

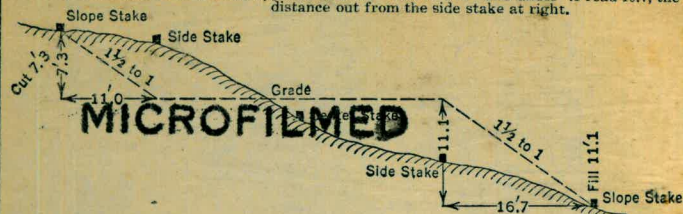
MISSION BAY

\*44

11.27 CONC MON  
 5.29  
 16.71  
 9.11  
 12.60

**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.

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

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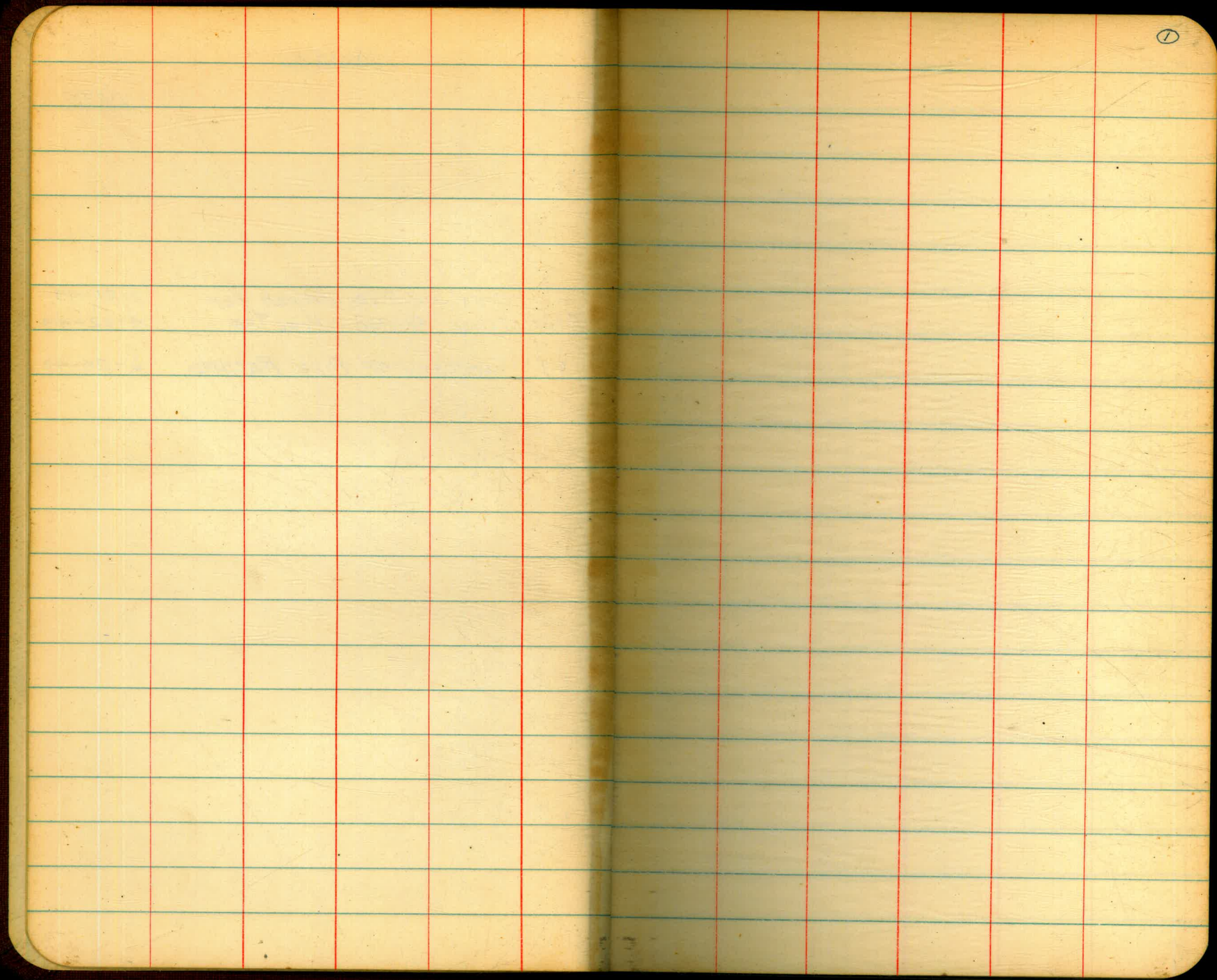
DATE

	DATA ON Piles driven for	2-21-49
5-64	Temp. Bridge - Proj #35	4-22-49
65	SUMMARY OF PILE RECORD	6-20-49

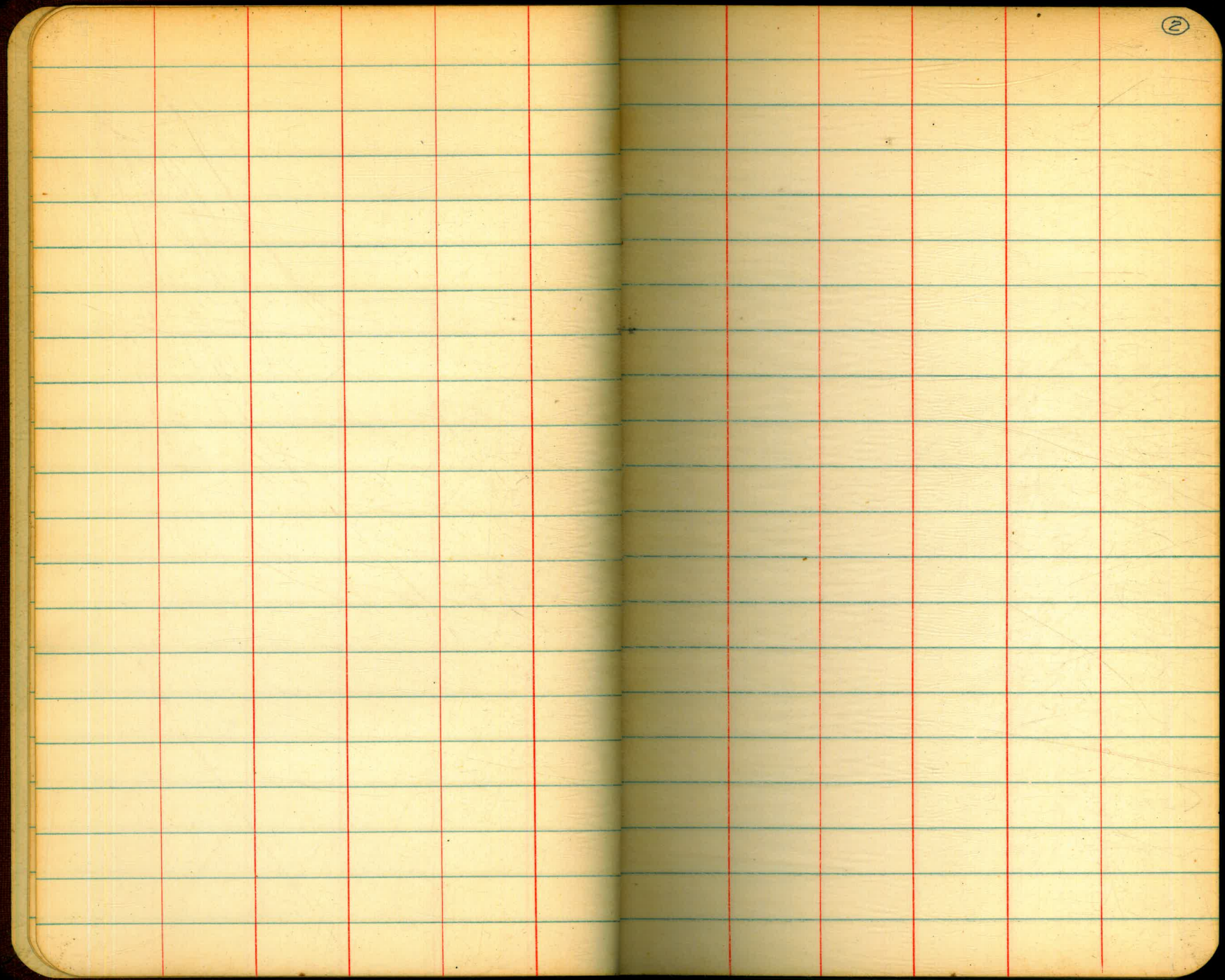
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## General Notes

