PACIFIC
WATERPROOF

822293

Mining Transit Book

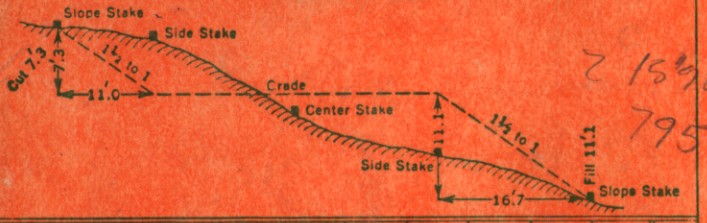
FILLER No. 321

L. B. WARREN

Benamy Project
093L/01
1985

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING
Roadway of any Width. Side Slopes 1½ 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	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
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

FALCON BRIDGE GRID – LUCKY BEN CLAIMS
JANUARY 85

0+00 ℄ – 10" spruce stump on N bank of road way

0+31 S – small creek crossing at angle.

0+50 S – on hill side $V_A = 266° 25' 10"$
$H_I = 0.7$ M.

0+~~00~~ S – in valley FS $V_A = 263° 36' 30"$
$H_I = 0.4$M

0+~~00~~ S – on flat (150) FS $V_A = 269° 35' 00"$
(150) BS $V_A = 84° 37' 00"$
$H_I = 0.5$M

18185

0+100 S – on flat 81.8 FS $V_A = 270° 24' 00"$
BS ~~00~~ same
$H_I = 0.5$M

0+18185 – on edge of creek (200) FS $V_A = 256° 44' 20"$
(100) BS $V_A = 91° 10' 10"$
$H_I = 0.7$M.

0+225 creek in ravine (225.2) FS $V_A = 261° 49' 10"$
℄

STAR SHOT ATTEMP

SETUP AT STATION
0+00, 2+87.5

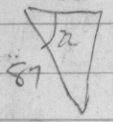
REF STN ~100 M ALONG LINE TO S

SET TO 0+00+00

TURN ANGLE ~165° TO RIGHT TO POLARIS

237
.54
148
1482
19.98

cos = 9/h



88
elevation 54 15'
34'45"

270
5415
32415

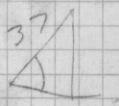
Load up

2+25.2 – Study back sight.

B_S (2+25.2) V_A = 83° 11' 10"

F_S (2+50) V_A = 280° 7' 10"

H_I = 0.5 M





→ F_S (2+70) V_A = 291° 29' 40"

2+70 – top of knoll

B_S (2+25.2) V_A = 247° 41' 22° 19'

cos 22°19 = 0.92463 × 37 = 20.15 m

F_S (3+00) V_A = 91° 35' 50"

H_I = 0.6 M.

F_S (3+50) V_A = 90° 21' 10"

F_S (4+00) V_A = 89° 12' 40"

4+60 S Turn EW – 50 W 2x2 pole
15 E 2x2 poles
no deviation

H_I = 0.5 M

B_S (2+70) V_A

F_S (4+50) V_A – Com +

Total Stewdence
+ Total Multiclass

7/7/1932 000

Fn @ 4+00 S

BS 2+70 268° 45' 40"

FS (5+00 S) VA = 90° 03' 10"

FS (5+50 S) VA = 89° 37' 05"

FS (5+70 S) VA = 89° 02' 10"

△ 5+70 S

HI = 0.4M

BS (4+00 S) VA = 91° 12' 00"

FS (6+00 S) VA = 265° 27' 20"

FS (6+50 S) VA = 268° 42' 30"

FS (6+70 S) VA = 270° 09' 50"

△ 6+70 S

3+Brooks

HI = 0.6M.

BS (5+70 S) VA = 269° 18' 30"

FS (7+00 S) VA = 89° 31' 20"

FS (7+50 S) VA = 88° 47' 50"

FS (8+00 S) VA = 88° 13' 50"

△ 8+00 S

HI = 0.7M

BS (6+70 S) VA = 267° 39' 40"

FS (8+50 S) not visible

FS (9+00 S) VA = 88° 34' 50"

turn off E/W line

50 ft each side

2+2 pilots

Δ 9+00S BS (9+50S) VA = 267°52'10"

FS (9+50S) VA = 96°10'40"

HI = 0.8 M

Δ 9+50S BS (9+00) VA = 268°39'10"

FS (10+00) Not visible in ravine

HI = 0.7M FS (10+50) VA = 89°03'40"

Ravine ≈ 10+15S (10M deep?)

