

25' Bench Levels

No. 1.

LEVEL BOOK

400



W 19

# H. S. CROCKER COMPANY

DRAWING MATERIALS AND  
SURVEYING INSTRUMENTS

SAN FRANCISCO

## TABLES FOR EXCAVATIONS AND EMBANKMENTS

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING

Roadway 18 Feet Wide. Side Slopes 1 to 1.  
For Single Track Excavation.

"Copyright, 1895, by Kueffel & Esser Co."

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	5
6	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	6
7	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	7
8	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	8
9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	9
10	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	10
11	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	11
12	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	12
13	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	13
14	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	14
15	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	15
16	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	16
17	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	17
18	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	18
19	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	19
20	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	20
21	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	21
22	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	22
23	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	23
24	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	24
25	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	25
26	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	26
27	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	27
28	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	28
29	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	29
30	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	30
31	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	31
32	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	32
33	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	33
34	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	34
35	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	35
36	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.

MICROFILMED

MICROFILMED

5.00  
30  
150.00

12

98.75  
80  
055

REPRODUCED FROM



H.

TABL

DIST

	0
0	9.0
1	10.0
2	11.0
3	12.0
4	13.0
5	14.0
6	15.0
7	16.0
8	17.0
9	18.0
10	19.0
11	20.0
12	21.0
13	22.0
14	23.0
15	24.0
16	25.0
17	26.0
18	27.0
19	28.0
20	29.0
21	30.0
22	31.0
23	32.0
24	33.0
25	34.0
26	35.0
27	36.0
28	37.0
29	38.0
30	39.0
31	40.0
32	41.0
33	42.0
34	43.0
35	44.0
36	45.0

MICROFILMED

Dulzura Conduit

Sta. 286+50 to 361+00

1-35

Sta. 128+50 to 214+50

37-75

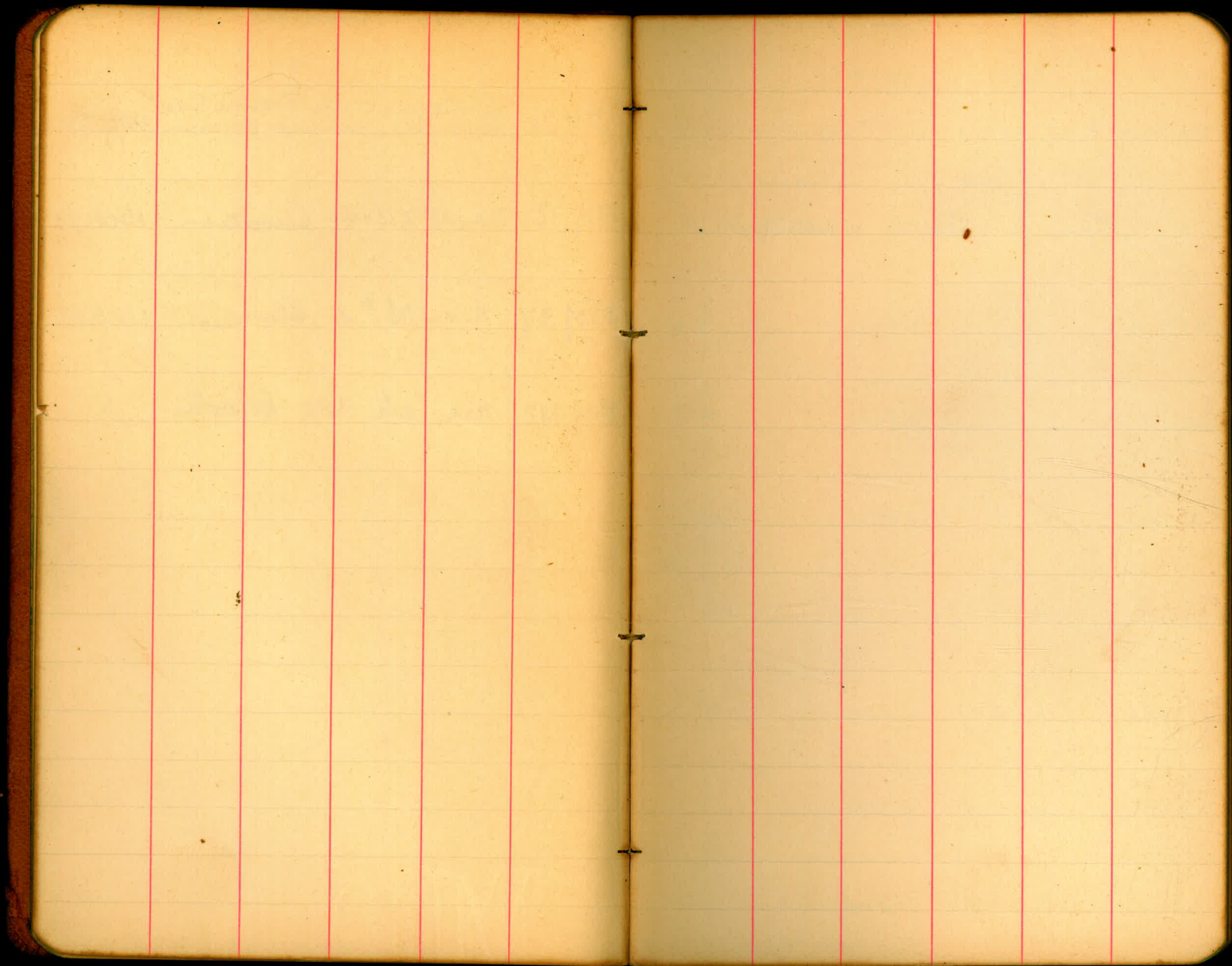
BM 26 on white oak tree in Lauterbach Gulch  
Elevation for grade purposes 1510.73