(5)

DIST. Between Bents on slope 19.034

1. Piles in Bents are lettered from East to West
2. Bents are numbered from Ventura Pt. To Sunset Point.
3. Formula For Bearing Cap.

$$R = \frac{2wh}{S+0.3}$$

$R = 40,000^{\#}$  Min Bearing Cap.

$W = 5,000^{\#}$  Weight of hammer.

$h = 3^{\text{ft}}$  Fall of hammer.

$S = \text{Pene. Average last five blows}$

$$S = \frac{2wh}{R} - 0.3$$

$$S = \frac{2 \times 5000 \times 3}{40000} - 0.3$$

$$S = .45^{\text{in.}}$$



2-22-49

BENT #1

GRADES	Pile	Pile	Butt
	Top	TIP	Leads
	+11.50	-15.0	+13.5

73.60 FROM HUB TO FIRST BENT &amp;

Pile	Size TIP	Size Butt	Per sq. AV. Last 5 Blows	Elev. TIP	Length
"A"	11"	13"	.45"	-16 <del>-17</del>	29'
"B"	9"	12"	.45"	-16	29'
"C"	9"	13"	.45"	-16	29'
"D"	10"	13"	.4"	-17	30'
"E"	6"	13"	.30"	-23	37'
"F"	11"	13"	.35"	-21	35'
"G"	8"	12"	.4"	-16	31'
"H"	9"	13"	.375"	-20	33'

2-22-49

BENT # 2

GRADES	Pile	PILE		BOTT	
	TOP	TIP		Leads	
	+12.64	-17.2		14.0	
Pile	Size TIP	Size BUTT	Penetra AV/ast 5 blows	Elev. TIP	Length
"A"	10"	12"	.45"	-19'	33'
"B"	10"	12"	.4"	-19'	33'
"C"	10"	13"	.3"	-19'	33'
"D"	9"	12"	.4"	-19'	33'
"E"	10"	12"	.4"	-19'	33'
"F"	10"	12"	.4"	-19'	33'
"G"	9"	12"	.4"	-19'	33'
"H"	10"	12"	.4"	-17 <sup>5</sup>	33'

⑦

2-23-49

BENT #3

GRADE	Pile	Pile		Boat					
	TOP	TIP		Leads					
	+13.78	-19.3		+16.0					
Pile	Size Tip	Size Butt	Pene. last AV 5 blows	Elev. Tip	Length				
"A"	9	13"	.35"	-24'	40'				
"B"	9"	12"	.45"	-19 <sup>5</sup>	36'				
"C"	10"	13"	.45"	-20	36'				
"D"	9"	12"	.35"	-19 <sup>5</sup>	40'				
"E"	9"	12"	.4"	-20	41'				
"F"	9'	13"	.45"	-19.5	35'				
"G"	8"	13"	.4"	-20'	36'				
"H"	9"	13"	.45"	19.5	35'				

2-24-49

## Bent #4

⑨

GRADE <sup>s</sup>	Pile	Pile	BOTT		
	TOP	TIP	Leads		
	+14.92	-21.5	+17		
Pile	Size	Size	Pene.	Elev.	Length
	TIP	BUTT	last Av.	TIP	
			5 BLOWS		
"A"	8"	12"	.45"	-24	41'
"B"	8"	12"	.45"	-25	42
"C"	8"	12"	.45"	-24	41'
"D"	8"	12"	.38"	-23	42
"E"	9"	12"	.4"	-24	41'
"F"	10"	13"	.35"	-25	42
"G"	9"	12"	.4"	-23	42
"H"	9"	13"	.4"	-23	40

2-25-49

## BENT #5

GRADE	Pile	Pile	Bott		
	TOP	TIP	Leads		
	+16.06	-23.6	+18		
Pile	Size TIP	Size BUTT	Pen. Av. 10sts 5 blows	Elev. TIP	Length
"A"	8"	12"	.4"	-24	42'
"B"	9"	13"	.4"	-24	42'
"C"	9"	13"	.4"	26'	44'
"D"	8"	13"	.4"	24'	41'
"E"	8"	12"	.45"	24'	41'
"F"	8"	12"	.45"	25'	42'
"G"	9"	13"	.45"	24'	41'
"H"	9"	13"	.45"	24'	41'

⑩

2-28-49

BENT #6

GRADES

Pile Top	Pile TIP
+17.20	-25.7

Bot. Leads
+19.0

Pile	Size TIP	Size Butt	Pen. <sup>AV</sup> lasts 5 blows	Elev. TIP	Length
"A"	8"	13	.45"	-26	45'
"B"	7"	12"	.45"	-26	45'
"C"	8"	13"	.4"	-26	45'
"D"	8"	13"	.45"	-26	45'
"E"	8"	12"	.4"	-26	45'
"F"	8"	12"	.4"	-26	45'
"G"	9"	13"	.45"	-26	45'
"H"	9"	13"	.3"	-26	45'

BENT #7 2-28-49

GRADE	Pile TOP	Pile TIP	Bott Leads
	+18.34	-27.9	+20

Pile	Size TIP	Size Butt	Pene. AN last 5 blows	Elev. TIP	Length
------	----------	-----------	-----------------------	-----------	--------

