

WINTER
TRAVEL BOOK

ccc 69

TABLES FOR EXCAVATIONS AND EMBANKMENTS.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING-
ROADWAY 18 FEET WIDE. SIDE SLOPES 1 TO 1.
FOR SINGLE TRACK EXCAVATION.

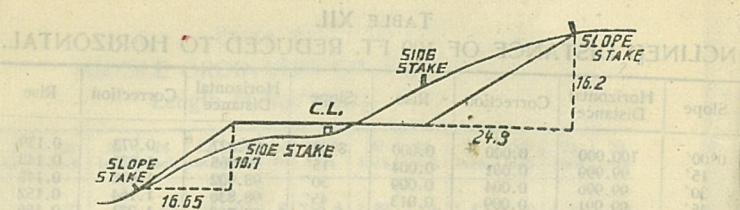
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1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

Road Traverse Notes

Marcell, Minn

Marcell Ranger District

Chippewa National Forest

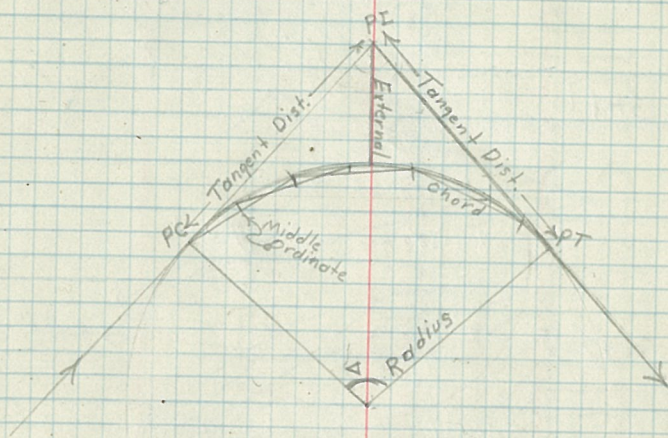


DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING.

SLOPE 1 1/2 TO 1. ROADWAY OF ANY WIDTH.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	0.00	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	0
1	1.50	1.65	1.80	1.95	2.10	2.25	2.40	2.55	2.70	2.85	1
2	3.00	3.15	3.30	3.45	3.60	3.75	3.90	4.05	4.20	4.35	2
3	4.50	4.65	4.80	4.95	5.10	5.25	5.40	5.55	5.70	5.85	3
4	6.00	6.15	6.30	6.45	6.60	6.75	6.90	7.05	7.20	7.35	4
5	7.50	7.65	7.80	7.95	8.10	8.25	8.40	8.55	8.70	8.85	5
6	9.00	9.15	9.30	9.45	9.60	9.75	9.90	10.05	10.20	10.35	6
7	10.50	10.65	10.80	10.95	11.10	11.25	11.40	11.55	11.70	11.85	7
8	12.00	12.15	12.30	12.45	12.60	12.75	12.90	13.05	13.20	13.35	8
9	13.50	13.65	13.80	13.95	14.10	14.25	14.40	14.55	14.70	14.85	9
10	15.00	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	10
11	16.50	16.65	16.80	16.95	17.10	17.25	17.40	17.55	17.70	17.85	11
12	18.00	18.15	18.30	18.45	18.60	18.75	18.90	19.05	19.20	19.35	12
13	19.50	19.65	19.80	19.95	20.10	20.25	20.40	20.55	20.70	20.85	13
14	21.00	21.15	21.30	21.45	21.60	21.75	21.90	22.05	22.20	22.35	14
15	22.50	22.65	22.80	22.95	23.10	23.25	23.40	23.55	23.70	23.85	15
16	24.00	24.15	24.30	24.45	24.60	24.75	24.90	25.05	25.20	25.35	16
17	25.50	25.65	25.80	25.95	26.10	26.25	26.40	26.55	26.70	26.85	17
18	27.00	27.15	27.30	27.45	27.60	27.75	27.90	28.05	28.20	28.35	18
19	28.50	28.65	28.80	28.95	29.10	29.25	29.40	29.55	29.70	29.85	19
20	30.00	30.15	30.30	30.45	30.60	30.75	30.90	31.05	31.20	31.35	20
21	31.50	31.65	31.80	31.95	32.10	32.25	32.40	32.55	32.70	32.85	21
22	33.00	33.15	33.30	33.45	33.60	33.75	33.90	34.05	34.20	34.35	22
23	34.50	34.65	34.80	34.95	35.10	35.25	35.40	35.55	35.70	35.85	23
24	36.00	36.15	36.30	36.45	36.60	36.75	36.90	37.05	37.20	37.35	24
25	37.50	37.65	37.80	37.95	38.10	38.25	38.40	38.55	38.70	38.85	25
26	39.00	39.15	39.30	39.45	39.60	39.75	39.90	40.05	40.20	40.35	26
27	40.50	40.65	40.80	40.95	41.10	41.25	41.40	41.55	41.70	41.85	27
28	42.00	42.15	42.30	42.45	42.60	42.75	42.90	43.05	43.20	43.35	28
29	43.50	43.65	43.80	43.95	44.10	44.25	44.40	44.55	44.70	44.85	29
30	45.00	45.15	45.30	45.45	45.60	45.75	45.90	46.05	46.20	46.35	30
31	46.50	46.65	46.80	46.95	47.10	47.25	47.40	47.55	47.70	47.85	31
32	48.00	48.15	48.30	48.45	48.60	48.75	48.90	49.05	49.20	49.35	32
33	49.50	49.65	49.80	49.95	50.10	50.25	50.40	50.55	50.70	50.85	33
34	51.00	51.15	51.30	51.45	51.60	51.75	51.90	52.05	52.20	52.35	34
35	52.50	52.65	52.80	52.95	53.10	53.25	53.40	53.55	53.70	53.85	35
36	54.00	54.15	54.30	54.45	54.60	54.75	54.90	55.05	55.20	55.35	36
37	55.50	55.65	55.80	55.95	56.10	56.25	56.40	56.55	56.70	56.85	37
38	57.00	57.15	57.30	57.45	57.60	57.75	57.90	58.05	58.20	58.35	38
39	58.50	58.65	58.80	58.95	59.10	59.25	59.40	59.55	59.70	59.85	39
40	60.00	60.15	60.30	60.45	60.60	60.75	60.90	61.05	61.20	61.35	40
41	61.50	61.65	61.80	61.95	62.10	62.25	62.40	62.55	62.70	62.85	41
42	63.00	63.15	63.30	63.45	63.60	63.75	63.90	64.05	64.20	64.35	42
43	64.50	64.65	64.80	64.95	65.10	65.25	65.40	65.55	65.70	65.85	43
44	66.00	66.15	66.30	66.45	66.60	66.75	66.90	67.05	67.20	67.35	44
45	67.50	67.65	67.80	67.95	68.10	68.25	68.40	68.55	68.70	68.85	45
46	69.00	69.15	69.30	69.45	69.60	69.75	69.90	70.05	70.20	70.35	46
47	70.50	70.65	70.80	70.95	71.10	71.25	71.40	71.55	71.70	71.85	47
48	72.00	72.15	72.30	72.45	72.60	72.75	72.90	73.05	73.20	73.35	48
49	73.50	73.65	73.80	73.95	74.10	74.25	74.40	74.55	74.70	74.85	49
50	75.00	75.15	75.30	75.45	75.60	75.75	75.90	76.05	76.20	76.35	50

