4693 673 9 157.3 470.53

1243

Hubbard
County

This Book belongs
to Harold Curo
County Surveyor of Cass
County Walker Minn.

1356.96
91.45

THIS BOOK BELONGS TO WALTER
E. CURO
HACKENSACK MINN

The paper in this book **No. 360**
is made of **100%** high grade rag stock
with a **WATER RESISTING** surface sizing.

2-5	A.B. MOODY	27-141-34
6-11	ED. LOF	NW-NE-10-140-33
12-13		35-141-34
14-29	W.F. BOORTZ	RINE CONE LODGE 6-35-141-34
30-35	W. WILLIAMS	NW-NW-30-140-34
37-42	INTERSECTIONS OF HWYS 64+34 AMELEY	
43-	DORSEY BANK	34-141-34
44-45	STROUT RLTY.	GL 1-12-140-34
46-49	N. RIETER	LOT 17 MUSHIE BAY
50-	FLETCHER	GL 5-26-141-34
52-55	DOCK'S RESORT	9-139-32
56-59	GREEN	6-140-32
60-63	COLEMAN	BLDG LOCATIONS
64-67	C. CHASE	12-140-32
68-69	R. ERICKSON	NE-NE-21-135-29
70-75	F ERICKSON	5-3-141-29
76-78	R ERICKSON	5-140-28
80-81	F. ERICKSON	5-3-141-29
82-90	C. CHASE	
92-93	F. MARTIN	CARLSON'S FIELD AC,
94-97	M. PELTIER	NE-SW 3-141-29
98-115	T. DUPRE	1-140-30
116-117	C. LANGESON	1-27-140-30
118-119	R. HOWE	GL 1-1-140-27
120-130	REMONUMENTATION	
132-133	L. CLODFELDER	5-137-29

INDEX

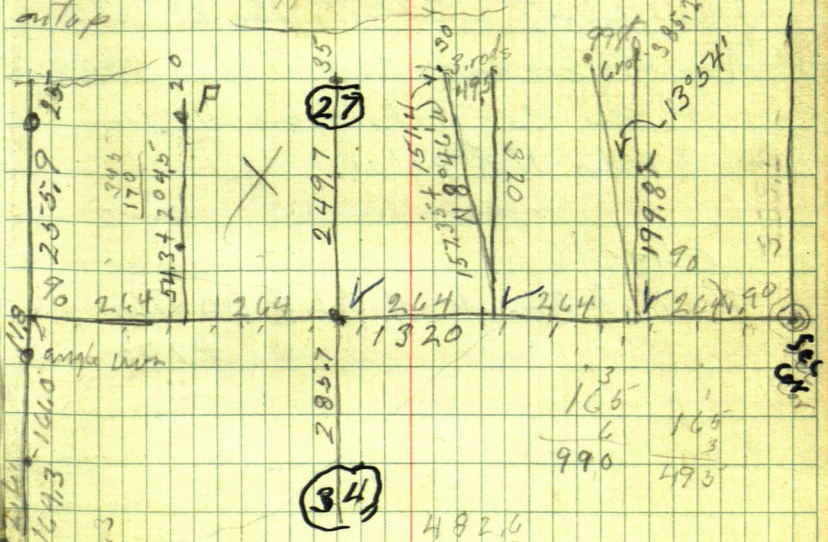
Sunday

A B Moody Dorset

1714 / 6 / 165.4

3

Bob Ed + I to Corner 26-27 34-35-14N-34 where we meet Mr Moody we find the I M Sec. Cor. in Center of the road Down I M site N 2 ft W of N&S fence and run West at every 16 rods or 264 ft mark in E road + 264 = 528 hub + 264 = 792 hub hit 39" W.P. offset 1 ft N @ 957.6 hub on top



20°

Cosine .939693 unit 99 = 105.35

.2475 = 13°54'

400 / 99.0

4

160
160
320

165
3
495

Tues Aug. 1960

John - Bob + I to Sec. 27-141-34
Town second 264 ft tract site
E + run North 320 ft.

15-41 = 8°46'-

320 / 495
320
1750
1600
1500
1280
320

152411
320

Wed. Aug.
John - Bob + I to Sec. 27-141-34
Town second 264 ft pt or 528 ft
W of sec. cor site E on sec line
and run N 8°46' W

Check
Nat Bank of ALEDO Ill
#170

H1071

Nevis Minn

C.R. Hewitt Representative
of the Estate of Peter Kavanagh Decedent
& Edwin A. Loft Eva M Loft his wife
Hubbard County

Deed

That part of the NW¼ of the NE¼ Sec 10
140-33 containing 7.48 acres ± bounded
and described as follows:
Commencing at N¼ cor. sec 10 & running
South on the N & S. E a dist. of 687 ft. thence
East 33 ft to point of Beg. on the E Boundary
of First Street in the Village of Nevis
thence continue E 164 ft thence deflect
Left 90°15' a dist of 100 ft thence Interior Angle
96°45' on and along the S. line of tract
heretofore conveyed a dist of 250 ft
thence deflect Left 83°10' on the E line of
tract heretofore conveyed a dist of 330 ft
to apt on south boundary of former
Highway #34 thence NEerly Interior angle
122° a dist of 337.4 ft along S boundary
of former Highway 34 thence deflect Right
26°25' on the S line of Front Street
in the Village of Nevis a dist. of 74 ft
to the West boundary of present highway 34

thence S Wesly on West boundary of T.H #34 Interior Angle 55°50' a dist. 1274.90 ft thence West, Interior Angle 117°50' on line parallel to S. line of said NW¼ of NE¼ a dist of 164.5 ft to a point on the E boundary line of First Street thence N on E boundary of 1st St. a dist of 479.4 ft ± to pt of Beg.

IN Office converting angles and deflections into courses, as follows South 687 ft: E 33 to pt of beg. E 164 N 0°15' W 100 N 83° E 250 N 0°10' W 330 N 58°10' E 337.40 N 84°35' E 74' S 28°45' W 1274.9 N 89°05' W 164.5 does not close, as this pt is 25.37 E and 1156.66 S of ¼ should be 33' E and 1166.40 S

Aug 11th

John & I drive to Nevis stop at LOF lumber Co. to see what land he has sold find he has commenced all tracts sold from N 1/16 on N & S ℄ Sec 10 and goes N to place of beg. as I do not know where or how

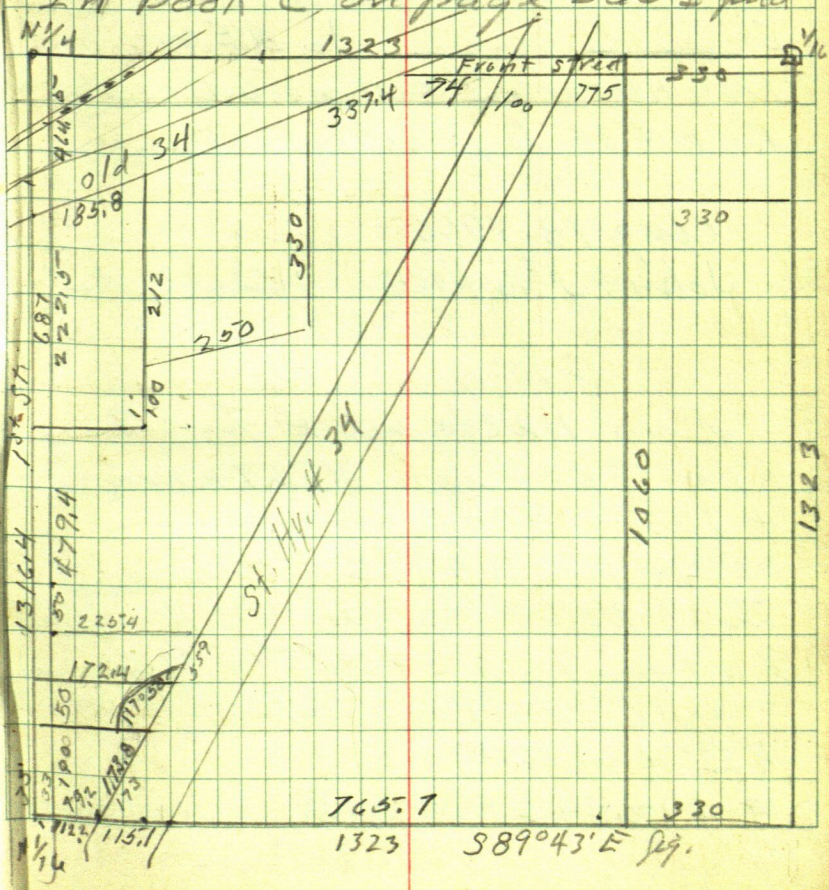
for S of N ¼ cor. the N ¼ is
there is not much I can do
until I find out get Phone
call from Gert - her Bob
and Mary went to Park
Rapids in the chev and
had trouble to start for
Park Rapids find them coming
about half way I give many
$5 for which she had paid
to get Chev fixed we all
stop at Nevis for supper

Fri Aug 12th 1960
I Gert + Mary go to Park
Rapids in Ford Gert +
Mary shop I go to Court House
to look up Records if any in
Sec 10 - 140 - 33
I find in Book C on
page 80 where Wilcie ran
the E & S from N ¼ Sec 10
and did some work in the
SE ¼ of NW ¼ sec 10 also
tract 132 ft N of N ¼ line W

of N+S ℄ the distance here shown from N¼ S along N+S ℄ at 1316.4 the N¼ + 1314.4 center of Sec. 10.

In Book A. Page 19 Spencer in 1909 called this distance 1314.6.

In Book C on page 360 I find



figureing and checking I [illegible] to get what I want.

⊼ over I M. on E street line [illegible] Eastern flag at I M 164 ft E and run south 359.4 set stake along this line at place L of wants it set for his N line

⊼ over 359.4 run S 89°47'E ______ to pt on R of W 34 = L of S. line & SE cor

⊼ back on stake set for LOF's N W cor run E ______ ______ to N E cor of tract

⊼ over NE cor run Southwesterly along R of W #34 to pt set for S.E cor

Aug. 18 - 1960
John & J to Nevis rain

⊼ over NW cor [illegible] E Tur 90 run S 60 ft spike at 359.4 spike + 125 + 144 - Iron pin

⊼ at 60 ft run N 88° E

This to NW cor 2" pipe east pole Hazel Park Resort sign bears S 46°45' W 12.3

3" Pipe E pole of Resort Centent sign bears N 22°30' W 26.15

90 + 170.5 + 25' =

170.5
90°
2605
25
285

170.5
90
2605

Monday Aug. 22 1960

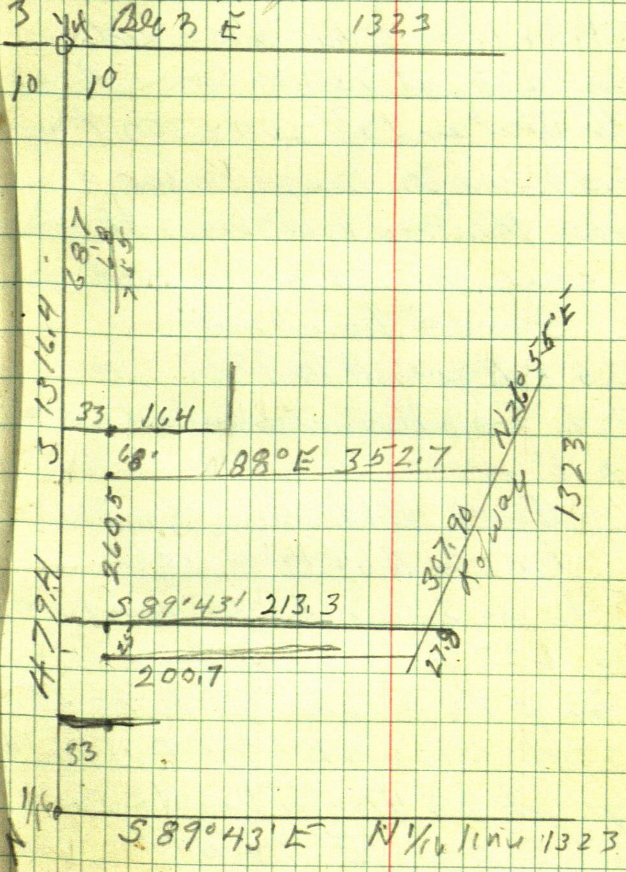
John - Bob & I to Neves

Moved wood hub right of way 34

other wood hub " " "

and intersect property line

with R of W



89.9

220
879
3079

60
60
80.7

60
153.3
213.3

27.7 + 150 + 175 =

175
325
27.7
352.7

200.7

12 Sec. 35-141-34

Book A page 334-335

Field Notes of Survey in Sec 35-141-34 as surveyed by Geny A Todd for H L Farmer & C L Thomas in Feb. 1919 Feb 15th

Wego to the I M 1/4 on S side Sec 35 & run N line N on 10° Var @ 100 enter Little Sand Lake at 730 Lv same at 1160 enter west end of 250 x 300 Slough at 1325.50 hub for temp 1/16 Cor @ 1449 cross Mantrap road bears NE SW @ 2674 center Sec 35 bears West 114 ft correct line back

hub 13 25.5 N goes N to 1337 then West 57 to True 1/16 Cor where we drive a 1/2 x 1/2 x 18" square iron for cor with New B T's Pos 2 N 19° 35' E 23.80

Pine 2 N 66° 15' W 14.80

Beg at E 1/16 on S line Sec 35 run North 12° Var @ 627 enter Little Sand Lake @ 1320 temp 1/16 on west at 1685 Lv Lake @ 2200 cross NE & SW Put road to cottage at 2650 the true NE Cor of South Lot 5 bears E - 32.50 ft

Correct line back

Hub 1685 goes East 20.70 & North to 1706 = true SE Cor Lot 5 drive a 1/2 x 1/2 x 18" Square iron for cor

Beg. at S W cor Lot 5 run East on true true 1/16 line at 492 set a 1/2 x 1/2 x 18" square iron for the SE cor Lot 5

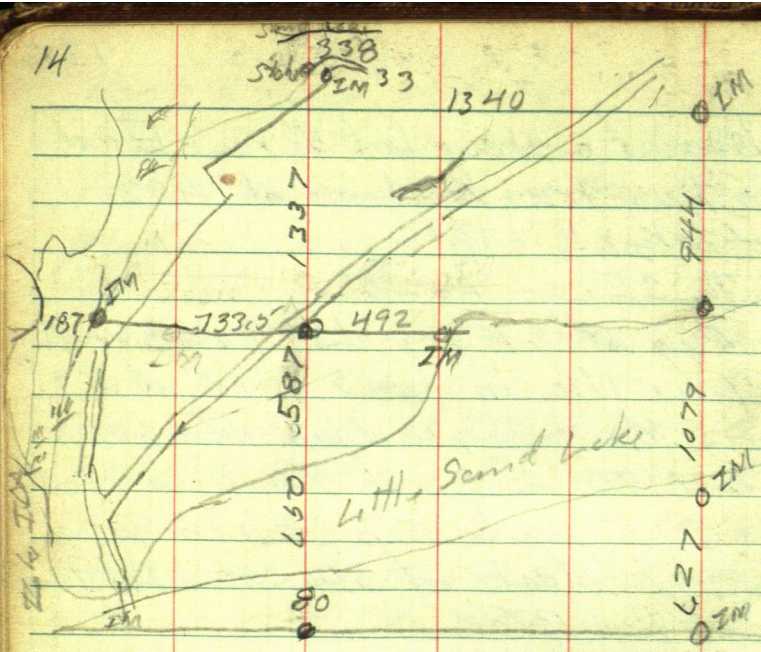
Beg at S E Cor Lot 9 run West on true 1/16 line Var 8°45' at 5.3 cross Mantrap road bra. NE & SW at 628.50 intersect Thomas road at 733.5 poplar stake + iron for high water Mark at SW cor Lot 9 with New B T's

Pop. 8 S 35 W 11.40

" Stub 8 N 10 W 2.4 a

at 745 enter swp at 920 enter lake where we drive a 4 x 4 x 60 Oak stake for true SW cor Lot 9

14



Robert M. Stuart
attorney at law
501 Park Bldg.
Council Bluffs Iowa

W.J. Boortz Survey

Aug, 24 - 1960

get call from Real Estate Olson
East Highway 34, Park Rapids Minn
Telephone 602 W 2

John - Bob + I drive to Olsons where I pick up another small plat of Pine Cone Lodge and drive onto Dorset get Lunch and on to Pine Cone Lodge we look for old lot and Street corners We find where Wilsie set the SW cor Lot 2 Blk 1 of Pine Cone lodge from this I.M we locate an iron at Street cor of Lake Ave Wilsie cor of Lot 1 & 2 is only 16 steps away and it should be 60 ft across Lot 1 and 20 ft over street We do not know what corner We found can find No others drive into Park Rapids to check records find nothing that will help.

Aug 25 1960 rain

Aug 26 1960 - Glen + family came from Kenner I finish Plat of Windy Acres and send it to M.B.P.Co.
Ed + I drive to Park Rapids to check Co. highway as the have put in a new Bridge since this was Platted and changed the road Mae gone stop in

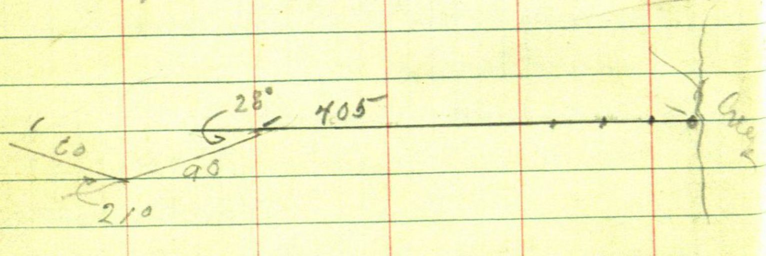
to see Mc Mann She is gone
Mrs Wilsie is also not home
back to walker Write description
for L OF Lumber Co work out bill
Send Letter for new book of tables

Mon 29 of Aug.
Get a phone call from Real Estate
Olson, he is mad because I was
not on the job Fri - or Sat. says
he might get someone else to do
the work if I can not do it says
the people are mad because the work
was not finished that it is a
130 000 dollar deal I tell him
to do what ever he wants to do
he says he is going out to see the
people and will let me know if
they want me to go ahead or get some
one else - he calls back nice
wants me to get right on the job
Johns - Bob & I go to Pine Cone
Lodge can find nothing people
say they want the work done
right and in no hurry it was

Olson that is doing all the kicking at 3-15 we go into Park Rapids to see if I can find the lenght of Lot 1 Blk 2 when new road is also lenght of Lots 7-8-9 Blk 1 nothing shows on plat no angles or dim

Tues. Aug 30 1960
John Bob & I to Pine Cone
Lodge. Bob & John cut out
shore line I go see Mrs Wilson
get a flag pole - Ammo - 100 ft chain
old Link chain foot belt sack
for field Books and some stones
$10.00 we chain along lake
shore 43-43-75-95-75-90
which do not fit the shore line
as shown on plat - The plat
shows distance between lots
6-7- Blk 1 as 97 ft from stakes on
shore to ℄ old road + 70 to stake
on street we find 97 to road OK
but 30 ft short to street

Fig. Street line



direction of Strut line called
E & W for figuring
from cor lot 1 on creek runs West
405 ft thence deflect L 28° for 90 ft
thence deflect R- 21° for 60 ft

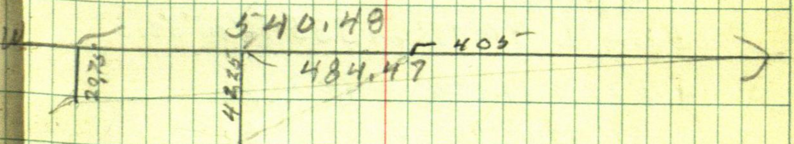
28° - 90 ft
Sine 469472 x 90 = 42.25
Cosine 882948 x 90 = 79.47

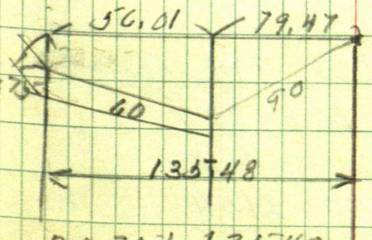
21° 60 ft
Sine 358368 x 60 = 21.50
Cosine 933580 x 60 56.01

405
7947
5601
540.48

405
7947
48447 W 1 S 42.25 S

4225
2150
2075



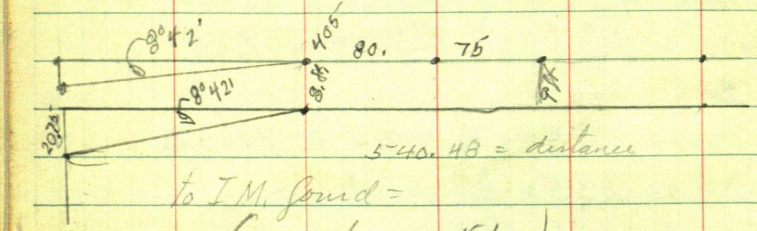


7947
5601
135.48) 20.75.0

20.75 ÷ 13548 = .15315913 = 8°42'

8°42'
Sine 151261 = 20.73
cosine 988494 into 13548 = 137.06

Tower pt approx 405' ft from curb
run S 8°42' L 135.48
(should have went 137.06)
Tower 135.48 BS 8°42' R IM
bears L 54°44' 36.5'



to IM found =
Crandon as E & W
Tower 405' turn L 8°42' 135.48 S 81°18' W
Sine 151261 x 135.48 = 20.49 S
Cosine 988494 x 135.48 = 133.92 W 5'40.48 W
Tower 5'40.48
IM bears L 46°02' or S 35°16' W 36.5'
Sine 577383 x 36.5' = 9.52 W
Cosine 816474 x 36.5' = 29.8 S

Plat shows 136° 25' Inter Angle
for Street ÷ 2 = 68° 12½' 20 ft
Sine 371233 x 21.54 = 8. ft.
Cosine 928540 into 20 = 21.54

20.75
20
40.75

19.3
60

We will set our hinge 4 ft what we call 5 and try that.