BM 32 Near sta 212+40 Elevation 1506.98

BM 37 near N. # 4. Elevation 1505.48

BM 42 near sta 350 Elevation





Nov 11, 1907

El. Capn  
EPN Station  
Es. Alameda  
Vato, Italian

GRADE  
+4.0

1

GRADE 54

7.2

Old Sta  
282+50

4.17

1487.76

1483.59

6

This is old grade - Tunnel has been lowered .35'  
This sta was put down .45' now is changed to  
.35 below. making elevation 1483.69

282+50

4.07

1483.69

282+75

4.09

1483.67

283+00

4.11

1483.65

283+25

4.13

1483.63

ground 2 low

283+50

4.15

1483.61

283+75

4.17

1483.59

ground 2 low

284+00

4.19

1483.57

ground 2 low



284+25

1487.76

4.21

grad +4.0

1483.55

OK

2  
Grand cler

284+50

4.23

1483.53

-0.10

DINNER -

284+75

4.25

1483.51

+0.05

285+00

4.27

1483.49

-0.13

285+25

4.29

1483.47

O.K.

0

4.29

1483.47

4.24

1487.71

285+50

4.26

1483.45

-0.10

285+75

4.28

1483.43

+0.30

286+00

4.30

1483.41

-0.13

148771

286+25	4.32
286+50	4.34
286+75	4.36
287+00	4.38
287+25	4.40

287+50 TUNNEL GRADE 8.42

Began Nov 12. 9:30 AM. Cape, Newton  
Alexander  
gap -  
147929

287+50	8.60	1487.89
0	6.82	1481.07
3.53		1484.60

Grade  
+4.0

1483.39

1483.37

1483.35

1483.33

1483.31

GRADE 1479.29 Iron dhill L. side 10' from face

3

grad

-0.10

-0.20

o.k.

-0.35

-0.25



GRADE

+4.0

.23  
1.13  
1484.60

6.27 1478.33

2.81 1481.14

0.27 1480.87

3.36 1484.23

old pth.  
296+50

1.25 1482.98

8.09 1476.14

3.52 1479.66

TUNNEL No. 5 is 555 feet long.

3.46 1476.20

GRADE ALLOWED = .5

10.03 1486.23

TUNNEL GRADE  
299+50

7.44

1478.79 TUNNEL GRADE  
Iron pin Rt. side by large boulder

299+70

7.46

1478.77 TUNNEL GRADE  
Shovel HANDLE Sta. 270 Lt. side

DINNER

299+50

3.40

1482.79

299+75

3.46

1482.77

19.72

19.09

	1486.83		
300+00		3.48	
300+25		3.50	
300+50		3.52	
300+75		3.54	
301+00		3.56	
301+25		3.58	
	3.73	1492.50	
	4.50	1487.00	
301+50		4.37	
301+75		4.34	

GRADE  
(+4.0)

74  
592

5

1482.75		-0.20
<del>1476.83</del>		
1482.73	1482.75	+0.20
1482.71		-0.40
1482.69		-0.25
1492.7		
1482.65		-0.25
1492.63		-0.10
1482.61		-0.10



1487.00

302+00

4.41

GRADE  
(+4.0)

1482.59

-0.10

302+25

4.43

1482.57

-0.20

302+50

4.45

1482.55

-0.38

302+75

4.47

1482.53

-0.25

303+00

4.49

1482.51

-0.20

Stopped Nov. 12, 3:30 P.M.

Began Nov 13, 10 A.M.

Cofe, Newton, Alexander + Gap

Turn grade

8.46

1487.25

1478.79

o

323

1484.02

2.96

1486.98

303+25

4.49

1482.49

-0.43

1486.98

303+50

4.51

303+75

4.53

304+00

4.55

304+25

4.57

304+50

4.59

304+75

4.61

305+00

4.63

305+25

4.65

305+50

4.67

FLUME

GRADE  
(+4.0)

1482.47

1482.45

1482.43

1482.41

1482.39

1482.37

1482.35

1482.33

1482.31

Spike

7

GROUND

OK.

OK.

-0.35

-0.40

-0.30

-0.43

-0.50

-0.07

OK



306+00	1486.98		4.71
306+25			4.73
306+50			4.75
		4.67	1482.31
	4.04	1486.35	LUNCH-
306+75			4.14
307+00			4.16
307+25			4.18
307+50			4.20

GRADE +4.0		8
		GROUND
1482.27	Spike	+0.25
1482.25	Spike	+0.50
1482.23	Spike	+0.60
1482.21		+0.25
1482.19		-0.20
1482.17		+0.08
1482.15		-0.10

				GRADE +4.0	9 Ground
307+75	1486.38		4.22	1482.13	OK
308+00			4.24	1482.11	-0.19
308+25			4.26	1482.09	-0.20
308+50			4.28	1482.07	OK
308+75			4.30	1482.05	OK
		4.43	1481.92		
	4.54	1486.46			
309+00			4.43	1482.03	OK
309+25			4.45	1482.01	Spike +0.10

old memo.



