

PACIFIC
WATERPROOF

013543

FIELD BOOK

No. 301

Roe Hill

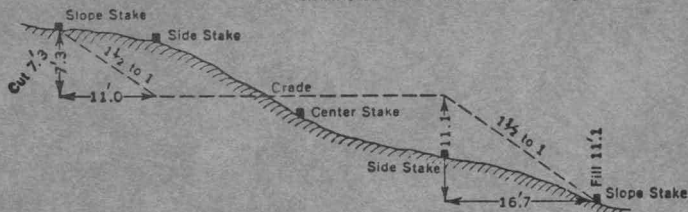
Field Notes

Jan 1901

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes $1\frac{1}{2}$ 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.



Cutor Fill	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cutor 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

AUG 19

PEEL RIVER

Ray Conet - Pilot

SECTION 106 E 17 - Camp #1

Started at north end

Silt and muds locally carbonaceous
with coaly beds

Very poorly consolidated - subject
to mud flowage. Probably underlies
coal. Much leafy material & fragments
Very soft

Coal bed is contorted - probably
either soft sediment deformation or
glacial deformation - more likely
overlain unconformably by Quaternary
gravel

Brown lignite with some black
vitreous bands

White Ash bands an inch or so thick
every few inches

Base of seam not exposed

Black slumping

At top of seam dip is approx

~~50/004~~ 004/50 E

Coal overlain by thick light grey mudst clay

Samples start from top of seam

Top 12'

PR 1

lignite

1'

light grey mud

~ Discontinuity (slumping) ~~~~~

4'

PR 2

lignite (ash bands)

~~correct interval (gravel)~~

(bedding rolls over to 081/26N)

9'

PR 3

lignite (ash bands)

bedding 102/31N (Good cleat here)

~~~~~ ? steep fault? ~~~~~

Zone of 4' of crushed coal & ash, not sampled

Displacement unknown. Drag folding

~~~~~

24 ft

PR 4

lignite - a little ash

Dip 153/20 NE ~~low~~ a few thin clay bands

Base of coal - light grey clay

with beds of dk bn carbonaceous

mudstone

About 6 ft exposed,

below that a thick covered interval

(~100') which further along the

dipps looks like lt grey clay with

~~conglomerate~~ massive conglom below

Walking westward - continued
down section

Conglomerate is massive - beds
up to 6' thick with lenses
of cross-bedded sand in between

- very poorly sorted & indurated. ^{Not cemented}
- pebbles average about $\frac{1}{2}$ " diam,
a few up to 1"
- really a gravel, not conglom
Lenses of sand from a few inches to
several feet thick

Locally gravel has limonitic cement

3 ft light gray clay

Lower Lignite. Top part looks rather
muddy, but appears to get cleaner
downwards. Rather harder than the
upper seam. Dip ~~121/00~~ 121/4° NE

upper 8 ft

PR5

lignite

lower 8 ft

PR6

lignite - a

few clay bands (1")

Below coal - med. gray clay
for exposed 3 ft.

(Covered interval)

Below that - 100 ft or so
of unconsolidated gravels with
sandy lenses, cobbles in gravel
get coarser towards base - up to 12"

Below that - slightly harder sand
Well cross-bedded med brown

A few little plant stems or
rootlets standing + bedding

Sst probably a couple of hundred
feet thick - didn't continue
round section - base not exposed

Some bands quite well cemented
eg PR-77-1

Thin bedded

Aug 20.

A. Move camp to site #3

B. Reconnaissance.

① Junct of Bonnet Plume & Peel R
& Noisy Creek area

Good exposure of UKBP₂ -
mostly gravels with sand lenses,
apparently.

Returned past camp, continued
down section

Clearly seen that Q gravels u/c
on Bonnet plume - discordance
~ 10-15°. Both seams sampled

are cut out by feather edge

below Quaternary u/c. At west end of
section 106E-17 lower (third) seam of lignite

approx 6 feet thick, overlain by
soft light greenish grey mudstone
Underlain by soft light greenish
grey clay. Dip 156/13 NE approx

Sample PR7

exposure
in little
creek cut

||||| mudst

15" Hard lignite

~~15~~ 12" soft, black lig.