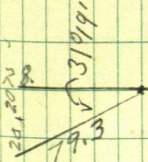
2 | 5 4 0 4 8
2 7 0 2 4

40
40
45
60
65
250
75
80
405
270
135

2075
20
4075

4122
4075
47

5401
8
64,01



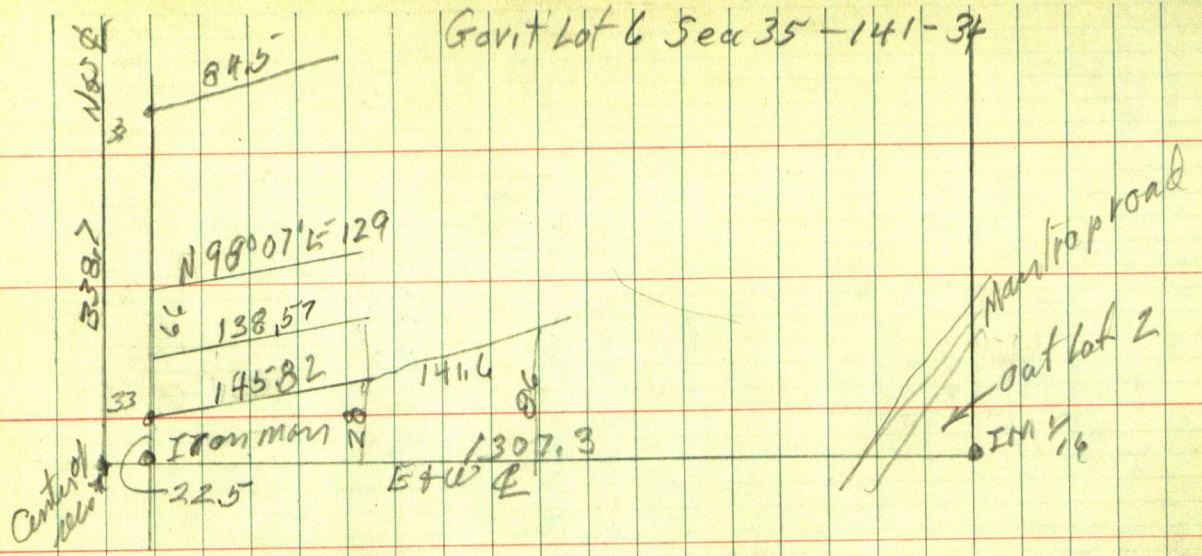
31°19'-793

Sine .519748 × 79.3 = 41.22

Cosine .854308 × 79.3 = 67.75
64.01
3.74

2 | 136 25
68 12½

Govt Lot 6 Sec 35 - 141 - 37



7°
8 4 7
15 4 7

179.65 120 86.6
190.1 210
310.1 296.6

Sept 16 - 1960

Bob & I to Pine Cone Lodge talk with S lone drive write Birch Rapids get copy of E Pine Cone talk with Hy Engr

Sept 27 1960

Bob & I to Pine Cone we go to West N line set flag at R of W I M work T on line but said flag on I M on shore of Lake

Move I M S set at I M N C on the line set N 16°34'E 35 ft ±

Move I M on S R of W at ~~street~~ Co Road set W on line & run.

S 29°39'E 216.8 sta 6 ft ℄ N

S 58°32'E 308.1 sta 7 ft ℄ S

S 26°E 227.25 - = ℄

S 35°30'E 296.6 opposite Pine Tree

S 39°54'E 154.7 ℄ 9 L

S 64°23'E 178.65 ℄ 7 L

S 84°57'E at 70 ℄ 6 ft @ 100 ℄ 8 ft at @ 150 ℄ 6 L at 200 ℄ 3 L at 210 = ℄

251.45 - ℄ 7 R

S 57°37'E 156.8 to Center of Bridge

T still at 251.45 run N 75°15'W

134.8

24

110
120.1
126.1

230.1

Town 134.8 BSS 75°15'E runs
N 35°24'E 126.1 to Lot line
Lot line runs N 30°51'W 228.1 to it
on Line N of AP, Lot 2

84.4
117.3
201.7

40
40
40
41.2
161.2

913 / 7   92.3 / 25 / 117.3

Sept 30 1960

Bob takes his driver's test makes out O.K. - Bob + I to Pine Cone Camp work ⊼ on line bet I M A.P. of street an N.P. tree at edge of road have to cut a lot to get the line as it runs over high hill.

⊼ over hub in ℄ County road S N35°30' W on spike in ℄ road.
Spike by N.P. Tree 35± ft from ℄ = cor of tract bears S 73°59'E 64.60
⊼ over 64.60 site N 73°59' W run along property line N 46°57' E 84.4 hub + 117.3 = 201.7 hub + 161.2 I M A.P. Road

161.2 / 362.9

⊼ over I M A.P. Street site on A.P.
Turn
⊼ over I N site S 46°57' W run N 11°58' E 195.2 + 27.8 Water's.
⊼ over 195.2 Turn 90 run 20 ft ⊼ over 20 turn 90° run 36' 10 from water

24

Oct 7 1960

in Office making Sketch & fig for
Boorily Survey Pine Cone Camp

angle of Street at SW cor lot 1 - Blk 1
156°45' fig ÷ 2 = 78°22' 20 ft
Sine 201648 x 20.42 = 4.12 + 60 = 64.12
Cosine 979458 into 20 = 20.42
angle bet lots 1-2 - 158°52' ÷ 2 = 79°26'
Sine 183379 x 20.35 = 3.73
Cosine 983042 into 20 = 20.35

angle bet lots 2-3 152°43' ÷ 2 = 76°22'
sine 235708 x 20.58 = 4.85
Cosine 971824 into 20 = 20.58

65. ft
412
———
412

60
4.12
3.73
———
67.85

90
3 73
———
9373
- 485
———
8888

83
75
———
160
- 485
———
155 15

street runs N 3°45' E

Time Sheet

8 @ 85 = 680

27

Aug	24	25	26	27	28	29	30
HJC	1	Tues	Thurs	X	Sun	1	1
Bob	1					1	1
John	1					1	1

Sept.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
HC																1						1					
Bob																1						1					
John																											

Sept	28	29	30
HC		1	1
Bob		1	1

Oct.	1	2	3	4	5	6	7	8	9	10
HC							1	1		

= 8 days @ $85 =

680

Oct 1960

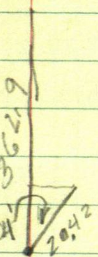
I made a sketch yesterday of
Blk 1 – & Part of Out Lot 1 of
Pine Cone Camp and took same
to Stowe at Pine Cone Camp

Today John & I to Pine Cone
Camp set I M on R/W of Co.
road No 88

X over I M SW cor Lot 1 Blk 1 of
said Plat site S 46°57'W

362.9
16.9
346.0

.03306358
346) 11.44



34°04'

Sine 560157 × 2042 = 11.44
Cosine 828386 × 2042 = 16.92

35°04'
Sine 574529 × 2042 = 11.73
Cosine 818484 × 2042 = 16.71

362.9
16.7
346.2

.03388215
346.2) 11.73

hub. 84.4 x 03306359 = 2.79
201.7 x " = 6.67
3462 x " = 11.45

hub 84.4 x 03388213 = 2.86
201.7 x " = 6.83
3462 x " = 11.73

Warren W. Williams
Park Rapids Minn

A parcel of Land in NW¼ of the NW¼ Sec. 30-140-34 described as follows

Beginning at Section corner (Iron) for Sec 19-30-140-34 & secs 24 & 25-140-35; thence East on North Sec line of said sec 30 645 ft; thence right angle South 14.4 ft ± to To Pt. on S. Boundary Hy. 34 Point of Beginning; thence continue continue South 75 ft. (Iron); thence Southeasterly (Int. Angle 135°20') 174.50 ft; thence East (Def. L. 45°20') 150 ft. Iron; thence North 195 ft. to a pt. on S. boundary of Hy. 34 Iron thence West on said S boundary said Hy. 34 distance 275 ft to the point of beg. appro. 1.05 acres

+

Commencing at NW Cor Sec 30 thence East on Sec line 595 ft to pt of beg. thence continue E along Sec. line 50 ft. thence South (Int. Angle 92°14') a distance of 85 ft; thence North westerly (Int. Angle 55°) a distance of

44.6 ft.; thence running North (Int. Angle 137°) 59.7 ft to pt of beg. approx .08 of an acre

Jan. 4th 1961

Ed & I to Park Rapids meet Williams at his gas sta. in NW ¼ NW ¼ Sec. 30-140-34 where I copy Abstract.

⊼ over I.M. NE cor of tract on S. boundary Highway 34 site S. on I.M. SE cor (1.3 short along E side

⊼ still at NE Cor Take Bldg.

SE cor. S 28° 20 W 126.

NE cor S 38° 59 W 93.7

NW Cor S 55° 34' W 127.5

Gas Sta

SE cor S 57° 29' W 149.8

NE Cor S 62° 53 W 141.6

NW Cor S 67° 06 W 165

⊼ still at NE cor flag at hub at NW cor bears N 89° 30' W

143 + 102.2 + 78

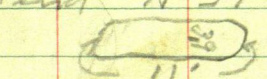
Tstill at NE cor
Gas Pumps base
E end ℄ S 74°12'W
W end ℄ S 76°37 W

Gas Pump Base
E end S 79°51'W
W end S 81°05 W

Tel. Booth 2x3
NE cor bears 90°, E edge 139.5 - 8

Tstill at NE cor runs
S 73°38'W 239.8 - 7 = 232.8
Tower 232.8 BS N 73°38'E
SE cor bears S 60°10'E 257.6
I M bears S 30°06'E 144.55
I M bears S 75°26 W 56.4
I M corner fence N 81°54'W 91.2
NW Cor I M N 54°56'W 124.2

Tst 232.8 Truck Pump
W. end N 50°24'W 35
E end N 37°08 W 25.8



13-07-41 33

2576

Shedd Back of Garage

SW cor. S 62°05' E 148.1 16x16

NW Cor. S 67°54' E 141.6 ±

Shed Back of Gas Sta

SW cor S 67°18' E 86.66 8x16

NW cor S 77°40' E 18' 89.8

3 pr

Transit at 232.8

Gas Pumps Bases

W end N 52°13' E

E " N 61°00 E 18'

(in)

W end N 70°09 E

E end N 73° 09 E

Phone both

N 54°32' E

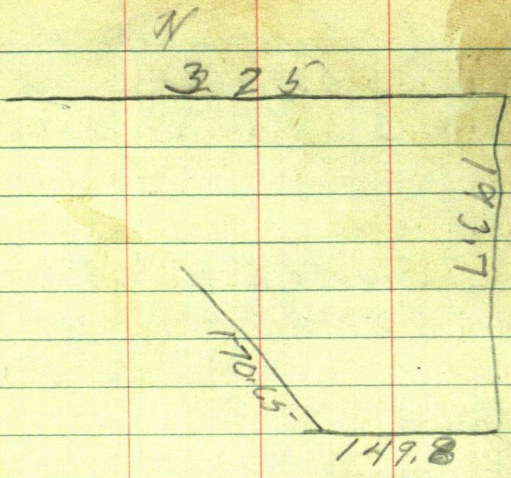
Transit over 234.8

Gas Tanks

W one S 28°24' W 32.6 35 15

Mid one S 6° 48' W 36.4 25

E. one S 9°55' E 37.1 31.4



Air hose for 232-8

S 88°33'E 42.2

figuring Diameter of Gas tanks

West tank 55.5 ft around -

55.5 ÷ 3.1414 = 17.67

17.67 ÷ 2 = 8.84 -

Center Tank 25 ft

25 ÷ 3.1414 = 7.96

7.96 ÷ 2 = 3.98

East tank 31.4 -

31.4 ÷ 3.1414 = 9.995 = 10

10 ÷ 2 = 5.0

fig. Locations of corners

E line as N+S,

from SE cor run North 195 ft to NE corner
(run from Sta 3) OK

from NE cor run S 73°38'W 232.8, sta (3)

Sine .95 94 78 x 232.8 = 223.37 W

Cosine 28 17 83 x 232.8 = 65.60 S

run N 54°56'W 124.2

Sine 818484 x 124.2 = 101.66 W

Cosine 5745 29 x 124.2 = 71.36 N

N 81°54'W 91.2

Sine 990024 x 91.2 = 90.29 W

Cosine 140901 x 91.2 = 12.85 N

S 75°26'W 56.6

Sine 967856 x 56.6 = 54.78 W

Cosine 2515 04 x 56.6 = 14.24 S

S 30°06'E 146.53

Sine 501511 x 146.53 = 73.50 E

Cosine 865151 x 146.53 = 126.79 S

S 60°10'E 257.6

Sine 867476 x 257.6 = 223.46 E

Cosine 497479 x 257.6 = 128.15 S

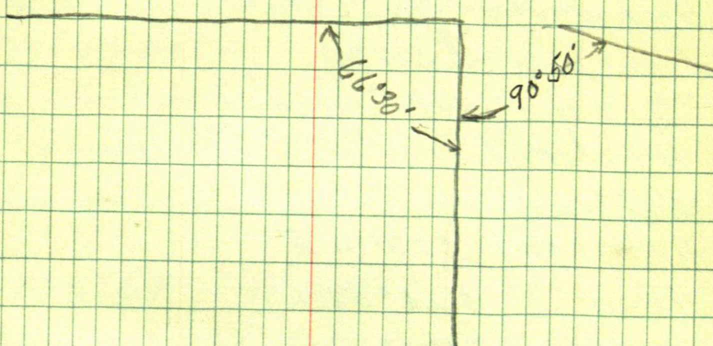
Akeley

Intersection of Highways 34+64

Feb. 21, 1961

Bob & I.

Tower N side of Street at Mobiloil Sta South edge of sidewalk west side west Var on 00 Turn L



Useing W side 64 as S

stop sign - S 38°45' E

Village light post old S 85°08' W

Mobil sign post S 61°25' W

" gas tank base N 85°15' W W end

" " " " N 56°30' W E end

" Stat Garage S.W cor N 69°50' W

" " " SE Cor N 11° W

Light pole N 1° E

over street E old light pole N 89° E

Highway sign Post S 89°43' E

Stan Bldg S 88°10' E

~~radio shop~~
SW cor S 72° 35' W
SE cor
NE cor N 82° 28' W

South side 34 & E of 64
light post S 71° 41' E
Pine tree S 69° 12' E
Highway sign East 34 S 69° 35' E
Light pole S 53 20
Stop sign posts S 39° 55' E S 38° 43' E
Novelcraft sign N edge S 35° 33' E S " S 31° 18' E
Building
NW cor front S 23° 14' E
NW cor S 21° 58' E
SW cor S 19° 25' E

N of 64 S of 34
Light pole S 1° W
Highway sign post S 4° 12' W S 5° 12' W
also old light post
Pure Oil sign post S 10° 43' W
S 10° 15' W
Pure Oil gas pump base S 12° 30' W
Pure Oil Sta
SE cor S 7° 12' W
NE cor S 17° W
NW cor S 22° 28' W

Pum S 36°05'E 90'10½" at spike
Tower spike BS N 36°05'W
Pure Oil Sta
NW cor S 53° W
NE cor S 50°45' W
SE cor S 32°52'W
Pure Oil Pump base S 48°56'W
S 54°38'W
Pure Oil sign post S 63°13'W
Highway sign post S 74°28'W
S 76°13'W
old light post S 71°47'W
~~Highway sign post~~
Light pole S 75°21

E of 64 S of 34
Bldg.
SW cor S 6°17'E
NW cor S 7°50'E
NW Cor S 17°50'E
Navelcraft sign S 18°E
S 32°18'E
Stop sign post N 18°38' W
N 6°45' W
light pole N 36°33'E
Highway sign post N 72°50E
Pine Tree S 83°48'E
light Pole S 78°E

Radio Shop
SW cor N 73°40'W
SE cor N 65°58'W
NE cor N 59° W
Mobil sign N 48°18'W
old lamp post N 40°35'W
Stop Sign N 34°38'W
N 40°35'W
Gas tank Base N 31°19'W
Bldg
SW cor N 47°47'W
SE cor N 29°02'W
Light Pole N 28° W
Light Pole N 23°05'W
Old Street lamp Post N 6-20 W
high Way sign Post N 40 35' E
N 4°17' E

East of 6th intersection
34 ft 66 ft wide
5 ft sidewalks N side

West intersection
street is 100 ft wide

Akeley 80.2 80.1 41

Bob + I March 10 - 1961

Angle S W 66°28'
" N E 89°10'

Sign Post E S 89°53' E 73.2
" " S 88°14' E 73.1

Old fashion light post N 88°49' E 61.4

Stop Sign S 61°43' E 5.8

light Pole N 1°30' E 49.5

Cor Garage SE N 10°25' W 35.2
" " SW N 69°34' W 30.3

Raids Shop

NE Cor N 82°20' W 89.8

SE Cor S 75° W 77.9

SW Cor S 72°36' W 99.7

Old fashion light pole S 75°20' W 7.50

Mobil sign S 61°05' W 20.0

Gas pumps Base

W end N 85°03' W 42.6

E end N 56°04' W 24.8

run S 16°11' W 119.1 Mkr 2

Tone 2-

light pole N 50°37' E 45

Old fashion light Pole N 49° E 33.2

Hiway sign post N 46° E 36.2
N 43°26' E 37.1

100
2.2
97.8 99.8

Pure Oil sign N 70°E 13.5

Gas Pump base

W end S 22°30'W 29.4

E end S 2°30'E 32.4

Sta.

NW cor S 35°W 59.6

NE cor S 19°15'W 43.2

NE Cor S 7°35'W 44.4

SE cor S 6°26'E 79.0

light Pole S 21°45'E 92.3

Run N 82°09'W 95.8 Sta 3.

WP Tree N 77 E 104.9

No Pass sign Post N 74°44'E 126.0

light Pole N 60°53'E 104.0

E 34 sign post N 52°E 85.8

light Pole N 8°12'E 50.4

Stop Sign E N 13°25'W 39.4

W N 16°10'W 40.1

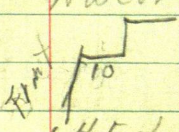
Novel Craft sign N end N 68°29'E 11.0

S end. - S 29°26'E 9.0

Bldg. SW cor S 3°51'E 101.3

" NW cor S 5°06'E 66.7

NW cor S 20°10'E 45.2

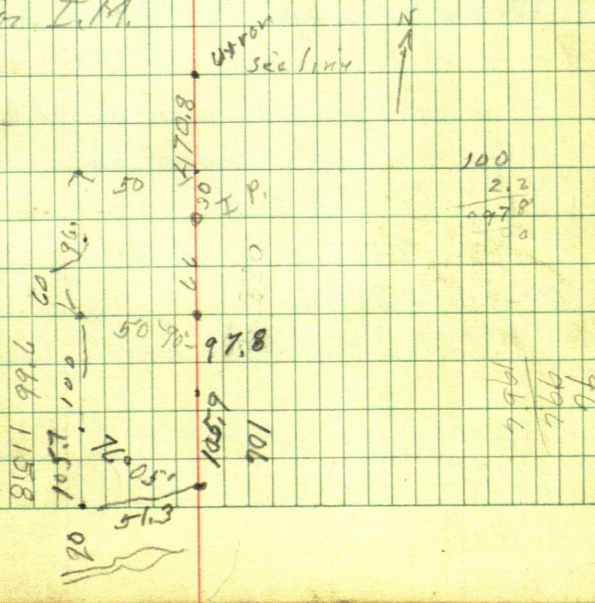


6 ft E of mid wall

0 8 1
07 1
0 6 2

E 1/16 line bet Secs 27-34
141-34 See page 3 this book

Bank at Dorset sends me a note
wants a line run in Sec. 34 141-34
Monday Sept 16 1963
Bob & I to Dorset State Bank
The Banker (   )
goes with us We find I M on
R of W line 482.6 ft S of E 1/16 Cor
we open up 1/16 line N 167.3 look
for our old hub
We chain back and look for old
hubs find None
Work Tran line between I M. which
is 470.8 ft apart
from I M on R of W chain N 30 ft
set pt for I.M.



Strout Realty
Nevis

Get a letter from Strout Realty they want a strip of land surveyed in Lot 1 sec. 12-140-34 beg. 300 ft west of East line and running West —

I drive to Nevis to Strout Realty Office Mr C.R. Stengel Branch manager takes me in his car, to Lot 1 sec 12-140-34 and shows me what he wants I set the cost of surveying at $75.00 they say O.K. go ahead.

May 22 - 1964

Bob & I to Lot 1 sec. 12-140-34 set Transit I M on shoreline on W 1/4 line sec 12 sets S on flag at I m on Right of way of old road, and run N 68° W

N 68° W 323.57

Sine 92718 into 300 = 323.57 OK

Cosine 37461

at 210.2 - 3.00 = 207.2 hub

323.57 at 323.57 set spike hub
207.2 300 ft W of E line Lot 1
116.37

⊼ over 323.57 BS S 68° and run
N to lake sup pt. for I H run S
to pt about 55 ft ± from ℄ New road
⊼ still at 323.57 run
S 70° W
Sine 93969 into 150 = 159.63 OK.
Cosine 34202
159.63 is OK for 150 ft W

Description

A tract or parcel of land situated in Gov't Lot 1 Sec. 12 - T. 140 R34 Hubbard Co Minn described as
the West 150 feet of the East 450 ft. of that part of said Lot 1 lying and being North of County Road No 13

Muskie Bay

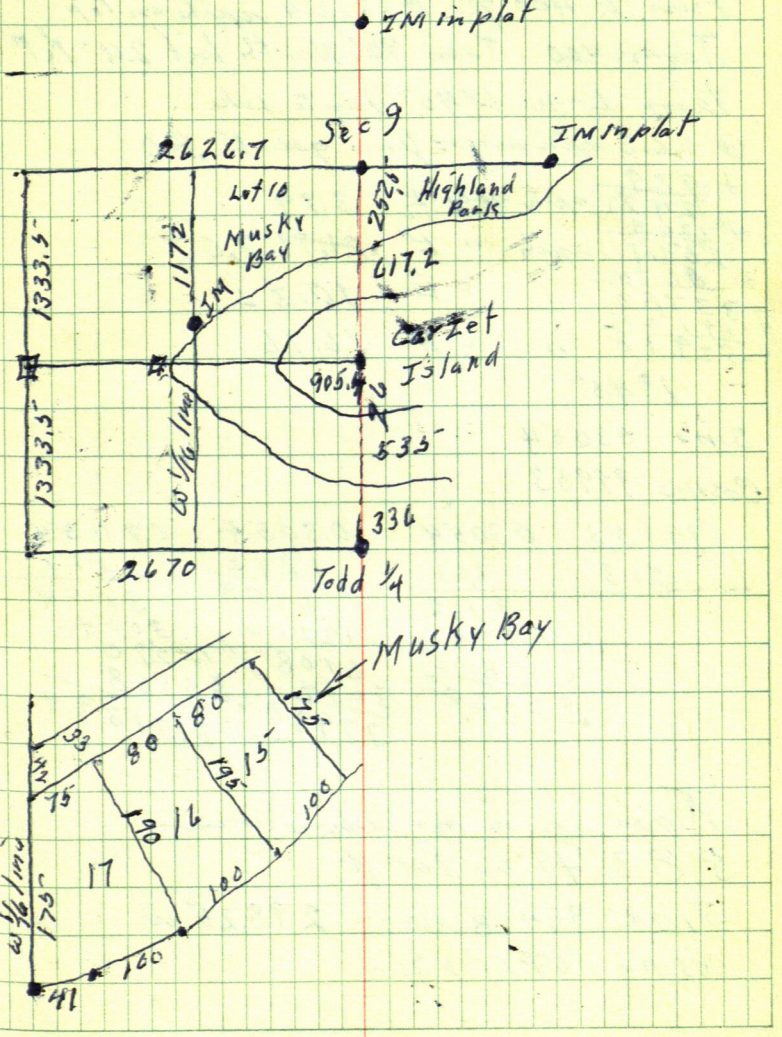
Bob & I to Muskie Bay where we meet Nicolas Reiter of 108 - 14th Street Sioux City Iowa Who owns Lot 17 of Muskie Bay Some one has moved his SE corner on the lake shore He says that from the SW cor of the lot to chain along the shore 41 ft to an I. P. which we did this I P is just 41 ft from I P on the W line from this 41 ft pipe we measure along the shore 100 ft and set an I. P. for his SE cor Work N on line between this 100 foot pipe and one at the NE cor of said lot 17 and drive two pipe to mark the lot line This measurement we took his word as I did not see the Plat as I only charged him $10.00. He said the Surveyor told him to chain it out himself but he got me to do it.