1486.46  
309+50 4.47

309+75 4.49

310+00 4.51

310+25 4.53

310+50 4.55

4.62 1481.84  
4.64 1486.48

310+75 4.59

311+00 4.61

GRADE

1481.99 Spike

1481.97

1481.95

1481.93

1481.91

old sta 310+50

1481.89

1481.87

10  
GROUND

+0.20

+0.10

OK

OK

-0.10

OK

-0.30

1486.48

311+25	4.63
311+50	4.65
311+75	4.67
312+00	4.69
312+25	4.71
312+50	4.73
312+75	4.76
313+00	4.77
313+25	4.79

GRADE +4.0	GROUND
1481.65	-0.83
1481.83	-0.15
1481.91	-0.10
1481.79	0.81
1481.77	-0.18
1481.75	-0.15
1481.73	-0.30
1481.71	-0.13
1481.69	-0.15

		1486.48					12
			4.79	1481.69	1		GROUND
	4.21	1485.90					
313+50					4.23	1481.67	OK
313+75					4.26	1481.65	-0.25
314+00					4.27	1481.63	-0.25
314+25					4.29	1481.61	-0.10
314+50					4.31	1481.59	-0.20
314+75					4.33	1481.57	-0.25
315+00					4.35	1481.55	Spike +0.30



	1485.90		
315+25			4.37
315+50			4.39
		4.39	1485.51
	4.56	1486.07	
315+75			4.58
316+00			4.60
316+25			4.62
316+50			4.64
316+75			4.66
317+00			4.68

		13
GRADE +4.0		GROUND
1485.53	Spike	+0.10
1485.51		-0.20
1485.49		-0.20
1485.47		-0.15
1485.45		O.K.
1485.43		-0.10
1485.41		-0.10
1485.39		O.K.

317+25	1486.07	4.70
	4.70	1481.37
	4.58	1485.95
317+50		4.60
317+75		4.62
318+00		4.64
318+25		4.66
318+50		4.68
319+75		4.70
319+00		4.72

GRADE  
+4.0

1481.37 Spike +0.25

Stopped Nov. 13. 07 3:15 P.M. Windy

Began Nov. 14. 07. E. L. Cape, E. P. Newton, E. E. Alexander, J. G. J.

1481.35 Spike O.K.

1481.33 O.K.

1481.31 -0.30

1481.29 -0.20

1481.27 -0.30

1481.25 -0.40

1481.23 -0.40

14  
GROUND

	148595		
319+25		4.74	
		4.74	1481.21
	4.05		1485.26
319+50		4.07	
319+75		4.09	
320+00		4.11	
320+25		4.13	
320+50		4.15	
320+75		4.17	
321+00		4.19	

GRADE  
+4.0

1481.21

1481.19

1481.17

1481.15

1481.13

1481.11

1481.09

1481.07

15

GROUND

-0.40

-0.15

-0.10

+0.12

-0.10

-0.35

-0.10

+0.25



	1485.26		
321+25		4.21	
321+50		4.23	
321+75		4.25	
0		4.25	1481.01
	4.17		1485.18
322+00		4.19	
322+25		4.21	
322+50		4.23	
322+75		4.25	
323+00		4.27	

GRADE  
+4.0

1481.05	Spike	+0.10
1481.03	Spike	+0.23
1481.01	Spike	+0.20
1480.99	Spike	+0.20
1480.97		-0.10
1480.95		+0.20
1480.93		-0.10
1480.91		OK-

16  
GROUND

	1485.8		
323+25		4.29	
323+50		4.31	
323+75		4.33	
324+00		4.35	
324+25		4.37	
324+50		4.39	
324+75		4.41	
325+00		4.43	

4.43

1460.75

LUNCH

GRADE  
+4.0

1480.89

1480.87

1480.85

1480.83

1480.81

1480.79

1480.77

1480.75

Spike

17  
GROUND

-0.10

-0.10

O.K.

-0.20

-0.07

O.K.

O.K.

325+25

4.49

1480.73

O.K.

325+50

4.51

1480.71

-0.10

325+75

4.53

1480.69

-0.10

326+00

4.55

1480.67

O.K.

326+25

4.57

1480.65

O.K.

326+50

4.59

1480.63

-0.10

326+75

4.61

1480.61

-0.20

327+00

4.63

1480.59

O.K.

4.47 1485.22

1490.75

GRADE  
+4.0

18  
GROUND



	1485.22			
327+25			4.65	
		4.65	1480.57	
	4.44	1485.01		
327+50			4.46	
327+75			4.48	
328+00			4.50	
328+25			4.52	
328+50			4.54	
328+75			4.56	
329+00			4.56	

GRADE  
+4.0

1480.57

1480.55

1480.53

1480.51

1480.49

1480.47

1480.45

1480.43

19  
GROUND

-0.30

OK.

OK.

-0.17

OK.

OK.

-0.30

-0.20

Spike

329+25	1485.01		4.60
329+50			4.62
329+75			4.64
0		4.64	1480.37
	4.07	1484.44	
330+00			4.09
330+25			4.11
330+50			4.13
330+75			4.15
331+00			4.17

GRADE  
+4.0

1480.41

1480.39

1480.37

1480.35

1480.33

1480.31

1480.29

1480.27

Spike

Spike

20  
Ground

0.K

0.K.

-0.20

-0.K.

-0.30

-0.50

-0.25

+0.15

1484.44

331+25	4.19
331+50	4.21
331+75	4.23
332+00	4.25
332+25	4.27
332+50	4.29
332+75	4.31
333+00	4.33
333+25	4.35

GRADE  
+4.0

21

1480.25		-0.20
1480.23	Spike	-0.23
1480.21		-0.12
1480.19	Spike	+0.10
1480.17		-0.30
1480.15	Spike	-0.10
1480.13	Spike	+0.24
1480.11		-0.20
1480.09		+0.10



	1484.44		
333+50		4.37	
333+75		4.39	
	4.39	1480.05	
	3.74	1483.79	
334+00		3.76	
334+25		3.78	
334+50		3.80	
334+75		3.82	
335+00		3.84	
335+25		3.86	

GRADE  
+4.0

22  
Ground.

1480.07 Spike -0.15

1480.05 -0.10

Stopped Nov. 14, '07 - 3:15 P.M.

Began Nov. 15, '07 - 10:00 A.M.