"A"	8"	13"	.3"	-28	48'
-----	----	-----	-----	-----	-----

"B"	9"	13"	.3"	-28	48'
-----	----	-----	-----	-----	-----

"C"	8"	12"	.25"	-28	48'
-----	----	-----	------	-----	-----

"D"	8"	13"	.25"	-28	48'
-----	----	-----	------	-----	-----

"E"	9"	13"	.4"	-28	48'
-----	----	-----	-----	-----	-----

"F"	9"	13"	.4"	-28	48'
-----	----	-----	-----	-----	-----

"G"	8"	13"	.4"	-28	48'
-----	----	-----	-----	-----	-----

"H"	9"	13"	.4"	-28	48'
-----	----	-----	-----	-----	-----

1, MAR 49

BENT #8

GRADE }	Pile TOP	Pile TIP	Butt Leads
	+19.48	-30.2	+21

Pile	Size TIP	Size Butt	Pen. Av last 5 Blows	Elev. TIP	Length
------	----------	-----------	----------------------	-----------	--------

"A"	9"	13"	.4"	-31	52'
-----	----	-----	-----	-----	-----

"B"	8	13"	.4"	-30	51'
-----	---	-----	-----	-----	-----

"C"	9"	13"	.4"	-30	51'
-----	----	-----	-----	-----	-----

"D"	9"	13"	.4"	-30	52'
-----	----	-----	-----	-----	-----

"E"	9"	14"	.4"	-30	52'
-----	----	-----	-----	-----	-----

"F"	9"	13"	.25"	-30	52'
-----	----	-----	------	-----	-----

"G"	9"	13"	.4"	-30	52'
-----	----	-----	-----	-----	-----

"H"	9"	13"	.4"	-31	52'
-----	----	-----	-----	-----	-----



2 MAR 49  
BENT #9

GRADE } Pile	Pile Top	Pile Tip	Bott Leads		
	+20.62	-30.2	+22		
	Size Tip	Size Butt	Pene. AVElev. last 5 Blows	Elev. Tip	Length
"A"	8"	13"	.4"	-30	52'
"B"	9"	13"	.45"	-30	52'
"C"	9"	14"	.5"	-30	52'
"D"	9"	13"	.4"	-30	52'
"E"	9"	13"	.4"	-30	52'
"F"	8"	13"	.4"	-30	52'
"G"	8"	13"	.4"	-30	52'
"H"	9"	13"	.4"	-30	52'

2 Mar 49

## BENT #10

(15)

GRADE	Pile	Pile	Pen. <sup>N</sup>	Elev.	Length
	TOP	TIP			
	+21.76	-30.0		+23	
	Size	Size	Last		
	TIP	Butt	5 Blows		
"A"	7"	14"	.4"	-40	68'
"B"	7"	<del>14"</del> 13"	.35"	-36	62'
"C"	7"	14"	.4"	-37	60'
"D"	7"	13"	.4"	-40	64'
"E"	7"	14"	.4"	-40	64'
"F"	7"	13"	.4"	-39	62'
"G"	7"	14"	.45"	-41	65'
"H"	7"	14"	.4"	-40	64'

FIRST Pile "B" SPLIT-Rejected

NEW 14" Butt Pile DRIVEN

3 MAR. 1949

16

GRADE } Pile		BENT #11		Bott			
} TOP		Pile	Tip	Leads			
		+22.90	-30.0	+25			
Pile	Size	Size	Pene	Elev.	Length		
	TIP	Butt		TIP			
"A"	10"	14"	.45"	-40 <del>-45</del>	68' <del>70'</del>		
"B"	9"	14"	.45"	-43 <del>-44</del>	68' <del>70'</del>		
"C"	10"	14"	.35"	-43	68		
"D"	9"	14"	.45"	-44	70		
"E"	10"	14"	.45"	-45	70		
"F"	10"	14"	.4"	-44	70		
"G"	9"	14"	.45"	-44	70		
"H"	10"	14"	.45"	-45	70		

FIRST Pile "A" SPLIT REJECTED  
NEW Pile DRIVEN

4 MAR 1949

(17)

GRADE } BENT #12		Pile	Pile	Boat	
GRADE } TOP		TOP	TIP	Leads	
GRADE } +24.04		-30.0		+26	
Pile	Size	Size	Pene.	Elev.	Length
	TIP	Butt		TIP	
"A"	9"	14"	.45"	-39	66
"B"	9"	14"	.4"	-36	<del>70</del> <sup>66</sup>
"C"	8"	13"	.45"	<del>-42</del> <sup>-40</sup>	<del>68</del> <sup>66</sup>
"D"	8"	14"	.4"	<del>-41</del> <sup>-37</sup>	<del>70</del> <sup>66</sup>
"E"	7"	13"	.4"	-40	66
"F"	7"	14"	.4"	<del>-42</del> <sup>-39</sup>	<del>69</del> <sup>66</sup>
"G"	7"	14"	.45"	<del>-43</del> <sup>-39</sup>	<del>70</del> <sup>66</sup>
"H"	8"	14"	.45"	<del>-43</del> <sup>-39</sup>	<del>70</del> <sup>66</sup>

7 MAR 1949

⑩

## BENT #13

GRADE	Pile	Pile		Butt	
	TOP	TIP		Leads	
	+25.18	-30.0		+27	
Pile	Size	Size	Pen.	Elev.	Length
	TIP	Butt		TIP	
"A"	7"	13"	.4"	-41	68'
"B"	8"	13"	.45"	-41	68'
"C"	8"	13"	.45"	-41	68'
"D"	7"	13"	.45"	-41	68'
"E"	8"	13"	.35"	-41	68'
"F"	7"	13"	.45"	-41	68'
"G"	8"	13"	.4"	-41	68'
"H"	7"	14"	.45"	-41	68'

7 MAR. 1949

BENT #14

GRADE } Pile	Pile TOP	Pile TIP	Bot Leads		
	Size TIP	Size Butt	Pene.	Elev. TIP	Length
	+26.32	-30.0		+28	
"A"	7"	13"	.45"	-39	70'
"B"	8"	14"	.4"	-39	70'
"C"	8"	13"	.3"	-39	70'
"D"	7"	13"	.45"	-40	70'
"E"	9"	15"	.45"	-40	70'
"F"	7"	13"	.45"	-42	70'
"G"	7"	13"	.45"	-42	70'
"H"	9"	15"	.45"	-42	70'

8 MAR. 1949

(20)

GRADE <sup>s</sup>	BENT #15		Pene	Elev TIP	Length
	Pile TOP	Pile TIP			
	+27.46	-30.0		+29	
Pile	Size TIP	Size Butt			
"A"	8"	13"	.45"	-39	70'
"B"	8"	13"	.4"	-40	70'
"C"	7"	13"	.45"	-40	70'
"D"	7"	13"	.45"	-40	70'
"E"	7"	13"	.45"	-40	70'
"F"	8"	13"	.4"	-36	70'
"G"	7"	13"	.45"	-40	70'
"H"	7"	13"	.45"	-40	70' 72'