May 29-1964

Reiter comes over he wants me to chain and check the next Lot No 16 as I do not know the size of the lots Bob + I drive to Park Rapids copy a part the Plat of Musky Bay as Platted by Welsie and gives no angles or courses of lines or street check the Original plat find it the same We drive to County Garage Check Records no notes of Welsie Survey in making the plat. Find where he ran the West line of Sec 9 from SW cor to 1/4 and the S line to Todds 1/4 S side 9 he marked Tree to W 1/16 line where same intersect the lake being the SW cor of Musky Bay Plat his Tree J.P. & N 11° 30' W 42.6' J.P. & N 50° W 28.8 We find the 8" Pine now 12" the 6" one is gone the distance to I M chick from B.T. and the next I M 41 ft E from the 41 ft I M yesterday we chained E 100 ft and set

an Iron pipe which is 10 ft
E. of old I Pipes & wood stake
from our 100 ft point we
Chain E along the shore and
find distince to next I M to
be 101.5 - should be 100
seems that the owner of lot
16 was trying to get 111.5
ft of shore line enstead of
the 100 he should have
Ties we find in Record
Book A.
New BTs for S 1/16 cor on W side
see 9. Nor. 12 S 54° 05' E 63.2
" 10 N 88° 50' E 73.0
from SW cor sec 9 run E 2670
to Todds 1/4 & mid sec 9 ties
NP 12 N 8° W 85.5
" 12 N 53° 25' E 68
at Center 1/4 sec 9 Ties to IM
NP 10 S 42° 50' E 40.2
Reg Oak 6 N 45° 45' W 19.5
BTs & IM set for MC N shore on
N & S & Elm 18 N 19° 20' W 97.4
NP 14 S 87° 20' W 90.2

Reiter gives Bob a 14 ft wood boat and gives me $10 for checking to be sure his corners are right



50

Fletcher

May 1964

Lot 5 - Sec. 26 - 141 - 34

W. 400 ft

Tower sec cor SW cor sec 26 - 141 - 34

run E 400 ft @ 312.4 spike on top

Tower 400 Turn 90° North set 24" KP

turn L - W 1°45' run to Lake

@ 26.3 spk unger jena goes E .80

+ 979 / 1242. spk goes E 3.79

+ 1269 / 2511. spk " E 7.67

+ 8670 / 33789 " " E 10.32

+ 17123 / 52910 " " E 16.16

1°45"

Sine .03054

Cosine .99953

.99953	.03054	.03054	.03054
263	263	1242	2511
	9162	6108	3054
	18324	12216	30540
	6108	6108	15270
	.803202	3054	84168
		3.793068	21.713942

Tower spike on above run

S 83°49'W 300 ft.

Sine .99418 x300 = 298.25' W

Cosine .10771 x300

43560 37

2 1 2
99418
3
298254

400 00
298.25
1017 5
13
5 29
400
211,400

43560
3
130680

43560
5
217800

52

Dock's Resort
Sec 9-139-32

Aug 6 1964

I drive to Dock Resort on Mow Lake where I pick up Dock drive to Cor to section 4-5-8-9 139-32 where Todd set Cor in 1916 from USBT and marked new Trees

BP 7 N 36° W 73.92
BP 8 S 36½ E 67.98
BP 6 S 57° W 54.12

In 1956 Wilshe Hubbard Co Surveyor set a ½ pipe for this Cor from Todd BTs

County Engr. Office tied this Cor. in from Todds NW BT stp

Their ties

NW cor church Bldg S 33° 36' E 124.6

Todds old BT Stp N 3 C° W 73.92

to day we find old stp about gone but find pipe in road

Take new ties

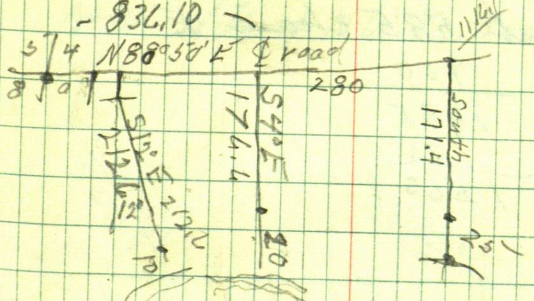
Town cor site S 33° 36' E on NW cor of old church Bldg.

Take new Ties

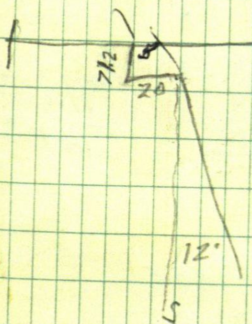
1266
50

720
253
717.54

J.P. N 4 S 39°46' E 40.-36
W oak 4 S 5°16' W 60.-3.20
Steel Tel. Box 4x4 bears N 38°42' E 38.7
Useing cor of old Church Bldg
as S 33°36' E (Course given by County
highway Engs) run N 88°50' E along
℄ road @ 600 spik nail in line
@ 717.45 hub in ℄ road



600
-39.3
560.7



at 560.7 run S 71.2
thence E parallel with
road 20 ft thence S 12° E
212.6

118.65
717.45
836.10

560.7
5
565
20
585

54

Synday Aug 1964

Ed & I to Mow Lake cannot find our old spike in & road

Tower NW Cor Sec 9 - 139 - 32

run N 88°50' E 585. ft thence

S 11°24' E @ 78.9 spike + 100 + 91.4 -

178.9

91.4

270.3 stake + 15 to water

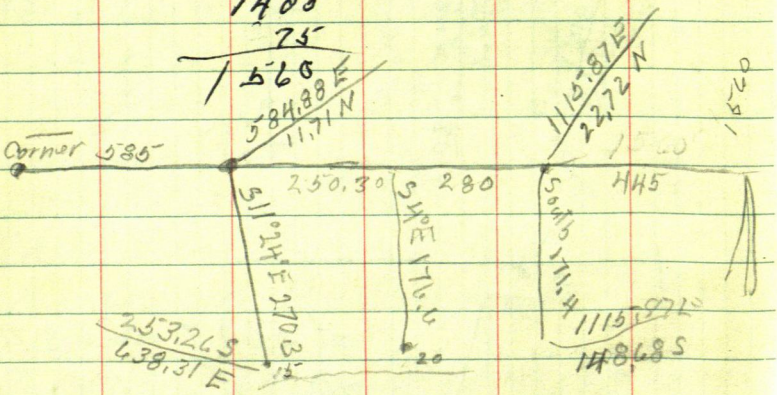
from hub 585 chain E

900

1485

75

1560



N 88°50' E 585

Sine .99979 X 585 = 584.88 E

Cosine .02036 X 585 = 11.71 N

S 11°24' E 270.3

Sine .19766 X 270.3 = 53.43 E

Cosine .98027 270.3 = 264.97 S

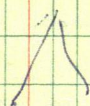
1.1 $\frac{80}{1.1}$ = 188 $\frac{291.4}{100}$

N 88°50' E 1116.10

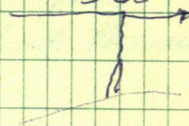
Sine 999.79 x 1116.10 = N 1115.87 E

Cosine 02036 x 1116.10 = 22.72

20°28.5' E



1560



Louis Edelman has Next tract

~~NW~~ N ½ of NW ¼ Sec 9-139-32

Green Acres

Monday ~~Sunday~~

Mr Green comes to my house Aug. 1964 says he wants the E6 W & Sec 6-140-32 runs and the N¼ line. I tell him I will go to Park Rapids to Morrow and check the survey Records there.

Tues Aug, 1964

I go to Park Rapids to Co. Eng. office Book A page 500 dated Aug, 1922 by Todd who run the line between Sec 1-140-33 + sec 6-140-32 gives distance from NE Cor sec 1-140-33 as 4320 ends Crow Wing lake and Platted Minnegbo Beach.

in Book B page 406 Wilsie ran this line from Todd Corner South and 4709.6 to MC No 79

Chas Murray who platted Owasso Plat does not give this distance

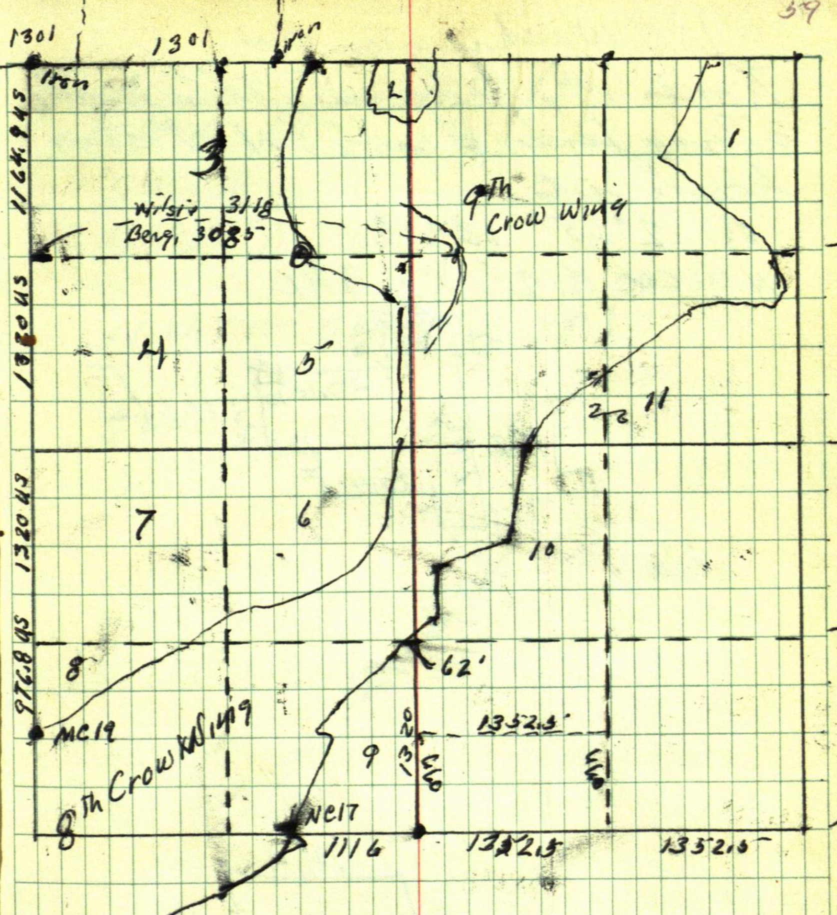
Berg's record of this line in Old Record Book ~~give~~ dated March 21- 1898 give this distance as 4794.4 - Murray did not run the whole mile No Record of his survey figures used as from Plat of Owasso which gives dist from lake N to ¼ line

Wilsie ran N¼ line E page at 3118 MC on

W. shore of 9th Crow Wing which he found B.T. marked by Berg in 1898
Berg's dist. of N½ line E to Lake is 4675 lks = 3085.50 ft Wilsie is 3118 along This line
Berg's B.T. is ~~NP10 S85 W10~~ = ~~660~~ Berg Notes are all in links Not feet NP14588W10 lks = 660 ft.
Berg's Notes N¼ BP 7N 25W 5 Lks
at ¼ BP 85 88W 17 lks
" " 8N 37E 10 lks
at S¼ BP. 4N 3W 26 Lks.
at Center of SW ¼ Elm 8N 18W 15 lks

Wilsie B.T.
MC 19 No Ties
MC 17 Elm Cluster 6 S 10°45' W 12.6
W Oak. 4 N 61°20' E 30.5

Note: Will have to look in Record Book A page 50. Which I did Not See in Index while looking for Records in said Book A.



Notes of W.B.T's 1/4 E side Sec 6-140-32
W Oak 4 S 11 W 9.2
" " 4 N 10°20' 19.6

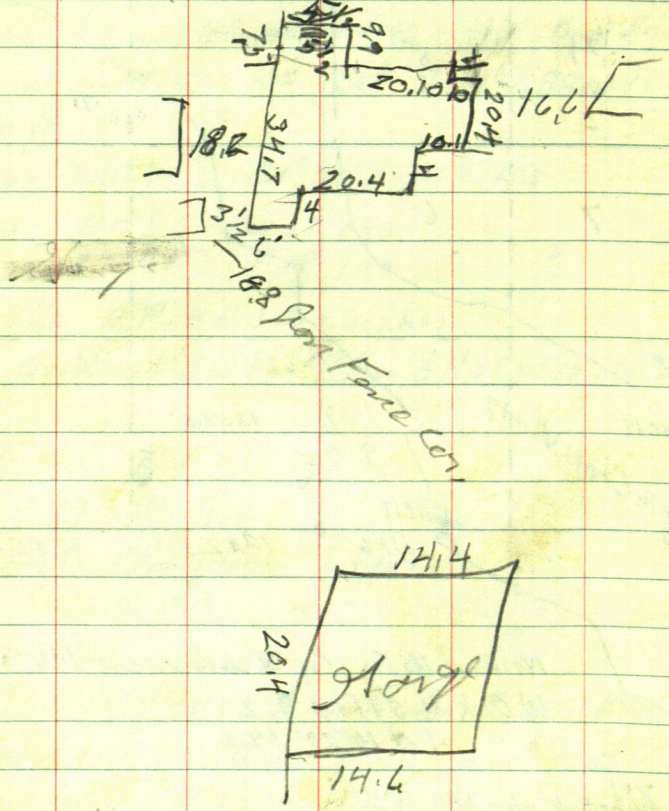
at 1/4 bet 5-6-140-32
Berg gives tie as NP 12 N 30 E 112
Berg gives dist from SE cor N to 1/4 as 2560.8
" " " from E 1/4 W to lake as 1303.50'

105 Washington ave

Tower cor fence in alley set along fence E called N N E cor house set

R. 2°25' 126.8

NW cor R. 2°55' E 88.6



Gauge Tower NW General Cor
Coll E N
NE cor
40°24' R 48.8

NW cor 61°38' R 35.3

SW cor. 70°15' R

Coleman

516 Front St & Forth

Tower pt 3 ft S of end of fence

S. to N along fence to 6

Buildings which is 57

ft S of NW cor of fence

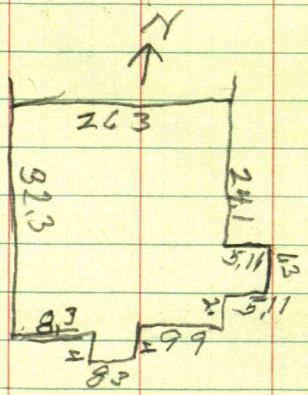
House

NW cor bears

N 33°08'E 65.4

SW cor

N 58°00'E 42.4



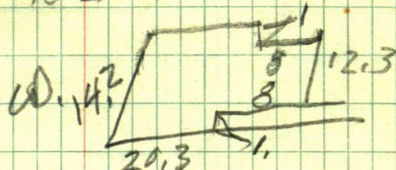
Garage

NW cor N75°18'E 65.4

SW cor N85°36'E 42.4

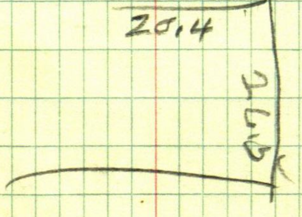
run 83 ft N 86°34'E
Tober 83 to Star.

White bldg
NW cor N 7°10'E 52.85
SW " N 10°10'E 38.8
SE " N 41°43'E 52.8



Garage

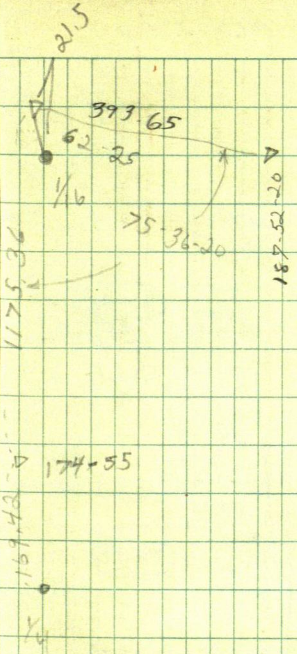
NW Cor. N 46°12'E 35.9
SW " N 82°37'E 27.6
SE " N 85°38'E 53.10



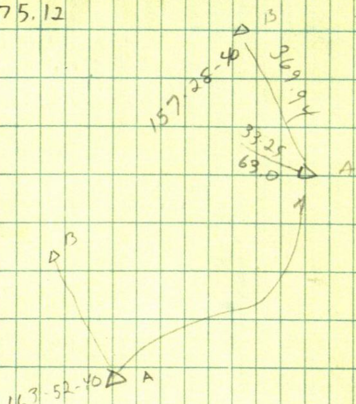
64

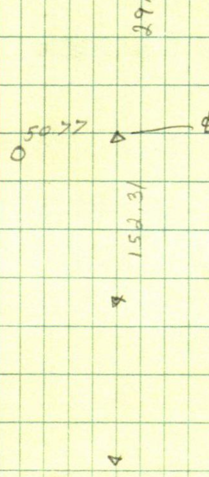
WILLAMS LAKE
HUBBARD CO.

CLIFF	CHASE		
174-55-30			
349-50			
164-45	174-55		
260 10			
524 10			
75-36			
151-12	75-36-20		
226-39			
187-52			
16-45	187-52-20		
203-37			
360 10			
563 157			
157.28			
314-57			
112-26	157-28-40		
270 40			
427 68			
163-54			
327-46	163-52-40		
131-38			
360			
491 158			
252-40		52.36	50'
		157.08	150'


21.5
393.65
62.25
1/16
75-36-20
187-52-20
1175.36
174-55
159.42
1/4

2375.12


B
157-28-40
369.94
33.25
63.0
A
B
A
163-52-40


291.33
50.77
152.31

6-6

CLIFF CHASE
468-2720

67-58
135-56 67-58

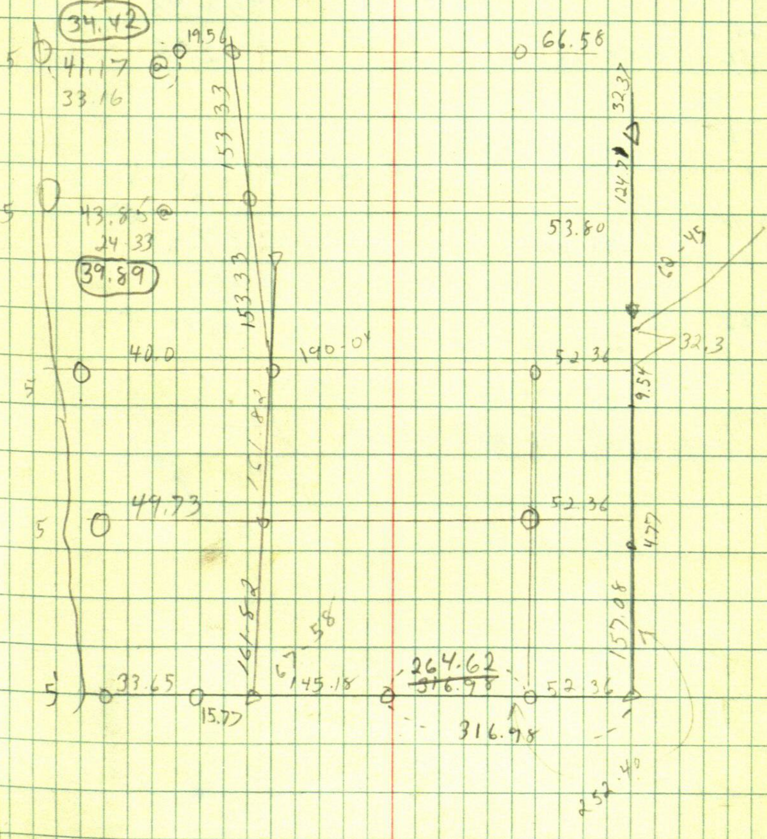
190.04

157.05
152.31
4.77
4.77
9.54

285
31.98
316

52.36
31.98
20.38

291.33
9.54
281.79
157.05
124.74
32.37


34.42
41.17
33.16
19.56
66.58
32.37
153.33
43.85
24.33
39.89
124.71
53.80
60.45
153.33
190.04
32.3
40.0
52.36
9.54
49.73
52.36
4.77
157.08
67.58
264.62
316.98
33.65
145.18
15.77
52.36
316.98
252.40

68

ROLLIE ERICKSON

180 · 22 · 30
0 · 45
180 · 22 · 30

61 · 05
122 · 10
61 · 05

119 · 26
238 · 52
119 · 26

199 · 09
398 · 18
199 · 09

139 · 40
279 · 20
139 · 40

221 · 08
82 · 16
221 · 08

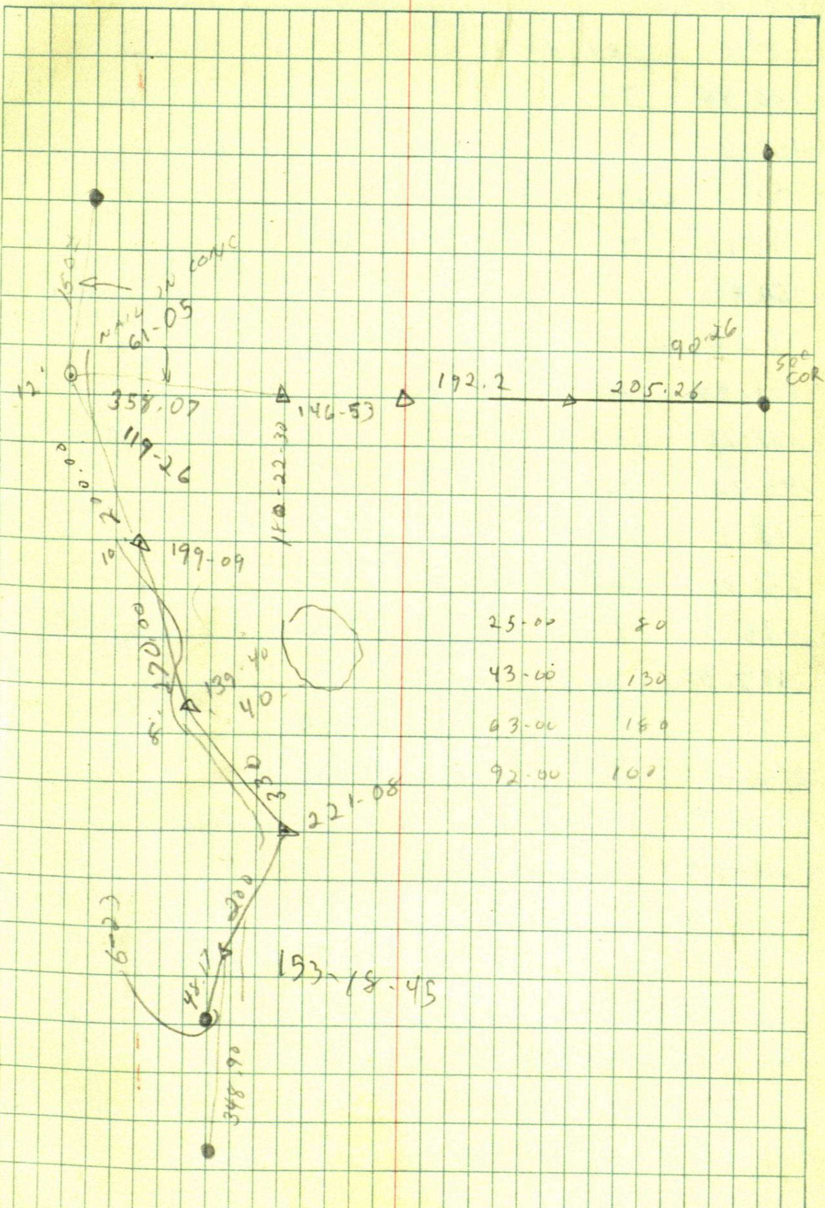
153 · 19
306 · 37 · 30
153 · 18 · 45

LIVINGSTON'S LAKE LOTS

544
397
147

205.26
192.2
397.46
176.53
543.99
356.07
902.06

200
270
330
200
1000



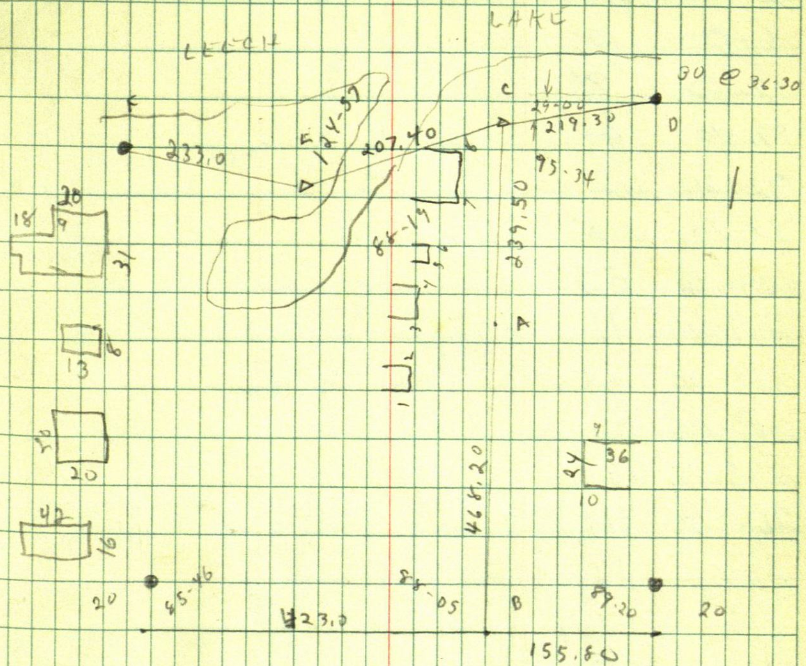
NAIL IN CONC
150'
61-05
12'
358.07
119-26
146-53
192.2
90.26
205.26
50' COR
199-09
139-40
40
221-08
48.17
200
6-23
153-18-45
348.90
25-00 80
43-00 130
63-00 180
92-00 100

