75	93	41.5	-38	Tightened Last 2 ft. tightened at -30 increased 95 driven
	760		755					

Blows per ft
to 15
Then tightens
very regular across
entire footing.

No	Length	cut	Drive pay	Blows	Tons	-Elev TIP	Elev top	Jet to	Rejet	
39 ✓ 42 ¹⁶	40	0	40	27	45	41.5		-38	26 to 40	
40 ✓ 11	40	0	40	26	44	41.5		-38		
✓ 12	40	0	40	50		41.5		-38	32 to 39	
✓ 22 ¹⁵	40	0	40	25		41.5		-38	20 to 38	
✓ 30	40	1.0	39	23		40.5		-38	24 to 41	head broke East ft.
✓ 43	40	2.4	38	Head Crushed		39.1		-38	23 to 41	Jetted to place
✓ 44	40	1.8	38	Crushed head		39.7		-38	23 to base	Jetted to place Extra hand struts
✓ 23	40	2.4	38	Crushed head		39.1		-38	30 to base	
✓ 13	40	2.0	38	Crush head		39.5		-38	21 to base	
48 ✓ 14 ¹⁵	40	0	40	Jet to base		41.5		38	24 to base	
	400		391							

Extra hand struts

Total 1920 ✓ 1903 ✓

Finish driving 11:05 AM.

400	391
760	755
760	757
<u>1920</u>	<u>1903</u>

PIER 8			Drive	Blows	Tons	E/Top	E/Top	Jet to	ReJet	
No	Length	Cut	Pay							
40	40	1.4	39	24		40.1		39	26 to 38	Error
✓39	40	1.4	39	Jet to place		40.1		38	36 to 42	in Grade elev
✓38	40	0	40	Jet to place		41.5		38	22 to 42	
✓37	40	0	40	Jet to place		41.5		38	32 to 41	
✓17	40	0	40	21		41.5		40		
✓18	40	0	40	20		41.5		42		
✓19	40	0	40	25		41.5		40		
✓20	40	0	40	21		41.5		38		
✓36	40	0	40	Jet to place		41.5		40	25 to 42	
✓35	40	0	40	Jet to place		41.5		40	6 to 42	
✓34	40	0	40	Jet to place		41.5		40	6 to 42	
✓33	40	0	40	Jet to place		41.5		42		
✓32	40	0.8	39	Jet to head broke		40.7		42	33 to 42	
✓31	40	2.2	38	head broke		39.3		40	32 to 40	
✓11	40	0	40	Jet to place		41.5		40	18 to 42	
✓12	40	2.7	37	head broke Jet to place		38.8		42	20 to 42	
✓13	40	0	40	Jet to place		41.5		42	20 to 42	hammer used to settle last 6 feet
✓14	40	0	40	Jet to place		41.5		42	20 to 42	hammer used to settle last 6 ft
✓15	40	0	40	Jet to place		41.5		42	22 to 42	hammer used to settle last 8 ft.
	160		752							

Hammer used to settle last 6 to 10 feet

560
 192
 368

PIER #	length	Cut	Drive Ply	Blows	Tons	Elev Tip	Elev Top	Jet to	Rejet	
✓ 16	40	0	40	Jet to Place		41.5		42	4.2	Hammer cast 7 ft.
✓ 30	40	0	40	Jet to Place		41.5		40		"
✓ 29	40	0	40			41.5		to place		"
✓ 28	40	0	40			41.5		to Place		"
✓ 27	40	0	40		30	41.5		to place		"
✓ 26	40	0	40	20	35	41.5		42		settled to 30 drove with hammer
✓ 10	40	0	40	Jet to Place		41.5		40		set with hammer
✓ 9	40	0	40	Jet to Place		41.5		42		set with hammer
✓ 8	40	0	40	"		41.5		42		set with hammer
✓ 7	40	0	40	"		41.5		42	"	"
✓ 6	40	0	40	"		41.5		42	"	"
✓ 25	40	0	40	"		41.5		42	"	"
✓ 24	40	2	38	struck with hammer	at 30	39.5		40		set down head crushed
✓ 23	40	2	38	Jet to P.		39.5		42		set down head crushed
✓ 22	40	2	38	"		39.5		42		set down head crushed
✓ 21	40	2 ³	38	"		39.2		42		
✓ 5	40	0	40	"		41.5		42		
✓ 4	40	0	40	"		41.5		42		
✓ 3	40	0	40	"		41.5		42		
	160		752							

PIER 8

No	Length	cut	Drive Pay	Blows	Tons	Eler Tip	Eler Top	Jet to	Re Jet
✓ 2	40	0	40	Jet		41.5		42	
✓ 1	40	0	40	Jet		41.5		42	
	<u>80</u>		<u>80</u>						
	760		752						
	<u>760</u>		<u>752</u>						
	1600 ✓		1584 ✓						