24" Hard lignite

12" soft, black lig

12" Hard, lignite

||||| clay

Long's camp #5 good exp. on SW
Flank Mt. Delamater, also in
river bank Mostly gravelly cong
with thin sst lenses

At ③ - ILLTYD CK.

Good exposure in cliff

Approx 18-20 ft thick seam of
lignite overlain by relatively soft
gravelly cong.

Coal looks a lot better than
that on Lee R - its harder, bright
coal (? subbit)

Contains several thin mudstone
bands. BASE NOT EXPOSED

Dip approx 197/12 E
~~Underlain by black~~

Small Sample PR8

2 Photos + 3 ft section

Lignite underlain by thick bedded
light brownish grey sandstone

About 200 yds north - second, lower
seam exposed behind stump

(photo) - impossible to judge thickness
but probably $> 5'$ - May be same
seam brought down by faulting

All these sed's are a lot better
indurated than along P River

Then along B.P. River (photos)

Aug 21

Second camp - Section 106E18
Started at NE end of section

Lignite seam Dip 172/50E
Steep dip may be due to glacial action
Underlain by inconsol pebbly sst
massive, cross bedded

East limb of anticline

Lignite thin bedded looks rather
dirty - some hard, bright bands,
also some white ? volcanic ash
bands. ~~Top of seam covered~~
~~by~~

Overlain by about 3 feet of
gray clay, in turn overlain by
coarse inconsol gravel which
looks like quaternary, but
long dimensions of cobbles // to
bedding in coal. - probably
in sequence.

Top 8 feet	PR9	} Combined
↓ 6 feet	PR10	

1 ft gray clay

Below this - lignite very dirty

10 ft +
~~± 6 ft ± 5 ft~~ black soft carb mudst

260
180
80

with lignite bands - tastes
like Plasticene!

Interbanded - lignite bands a few
inches to a foot thick

Less than 50% lignite

Then a covered interval
before gravel below.

Some evidence for burning in
situ off to the side

On the way back - other seam
looks like same one on west
limb of anticline.

Top 6 ft or so looks like reasonably
good lignite, below which is
10 feet or so of interbanded
lignite, black mudstone & light
gray clay (Photo)

Dip ~~260/145~~ 260/145!

Remainder of section mostly obscured
by Pleist & recent sands

Mon Aug 22

Fly out of 2nd camp.

Very late! Left equipment, food & 2 samples

Saw 2 grizzlies

Drove to Dawson

§

Tue Aug 23

Repairs to truck

Mould drinking heavily - beginning
to get out of hand.

Wed Aug 24 DAWSON AREA

Helicopter Reconnaissance

✓ INDIAN R.

Only spotty outcrop - Haystack Mtn
appears volcanic (eTcu?) No
coal seams seen - did not land.
No good outcrops of eTcu seen below volcanos.

✓ SVEN CREEK MINE

No trace of anything except
nice schist, & 1 black bear.

✓ CLIFF CK MINE

No outcrop - no trace of
of old mineworkings or railway
Cliffs along River & near
head of creek - looks like
thick sequence of sands & gravels.
Dips up to 45° no trace of coal

✓ SOURDOUGH MINE

Old building - lots of
coaly material in soil
Outcrop in creek - poorly consd
sands & pebble cong. - similar
to Leek River

Some loose coaly material - no
outcrop. Looks mostly like
dull black lignite with streaks
of bright coal
Old steam boilers

Found remains of a collapsed
adit

Very thick brush in bottom of
valley

Found a clearing full of dark
slaty material - spoil heap?
with a couple of large lumps
of coal cont. resin globules

Down the creek from minesite -
odd outcrops of unconsd sands
& black shales along north
bank

✓ COAL CK

odd outcrops of sst. & cong
No trace of coal

✓ FIFTEEN MILE R

No outcrop
No trace of coal.

✓ GATES MINE

Old building, ~~exit~~ boiler,
burnt red shale, mine equipt.
Some coaly material in soil -
black, moderately bright

Area mostly flat - no outcrop

Thurs Aug 25 Tried to drive to
Indian R. area - couldn't get through

Fri Aug 26 Drove to Carmacks.

✓ Mould met his love-life and quit.

Sat Aug 27 Went to Whitehorse with
Mould to collect truck - R.T. Carmacks

Sun, Aug 28
Brabrum coal area.

