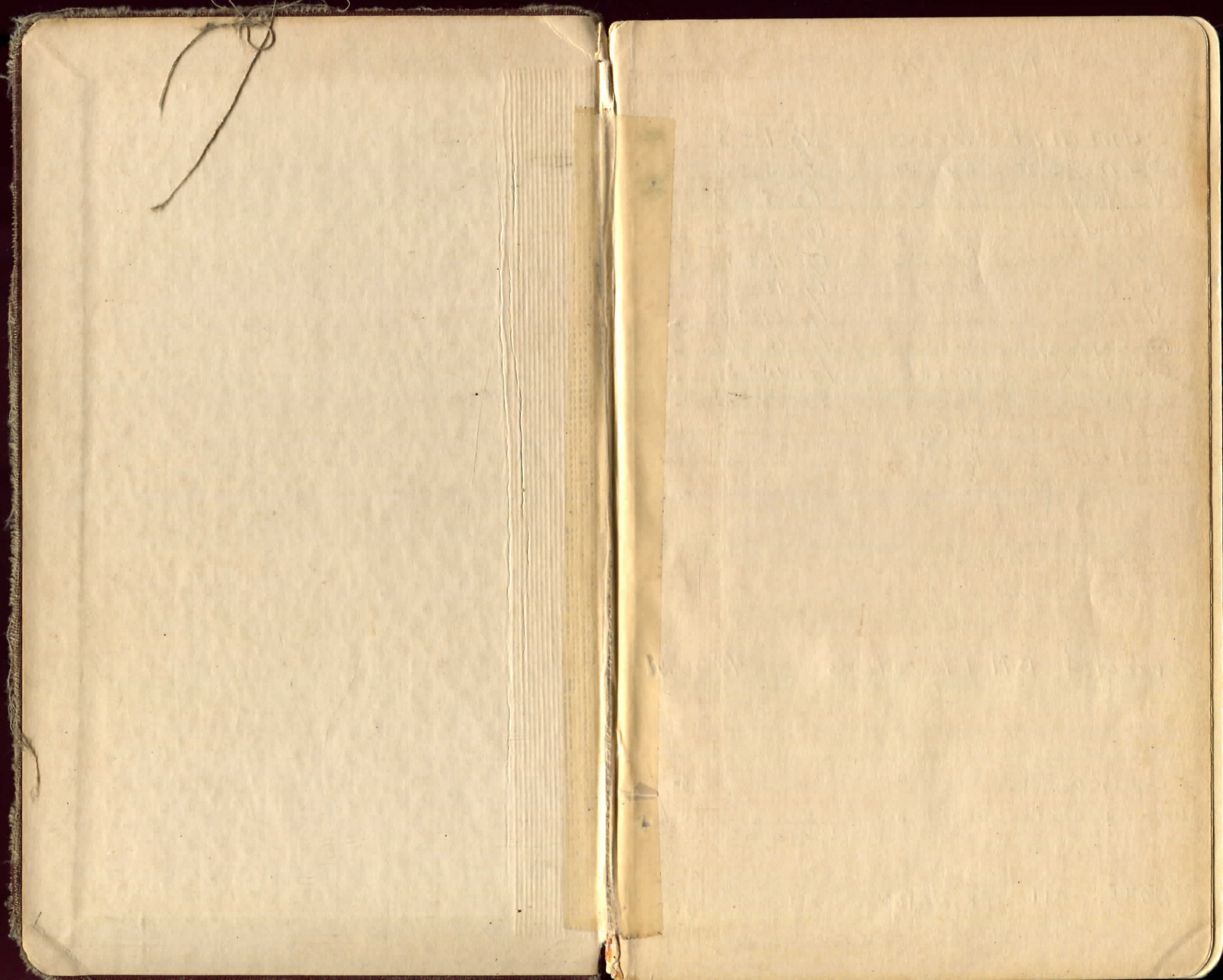


TRANSIT BOOK



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NOTE: ALL P.K. NAILS CHANGED TO  
PIPES OR LARGE SPIKES.

## DIRECTIONS FOR USE OF TABLES

TABLE No. 1

Distance of slope stake from side or shoulder  
stake for any width roadway, slope  $1\frac{1}{2}$  to 1.  
If ground is nearly level, the cut or fill at side

## IMPROVED TABLES AND INFORMATION

TABLE No. 2

To find Tangent and External for curve of  
any other degree, divide by degree of curve and  
add correction found in column of correction.  
Degree of curve with a given  $L$  may be found  
by dividing tangent (or external), opposite  $L$  by  
gives tangent (or external).  
The distance from a point on the tangent to  
the curve is very nearly the square of the tangent  
length divided by twice the radius.

## DIRECTIONS FOR USE OF TABLES

TABLE No. 1.

Distance of slope stake from side or shoulder stake for any width roadway, slope  $1\frac{1}{2}$  to 1. If ground is nearly level, the cut or fill at side stake is located by the double entry method in left column and top row. The number in body of table in same row and column gives distance from side stake to slope stake. If ground is not level estimate the difference in elevation between the side stake and slope stake, lower target by this amount if cut, elevate if fill. Add this amount to cut or fill and find distance in table. Set up rod at this point, and line of sight should cut target. If it does not make the slight adjustment necessary.

TABLE No. 9.

To find Tangent and External for curve of any other degree, divide by degree of curve and add correction found in column of corrections. Degree of curve with a given I may be found by dividing tangent, (or external), opposite I by given tangent, (or external).

The distance from a point on the tangent to the curve is very nearly the square of the tangent length divided by twice the radius.

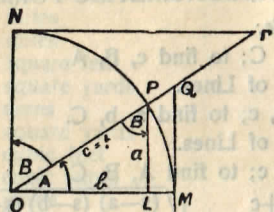


TABLE II  
TRIGONOMETRIC FORMULÆ.

$$\angle A = \angle MOP \quad \angle B = \angle PON = \angle OPL$$

$$R = OB = c = 1$$

$$\sin A = \frac{a}{c} = \frac{a}{1} = a = \sin B = LP$$

$$\cos A = \frac{b}{c} = \frac{b}{1} = b = \cos B = OL$$

$$\tan A = \frac{a}{b} = \frac{MQ}{OM} = \frac{MQ}{1} = MQ = \tan B = MQ$$

$$\cot A = \frac{NT}{ON} = \frac{NT}{1} = NT = \cot B = NT$$

$$\sec A = \frac{OQ}{OM} = \frac{OQ}{1} = OQ = \sec B = OQ$$

$$\csc A = \frac{OT}{ON} = \frac{OT}{1} = OT = \csc B = OT$$

$$\text{vers } A = \frac{LM}{OP} = LM = \text{vers } B$$

$$\text{covers } A = \frac{OP-LP}{OP} = OP-LP = \text{covers } B$$

$$\text{exsec } A = PQ = \text{exsec } B$$

$$\text{coexsec } A = PT = \text{exsec } B$$

$$\sin \frac{1}{2} A = \sqrt{\frac{1-\cos A}{2}} \quad \cos \frac{1}{2} A = \sqrt{\frac{1+\cos A}{2}}$$

$$\sin 2 A = 2 \sin A \cos A \quad \cos 2 A = \cos^2 A - \sin^2 A$$

$$\text{Law of Lines} \quad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\text{Law of Cosines} \quad c^2 = a^2 + b^2 - 2 ab \cos C$$

$$\text{Law of Tangents} \quad \frac{a+b}{a-b} = \frac{\tan \frac{1}{2} (A+B)}{\tan \frac{1}{2} (A-B)}$$

TABLE II — Continued  
TRIGONOMETRIC FORMULÆ (continued)

in any triangle:

Given a, b, C; to find c, B, A.

Use Law of Lines.

Given A, B, c; to find a, b, C.

Use Law of Lines.

Given a, b, c; to find A, B, C.

$$\text{Let } \frac{a+b+c}{2} = s, \sqrt{\frac{(s-a)(s-b)(s-c)}{s}} = r$$

$$\cos \frac{1}{2} A = \sqrt{\frac{s(s-a)}{bc}}$$

$$\tan \frac{1}{2} A = \frac{r}{s-a}$$

$$\tan \frac{1}{2} B = \frac{r}{s-b}$$

$$\tan \frac{1}{2} C = \frac{r}{s-c}$$

Area of a triangle:

$$\text{Area} = \frac{1}{2} ab \sin C$$

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

PRISMOIDAL FORMULA.

$$\text{Vol.} = \frac{h}{6} (B+b+4M)$$

h = altitude; b, B = bases; M = midsection

TABLE III

INCHES AND FRACTIONS OF AN INCH IN DECIMALS OF A FOOT

	0	1	2	3	4	5	6	7	8	9	10	11	
<sup>1</sup> / <sub>16</sub>	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219	<sup>1</sup> / <sub>16</sub>
<sup>1</sup> / <sub>8</sub>	.0104	.0938	.1771	.2604	.3438	.4271	.5104	.5938	.6771	.7604	.8438	.9271	<sup>1</sup> / <sub>8</sub>
<sup>3</sup> / <sub>16</sub>	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323	<sup>3</sup> / <sub>16</sub>
<sup>1</sup> / <sub>4</sub>	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375	<sup>1</sup> / <sub>4</sub>
<sup>5</sup> / <sub>16</sub>	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427	<sup>5</sup> / <sub>16</sub>
<sup>3</sup> / <sub>8</sub>	.0313	.1146	.1979	.2813	.3646	.4479	.5313	.6146	.6979	.7813	.8646	.9479	<sup>3</sup> / <sub>8</sub>
<sup>7</sup> / <sub>16</sub>	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531	<sup>7</sup> / <sub>16</sub>
<sup>1</sup> / <sub>2</sub>	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583	<sup>1</sup> / <sub>2</sub>
<sup>9</sup> / <sub>16</sub>	.0469	.1302	.2135	.2969	.3803	.4635	.5469	.6302	.7135	.7969	.8802	.9635	<sup>9</sup> / <sub>16</sub>
<sup>5</sup> / <sub>8</sub>	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688	<sup>5</sup> / <sub>8</sub>
<sup>11</sup> / <sub>16</sub>	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740	<sup>11</sup> / <sub>16</sub>
<sup>3</sup> / <sub>4</sub>	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792	<sup>3</sup> / <sub>4</sub>
<sup>13</sup> / <sub>16</sub>	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844	<sup>13</sup> / <sub>16</sub>
<sup>7</sup> / <sub>8</sub>	.0729	.1563	.2396	.3229	.4063	.4896	.5729	.6563	.7396	.8229	.9063	.9896	<sup>7</sup> / <sub>8</sub>
<sup>15</sup> / <sub>16</sub>	.0781	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7448	.8281	.9115	.9948	<sup>15</sup> / <sub>16</sub>
1	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167	1.000	1
	0	1	2	3	4	5	6	7	8	9	10	11	

TABLE IV. USEFUL RELATIONS.

Lineal feet	×	.00019	=	miles
Lineal yards	×	.0006	=	miles
Square inches	×	.007	=	square feet
Square feet	×	.111	=	square yards
Square yards	×	.0002067	=	acres
Acres	×	4840	=	square yards
Cubic inches	×	.00058	=	cubic feet
Cubic feet	×	.03704	=	cubic yards
Links	×	.22	=	yards
Links	×	.66	=	feet
Feet	×	1.5	=	links

$$360^\circ = 21600' = 1296000''$$

$$\text{Radius} = \text{arc of } 57.2957790''$$

$$\text{Arc of } 1^\circ (\text{radius} = 1) = .017453292$$

$$\text{Arc of } 1' (\text{radius} = 1) = .000290888$$

$$\text{Arc of } 1'' (\text{radius} = 1) = .000004848$$

$$\pi = 3.141592654 \quad \sqrt{\frac{1}{4}} = 0.564190$$

$$\frac{\pi}{4} = 0.785398163 \quad \sqrt[3]{\frac{6}{\pi}} = 1.240700982$$

$$\frac{\pi}{6} = 0.523598776 \quad \pi^2 = 9.869604401$$

$$\sqrt{\frac{4}{\pi}} = 1.128379167 \quad \frac{1}{\pi^2} = 0.101321184$$

$$\frac{\pi}{6} = 0.523598776 \quad \sqrt{\pi} = 1.772453851$$

$$\frac{4\pi}{3} = 4.188790205 \quad \frac{1}{\pi} = 0.3183099$$

Curvature of Earth's surface = about 0.7 feet in 1 mile

Curvature in feet = 0.667 (Dist. in miles)<sup>2</sup>

Difference between arc and chord length, 0.05 feet in 11<sup>1</sup>/<sub>2</sub> miles

$$\text{Probable error of a single observation} = 0.6754 \sqrt{\frac{M}{n-1}}$$

Error in chaining of 0.01 feet in 100 feet:

Due to—

1. Length of tape error of 0.01 feet
2. Alignment. One end 1.4 feet out of line
3. Sag of tape at centre of 0.61 feet
4. Temperature difference of 1'
5. Difference of pull of 15 lbs.