EXPLANATION OF SYMBOLS USED



Symbols:

Δ = internal Angle
 Ex = External
 R = Radius
 T = Tangent Distance
 M = Middle Ordinate
 D = Deflection Angle (for laying
 out curves with transit)
 PI = Point of Intersection
 PC = " " Curve
 PT = " " Tangency

Data on above Curve:

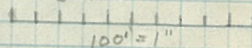
$\Delta = 97^{\circ}45'$
 Ex = 52'
 R = 100'
 T = 115'
 M = 13.4/50
 D = $28^{\circ}57'/50$

Explanation:

M = 13.4/50 :
 stakes to be set every
 50 ft, using Middle Ordinate
 of 13.4 ft.

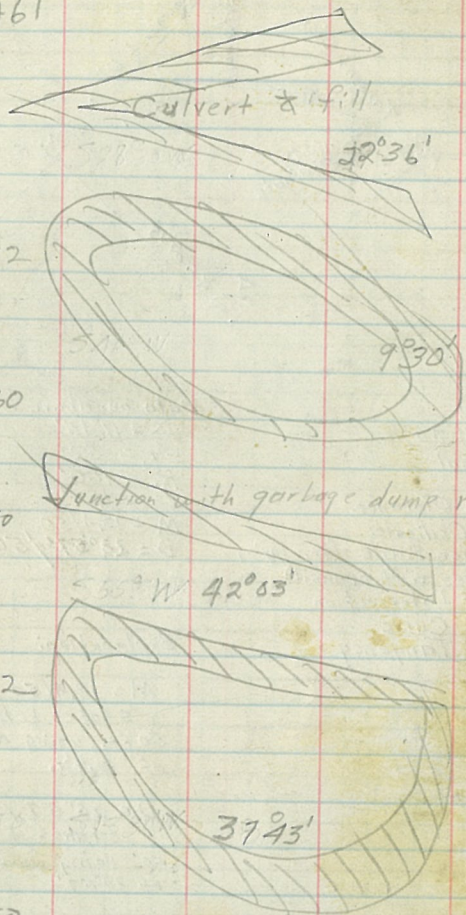
D = $28^{\circ}57'/50$
 stakes to be set every
 50' using Deflection Angle
 of $28^{\circ}57'$

SCALE



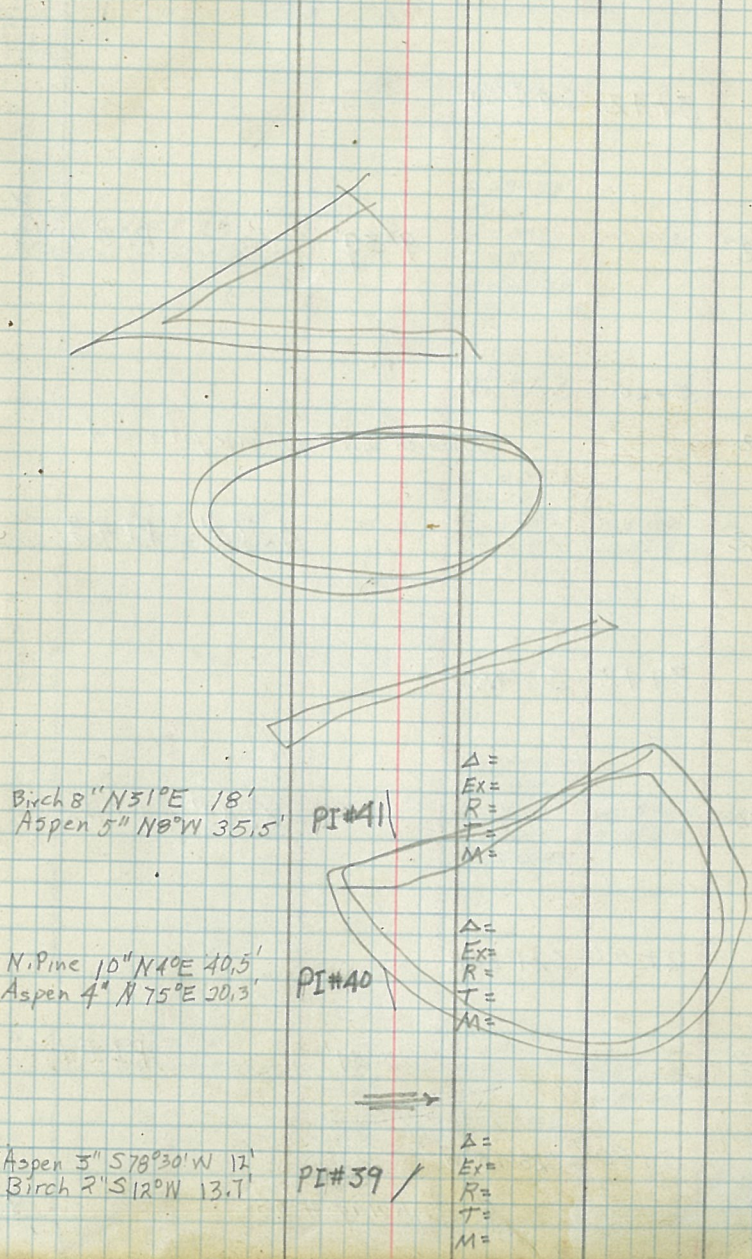
Traverse Truck Trail #570

Sta.	Dist.	Bearing	L	R	L
23+74				44°15'	
	3+61				3+61
22+47					
20+14				22°36'	
	3+42				3+41.5
16+72					
	2+60				
14+12					5+00
	2+40				
11+72		55°W		42°53'	
	3+42				3+42
8+30					
	2+50				2+49.5
5+80		52°36'E			53°34'
		528°45'W			
0	3+80	528°45'W			C/L Hwy #38