70

FRED ERICKSON — GOVT LOT 5 SEC 3 1Y1-29

	T @ A	BS B	
1	106.40	97	1
2	110.20	97	2
3	147.	78	3
4	158.10	90	4
5	162.10	101	5
6	165.60	108	6
7	172.80	136	7
8	177.20	160	8
9	284.15	76	
10	318.30	82	
11	223.30	64	
12	213.	48	
13	187.30	32	
14	90.	8	
15	185~~3~~	42	
16	8 ~~47~~	145	
17	5 ~~40.20~~	252	

T @	C BS D	
356.30	200	TOP BANK
353.30	160	
345.40	130	
337.30	90	
330	54	
236	8~~0~~	
177	46	


LEECH
LAKE
F
E
C
D
A
B
30 @ 36.30
233.0
124.87
207.40
29.00
219.30
95.34
239.50
88-19
468.20
85.46
88.05
89.20
223.0
155.80
20
20
18
28
31
13
6
20
20
42
16
24
36
10

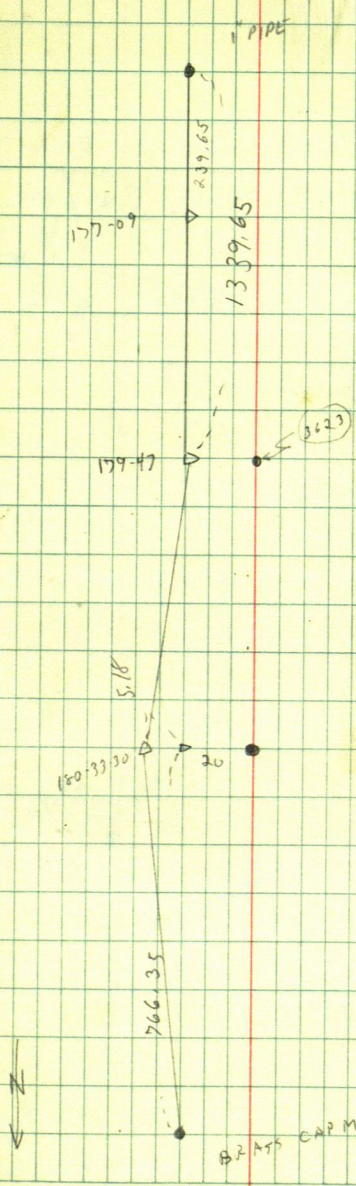
180-33
1-07.. 180·33·30

⊼ @ E BS F

	∠	DIST
1	6-0	163
2	12-30	88
3	87-40	62
4	92-20	112
5	97-10	115
6	104-5	55
7	264-20	11
8	339-05	72
9	319-05	90
10	288-0	107
11	264-05	115
12	246	131
13	245	110
14	222	74
15	187-00	57
16	150	72
17	131	97
18	118	150

179·47
359·34 179·47

177·09
354·18


1" PIPE
239.65
1339.65
177-09
179-47
3623
5.18
180-33-30
26
766.35
N
BRASS CAP MON

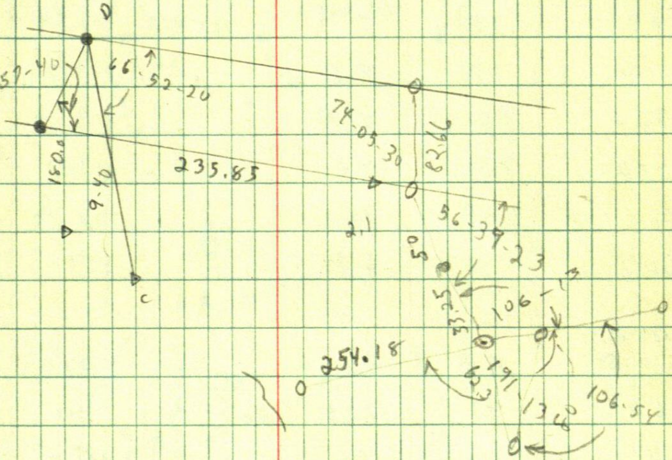
74

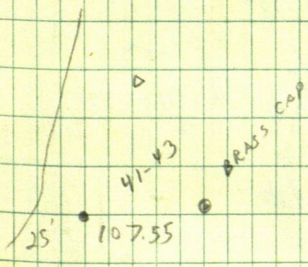
ERICKSON

GL 5-3-141-29

T	D	BS	C
SPK 9-40	120'		
16-10 P.Pe	80.1		

41-43
83-76

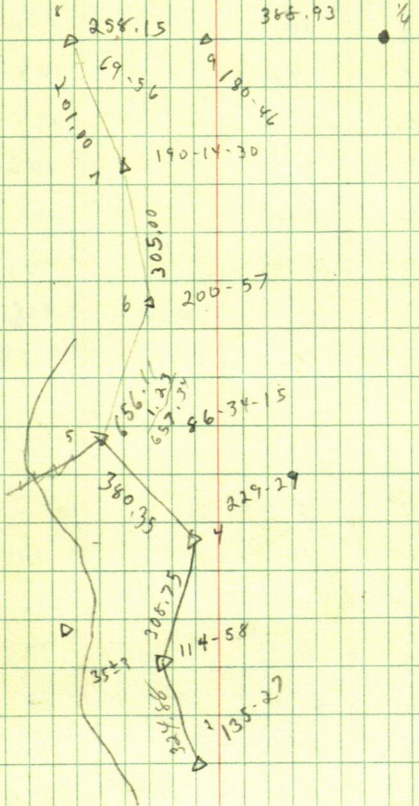




502.6
433
69.6
67.0

SHANGRILA

T @ 2	BS 1		HI = 118.29		
76 - 10	130	11	- 3 - 13	100	LAKE
62 -	65	4.2		114.09	
109 -	35	5.7		112.59	
146 -	49	8.6		109.7	
320	49	4.3		113.99	
354	95	4.6		113.7	
325 - 30	165	10.1		108.19	E
307 -	90	6.3		112	E
135 - 27					
270 - 54	T @ 3	BS 2	HI = 107.25		
60 -	93	7.25		100	LAKE
0	120	5.6		101.7	
327	125	5	+ 0 - 45	103.9	
295	100	4.3		103	
295 - 10	170	4.0		103.25	
114 - 58					
229 - 56		[illegible]	- [illegible]		
T @ 4	BS 3		HI = 105.03		
50	140	11	- 1 - 30	100	LAKE
112	60	8		107	
184	65	8.5		106.5	
245 - 30	85	4.2		110.83	
311	120	5		110	
130	135	9		106.03	
	235	9.5		105.5	


8
258.15
385.93
1/4
9
69.56
180.46
201.00
190-14-30
7
305.00
6
200-57
656.
1.73
657.34
86-34-15
5
380.35
229.29
4
308.75
114-58
35±3
324.86
2
135-27
1

R. ERICKSON

229-29 98-55 36.9 45.8	229-29				
	⊼ @	5 BS 4		HI = 110.10	
90	100	10.1		100	
〃	54	4.4		105.7	
23	56	3.2		107	
0	50	4.2		106	
307	80	4.4		105.7	
273	95	6.3		103.8	
〃	270	5	+ 0-18	106.80	
〃	410	7	〃	105.2	
86-34 173-08-30					
	⊼ @	6 BS 5		HI = 110.10	
75	32	10.1		100	LAKE
292	60	2.3		107.8	
222	85	2.1		108	
158	105	6.5		103.6	
〃	185	8.4		101.7	
〃		5.1		105	?
200-57 41-54	200-57				
190-15 20-29	190-14-30				
64-56 130-52	69-56				
180-46 1-32	180-46				

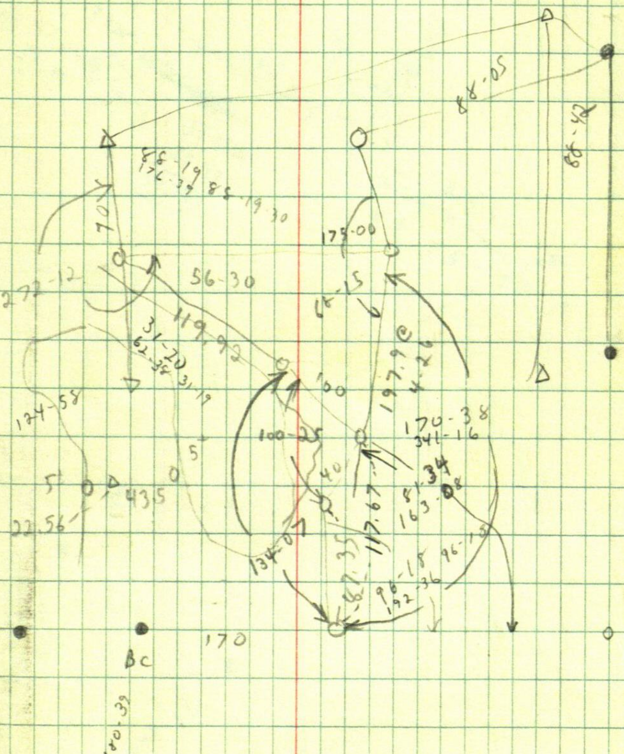
80

FRED ERICKSON

33
170
5 7
780.7

235.13
152.51
82.62

51-37-50
87-23-50
139-01-40
40-56-20


88-05
88-42
88-19
176-39
88-19.30
70
272-12
56-30
119.92
31-20
62-38
31-19
124-58
175-00
68-15
197.90
4.26
100
100-25
170-38
341-16
40
5
43.5
22.56
134-07
117.67
81.34
163.08
96-18
192-36
170
Bc
180.39

82

CLIFF CHASE

174-40

172-53

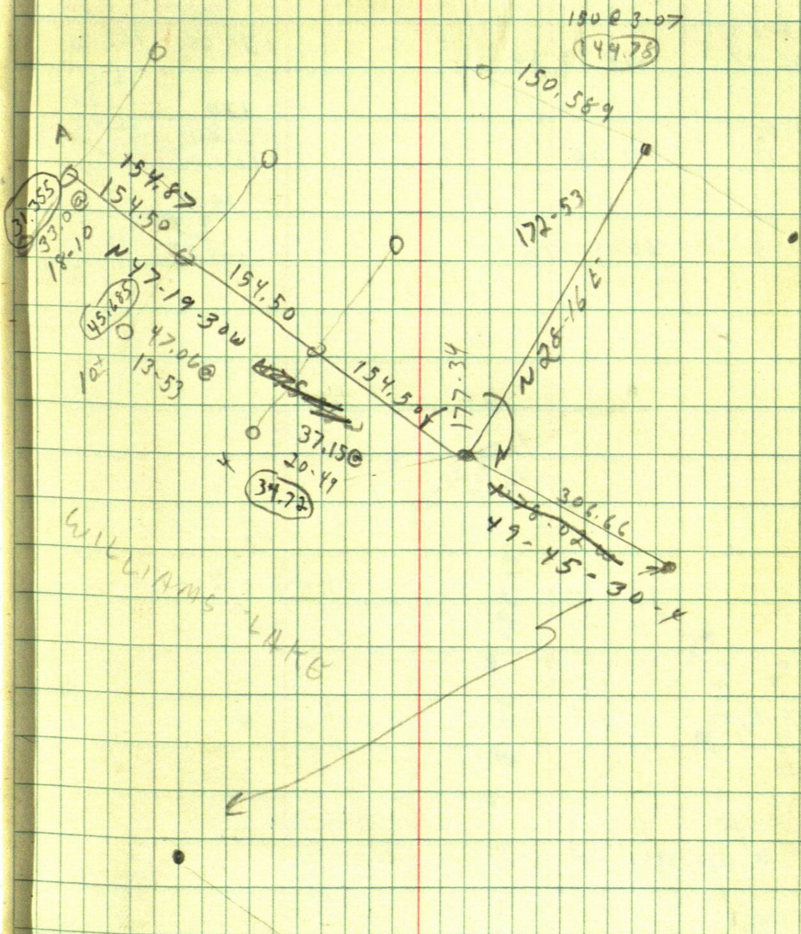
150.59
149.78
.81

2.16
177.34

75.35
28.16
103.52

47.19.30
28.16.22
75.35.52

50
2.94
47.06


180 @ 3-07
144.78
150.589
A
31.355
33.0 @
18.10
154.87
154.50
N 47-19-30 W
154.50
45.685
47.06 @
13.53
10±
154.50
37.15 @
20.49
34.72
172.53
N 28-16 E
177.34
306.66
49-45-30
WILLIAMS LAKE
174.40
55.68
PIPE IN PL
BY OTHERS
LOT 9

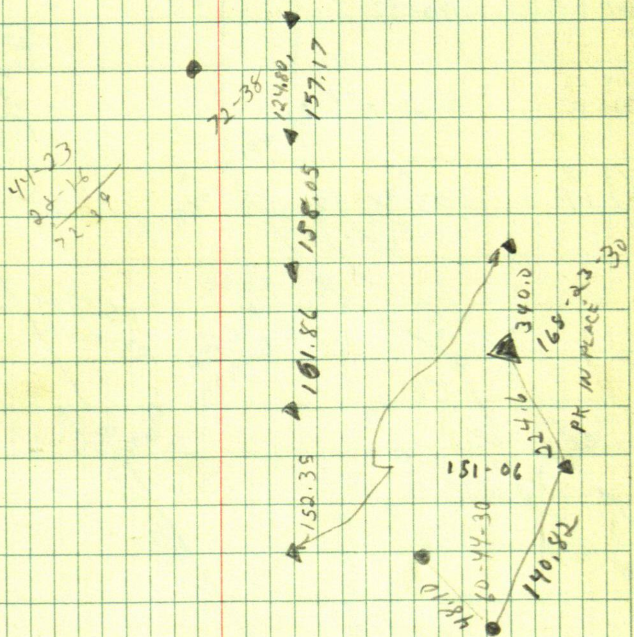
84

CLIFF CHASE

			160	160
			1.95	7.65
168-23			158 05	152.35
336-47	168-23-30			230
			170	5.6
			8.14	224.4
151-06			161.86	
302-12	151-06			
			150	
			9.18	
121-29			140.82	
60-45	60-44-30			

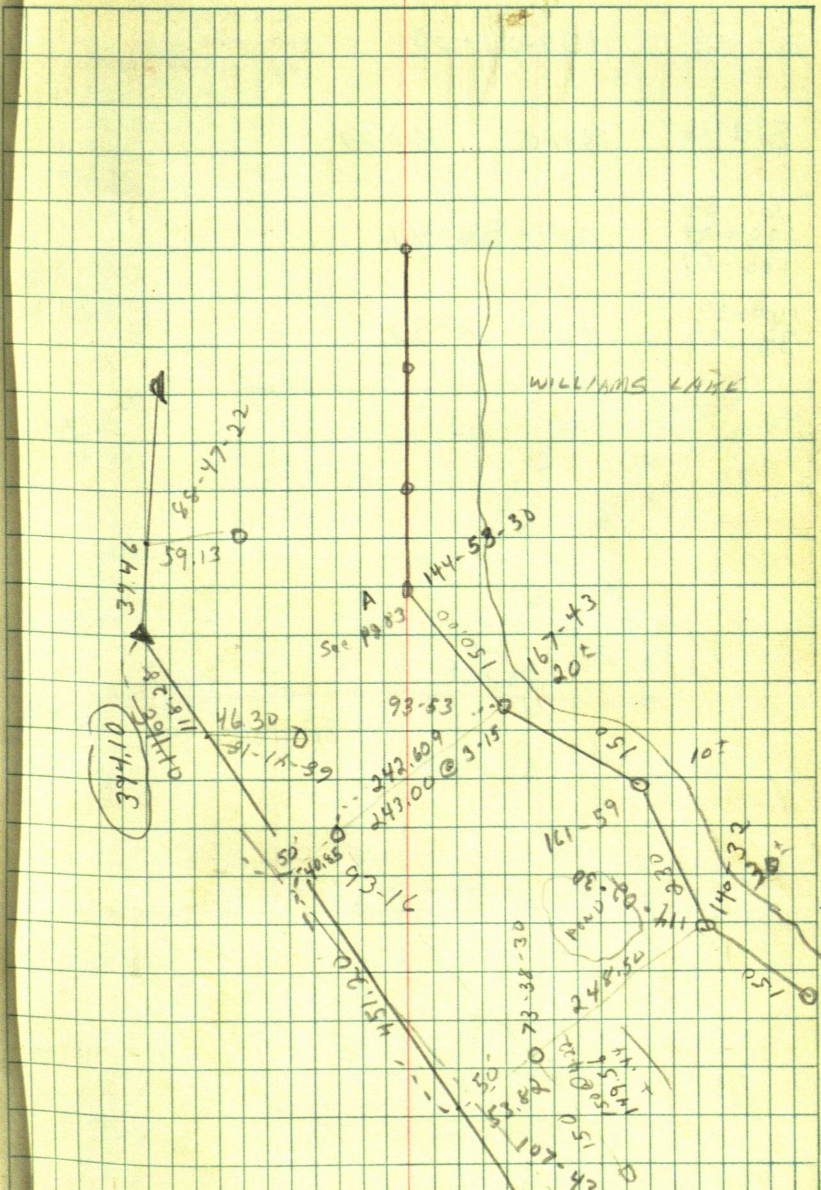
E.C.
R.D.
M.K.

6-24-75



CHASE

144-54 289-47	144-53-30		250 1.5 248.5
167-43 335-26	167-43	50 3.70 46.30	60 6.14 53.82
93-53 187-46	93-53		
161-54 323-58	161-54		400 5.7
140-32 281-04	140-32	250 4.1 275.9 118.24 394.18	394.3
114-02 228-05	114-02-30		
73-38 147-17	73-38-30		


WILLIAMS LAKE
A
144-53-30
167-43
20±
93-53
10±
242.60
243.00 @ 3.15
161-59
140-32
15±
73-38-30
248.50
107-43
88-47-22
59.13
37.46
46.30
394.10
50'
40.85
93-16

107-21
214-43

107-21-30

359-59-30
169-58-30
190-01 00

140
33

170
6.5
163.5

5-44

SLOPE 300.00

67-~~59~~
~~135-27~~
135-57

67-58-30

330
6.12
323.88

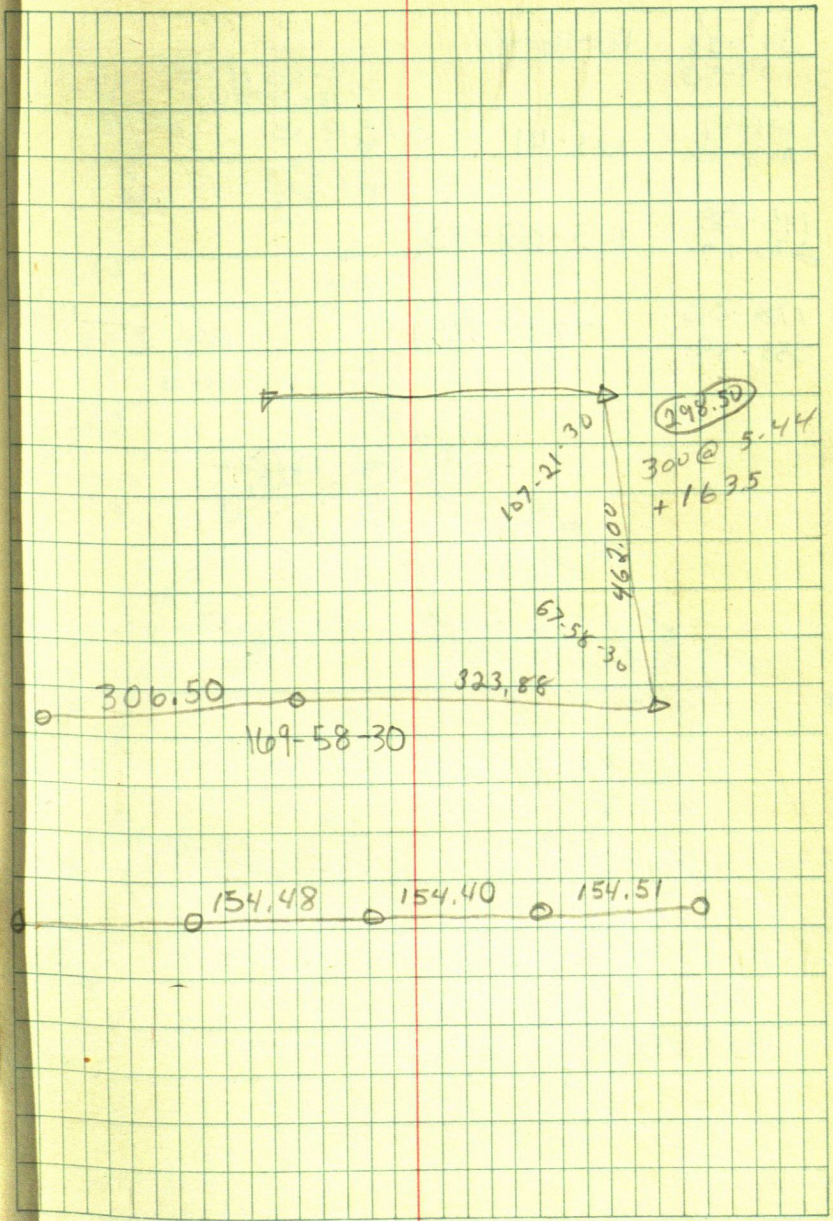
169-59
~~339~~-57

169-58-30

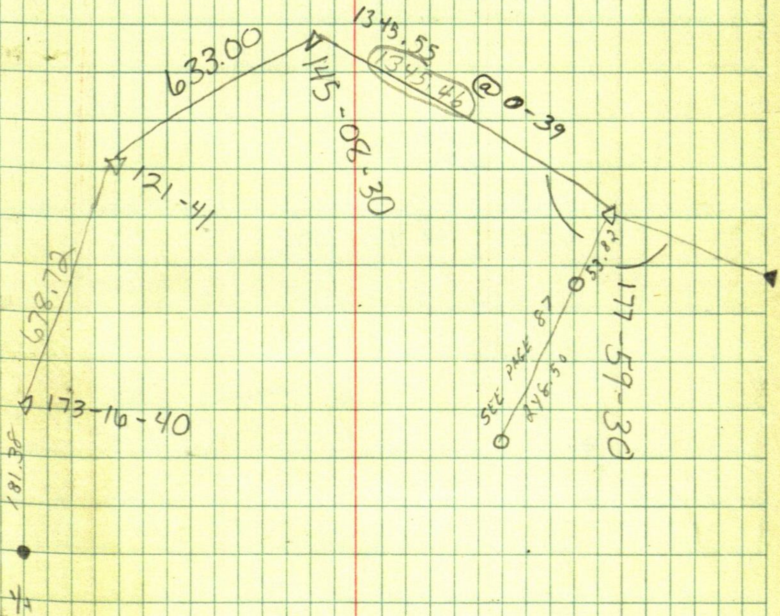
160
5.49
154.51

160
5.60
154.40

160
5.52
154.48


298.50
107-21-30
300 @ 5.44
+ 163.5
462.00
67-58-30
323.88
306.50
169-58-30
154.48
154.40
154.51