STADIA REDUCTION FORMULÆ.

Horizontal Distance = R - R sin<sup>2</sup> a + C cos a

Vertical Distance = R<sup>1</sup>/<sub>2</sub> sin 2a + C sin a

$$R = \text{Reading} \times \frac{\text{distance from Object glass to cross hairs}}{\text{distance between cross hairs}}$$

C = distance from Object glass to cross hairs + distance from Object glass to center of instrument.

a = angle of elevation for mid Reading



TABLE V.—RADII, ORDINATES AND DEFLECTIONS

Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Offset	Def. for 1 Foot		
0°	10	34377.5	.036	.145	0.05'	7°	819.02	1.528	6.105	2.10'	
	20	17188.8	.073	.291	0.10		20'	781.84	1.600	6.395	2.20
	30	11459.2	.109	.436	0.15		30	764.19	1.637	6.540	2.25
	40	8594.42	.145	.582	0.20		40	747.89	1.673	6.685	2.30
	50	6875.55	.182	.727	0.25						
						8	716.78	1.746	6.976	2.40	
1		5729.65	.218	.873	0.30	20	688.16	1.819	7.266	2.50	
	10	4911.15	.255	1.018	0.35	30	674.69	1.855	7.411	2.55	
	20	4297.28	.291	1.164	0.40	40	661.74	1.892	7.556	2.60	
	30	3819.83	.327	1.309	0.45						
	40	3437.87	.364	1.454	0.50	9	637.28	1.965	7.846	2.70	
	50	3125.36	.400	1.600	0.55	20	614.56	2.037	8.136	2.80	
						30	603.80	2.074	8.281	2.85	
2		2864.93	.436	1.745	0.60	40	593.42	2.110	8.426	2.90	
	10	2644.58	.473	1.891	0.65						
	20	2455.70	.509	2.036	0.70	10	573.69	2.183	8.716	3.00	
	30	2292.01	.545	2.181	0.75	30	546.44	2.292	9.150	3.15	
	40	2148.79	.582	2.327	0.80	11	521.67	2.402	9.585	3.30	
	50	2022.41	.618	2.472	0.85	30	499.06	2.511	10.02	3.45	
						12	478.34	2.620	10.45	3.60	
3		1910.08	.655	2.618	0.90	30	459.28	2.730	10.89	3.75	
	10	1809.57	.691	2.763	0.95	13	441.68	2.839	11.32	3.90	
	20	1719.12	.727	2.908	1.00	30	425.40	2.949	11.75	4.05	
	30	1637.28	.764	3.054	1.05	14	410.28	3.058	12.18	4.20	
	40	1562.88	.800	3.199	1.10	30	396.20	3.168	12.62	4.35	
	50	1494.95	.836	3.345	1.15						
						15	383.07	3.277	13.05	4.50	
4		1432.69	.873	3.490	1.20	30	370.78	3.387	13.49	4.65	
	10	1375.40	.909	3.635	1.25	16	359.27	3.496	13.92	4.80	
	20	1322.53	.945	3.718	1.30	30	348.45	3.606	14.35	4.95	
	30	1273.57	.982	3.926	1.35	17	338.27	3.716	14.78	5.10	
	40	1228.11	1.018	4.071	1.40	18	319.62	3.935	15.64	5.40	
	50	1185.78	1.055	4.217	1.45	19	302.94	4.155	16.51	5.70	
						20	287.94	4.374	17.37	6.00	
5	10	1146.28	1.091	4.362	1.50	21	274.37	4.594	18.22	6.30	
	20	1109.33	1.127	4.507	1.55	30	262.04	4.814	19.08	6.60	
	30	1074.68	1.164	4.653	1.60	22	250.79	5.035	19.94	6.90	
	40	1042.14	1.200	4.798	1.65	23	240.49	5.255	20.79	7.20	
	50	1011.51	1.237	4.943	1.70						
						24	231.01	5.476	21.64	7.50	
	10	982.64	1.273	5.088	1.75	25	222.27	5.697	22.50	7.80	
						26	214.18	5.918	23.35	8.10	
6	10	955.37	1.309	5.234	1.80	27	206.68	6.139	24.19	8.40	
	20	929.57	1.346	5.379	1.85	28	199.70	6.360	25.04	8.70	
	30	905.13	1.382	5.524	1.90	29	193.18	6.583	25.88	9.00	
	40	881.95	1.418	5.669	1.95						
	50	859.92	1.455	5.814	2.00	30					

TABLE VI (continued)  
SINES, COSINES, TANGENTS, COTANGENTS (continued)

deg.	sin 0'	tan 0'	sin 10'	tan 10'	sin 20'	tan 20'	sin 30'	tan 30'	sin 40'	tan 40'	sin 50'	tan 50'	deg.
46	7193	1.0355	7214	1.0416	7234	1.0477	7254	1.0533	7274	1.0599	7294	1.0661	43
47	314	.0724	333	.0786	353	.0850	373	.0913	392	.0977	412	.1041	42
48	431	.1106	451	.1171	470	.1237	490	.1303	509	.1369	528	.1436	41
49	547	.1504	566	.1571	585	.1640	604	.1708	623	.1778	642	.1847	40
50	660	1.1918	7679	1.1988	7698	1.2059	7716	1.2131	7735	1.2203	7753	1.2276	39
51	771	.2349	790	.2423	808	.2497	826	.2572	844	.2647	862	.2723	38
52	880	.2799	898	.2876	916	.2954	934	.3032	951	.3111	969	.3190	37
53	986	.3270	8004	.3351	8021	.3432	8039	.3514	8056	.3597	8073	.3680	36
54	8090	.3764	107	.3848	124	.3934	141	.4019	158	.4106	175	.4193	35
55	192	.4281	208	.4370	225	.4460	241	.4550	258	.4641	274	.4733	34
56	290	.4826	307	.4919	323	.5013	339	.5108	355	.5204	371	.5301	33
57	387	.5399	403	.5497	418	.5597	434	.5697	450	.5798	465	.5900	32
58	480	.6003	496	.6107	511	.6212	526	.6319	542	.6426	557	.6534	31
59	572	.6643	587	.6753	601	.6864	616	.6977	631	.7090	646	.7205	30
60	660	1.7321	8675	1.7437	8689	1.7556	8704	1.7675	8718	1.7797	8732	1.7917	29
61	746	.8040	760	.8165	774	.8291	788	.8418	802	.8546	816	.8676	28
62	829	.8807	843	.8940	857	.9074	870	.9210	884	.9347	897	.9486	27
63	910	.9626	923	.9768	936	.9912	949	2.0057	962	2.0204	975	2.0353	26
64	988	2.0503	9001	2.0655	9013	2.0809	9026	.0965	9038	.1123	9051	.1283	25
65	9063	.1445	075	.1609	088	.1775	100	.1943	112	.2113	124	.2286	24
66	135	.2460	147	.2637	159	.2817	171	.2998	182	.3183	194	.3369	23
67	205	.3559	216	.3750	228	.3945	239	.4142	250	.4342	261	.4545	22
68	272	.4751	283	.4960	293	.5172	304	.5386	315	.5605	325	.5826	21
69	336	.6051	346	.6279	356	.6511	367	.6746	377	.6985	387	.7228	20
70	397	2.7475	9407	2.7725	9417	2.7980	9426	2.8239	9436	2.8502	9446	2.8770	19
71	455	.9042	465	.9319	474	.9600	483	.9887	492	3.0178	502	3.0475	18
72	511	3.0777	520	3.1084	528	3.1397	537	3.1716	546	.2041	555	.2371	17
73	563	.2709	572	.3052	580	.3402	588	.3759	596	.4124	605	.4495	16
74	613	.4874	621	.5261	628	.5656	636	.6059	644	.6470	652	.6891	15
75	659	.7321	667	.7760	674	.8208	681	.8657	689	.9136	696	.9617	14
76	703	4.0108	710	4.0611	717	4.1126	724	4.1653	730	4.2193	737	4.2747	13
77	744	.3315	750	.3897	757	.4494	763	.5107	769	.5736	775	.6382	12
78	781	.7046	787	.7729	793	.8430	799	.9152	805	.9894	811	5.0658	11
79	816	.1446	822	5.2257	827	5.3093	833	5.3955	838	5.4845	843	.5764	10
80	9848	5.6713	9853	5.7694	9858	5.8708	9863	5.9758	9868	6.0844	9872	6.1970	9
81	877	6.3138	881	6.4348	886	6.5606	890	6.6912	894	.8269	899	.9682	8
82	903	7.1154	907	7.2687	911	7.4287	914	7.5958	918	7.7704	922	7.9530	7
83	925	8.1443	929	8.3450	932	8.5555	936	8.7769	939	9.0098	942	9.2553	6
84	945	9.5144	948	9.7882	951	10.078	954	10.385	957	10.711	959	11.059	5
85	962	11.430	964	11.826	967	12.250	969	12.706	971	13.197	974	13.727	4
86	976	14.300	978	14.924	980	15.605	981	16.350	983	17.169	985	18.075	3
87	986	19.681	988	20.206	989	21.470	990	22.903	992	24.542	993	26.432	2
88	994	28.036	995	31.242	996	34.368	997	38.189	997	42.964	998	49.104	1
89	9998	57.290	9999	68.750	9999	85.940	9999	114.58	1.000	171.88	1.000	343.77	0
deg.	60' cos	60' cot	50' cos	50' cot	40' cos	40' cot	30' cos	30' cot	20' cos	20' cot	10' cos	10' cot	deg.

Note. Chord Deflection = 2 times tangent deflection.

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE.