PIER I No	Length	Cut	Drive PAY	Blow Tons	El Tip	El-Top	Jet to	ReJet	Set with Hammer	Head Crushed
✓48 ⁵	40	0	40	500-38 22@41.5	-41.5	-1.5	42	-38 +0.42	50@-38	
✓47 ⁵	40	0	40	50	-41.5	-1.3	42	-27 To -42	25	
✓320	40	0	40	28 Jet to Place	-41.5	-1.5	42	28/42 36/	35-	
✓24 ⁵	40	0	40	55	-41.5	-1.5	42	-	26	
✓16	40	0	40	38@-38 Rejet	-41.5	-1.5	42	38 to place	27	
✓14 ⁵	40	0	40	52@-39 Rejet	-41.5	-1.5	42	39 to place	30	
✓13 ⁶	40	0	40	50@38 Rejet	-41.5	-1.5	42	38 to place	28	
✓23 ⁵	40	2.3	38	40@37 Rejet	-39.2		42	37 To place	26	@-38
✓31	40	0	40	75	-41.5	-1.5	42		30	
✓46	40	0	40	60	-41.5	-1.5	42		31	
✓45	40	0	40	25	-41.5	-1.3	42		32	
✓44	40	0	40	75	-41.5	-1.5	42		30	
✓43	40	10	39	30	-40.5	^{cut to} -1.5	42	35 to place	28	sealed @-37
✓30	40	0	40	65	-41.5	-1.5	42		32	
✓22	40	0	40	35	-41.5	-1.5	42		29	
✓12	40	0	40	40	-41.5	-1.5	42		33	
✓11	40	0	40	60	-41.5	-1.5	42		30	
✓10	40	0	40	55	-41.5	-1.5	42	27	25	
	760		757							

PIER Len	Length	Cut	Drive Pay	Blows Tons	E/Tip	E/Top	Jet to	Re Jet	Set with Hammer	Head Crushed
✓9	40	.7	39	40	40.8	cut to -1.5	42	35	35	@ 35
✓21	40	0	40	60	-41.5	-1.5	42	-	32	
✓29	40	0	40	35 @ 35	-41.5	-1.5	42	35	30	
✓42	40	0	40	50 @ 38	-41.5	-1.5	42	38 top place	30	Redrove 10 blow small night
✓41	40	0	40	35	-41.5	-1.5	42	35	28	
✓40	40	0	40	Jet to place	-41.5	-1.5	42	35	20	
✓39	40	0	40	45	-41.5	-1.5	42		30	
✓28	40	0	40	45	-41.5	-1.5	42		27	
✓20	40	0	40	40 @ 36	-41.5	-1.5	42	36 top place	28	
✓8	40	0	40	Jet to place	-41.5	-1.5	42	31	Jet to place	
✓7	40	2.8	37	Jet to place	38.7		42	27	22	31
✓6	40	0	40	40	-41.5	-1.5	42	28	24	
✓5	40	0	40	40	-41.5	-1.5	42	31	27	
✓19	40	0	40	Jet to place	-41.5	-1.5	42	32	25	
✓27	40	0	40	40	-41.5	-1.5	42		30	
✓38	40	0	40	Jet to place	-41.5	-1.5	42	35	30	
✓37	40	0	40	Jet to place	-41.5	-1.5	42	30	25	
✓36	40	0	40	50	-41.5	-1.5	42		28	
✓35	40	1.0	39	Jet to place	-40.5		42	34		head broke 36
	760		755							

PIER 1 No	Length	Cut	Drive Pay	Blows	Tons	El. Tip	El Top	Jet to	ReJet	Set With Head Hammer Crushed
✓26	40	0	40	Jet to Place		-41.5	-1.5	42	31	28
✓18	40	0	40	60@39		-41.5	-1.5	42	31 to 37	37 to 39
✓4	40	0	40	30		-41.5	-1.5	42	35	to 35
✓3	40	0	40	Jet to Place		-41.5	-1.5	42	34	to base
✓2	40	0	40	35		-41.5	-1.5	42	32	
✓1	40	0	40			-41.5	-1.5	42	35	to place
✓17	40	0	40			-41.5	-1.5	42	35	to place
✓25	40	0	40			-41.5	-1.5	42	34	to place
✓34	40	0	40			-41.5	-1.5	42	35	to place
✓33	40	0	40			-41.5	-1.5	42	36	to place