VERY WINDY

E.L. Coffey - level  
E.P. Weston - rod  
E.E. Anderson - chain  
Jap - stakes

1480.03 +0.10

1480.01 -0.30

1479.99 -0.50

1479.97 Spike -0.30

1479.95 Spike O.K.

1479.93 +0.20

1483.79

GRADE  
+4.023  
GROUND

335+50

3.88

1479.91

Spike

OK

335+75

3.90

1479.89

Spike

OK

336+00

3.92

1479.87

-0.30

336+25

3.94

1479.85

-0.40

336+50

3.96

1479.83

Spike

-0.15

336+75

3.98

1479.81

-0.10

337+00

4.00

1479.79

-0.25

337+25

4.02

1479.77

-0.55

337+50

4.04

1479.75

-0.30

FLUME BEGINS

338+00	1483.79		4.08
338+50			4.12
338+78			4.14

1.35 1482.44

1.41 1483.25

340+75			4.36
341+00			4.38
341+25			4.40
341+50			4.42

GRADE  
+4.0

1479.71

1479.67

1479.65

FLUME ABOVE BLOCKS

LUNCH

1479.49

1479.47

1479.45

1479.43

24

GROUND

-0.15

-0.30

-0.10

OK.



	1483.85		
341+75		4.44	
342+00		4.46	
342+25		4.48	
		4.48	1479.37
	4.56 1483.93		
342+50		4.58	
342+75		4.60	
343+00		4.62	
343+25		4.64	
		4.64	1479.29
	4.74 1483.83		

GRADE  
+4.0

1479.41

1479.39

1479.37

1479.35

1479.33

1479.31

1479.29

25

GROUND

-0.25

-0.40

-0.10

-0.40

O.K.

O.K.

-0.20

Spike

Spike

	1683.53		
343+50		4.26	
343+75		4.28	
344+00		4.30	
344+25		4.32	
344+50		4.34	
344+75		4.36	
345+00		4.38	
	4.10 1483.25	4.48	1479.15
345+25		4.12	

GRADE  
+4.0

1479.27

1479.25

1479.23

1479.21

1479.19

1479.17

1479.15

1479.13

26  
GROUND

-0.15

-0.35

-0.50

-0.30

-0.20

0.15

-0.25

-0.40

Spike

345+50	1483.25	4.14
345+75		4.16
346+00		4.18
346+25		4.20
346+50		4.22
346+75		4.24
347+00		4.26
347+25		4.28

4.67

1483.64

4.28

1478.97

GRADE  
+4.0

1479.11

1479.09

1479.07

1479.05

1479.03

1479.01

1479.99

1478.97

27

G.P. Point

-0.20

-0.60

-0.50

-0.50

-0.20

-0.50

-0.10

O.K.

Spike

Spike

Spike

Spike



148364

347+50

4.69

347+75

4.71

348+00

4.73

348+25

4.75

348+50

4.77

348+75

4.79

349+00

4.81

349+25

4.83

349+50

4.85

GRADE  
+4.0

147895 Spike

1478.93

1478.91

1478.89 Spike

1478.87

1478.85

1478.83 Spike

1478.81

1478.79

28  
GROUND

0.0

+0.15

+0.20

+0.15

+0.20

-0.12

-0.10

-0.20

-0.35

	1483.64					
0		4.85	1478.79			
	4.17	1482.96				
MA 265 350+00				4.37	1478.59	
349+75				4.19	1478.77	-0.25
350+00				4.21	1478.75	Spike 0.K
350+25				4.23	1478.73	Spike -0.15
350+60				4.25	1478.71	0.K
0		4.25	1474.71			
	3.92	1482.63				
350+75				3.94	1478.69	-0.15

Stopped Nov. 15, '07 - 3:00 P.M.

Resumed Nov. 16, '07 - 8:30 A.M.

1482.63  
351+00 3.96

351+25 3.98

351+50 4.00

351+75 4.02

352+00 4.04

352+25 4.06

352+50 4.08

4.08 1478.55

4.50 1483.05

352+75 4.52

GRADE  
+4.0

1478.67 Spike

1478.65 -0.10

1478.63 -0.35

1478.61 -0.50

1478.59 Spike -0.15

1478.57 Spike -0.35

1478.55 -0.20

30  
GROUND

~~0.25~~

1478.53 -0.25



146325

353+00

4.54

353+25

4.56

353+50

4.58

353+75

4.60

354+00

4.62

354+25

4.64

354+50

4.66

354+75

4.68

355+00

4.70

GRADE  
+4.0

1478.51

1478.49

1478.47

1478.45

1478.43

1478.41

1478.39

1478.37

1478.35

31

GROUND

-0.25

-0.20

-0.40

-0.30

-0.10

-0.30

-0.10

-0.30

-0.15

Spike

Spike

	1483.05			
355+25			4.72	
0		4.84	1478.21	
	4.32	1482.53		
355+50			4.22	
355+75			4.24	
356+00			4.76	
356+25			4.28	
356+50			4.30	
356+75			4.32	

32

GRADE +4.0		GROUND
1478.33	Spike	-0.40
1478.31	Spike	-0.20
1478.29		-0.20
1478.27	Spike	O.K.
1478.25		+0.10
1478.23	Spike	O.K.
1478.21	Spike	-0.10

1482.53  
357+00 4.34

0 4.63 1477.90

4.85 1482.75

357+25 4.58

357+50 4.60

357+75 4.62

358+00 4.64

358+25 4.66

0 4.66 1478.09

391 1482.00

GRADE  
+4.0

1476.19

Spike

-0.15

1476.17

Spike

-0.10

1476.15

Spike

-0.25

1476.13

Spike

-0.20

1476.11

Spike

-0.10

1476.09

-0.25

30

GROUND



1482.00

358+50

3.93

358+75

3.95

359+00

3.97

359+25

3.99

359+50

4.01

359+75

4.03

360+00

4.05

360+25

4.07

360+50

4.09

GRADE  
+4.0

1478.07

Spike

1478.05

1478.03

1478.01

1477.99

1477.97

1477.95

1477.93

1477.91

84  
GROUND

O.K.