8 MAR 1949

(21)

## BENT #16

GRADE } Pile	Pile	Pile	Bott		
	TOP	TIP	Leads		
	+28.60	-30.0	+30		
Pile	Size TIP	Size Butt	Pene	Elev. TIP	Length
"A"	7"	13"	.4"	-40	71'
"B"	7"	12"	.45"	-40	71'
"C"	7"	12"	.4"	-36	71'
"D"	8"	13"	.35"	-41	71'
"E"	7"	13"	.35"	-40	71'
"F"	8"	14"	.45"	-36	71'
"G"	7"	13"	.45"	-35	71'
"H"	7"	13"	.45"	-40	71'

LAST BENT capped #16 - 8 Mar 49



10 March 49

## BENT #17

GRADE	Pile	Pile	Pene.	Elev.	Length
	TOP	TIP			
	+29.74	-30.0			
"A"	8"	13"	.45"	-35	70'
"B"	7"	13"	.45"	-35	70'
"C"	8"	13"	.3"	-33	70'
"D"	8"	14"	.4"	-35	70'
"E"	7"	13	.35"	-33	70'
"F"	8"	13"	.35"	-37	72'
"G"	7"	13"	.45"	-37	70'
"H"	8"	14"	.45"	-37	70'

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11 March 1949

(23)

## BENT #18

GRADE	Pile	Pile	Pene.	Elev.	Length
	TOP	TIP			
	+30.88	-30.9			
"A"	7"	13"	.45"	-36	70'
"B"	8"	13"	.45"	-35	70'
"C"	8"	13"	.45"	-35	70'
"D"	8"	13"	.35"	-32	70'
"E"	7"	13"	.45"	-35	70'
"F"	7"	13"	.45"	-35	70'
"G"	8"	14"	.45"	-35	70'
"H"	7"	13"	.35"	-35	70'

11 March 1949

(24)

## BENT #19

GRADE } Pile	Pile	Pile	Pene.	Elev.	Length
	TOP	TIP			
	+32.02	-30.0			
	Size TIP	Size Butt			
"A"	7"	13"	.45"	-35	70
"B"	8"	14"	.45"	-35	70
"C"	7"	13"	.45"	-35	70
"D"	7"	13"	.45"	-35	70
"E"	7"	13"	.45"	-35	70
"F"	7"	13"	.45"	-35	70
"G"	7"	12"	.4"	-35	70
"H"	7"	13"	.45"	-35	70

11 March 1949

25

BENT #20

GRADE } Pile	Pile TOP	Pile TIP	Pen.	Elev. TIP	Length
	Top	Tip			
	+33.16	-30.0			
"A"	8"	13"	.4"	-33	70
"B"	7"	13"	.35"	-31	70
"C"	7"	13"	.4"	-34	70
"D"	8"	14"	.45"	-34	70
"E"	8"	14"	.45"	-33	70
"F"	7"	13"	.45"	-33	70
"G"	7"	13"	.4"	-34	70
"H"	7"	13"	.4"	-33	70

BoTT Leads

BoTT	Leads	BoTT	Leads	BoTT	Leads
124	124	124	124	124	124
125	125	125	125	125	125
126	126	126	126	126	126
127	127	127	127	127	127
128	128	128	128	128	128
129	129	129	129	129	129
130	130	130	130	130	130
131	131	131	131	131	131
132	132	132	132	132	132
133	133	133	133	133	133
134	134	134	134	134	134
135	135	135	135	135	135
136	136	136	136	136	136
137	137	137	137	137	137
138	138	138	138	138	138
139	139	139	139	139	139
140	140	140	140	140	140

# March 1949

(26)

BENT #21

GRADE } Pile	Pile				
	TOP	TIP		Butt	Leads
	+34. <sup>22</sup>	-30. <sup>0</sup>			
Pile	Size TIP	Size Butt	Perce.	Elev. TIP	Length
"A"	7"	13"	.4"	-33	70
"B"	7"	12"	.45"	-32	70
"C"	7"	13"	.4"	-32	70
"D"	7"	12"	.45"	-30	70
"E"	7"	12"	.45"	-32	70
"F"	7"	12"	.4"	-33	70
"G"	8"	13"	.35"	-32	70
"H"	8"	13"	.45"	-33	70

14 Mar 1949

(27)

GRADE } Pile	BENT #22		Pene.	Elev.	Length
	TOP	TIP			
	+35.14	-30.0			
Pile	Size TIP	Size Butt		TIP	
"A"	8"	12"	.4"	-31	70
"B"	7"	12"	.45"	-31	70
"C"	7"	12"	.45"	-30	70
"D"	7"	12"	.45"	-31	70
"E"	7"	12"	.4"	-31	70
"F"	7"	12"	.4"	-32	70
"G"	7"	12"	.45"	-32	70
"H"	7"	13"	.45"	-32	70

14 March 1949

## BENT #23

GRADE	Pile	Pile	Bott		
	TOP	TIP	Leads		
	+35.91	-30.0			
Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"A"	7"	13"	.4"	-35	75'
"B"	8"	14"	.4"	-36	75'
"C"	7"	13"	.4"	-36	75'
"D"	7"	13"	.45"	-36	75'
"E"	7"	12"	.45"	-36	75'
"F"	7"	13"	.4"	-36	75'
"G"	7"	14"	.4"	-34	75'
"H"	7"	13"	.45"	-36	75'

(28)

14 Mar 1949

## BENT #24

29

GRADE } Pile	Pile TOP	Pile TIP	Bott Leads		Length
	Size TIP	Size Butt	Pene.	Elev. TIP	
	+36.53	-30.9			
"A"	7"	13"	.45"	-35	75'
"B"	7"	12"	.4"	-30	75'
"C"	7"	13"	.3"	-32	75'
"D"	7"	12"	.35"	-35	75'
"E"	7"	13"	.35"	-35	75'
"F"	7"	12"	.4"	-35	75'
"G"	7"	12"	.4"	-35	75'
"H"	7"	12"	.4"	-36	75'



15 March 1999

30

## BENT #25

GRADE } Pile	Pile	Bott
TOP	TIP	Leads

+37.02 -30.0

Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
------	----------	-----------	-------	-----------	--------