#570

PI	Witness Trees	Map	Curve Data	Cross Section	
				L	R



Birch 8" N31°E 18'
 Aspen 5" N8°W 35.5'

N. Pine 10" N40°E 40.5'
 Aspen 4" N 75°E 30.3'

Aspen 5" S78°30'W 12'
 Birch 2" S12°W 13.7'

PI#41
 Δ =
 Ex =
 R =
 T =
 M =

PI#40
 Δ =
 Ex =
 R =
 T =
 M =

PI#39 /
 Δ =
 Ex =
 R =
 T =
 M =

Truck Trail				E grad
Sta.	Dist.	Bearing	< L < R	
	3+42	S45°W		-4%
	5+00	S55°W		
16+72		9°39'	PI #4	
14+12				Junction with garbage pit road
11+72		42°03'	PI #3	
	3+47	S11°45'W		0%
8+30		37°43'	PI #2	
	2+50	S24°30'E		
5+80		53°34'	PI #1	
	5+80	S28°45'W		
				⊕ Highway #38

#570		Map	Curve Data	Cross Section	
PI	Witness Trees			L	R
	Oak 6" N3°E 33' Maple 6" N61°W 46.5'		Δ=9°39' Ex=2' R=500' T=42' M=0.7/25	-0.5/30	+0.5/40
	Bal. 6" S44°30'E 38' Birch 8" S81°E 38.5'		Δ=42°05' Ex=12' R=165' T=65' M=2.0/25	0.0/40	0.0/30
	Bal. 6" S58°30'E 16.5' Ironwood 4" N43°30'E 6'		Δ=37°43' Ex=18' R=320' T=108' M=4.0/50	-0.5/50	+0.5/20
	Bal. 10" S 31°30'W 36.5' Bal. 6" S 58°30'W 35.5'		Δ=53°34' Ex=30' R=250' T=126' M=5.1/50	-1.5/10	-0.0/30
				-0.5/10	+1.0/60
				-1.0/30	+1.0/30

Truck Trail			
Sta.	Dist.	Bearing	$\angle L \quad \angle R$
40+70			Intersect $\frac{1}{4}$ line 2956' E of $\frac{1}{4}$ Co.
34+10		29°30'	PI #8
	5+85	544°45'W	
31+92			Culvert fr ue ed
28+25		27°30'	PI #7
	4+50	572°15'W	
25+53			Culvert & short fill ^{ht. of fill -} Culvert size - 20" x 26"
24+91			End cut
24+61			Begin cut
23+75		44°15'	PI #6
	3+61	528°W	
22+47			Culvert & Fill ^{ht. of fill - 2 1/2 ft} culvert size - 24" x 26" _{End fill - 25 ft}
20+14		17°11' 22°36'	PI #5

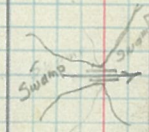
# 570		91		
PI	Witness Trees	Map	Curve Data	
			Cross Section	
			L	R
			$\Delta = 29^{\circ}30'$	
			Ex = 28'	
	Bal. 7" S89°30' W17.5'		R = 800'	+2.0/30
	W. PINE 8" N81° E12'		T = 210'	-4.0/50
			M = 1.5/50	+1.0/20
				-2.0/30
			$\Delta = 27^{\circ}30'$	
			Ex = 14'	
	Basswood 9" N59° W15'		R = 480'	+1.5/25
	Balsam 5" N7°30' W33.5'		T = 115'	+0.5/10
			M = 2.6/50	-2.0/35
				-1.0/15
			$\Delta = 44^{\circ}15'$	
			Ex = 14'	+1.0/15
	Bal. 8" N82° E 21'		R = 180'	-0.5/25
	Bal. 6" S46° E 29.5'		T = 150'	+3/25
			M = 2.8/50	-1/25
			$\Delta = 22^{\circ}36'$ $\theta = 11'$	
			Ex = 4.4'	
	W. PINE 12" N18° E 108'		R = 300'	-1.5/25
	Birch 5" N67°30' W66.5'		T = 60'	-2.5/40
			M = 1.1/25	

Sta.	Dist	Bearing	TRUCK TRAIL		E Grad	#570 PI Witness Trees	Map	Curve Data	Cross Section	
			< L	< R					L	R
66+35			17°15'	PI#17		MAPLE 8" N2°30'W42' L.T. ASPEN S88°W47'		Δ=17°15' Ex=6' R=500' T=77' M=0.7/25 D=2.2/25	+0.5/25	0.0/20
	2+26	S43°40'W								
64+09			34°04'	PI#16		W. PINE 4" N41°30'W28' MAPLE N30°E16'		Δ=34°04' Ex=9' R=200' T=62' M=1.6/25 D=7.0/25	-0.5/25	+0.5/25
	3+73	S77°55'W			0%					
			Intersect 1/6 line							
60+36			34°10'	PI#15		Maple S73°E26' Bal. S38°30'E25.7'		Δ=34°10' Ex=6' R=135' T=41' M=2.4/25	-1.0/16	-1.0/20 Swamp
60+20			20" X 26' fill - 2'	Culvert						
	2+34	S43°45'W			0%					
58+62			15°37'	PI#14		Maple 8" S64°E25' Balsam 8" S18°E21'		Δ=15°37' Ex=7' R=750' T=101' M=7.6/50	-1.0/25	-0.5/25
	4+41	S28°15'W								
53+80			Culvert	15" X 26' fill -						
53+61			30°14'	PI#13		Maple 6" S78°W14' Birch 5" N64°W9.7'		Δ=30°14' Ex=12' R=330' T=89' M=1.0/25	-0.5/10	+1.5/25 +0.5/10

TRUCK TRAIL					#570	19				
Sta.	Dist	Bear.	∠ L	∠ R	grade	PI WITNESS TREES	MAP	Curve Data	Cross Section	
					*				L	R
111+90			22°40'		0%	PI#29 ASPEN 3" S63°30'E 8' ASPEN 4" S5°30'W 5.7'		Δ=22°40' Ex=10' R=500' T=100' M=2.5/30	-0.5/20	-1.0/25 +0.5/10
110+40	3+19	N32°10'W				CROSS SECTION			0.0/8 -2.5/15	-0.5/5 -2.0/10
108+71				55°00'	4%	PI#28 W. PINE 1/6" S6°E 8' ASPEN 12" N27°30'E 40'	46 1 46	Δ=55° Ex=21' R=165' T=85' M=2.0/25	0.0/25 +0.5/45 +0.5/20	+0.5/20 -0.5/10
	1+96	N87°15'W								
106+75			14°56'		0%	PI#27 BIRCH 8" N60°30'E 63' W. PINE 9" S84°30'E 85'		Δ=14°56' Ex=4.5' R=500' T=65' M=2.5/50	-1.0/10 -4.5/25 (bump)	+0.5/10
	4+77	N72°30'W								
101+98			10°22'			PI#26 W. PINE 14" S17°W 17.3' ASPEN 4" N13°30'W 33.5'	46 1 46	Δ=10°22' Ex=2' R=500' T=44' M=0.7/25	-0.5/25	+0.5/20