-0.10

-0.30

+0.55

-0.40

-0.20

Spike  
-0.10Spike  
-0.15

-0.40

360+75	1482.00		4.11
361+00			4.13
0		0.44	1481.56
9.83	1491.39		
BM. 43		4.18	1487.21

GRADE

1477.89	Spike	-0.10
1477.87	Spike	-0.15

Stopped 11 AM on 16.





Begin No. 1, 8, '07,

Cape level  
North Pass

37

BM 26 0.68 1511.41 1510.73

BM 26A 4.815 1506.595

on rock 25' East BM 26 and 20' N.E. of dip stake opp.

8.97 1502.44

0.96 1503.40

Sta. 128+50

6.91

1496.49

2.46 1500.94

0.60 1501.54

TUN. GRADE

8.70

1492.84

Nov. 16 - 330 P.M.

Cape  
Newton

BM. 32 1.37 1508.35 1506.98

0

10.79 1497.56

0.85 1498.41

TUNGRADE #2

12.75

1485.66

Sta. 215

8.75

1489.66

Sta 215

8.74

TUN. GR. 51. 823 1501.07

130+50

4.55

130+75

4.57

131+00

4.59

131+25

4.62

131+50

4.64

131+75

4.66

132+00

4.69

1492.84

Nov. 20, 1907.

Cape - Level  
NEWTON - Rod.  
MIGUEL - Chain

P.M.

1496.52

-0.20

1496.50

-0.35

1496.48

Spike

OK

1496.45

Spike

-0.20

1496.43

Spike

OK

1496.41

-0.10

1496.38

-0.20

GRADE +4.0

39

GROUND



					GRADE +A.0		40
132+25	1501.07			4.71	1496.36		O.K.
132+50				4.73	1496.34		-0.20
132+75				4.75	1496.32		O.K.
133+00				4.77	1496.30	Spike	O.K.
			4.77	1496.30			
	440	1500.70					
133+25				4.42	1496.28	Spike	O.K.
133+50				4.44	1496.26		-0.15
133+75				4.47	1496.23	Spike	-0.10
134+00				4.49	1496.21		O.K.

	150070	
134+25	4.51	
134+50	4.53	
134+75	4.55	
135+00	4.57	
135+25	4.60	
135+50	4.62	
135+75	4.64	
136+00	4.67	

GRADE +4.0		41. GROUND
1496.19	Spike	+0.10
1496.17		OK
1496.15	Spike	OK
1496.13		OK
1496.10		-0.10
1496.08	Spike	-0.20
1496.06	Spike	-0.10
1496.03		-0.20

	1500.70		
0		4.67	1496.03
	4.41	1500.44	
136+25			4.43
136+50			4.45
136+75			4.47
137+00			4.49
137+25			4.51
137+50			4.53
0		116	1499.28
	0.88	1500.16	
138+00			4.29

GRADE  
+4.0

1496.03

1496.01

1495.99

1495.97

1495.95

1495.93

1495.91

1495.87

42  
GROUND

OK

-0.00

OK

OK

-0.10

—

on rock map Sta. 138

Ajete

Nov. 21, 1907

10:30 Am.

COPE  
NEWTON  
MIGUEL  
MEXICAN



	1500.16			
138+25			4.31	
138+50			4.33	
138+75			4.35	
139+00			4.37	
139+25			4.39	
139+50			4.41	
139+75			4.43	
140+00			4.45	
		4.45	1495.71	

4.30 1500.00

GRADE +4.0		43 GROUND
1495.85		O.K.
1495.83	Spike	+1.10
1495.81	Spike	outside -1.0 +0.30
1495.79	Spike	outside -0.0 +0.45
1495.77		+0.25
1495.75		O.K.
1495.73		-0.10
1495.71	Spike	+0.35

1500.01

140+25	4.32
140+50	4.34
140+75	4.36
141+00	4.38
141+25	4.40
141+50	4.42
141+75	4.44
142+00	4.46
142+25	4.49

.01

GRADE  
+4.0

1495.69
1495.67
1495.65
1495.63
1495.61
1495.59
1495.57
1495.55
1495.52

44  
GROUND

+0.30
+0.30
O.K.
-0.10
O.K.
O.K.
-0.20
O.K.
to.10

Spike

	1500.01		
142+50 0		4.49	1495.52
	418 1499.70		
142+50			4.20
142+75			4.22
143+00			4.24
143+25			4.26
143+50			4.28
143+75			4.30
144+00			4.32
144+25			4.34

GRADE +4.0	45 GROUND
142+50	+0.40
142+75	O.K.
143+00	-0.25
143+25	O.K.
143+50	<del>-0.50</del> -0.50
143+75	-0.80 outside -5
144+00	O.K.
144+25	O.K.