"A"	7"	13"	.4"	-34	75'
-----	----	-----	-----	-----	-----

"B"	7"	13"	.4"	-33	75'
-----	----	-----	-----	-----	-----

"C"	8"	13"	.4"	-33	75'
-----	----	-----	-----	-----	-----

"D"	7"	12"	.3"	-33	75'
-----	----	-----	-----	-----	-----

"E"	7"	12"	.45"	-34	75'
-----	----	-----	------	-----	-----

"F"	7"	12"	.4"	-34	75'
-----	----	-----	-----	-----	-----

"G"	7"	12"	.4"	-34	75'
-----	----	-----	-----	-----	-----

"H"	7"	12"	.4"	-34	75'
-----	----	-----	-----	-----	-----

15 May 1949

## BENT # 26 A

GRADE } Pile	Pile	BENT # 26 A			
	Top	Pile TIP	Boat Leads		
	+33.08	-30.9			
Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"A"	7"	13"	.4"	-35	75'
"B"	7"	13"	.4"	-33	75'
"C"	8"	14"	.4"	-34	75'
"D"	7"	13"	.45"	-34	75'
"E"	7"	13"	.4"	-34	75'
"F"	7"	13"	.4"	-34	75'
"G"	7"	13"	.45"	-33	75'
"H"	8"	13"	.4"	-33	75'

26 A Con'td.

(31)

Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"I"	7"	13"	.3"	-31	75'
"J"	7"	13"	.3"	-30	75'
"K"	8"	13"	.4"	-34	75'

15 March 1949

(32)

GRADE } Pile	BENT #26B				
	TOP	Pile TIP	Butt	Leads	
	+33.12	-30.9			
Pile	Size Tip	Size Butt	Perch.	Elev. TIP	Length
"A"	7"	13"	.35"	-33	70'
"B"	8"	13"	.3"	-30	70'
"C"	7"	12"	.4"	-33	70'
"D"	7"	12"	.45"	-33	70'
"E"	7"	13"	.45"	-33	70'
"F"	7"	13"	.4"	-32	70'
"G"	7"	13"	.3"	-32	70'

16 March 1949

(33)

+33  
 GRADES } Pile TOP <sup>28</sup> <sub>30</sub>  
 BENT #27<sup>B</sup> Pile TIP Bott. Leads  
 +33. <sup>28</sup> <sub>30</sub> -30.0

Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"A"	8"	<sup>14"</sup> 13"	.35"	-34	74'
"B"	7"	13"	.25"	-33	74'
"C"	8"	14"	.15"	-31	74'
"D"	8"	14"	.3"	-31	74'
"E"	7"	13"	.3"	-32	74'
"F"	8"	13"	.35"	-34	74'
"G"	7"	13"	.4"	-36	74'
"H"	7"	<sup>14"</sup> 13"	.35"	-32	74'

#27A	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"I"	8"	14"	.35"	-34	74'
"J"	7"	13"	.4"	-34	74'
"K"	7"	13"	.15"	-33	74'
FIRST Pile No Good Rejected					

16 March 1949

34

BENT #27B

A  
Bott.  
Leads

GRADE	Pile	Pile	Pene.	Elev.	Length
	TOP	TIP			
	+33. <sup>30</sup> <sub>28</sub>	-30.0			
	Size Tip	Size Butt		TIP	
"A"	7"	13"	.35"	-32	70
"B"	7"	13"	.45"	-31	70
"C"	7"	13"	.45"	-32	70
"D"	7"	13"	.45"	-31	70
"E"	7"	13"	.4"	-31	70
"F"	7"	13"	.35"	-31	70
"G"	7"	13"	.3"	-31	70

16 Mar 1949

## BENT #28

GRADE	Pile	Pile	Pene.	Elev.	Length
	TOP	TIP			
	+37.36	-30.9			
"A"	7"	13"	.35"	-33	74' 70'
"B"	7"	14"	.35"	-33	74'
"C"	9"	15"	.25"	-31	74'
"D"	7"	13"	.4"	-33	74'
"E"	9"	14"	.4"	-30	74'
"F"	7"	13"	.45"	-34	74'
"G"	7"	13"	.3"	-33	74'
"H"	7"	13"	.4"	-34	74'

33

17 March 1949

36

GRADE	Pile	BENT #29			
	Top	Pile TIP	Boat Leads		
	+37.02	-30.0			
Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"A"	7"	14"	.4"	-31	74'
"B"	7"	13"	.35"	-32	74'
	<del>9"</del>	<del>13"</del>	<del>.4"</del>	<del>-33</del>	<del>74'</del>
"C"	7"	12"	.4"	-33	74'
	<del>8"</del>	<del>13"</del>	<del>.45"</del>	<del>-33</del>	<del>74'</del>
"E" <del>"D"</del>	7"	13"	.4"	-32	74'
"D" <del>"E"</del>	7"	12"	.4"	-30	74'
"F"	7"	13"	.4"	-32	74'
	<del>7"</del>	<del>12"</del>	<del>.3"</del>	<del>-30</del>	<del>74'</del>
"G"	8"	13"	.45"	-33	74'
"H"	9"	13"	.4"	-33	74'

17 March 1949

BENT #30

GRADE}

Pile TOP

Pile TIP

Bot Leads

+36.53 -30.0

Pile

Size TIP

Size Butt

Penet.

Elev. TIP

Length

"A"

7"

13"

.45"

-32

72'

"B"

7"

13"

.4"

-31

72'

"C"

7"

13"

.4"

-30

72'

"D"

7"

13"

.4"

-31

72'

"E"

9"

14"

.3"

-31

73'

"F"

9"

14"

.35"

-31

73'

"G"

8"

13"

.4"

-31

72'

"H"

8"

13"

.4"

-31

72'



17 March 1949

BENT #31

GRADE}

Pile  
TOPPile  
TIPBott  
Leads

+35.91

-30.9

36

Pile

Size  
TIPSize  
Butt

Pene.

Elev.  
TIP

Length

"A"

7"

12"

.45"

-32

72'

"B"

7"

13"

.4'

-32

72'

"C"

7"

13"

.45"

-31

72'

"D"

8"

13"

.4"

-32

72'

"E"

7"

12"

.4"

-32

72'

"F"

9"

13"

.4"

-31

72'

"G"

7"

13"

.4"

-32

72'

"H"

7"

13"

.35"

-33

73'

(38)

17 March 1949

39

GRADE } Pile	BENT #32		Pene.	Elev. TIP	Length
	TOP	Pile TIP			
	+35.14	-30.0			
Pile	Size TIP	Size Butt			
"A"	8"	13"	.4"	-33	72'
"B"	8"	14"	.45"	-32	71
"C"	7"	13"	.4"	-36	75
"D"	7"	12"	.35"	-31	71
"E"	7"	13"	.4"	-32	71
"F"	7"	13"	.25"	-31	71
"G"	8"	13"	.3"	-31	71
"H"	7"	13"	.45"	-32	71

18 March 1949

(40)

GRADE	Pile	Pile	Pene.	Elev.	Length
	TOP	TIP			
	+34.22	-30.0	.37		
	Size TIP	Size Butt			
"A"	8"	13"	.45"	-36	74'
"B"	8"	13"	.45"	-31	72'
"C"	8"	13"	.15"	-30	72'
"D"	7"	12"	.3"	-30	72'
"E"	7"	12"	.4"	-33	72'
"F"	<del>7"</del> 8"	<del>12"</del> 12"	<del>.45"</del> .45"	<del>-32</del> -32	<del>72</del> 72
"G"	8"	13"	.4"	-33	72'
"H"	8"	<del>12"</del> 13"	.35'	-33	72'