I	T	E	I=100	I	T	E	I=200	I	T	E	I=300
1°	50.00	.218		11°	551.70	26.500		21°	1061.9	97.577	
10'	58.34	.297		10'	560.11	27.313		10'	1070.6	99.155	
20'	66.67	.388		20'	568.53	28.137		20'	1079.2	100.75	
30'	75.01	.491	5° C.	30'	576.95	28.974	5° C.	30'	1087.8	102.35	5° C.
40'	83.34	.606	+.03	40'	585.36	29.824	+.06	40'	1096.4	103.97	+.10
50'	91.68	.733	E .001	50'	593.79	30.686	E .006	50'	1105.1	105.60	E .013
2°	100.01	.873		12°	602.21	31.561		22°	1113.7	107.24	
10'	108.35	1.024		10'	610.64	32.447		10'	1122.4	108.90	
20'	116.68	1.188		20'	619.07	33.347		20'	1131.0	110.57	
30'	125.02	1.364		30'	627.50	34.259		30'	1139.7	112.25	
40'	133.36	1.552		40'	635.93	35.183		40'	1148.4	113.95	
50'	141.70	1.752		50'	644.37	36.120		50'	1157.0	115.66	
3°	150.04	1.964	10° C.	13°	652.81	37.070	10° C.	23°	1165.7	117.38	10° C.
10'	158.38	2.188	T .06	10'	661.25	38.031	T .13	10'	1174.4	119.12	T .19
20'	166.72	2.425	E .003	20'	669.70	39.006	E .011	20'	1183.1	120.87	E .025
30'	175.06	2.674		30'	678.15	39.993		30'	1191.8	122.63	
40'	183.40	2.934		40'	686.60	40.992		40'	1200.5	124.41	
50'	191.74	3.207		50'	695.06	42.004		50'	1209.2	126.20	
4°	200.08	3.492		14°	703.51	43.029		24°	1217.9	128.00	
10'	208.43	3.790		10'	711.97	44.066		10'	1226.6	129.82	
20'	216.77	4.099		20'	720.44	45.116		20'	1235.3	131.65	
30'	225.12	4.421		30'	728.90	46.178		30'	1244.0	133.50	
40'	233.47	4.755		40'	737.37	47.253		40'	1252.8	135.35	
50'	241.81	5.100	15° C.	50'	745.85	48.341	15° C.	50'	1261.5	137.23	15° C.
5°	250.16	5.459	T .09	15°	754.32	49.441	T .19	25°	1270.2	139.11	T .29
10'	258.51	5.829	E .004	10'	762.80	50.554	E .017	10'	1279.0	141.01	E .038
20'	266.86	6.211		20'	771.29	51.679		20'	1287.7	142.93	
30'	275.21	6.606		30'	779.77	52.818		30'	1296.5	144.85	
40'	283.57	7.013		40'	788.26	53.969		40'	1305.3	146.79	
50'	291.92	7.432		50'	796.75	55.132		50'	1314.0	148.75	
6°	300.28	7.863		16°	805.25	56.309		26°	1322.8	150.71	
10'	308.64	8.307		10'	813.75	57.498		10'	1331.6	152.69	
20'	316.99	8.762		20'	822.25	58.699		20'	1340.4	154.69	
30'	325.35	9.230	20° C.	30'	830.76	59.914	20° C.	30'	1349.2	156.70	20° C.
40'	333.71	9.710	T .13	40'	839.27	61.141	T .26	40'	1358.0	158.72	T .39
50'	342.08	10.202	E .006	50'	847.78	62.381	E .022	50'	1366.8	160.76	E .051
7°	350.44	10.707		17°	856.30	63.634		27°	1375.6	162.81	
10'	358.81	11.224		10'	864.82	64.900		10'	1384.4	164.86	
20'	367.17	11.753		20'	873.35	66.178		20'	1393.2	166.95	
30'	375.54	12.294		30'	881.88	67.470		30'	1402.0	169.04	
40'	383.91	12.847		40'	890.41	68.774		40'	1410.9	171.15	
50'	392.28	13.413		50'	898.95	70.091		50'	1419.7	173.27	
8°	400.66	13.991		18°	907.49	71.421		28°	1428.6	175.41	
10'	409.03	14.582	25° C.	10'	916.03	72.764	25° C.	10'	1437.4	177.55	25° C.
20'	417.41	15.184	T .16	20'	924.58	74.119	T .32	20'	1446.3	179.72	T .49
30'	425.79	15.799	E .007	30'	933.13	75.488	E .028	30'	1455.1	181.89	E .065
40'	434.17	16.426		40'	941.69	76.869		40'	1464.0	184.08	
50'	442.55	17.065		50'	950.25	78.264		50'	1472.9	186.29	
9°	450.93	17.717		19°	958.81	79.671		29°	1481.8	188.51	
10'	459.32	18.381		10'	967.38	81.092		10'	1490.7	190.74	
20'	467.71	19.058		20'	975.96	82.525		20'	1499.6	192.99	
30'	476.10	19.746		30'	984.53	83.972		30'	1508.5	195.25	
40'	484.49	20.447		40'	993.12	85.431		40'	1517.4	197.53	
50'	492.88	21.161	30° C.	50'	1001.7	86.904	30° C.	50'	1526.3	199.82	30° C.
10°	501.28	21.887	T .19	20°	1010.3	88.389	T .39	30°	1535.3	202.12	T .59
10'	509.68	22.624	E .008	10'	1018.9	89.888	E .034	10'	1544.2	204.44	E .078
20'	518.08	23.375		20'	1027.5	91.399		20'	1553.1	206.77	
30'	526.48	24.138		30'	1036.1	92.924		30'	1562.1	209.12	
40'	534.89	24.913		40'	1044.7	94.462		40'	1571.0	211.48	
50'	543.29	25.700		50'	1053.3	96.013		50'	1580.0	213.86	

T = R tan 1/2 I

E = R exsec 1/2 I

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=400	I	T	E	I=500	I	T	E	I=600
31°	1589.0	216.3		41°	2142.2	387.4		51°	2732.9	618.4	
10'	1598.0	218.7		10'	2151.7	390.7		10'	2743.1	622.8	
20'	1606.9	221.1	5° C.	20'	2161.2	394.1	5° C.	20'	2753.4	627.2	5° C.
30'	1615.9	223.5	T .13	30'	2170.8	397.4	T .17	30'	2763.7	631.7	T .21
40'	1624.9	226.0	E .023	40'	2180.3	400.8	E .037	40'	2773.9	636.2	E .056
50'	1633.9	228.4		50'	2189.9	404.2		50'	2784.2	640.7	
32°	1643.0	230.9		42°	2199.4	407.6		52°	2794.5	645.2	
10'	1652.0	233.4		10'	2209.0	411.1		10'	2804.9	649.7	
20'	1661.0	235.9		20'	2218.6	414.5		20'	2815.2	654.3	
30'	1670.0	238.4		30'	2228.1	418.0		30'	2825.6	658.8	
40'	1679.1	241.0		40'	2237.7	421.4		40'	2835.9	663.4	
50'	1688.1	243.5		50'	2247.3	425.0		50'	2846.3	668.0	
33°	1697.2	246.1	10° C.	43°	2257.0	428.5	10° C.	53°	2856.7	672.7	10° C.
10'	1706.3	248.7	T .26	10'	2266.6	432.0	T .34	10'	2867.1	677.3	T .42
20'	1715.3	251.3	E .046	20'	2276.2	435.6	E .075	20'	2877.5	682.0	E .112
30'	1724.4	253.9		30'	2285.9	439.2		30'	2888.0	686.7	
40'	1733.5	256.5		40'	2295.6	442.8		40'	2898.4	691.4	
50'	1742.6	259.1		50'	2305.2	446.4		50'	2908.9	696.1	
34°	1751.7	261.8		44°	2314.9	450.0		54°	2919.4	700.9	
10'	1760.8	264.5		10'	2324.6	453.6		10'	2929.9	705.7	
20'	1770.0	267.2		20'	2334.3	457.3		20'	2940.4	710.5	
30'	1779.1	269.9		30'	2344.1	461.0		30'	2951.0	715.3	
40'	1788.2	272.6		40'	2353.8	464.6		40'	2961.5	720.1	
50'	1797.4	275.3	15° C.	50'	2363.5	468.4	15° C.	50'	2972.1	725.0	15° C.
35°	1806.6	278.1	T .40	45°	2373.3	472.1	T .51	55°	2982.7	729.9	T .63
10'	1815.7	280.8	E .070	10'	2383.1	475.8	E .116	10'	2993.3	734.8	E .168
20'	1824.9	283.6		20'	2392.8	479.6		20'	3003.9	739.7	
30'	1834.1	286.4		30'	2402.6	483.4		30'	3014.5	744.6	
40'	1843.3	289.2		40'	2412.4	487.2		40'	3025.2	749.6	
50'	1852.5	292.0		50'	2422.3	491.0		50'	3035.8	754.6	
36°	1861.7	294.9		46°	2432.1	494.8		56°	3046.5	759.6	
10'	1870.9	297.7		10'	2441.9	498.7		10'	3057.2	764.6	
20'	1880.1	300.6		20'	2451.8	502.5		20'	3067.9	769.7	
30'	1889.4	303.5	20° C.	30'	2461.7	506.4	20° C.	30'	3078.7	774.7	20° C.
40'	1898.6	306.4	T .53	40'	2471.5	510.3	T .68	40'	3089.4	779.8	T .81
50'	1907.9	305.3	E .093	50'	2481.4	514.3	E .151	50'	3100.2	784.9	E .225
37°	1917.1	312.2		47°	2491.3	518.2		57°	3110.9	790.1	
10'	1926.4	315.2		10'	2501.2	522.2		10'	3121.7	795.2	
20'	1935.7	318.1		20'	2511.2	526.1		20'	3132.6	800.4	
30'	1945.0	321.1		30'	2521.1	530.1		30'	3143.4	805.6	
40'	1954.3	324.1		40'	2531.1	534.2		40'	3154.2	810.9	
50'	1963.6	327.1		50'	2541.0	538.2		50'	3165.1	816.1	
38°	1972.9	330.2		48°	2551.0	542.2		58°	3176.0	821.4	
10'	1982.2	333.2	25° C.	10'	2561.0	546.3	25° C.	10'	3186.9	826.7	25° C.
20'	1991.5	336.3	T .67	20'	2571.0	550.4	T .85	20'	3197.8	832.0	T .105
30'	2000.9	339.3	E .117	30'	2581.0	554.5	E .189	30'	3208.8	837.3	E .283
40'	2010.2	342.4		40'	2591.0	558.6		40'	3219.7	842.7	
50'	2019.6	345.5		50'	2601.1	562.8		50'	3230.7	848.1	
39°	2029.0	348.6		49°	2611.2	566.9		59°	3241.7	853.5	
10'	2038.4	351.8		10'	2621.2	571.1		10'	3252.7	858.9	
20'	2047.8	354.9		20'	2631.3	575.3		20'	3263.7	864.3	
30'	2057.2	358.1		30'	2641.4	579.5		30'	3274.8		

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE.