144+50	1499.70		4.36
0		4.36	1495.34
0.04	1495.98		
144+75			0.66
FLUME 175			
146+50			0.80
146+75			4.52
147+00			4.84
147+18			4.86
0		47	1494.81
147+25	498	1499.79	
147+25			4.67

GRADE +4.0	46
1495.34	GROUND +0.20
1495.32	+ 1.80
1495.18	-
1491.16	R SPIKE L - 0.08 R - 0.20
1491.14	Tunnel Grades - Both spikes L - 0.10 R - 0.06
1491.12	L Spike R. O.K. L. O.K.
1495.12	+1.35

147+50	1499.79	4.69
147+75		4.71
148+00		4.73
	4.73 1495.06	
	4.52 1499.58	
148+25		4.54
148+50		4.56
148+75		4.59
149+00		4.60
149+25		4.62

GRADE +4.0		47
1495.10		GROUND +0.30
1495.08	Spike	+0.50
1495.06		+0.30
1495.04	Spike	-0.10
1495.02	Spike	+1.55
1495.00		+0.70
1494.98		+0.15
1494.96		-0.30

							48
	1499.58						G Round
○		3.79	1495.79				
	3.29	1499.08					
149+50				4.14		1494.94	-0.25
149+75				4.16		1494.92	OK
150+00				4.18		1494.90	+0.50
150+25				4.20		1494.88	OK
150+50				4.22		1494.86	+0.12
150+75				4.24		1494.84	Spike. +0.40
151+00				4.26		1494.82	OK
○		4.26	1494.82				
	4.50	1499.32					



Nov. 23, 1907 8<sup>30</sup> 49  
GRADE NEWTON.  
+0.40 COOPER  
SWAYNE MIREL

151+25	1499.32	4.52	1494.80	+0.30
151+50		4.54	1494.78 Spike	+0.45
151+75		4.56	1494.76 SPIKE	+0.90
152+00		4.58	1494.74 Spike	+0.35
152+25		4.60	1494.72 Spike	+0.03
152+50		4.62	1494.70	+0.20
152+75		4.64	1494.68	-0.10
153+00		4.66	1494.66	-0.02
153+25		4.68	1494.64	+0.05

	1499.32		
	4.80	1494.52	
153+50	4.57	1499.09	4.47
153+75			4.50
154+00			4.52
154+25			4.54
154+50			4.56
154+75			4.58
155+00			4.60
155+25			4.62

	1494.64 +4.0		50 GROUND
1494.62			+0.30
1494.59	Spike		+0.30
1494.57			+0.30
1494.55			+0.10
1494.53	Spike		+0.50
1494.51			+0.16
1494.49			+0.18
1494.47			O.K.

1499.09

155+50	4.64
155+75	4.66
o	4.66 1494.43
4.60 1499.03	
156+00	4.62
156+25	4.64
156+50	4.66
156+75	4.68
157+00	4.70
157.25	4.72

51

GROUND

1494.45 Spike	+0.10
1494.43	+0.08
1494.41 Spike	+0.06
1494.39 Spike	+0.65
1494.37 Spike	+0.65
1494.35 Spike	+0.35
1494.33 Spike	+0.50
1494.31 Spike	-0.08



	1499.03		
157+50		4.74	
157+75		4.76	
158+00		4.78	
158+25		4.80	
	4.80	1494.23	
	4.43	1498.66	4.45
158+50		4.45	
158+75		4.47	
159+00		4.50	.01
159+25		4.52	

52

	GROUND
1494.29 Spike	-0.40
1494.27 Spike	0.K.
1494.25 Spike	+0.15
1494.23 Spike	+0.30
1494.21 Spike	+1.25
1494.19 Spike	+0.20
1494.16 Spike	+0.20
1494.14	+0.70

	1498.66		
159+50		4.54	
159+75		4.56	
160+00		4.58	
160+25		4.60	
160+50		4.62	
	1494.04	4.62	
	4.47	1498.51	
160+75		4.49	
161+00		4.51	
161+25		4.53	

53.

		GROUND
1494.12	Spike	+0.35
1494.10	Spike	+0.10
1494.08	Spike	-0.10
1494.06	Spike	-0.14
1494.04	Spike	O.K.
1494.02		+0.30
1494.00	Spike	+0.35
1493.98	Spike	+0.40

	1498.51	
161+50		4.55
161+75		4.57
162+00		4.59
162+25		4.61
162+50		4.63
162+75		4.65
163+00		4.67
163+25		4.69

1494.25 4.26

4.96

1499.21

54

		GROUND
1493.96 Spike		+0.25
1493.94 Spike		+0.40
1493.92 Spike		-0.04
1493.90		-0.10
1493.88 Spike		+0.40
1493.86 Spike		+0.61
1493.84		+0.40
1493.82 Spike		



	1499.21	
163+50		5.41
163+75		5.43
164+00		5.45
164+25		5.47
164+50		5.49
164+75		5.51
165+00		5.53
165+20		5.59

4.28 1494.93

	55	
	GROUND	
1493.80 Spike		+0.40
1493.78 Spike		+0.50
1493.76 Spike		+0.75
1493.74 Spike		+1.30
1493.72 Spike		+1.19
1493.70 Spike		+1.10
1493.68 Spike		+1.28
Flume		
1493.62		

Stopped 4 P.M. 11.23.07

Check levels - No 25  
 E.H. Cooper  
 E.R. Newton

151+00

381

1498.63

1494.82

151+25

386

1494.77

152+75

395

1494.68

153+25

399

153+75

414

1494.49

154+00

416

+25

418

+75

422

156+25

426

		1498.63				
155 + 75				4.29	1494.34	
156 + 75			4.36	1494.27	4.36	1494.27
	4.41	1498.68				
158 + 25				4.53	1494.15	
160 + 75			4.73	1493.95		
	4.15	1498.10				
162 + 00				4.27	1493.83	
164				4.41	1493.69	
165 + 80				4.54	1493.56	
			3.24	1494.86		
	2.12	1496.98				

Newton's T.P.



NEWTON  
MIGUEL  
MEXICAN

Nov. 27.07  
8.45 A.M.