FIRST Pile SPLIT - Rejected

FIRST Pile SPLIT - Rejected

18 March 1949

④

GRADE	BENT #34		Pene.	Elev. TIP	Length
	Pile TOP	Pile TIP			
	+ 33.16	- 30.0	36		
Pile	Size TIP	Size Butt			
"A"	$\frac{10''}{8''}$	$\frac{14''}{13''}$	.25"	-30	70'
"B"	7"	13"	.4"	-32	70'
"C"	7"	13"	.4"	-34	70'
"D"	8"	13"	.35"	-33	70'
"E"	7"	13"	.4"	-30	70'
"F"	8"	13"	.4"	-31	70'
"G"	8"	$\frac{12''}{13''}$	.3"	-30	70'
"H"	8"	13"	.45"	-32	70'

5 APRIL 1949

(42)

GRADE } 35 33	BENT #35		Bott		Length
	Pile TOP	Pile TIP	Leads		
	Size TIP	Size Butt	Pene.	Elev. TIP	
	+32.02	-30.2	.35 .32	23 34	
"A"	9"	15"	.3"	-34	69'
"B"	9"	14"	.35"	-33	70
"C"	9"	14"	.3"	-33	70'
"D"	8"	13"	.3"	-34	71'
"E"	8"	13"	.4"	-36	71'
"F"	8"	12"	.45"	-34	71'
"G"	7"	12"	.4"	-35	71'
"H"	8"	13"	.45"	-37	72' 65'

4 APRIL 1949

5 APRIL 1949

(43)

GRADE	BENT #36		Pene.	Elev. TIP	Length
	Pile TOP	Pile TIP			
32 33	+ 30.88	-30°	33 30	33	
Pile	Size TIP	Size Butt			
"A"	8"	13"	.4"	-35	71'
"B"	8"	12"	.35"	-35	71'
"C"	7"	12"	.4"	-35	71'
"D"	8"	13"	.4"	-30	65'
"E"	7"	13"	.35"	-36	71'
"F"	7"	13"	.3"	-38	71'
"G"	7"	12"	.4"	-36	71'
"H"	7"	12"	.4"	-31	65'

4 APRIL 1949

5 APRIL 1949

(44)

BENT #37

GRADE	Pile	Pile	Bott	
	TOP	TIP	Leads	
33	+29.74	-30.0	32	31

Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
------	----------	-----------	-------	-----------	--------

"A"	8"	12"	.4"	-38	71'
-----	----	-----	-----	-----	-----

"B"	8"	12"	.45"	-32	65'
-----	----	-----	------	-----	-----

"C"	8"	13"	.4"	-31	65'
-----	----	-----	-----	-----	-----

"D"	8"	13"	.4"	-32	65'
-----	----	-----	-----	-----	-----

"E"	7"	12"	.45"	-32	65'
-----	----	-----	------	-----	-----

"F"	8"	12"	.4"	-31	65'
-----	----	-----	-----	-----	-----

"G"	7"	12"	.4"	-32	65'
-----	----	-----	-----	-----	-----

"H"	7"	12"	.35"	-31	65'
-----	----	-----	------	-----	-----

4 APRIL 1949

5~~4~~ APRIL 1949

(45)

GRADE	BENT #38		Pene.	Elev. TIP	Length
	Pile TOP	Pile TIP			
	+28.60	-30.0			
Pile	Size TIP	Size Butt			
"A"	8"	12"	.4"	-35	70
	8"	13"	.4"	-32	65
"B"	7"	12"	.4"	-31	65
"C"	8"	13"	.35"	-31	65
"D"	8"	13"	.3"	-30	65
"E"	8"	12"	.3"	-30	65
"F"	8"	13"	.45"	-33	65
"G"	7"	12"	.4"	-30	65
"H"	8"	13"	.3"	-31	65

FIRST PILE OUT OF LINE - PULLED  
AND ~~REMOVED~~ NEW PILE DROVE

4 APRIL 1949



4 APRIL 1949

(46)

GRADE } Pile	BENT #39		Pene.	Elev. TIP	Length
	TOP	Pile TIP			
	+27.46	-30.0	28		
Pile	Size TIP	Size Butt			
"A"	7"	13"	.35"	-33	65'
"B"	7"	12"	.4"	-34	65'
"C"	7"	12"	.3"	-31	65'
"D"	8"	12"	.4"	-34	65'
"E"	8"	13"	.4"	-35	65'
"F"	7"	12"	.3"	-32	65'
"G"	8"	12"	.3"	-30	65'
"H"	7"	12"	.4"	-35	65'

4 APRIL 1949

(47)

GRADE } Pile	BENT #40		Pene.	Elev. TIP	Length
	Pile TOP	Pile TIP			
	+26.32	-30.9			
	Size TIP	Size Butt			
"A"	7"	12"	.45"	-31	60'
"B"	7"	12"	.45"	-32	60'
"C"	8"	13"	.3"	-32	65'
"D"	7"	13"	.4"	-34	65'
"E"	8"	12"	.35"	-32	65'
"F"	8"	12"	.35"	-32	65'
"G"	7"	12"	.35"	-32	65'
"H"	7"	12"	.4"	-31	60'

4 APRIL 1949

(48)

GRADE	Pile	BENT #41		Bott.	
	TOP	Pile TIP	20 26	Leads	
	Size TIP	Size Butt	Perch.	Elev. TIP	Length
	+25.18	-30.0			
"A"	8"	12"	.4"	-30'	60'
"B"	8"	13"	.35"	-32'	60'
"C"	7"	12"	.4"	-31'	60'
"D"	9"	<sup>14"</sup> <del>13"</del>	.3"	-30'	60'
"E"	7"	13"	.4"	-31'	60'
"F"	8"	13"	.3"	-30'	60'
"G"	8"	12"	.35"	-30'	60'
"H"	8"	13"	.4"	-30'	60'

4 APRIL 1949

(42)

GRADE	Pile	BENT	#42	Boff	
	TOP	Pile TIP	53 57	Leads	
	+24.0'	-30.9	57.5'	56	
Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"G" "A"	8"	13"	.3"	-31	60'
"F" "B"	7"	13"	.3"	-31	60'
"E" "e"	8"	14"	.35"	-30	59'
"D" "D"	7"	12"	.4"	-32	59'
"C" "E"	7"	12"	.3"	-30	59'
"B" "F"	7"	13"	.3"	-30	59'
"A" "G"	8"	14"	.4"	-32	59'
"H"	7"	13"	.35"	-32	58'