STA	DIST	BEAR	TRUCK TRAIL		grade	#570	PI WITNESS TREES	MAP	CURVE DATA	25	
			< L	< R						L	R
	H62	N63°W									
171+35			36°02'			PI#41	BIRCH 8" N31°E 18' ASPEN 5" N8°W 35.5'		Δ=36°02' Ex=7' R=136' T=44 M=	-3.0/15 -1.0/7 -2.0/8 -3.5/15	4.0/10 +1.0/7 +1.0/17
	2+14	N27°W									
169+21			33°20'			PI#40	N. PINE 10" N4°E 40.5' ASPEN 4" N75°E 20.3'		Δ=33°20' Ex=10' R=228' T=68' M=	+2.0/14 +3.0/20 +2.0/20 +1.0/10 +0.5/20	-2.0/10 +0.5/15 -3.0/25
	3+93	N65°E									
165+94											
165+28						PI#39	ASPEN 3" S78°30'W 12' BIRCH 2" S12°W 13.7'		Δ=76°11' Ex=23' R=85' T=67' M=	+0.5/13 +3.5/23 +7.5/35 +0.5/7	-5.0/25 -5.5/35 -2.0/10 (Swamp)
	4+96	N70°W									
160+32			47°16'			PI#38	MAPLE 12" S69°30'E 34' BALSAM 6" S36°E 6'		Δ=47°16' Ex=22' R=240' T=105' M=	+7.5/30 +6.0/25 +0.5/5 +4.0/10	-6.0/25 -5.5/14 -1.5/12 -2.5/20
160+00											
157+43											
156+79.5											

about 15" x 21" fill 12" 0+66 to culvert



length of curves = 107'

A6 B6

B6 A6

STA	DIST	BEAR	TRUCK TRAIL		grade	#570	PI WITNESS TREES	MAP	CURVE DATA	27	
			< L	< R						CROSS SECTION	R
	4+18	N66°W									
187+18			51°15'			Aspen 5" S88°45'E 53' Aspen 5" N68°E 48'			Δ = 51°15' Ex = 33' R = 303' T = 145' M =	0.0/30	-0.5/33
	6+66	N34°45'W			0.0						
180+52			16°53'			Aspen 9" N12°30'E 24' Aspen 9" N29°E 33'			Δ = 16°53' Ex = 6' R = 548' T = 79.7' M =	+0.6/6 +2.0/10 +1.5/10	-0.5/6 -2.5/15
		Intersect Sec. line 1/4 W. of Approx. 1/4 Cor.									
	3+27	N18°W									
177+25			10°59'		*	Aspen 6" S51°0'W 22' Aspen 6" S30°30'W 28'			Δ = 10°59' Ex = 6' R = 1300' T = 125' M =	0.0/15	-0.5/15
	4+28	N29°W			0.0						
172+97			34°04'			N. Pine 14" S85°50'W 35' Aspen 4" S6°W 21.5'			Δ = 34°04' Ex = 5' R = 110' T = 34' M = D =	+0.5/5 +3.0/15	-2.5/5 -4.5/10 -6.0/15

TRUCK TRAIL

#570

29

STA. DIST BEAR. <L <R

PI WITNESS TREES

MAP

CURVE DATA

CROSS SECTION

208+37

grade

L R
-1.0/8 +0.5/6
-5.0/15 +7.0/12

3+82 S81°30'W

X

X

207+20

26°24' PI# 49

X

$\Delta = 26^{\circ}24'$
Ex = 9'
R = 500'
T = 117'
M =

-1.0/20 +1.5/15
0.0/9

5+50 S55°W

X

X

204+00

Cross Section

$\Delta = 9^{\circ}22'$
Ex = 5'
R = 363'
T = 34.6'
M =

-1.0/5 0.0/10
-2.5/12 +4.0/16

201+70

9°22' PI# 48

X

X

4+03 S46°W

X

197+67

71°54'

PI# 47

Aspen 3" N 12°30' W 38'
Aspen 4" N 15° E 50.5'

$\Delta = 71^{\circ}54'$
Ex = 55'
R = 150'
T = 108'
M =

~~-2.0/10~~ +4.0/25
~~-6.0/35~~ +6.0/35
~~-2.5/50~~
-1.5/15

6+31 N 61°20' W

X

193+75

Culvert

size - 18" x 24"
fill - 2'

X

X

191+36

23°40' PI# 46

Aspen 3" S 16°45' W 24'
Aspen 5" S 55°30' W

$\Delta = 23^{\circ}40'$
Ex = 11'
R = 500'
T = 104'
M =

-2.5/11 +2.0/11
~~+1.0/15~~
+1.5/15

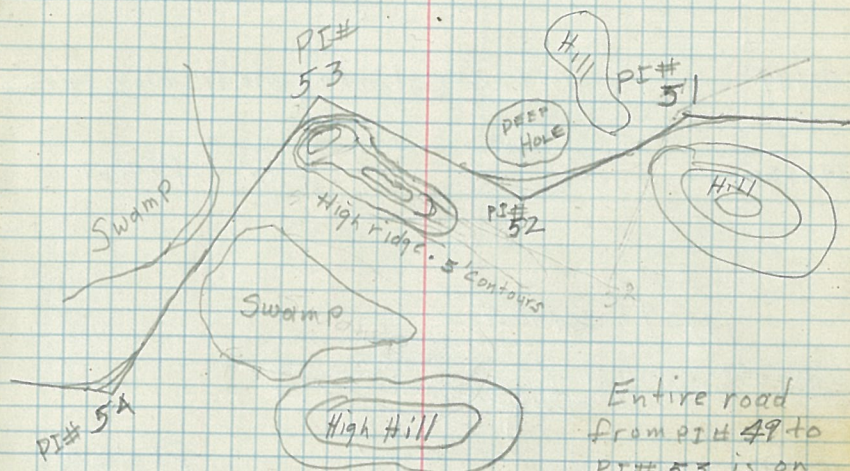
STA.	Dist	BEAR.	TRUCK TRAIL		#570	PI WITNESS TREES	MAP	CURVE DATA	35 CROSS SECTION	
			< L	< R					L	R
	14+31	N69°50'W				grate				
262+86				28°45'	PI#60	0/0		Δ=28°45' Ex=171 R=500' T=129'	0.0/17	0.0/15
	127+21	S01°40'W								
250+65		S01°40'W		5°50'	PI#59	0/0		Δ=5°50' Ex=2' R=1537' T=78'	-1.0/10 -1.5/20	+0.5/20
249+60					leave swamp					
248+10	5+17	S15°50'W			Hitswamp					
245+48			17°45' +5°14'		PI#58			Δ=15°14' Ex=456' R=500' T=67'	-0.5/10 -1.0/20	+2.0/20
	5+43	N86°25'W S88°30'W								
240+05 242+65 253+77			19°15'		PI#57			Δ=19°15' Ex=81 R=500' T=85'	-2.0/10 -4.0/20	+1.0/8