58

	+	H	-				
167+00		1496.98		3.73 3.44	1493.54	Spike	+0.10
+25				2.78			
+50				3.77			+0.25
+75				3.79			
168+00				4.12 3.81 3.52	1493.46	Spike	-0.65
+25				4.14			
+50				4.16			
+75				4.18			
169+00				4.20 4.21 4.14 3.60	1493.38	Spike	+0.13 +0.40

1494.98

292 1494.06

0

352 1497.58

169+25

+50

+75

170+00

+25

+50

+75

171+00

+25

4.46

4.48

4.50

4.52

4.18

4.20

4.22

4.24

4.24

4.55

4.30

4.36

1493.28

1493.22

Spike

Spike

Spike

OK

+0.2

OK

1497.58

+50

+75

172+00

+25

+50

+75

173+00

+25

+50

417.5

419.5

420.5

421

423

425

427

429

434

436

438

4.44

4.52

60

1493.14

Spike

0.5

Spike

1493.06

Spike

-0.20



	1497.58					
0		199	1495.59			
194	1497.53					
173+75			4.40			
174+00			4.67	4.55	1492.98	+0.10
+25			4.69			
+50			4.71		S	Spike
+75			4.73			OK
175+00			4.75	4.63		-0.08
+25			4.77			
+50			4.79		1492.90	

1497.53

+75

4.81

176+00

4.83

4.71

1492.82

+25

4.00

+50

4.02

+75

ENTRANCE TUN. 1½

4.77

1492.76

Spike

-0.20

177+50

4.71

4.83

1492.70

Spike

0

4.83

1492.70

4.11

1496.81

4

4.42

178+00

4.44

4.15

1492.66

Spike

1496.81

+25

4.46

+50

4.48

+75

4.50

179+00

4.52

4.23

1492.58

old 26  
151 0

4.60

4.25  
1492.21

4.50

1496.71

+25

4.27

+50

4.29

+75

4.31

Spike

+0.24

+0.65

+0.25



Rod

HI

180	1496.71	4.33	4.21	4.24	1492.50	-0.10
+25				4.26	1496.74 1492.48	-0.42
+50				4.28	1492.46	-0.20
+75				4.30	1492.44	-0.33
181+00 old sto 1930			429	4.32 <sup>3</sup>	1492.42	
+25	457 1496.59	459	1492.12	4.34	1492.40	-0.32
+50				4.36	1492.38	-0.40
+75				4.38	1492.36	-0.3
182+00			4.25	4.34	1496.68 1492.34	

1496.59

Pos. H.

+25

4.27

4.36

1496.68

1492.32

-0.30

+50

4.38

1492.30 Spike

-0.25

+75

4.40

1492.28 Spike

-0.2

183+00

4.33

4.42

1492.26

25

4.44

1492.24

+0.08

50

75

184

4.41

4.32

1496.50

1492.18

-0.30

0

4.41

1492.18

440

1496.58

	1496.58		
+25			
50			
75			
185+00		4.48	
+25			
+50		4.52	
1		293	1493.65
1	3.19	1496.84	
1			
1			
186+90		4.90	
187+60		4.95	

4.34	1496.50	1492.16	
4.36		1492.14	-0.3
4.38		1492.12	
4.40 <sup>39</sup>		1492.10	OK
		1492.06	
Spike across gulch marked T.P.			
Began Nov. 26. Copied mistake Barometer -			
		1491.94	
		1491.89	



149684

158

+25

+50

0

3.51

1495.97

438

1492.46

8.54

189+75

189

+25

+50

499

503

4.20

4.26

1496.03

1491.77

4.28

1491.75

4.30

1491.73

1491.85

1491.81

67

OK

+0.03

OK

149597

+75

190+00

+25

+50

+75

191+00

+25

+50

+75

4.28

4.34

4.36

4.38

4.40

4.36

1496.03

1491.69

1491.67

1491.65

1491.63

1491.61

68

O.K.

O.K.

-0.15

-0.20

O.K.

1495.97

192+00

4.44

1491.53

~~0.00~~

+25

+50

+75

193+00

4.52

1491.45

no alt

143+50

4.74 1491.23

4.44 1495.67

+25

+50

+75



194+00

149567

4.30

149137

70  
-0.20

+25

+50

+75

195+00

4.38

149129

-0.12

+100

+125

4.14

1491.53

4.19 1495.72

196+00

4.46

149121

196+00

4.51

149121

1495.72

+25

+50

+75

197+00

4.59

1491.13

OK

+25

+50

+75

198+00

4.67

1491.05

-0.13

0

4.67

1491.05

4.24 1495.29

+25

+50

+75

199+00

4.32

1490.97 Spike

1495.29

199+25  
+50  
+75

200+00  
+25  
+50  
+75

201+00  
+25  
+50  
+75

202+00  
0

4.57 1495.07

203+00

4.40

4.48

4.56

4.79 1490.50

4.42

1490.89

1490.81

1490.73

Spoken

1490.65

-0.15



1495.07

704+00

4.50

1490.57

O.K.

705+00

4.58

3.99

1494.48 1490.49

Spike

-0.80

25

4.01

1490.47 Spike

-0.50

50

4.03

1490.45 Spike

-0.21

75

4.05

1490.43 Spike

-0.11

706+00

4.66

4.07

1490.41

O.K.

25

4.11

1494.49 1490.38

-0.20

50

4.13

1490.36

-0.037

75

4.15

1490.34 Spike

+0.10

707+00

4.75

4.21/01

1490.32 Spike

+0.20

25

4.23

Spike

+0.40

50

4.25

-0.5

75

4.27

Spike

-0.45

4.31

1494.48

4.90 1490.17

1494.48

208+

+25

+50

+75

209

+25

209+50

+75

0

flume 45'

210+50

211

+50

212

0

11.01

1500.93

3.63

1494.43

3.08

1496.80

4.51

1489.92

4.24

4.32

4.39

4.39

4.51

4.18

4.20

4.22

4.24

4.26

4.28

4.30

4.32

1490.24

1490.22

1490.20

1490.18

1490.16

1490.14

1490.12

1490.10

1490.04

1489.92

Spike

Spike

Spike

74

-0.80

-0.30

-0.12

-0.05

-0.40

-0.15

-0.20

1500.93

2 0

306 1497.87

10.49 1508.37

8m. 32

1.89 1506.97 Check Machine .01

212 593 1495.85 1489.92

213+00 6.01

1489.84

2

+58 6.25

1489.80

4.48 1494.28

214 4.52

1489.76

214+50 4.57

.01

1489.71

Tom Check 8.62



Reestablishing B.M. 23

~~151~~

BM 23 - 190 1517.36 1515.46

BM 23 A 4.50 1512.86

G.