21 March 1949

50

GRADE } Pile	Pile TOP	Pile TIP	BENT #43	Bott Leads	
	Size TIP	Size Butt	Pene.	Elev. TIP	Length
	+22.90	-30.0	25 2.00		
"A"	8"	12"	.45"	-30	55'
"B"	8"	12"	.4"	-30	55'
"C"	8"	13"	.3"	-31	58'
"D"	8"	12"	.4"	-32	58'
"E"	8"	13"	.35"	-34	65'
"F"	8"	12"	.4"	-37	65'
"G"	8"	12"	.45"	-39	65'
"H"	9"	12"	.3"	-30	55'

21 March 1949

⑤

## BENT #44

GRADE } Pile	Pile TOP	Pile TIP	Pene. 25 -2 23	Elev. Tip	Length
	Size TIP	Size Butt			
	+21.76	-30.0			
"A"	8"	12"	.45"	-30	55'
"B"	9"	13"	.45"	-30	55'
"C"	8"	12"	.4"	-30	55'
"D"	9"	13"	.25"	-30	55'
"E"	8"	12"	.3"	-30	55'
"F"	8"	13"	.4"	-30	55'
"G"	8"	13"	.3"	-30	55'
"H"	7"	12"	.4"	-31	55'

21 MARCH 1919

(52)

GRADE <sup>3</sup>	BENT #45		Pene.	Elev. TIP	Length
	Pile TOP	Pile TIP			
	+20.62	-30.0	.23		
			.22		
			.29		
Pile	Size TIP	Size BUTT			
"A"	8"	13"	.4"	-32	55'
"B"	7"	13"	.45"	-32	55'
"C"	7"	12"	.4"	-30	55'
"D"	8"	12"	.4"	-30	55'
"E"	9"	12"	.4"	-31	55'
"F"	9"	12"	.45"	-32	55'
"G"	8"	12"	.4"	-31	55'
"H"	8"	12"	.4"	-31	55'

21 March 1943

(53)

GRADE	BENT #46		Bott. Leads	Elev. TIP	Length
	Pile TOP	Pile TIP			
	+19.48	-30.0	.27 21		
Pile	Size TIP	Size Butt	Peme.	Elev. TIP	Length
"A"	8"	13"	.3"	-31	54'
"B"	8"	13"	.35"	-31	54'
"C"	8"	13"	.4"	-32	54'
"D"	8"	12"	.25"	-30	54'
"E"	8"	12"	.4"	-30	54'
"F"	8"	12"	.4"	-31	54'
"G"	9"	13"	.35"	-30	54'
"H"	9"	13"	.4"	-30	54'



21 March 1949

54

GRADE	Pile	BENT #47		Bott.	
	TOP	PILE TIP	21	Leads	
	+18.34	-27.9	$\frac{21}{20}$		
Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"A"	8"	12"	.45"	-32	53'
"B"	7"	12"	.45"	-32	53'
"C"	8"	13"	.4"	-31	53'
"D"	9"	12"	.45"	-31	53'
"E"	9"	13"	.4"	-30	54'
"F"	8"	13"	.3"	-30	54'
"G"	8"	12"	.4"	-31	54'
"H"	7"	12"	.4"	-31	53'

21 March 1949

(55)

GRADE } Pile TOP	BENT #48		Pene.	Elev. TIP	Length
	Pile TOP	Pile TIP			
	+17.20	-25.7	$\frac{20}{18}$		
Pile	Size TIP	Size Butt			
"A"	8"	13"	.4"	-31	53'
"B"	7"	12"	.35"	-27	53'
"C"	8"	12"	.3"	-27	53'
"D"	8"	12"	.45"	-33	53'
"E"	9"	12"	.4"	-32	53'
"F"	8"	12"	.45"	-32	53'
"G"	7"	12"	.45"	-33	53'
"H"	8"	12"	.45"	-32	53'

18 March 1949

⑤

GRADE } Pile TOP	BENT #49		Pene.	Elev. TIP	Length
	Pile TIP	Pile BUTT			
	+16.06	-23.6	<sup>19</sup> <sub>17</sub>		
Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"A"	8"	12"	.45"	-34	54
"B"	9"	12"	.35"	-29	54
"C"	8"	12"	.45"	-29	54
"D"	9"	13"	.45"	-27	54
"E"	8"	12"	.4"	-33	54
"F"	9"	12"	.4"	-32	54
"G"	8"	12"	.35"	-30	54
"H"	9"	13"	.4"	-30	54

18 March 1949

(57)

## BENT #50

GRADE <sup>3</sup>	Pile	Pile	Pene	Elev.	Length
	TOP	TIP			
	Size	Size			
Pile	TIP	Butt		TIP	
"A"	+14.92	-21.4	.4	-25	46
"B"	9"	13"	.3	-23	47
"C"	9"	<sup>13"</sup> <del>12"</del>	.25	-23	48
"D"	9"	13"	.4	-29	53
"E"	9"	13"	.4	-28	53
"F"	9"	12"	.35	-25	48
"G"	9"	12"	.4	-23	45
"H"	9"	13"	.35	-24	48

18 March 1949

(58)

GRADE } Pile	Pile TOP	Pile TIP	Pene.	Elev. TIP	Length
	Size TIP	Size Butt			
	+13.78	-19.3			
"A"	10"	13"	.35"	-23	45
"B"	9"	13"	.4"	-22	45
"C"	10"	13"	.45"	-22	40
"D"	9"	13"	.4"	-22	40
"E"	10"	13"	.4"	-21	45
"F"	9"	13"	.4	-24	48
"G"	10"	13"	.4"	-22	48
"H"	9"	13"	.4"	-24	45

BENT #51

Bott.  
Leads19  
17  
26  
17

4-21-49

## BENT #52

GRADE } Pile	Pile TOP	Pile TIP	Perme. Butt	Bott. Leads Elev. TIP	Length
	+12.64	-17.3		+14.6	
"A"	9"	12"	.4"	-20	33'
"B"	9"	12"	.4"	-20	33'
"C"	9"	12"	.4"	-22	36'
"D"	9"	12"	.35	-23	37'
"E"	10"	13"	.3"	-19	33'
"F"	9"	12"	.4	-19	33'
"G"	9"	12"	.4"	-19	33'
"H"	9"	12"	.35"	-19	33'

4-21-49

50'  
20.60 To C #53 FROM Hub

60

BENT #53

GRADE }  
TOPPile  
TOPPile  
TIPButt  
Leads

+11.50

-15.0

+13.5

Pile

Size  
TIPSize  
Butt

Pene.