400

400

760

755

760

757

1920 ✓

1912 ✓

PIER No	Length	4 Cut	Drive Ply	Blows	Tons	E/Tip	E/Top	Jet to -	ReJet	Set with hammer	Head Crashed
✓ 16	40	0	40	120		-41.5	-1.5	42		28	
✓ 15	40	0	40	70		-41.5	-1.5	42		30	
✓ 24	40	0	40	50		-41.5	-1.5	42		25	
✓ 32	40	0	40	30		-41.5	-1.5	42		26	
5 ✓ 48 ₀	40	0	40	35		-41.5	-1.5	42		30	
✓ 47 ₁	40	0	40	29		-41.5	-1.5	42		27	
✓ 46 ₁	40	0	40	32		-41.5	-1.5	42		29	
✓ 45 ₀	40	0	40	38		-41.5	-1.5	42		27	
✓ 31	40	0	40	35		-41.5	-1.5	42		30	
10 ✓ 23	40	0	40	30		-41.5	-1.5	42		25	
✓ 14	40	0	40	27		-41.5	-1.5	42		27	
✓ 13 ₁	40	5 ⁰	35			-36.5	cut to -1.5	42	32 ₇₀₀	28	32
✓ 12 ₁	40	0	40	22		-41.5	-1.5	42		26	
✓ 11	40	6	40	24		-41.5	-1.5	42		27	
15 ✓ 22 ₀	40	0	40	25		-41.5	-1.5	42		28	
✓ 30 ₁	40	3 ⁰	37	22		-38.5	cut to -1.5	42		25	35
✓ 44 ₂	40	0	40	25		-41.5	-1.5	44		27	
✓ 43 ₀	40	0	40	20		-41.5	-1.5	44		24	
19 ✓ 42	40	0	40	15		-41.5	-1.5	44		28	
	760		752						Setting Heavies		

PIER 4				Drive Pay	Blows	Tons	El Tip	El Top	Jet to	Re Jet	Set with Head	
No	Length	Cut	Hammer								Crushed	
37	✓18	40	0	40	21		-41.5	-1.5	44		27	
40	✓26	40	0	40	15		-41.5	-1.5	44		28	
	✓36	40	0	40	24		-41.5	-1.5	44		27	
	✓35	40	0	40	20		-41.5	-1.5	44		27	
	✓34	40	0	40	22		-41.5	-1.5	44		26	
	✓33	40	0	40	24		-41.5	-1.5	44		29	
45	✓25	40	18	39	Jet		-40.7	^{Cutto} -1.5	44		30	30
	✓17	40	0	40	32		-41.5	-1.5	44		29	
	✓1	40	0	40	22		-41.5	-1.5	44	33	30	
48	✓2	40	0	40	30		-41.5	-1.5	44		27	

400

399

760

745

760

752

1920 ✓

1896 ✓

PIER 7 NO	Length	cut	Drive Pay	Blows	Tons	El Tip	El Top	Jet To	Rejet	Hammer Set	Head Crushed.
✓ 3	40	0	40	18		-41.5	-1.5	44		22	
40 ✓ 26	40	0	40	22		-41.5	-1.5	44		23	
✓ 36	40	0	40	20		-41.5	-1.5	44		21	
✓ 35	40	0	40	20		-41.5	-1.3	44		30	
✓ 34	40	1.8	38		Jet to Place	39.7	Cut to -1.5	44	32	28	32
✓ 25	35 40	0	40	21		-41.5	-1.5	44		31	
45 ✓ 33	40	1.4	39	22		40.1	Cut to -1.5	44		30	38
✓ 17	40	0	40	21		-41.5	-1.5	44		28	
✓ 2	40	0	40	22		-41.5	-1.5	44		31	
48 ✓ 1	40	1.0	39	20		-40.5	Cut to -1.5	44		32	38

400	396
760	759
760	758
<u>1920</u> ✓	<u>1913</u> ✓

No	PIER Length	2 cut	Drive post	Blow Tons	El Top	El Top	Jet to	Rejet	Set mer.	Nm Hard Crushed
✓40	40	0	40	33	-41.5	-1.5	44		24	
✓39	40	0	40	38	-41.5	-1.5	44	38	25	
✓20	40	0	40	60	-41.5	-1.5	44		26	
✓19	40	0	40	62	-41.5	-1.5	44	36	25	
✓18	40	0	40	50@36 Jet to place	-41.5	-1.5	44	36	26	
✓38	40	0	40	50@37 Jet 20.	-41.5	-1.5	44	37	24	
✓37	40	0	40	24	-41.5	-1.5	44		25	
✓36	40	0	40	65	-41.5	-1.5	44		27	
✓35	40	0	40	35	-41.5	-1.5	44		20	
✓17	40	0	40	40	-41.5	-1.5	44		23	
✓16	40	0	40	70	-41.5	-1.5	44		23	
✓15	40	0	40	40@36 Jet 20	-41.5	-1.5	44	36	24	
✓14	40	0	40	58	-41.5	-1.5	44		25	
✓13	40	0	40	20	-41.5	-1.5	44		28	
✓34	40	0	40	37	-41.5	-1.5	44		26	
✓33	40	0	40	50	-41.5	-1.5	44		27	
✓32	40	0	40	50	-41.5	-1.5	44		26	
✓31	40	0	40	34	-41.5	-1.5	44		26	
✓30	40	0	40	35	-41.5	-1.5	44		24	
✓29	40	0	40	52	-41.5	-1.5	44		25	