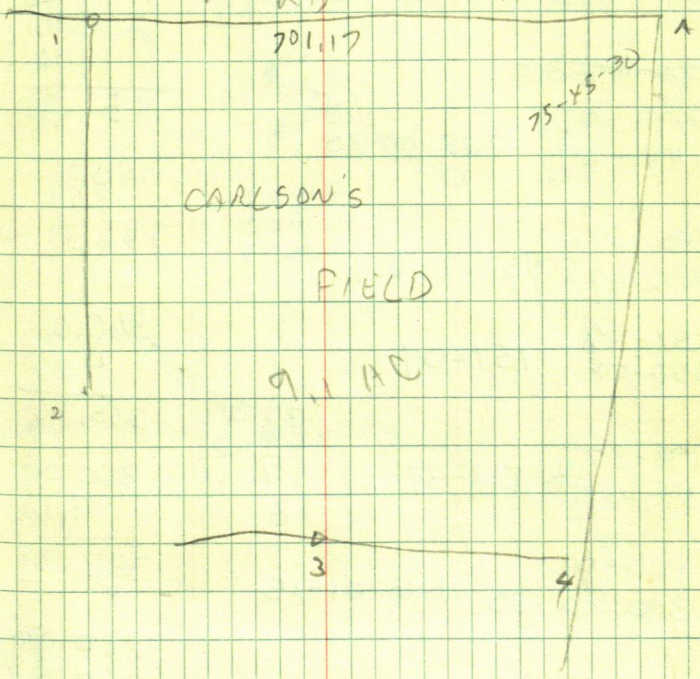
173-17 347-33 159-50	173-16-40	159-50 360-00 519-50 173-16-40	190 8.62 181.38	59-30
121-41 ~~243-22~~	121-41	3 / 519.50 3 21 3 20 18		2 / 119 10 19 17 18 1
145-08 ~~290-17~~	145-08-30	59 60 119		680.00 1.28 678.72
178-00 ~~355-59~~	177-59-30	1 1 178 0 356	1350 4.45 1345.55	
			177-79 2 / 355-59 2 15 14 15 14 15 19 18 1	640.0 7.0 633.00



1345.55
1345.46
633.00
@ 0-39
145-08-30
121-41
678.72
173-16-40
181.38
177-59-30
53.82
SEE PAGE 87
248.50

92 FRED MARTIN

	AZ	ADS	SOUTH	
1.	75 · 45 · 30			701.17
2	40 · 59 · 18			911.74
3	19 · 09 · 24			768.63
4	0			672.0


TWP RD
701.17
1
4
75-45-30
CARLSON'S
FIELD
9.1 AC
2
3
4

PELTIER

260' @ 4-05

123.86

53-26-30
107-52
161-48

222-05
444-09

145-59
292-59

151-04
352-08

198-37
397-14

166-01
332-02-30

194-43
389-26

127-33
255-05-30

87-13-30
174-26

53-56

222-04-30

145-59-30

151-04

* 198-37

166-01-15

194-43

255-05-30

* 87-13-15

1356
258
598

53-56
53-52
3 | 161-48
15
11 3/168
9 15
24 18
8

84-09
360-00
44 4-09

37-11
360-00
2 | 397-14
198

260
123.86
374.74
258.80

130
6.14
123.86

380
5.06
374.94

200.00
4.52
195.48

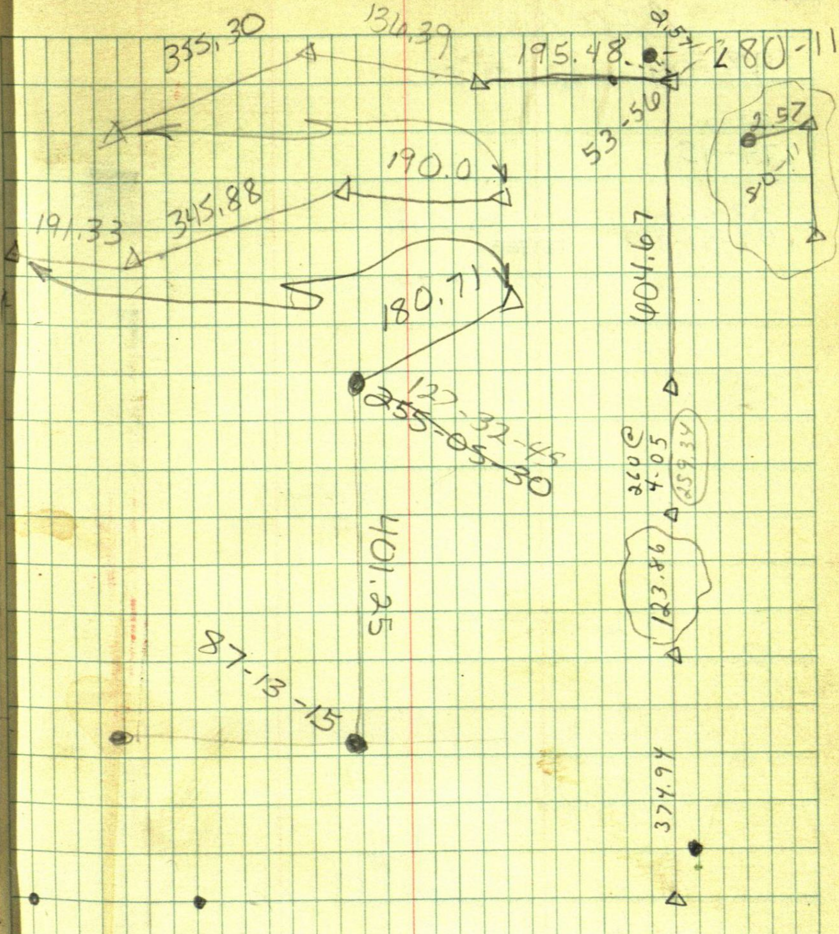
140.00
3.61
136.39

360.00
4.70
355.30

350.00
4.12
345.88

200.00
8.67
191.33

190
8.29
180.71


355.30
195.48
80-11
53-56
190.0
2.57
345.88
191.33
180.71
604.67
127-32-45
255-05-30
4.05
123.86
401.25
87-13-15
374.94

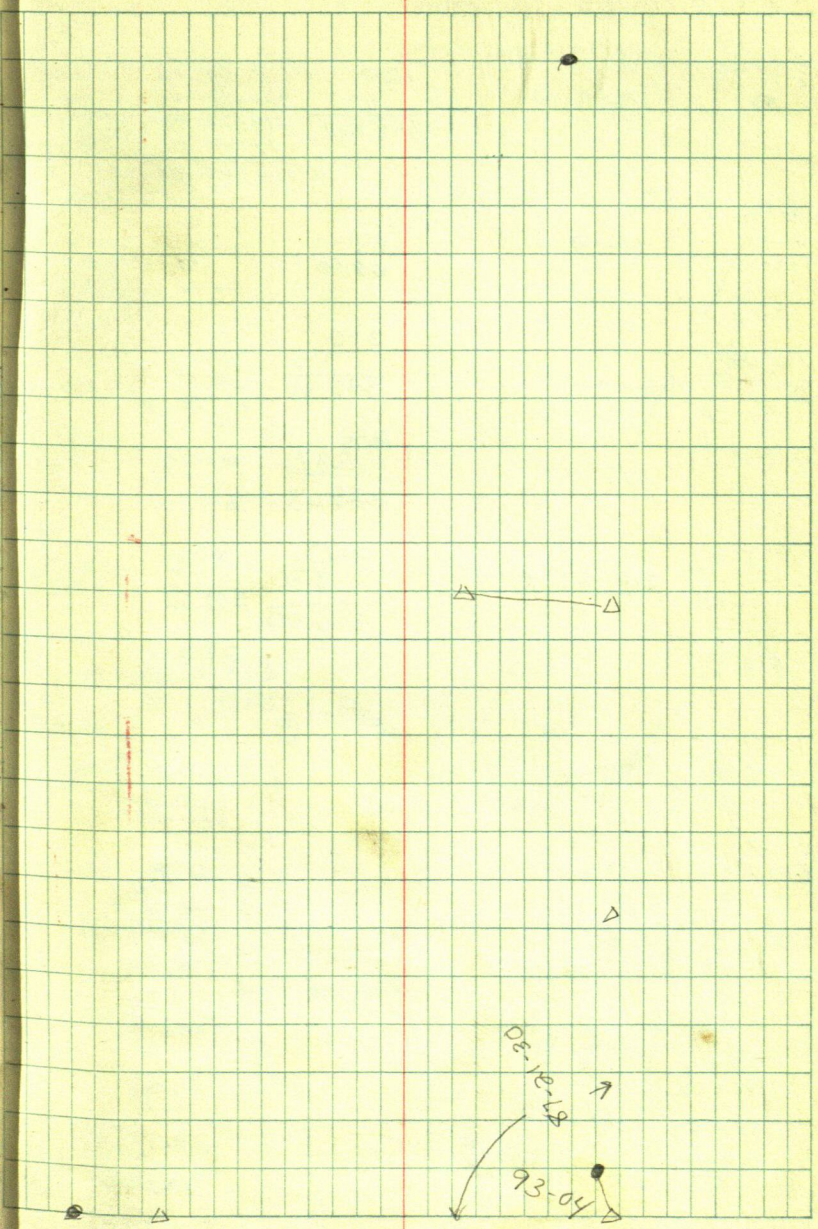
PELTIER

93-04

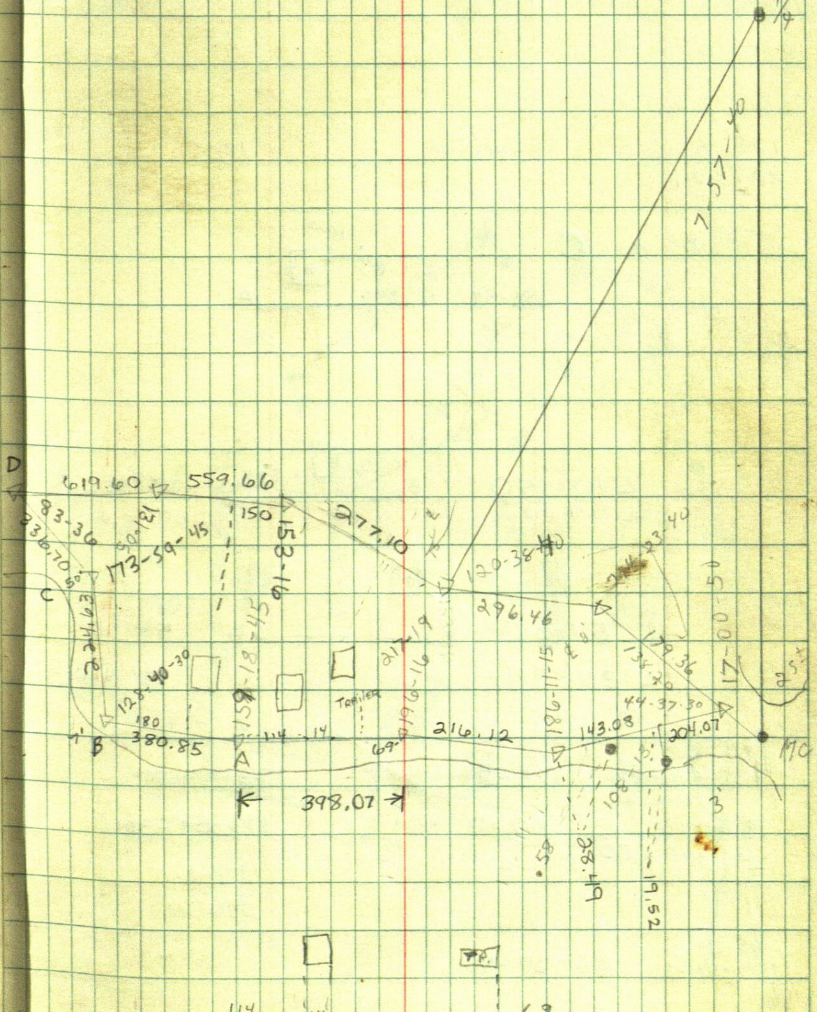
87-21
174-43

53-550
107-51-30

55
53 2) 101
~~107~~ 19
53-55-45


87-21-20
93-04

HIETH	DUPRE	WEBB LANE	SEC.
7-57-30 15-55-30 23-53	7-57-40	400 1.93 398.07	7-57-40 120-38-40 214-23-40 17-00-50 360-00-50
120-39-30 241-17 1-56	120-38-40	114 128.50	297 .57 296.46	140 138.2
142-08 284-18	142-09	390 9.15 380.85	180 179.36
217-19 74-38	217-19	230 5.37 224.63	620.00 .40 619.60
214-24 68-47 428-47 283-11 643-17	214-23-40	340 3.30 336.70	560.00 .34 559.66 280.00 2.90 277.10
17-01 34-1-30 51-02-30	17-00-50		210.00 5.93 204.07
44-37 89-15	44-37-30		20.00 .48 19.52
186-11 12-22-30 372-23-30	186-11-15		150.00 6.92 143.08
196-16 32-32 392-32 159-19 318-37-30	196-16 159-18-45		30.00 1.51 28.49 220.00 3.88 216.12

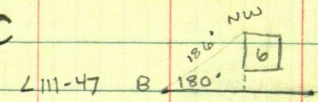

1/4
7-57-40
D
619.60
559.66
150
83-36
336.70
50°
173-59-45
153-16
277.10
120-38-40
296.46
C
234.63
128-40-30
180
Trailer
217.19
179.36
17-00-50
25±
B
380.85
A
114.14
216.12
143.08
44-37-30
204.07
MC
398.07
3'
38.49
19.52
114
14
69
A
398.07

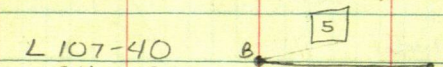
100

∠ @	H	BS	B	
35-18	46'			SE COR
51-30	39'			SW COR
115-00	85'			SE
123-45	74'			NW
				SW

128-40-30 128-40-30 180'
257-21

∠ @ B BS C





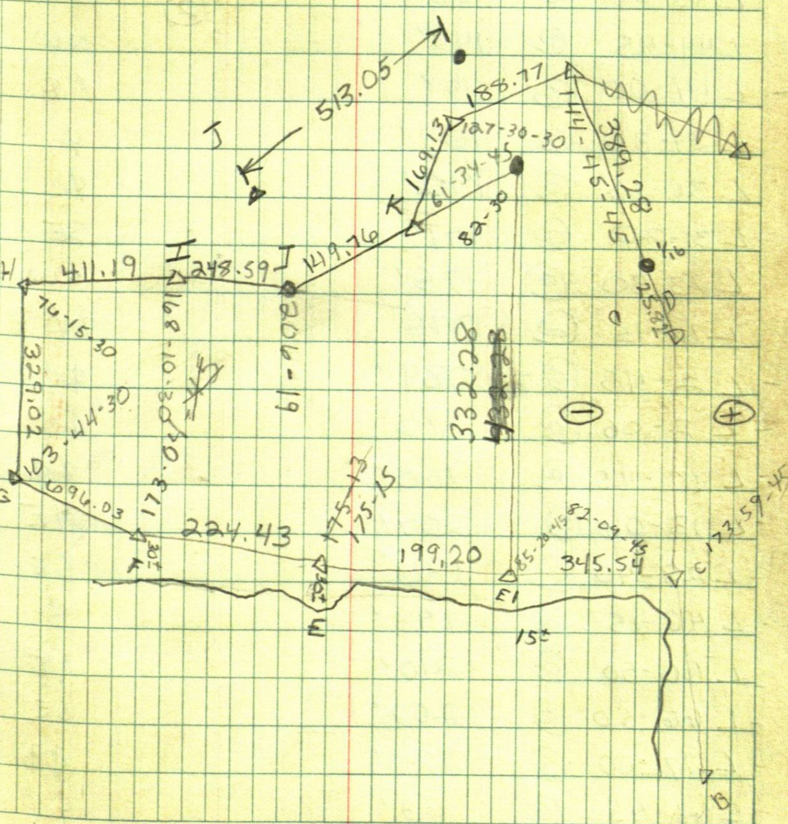
174-00
347-59-30 173-59-45 ~~173-04-30~~

82-10 82-09-45 ~~173-01-30~~
164-19-30

173-04
346-08

85-21
190-41-30 85-20-45

175-15-30
350-30   175-15



	TE	C	BS	D		
1	L 152-15	@	130'		(3)	SW COR
2	L 142-45	@	113'			NW COR
3	L 131-30	@	195'			℄
4	L 113-45	@	165'			℄
5	L 97-00	@	135'			℄
6	L 86-20	@	92'			℄
7	L 53-00	@	136'		(2)	SW
8	L 44-45	@	149'			NW
9	L 14-00	@	19'			℄℄
10	L 39-30	@	104'			℄
11	L 36-15	@	192'			℄
12	L 31-20	@	171'			SE
13	L 23-30	@	175'			SW
14	L 6-15	@	275'			℄℄
15	L 2-45	@	284'			℄℄
16	L 2-06	@	210'			℄℄
17	L 10-45	@	160'			℄℄
18	L 13-06	@	207'			NE
19	L 28-40	@	186'			SE
20	L 40-15	@	148'			℄
21	L 60-50	@	210'			NE
22	L 66-50	@	202'			SE
23	L 77-00	@	220'			℄℄
24	L 63-45	@	63'			℄℄


VECTOR

83-36
167-12

121-11-30
242-23

~~130-54-30~~ 130-52-45
~~261-45-30~~

131-05 131-05
262-10

~~153-28~~ 153-16
306-32 153-16
175-13
350-26 175-13

~~A @ ET BS D~~

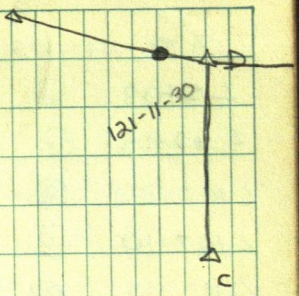
173-05 173-04-45
346-09-30

103-44
207-29 103-44-30

76-16
152-31 76-15-30

168-11
336-21 168-10-30

206-19-30
412-38 206-19


121-11-30
C

T @ E1 BS C

L 5409	@	151'	SE
L 62-15	@	139'	SW
L 101-30	@	176'	NE
L 107-10	@	131'	SE
L 110-15	@	83'	SE
L 132-30	@	110'	SW
L 141-30	@	133'	SE
L 150-20	@	173'	SW

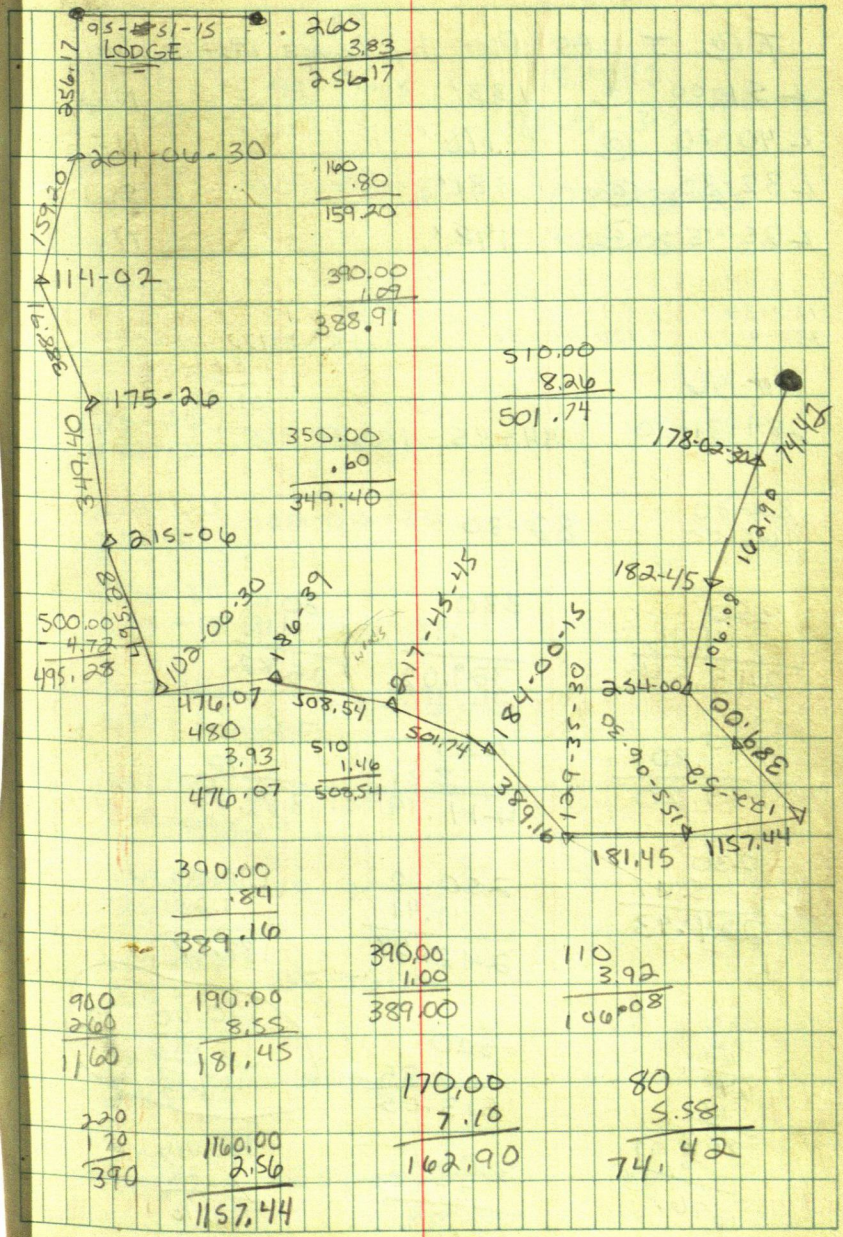
T @ E BS C

L 70-00	@	231'	SE
L 79-30		224'	SW
L 77-45		108'	R well
L 18-20		73'	¢
L 146-10		150'	¢
L 150		156'	NE
L 169		135'	SE

T @ F BS E

L 23-45	@	43'	(18)	SW
L 62-30		71'		NW

61-35
L 23-09-30 61-34-45



260
3.83
256.17

160
.80
159.20

390.00
1.09
388.91

510.00
8.26
501.74

350.00
.60
349.40

500.00
4.72
495.28

480
3.93
476.07

510
1.46
508.54

390.00
.84
389.16

390.00
1.00
389.00

110
3.92
106.08

900
260
1160

190.00
8.55
181.45

220
170
390

1160.00
2.56
1157.44

170.00
7.10
162.90

80
5.58
74.42

T @ I BS Pipe by Lodge NEXT to WALL

L 51-00	@	133'	NW
L 40-20	@	176'	NE
L 32-30	@	181'	SW
L 25-45	@	178'	NW

127-30
255-01

127-30-30

144-46

289-31-30

144-45-45

82-30
165-00

82-30

170
8.62
161.38

350
4.116
345.54

330
.198
329.02

300.00
4.18
25.82

200
.80
199.20

420
8.81
411.19

390.00
.72
389.28

230
5.57
224.43

250.00
1.41
248.59

190.00
1.23
188.77

230
230
160
60
100
3.97
696.03

520
6.95
513.05

170.00
.87
169.13
?