Elev.  
TIP

Length

"A"

9"

12"

.4"

-17'

30'

"B"

9"

13"

.35"

-16'

30'

"C"

10"

13"

.4"

-16'

29'

"D"

10"

13"

.35"

-16

29

"E"

9"

12"

.4"

-16

30'

"F"

10"

12"

.3"

-16

29'

"G"

10"

12"

.35"

-16

29'

"H"

9"

13"

.3"

-15

29'

2-21-49 ~~4-22-49~~

## Wing Walls Ventura Pt.

(61)

## EAST WING

Pile	Size TIP	Size Butt	Penetration	Elev. TIP	Length
"A"	10"	12"	.5"	-17	30'
"B"	9"	11"	.5"	-17	30'
"C"	10" 7"	13" 12"	.5"	-17	29' 30'
"D"	11" 10"	13" 12"	.5" .5"	-15 -17	29' 30'

## West Wing

Pile	Size TIP	Size Butt	Penetration	Elev. TIP	Length
"E"	13"	15"	.5"	-17	30'
"F"	12"	14"	.5"	-15	30'
"G"	12"	14"	.5"	-17	30'
"H"	12"	14"	.5"	-15	24'



FEB. 21, 1949

## Deadmen Ventura Pt.

30

(62)

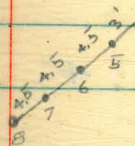
12

8

Pile	Size TIP	Size Butt	Pen.	Elev TIP	Length
"A"	7"	12"	.5"	-17	30
"B"	10"	12"	.5"	-17	30
"C"	10"	12"	$\frac{3}{8}$ "	-17	30
"D"	10"	14"	$\frac{3}{8}$ "	-18	39'
"E"	10"	14"	$\frac{1}{2}$ "	-18	30'
"F"	12"	14"	$\frac{1}{2}$ "	-11	30'

Wings near  
AOL

12" 14"



W. SIDE

4-22-49

## WING WALLS SUNSET PT.

## EAST WING

Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"A"	9"	12"	.4"	-18	30'
"B"	9"	12"	.4"	-16	30'
"C"	10"	13"	.4"	-15	30'
"D"	9"	12"	.45"	-16	30'
"E"	10"	12"	.45"	-16	30'

## WEST WING

Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"F" "E"	9" 12"	12" 14"	.3"	-18	33' 24'
"G" "F"	10"	12"	.4"	-16	29'
"H" "G"	10"	12"	.45"	-17	29'
"I" "H"	9"	12"	.4"	-16	29'

1-13

63

4-22-49

## Deadmen SUNSET PT.

(67)

Pile	Size TIP	Size Butt	Pene.	Elev. TIP	Length
"A"	9"	12"	.4"	-16	30'
"B"	10"	13"	.4"	-18	29'
"C"	10"	12"	.45"	-19	29'
"D"	9"	12"	.4"	-18	29'
"E"	10"	13"	.3"	-18	29'
"F"	10"	12"	.4"	-17	29'

## SUMMARY OF PILE RECORD

Date	No. Piles Driven	Type Rig
21 Feb 49	14	SKID
22 Feb 49	16	"
23 Feb 49	8	"
24 Feb. 49	8	"
25 Feb. 49	8	"
28 Feb 49	16	"
1 Mar 49	8	"
2 Mar 49	16	"
3 Mar 49	8	"
4 Mar 49	8	"
7 Mar 49	16	"
8 Mar 49	16	SKID
10 Mar 49	8	SCOW
11 Mar 49	24	"
14 Mar 49	32	"
15 Mar 49	26	"
16 Mar 49	26	"
17 Mar 49	32	SCOW

Date	No. Piles Driven	Type Rig
18 Mar 49	40	SCOW
21 Mar 49	48	"
4 Apr. 49	36	"
5 Apr. 49	28	SCOW
21 Apr 49	16	SKID
22 Apr. 49	15	SKID

TOTAL NO. OF PILES DRIVEN = 473

TOTAL NO. DRIVEN WITH SKID RIG = 173

TOTAL NO. DRIVEN WITH SCOW RIG = 300

MOST NO DRIVEN IN DAY, SKID = 16

" " " " " SCOW = 48

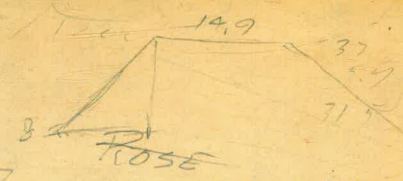
AVERAGE PER DAY WITH SKID = 12.4

" " " " SCOW = 30

AVERAGE PER DAY ENTIRE JOB = 19.7

38 6.70

25 | 1000  
100  
2



- 15" = 27
- 4" = 30
- 35 = 35
- 3 = 40

+39  
75  
74  
37  
55  
40  
5  
32

45  
18  
27

18  
45  
35  
3.2 5.83

.083  
2.5  
41.5  
166  
207.5

38.5  
.083  
11.55  
3.080  
3.1955

19 APRIL

1.4 APRIL

ed by the  
e=319.4ft.  
os 5° 10' =  
ft.  
nus slope  
With the  
he follow-  
9959=.0041.  
slope dist-  
rise=14 ft.  
302.28 ft.

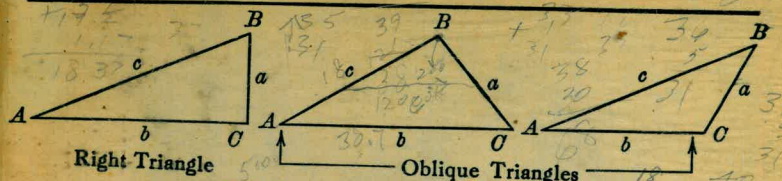
DE IN U. S. A.

17 12 37 12 36 15 41  
 26 3.2 ON LEADS = +16.17  
 43 3.81 45 21 21 19  
 13.5 BOT LEAD = 1350  
 16.00 39 39 53 38  
 39 7.23 12 35 36 53 38  
 13 24 17 24 13 39  
 25 17 16 18 16 30  
 21 17 14 38 30 26 14  
 35 18 33 78 12 19 22  
 15 39 18 16 36 17 42 38  
 20 30 35 36  
 + 34 10 10 10 10 10  
 31 33 17.2 76 37 4.33  
 30 42.9 32 36 30 85 18  
 1 41 41 15 120 120  
 74 73 14.98 14.25  
 42 73 8.28  
 6 715 19 6.70  
 11.42 68 19 70  
 3.56 23 27  
 14.98 45 1083 27  
 7.1 117 40 33 33  
 7.88 13.84 14.98 14.42  
 13.81 14.95 3.70  
 73.78 14.92 15.12

(CV) WA = W0

TRIGONOMETRIC FORMULÆ

6.70



Solution of Right Triangles

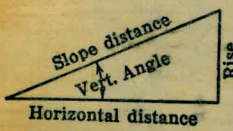
For Angle A.  $\sin = \frac{a}{c}$ ,  $\cos = \frac{b}{c}$ ,  $\tan = \frac{a}{b}$ ,  $\cot = \frac{b}{a}$ ,  $\sec = \frac{c}{a}$ ,  $\text{cosec} = \frac{c}{b}$

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	$\text{area} = \frac{b c \sin A}{2}$
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° 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.  $\cosine 5^\circ 10' = .9959$ .  $1 - .9959 = .0041$ .  $319.4 \times .0041 = 1.31$ .  $319.4 - 1.31 = 318.09$  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.