Cub Mtn LKT, just about vertical (photos). Covered areas may reflect recessive horizons (? cont. coal). Verticality indicates unfavourable mining situation.

Lake George ssts & shales exposed along road to Division Mtn - contains thin coaly shale bands. Sequence contorted by minor folding.

RAIN STOPPED PLAY

Mon, Aug 29

Division Mtn

① Found 2 DDH on one site - trend 040° , one (HW casing) @ -50° one (NW casing) @ -61°

~~App~~ Sited on massive '(Tantalus?) pebble conglomerate, bearing on Division Mtn 158°

Bearing on southern peak of Vowel mountain 310°

Photo - S end Vowel Mtn - syncline in LKT cong.

Dips are steep - $\sim 70-90^\circ$. DM-77-1

② Just down dip to NE - ~~Go~~ white pebble cong - pebbles up to $1/4"$, uplain by coarse

white sst (Lake George) DM-77-2 Dip $308/61$ SW

③ Ck Vcg white sst with beds of white quartz-pebble
cong - pebbles up to $\frac{1}{4}$ ". Dip 325/39 SW

Probably, labege st. Contains interbeds of
black carb shale & grey shale. Walking eastward
dip steepens rapidly - (may be a fault)

④ Same sst & cong - dip 332/79 SW

⑤ Same dip 332/74

⑥ Band of black carb shale approx 10ft thick -
o/lain to SW by veg white sst, u/lain to NE
by mottled gray & white veg sst - looks
like pea-sized pebbles of quartz & feldspar in
a grey ~~carbonaceous~~ carbonaceous mud matrix

DM-77-3

⑦ Small covered interval, then a body of
igneous rock - dark blue-grey (DM-77-4A),
green-weathering (48) vesicular lava, possibly
of intermediate composition.

NE contact, with underlying carb shales,
appears to dip // bedding, but not well exposed
shales weathered, $\therefore$ cannot see if backed.

Appears to be lava flow perhaps 20ft + thick
within labege sequence

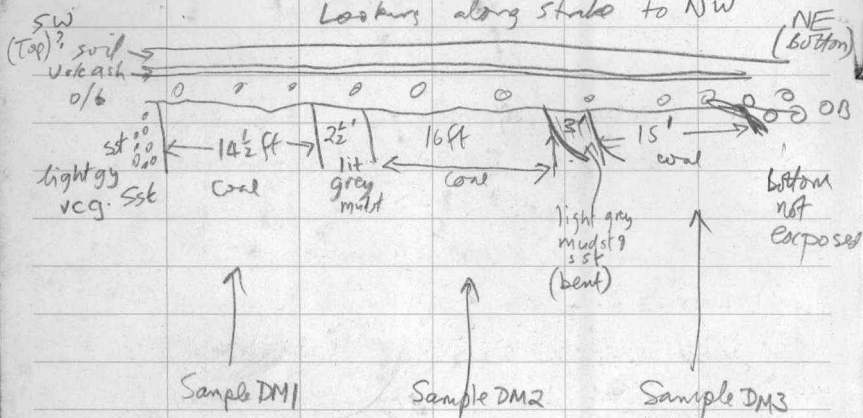
Carb shales ~ 6ft thick, u/lain by ~ 10ft
veg white sst, u/lain by ~ 15ft

dirty coal with carb shale partings,

u/lain by veg white sst dip 311/87 SW

Walking E, then about 70ft vcg
grey sst with interbeds of grey shale
+ black carb shale

(8) THEN Thick coal seam with
sandstone partings - well-exposed
in trenches - approx 50ft wide + vertical
Looking along strike to NW



Note - apparently high ash
- apparently highly oxidised
- thin overburden (1-3 ft)

Photos taken

20ft NE of NE end - more coal +
coaly shale exposed in trench -
seems to be sst in between but not continuously
exposed - lower zone about 6ft thick,
then more grey sandstone.

33
17
16

67
36
75

Tue Aug 30

- (9) DDTI drilled 540 to 310 - Along strike!!!
Coal apparently u/lam by vcg sst with
grey shale interbeds, but contact obscured
by catwork.

big long trench extends east from
here - very little exposure in it except
for odd bit of vcg sst

- (10) Sst - grey vcg dip 311/69 SW
Same sequence - grey cg to vcg sst
with interbeds of dk grey shale - seems
to continue past small gully.