TRUCK TRAIL

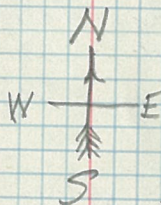
#570

MAP of VICINITY OF PI #51, 52, 53




37



Entire road
from PI# 49 to
PI# 53 is on
old railroad grade
in good condition

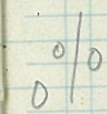
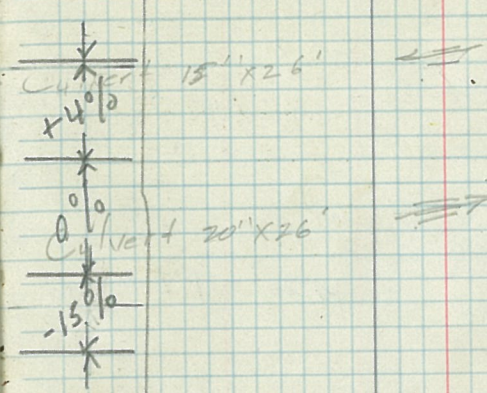


TRUCK TRAIL #570

STATION	DISTANCE	BEARING	CURVE		grade	MAP	CURVE DATA	CROSS SECTION	
			L	R				L	R
	2+76	S71°10'W							
292+79		15" X 26'	Culverting of 10' fill across swamp						
292+24			16°32'	PI#64			Δ=16°32' Ex=5' R=475' T=65'	1.0/15	0.0/15
4+27		S54°45'W							
288+55		S45°15'W							
287+97			9°46'	PI#63			Δ=9°46' Ex=5' R=147'116" T=141'121"	0.0/15	0.0/15
287+20		Culvert	End fill across swamp		0/0				
286+90		15" X 26'	Begin fill across swamp						
2+43		S64°30'W							
286+76			Intersect Range line 660' N at. Twp Cor Twp 57-58, R26-27						
422									
285+54			39°08'	PI#62			Δ=39°08' Ex=15' R=250' T=89'	-0.5/10	+0.5/15
8+37		N76°30'W				Ab			
277+17			6°48'	PI#61			Δ=6°48' Ex=2' R=1134' T=67'	+0.5/15	-1.5/10 -2.0/15

TRUCK TRAIL #570

STATION	DISTANCE	BEARING	TRUCK TRAIL		grade	MAP	CURVE DATA	CROSS SECTION	
			< L	< R				L	R
309+48				End Cut - Begin fill across Swamp					
308+08				Begin Borrow cut					
307+50				End cut					
305+58				Begin Cut					
303+58				End fill across Swamp					
302+97				Intersect Mo line 18.5' W of E 1/4 Cor. S36-1					
301+72				End cut - Begin fill across swamp					
300+58				Begin Borrow cut					
300+22	12+13	S42°W	23°17'	PI#67			Δ=23°17' Ex=5' R=240' T=52.50'	0.0/20	0.0/20
	1+44	S65°W							
298+78			28°09'	PI#66			Δ=28°09' Ex=8' R=500' T=74.65'	0.0/20	0.0/20
295+20	3+78	N86°50W							
295+12				End fill Through Swamp					
295+05				Culvert 15" X 26'					
295+00				Begin fill through Swamp					
				22°14' PI#65			Δ=22°14' Ex=10' R=500' T=98'	0.0/15	0.0/15



Δ=23°17'
Ex=5'
R=240'
T=52.50'

Δ=28°09'
Ex=8'
R=500'
T=74.65'

Δ=22°14'
Ex=10'
R=500'
T=98'

STATION	DISTANCE	BEARING	TRUCK TRAIL		#570	MAP	CURVE DATA	CROSS SECTION	
			< L	< R				L	R
	2+88	S72°35'W			grade				
322+27			Intersect	line					
320+55			14°26'	PI#70			$\Delta = 14^{\circ}26'$ $E_x = 5'$ $R = 556'$ $T = 70'$	-0.5/15	+1.0/15
	4+24	S57°40'W			0%				
316+31			25°21'	PI#69			$\Delta = 25^{\circ}21'$ $E_x = 13'$ $R = 520'$ $T = 115'$	-1.5/20	+1.5/20
	3+96	S32°35'W							
313+75			END FILL						
313+40			Culvert 15" X 26'						
313+05			End cut - Begin fill (swamp)						
312+35			9°05'	PI#68			$\Delta = 9^{\circ}05'$ $E_x = 3'$ $R = 955'$ $T = 76'$	-2.0/8	+1.5/10
							-2.5/12	+2.5/20	(swamp)
310+38			End fill. Begin Cut						
310+20			Culvert 15" X 26'						

TRUCK TRAIL #570

STATION	DISTANCE	BEARING	< L < R		E grade	MAP	CURVE DATA	GROSS SECTION	
			L	R				L	R
342+00			52°41'	PI#74	*	A6 B6	$\Delta = 52°41'$ EX = 25' R = 220' T = 108'	0.0/25	0.0/15
	7+14	S80°26'W							
334+86			16°19'	PI#73		A6	$\Delta = 16°19'$ EX = 6' R = 550' T = 84'	-0.0/15	+1.0/15
332+00 331+50 331+18				Leave Swamp Cutler 15' x 26' Enter Swamp					
	7+90	S64°W							
326+96			1°55'	PI#72	0/0		$\Delta = 1°55'$ EX = 1' R = 7140' T = 119'	0.0/15 -4.0/50 Swamp	0.0/15 -4.0/40 Swamp
	3+53	S65°40'W							
323+43			7°45'	PI#71			$\Delta = 7°45'$ EX = 2' R = 750' T = 51'	-1.0/15	+1.0/15