Δ 10+50S BS (9+50S) VA = 268°20'40"

FS (11+00S) VA = 97°03'10"

HI = 0.7M.

FS (11+50S) VA = 93°24'00"

Swamp & East of station 11+00 ≈ 20-30 m.

Δ 11+50S BS (10+50S) VA = 87°13'30"

FS (12+[illegible]45) VA 276°00'50"

HI = 0.4M.

Ja 13/84

Δ 11+945 B_S (11+000S) V_A = 266° 29' 00"

H_I = 0.5M F_S (12+000S) V_A = 97° 57' 10"

Δ 12+000S B_S (11+000S) V_A = 93° 08' 00"

H_I = 0.5M F_S (12+500S) V_A = 91° 20' 10"

turn off to E @ 90°.
500M

F_S (13+000S) V_A = 91° 55' 00"

F_S (13+500S) V_A = 91° 18' 10"

Δ 13+505 B_S (13+000S) V_A = 90° 30' 00"

H_I = 0.55M F_S (14+000S) V_A = 268° 15' 10"

torque of swamp about 10M West of 14+000S
swamp goes considerable dist north

F_S (14+255) V_A = 268° 38' 10"

Δ(14+255) BS(13+50)VA = 89°27'50"

FS(14+50)VA = 26°38'20"

HI = 0.5M FS(14+)VA = 26°27'00"

swamp

M+67M edge of swamp to gate

14+90(S) edge of swamp to gate

Δ (14+00S) BS(14+255)VA = 275°49'10"

FS(18+00)VA = 91°15'30"

HI = 0.5M FS( )VA =

Δ(15+00S) BS(14+50)VA = 269°54'10"

HI = 0.6M FS(15+35)VA = 88°28'10"

Δ(15+35) BS(15+00)VA = 266°32'00"

FS(15+50)VA = 94°40'40"

HI = 0.6M FS(16+00)VA = 91°53'10"

Δ(16+00S) BS(15+50)VA = 89°43'00"

FS(16+50)VA = 268°59'00"

~10M from edge of clear swamp HI = 0.65 FS(17+00)VA = 269°06'50"

M = 108M ∈ — across clear swamp to ~20M past far edge of swamp

---

Δ(16+00S) FS(17+50)VA = 269°34'50"

(edge of swamp ~18+75 very visible) FS(18+00S)VA = 269°44'00"

Δ(18+00S) BS(14+00)VA = 90°04'30"

HI = 0.55M FS(18+50)VA = 269°52'00"

FS(19+00)VA = ~269°48' "can't see"

FS(19+50)VA = 270°09'30"

edge of swamp ~19+40 very indistinct FS(20+00)VA = 270°32'40"

14/84

Δ 20+00S BS(17+00S)VA = 90°40'50"

FS(20+50)VA = 271°55'00"

HI = 0.45 FS(20+00)VA = 272°24'50"

turn of 50M E/W ⊙ 90° to R

Establish into open swamp after 50M

Δ 21+00S BS(19+50S)VA = 92°34'50"

HI = 0.60 FS(21+50)VA = 274°45'30"

FS(21+65)VA = 274°29'30

Jan 15/85

Δ 21+655 BS (20+50 S) V_A = 265°38'50"
FS (22+01) V_A 91°45'10
H_I = 0.55M FS (22+50) V_A = 88°09'20

Δ 22+50 BS (22+01) V_A = 265°24'10"
H_I = 0.75M FS (23+00) V_A 89°45'20

Δ 23+00 BS (22+50S) V_A = 91°44'20"
H_I = 0.55 FS (23+50) V_A = 269°46'30"
FS (24+00) V_A = 270°35'30"
small dam/swamp
edge 5M E of 23+25S

Δ 24+00S BS (23+00) V_A = 91°18'30"
H_I = 0.70 FS (24+50) V_A = 270°12'20"
FS (25+00) V_A = 270°35'50"
Son sad way
tw — E/W @ 90° FS (25+50) V_A = 270°36'50"