I	T	E	I=70°	I	T	E	I=80°	I	T	E	I=90°
61°	3375.0	920.2		71°	4086.9	1308.2		81°	4893.6	1805.3	
10'	3386.3	925.9		10'	4099.5	1315.6		10'	4908.0	1814.7	
20'	3397.5	931.6		20'	4112.1	1322.9		20'	4922.5	1824.1	
30'	3408.8	937.3		30'	4124.8	1330.3		30'	4937.0	1833.6	
40'	3420.1	943.1		40'	4137.4	1337.7		40'	4951.5	1843.1	
50'	3431.4	948.9		50'	4150.1	1345.1		50'	4966.1	1852.6	
62°	3442.7	954.8		72°	4162.8	1352.6		82°	4980.7	1862.2	
10'	3454.1	960.6		10'	4175.6	1360.1		10'	4995.4	1871.8	
20'	3465.4	966.5		20'	4188.5	1367.6		20'	5010.0	1881.5	
30'	3476.8	972.4		30'	4201.2	1375.2		30'	5024.8	1891.2	
40'	3488.3	978.3		40'	4214.0	1382.8		40'	5039.5	1900.9	
50'	3499.7	984.3		50'	4226.8	1390.4		50'	5054.3	1910.7	
63°	3511.1	990.2		73°	4239.7	1398.0		83°	5069.2	1920.5	
10'	3522.6	996.2		10'	4252.6	1405.7		10'	5084.0	1930.4	
20'	3534.1	1002.3		20'	4265.6	1413.5		20'	5099.0	1940.3	
30'	3545.6	1008.3		30'	4278.5	1421.2		30'	5113.9	1950.3	
40'	3557.2	1014.4		40'	4291.5	1429.0		40'	5128.9	1960.2	
50'	3568.7	1020.5		50'	4304.6	1436.8		50'	5143.9	1970.3	
64°	3580.3	1026.6		74°	4317.6	1444.6		84°	5159.0	1980.4	
10'	3591.9	1032.8		10'	4330.7	1452.5		10'	5174.1	1990.5	
20'	3603.5	1039.0		20'	4343.8	1460.4		20'	5189.3	2000.6	
30'	3615.1	1045.2		30'	4356.9	1468.4		30'	5204.4	2010.8	
40'	3626.8	1051.4		40'	4370.1	1476.4		40'	5219.7	2021.1	
50'	3638.5	1057.7		50'	4383.3	1484.4		50'	5234.9	2031.4	
65°	3650.2	1063.9		75°	4396.5	1492.4		85°	5250.3	2041.7	
10'	3661.9	1070.2		10'	4409.8	1500.5		10'	5265.6	2052.1	
20'	3673.7	1076.6		20'	4423.1	1508.6		20'	5281.0	2062.5	
30'	3685.4	1082.9		30'	4436.4	1516.7		30'	5296.4	2073.0	
40'	3697.2	1089.3		40'	4449.7	1524.9		40'	5311.9	2083.5	
50'	3709.0	1095.7		50'	4463.1	1533.1		50'	5327.4	2094.1	
66°	3720.9	1102.2		76°	4476.5	1541.4		86°	5343.0	2104.7	
10'	3732.7	1108.6		10'	4489.9	1549.7		10'	5358.6	2115.3	
20'	3744.6	1115.1		20'	4503.4	1558.0		20'	5374.2	2126.0	
30'	3756.5	1121.7		30'	4516.9	1566.3		30'	5389.9	2136.7	
40'	3768.5	1128.2		40'	4530.4	1574.7		40'	5405.6	2147.5	
50'	3780.4	1134.8		50'	4544.0	1583.1		50'	5421.4	2158.4	
67°	3792.4	1141.4		77°	4557.6	1591.6		87°	5437.2	2169.2	
10'	3804.4	1148.0		10'	4571.2	1600.1		10'	5453.1	2180.2	
20'	3816.4	1154.7		20'	4584.8	1608.6		20'	5469.0	2191.1	
30'	3828.4	1161.3		30'	4598.5	1617.1		30'	5484.9	2202.2	
40'	3840.5	1168.1		40'	4612.2	1625.7		40'	5500.9	2213.2	
50'	3852.6	1174.8		50'	4626.0	1634.4		50'	5517.0	2224.3	
68°	3864.7	1181.6		78°	4639.8	1643.0		88°	5533.1	2235.5	
10'	3876.8	1188.4		10'	4653.6	1651.7		10'	5549.2	2246.7	
20'	3889.0	1195.2		20'	4667.4	1660.5		20'	5565.4	2258.0	
30'	3901.2	1202.0		30'	4681.3	1669.2		30'	5581.6	2269.3	
40'	3913.4	1208.9		40'	4695.2	1678.1		40'	5597.8	2280.6	
50'	3925.6	1215.8		50'	4709.2	1686.9		50'	5614.2	2292.0	
69°	3937.9	1222.7		79°	4723.2	1695.8		89°	5630.5	2303.5	
10'	3950.2	1229.7		10'	4737.2	1704.7		10'	5646.9	2315.0	
20'	3962.5	1236.7		20'	4751.2	1713.7		20'	5663.4	2326.6	
30'	3974.8	1243.7		30'	4765.3	1722.7		30'	5679.9	2338.2	
40'	3987.2	1250.8		40'	4779.4	1731.7		40'	5696.4	2349.8	
50'	3999.5	1257.9		50'	4793.6	1740.8		50'	5713.0	2361.5	
70°	4011.9	1265.0		80°	4807.7	1749.9		90°	5729.7	2373.3	
10'	4024.4	1272.1		10'	4822.0	1759.0		10'	5746.3	2385.1	
20'	4036.8	1279.3		20'	4836.2	1768.2		20'	5763.1	2397.0	
30'	4049.3	1286.5		30'	4850.5	1777.4		30'	5779.9	2408.9	
40'	4061.8	1293.6		40'	4864.8	1786.7		40'	5796.7	2420.9	
50'	4074.4	1300.9		50'	4879.2	1796.0		50'	5813.6	2432.9	

E = R tan 1/2 I

E = R exsec 1/2 I

TABLE IX. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=100°	I	T	E	I=110°	I	T	E	I=120°
91°	5830.5	2444.9		101°	6950.6	3278.1		111°	8336.7	4386.1	
10'	5847.5	2457.1		10'	6971.3	3294.1		10'	8362.7	4407.6	
20'	5864.6	2469.3		20'	6992.0	3310.1		20'	8388.9	4429.2	
30'	5881.7	2481.5		30'	7012.7	3326.1		30'	8415.1	4450.9	
40'	5898.8	2493.8		40'	7033.6	3342.3		40'	8441.5	4472.7	
50'	5916.0	2506.1		50'	7054.5	3358.5		50'	8468.0	4494.6	
92°	5933.2	2518.5		102°	7075.5	3374.9		112°	8494.6	4516.6	
10'	5950.5	2531.0		10'	7096.6	3391.2		10'	8521.3	4538.8	
20'	5967.9	2543.5		20'	7117.8	3407.7		20'	8548.1	4561.1	
30'	5985.3	2556.0		30'	7139.0	3424.3		30'	8575.0	4583.4	
40'	6002.7	2568.6		40'	7160.3	3440.9		40'	8602.1	4606.0	
50'	6020.2	2581.3		50'	7181.7	3457.6		50'	8629.3	4628.6	
93°	6037.8	2594.0		103°	7203.2	3474.4		113°	8656.6	4651.3	
10'	6055.4	2606.8		10'	7224.7	3491.3		10'	8684.0	4674.2	
20'	6073.1	2619.7		20'	7246.3	3508.2		20'	8711.5	4697.2	
30'	6090.8	2632.6		30'	7268.0	3525.2		30'	8739.2	4720.3	
40'	6108.6	2645.5		40'	7289.8	3542.4		40'	8767.0	4743.6	
50'	6126.4	2658.5		50'	7311.7	3559.6		50'	8794.9	4767.9	
94°	6144.3	2671.6		104°	7333.6	3576.8		114°	8822.9	4790.4	
10'	6162.2	2684.7		10'	7355.6	3594.2		10'	8851.0	4814.1	
20'	6180.2	2697.9		20'	7377.8	3611.7		20'	8879.3	4837.8	
30'	6198.3	2711.2		30'	7399.9	3629.2		30'	8907.7	4861.7	
40'	6216.4	2724.5		40'	7422.2	3646.8		40'	8936.3	4885.7	
50'	6234.6	2737.9		50'	7444.6	3664.5		50'	8965.0	4909.9	
95°	6252.8	2751.3		105°	7467.0	3682.3		115°	8993.8	4934.1	
10'	6271.1	2764.8		10'	7489.6	3700.2		10'	9022.7	4958.6	
20'	6289.4	2778.3		20'	7512.2	3718.2		20'	9051.7	4983.1	
30'	6307.9	2792.0		30'	7534.9	3736.2		30'	9080.9	5007.8	
40'	6326.3	2805.6		40'	7557.7	3754.4		40'	9110.3	5032.6	
50'	6344.8	2819.4		50'	7580.5	3772.6		50'	9139.8	5057.6	
96°	6363.4	2833.2		106°	7603.5	3791.0		116°	9169.4	5082.7	
10'	6382.1	2847.0		10'	7626.6	3809.4		10'	9199.1	5107.9	
20'	6400.8	2861.0		20'	7649.7	3827.9		20'	9229.0	5133.3	
30'	6419.5	2875.0		30'	7672.9	3846.5		30'	9259.0	5158.8	
40'	6438.4	2889.0		40'	7696.3	3865.2		40'	9289.2	5184.5	
50'	6457.3	2903.1		50'	7719.7	3884.0		50'	9319.5	5210.3	
97°	6476.2	2917.3		107°	7743.2	3902.9		117°	9349.9	5236.2	
10'	6495.2	2931.6		10'	7766.8	3921.9		10'	9380.5	5262.3	
20'	6514.3	2945.9		20'	7790.5	3940.9		20'	9411.3	5288.6	
30'	6533.4	2960.3		30'	7814.3	3960.1		30'	9442.2	5315.0	
40'	6552.6	2974.7		40'	7838.1	3979.4		40'	9473.2	5341.5	
50'	6571.9	2989.2		50'	7862.1	3998.7		50'	9504.4	5368.2	
98°	6591.2	3003.8		108°	7886.2	4018.2		118°	9535.7	5395.1	
10'	6610.6	3018.4		10'	7910.4	4037.8		10'	9567.2	5422.1	
20'	6630.1	3033.1		20'	7934.6	4057.4		20'	9598.9	5449.2	
30'	6649.6	3047.9		30'	7959.0	4077.2		30'	9630.7	5476.5	
40'	6669.2	3062.8		40'	7983.5	4097.1		40'	9662.6	5504.0	
50'	6688.8	3077.7		50'	8008.0	4117.0		50'	9694.7	5531.7	
99°	6708.6	3092.7		109°	8032.7	4137.1		119°	9727.0	5559.4	
10'	6728.4	3107.7		10'	8057.4	4157.3		10'	9759.4	5587.4	
20'	6748.2	3122.9		20'	8082.3	4177.5		20'	9792.0	56	

### 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

### DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES  $1\frac{1}{2}$  TO 1.

FOR SINGLE TRACK EMBANKMENT.

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

Deflections for Sub Chords for Short Radius Curves.

Degree of Curve	Radius 50 sin. def. ang.	$\frac{1}{2}$ sub chord R = sin of def. angle				Length of arc for 100 ft
		12.5 Ft.	15 Ft.	20 Ft.	25 Ft.	
		30°	193.18	1° 51'	2° 17'	
32°	181.39	1° 59'	2° 25'	3° 10'	3° 58'	101.33
34°	171.01	2° 06'	2° 33'	3° 21'	4° 12'	101.48
36°	161.80	2° 13'	2° 41'	3° 33'	4° 26'	101.66
38°	153.58	2° 20'	2° 49'	3° 44'	4° 40'	101.85
40°	146.19	2° 27'	2° 57'	3° 55'	4° 54'	102.06
42°	139.52	2° 34'	3° 05'	4° 07'	5° 08'	102.29
44°	133.47	2° 41'	3° 13'	4° 18'	5° 22'	102.53
46°	127.97	2° 48'	3° 21'	4° 29'	5° 36'	102.76
48°	122.92	2° 55'	3° 29'	4° 40'	5° 50'	103.00
50°	118.31	3° 02'	3° 38'	4° 51'	6° 04'	103.24
52°	114.06	3° 09'	3° 46'	5° 02'	6° 17'	103.54
54°	110.11	3° 16'	3° 54'	5° 13'	6° 31'	103.84
56°	106.50	3° 22'	4° 02'	5° 23'	6° 44'	104.14
58°	103.14	3° 29'	4° 10'	5° 34'	6° 57'	104.43
60°	100.00	3° 35'	4° 18'	5° 44'	7° 11'	104.72

TABLE XIII.  
MINUTES IN DECIMALS OF A DEGREE.

0'30''	.00833	10'30''	.17500	20'30''	.34167	30'30''	.50833	40'30''	.67500	50'30''	.84167
1 00	.01667	11 00	.18333	21 00	.35000	31 00	.51667	41 00	.68333	51 00	.85000
2 00	.02500	30	.19167	30	.35833	30	.52500	30	.69167	30	.85833
3 00	.03333	12 00	.20000	22 00	.36667	32 00	.53333	42 00	.70000	52 00	.86667
4 00	.04167	30	.20833	30	.37500	30	.54167	30	.70833	30	.87500
5 00	.05000	13 00	.21667	23 00	.38333	33 00	.55000	43 00	.71667	53 00	.88333
6 00	.05833	30	.22500	30	.39167	30	.55833	30	.72500	30	.89167
7 00	.06667	14 00	.23333	24 00	.40000	34 00	.56667	44 00	.73333	54 00	.90000
8 00	.07500	30	.24167	30	.40833	30	.57500	30	.74167	30	.90833
9 00	.08333	15 00	.25000	25 00	.41667	35 00	.58333	45 00	.75000	55 00	.91667
10 00	.09167	30	.25833	30	.42500	30	.59167	30	.75833	30	.92500
11 00	.10000	16 00	.26667	26 00	.43333	36 00	.60000	46 00	.76667	56 00	.93333
12 00	.10833	30	.27500	30	.44167	30	.60833	30	.77500	30	.94167
13 00	.11667	17 00	.28333	27 00	.45000	37 00	.61667	47 00	.78333	57 00	.95000
14 00	.12500	30	.29167	30	.45833	30	.62500	30	.79167	30	.95833
15 00	.13333	18 00	.30000	28 00	.46667	38 00	.63333	48 00	.80000	58 00	.96667
16 00	.14167	30	.30833	30	.47500	30	.64167	30	.80833	30	.97500
17 00	.15000	19 00	.31667	29 00	.48333	39 00	.65000	49 00	.81667	59 00	.98333
18 00	.15833	30	.32500	30	.49167	30	.65833	30	.82500	30	.99167
19 00	.16667	20 00	.33333	30 00	.50000	40 00	.66667	50 00	.83333	60 00	1.00000

H. Patterson  
G. Paine

4/19/69  
30° Br.