	No	Pick Length	cut	Drive pay	Blow	Tons	E/Tip	E/Top	Jet to	Re Jet	Set Ham	Head Crush
21	✓ 9	40	0	40	60		-41.5	-1.5	44		26	
	✓ 10	40	0	40	85		-41.5	-1.5	44		25	
4	✓ 11	40	0	40	65		-41.5	-1.5	44		25	
	✓ 12	40	1.0	39	30		-40.5	-1.5	44	35	26	35
25	✓ 28	40	0	40	45		-41.5	-1.5	44		24	
	✓ 27	40	0	40	22		-41.5	-1.5	44		26	
	✓ 26	40	0	40	40		-41.5	-1.5	44		24	
4	✓ 25	40	0	40	60		-41.5	-1.5	44		25	
	✓ 6	40	0	40	55		-41.5	-1.5	44		23	
30	✓ 7	40	0	40	40		-41.5	-1.5	44		24	
	✓ 8	40	0	40	6	Jet heavy	-41.5	-1.5	44		23	
	✓ 21	40	0	40	60		-41.5	-1.5	44		23	
	✓ 22	40	0	40	38		-41.5	-1.5	44		22	
	✓ 23	40	0	40	45		-41.5	-1.5	44		24	
35	✓ 24	40	2	38	35		39.5	-1.5	44		23	37
	✓ 5	40	0	40	40		-41.5	-1.5	44		25	
	✓ 4	40	0	40	45 @ 36	Re jet	-41.5	-1.5	44	38	22	
	✓ 3	40	0	40	45		-41.5	-1.5	44		25	
	✓ 2	40	0	40	60		-41.5	-1.5	44		26	
40	✓ 1	40	0	40	42		-41.5	-1.5	44	38	22	

1600 ✓

1597 ✓

N	A B T	No Length	Cut	Drive Pay	Blow Tons	El Tip	El Top	Jet to	ReJet	Head Hammer	Head Crushed
✓ 21		60	0	60	33	-39.75	+20.25	34	-34	-34	
✓ 20		60	0	60	150	-39.75	+20.25	33	-33	-33	
✓ 19		60	1.0	59	480	38.75	cut to 20.25	34	-38	-34	
✓ 29		60	1.0	59	175	38.75	cut to 20.25	32	-32	-32	
✓ 28		60	1.0	59	160	38.75	cut to 20.25	-28	-28	-28	
✓ 27		60	0	60	155	39.75	20.25	-27	-27	-27	
✓ 26		60	6.4	54	150	-33.35	cut to 20.25	-27	-27	-27	-30
✓ 25		60	0	60	180	-39.75	20.25	-24	-24	-24	
✓ 24		60	0	60	96	-39.75	20.25	-27	-27	-27	
✓ 23		60	1.3	59	65	-38.45	cut to 20.25	-24	-24	-24	
✓ 22		60	0	60	60	-39.75	20.25	33	33	33	
✓ 2		60	0	60	55	-39.75	20.25	-33	-33	-33	
✓ 3		60	0	60	60	-39.75	20.25	-33	-33	-33	
✓ 1		60	0	60	140	-39.75	20.25	-34	-34	-34	
✓ 5		60	0	60	25	-36.25	20.25	-26	-26	-26	
✓ 8		60	0	60	24	-36.25	20.25	-26	-26	-26	
✓ 11		60	.4	60	30	-35.85	cut to 20.25	-22	-22	-22	Chipped one side 35
✓ 14		60	0	60	50	-36.25	20.25	-20	-20	-20	
✓ 17		60	6.3	54	85	-33.45	cut to +20.25	-27	-27	-27	30
		1140		1124				patrol - 36.25			