Δ 25+50S BS (24+00) V_A = 91°08'20"
FS (26+00S) V_A = 269°18'40"
H_I = 0.65M FS (26+50S) V_A = 271°26'20"

Δ 26+50 S BS (26+00S) 265°48'00"
H_I = 0.75M FS (27+00S) 90°02'10"
FS (27+50) 89°25'30"
(small clearing (swamp) FS (28+00S) 88°27'40"
edge N 15M west of line @ 26+75)

Δ 28+00S BS (27+00S) 267°17'10"
H_I = 0.65M FS (28+50) — can't see in hollow
FS (29+00S) — 87°22'10"
Jan 16/85
Tw — o/h
50M E/W @ 90° small road swamp just west of 28+50S

Δ 29+00 S BS (27+00S) 267°09'58"
BS (28+50S) 265°54'50"
H_I = 0.55 FS (29+50S) 86°20'10"

Δ 29+50 S
H_I = 0.69M

BS (27+00) VA = 265°00'10"
FS (30+00 S) VA = 89°55'30"
FS (30+50 S) VA = 89°45'30"
FS (31+00 S) VA = 89°23'30"

Jan 17/85

FS (31+50 S) VA = 89°18'10"

extended elevation → FS (32+00 S) VA 89°25'20"

Calculate error for 20"

Δ 32+00 S

H_I = 0.5M

BS (31+50 S) VA = 90 46 20
FS (32+50) VA = 270°12'00"
FS (33+00) VA = 270°13'50"
FS (33+50) VA = 270°11'20"
FS (34+00) VA = 270°8'50"

turn off +50M E/W @ 90° into partially clear swap @ 32+75 out @ 33+00

Δ 34+00 S
H_I = 0.71M

BS (33+00) VA = 90°26'50"
FS (34+00) VA 268°32'40"
FS (34+00) VA = 269°39'10"
FS (35+50) VA 270°03'10"
FS (36+00 S) VA 270°05'30"

Δ 36+00 S ⊥ BS (line)
turn E/W @ 90° grid line
END OF BASELINE

Jan 17/85

STAR SHOT — POLARIS

Δ 17+50 S
BS (16+00 S) } line set 0°0'0"

5:30 PM PST
VA = 325°00'50"
HA = 345°21'30"

5:34 PM PST.
VA = 325°01'00"
HA = 345°26'30"

WATCH CHECK IN HOUSTON
WITHIN 15 SECONDS - 2 HRS LATER

L36SE Jan 18/85

100ME - W edge of swamp clearing
150ME - E edge of swamp "
210ME - W edge of swamp "
375ME - E edge of swamp "
675ME - creek depression
1000E END

L32SE Jan 21/85

75ME - W. edge of swamp clearing
125ME - E edge of swamp clearing
150ME - E-W(astr) blazed + flagged line
565ME - E-W(astr) flagged line (no blaze blue flagging with L4, 2400E also red flagging
575ME - N-S(astr) flagged line (no blaze) flagging up high
650ME - approx crest of hill.
2000ME - end of line Jan 23/85

Jan. 21/85 LBW - Mike.

L36S - 4+40W - ℄ of Draw.
- 6+02W - ℄ of Draw
7+45 - ℄ of Draw.
8+70 - South end of open Clearing Long + Nar. to North
10+95 - ℄ of Draw

Jan 23→25/85 -

L28SE

450-500ME → 10-20m South of line is a fair sized clear area
625ME → N/S flagged line - red flagging
650ME → E/W flagged line blue/red
850→880ME → Small clearing alongside line & to the south
980ME → Ravine - fairly shallow could be a small creek

2000ME end of line Jan 25/85

Line tends to steadily decrease in altitude from west to East.

L 245 E Jan 26/27 '85

200-250 - small mostly clear patch just to north of line here

1160 - crest of hill

1750 - west edge of Foxy Creek ravine quite steep ~15m deep

1810 ±5 - Foxy creek cuts line at ~45° angle - creek meanders in ravine bottom

1850 - End part way up East rim of canyon.
Line terminated short of target 2000m due to too late to finish and not worth going back in for only 150m.