Summit Drive

I. Pin

P.O.T.

I. Pin

P.O.T.

I. Pin

P.O.T.

SPK. N.  
side  
12" Elm

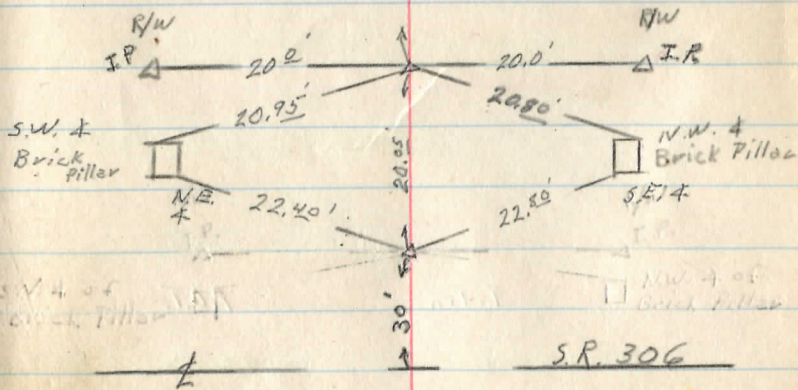
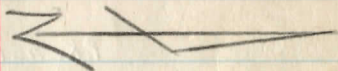
42.50'

931.91'

SPK. Crotch  
Twin Cherry

34.49'

403.28'



I Pin

P.O.T.

SPK. West side 14" Maple

24.9'

694.00'

21.90'

End SPK, E side 18" Maple

P.K. nail

P.O.T.

SPK N. side 12" cherry

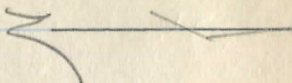
37.80'

660.40'

Woodmere Drive

26.20'

S.E. 4" x 4" wood light post



I. Pin

P.O.T.

SPK N. side 18" Maple

40.60'

335.95'

Maple Drive

1.15'

22.80'

SPK W. side 8" Pine

931.91'



I Pin

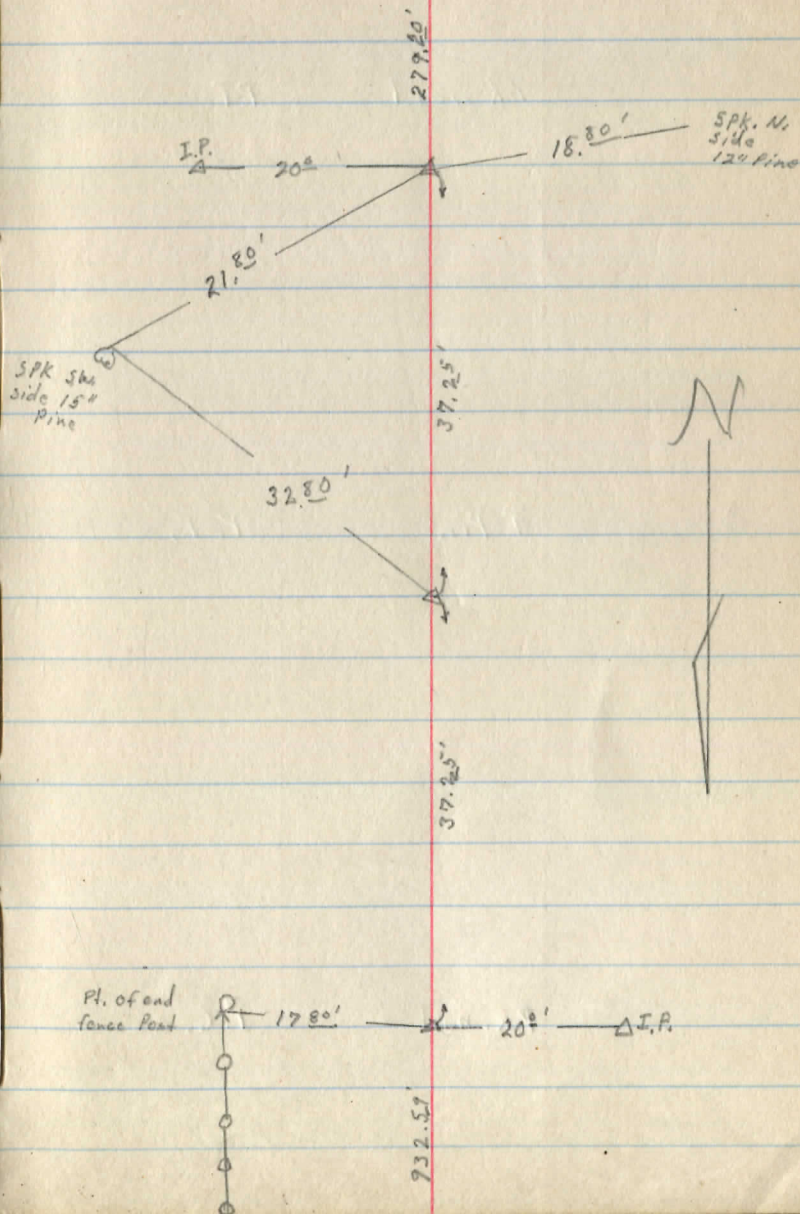
P.T.

P.K. nail

P.I.

I Pin

P.C.T.



End Sunset + Beg Valley Dr.  
? at P.I.

P.K. nail

P.T.

I. Pin

P.I.

P.K. nail

P.C.

front edge stool  
light Post  
(Mo Dado)

27.70

42.55'

front edge Round wood  
sign light Post (Howe)

19.90'

93.84'

Out.  
SPK. s. side  
6" Ash

7.10'

Spk in Top  
15" Elm stump

5.80'

93.84'



Spk. N. side  
15" Elm

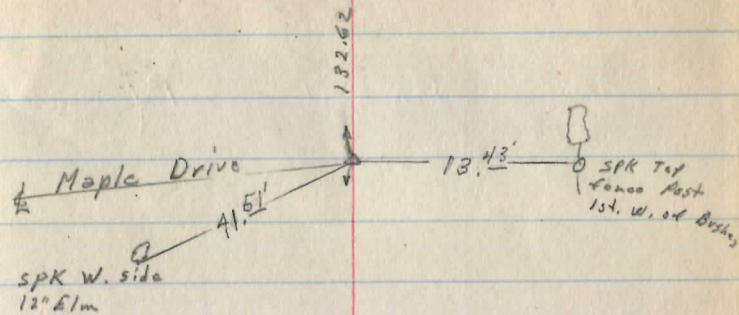
11.90'

39.70'

SPK s. side  
12" Maple

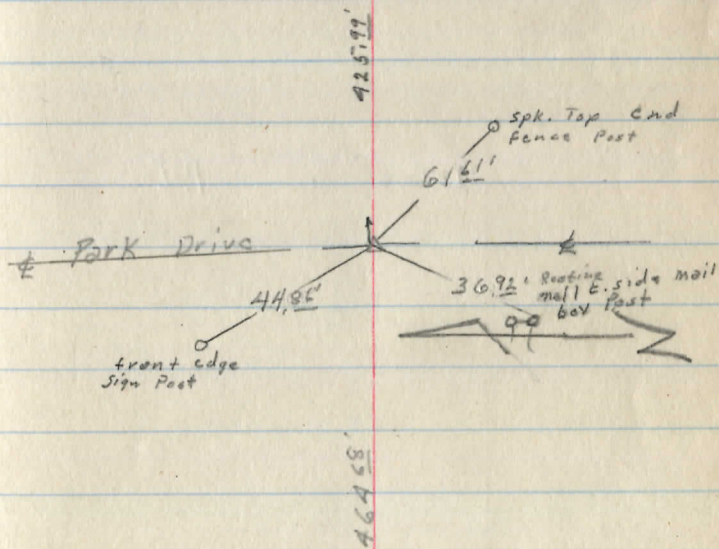
# Valley Drive

I. Pin



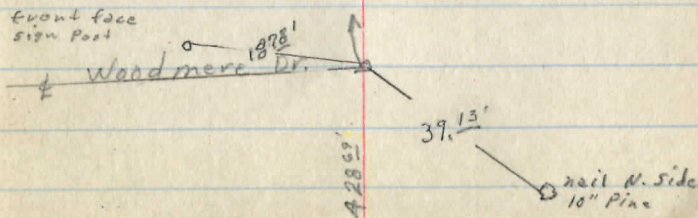
II. Pin

P.I.



PK. nail

P.O.T.



P.K nail

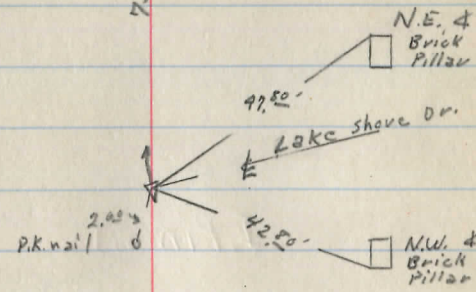
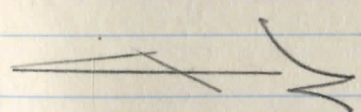
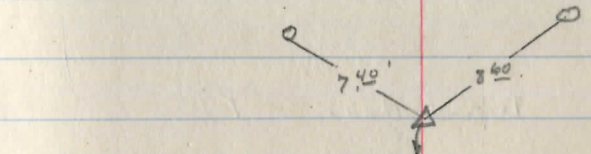
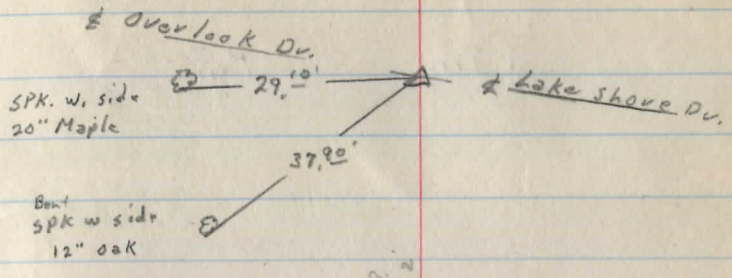
P.I.

I. Pipe

P.I.

I. Pin

P.O.T.



Woodmere Drive  
(Sunset to summit)

I. Pin

P.R.C.

Tacked Hub

P.I.

I. Pin

P.C.

SPK. E. side  
18" Beech

43.41'

APK 288.66'  
CAL 277.70'

22.15'

OSPK S. side  
"cherry"

384.67'

20.16'

OSPK SW. side  
15" Beech

1.80'

OSPK E. side  
15" Beech

334.65'

face sign  
Post

18.28'

Valley

Drive

39.13'

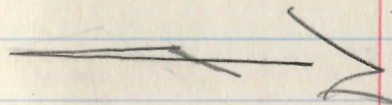
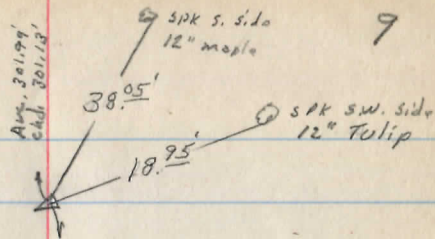
OSPK N. side  
10" Pine

I. Pin

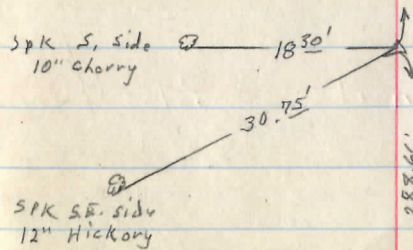
P.R.C.