made H1 Hammer speed

NORTH ABT			Drive Pay	Blow	Tons	El Tip	El Top	Jet To	Rejet	Hammer Set	Head Crushed
No	Length	Cut									
✓ 16	60	0	60	30		-36.25	+20.25	-29	-29	-29	
✓ 15	60	0	60	35		-36.25	+20.25	-29	-29	-29	Flaked 35
✓ 13	60	0	60	50		-36.25	+20.25	-29	-29	-29	
✓ 12	60	0	60	50		-36.25	+20.25	-29	-29	-29	
✓ 10	60	0	60	50		-36.25	+20.25	-31	-31	-31	
✓ 9	60	0	60	25		-36.25	+20.25	-28	-28	-28	
✓ 7	60	0	60	40		-36.25	+20.25	-28	-28	-28	
✓ 6	60	0	60	45		-36.25	+20.25	-29	-29	-29	
✓ 4	60	0	60	40		-36.25	+20.25	-27	-27	-27	
✓ 18	60	0	60	2.6		-36.25	+20.25	-30	-30	-30	
	600		600								
	1140		11.24								
	1740		1724								

18 =	6.4	9 =	7.6	22	7.0
17	13.0	8 =	10.7	23	15.5
16	7.0	7 =	8	24	12.5
15	7.0	6 =	7.0	25	16.0
14	16.0	5 =	10.5	26	13.0
13	7.0	4 =	9.2	27	13.4
12	7.0	3 =	7.0	28	12.0
11	13.2	2 =	7.0	29	7.7
10	5.5	1 =	6		

Pier No	Length	Cut	Drive ft/day	Blows	Tons	El TIP	El Top <i>cut to</i>	Jet to	ReJet	Hammer Sec	Head Crushed
✓30	40	3.4	37	22		-38.1	-1.5	44		24	30
✓10	40	0	40	19		-41.5	-1.5	44		24	
✓9	40	0	40	15		-41.5	-1.5	44		23	
✓29	40	0	40	20		-41.5	-1.5	44		23	
25 ✓28	40	1.3	39		Jet to Place	-40.2	-1.5	42	25	20	25
✓8	40	0	40	23		-41.5	-1.5	44		24	
✓7	40	0	40	22		-41.5	-1.5	44		23	
✓27	40	0	40	24		-41.5	-1.5	44		23	
✓26	40	0	40	22		-41.5	-1.5	44		22	
30 ✓6	40	0	40	20		-41.5	-1.5	44		23	
✓5	40	0	40	22		-41.5	-1.5	44		24	
✓25	40	0	40	18		-41.5	-1.5	44		22	
✓24	40	0	40	21		-41.5	-1.5	44		24	
✓4	40	0	40	20		-41.5	-1.5	44		22	
35 ✓23	40	0	40	24		-41.5	-1.5	44		22	
✓3	40	0	40	18		-41.5	-1.5	44		25	
✓2	40	0	40	22		-41.5	-1.5	44		20	
✓22	40	0	40	23		-41.5	-1.5	44		22	
✓21	40	0.7	39	20		-41.5	-1.5	44		23	39
40 ✓1	40	0	40	26		-41.5	-1.5	44		20	

PIER No	3 Length	Cut	Drive Pay	Blow	Tons	El. Tip	El. Top	Jet To	Re Jet	Hammer Set	Head Crushed
✓16	↑ 40	0	40	28		-41.5	-1.5	44	6	22	
✓24	40	0	40	42		-41.5	-1.5	44		25	
✓15	↳ 40	0	40	32		-41.5	-1.5	44		23	
✓32	1 40	0.4	40	55		-41.0	-1.5	44		22	40
5 48	N 40	0	40	80		-41.5	-1.5	44		23	
✓47	1 40	2.0	38	25		-39.5	-1.5	44		21	38
✓46	1 40	0	40	90		-41.5	-1.5	44		22	
✓45	1 40	0	40	65		-41.5	-1.5	44		24	
✓31	X 40	0	40	68		-41.5	-1.5	44		24	
10 ✓23	1 40	0	40	21		-41.5	-1.5	44		25	
✓14	1 40	0	40	34		-41.5	-1.5	44		22	
✓13	5 40	0	40	38		-41.5	-1.5	44		23	
✓12	3 40	0	40	32		-41.5	-1.5	44		22	
✓11	3 40	0	40	43		-41.5	-1.5	44		25	
15 ✓22	1 40	0	40	50		-41.5	-1.5	44		24	
✓30	40	0	40	48		-41.5	-1.5	44		21	
✓44	40	0	40	35		-41.5	-1.5	44		22	
✓43	40	0	40	39		-41.5	-1.5	44		26	
✓42	40	0	40	35		-41.5	-1.5	44		27	
no ✓29	40	0	40	57		-41.5	-1.5	44		23	
	800		798								