L 20S E Jan 28/30 '85

70→300 partially clear swamp area

300→380 line is in narrow strip of timber between lake to North + clear swamp to South

380→450 along south shore of lake

450→1000 in/out of partially clear swampy areas

1180 Foxy creek tributary crosses in shallow ravine

1210-1245 small clearing 2/3 north of line 1/3 south

1345 - NW rim of Foxy creek tributary ravine

1345→1420 - on side hill of ravine

1420 - NW rim of Foxy creek trib } level area

1445 ± NW rim of Foxy creek tributary

1500 - end of line down on side hill of Foxy creek ravine.

L 16 SE Jan 30/31 '85

15-125 mostly clear swampy area

175-250 large clearing ~15-20 m to South of line

340-425 large clearing - line cuts through south of center.

700 at edge of SW corner of swamp clearing found ID post - but no writing on it. Post is ~30m south of line.

750 blazed claim line crosses grid line

675-790 clearing crescent shaped -

860-875 small clearing - line cuts south edge.

Line 16SE Cont

1100 + 1120 – small clearing – line cuts south edge

1160 – 1180 – small clearing – line cuts through middle

1270 – 1290 – small clearing – line cuts through middle + blazed E-W line

1300 – found ID post ~ about 15M north of line. ID post writing badly faded but "Lucky Ben" "05 4E" still legible

1500 – End of line

Line 12SE Ja 31/Feb 1

50E – drop off to lower level

150-190E – line cuts N edge of large clearing

245-255E – line cuts S edge of large clearing

300-330E – line cuts S edge of small clearing

525E – small partially clear area to the south of line

650-700E – line cuts N edge of large clearing

Line 12SE Cont

725E – blazed + flagged N/S line crosses grid line

800E – Foxy creek is about 5M S

1100-1130E – line cuts over edge of deep canyon – Foxy Creek

1130E – old road comes in from N up to Foxy canyon edge + goes west to ~N1080E where area for turnaround cleared

1130 → 1395E Foxy creek Canyon Navig distance to S

1395E – edge of Foxy Creek Canyon Very deep + steep – est 75M deep, 300M wide

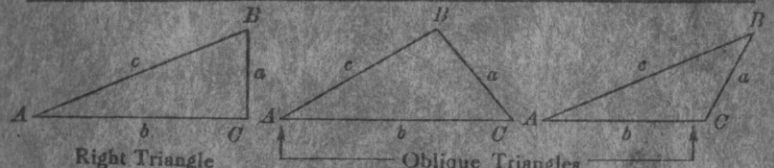
1700E – End – Line cut short because of steep drop off

Line 0SE Feb 2/3/85

~90 ME - edge of dropoff into ravine
~110-140 - N/S clearing at bottom of ravine
~145 - edge of ravine
245 - crest of ridge
350 - crest of ridge
425→450 - line crosses S edge of fairly large clearing
~470 - crest of ridge
~520 - crest of ridge
600 - crest of narrow ridge
775→800 - small clearing about 10-20M to S
850→870 - line crosses S end of fair sized clearing
~900 - small clearing ~15M to S of line
960-990 - line crosses ~20M from N end of clearing which extends ~50M to S
1060→1075 - small clearing ~10M to N of line
1103 - center of roadway running N/S
1150→1250 - narrow clearing ~10M→20M to N of line
1100→1500 in depression between two ridges - possible creek.
1500 End of line.

Bruce - 845-7609

TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

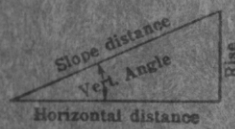
For Angle A, $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given	Required	
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	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A$

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}, C = 180° - (A + B), c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}, C = 180° - (A + B), c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180° - C, \tan \frac{1}{2}(A - B) = \frac{(a-b)\tan \frac{1}{2}(A+B)}{a+b}, c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a+b+c}{2}, \sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}, \sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}}, C = 180° - (A + B)$
a, b, c	Area	$s = \frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	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° 10′ = .9959. Horizontal distance = 319.4 × .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° 10′ = .9959. 1 − .9959 = .0041. 319.4 × .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.