I. Pin

P.R.C.

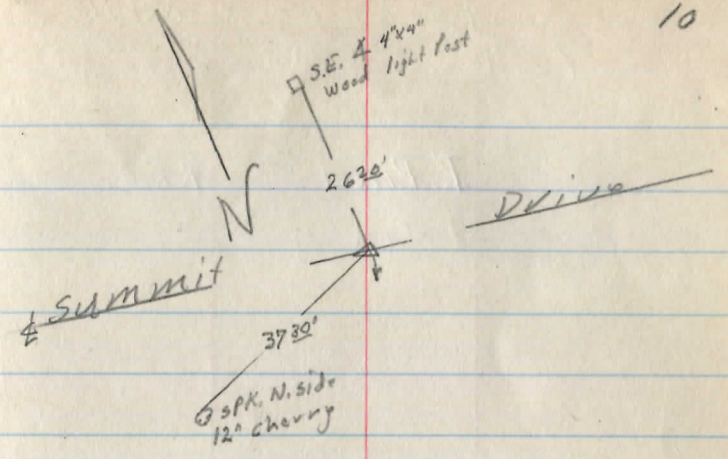


ARC. 378.80'  
CHD. 324.67'

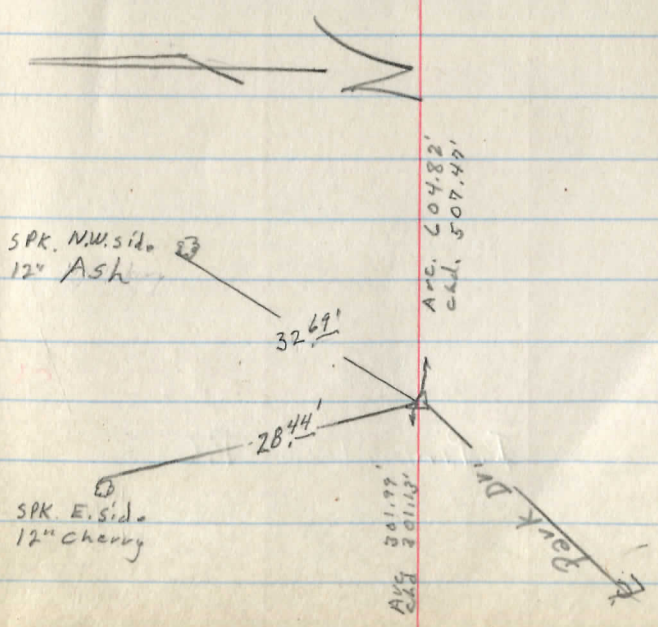


ARC. 288.66'  
CHD. 287.90'

P.K. nail P.T.



I. Pin P.T. - P.C.



Park Drive North  
(Valley to Woodmore Dr.)

11

I. Pin

P.R.C.

spk. s. side  
6" Ash

22.00'

434.54  
Elev 481.13

21.61'

spk s. side  
12" oak

I.P.

P.I.

207.51'

6.65'

6.65'

SPK N. side  
36" oak

SPK  
W. side  
Twin 6" Maple

mod. 2" oak

face  
sign Post

207.51'

44.86'

I. Pin

P.C.

Valley

Drive

36.92'

61.61'

roofing nail  
E. side Mail  
Box Post

spk Top end  
fence Post

I. Pin

P.T.

I. Pin

P.R.C.

SPK E. side  
12" Cherry

28.74'

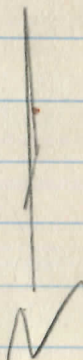
32.62'

SPK W. side  
12" Ash

DRIVE

Woodmere

AVE. 876.41  
C&D 878.43



12

SPK N side  
12" Maple

17.50'

25.41'

SPK S. side  
10" Beech

AVE. 484.54  
C&D 481.19

Park Drive South

I Pin

P.T.

I. Pin

P.I.

I. Pin

P.C.

SPK W. side  
Twin 15"  
Cotton wood

83.50  
~~87.36~~

Dam Rd 54.56' to Lucerne  
West Hill Dr 13

✓ okay

N

37.50

22.63

SPK S. side  
18" Pine

72.90

79.20

SPK W. side  
6" Pine

22.36

18.25

SPK N.W. side  
6" Evangreen

366.29  
390.62

PI

637.0

34.59

roofing nail  
E. side Mail  
Box Post

Valley

Drive

42.65

Face  
sign post

Maple Drive  
(Valley - Summit)

I. Pin

P.R.C.

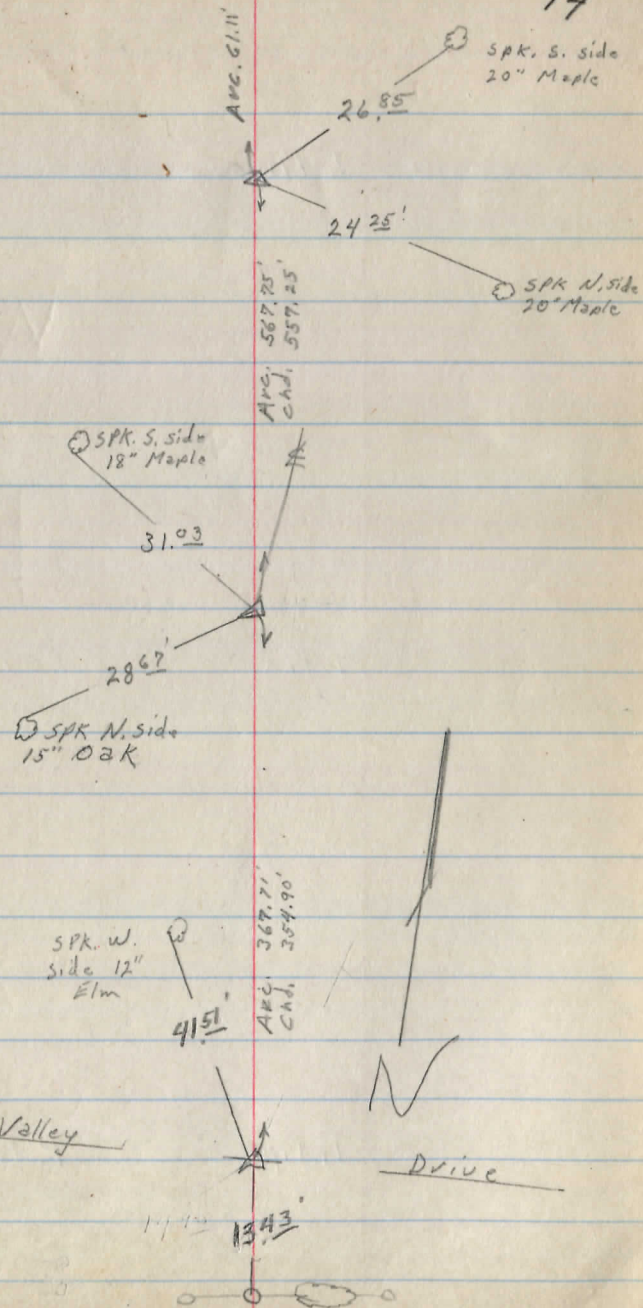
I. Pin

P.R.C.

I. Pin

P.C.

14



I. Pin

I. Pin

P.O.T.

I. Pipe

P.T.

SPK W. side  
8" Pine

15

22.90

Summit

Drive

40.60'

SPK. N. Side  
18" Maple

face steel light  
Post

59.44'

35.00'

face steel sign  
Post

Rockspring Dr.

270.76'

SPK. N. side  
30" Tulip

24.15'

38.20'

SPK. N.W.  
side 24"  
Cherry

Arc 61.11'

Rockspring Drive  
(Maple - S.R. 3061)

I. Pin

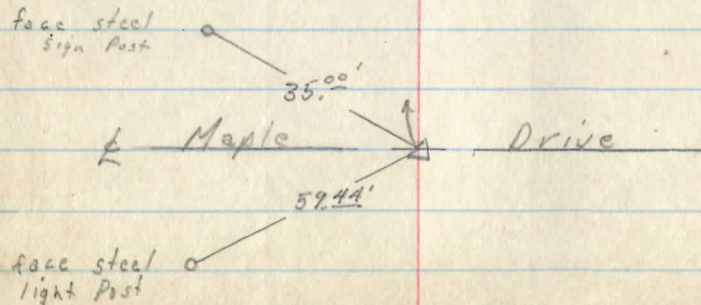
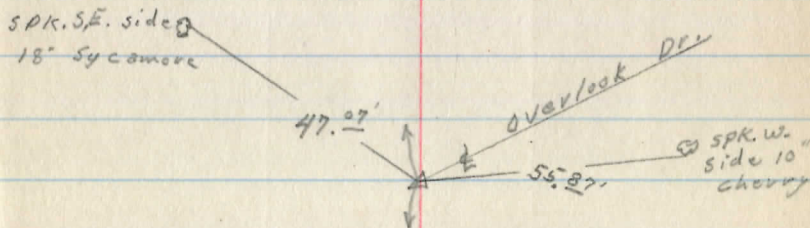
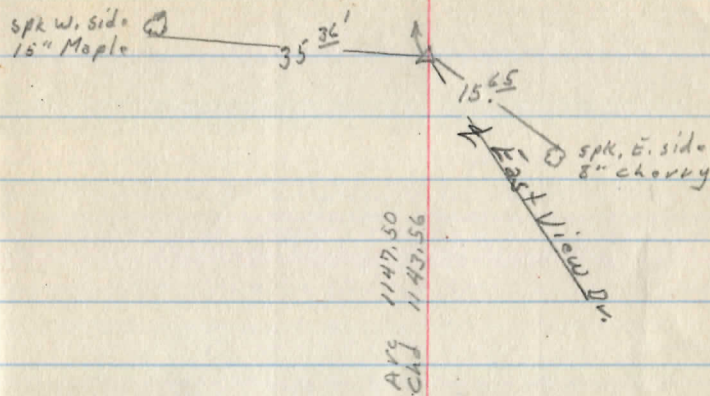
P. T.

Lg. nail

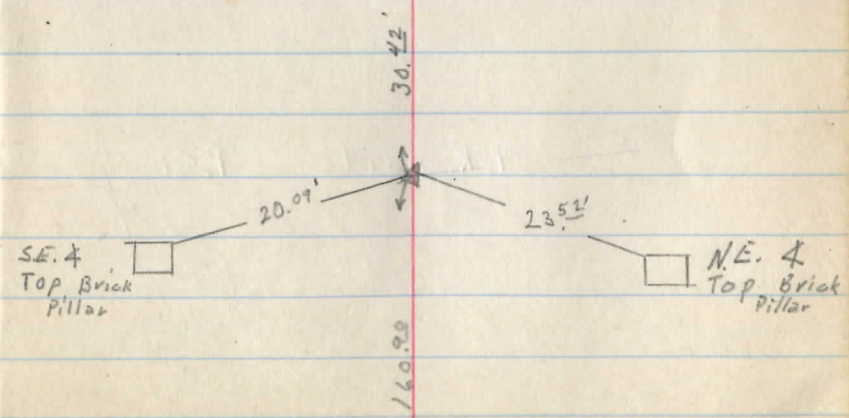
P.C.

I. Pin

16



S.P. 306



Overlook

Drive

18

I. Pin

P.C.

P.T.

P.K. nail

P.C.