AK(11) Very massive, brown-weathering
cg sandstone - ~~looks~~ highly jointed
DM-77-5 Dip 304/73 SW

Looks like they tried to follow seams
along strike to NW by trenching - looks
like bulk sample test pit which has
been filled in again

(12) S. side of gully - ~~only~~ much coal
in material in bank beside road.

(13) Coal exposed in trenches - does not
appear to be along strike with coal
on N side - could be fault
along gully

(14) More coal exposed in trenches -
hosted by massive gray sandstone.
Appears along strike with thin
upper seam on N side.

BUT Dip in east appears to be 250/765
OB thicker - ~ 6 ft

They do not appear to have gone
far enough east with trenches

Aug 31 Torrential rain

Sept 1 Waiting on G. Mackay to
get up enough enthusiasm to fly

Sept 2 A.M. Aerial Reconnaissance

✓ Jumpout ck.

- ① Near head of ck - mudflow of poorly consol. material - mud, light grey mudst with much carb plant material & congl, pebbles, pebbles & lumps of volcanic breccia & agglomerate. No outcrop of solid rock.

Appears to be a pocket of Tertiary sed. beneath Carmacks volcanic.

Sample JC-1 for petrographic
"Hoodoo"-like structures are a poorly consol. massive congl. Cont. rounded igneous rock pebbles & cobbles, rounded tuffaceous & volcanic pebbles & cobbles, angular mudstone pebbles. Fragments up to 6" diam. & tuffaceous clayey matrix.

Almost certainly Tertiary

Seems to be same rocks down stream in high banks, at least as far as elbow - same below.

CLAIRE CK.

Deep, narrow valley
o/c of ? JL ssts & congs o/c by
Carmacks Volcanics

No trace of coal seen.

Dips steep ($70-80^{\circ}$)

SEPT 2 P.M. Aerial recon

MOUNT VOWELS

NE side - no coal seen

SW side - shallow trenches, filled
in?

Two creeks NW of Mt Vowels -
good outcrop, steeply dipping JL
ssts & congs with shaley bands -
no sign of coal

Photos of Div. Mtn. trenching

Rt Carmacks - photo of coal exp
just off highway, a little north
of Jackson Bill's place

Sept 3 AM Reconnaissance

GRENER'S MINE (Fort Selkirk)

On Yukon R - left bank - lots
of exposures of Selkirk volcanics with
good columnar jointing.

Stopped at Pelly Farm for Coffee

✓ GRANITE CANYON

Columnar Basalt at south end

No trace of coal or seeds

✓ NEEDLEROCK CR.

Unconsol sands in banks

✓ PEARMIGAN MTN

Reported by Greg Simms

Could not locate

MINTO CONG.

Little outcrops of fantails cong.

Long, low ridge. No Coal seen

Sept 4 Truck broke down - waiting for
parts etc. Transfer case
broken

Sept 7

LONE PINE MTN

Around gravel pit @ Mile 90, KM 142

- ① Just to north of pit, just below power line, is dark shaley patch on hillside. This is grey shale or in soil - just above this is thin bedded med grey med grd sst outcrop - dip $318/81$ SW

In powerline above - coarse grained grey sandst with carb partings - dip about the same. Conts bands

of gty & chert pebble cong (pebbles up to $\frac{1}{2}$ ") which resembles Tantalus cong, but poorly cemented (? weathering)

Walking south along power line, pass from cong through cg sst into black & dk bn carb shales - all steeply dipping

- ② Above gravel pit - site of old adit, now collapsed. Coal exposed - apparently deformed & contorted around conchy rock, cong & sst. ^(igneous mass) Coal appears quite clean & bright, but oxidised
- Sample LPI Photo

- ③ At KM 140 - roadside cut in dk grey and black shales with carb partings & coaly bands - ? JL dip 160/25 NE
- ④ At KM 137 - gravel cut beside road
 Dk grey & black cg to veg sst with coaly bands - coal very weathered & very oxidised. Much coaly material in surrounding soil. Resembles JL seen at Morrison Mbr
 Dip 302/82 SW. Seems intruded by weathered, light brown feldspar porphyry (LP-TT-1)

PORTER COAL

Just off highway at Mile 86 - exposure seen from helicopter Sept 2. Cat trail.