TRUCK TRAIL				#570			47
STATION	DISTANCE	BEARING	< L < R	% grade	MAP	CURVE DATA	CROSS SECTION
							L R
	4+81	S49°35'W			46/88		
355+94			42°51'		46/88	$\Delta = 42°51'$ $EX = 20'$ $R = 270'$ $T = 106'$	0.0/25 0.0/25
	7+29	N87°45'W			46/88		
		Intersect ^{Sec.} line					
348+65			12°27'		46/88	$\Delta = 12°27'$ $EX = 3'$ $R = 500'$ $T = 55''$	0.0/25 0.0/25
	2+20	N75°30'W					
346+95			29°06'		46/88	$\Delta = 29°06'$ $EX = 12'$ $R = 360'$ $T = 93'$	0.0/25 0.0/25
						thick stand 46 Mixed with Be & Bat. Gil	
345+00	4+45	N46°30'W			46/88		
			Conduit 15" X 26"				

*

0/0

0/0
30

PI #77 is Hub
in center of
trail

58.1255
of N 46.5'

$$\begin{array}{r} 162 \\ \underline{66} \\ 972 \\ \underline{972} \\ 10692 \end{array}$$

$$\begin{array}{r} 71. \\ 1086 \\ \underline{86} \\ 11946 \end{array}$$

$$\begin{array}{r} 323.43 \\ \underline{107} \\ 322.36 \end{array}$$

165+28

$$\begin{array}{r} 106 \\ \underline{66} \\ 636 \\ \underline{636} \\ 6996 \\ \underline{17222} \\ 17222 \end{array}$$

$$\begin{array}{r} 6.06 \\ \underline{66} \\ 3636 \\ \underline{3636} \\ 39996 \end{array}$$

$$\begin{array}{r} .173 \\ \underline{.66} \\ 1050 \\ \underline{1050} \\ 11550 \end{array}$$

sta. of last PI =
 366+90

$$\begin{array}{r} 177.25 \\ \underline{1.40} \\ 178.65 \\ \underline{3.00} \end{array}$$

from PI to first Inter.
 .. Second ..

Tie-ins for TT 570 across private parties.

- ✓ Sta. 302+90 - intersect $\frac{1}{16}$ line
 25ft N. of E $\frac{1}{16}$ S. 1-36

- ✓ Sta. 317+50 intersect $\frac{1}{16}$ line 34.22 ch W. of $\frac{1}{16}$ Cor #7 Sec. 1

- ✓ Sta. 322+36 intersect $\frac{1}{4}$ line 20.26 ch S. of $\frac{1}{16}$ Cor S. 1-36

- ✓ Sta. 351+74 intersect section line 25.18 ch S. of S.C. 1-2-35-36

- Sta. 365+82 intersect $\frac{1}{4}$ line 153 ch E. of $\frac{1}{16}$ Cor #8, Sec. 2

- Sta. 366+88 intersect $\frac{1}{16}$ line 0.27 ch S. of $\frac{1}{16}$ Cor #8 S 2

- Sta. 177+90 intersect Random $\frac{1}{16}$ line 3 ch S. of ~~Cor~~ Sec. 4-5-32-35
~~T-52-58N Random~~
 E $\frac{1}{16}$ Cor S. 4-32
 T52-58N R26W

- Sta. 165+40 intersect Random $\frac{1}{16}$ line 10.96 ch W. of N $\frac{1}{16}$ Cor sec. 4-5.

TRAVERSE
of
NORTH STAR POINT ROAD
including
TRUCK TRAIL #

Var. $7^{\circ}E$ (after plotting, I discovered
that a variation of $5^{\circ}30'$ is correct)

Begun: 3/28/38

Completed: 4/1/38

Instruments used:

Gurley Transit #

Locator's Level, 100-ft. tape, Level Rod

Crew:

Bellefeuille - chainman & Level Man

Plese - Axeman

Sapan - Chainman & Rodman

Wilson - Transitman (first day)

Signed

Arthur Peterson
Foreman

Station	Between P.I.'s		North Star		PT	PI	Map	Curve Data	Cross Section	
	Distance	Bearing	< Left	< Right					Left	Right
11+36	1+32	N3°30'W						$\Delta = 31^{\circ}33'$ $E_x = 8$ $R = 200$ $T = 58$ $D_{50} = 7^{\circ}11'$ $M =$		
10+80				31°33'			5			-0.5/30 -1.5/50
10+24					PC					
	2+78	N28°W								
8+84					PT					
8+02				36°10'			4			+2.0/25 -1.0/20
7+20					PC					
	2+24	N64°W								
6+70					PT					
5+78			20°54'				3			
4+86					PC					
4+75					Hold ϕ					
	1+78	N43°W								-0.5/10 -0.7/15 Swamp/40
4+63					PT					+0.5/9 -1.4/12
4+00				36°29'			2			-0.5/15 -1.9/16 Swamp/20
3+37					PC					
	2+09	N79°30'W								
2+60					PT					+0.5/9 -1.4/12 -1.9/16 Swamp/20
1+91				19°37'			1			
1+22					PC					
	1+91	S81°W								

0+00 Point of beginning is in ϕ Hwy # 38 on NW end Caribou Lake

From point in line bet. Sections 489, 882 ft. E. of
MC on ~~the~~ bank Little Dead Horse Lake, thence ~~N42°15'W~~
N42°15'W 1019',
thence N18°W 205' to Sta. 0+10 on traverse of road.



Station	Between PI's		North Star		PT	PI	PC
	Distance	Bearing	< Left	< Right			
	7+14	✓ 538°W					
22+59					PT		
20+86			119°48'		PI		
19+13					PC		
19+00							
	4+18	N22°30'W					
17+13					PT		
16+68			25°18'		PI		
16+23					PC		
16+40							
16+00							
	1+13	N47°30'W					
16+03					PT		
15+55			27°15'		PI		
15+07					PC		
15+00					Hold Φ		
	1+54	✓ N20°15'W					
14+63					PT		
14+01			17°33'		PI		
13+39					PC		
	1+89	✓ N37°45'W					
12+88					PT		
12+12			41°35'		PI		
11+36					PC		