0  
1  
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35  
36



1493.52  
 346  
 1496.98  
 762 40.  
 417 9  
 45  
 8767 5. 151- 94.82  
 .08  
 2150 1.28  
 7.0636  
 17.20  
 93.54  
 1502 167  
 1720 1600 3 1/2  
 149 149  
 148 148  
 21455 9.30 .08  
 1.15  
 1505.07  
 215  
 165  
 5000  
 12091 10.2  
 1.28  
 1504.74  
 235  
 12050  
 2.34  
 16200 1492 11  
 151  
 1485.66  
 240  
 8167 1000  
 197  
 4.18  
 20  
 22  
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 25  
 26  
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 31  
 32  
 33  
 34  
 35  
 36  
 8521 718.00 1.084  
 68168  
 36320  
 575  
 46.00  
 6 472  
 4 1/2

1472.17  
 104  
 1476.83  
 4  
 1472.83

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.  
 FOR SINGLE TRACK EMBANKMENT.  
 ROADWAY 14 FEET WIDE. SIDE SLOPES 1 1/2 TO 1.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	7.0	7.2	7.3	7.5	7.6	7.8	7.9	8.1	8.2	8.4	0
1	8.5	8.7	8.8	9.0	9.1	9.3	9.4	9.6	9.7	9.9	1
2	10.0	10.2	10.3	10.5	10.6	10.8	10.9	11.1	11.2	11.4	2
3	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	3
4	13.0	13.2	13.3	13.5	13.6	13.8	13.9	14.1	14.2	14.4	4
5	14.5	14.7	14.8	15.0	15.1	15.3	15.4	15.6	15.7	15.9	5
6	16.0	16.2	16.3	16.5	16.6	16.8	16.9	17.1	17.2	17.4	6
7	17.5	17.7	17.8	18.0	18.1	18.3	18.4	18.6	18.7	18.9	7
8	19.0	19.2	19.3	19.5	19.6	19.8	19.9	20.1	20.2	20.4	8
9	20.5	20.7	20.8	21.0	21.1	21.3	21.4	21.6	21.7	21.9	9
10	22.0	22.2	22.3	22.5	22.6	22.8	22.9	23.1	23.2	23.4	10
11	23.5	23.7	23.8	24.0	24.1	24.3	24.4	24.6	24.7	24.9	11
12	25.0	25.2	25.3	25.5	25.6	25.8	25.9	26.1	26.2	26.4	12
13	26.5	26.7	26.8	27.0	27.1	27.3	27.4	27.6	27.7	27.9	13
14	28.0	28.2	28.3	28.5	28.6	28.8	28.9	29.1	29.2	29.4	14
15	29.5	29.7	29.8	30.0	30.1	30.3	30.4	30.6	30.7	30.9	15
16	31.0	31.2	31.3	31.5	31.6	31.8	31.9	32.1	32.2	32.4	16
17	32.5	32.7	32.8	33.0	33.1	33.3	33.4	33.6	33.7	33.9	17
18	34.0	34.2	34.3	34.5	34.6	34.8	34.9	35.1	35.2	35.4	18
19	35.5	35.7	35.8	36.0	36.1	36.3	36.4	36.6	36.7	36.9	19
20	37.0	37.2	37.3	37.5	37.6	37.8	37.9	38.1	38.2	38.4	20
21	38.5	38.7	38.8	39.0	39.1	39.3	39.4	39.6	39.7	39.9	21
22	40.0	40.2	40.3	40.5	40.6	40.8	40.9	41.1	41.2	41.4	22
23	41.5	41.7	41.8	42.0	42.1	42.3	42.4	42.6	42.7	42.9	23
24	43.0	43.2	43.3	43.5	43.6	43.8	43.9	44.1	44.2	44.4	24
25	44.5	44.7	44.8	45.0	45.1	45.3	45.4	45.6	45.7	45.9	25
26	46.0	46.2	46.3	46.5	46.6	46.8	46.9	47.1	47.2	47.4	26
27	47.5	47.7	47.8	48.0	48.1	48.3	48.4	48.6	48.7	48.9	27
28	49.0	49.2	49.3	49.5	49.6	49.8	49.9	50.1	50.2	50.4	28
29	50.5	50.7	50.8	51.0	51.1	51.3	51.4	51.6	51.7	51.9	29
30	52.0	52.2	52.3	52.5	52.6	52.8	52.9	53.1	53.2	53.4	30
31	53.5	53.7	53.8	54.0	54.1	54.3	54.4	54.6	54.7	54.9	31
32	55.0	55.2	55.3	55.5	55.6	55.8	55.9	56.1	56.2	56.4	32
33	56.5	56.7	56.8	57.0	57.1	57.3	57.4	57.6	57.7	57.9	33
34	58.0	58.2	58.3	58.5	58.6	58.8	58.9	59.1	59.2	59.4	34
35	59.5	59.7	59.8	60.0	60.1	60.3	60.4	60.6	60.7	60.9	35
36	61.0	61.2	61.3	61.5	61.6	61.8	61.9	62.1	62.2	62.4	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.