Let hammer set over night
 on 31. 50 blows = 6" in
 loosening

PIER 11 No	Length	Cut	Drive Ply	Blows	Tons	El Tip	El Top	Jet to	ReJet	Hammer Set	Head Crushed
✓40 ⁵⁰	40	0	40	21		-41.5	-1.5	44		32	
✓39 ¹	40	0	40	24		-41.5	-1.5	44		23	
✓20 ²	40	0	40	23		-41.5	-1.5	44		30	
✓19 ¹⁰⁰	40	0	40	21		-41.5	-1.5	44		28	
5✓18 ¹	40	0	40	17		-41.5	-1.5	44		24	
✓38	40	0	40	22		-41.5	-1.5	44		26	
✓37	40	0	40	30		-41.5	-1.5	44		23	
✓17	40	1.3	39	24		-40.2	-1.5 ^{cut to}	44		28	35
✓36	40	0	40	22		-41.5	-1.5	44		26	
10✓35	40	0	40	32		-41.5	-1.5	44		24	
✓16	40	2.4	38	31		-39.1	-1.5 ^{cut to}	44		23	
✓15	40	0	40	24		-41.5	-1.5	44		26	
✓14	40	0	40	26		-41.5	-1.5	44		25	
✓13	40	0	40	23		-41.5	-1.5	44		23	
15✓34	40	0	40	31		-41.5	-1.5	44		22	
10✓33	40	0	40	25		-41.5	-1.5	44		28	
✓12 ^v	40	0	40	15		-41.5	-1.5	44		27	
✓32 ⁰	40	0	40	24		-41.5	-1.5	44		25	
✓31 [✓]	40	0	40	16		-41.5	-1.5	44		24	
2.0 ✓11 ²	40	0	40	18		-41.5	-1.5	44		26	

PIER II		Cut	Drive Pay	Blows	Tons	E/Tip	E/Top	Jet to	ReJet	Hammer Set	Head Crushed
No	Length										
✓10	40	0	40	17		-41.5	-1.5	44		24	
✓30	40	0	40	14		-41.5	-1.5	44		28	
✓29	40	1.3	39	22		-40.2	-1.5 <i>cut to</i>	44		27	39
✓9	40	0	40	20		-41.5	-1.5	44		25	
✓8	40	0	40	23		-41.5	-1.5	44		24	
✓28	40	0	40	15		-41.5	-1.5	44		24	
✓27	40	0	40	16		-41.5	-1.5	44		23	
✓7	40	0	40	21		-41.5	-1.5	44		22	
✓6	40	2.4	38	18		39.1	-1.5 <i>cut to</i>	44		27	35
✓30	40	0	40	17		-41.5	-1.5	44		26	
✓25	40	2.3	38	15		-39.2	-1.5 <i>cut to</i>	44	35	25	34
✓5	40	1.3	39	24		40.2	-1.5 <i>cut to</i>	44		27	38
✓4	40	0	40	20		-41.5	1.5	44		24	
✓24	40	1.4	39	17		-40.1	1.5 <i>cut to</i>	44	36	23	35
✓35	40	1.3	39	14		-40.2	-1.5 <i>cut to</i>	44	35	26	33
✓3	40	0	40	16		-41.5	-1.5	44		24	
✓2	40	0	40	20		-41.5	-1.5	44		26	
✓1	40	0	40	18		-41.5	-1.5	44		25	
✓22	40	0	40	22		-41.5	-1.5	44		26	
✓40	40	2.8	37	17		-38.7	-1.5 <i>cut to</i>	44	35	25	33

S-ABT NO	Length	Cut	Drive Pay	Blows	No. of Tons	El Tip	El. Top	Jet to	Rejet	Hammer Set at	Head Crushed at
✓1	60	0	60	23		-39.75	+20.25	40	+40	34°	
✓24	60	0	60	21		-39.75	+20.25	40	40	35°	
✓25	60	3°	57	18		-36.75	+20.25 cut to	40	40	31°	35
✓2	60	0.4	60	20		-39.35	+20.25 cut to	40	40	35°	38
5 ✓3	60	0	60	22		-39.75	+20.25	40	40	34°	
✓26	60	0	60	24		-36.25	+20.25	36	36	31°	
28 ✓m	60	0	60	23		-36.25	+20.25	36	36	31°	
✓5	60	0	60	22		-36.25	+20.25	36	36	32°	
✓29	60	0	60	30		-36.25	+20.25	36	36	30	
10 ✓31	60	0	60	28		-36.25	+20.25	36	36	32°	
✓32	60	0	60	31		-36.25	+20.25	36	36	30	
✓19	60	0	60	34		-36.25	+20.25	36	36	31	
✓34	60	0	60	27		-36.25	+20.25	36	36	32	
✓35	60	0	60	30		-36.25	+20.25	36	36	29	
15 ✓12	60	0	60	28		-36.25	+20.25	36	36	30	
✓11	60	0	60	25		-36.25	+20.25	36	36	31	
✓10	60	0	60	35		-36.25	+20.25	36	36	31	
✓33	60	0	60	60		-36.25	+20.25	36	36	31	
19 ✓30	60	0	60	45		-36.25	+20.25	36	36	31	
	1140		1137								