PI #	Map	Curve Data	Cross Section	
			Left	Right
	36 B6			
10	✓	$\Delta = 119^{\circ}48'$ $E_x = 99$ $R = 100$ $T = 173$ $D_{50} = 14^{\circ}29'$ $M =$	-1.0/20 -1.5/30 -3.0/60 swamp/90	
	Cedar to Balsam Poles Lined Road	M6 B6 R. side road	-1.5/20 -4.0/30 swamp/30	
9	✓	$\Delta = 25^{\circ}18'$ $E_x = 5$ $R = 200$ $T = 45$ $D_{50} = 7^{\circ}11'$ $M =$	+1.5/10 +2.5/20 swamp/20	-1.5/20 -3.0/30
	Culvert, CM, 15" x 22' fill $\frac{1}{2}$ 1'	⇒	-1.0/20 swamp/20	
8	✓	$\Delta = 27^{\circ}15'$ $E_x = 6$ $R = 200$ $T = 48$ $D_{50} = 7^{\circ}11'$ $M =$	-1.0/10 -3.5/25 swamp/25	-2.0/15 -4.0/25
			-0.5/10 -4.5/30 swamp/35	-1.0/10 -3.5/20 -5.5/30
7	✓	$\Delta = 17^{\circ}33'$ $E_x = 5$ $R = 400$ $T = 62$ $D_{50} = 3^{\circ}35'$ $M =$	+1.5/60 swamp/35	-1.5/25 -2.0/40
6	⇒	$\Delta = 41^{\circ}35'$ $E_x = 14$ $R = 200$ $T = 76$ $D_{50} = 7^{\circ}11'$ $M =$	+1.5/45	-1.0/35
	Culvert, CM, 15" x 24' fill $\frac{1}{2}$ 1'	⇒		

Station	Between PI's		North Star		PT
	Distance	Bearing	∠ Left	∠ Right	
A1+55					leave swamp
A1+20				19°38'	PI
40+85					PC
40+50					Enter low swampy ground
39+81	2+10	N24°30'W			
39+81					PT
39+10			50°55'		PI
38+39					PC
	1+20	N26°30'E			
38+31					PT
37+90				44°52'	PI
37+49					PC
	1+60	N18°20'W N18°W			
36+69					PT
36+30			8°50'		PI
35+91					PC
36+15					
35+29					
	2+58	N9°30'W			
33+97					PT
33+72				5°49'	PI
33+47					PC
	5+72	N15°W			
32+86					PT
28+00				126°43'	PI
23+14					PC

PI #	Map	Curve Data	Cross Section	
			Left	Right
		$\Delta = 19^{\circ}38'$ $E_x = 3$ $R = 200$ $T = 35$ $D/50 = 7^{\circ}11'$ $M =$		swamp/20
16	36 / 36			
		$\Delta = 50^{\circ}55'$ $E_x = 16$ $R = 150$ $T = 71$ $D/50 = 9^{\circ}36'$ $M =$	-1.5/10 -2.5/20	+2.5/15
15	←			
	Bc-Mc			
		$\Delta = 44^{\circ}52'$ $E_x = 8$ $R = 100$ $T = 41$ $D/50 = 14^{\circ}29'$ $M =$	-0.5/20	-1.0/10 -3.0/20
14	/			
		$\Delta = 8^{\circ}50'$ $E_x = 1.5$ $R = 500$ $T = 39$ $D/50 = 2^{\circ}52'$ $M =$	-1.0/10 -3.0/15 -9.0/20	+1.5/10 0.0/20 -2.0/25
13	\			
		Intersect true 1/4 line 124 ft W. of 1/4 Cor. S1 #9 Intersect Rand. 1/4 line 130 ft W. of 1/4 Cor. S1 129 ft S. of true line		
		$\Delta = 5^{\circ}49'$ $E_x = 0.7$ $R = 500$ $T = 25$ $D/50 = 2^{\circ}52'$ $M =$		
12	/			
	Bc-Mc			
		$\Delta = 126^{\circ}43'$ $E_x = 300$ $R = 244$ $T = 486$ $D/50 = 5^{\circ}53'$ $M =$		
11	/			
	Bc-Mc			
	3+ / 36			

Station	Between PT's		<Left	<Right	North Star	Point Road	PT #	Map	Curve Data	Cross Section	
	Distance	Bearing								Left	Right
56+00					Hold @					-2.0/15	-1.0/15
55+58					PC					-6.5/30	-4.5/30
	2+10	N59°30'W									
55+49					PT				$\Delta = 13^{\circ}20'$		
54+91			13°20'		PI	20			$E_c = 3.5$	-2.0/15	+1.0/15
54+33					PC				$R = 500$	-5.0/30	0.0/30
	1+33	N46°W							$T = 58$		
54+13					PT				$D/50 =$		
53+58			15°42'		PI	19			$M =$		
53+03					PC				$\Delta = 15^{\circ}42'$		
52+00					Cross Section				$E_c = 4$	-1.0/15	+1.0/15
50+10					Leave Swamp				$R = 400$	-2.0/15	0.0/15
50+15					Intersect True 1/4 line 950 ft. E. of 1/4 #354				$T = 55$	-3.5/30	0.0/30
50+00					Intersect Rand. 1/4 line 14.5 sec. E. of 1/4 #354				$D/50 =$		
49+80					Culvert, CM, 18" x 24"				$M =$	-2.0/30	+1.0/30
49+48					Enter Swamp						
	6+65	N30°W									
48+10					PT						
46+93			26°14'		PI	18			$\Delta = 26^{\circ}14'$		
45+76					PC				$E_c = 13$		
	1+88	N4°W							$R = 500$		
46+00					Cross Section				$T = 117$	-1.0/10	+1.0/10
45+05					PI	17			$D/50 =$	+1.0/20	+1.0/20
44+00					Culvert, CM, 15" x 29"				$M =$		
	3+85	N4°45'W			Ditch along left side road from Sta. 42+00 to Sta. 44+50				No Curve		

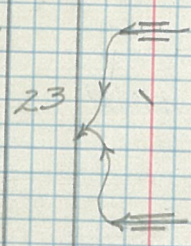
Station	Between PI's		North Star	
	Distance	Bearing	∠ Left	∠ Right
	1+38	S53°W		
71+23				PT
70+92			17°28'	PI
70+61				PC
70+00				cross Section
69+00				Cross Section
	3+65	S70°W		
				from sta. 67+27 shoot N70°E 27' to
68+37				PT
67+27			57°37'	PI
67+27				
67+00				Cross Section
66+20				
66+17				PC
65+00				Cross Section
	5+94	N52°45'W		
62+90				PT
61+33			64°25'	PI
60+50				Leave Swamp
60+25				
60+00				Enter Swamp
59+76				PC
	4+32	N12°E		
58+45				PT
57+01			71°20'	PI