340.00
7.72
332.28

150.00
.24
149.76

360
75 31-30
435 31-30

360.00
148-00
508-00

95-$1
191-$2-30
95-$1-15

182-45
365-30
182-45

201-06
402-13
201-06-30

178-02-30
356-05

114-02
228-04

175-26
350-52
175-26

215-06
430-12
215-06

102-00
204-01
102-00-30

186-39
373-18

217-46
435-31-30
217-45-45

184-00-30
368-00-30
184-00-15

129-35
259-11
129-35-30

155-07
310-13
155-06-30

122-52
245-44
122-52

254-01
508-00
254-00

110

	BS	HI	FS		
	6.41			134.09	WATER LEVEL OF SUP
		140.50			
TP	11.70		11.36	129.14	
		140.84			
TP	5.21		7.30	133.54	
		138.75			
TP	0.93		8.60	130.15	
		131.08			
TP	0.20		11.53	119.55	
		119.75			
TP	1.73		9.90	109.85	
		111.58			
TP	11.84		11.58	100	WATER LEVEL LEECH LAKE
		111.84			
TP	10.72		0.77	111.05	
		111.77			
TP	11.65		0.99	120.78	
		132.43			
TP	8.22		1.38	131.05	
		139.27			
TP	8.12		5.79	133.48	
		141.60			
TP	11.34		11.12	130.48	
		141.82			
	6.34		11.35		

111-35
223-10

111-35 240.00
8.49
231.51

177-40
355-19

177-39-30

200-44
401-27

200-43-30 193.72

189-19
378-37-30

189-18-45 150.00
4 3 4
145.66

89-06
178-12

84-49
169-37-30

84-48-45 300
140
160
220
380

5-12
10-24
15-36

89-44
179-29

89-44-30 130
1.35
128.65

150
9.47
140.53

140.00
5.35
134.65

200.00
2.39
197.61

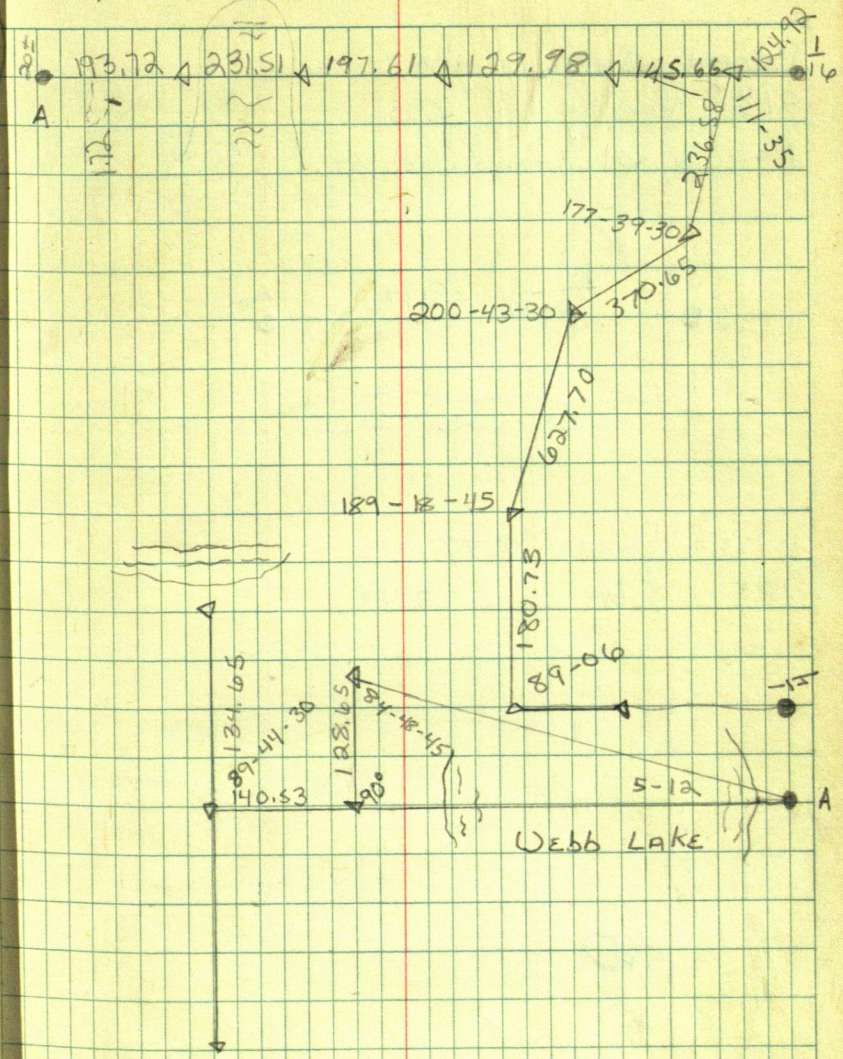
130.00
5.08
124.92

240
3.42
236.58

380.00
9.35
370.65

630.00
2.30
627.70

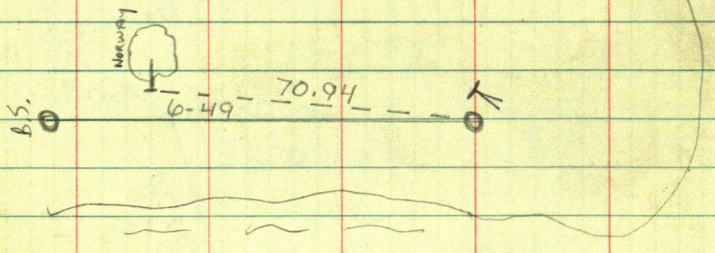
190.00
9.27
180.73


2"
A
193.72
231.51
197.61
129.98
145.66
124.78
1/16
111-35
236.58
177-39-30
370.65
200-43-30
627.70
189-18-45
180.73
89-06
1/4
134.65
89-44-30
140.53
128.65
84-48-45
90°
5-12
A
WEBB LAKE

Aug 28 '75

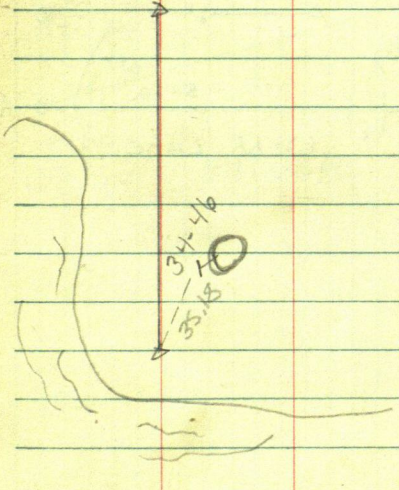
Pleasant Lake 11.87
21½" Norway 3.33
Nail @ .50 up from Ground

80
9.06
70.94



Webb Lake 8.77
18" Elm 2.99

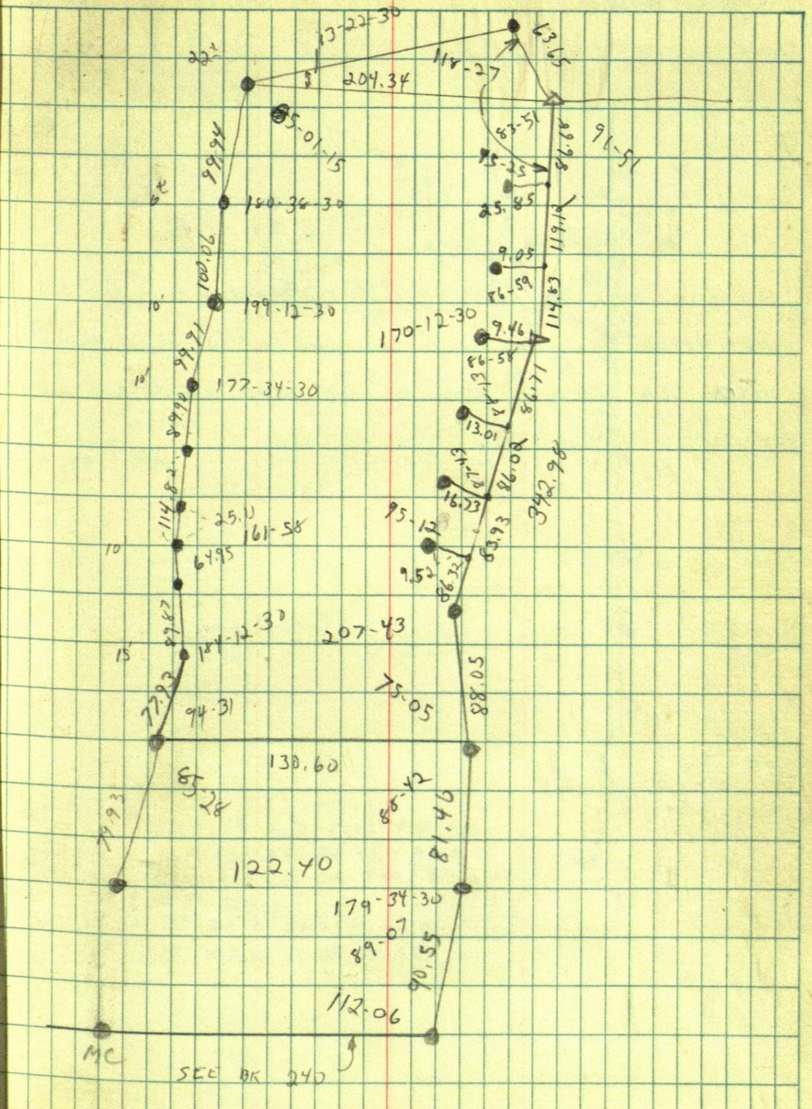
40
4.82
35.18



116

C. LAUGESON — GL 6 SEC 27

112-5-30		177-35	
224-12	112-06	355-09	177-34-30
179-35		161-58	
359-09	179-34-30	323-56	161-58
88-42		184-13	
177-24	88-42	8-25	184-12-30
75-05		94-31	
150-10	75-05	189-02	94-31
207-~~44~~ 43-30			
55-~~26~~	207-43-~~30~~		
415 85			
95-12			
87-43			
88-13			
86-58			
170-13			
340-25	170-12-30		
83-51			
167-42	83-51		
13-23			
26-45	13-22-30		
85-01			
170-2-30	85-01-15		
180-38			
01-17	180-38-30		
199-13			
38-25	199-12-30		



13-22-30
204.34
118-27
63.65
85-01-15
99.94
180-36-30
100.06
199-12-30
99.71
177-34-30
83-51
95-25
86.68
91-51
25.85
119.12
9.05
86-59
114.63
170-12-30
9.46
86-58
13.01
86.71
86.08
16.23
342.98
95-12
25.11
161-58
64.95
9.52
86.32
63.93
114.82
184-12-30
207-43
77.83
94.31
75-05
88.05
130.60
85-28
88-42
81.46
122.40
179-34-30
89-07
90.55
112-06
MC
SEE BK 240

118

ROBERT HOWE PART OF GOUT LOT SEC 140-27

572.06
841.35
1413.41

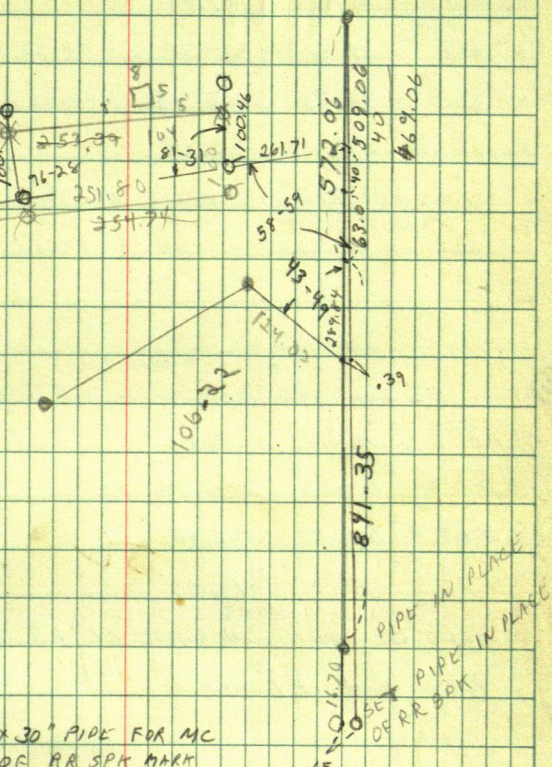
235
18.39
253.39

AS THE DIST BETWEEN THE MC & THE SEC COR DOES NOT AGREE WITH THE OLD DIST IN BK 274 Pg 33 BY K & WE CHECK OLD TIES TO THE MC WE FIND OLD RR SPK FROM THE TIES

861.9
392.84
469.06
509.06
469.06
40.00

ED
TONY
RON
10-14-75
10-16-75

119



1413.41
16.7
1430.11 MV CH
1429.92 OLD CH
.19 DIFF

SET 1½ x 30" PIPE FOR MC
IN PLACE OF RR SPK MARK
NEW BLAZES ON SAME BTS 2.15
IN BK 974/32 1.5
14" RD N 37-55E 52.0 .65
14" RD N 30-05 31.55

RE MONUMENTATION

T14O R31

(7) AT @ W¼ SEC 25 AS N ON SEC LINE TURN R

32" WP	11-42	147.93
5" WP	44-08	40+50.32 = 90.32
7" WD	92-33	30+70.56 = 100.56
Power Pole	249-45	56.04

SET CI MON IN PLACE OF 3/4 x 12" PIPE SET FROM OLD X ON ROCK IN ℄ ROAD

T14O R31

(6) AT @ SE COR SEC 23 AS N ON SEC LINE

5" NP	70-42	34.86
5" NP	121-26	26.38
5" WD	230-09	46.86
8" WD	337-34	106.95

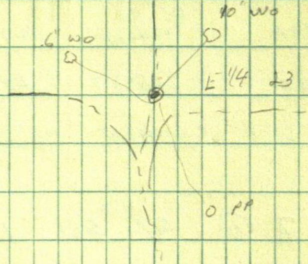
SET CI MON IN PLACE OF RR SPK SET FROM OLD TIES IN ℄ ROAD

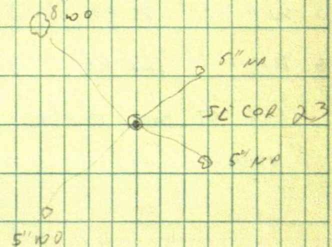
(5) AT @ E¼ SEC 23 T14O R31 AS SOUTH ON SEC LINE

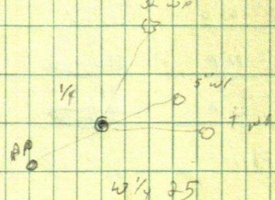
TURN LT °

Power Pole	27-13	69.80
10" WD	164-15	43.05
6" Twin WD	221-15	32.18

SET CI MON IN PLACE OF RR SPK N ℄ OLD ROAD BEAR TO NORTH


10" WO
6" WO
E 1/4 23
o PP


8" WO
5" WA
SE COR 23
5" WA
5" WO


32" WO
1/4
5" WA
7" WA
PP
W 1/4 25

⊼ @ S 1/4 SEC 15 T140 R31 BS WEST ✓

8" TAM 1	53.05	122.44
√8" TAM	85.33 ~~104.28~~	104.28
(4) 6" WO	265.27	58.20

SET CI MON IN PLACE OF BENT UP PIPE

⊼ @ S 1/4 SEC 1 140-31 BS E ON SEC COR ✓

(3) P Pole	89.92	33.24
10" NP	69.91	114.30
√12" WP	75.40	264.20
16" RO	122.85	321.28

SEC CI MON IN PLACE OF RR SPK SET FROM OLD CURV TIES

(2) ⊼ @ SE COR SEC 1 140-31 BS W ON 1/4 ✓

5" WO	81.14 ~~[illegible]~~	51.30	VERT. ~~6.00~~	153 1.95
3" NP	154.95 ~~[illegible]~~	152.44		
14" WP	91.90 ~~[illegible]~~	259.47	VERT 6.00	
P Pole	118.68	339.49		

(1) ⊼ E 1/4 SEC 19 140-30 BS SOUTH

12" NP	77.30	19.55
10" RO	73.92	51.29
6" RO	25.00	121.49
P Pole	58.47	271.10

Set cast iron mon in place of bent up pipe

(11) T@ SE COR SEC 33 140-29 BS N

PP	156-30	63.05
1" IRON ROD	224-41	46.98
√6" RO	245-30	32.90
5" RO	310-32	13.28

SET CI MON IN PLACE OF ROTTED CEDAR POST IN EDGE OF ROAD 6' W OF ℄

(20) T@ E¼ COR SEC 8 T139R30 BS N

6" TP	120-22	46.0
12" TP	247-43	71.43
8" TP	309-45	104.23

SET CI MON IN ℄ ROAD 3' N OF FENCE TO E

T OVER E ¼ SEC 8 T 140 - 27 BS N ON SEC LINE

10" TAM	56.22	62-18
8" CEDAR	74.33	92-42
11" CEDAR	94.22	231-50
16" TAM	78.47	299-30

SET CI FROM OLD TIES IN BK 243/12

℄

T OVER NE COR SEC 8 T 140 R 27 BS SOUTH ON ¼

20" NP	51-55	93.0
6" ND	149-54	49.20
18" NP	228-02	90.82
14" ND	310-18	101.55

SET CI MIN IN PLACE OF BENT UP GUN BARREL

℄ ℄

T OVER N ¼ SEC 8 BS 5 ON N-S ¼ LINE ~~NE COR SEC~~

8" BIRCH	11.45	61-03
POWER POLE & BIRCH	48.72	118-25
6" BIRCH BRANCH	55.35	188-43
8" BIRCH	12.59	331-27

SET CAST IRON MON IN PLACE OF OLD PIPE

ON SHOULDER OF ROAD

128

T. 140 - R. 31 — Turn West

(12) T over W 1/4 Sec 15 ✓ BS S on Sec. Line

15" Norway	177.48	22-24
14" White Pine	86.30	107-59
12" Norway	69.57	159-07
✓ 9" Oak (White)	65.50	258-33

Set CI Mon. by Replacing Pipe in Int.

T. 140 - R. 31 — Turn West

T over N 1/4 Sec 15 ✓ BS South on 1/4 Line

(13)

Power Pole	65.57	18-50	
8" R Oak	80.78	126-05	CHECK CERT.
Power Pole	71.40	163-11	
5" W Oak	57.82	212-38	

✓ Set CI Mon by Replacing Pipe in Int.