SPK sw. side  
is Maple



65.16'

Ave 179.67'  
Ctd. 129.15'

25.40 GP

29.20'

SPK  
N. side  
30" Elm

SPK W. side  
20" Maple



115.81'

29.10'

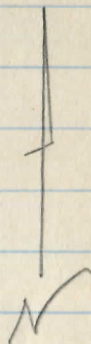
SPK W. side  
12" oak



37.90'

E Valley

Lake Shore Dr

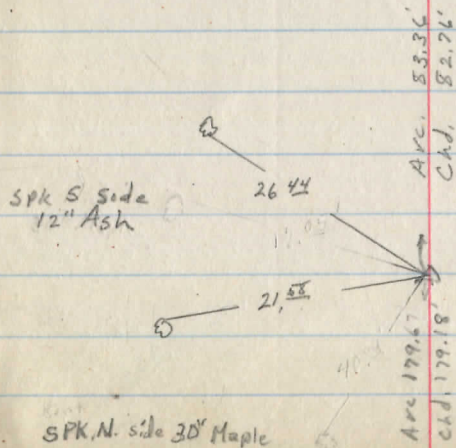
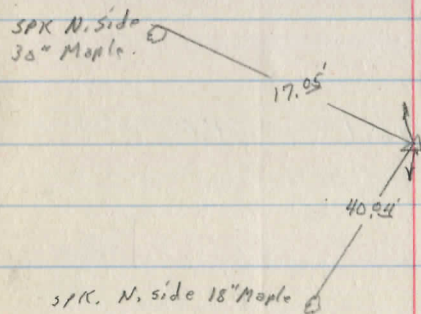


NOTE: ALL P.K. NAILS CHANGED TO I.P.  
OR LARGE SPKS.

P.K. nail P.R.C.

P.K. nail P.R.C.

CONT. Pg. 29 8-27-70



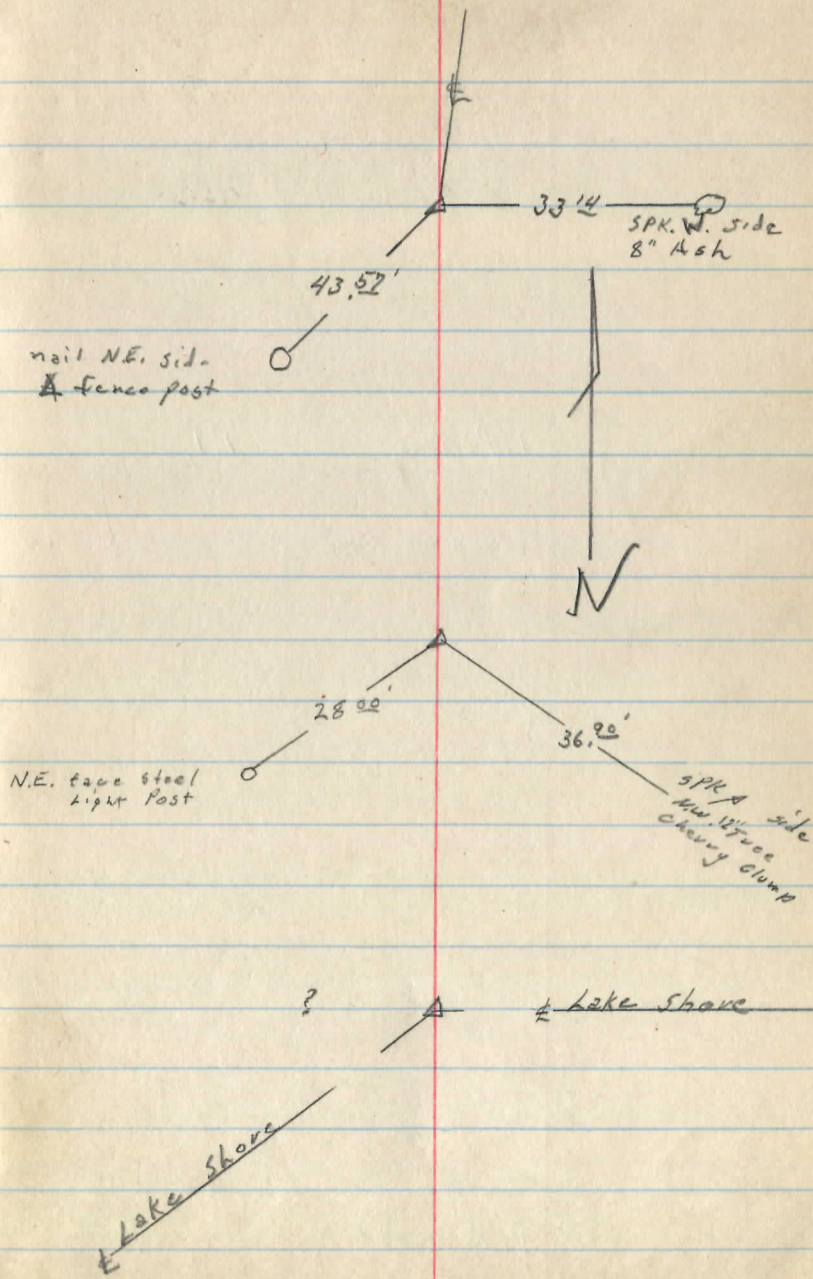
East View Drive  
(Lake Shore to Rookspring)

I. Pin

P.R.C.

P.K. nail

P.C.



I. Pin

P.T.

SPK W. side  
15" Maple

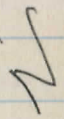
35.36'

Drive

15.65'

Rock spring

SPK E. side  
8" Cherry

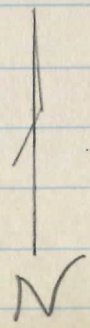


Tack N. side  
12" Silver Maple

35.96'

32.02'

Tack N. side  
15" Cherry



P.K. nail

P.C.

Lake Shore  
(Valley - S.R. 304)

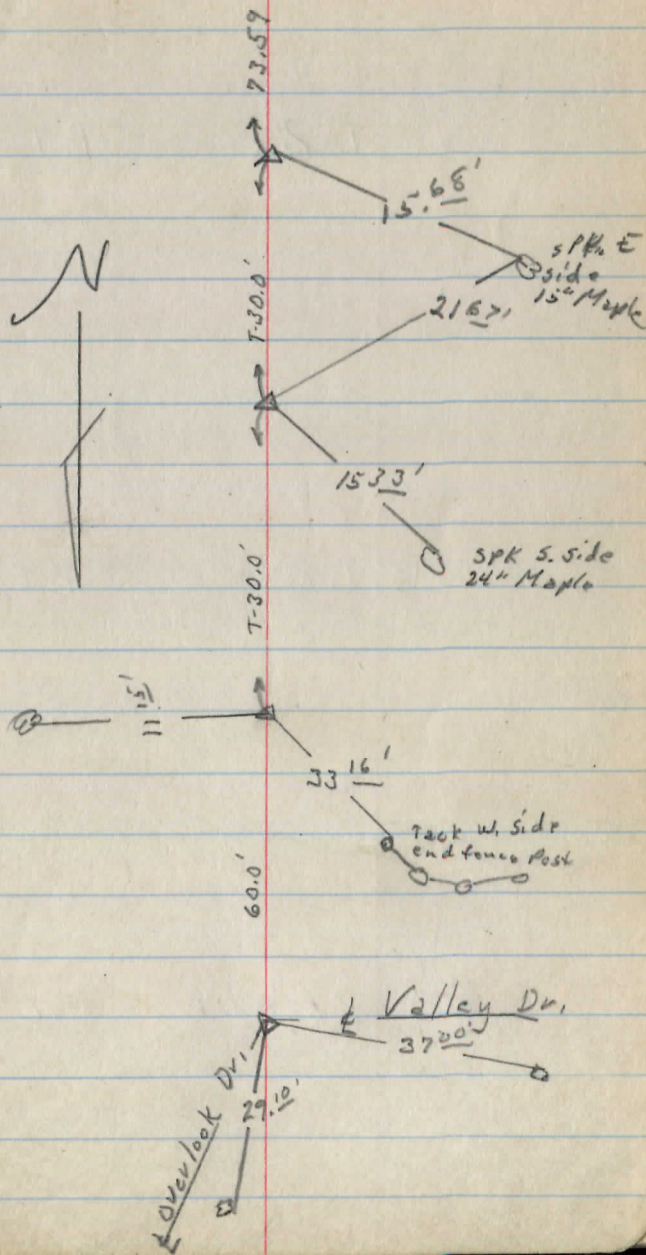
P.K. nail P.T.

P.K. nail P.I.

P.K. nail P.C.

P.K. nail P.O.T.

22



I. Pin

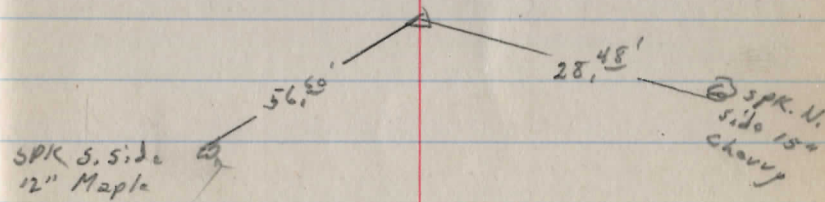
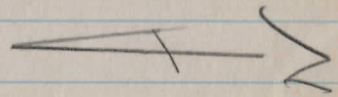
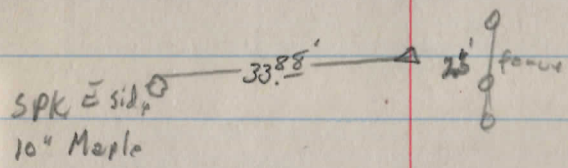
P. T.

I. Pin

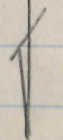
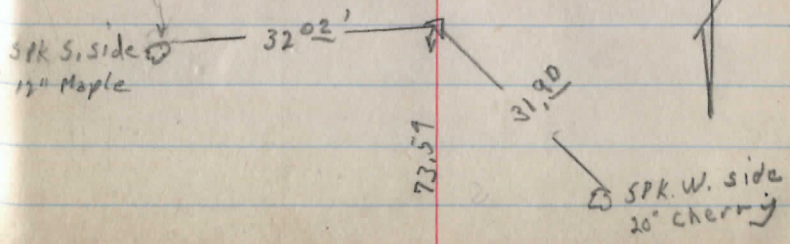
P. I.

P.K. nail.

P. C.



53' via



N.W.  $\angle$  4x4"  
Wood Light Post

29.51'

25.49'

W. face 2" Steel  
Light Post

22.31'

S.W. face 2"  
Steel Light Post

63.63'

33.09'

nail S.W. side  
8" Apple

I. Pin

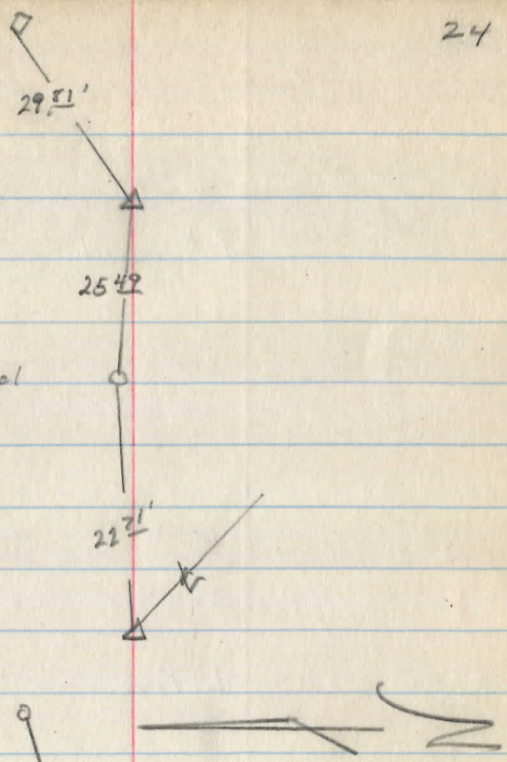
P. T.

I. Pin

P. I.

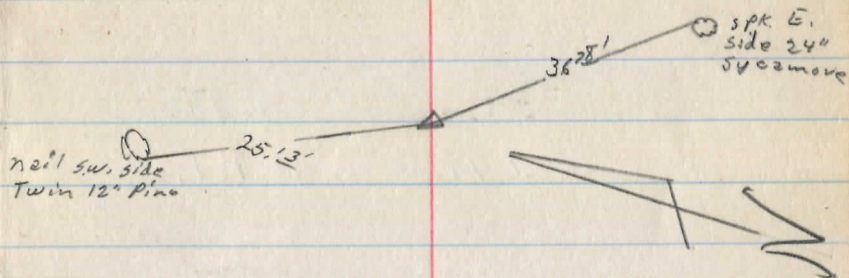
I. Pin

P. C.



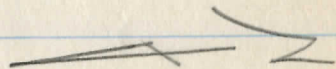
P.K. nail

P.T.