Note No. 1. Hammer used.
 No 0 hammer all pieces

S-ABT N	Length	Cut	Drive Pay	Blows Tons	El. Tip	El Top	Jet to	ReJet at	Hammer Head Set at	Crushed at
20 8	60	0	60	46	36 ²⁵	20 ²⁵	36	36	31	
7	60	0	60	38	36 ²⁵	20 ²⁵	36	36	32	
6	60	0	60	42	36 ²⁵	20 ²⁵	36	36	33	
27	60	0	60	45	36 ²⁵	20 ²⁵	36	36	30	
4	60	0	60	15	36 ²⁵	20 ²⁵	36	36	31	
23 36	60	0	60	25	36 ²⁵	20 ²⁵	36	36	31	
38	60	0	60	30	36 ²⁵	20 ²⁵	36	36	28	
15	60	0	60	27	36 ²⁵	20 ²⁵	36	36	31	
39	60	0	60	40	36 ²⁵	20 ²⁵	36	36	33	
41	60	0	60	42	36 ²⁵	20 ²⁵	36	36	32	
20 42	60	0	60	45	36 ²⁵	20 ²⁵	36	36	32	
19	60	0	60	110	36 ²⁵	20 ²⁵	36	36	30	
44	60	0	60	30	36 ²⁵	20 ²⁵	36	36	31	
21	60	0	60	27	39.75	20 ²⁵	39	39	35	
45	60	0	60	25	39.75	20 ²⁵	39	39	35	
35 22	60	0	60	48	39.75	20 ²⁵	39	39	35	
46	60	0	60	23	39.75	20 ²⁵	39	39	35	
23	60	0	60	40	39.75	20 ²⁵	39	39	36	
30 43	40	0	60	38	36 ²⁵	20 ²⁵	36	36	31	
	1140		1140							

S. PBT No	Length	Cut	Drive Pay	Blows	Tons	El Top	El Top	Jet to	Re Jet at	Hammer Head Set at	Head Crushed at
✓ 20	60	0	60	15		-36 ²⁵	+20 ²⁵	36	36	30	
40 ✓ 18	60	0	60	21		-36 ²⁵	+20 ²⁵	36	36	30	
✓ 17	60	0	60	23		-36 ²⁵	+20 ²⁵	36	36	30	
✓ 16	60	0	60	60		-36 ²⁵	+20 ²⁵	36	36	30	
40 ✓	60	0	60	30		-36 ²⁵	+20 ²⁵	36	36	31	
✓ 14	60	0	60	35		-36 ²⁵	+20 ²⁵	36	36	30	
46 ✓ 13	60	0	60	25		-36 ²⁵	+20 ²⁵	36	36	30	
46 ✓ 37	60	0	60	50		-36 ²⁵	+20 ²⁵	36	36	31	

480

480

1140
1140
480

2760

1137
1146

2757

note Piling Jitted
continuously while
driving point of jet
at toe of pile

1	5 ⁶	17	5 ⁻⁶	33	5 ⁴
2	4 ⁶	18	6 ⁰	34	4 ⁴
3	5 ⁴	19	5 ⁸	35	7 ⁰
4	4 ⁷	20	6 ⁴	36	5 ⁶
5	4 ⁵	21	4 ⁴	37	5 ⁰
6	3 ³	22	4 ²	38	8 ⁶
7	4 ⁰	23	3 ³	39	3 ³
8	5 ²	24	4 ⁹	40	4 ⁶
9	5 ⁴	25	6 ⁰	41	3 ⁷
10	5 ³	26	5 ⁶	42	4 ³
11	5 ⁰	27	5 ⁵	43	4 ⁶
12	6 ⁰	28	5 ²	44	5 ¹
13	5 ⁵	29	6 ³	45	4 ⁴
14	5 ⁶	30	5 ⁰	46	4 ³
15	5 ⁵	31	4 ⁴	L	
16	6 ⁰	32	6 ⁵		

TOTALS

1 Pier No Furnish Drive

1 1920 1912 8

2 1600 1597 3

3 1920 1915 5

4 1920 1896 24

5 1600 1595 5

6 1920 1912 8

7 1920 1913 7

8 1600 1584 16

9 1910 1906 4

10 1920 1903 17

11 1600 1586 14

12 2040 2007 33

NABT 1740 1724 16

SABT 2760 2757 3

Total 26370 26207

26208

92
23610

95
23450

23450
23610

23450
2757
26207

26370

163

26207

Elev Pier 10.