T. 140 - R. 31 ✓

(14) T @ NW COR Sec 23 BS W

20" NP	~~200.26~~ 186 17-24	25-02
✓ PP	47.14	107.40
14" WP	165.38	306-37

(15) T @ 1/4 Cor 7-8 139-29 BS S

9" JP	119.28	56-01
10" J.P.	240.89	108-25
✓ T.P.	41.85	142-43
P.P.	59.35	322-17

Replaced Pipe - 2" x 3'

1
300
300
170
300
260
1330
.87
1329.13

1323.83

1323.83
1077.09
246.49
2647.41

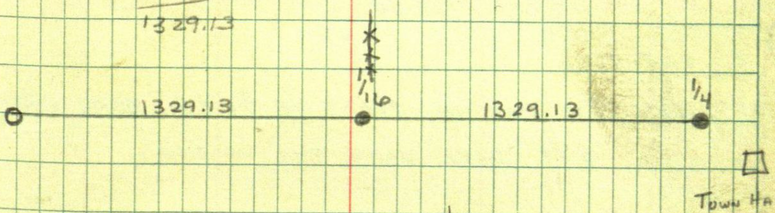
1323.70
2|2647.41

1077.09
246.49
1323.58

300
230
210
150
200
200
1290
39.13
1329.13

740
5.63
734.37

1329.13
740.00
589.13



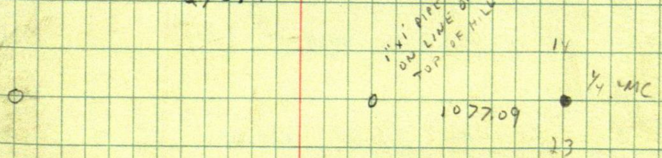
250
3.51
246.49

30
2.91
27.09

1050
27.09
1077.09
246.49
1383.83
2707.41

23.83
1360
1383.83

30
6.17
23.83
1360
1383.83



130

PENTO LAKE	139-29	
T @ S1/4 Cor 10 BS W)		℄ REPLACE 2"X2" PIPE
36" NP	112.39	11-50
(16) PP	172.42	171-38
PP	145.53	189-45
PP	178.31	351-59

30
13
90
30
390

PIPE

℄ COR

(19)	60 13	60.43
8" R.O	243.54	39.55
5" W.O	327.57	66.80
8" NP	343.25	111.63

IN PLACE OF OLD RR SPK 8" DEEP 1'E OF ℄

130

Ponto Lake 139-29

X @ S 1/4 Cor 10 BS W ℄ Replace 2"x2" pipe

36" NP	112.39	11-50
(16) PP	172.42	171-38
✓ PP	145.53	189-45
PP	178.31	351-59

X @ 1/4 Cor Bet 21-22 T139 R30 BS N ✓

8" Birch	70-43	119.46
6" IP	148-16	138.61
P Pole	184-31	103.28

(17) ℄ TWP Road

✓ Set Cast Iron Mon in place of 3/4 x 5' Bent Pipe

Located 2 FT Deep under fill in Road

X @ 1/4 Bet 21-28 139-30 BS W on Sec Cor ✓

Southwest 3 x 3' x 15 Con Pile	104-06	33.73
14" IP	137-57	57.74
P Pole	239-23	43.13

(18) ✓ In place of PK Nail NE

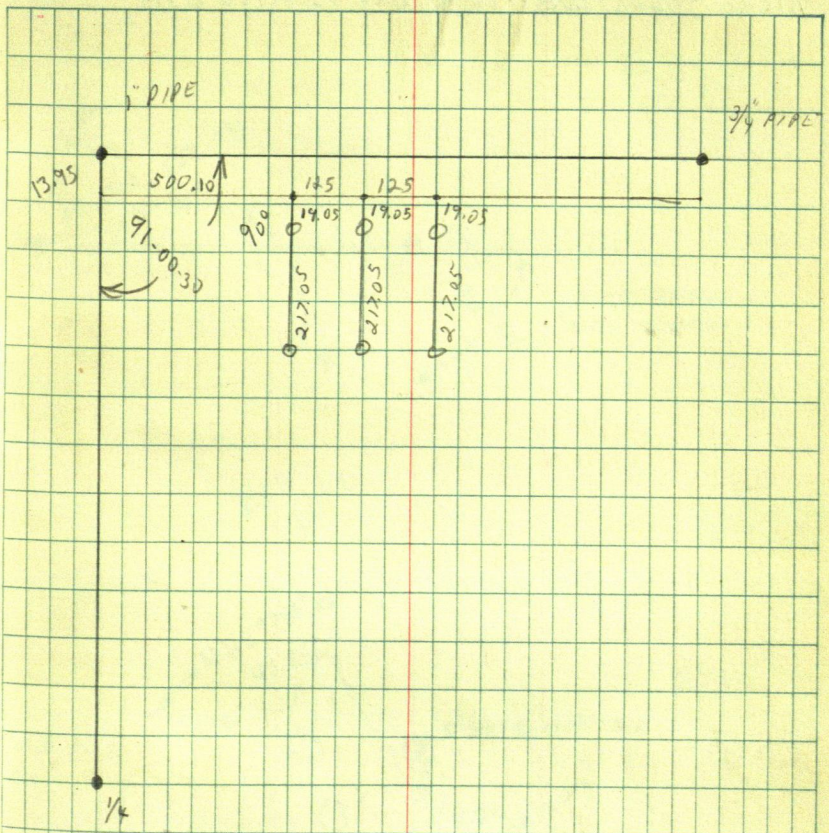
X @ 1/4 Bet 29-30 139-29 BS N

(19) 5" RO	60-45	60.43
✓ 8" RO	243-54	39.55
5" WO	327-57	66.80
8" NP	343-25	111.63

In place of old RR Spk 8" Deep 1'E of ℄

132

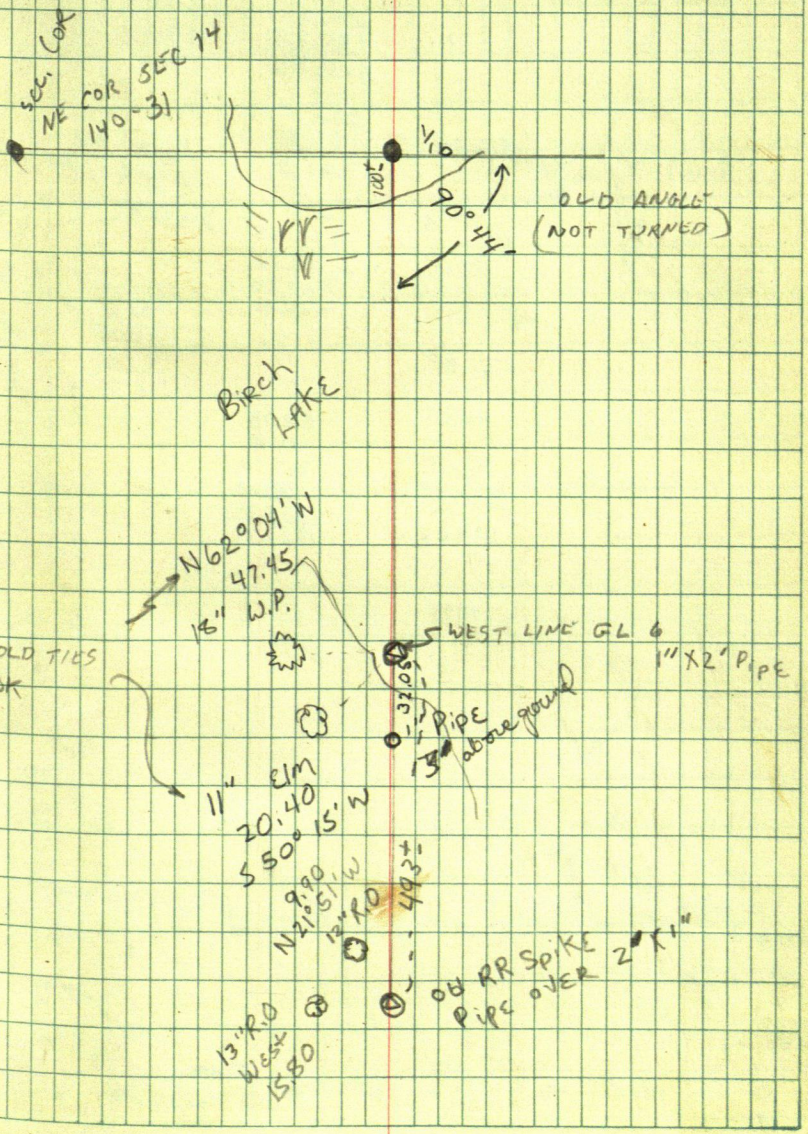
LYNN	CLODFELDER			5	132-29
91-00					
152-01	91-00-30				


1" PIPE
3/4" PIPE
13.95
500.10
12.5
12.5
19.05
19.05
19.05
90°
91-00-30
21.05
21.05
21.05
1/4

134

DICK JOHNSTONE W. LINE GOUT LOT 6 - 14 - 1Y0 - 31

Feb 23, 1976 Ron-Paul Mr. Johnstone.



136

28-03
56-07

88-03-30

140.0
40.0
200.0
135.83
515.83

190 ±
100 ±
20±
310±

200.0
121.18
321.18

166.90
57±

515.83
321.18
200.00
1037.01

60
200
37.24
297.24

200.00
67.50
267.50
120.00

1327.79
1037.01
290.78
-187.50
103.28

121.68

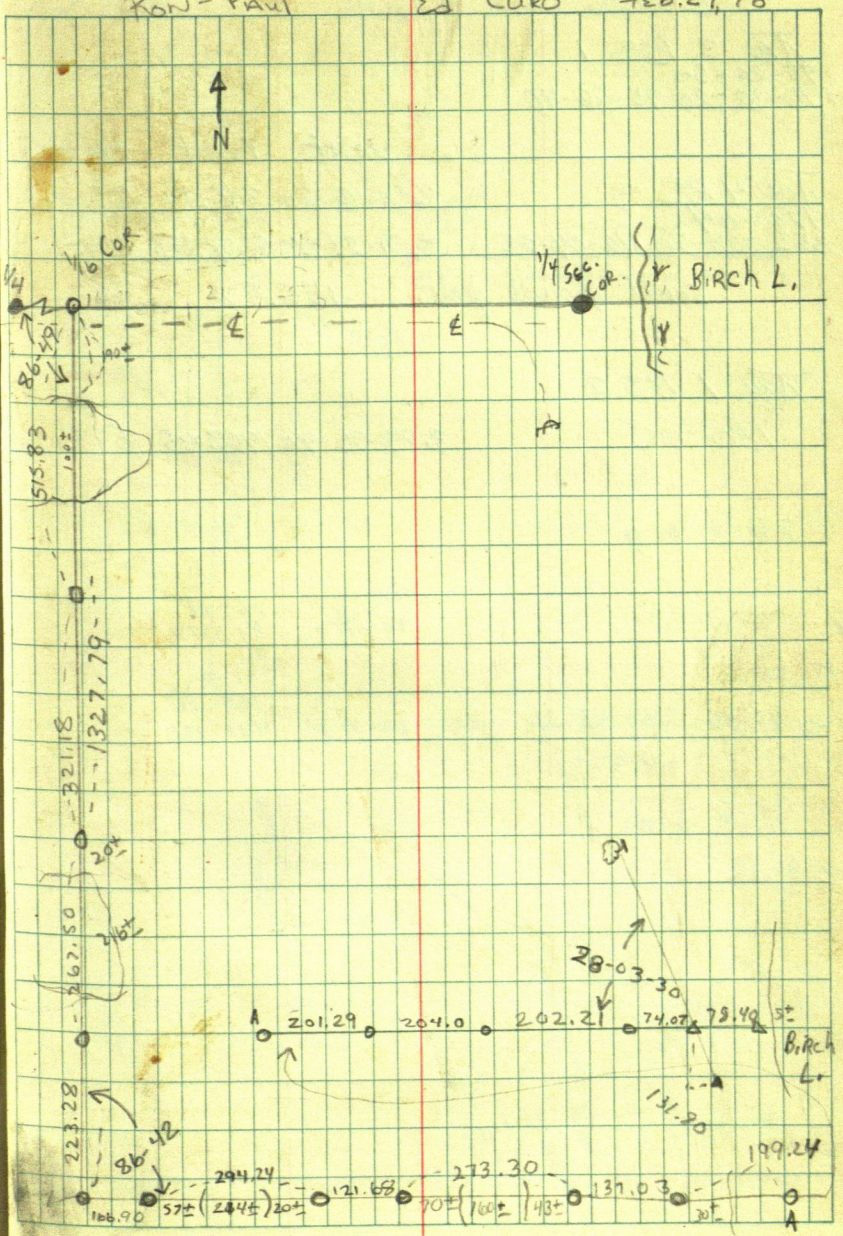
111
515.83
321.18
267.50
120.00
103.28
1327.79

70.0
160.0
43.30
273.30

137.03

7840

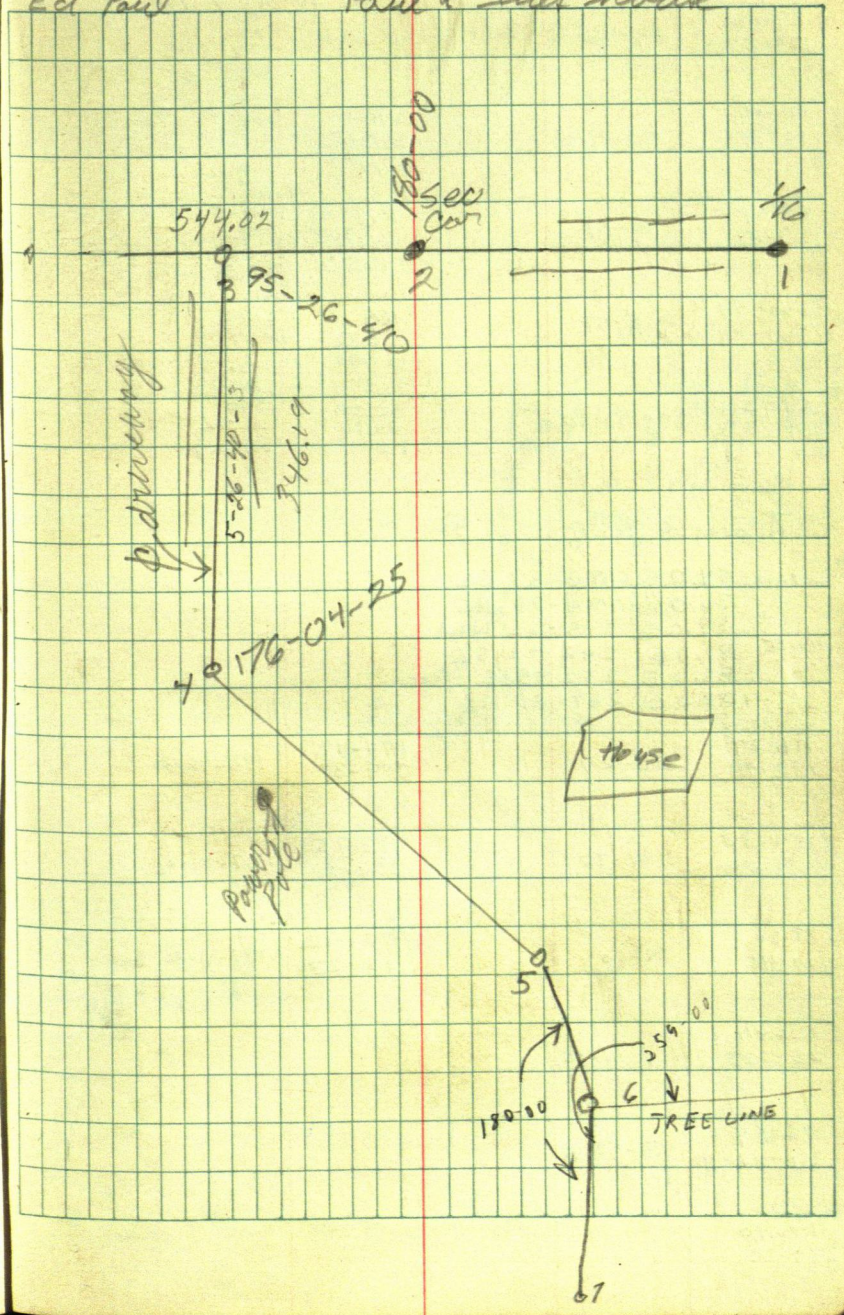
Ron - Paul Ed Curo Feb. 27, '76



Δ@ 3 BS 1					
95-26-50					
190-53-20	95-26-40				
			Vert	Feet	Meters
Δ@ 4 BS 3		3.	90-46-20	346.19	105.51
176-07					
352-08-50	176-04-25	5.	91-24-40	867.53	264.42
South power pole.				156.57	
Δ@ 1 BS 2					
180-00		3.	89-30-40	1967.45	589.6[illegible]
Δ@ 5 BS 4					
6			90-01	267.40 81.507m	
194-45-30					
7 29-30-50	194-45-25		89-30-18	1471.06 448.389	
Δ@ 6 BS 7					
259-00					

Ed Paul

Paul + Sues house



Y40

C. BRISSETT — GL 10 SEC 7 139-29

89-46
179-33 — 89-46-30 — ANGLE TO PPE .22 N

90-19
180-39 — 90-19-30

89-51
179-42 — 89-51

180-47
361-34 — 180-47

57-12
114-23 — 57-11-30

A over B, BS A

GARAGE 54.0 @ 176-57 SE
36.0 @ 184-25 NE
59.0 @ 215-21 NW
HOUSE 81.0 @ 242-03 SE
83.0 @ 252-15 NE - Porch
103.0 @ 267-23 NE

116-24
132-48 — 116-24

184-33
9-06 — 184-33

89-50
179-40 — 89-50

126-41
253-23 — 126-41-30

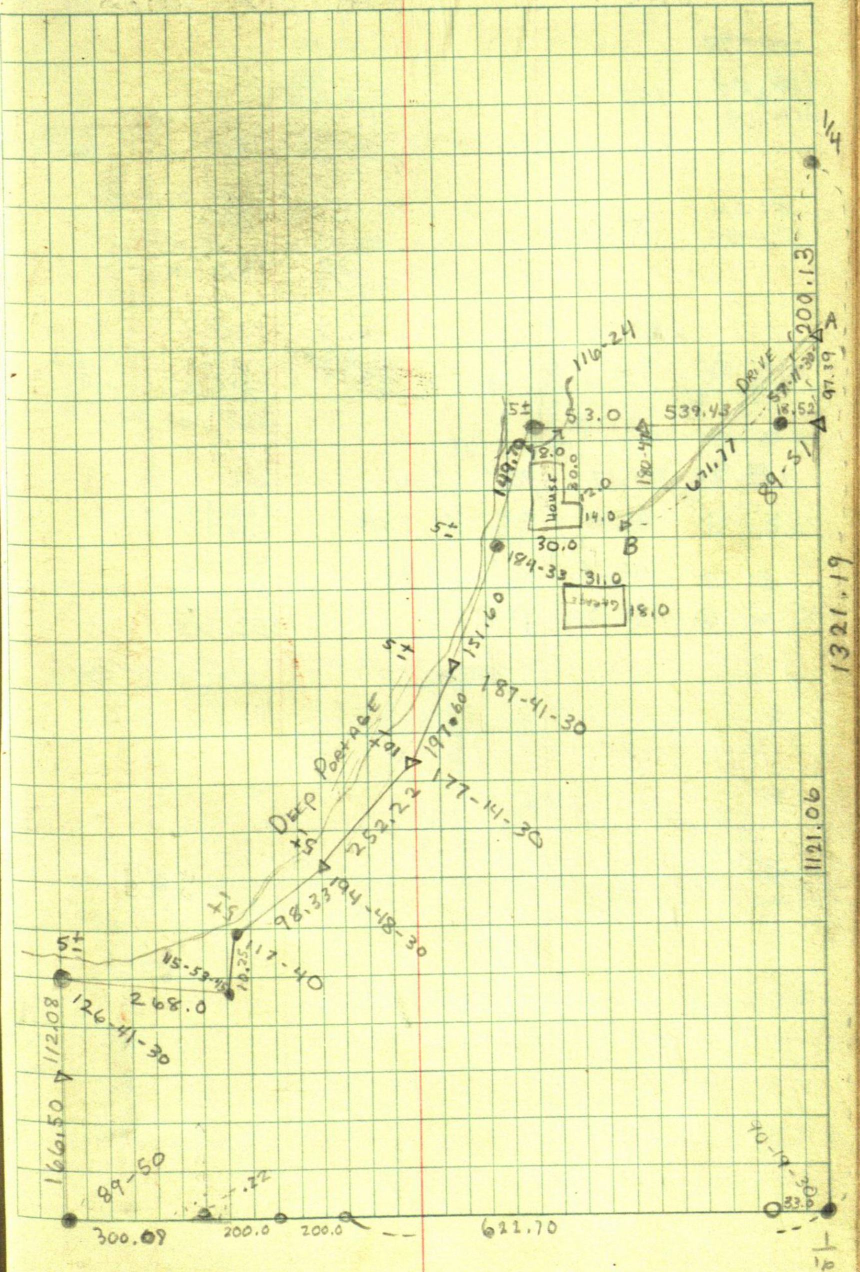
115-54
231-47-30 — 115-53-45

117-40
235-20

194-49
389-37 — 194-48-30

177-15
354-29 — 177-14-30

187-42
15-23 — 187-41-30



1/4
200.13
A
DRIVE
539.43
53.0
116-24
5±
149.70
18.0
30.0
House
12.0
14.0
B
180-47
671.77
57-11-30
97.39
18.52
89-51
30.0
184-33
31.0
Garage
18.0
1321.19
151.60
187-41-30
197.60
5±
DEEP PORTAGE
252.22
177-14-30
194-48-30
98.33
117-40
115-53-45
10.25
268.0
126-41-30
112.08
1661.50
89-50
.22
300.08
200.0
200.0
622.70
1121.06
90-19-30
33.0
1/16

142

SE 1/4-SE 1/4 SEC 1 140-31

~~101-56~~

158-04
316-09

158-04-30

1
33.15
1.85
35.00

89-56
179-53

89-56-30

1
92.32
1.85
94.17

1
38.33
~~1.85~~
40.18

Ties for Cent 1/4 Cor.

1200.0
2000
163.0
483.0
.14
482.86

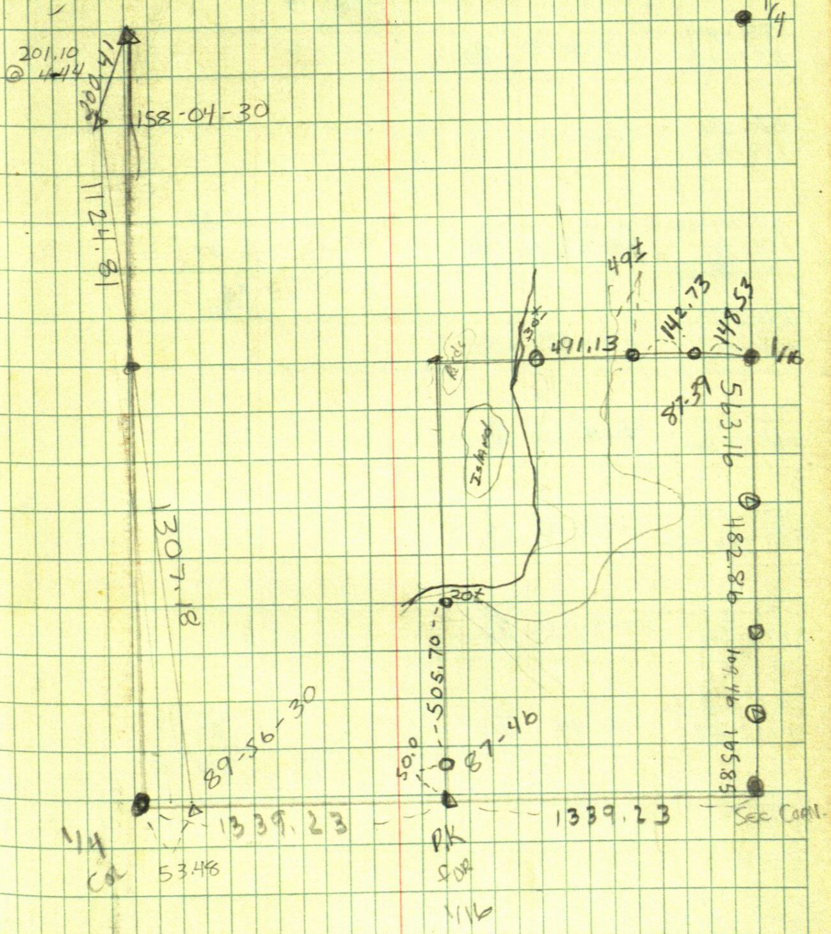
200.0
60.0
200.0
103.16
563.16

1
49.23
1.85
49.08

NE @	94.17	18" OAK	222
SE @	40.18	8" R. OAK	165.85
SW @	49.08	10" MAPLE	109.46
NW @	35.00	P.P.	482.86
			563.16
			1321.33