Ridge next to highway - ~~segment~~ feldspar porphyry. Walking up cat trail, rubble in floor changes abruptly from light cream ig rock to g/b & chert pebbles at about location of gully to north (?? contact)

Weathered & oxidised coaly material exposed on bank beside trail

Big outcrop - slump area - sequence
of interbedded sst, shales &
coal seams - beds mostly a foot
thick or so. Sst med to vcg, med
to dk grey ^{xbd} coal - banded, bright &
dull, weathered, oxidized.

Dip approx 090/37°N, but could
be contorted. Photo

Samples PC 1 - from outcrop

PC 2 - had, bright coal from float

(Just down trail - found claim posts)

Cobbles of cong with angular pebbles around

Post #2

MAY M.C #6 (95)

N

R 1500

April 17, 70

P. F. Guder

Guder's coal

Approx 2 mi S - roadside outcrop
Big trench & remains of small adit
Rather contorted & faulted - grey fg sst
& black & dk grey vcg sst with
thin coal seams - almost vertical
Coal friable & soft & crushed.
Strike 355° GC 1

Black Sst resembles Division M+
Dominant lithology is mg gray sst -
probably JL. photo

Sept 8 GODDAM FUCKING AVIS
TRUCK BROKE DOWN AGAIN

Sept 9 Drove to Ross River

Sept 10.

ROSS RIVER COAL

- ① Roadside gravel cut (ME2) about 6 feet of soft, black coal, overlain by a few feet of med grey shales & sst, then unconformable glacial material. Appears to be underlain by soft creamy-coloured clay - possibly bentonite.

Dip approx 315/40 SW - but may have slumped. Looks like DIP SLOPE

- ② About 100 yd along rd - dark grey siltstone, thin bed, dip 279/64 S

~~Looks like~~ Coal, parting

- ③ Dk grey siltstone & shales, locally black with carb parting. Dip 137/24 NE. Hard & well indurated - looks older than Tertiary

- ④ Borrow Pit - black & dk grey ~~med~~ shales & siltst & sandst. Dip 250/15 SE. Trail leads to power line - does not seem to be much outcrop around power line (flat). Dip steepens a bit towards road.

- ⑤ Massive chert pebble cong
Black & white chert pebbles well
rounded but low sphericity - largest 2" long.
~~Interbeds~~ of dk grey shales & silt
Overlies

Dip 246/40 SE

Resembles upper part of Kootenay Fm,
overlain by Basal Blairmore Cong
Cong extends all along lake to

- ⑥ where dip is 232/25 SE

Beds 3-4-5 ft thick - interbeds of 1'
sst & coaly shale parting

Sept 11 R. T. Carmichael

M.O.H. Trenching around open Pit.

SAMPLE ANALYSES

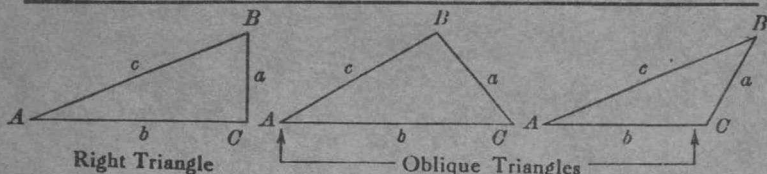
PR 1-8, Prox, S, B.T.U. crush to $\frac{1}{4}$ ", Air dry.
~~Test $\frac{1}{4}$ " x 28 mesh fraction~~

DM 1-3 Air dry Crush to $\frac{1}{4}$ " - Analyse $\frac{1}{4}$ " x 28 mesh
for Prox, S, B.T.U., F.S.I.,
Washability curve @

RR 1

Ditto

TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

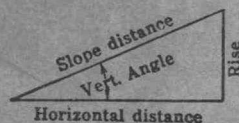
For Angle A . $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given a, b	Required 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 A, B, a	Required 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 - $5^\circ 10'$. 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. $\cos 5^\circ 10' = .9959$. $1 - .9959 = .0041$. $319.4 \times .0041 = 1.31$. $319.4 - 1.31 = 318.09$ 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.