+ H1 - E1

BM

14.16 BM Power Pole

TP 0.25 14.41 6.87 7.54

0.75 8.29 9.79 - 1.50

Elev Top pile #16

Blows Per Ft.	Tons Bear.	Blows Per Ft.	Tons Bear.
15	27	200	152
20	35	250	163
25	42	300	174
30	49	350	181
35	55	400	188
40	61		
45	66		
50	72	10	20
55	77	11	21
60	82	12	23
65	86	13	24
70	90	14	26
75	93	Formula.	
80	97	State	
90	106	$P = \frac{2WL}{5 + 0.1}$	
100	110	$W = 7500$	
125	125	$L = 3.25$	
150	135	$WL = 24,375 \#$	

(35)

1.3) 4875

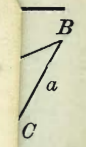
20) 1200 .6
 20

20) 3.5 (.17
 20
 15

7.) 48.750 (69.7
 42
 67
 63
 45

1.1) 4875 (44
 44
 44
 44

.27) 48.75000 (181
 27
 217
 216
 15



$$\frac{c}{a}$$

$$\frac{b^2}{a^2}$$

$$\frac{a^2}{a^2}$$

$$\frac{C}{A}$$

$$\frac{\sin C}{\sin A}$$

$$\frac{A+B}{A+B}$$

-(A+B)

ied by the
e = 319.4 ft.
os 5° 10' =
9 ft.
inus slope
With the
the follow-
.9959 = .0041.
slope dist-
rise = 14 ft.,
302.28 ft.

$$\begin{array}{r} 18 \\ -12 \\ \hline 36 \\ 18 \\ \hline 216 \\ 108 \\ \hline 174 \end{array}$$

$$\begin{array}{r} 65 \\ -12 \\ \hline 130 \\ 65 \\ \hline 780 \end{array}$$

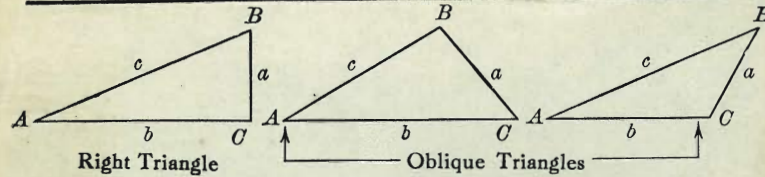
$$\begin{array}{r} 1940 \\ -760 \\ \hline 759 \end{array}$$

$$\begin{array}{r} 21 \overline{) 327} \\ \underline{32} \\ 7 \end{array}$$

$$\begin{array}{r} 65 \\ -12 \\ \hline 130 \\ 65 \\ \hline 780 \\ 1.4 \\ \hline 3120 \\ 780 \\ \hline 27 \overline{) 1092.0} \\ \underline{108} \\ 12 \end{array}$$

36.

TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given	Required	Formulas
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B$, $c = \sqrt{a^2 + b^2} = a \sqrt{1 + \frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B$, $b = \sqrt{(c+a)(c-a)} = c \sqrt{1 - \frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90^\circ - A$, $b = a \cot A$, $c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90^\circ - A$, $a = b \tan A$, $c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90^\circ - A$, $a = c \sin A$, $b = c \cos A$

Solution of Oblique Triangles

Given	Required	Formulas
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}$, $C = 180^\circ - (A + B)$, $c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}$, $C = 180^\circ - (A + B)$, $c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180^\circ - C$, $\tan \frac{1}{2}(A - B) = \frac{(a - b) \tan \frac{1}{2}(A + B)}{a + b}$ $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a + b + c}{2}$, $\sin \frac{1}{2}A = \sqrt{\frac{(s - b)(s - c)}{bc}}$ $\sin \frac{1}{2}B = \sqrt{\frac{(s - a)(s - c)}{ac}}$, $C = 180^\circ - (A + B)$
a, b, c	Area	$s = \frac{a + b + c}{2}$, $\text{area} = \sqrt{s(s - a)(s - b)(s - c)}$
A, b, c	Area	$\text{area} = \frac{bc \sin A}{2}$
A, B, C, a	Area	$\text{area} = \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL

Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = $5^\circ 10'$. From Table, Page IX. $\cos 5^\circ 10' = .9959$. Horizontal distance = $319.4 \times .9959 = 318.09$ ft.
 Horizontal distance also = Slope distance minus slope distance times (1 - cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. $\text{Cosine } 5^\circ 10' = .9959$. $1 - .9959 = .0041$. $319.4 \times .0041 = 1.31$. $319.4 - 1.31 = 318.09$ ft.
 When the rise is known, the horizontal distance is approximately:—the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance = $302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.