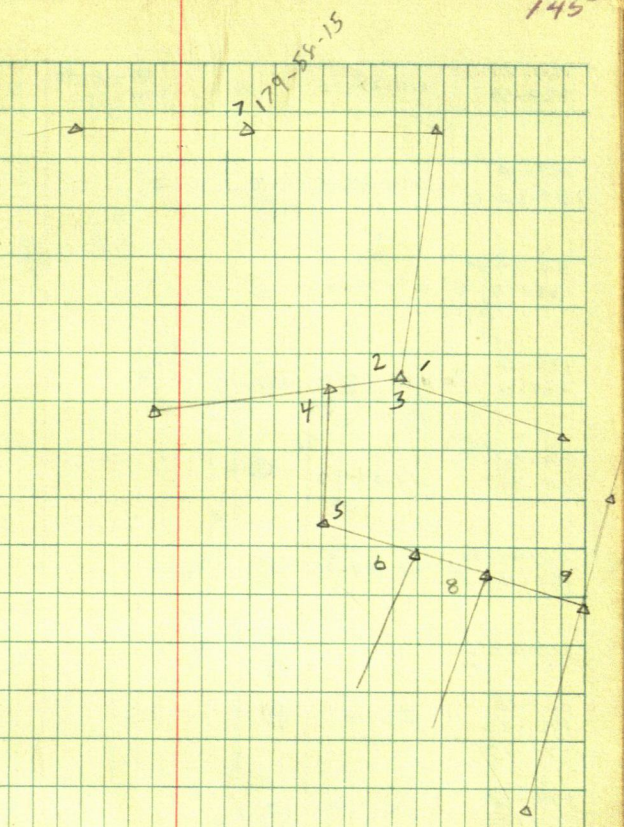
201.10 @ 4.44

Dave Miller

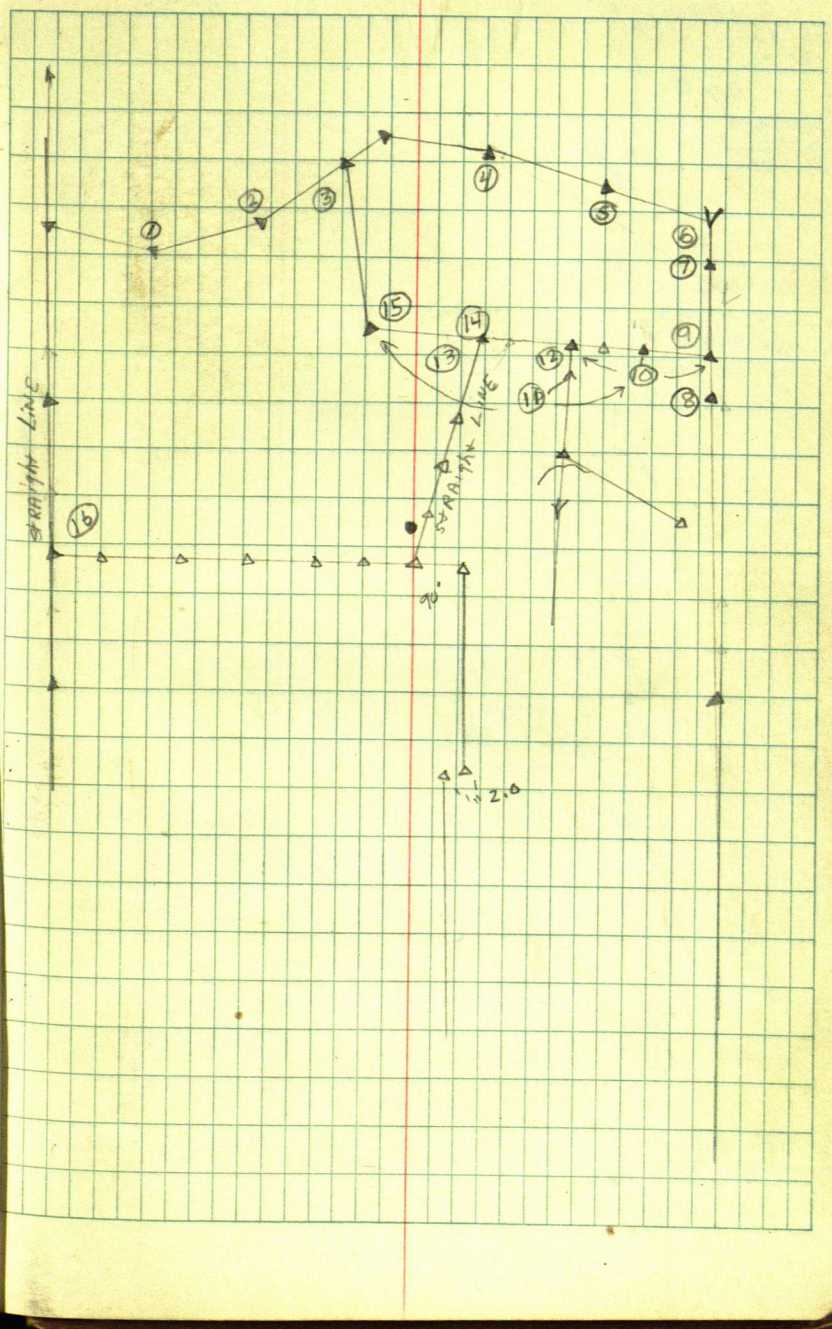

201.10
@ 4-44
200.41
158-04-30
1124.81
1307.18
89-56-30
1339.23
53.48
1/4
COR
PK
FOR
1/16
505.70
50.0
87-46
20±
Island
30±
491.13
49±
142.73
148.53
1/16
87-39
563.16
482.86
1339.23
Sec Corn.
1/4

144

61-56 123-52-30	61-56-15	①	
138-37 277-13	138-36-30	②	200-32-45 159-28 360-60-45
159-28 318-56	159-28	③	
69-09-30 138-19 207-28-30	69-09-33	④	3 / 207-28-30 = 69-09-33 18 27 27 10 10
135-00 270-01	135-00-30	⑤	
70-12 140-23	70-11-30	⑥	
179-58 359-56-30	179-58-15	⑦	
87-27 174-55	87-27-30	⑧	
89-13-37 178-28	89-14	⑨	179-60 89-14 90-46


179-58-15
7
2
1
3
4
5
6
8
9

164-27-30 328-55	164-27-30	①	89-58-30 179-59	89-58-30	⑯
144-40 289-20-30	144-40-15	②			
69-09-30 138-19	69-09-30	③			
134-36 269-11	134-35-30	④			
179-55 359-49	179-54-30	⑤			
90-54-30 181-49-30	90-54-45	⑥			
STRAIGHT LN. " "		⑦ ⑧			
89-15 178-30 267-45	89-15	⑨			
179-59 359-58	179-59	⑩			
179-59 359-58	179-59	⑪			
87-27 174-54	87-27	⑫			
70-12 140-24-30	70-12-15	⑬			
St. LN.		⑭			
135-00 270-00		⑮			


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Straight Line
Separating Line
R
1½ 2.0

148

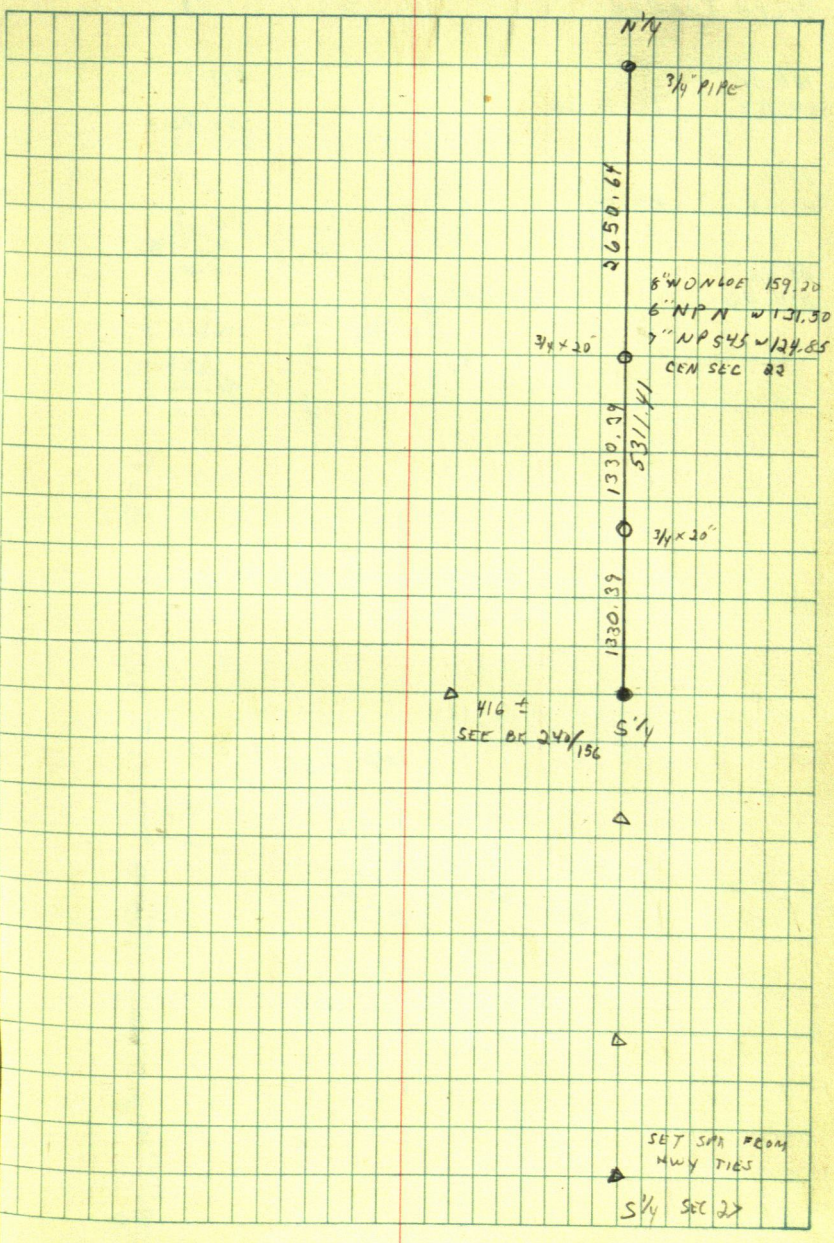
C. LAUGESON

GL 6 SEC 22
GL 1 SEC 27

90-46
181-32

~~180-35~~
179-56
~~359-58~~

179-55-30


N 1/4
3/4" PIPE
2650.64
6" W ON LOE 159.20
6" NP N W 131.30
7" NP S45 W 124.85
CEN SEC 22
3/4 x 20"
S31°W
1330.39
3/4 x 20"
1330.39
416 ±
SEE BK 242/156
S 1/4
SET SPK FROM HWY TIES
S 1/4 SEC 27

150

RALPH TURNER

SEC 1 141 30

180.11
360.23

180.11.30

265.73
90
355.73
254.93
610.66

84.40
169.20

84.40

64.68
60
124.68

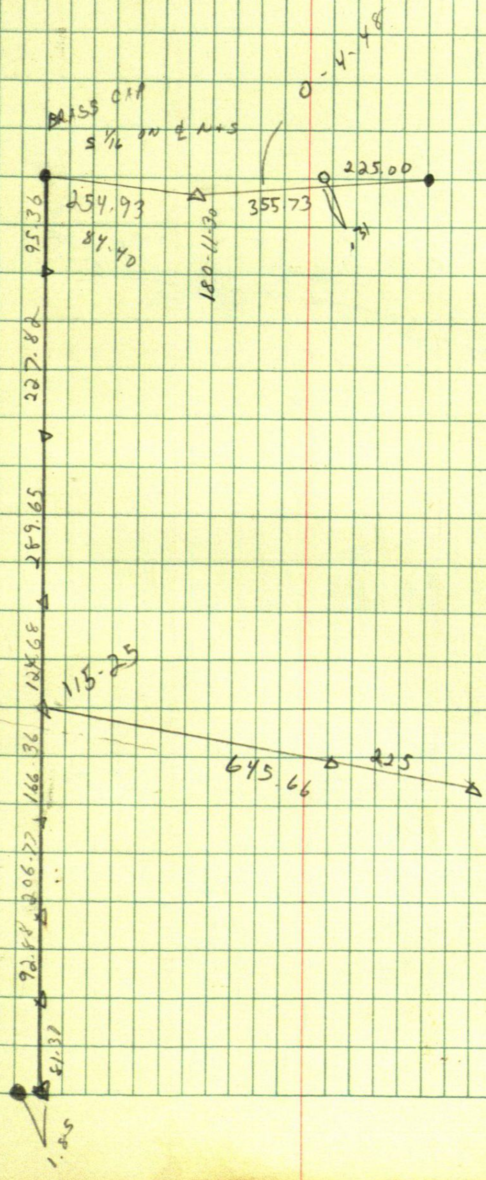
115.25
230.50

70
47
44.36
166.36

86.99
120
96.72

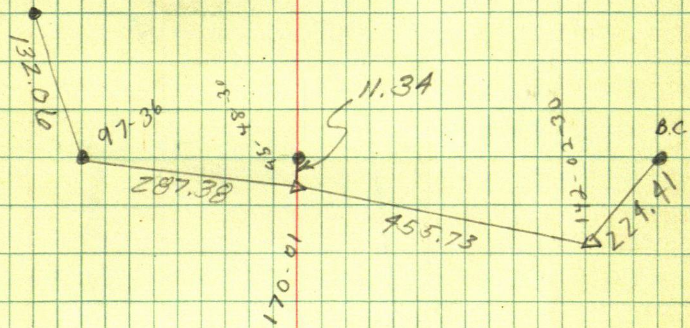
88.05.31

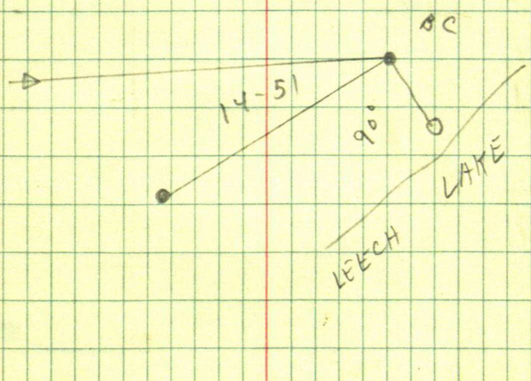
288.51


BRASS CAP
S 1/16 ON ℄ N+S
0-4-48
225.00
254.93
84.40
180-11-30
355.73
.31
95.36
227.82
269.65
115-25
166.36
645.66
225
206.22
92.88
51.38
1.85

152

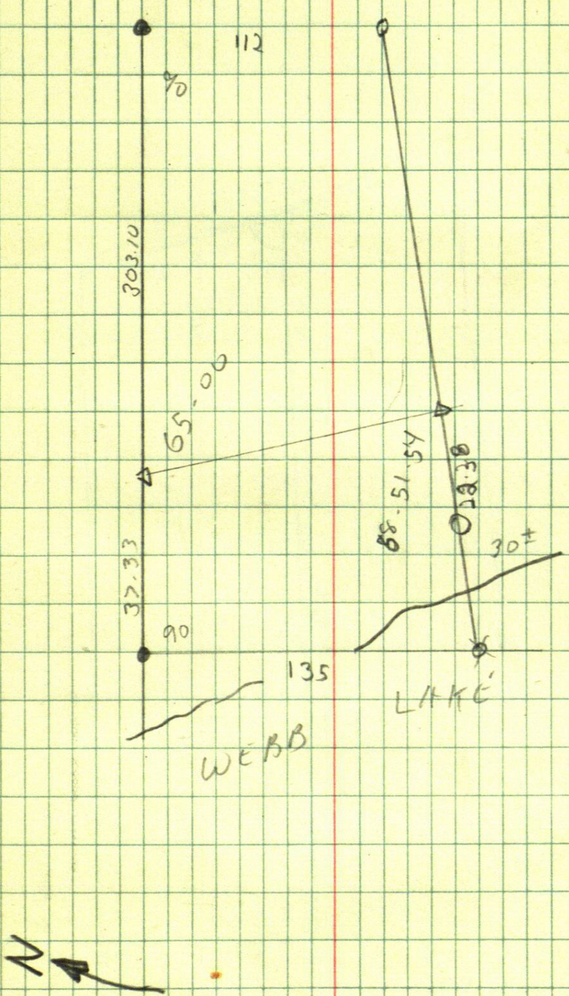
MIKE	MAROSCIA	31-143-30
97-36 195-12	97-36	
95-49 ~~95-04~~ ~~190-56~~ 191-39	95-45-36	
170-00-30 340-02	170-01	
142-02 284-05	142-02-30	
14-51 29-42		


132.06
97-36
287.38
N. 34
170-01
455.73
142-02-30
224.41
B.C


BC
14-51
90°
LEECH
LAKE

154

MARVIN OLSON

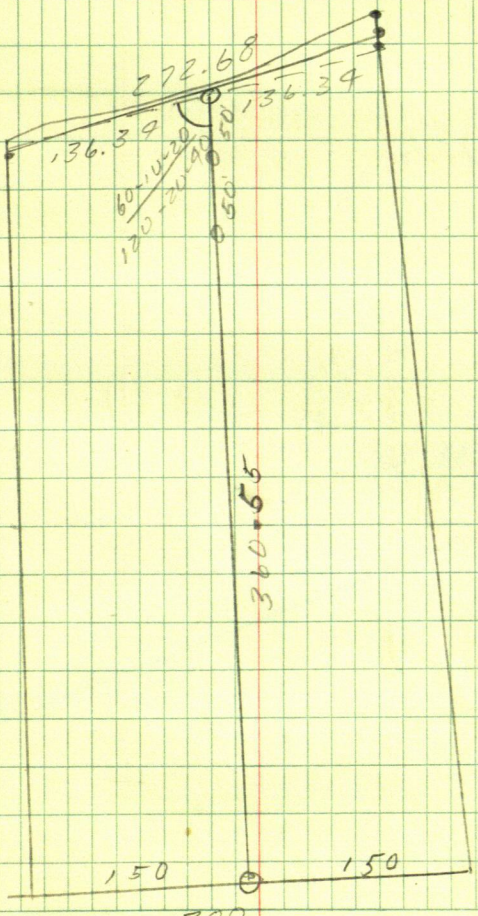

112
90
303.10
65.00
37.33
90
135
88-51-54
12.38
30±
LAKE
WEBB
N

1854

THOMAS ARAS

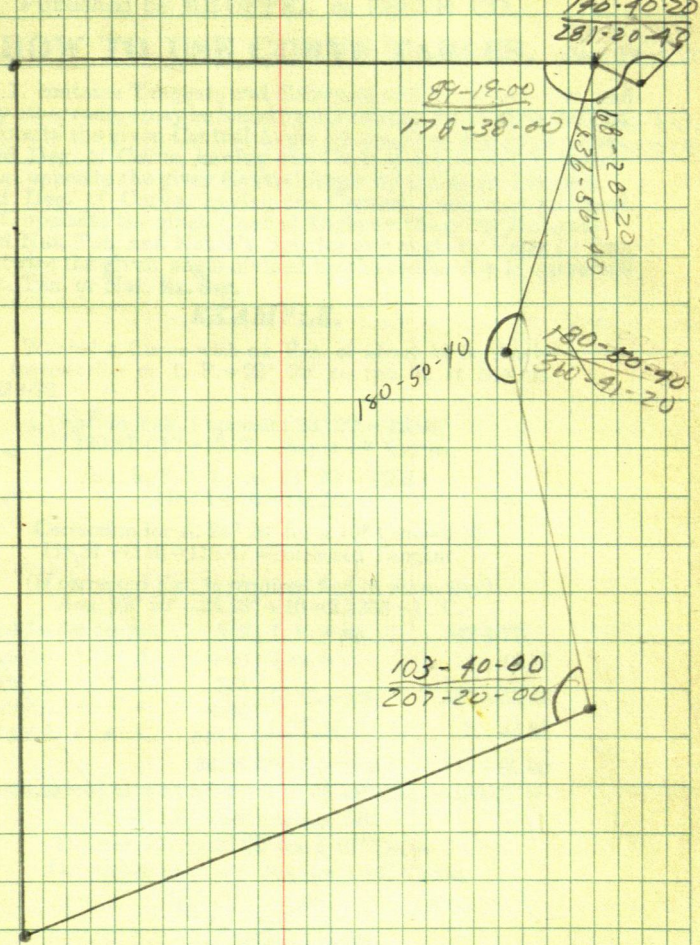
10-7-134-29

SEE C. BISSETT FILE


272.68
136.34
136.34
60°-00'-00"
120°-00'-00"
150'
300.55
150
150
300

MYRON OELL

103-40 207-20	103-40
180-50-40 360-41-20	180-50-40

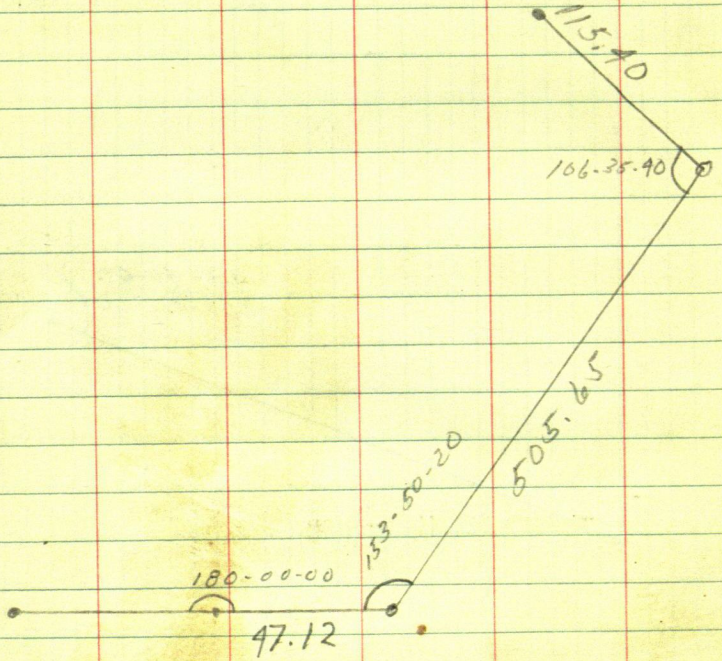

140-40-20
281-20-40
89-19-00
178-38-00
90-20-20
181-50-40
180-50-40
180-50-40
360-41-20
103-40-00
207-20-00

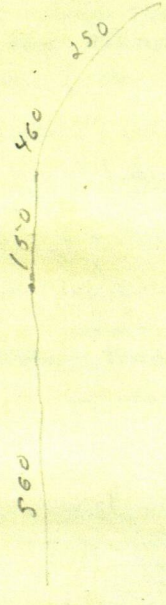
160

180-00-00

153-50-20
307-90-40

106-35-90
213-11-20





250
460
150
560
1420

129.9
89.75

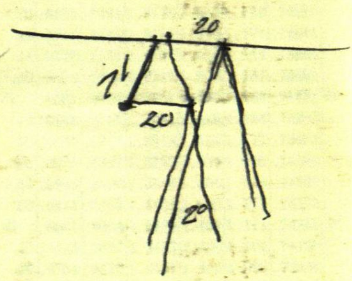
30.3
4
26.3

56.35
33.25

(.340)
97030) 3300000
291090
389100
388120
98000

291090
97030
4
388120
388120

160
4025
20025
8
191.25



1337.16
1347.72

296
230.3
55.7
50
100
109.6
10

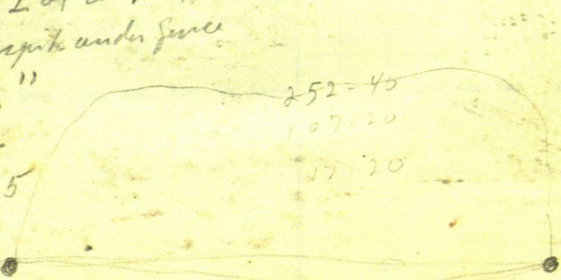
169.42
1175.36
1344.78

996
Fletcher

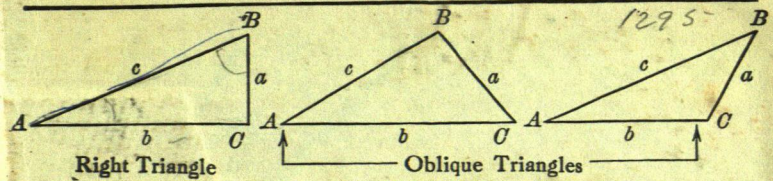
320.4
-8
312.4

400
312.4
87.6

Toor 400 Tam 90 lit 24" N
Tam Lor W 1°45' r
26.3 spike under fence
+97.9 "
+126.9
+86.75
+191.25



TRIGONOMETRIC FORMULÆ



Solution of Right Triangles

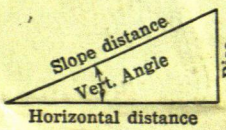
For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

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.