Point Road		Map	Curve Data	Cross Section	
PI #				Left	Right
24	Ab-30 Bb		$\Delta = 17^\circ 28'$ $E_x = 2.15$ $R = 200$ $T = 31$ $D/50 =$ $M =$	+1.0/15	0.0/15
				+2.0/30	-1.0/30
				+1.5/15	-1.0/15
				+1.0/30	-3.0/30
				+1.5/15	-1.5/15
				+1.0/30	-2.0/30
	Ab-30				
23			$\Delta = 57^\circ 37'$ $E_x = 28$ $R = 200'$ $T = 110'$ $D/50 =$ $M =$	+1.0/15	-2.0/15
				+1.0/30	-4.5/30
				+0.5/15	0.0/15
				-3.0/30	-2.0/30
				+1.0/15	+1.0/15
				-2.0/30	+1.5/30
22	A1-30		$\Delta = 61^\circ 25'$ $E_x = 45$ $R = 250'$ $T = 157$ $D/50 =$ $M =$	-1.0/15	+0.5/15
				-2.5/30	+1.0/30
	Bb				
21	3b Bb		$\Delta = 71^\circ 20'$ $E_x = 46$ $R = 200$ $T = 144$ $D/50 =$ $M =$	+0.5/15	-2.0/15
				-1.0/30	-4.5/30

Point in Road. Top 1/16
160' E. of S.C. A-5-32-33
Culvert, CM, 18" X 26'

Culvert, CM, 18" X 26'

Culvert, CM, 15" X 24'



Station	Between PI's		< Left	< Right		PI #	Map	Curve Data	Cross Section	
	Distance	Bearing							Left	Right
105+86					PT					
105+29			60°00'	60°00'	PI	42		$\Delta = 60^{\circ}00'$ $Ex = 15'$ $R = 100'$ $T = 58'$ $D/50 =$ $M =$		
104+72					PC					
	2+86	N32°E								
102+93					PT					
102+75										
102+43				11°21'	PI	41	/	$\Delta = 11^{\circ}21'$ $Ex = 2.5$ $R = 500$ $T = 50$ $D/50 =$ $M =$	-1.0/15	0.0/15
101+93					PC					
	1+13	N20°45'E								
101+89					PT					
101+30				42°47'	PI	40	/	$\Delta = 42^{\circ}47'$ $Ex = 11$ $R = 150$ $T = 59$ $D/50 =$ $M =$	-2.0/15	+1.0/15
101+00		N22°30'W			Cross Section					
100+71	1+79	N22°30'W			PC					
99+99					PT					
99+51				35°20'	PI	39	/	$\Delta = 35^{\circ}20'$ $Ex = 2.5$ $R = 150$ $T = 48$ $D/50 =$ $M =$		
99+03					PC					
	1+10	N12°30'E								
98+64					PT					
98+41				17°28'	PI	38	/	$\Delta = 17^{\circ}28'$ $Ex = 2$ $R = 150$ $T = 23$ $D/50 =$ $M =$	-0.5/15	+0.5/15
98+18					PC					
	1+75	N5°00'W								
97+07					PT					
96+66				18°49'	PI	37	/	$\Delta = 18^{\circ}49'$ $Ex = 3.5$ $R = 250$ $T = 41$ $D/50 =$ $M =$	0.0/15	0.0/15
96+25					PC					

North Star

Point Road

Back-Around

 $\Delta = 60^{\circ}00'$
 $Ex = 15'$
 $R = 100'$
 $T = 58'$
 $D/50 =$
 $M =$
Mb
/

Culvert, CM, 15" x 24'


 $\Delta = 11^{\circ}21'$
 $Ex = 2.5$
 $R = 500$
 $T = 50$
 $D/50 =$
 $M =$

-1.0/15	0.0/15
-0.5/30	+1.0/30

3b
BbPT
PI
Cross Section
 $\Delta = 42^{\circ}47'$
 $Ex = 11$
 $R = 150$
 $T = 59$
 $D/50 =$
 $M =$

-2.0/15	+1.0/15
-5.0/30	0.0/30

Culvert, CM, 15" x 22'


 $\Delta = 35^{\circ}20'$
 $Ex = 2.5$
 $R = 150$
 $T = 48$
 $D/50 =$
 $M =$

Swamp/25

PT
PI
PC
 $\Delta = 17^{\circ}28'$
 $Ex = 2$
 $R = 150$
 $T = 23$
 $D/50 =$
 $M =$

-0.5/15	+0.5/15
-1.0/30	+1.0/30

3b
BbPT
PI
PC
 $\Delta = 18^{\circ}49'$
 $Ex = 3.5$
 $R = 250$
 $T = 41$
 $D/50 =$
 $M =$

0.0/15	0.0/15
0.0/30	0.0/30

North Star

Point Road

Station	Between PIs		< Left	< Right
	Distance	Bearing		

PI #

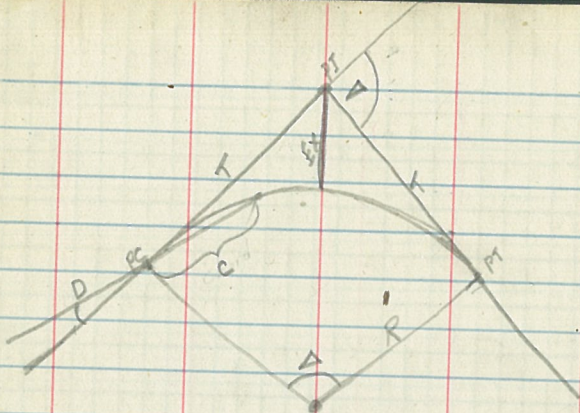
Map

Curve Data

Cross Section

Left

Right



R = Radius
 Ex = External
 D = Deflection Angle
 T = Tangent Distance
 Δ = Intersection Angle
 C = Chord

$$R = \frac{Ex \cos \frac{1}{2} \Delta}{1 - \cos \frac{1}{2} \Delta}$$

$$\sin D = \frac{C}{2R}$$

$$T = R \tan \frac{1}{2} \Delta$$

$$Ex = \frac{R(1 - \cos \frac{1}{2} \Delta)}{\cos \frac{1}{2} \Delta}$$

Check # 13
 12
 13
 22 - bearing

5280

$$\begin{array}{r} 36812 \\ 36966 \\ \hline 7.0 \end{array}$$

$$\begin{array}{r} 3960 \\ 12395 \\ \hline 5615 \\ 17960 \\ \hline 8960 \\ 3737 \\ \hline 5223 \\ 12 \\ \hline 64 \end{array}$$

$$\begin{array}{r} 128 \\ 766 \\ \hline 64 \end{array}$$