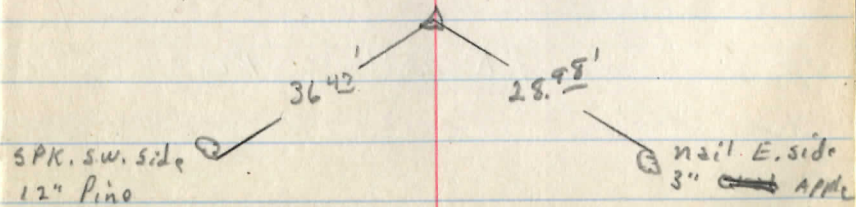
I. Pin

P.I.



I. Pin

P.C.



I Pin

P.T.

I. Pin

P.I.

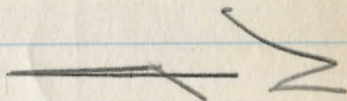
P.K. nail

P.C.

nail E. side  
14" Apple

15.89

42.55'

SPK N.E. side  
12" Apple

A

nail S.W. side  
12" Pine

43.90

45.38'

SPK E.  
side  
24" Sycamore

I. Pin

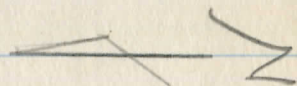
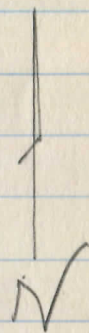
P. T.

I. Pin

P. I.

P. K. nail

P. C.

SPK S. side  
12" PineSPK S. side  
12" Apple

144.3'

26.87'

52.21'

72.29'

SPK N.E.  
side 12" Apple

I. Pipe

P.T.

Nw. & stone  
Pillar

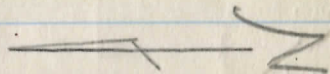
32.45'

Sw. & stone  
Pillar

31.13'

28

E SR - 306



I. Pin

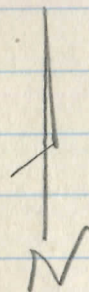
P.C.

S.E. & stone  
Pillar

10.32'

11.09'

S.E. & stone  
Pillar



East view

S.P.K. N. side

22.84'

Lake Shore

P.K. nail

24.60'

S.P.K. S.  
side 12"  
Pine

OVERLOOK CONT.

LARGE SPK.

ANGLE POINT

PAINE  
RHODES  
BAKER  
8-27-70  
80° HOT  
[initials]

IP,

P.T.

IP,

P.C.

IP,

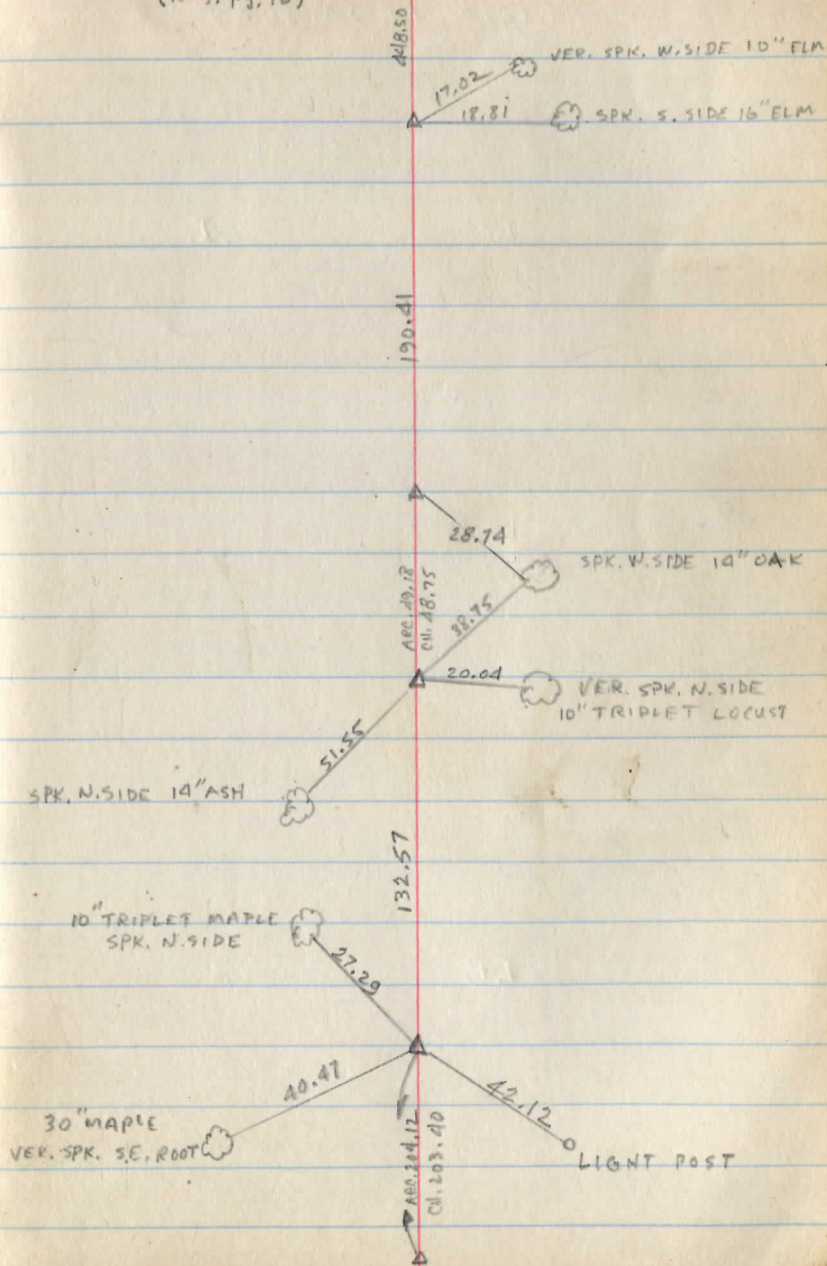
P.T.

IP,

P.R.C.

← ROCK SPRING  
(REF. PG. 16)

29

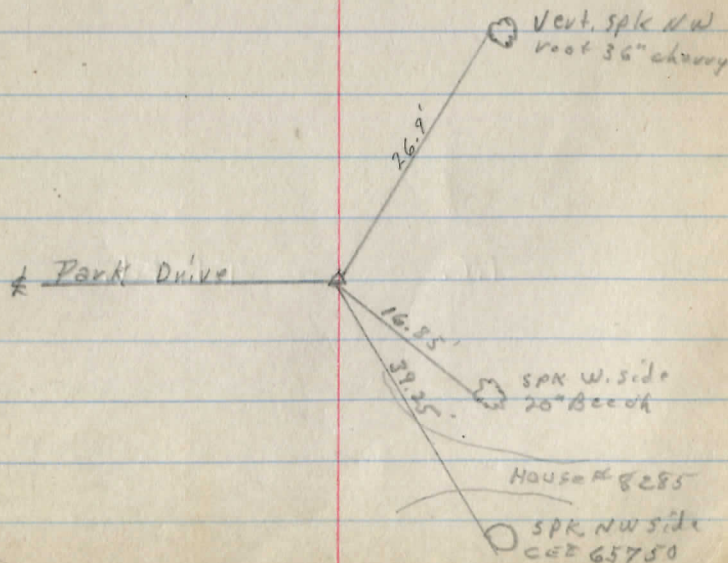
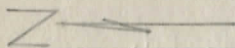
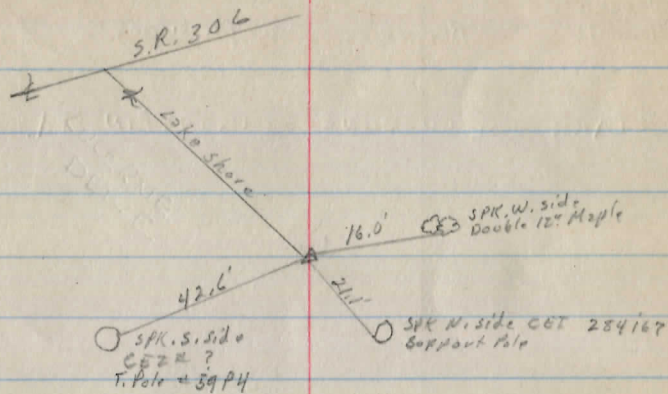


Lucerne Drive  
(Park to S.R. 306)

I.P.

P.I.

I.P.



SCHUSTER  
DORSEY  
JAREED  
4-28-72

REFERENCES FOR Pts. S. PARK + LUCERNE DRG.

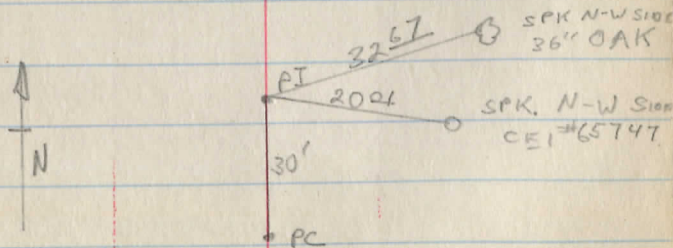
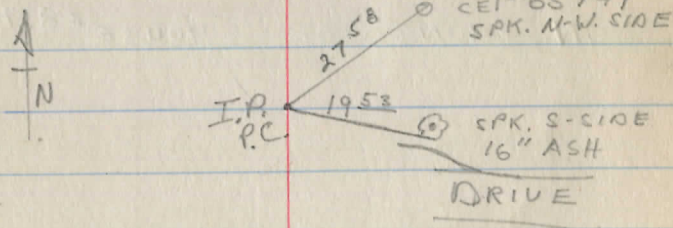
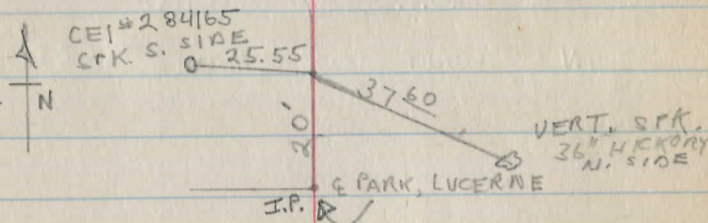
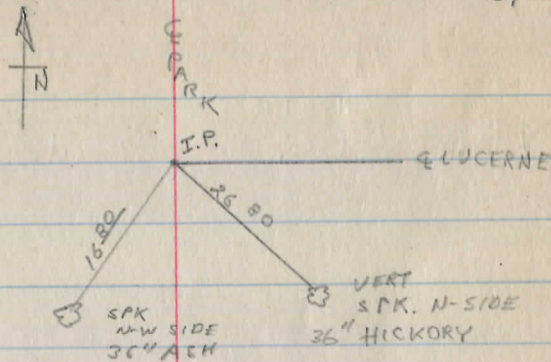
EPARK & LUCERNE IRON PIN Fd.

EPARK POT I.P. Fd.

EPARK P.C. I.P. Fd.

P.I. I.P. Fd.

31



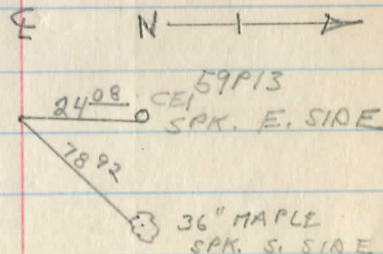
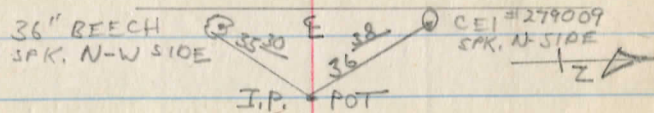
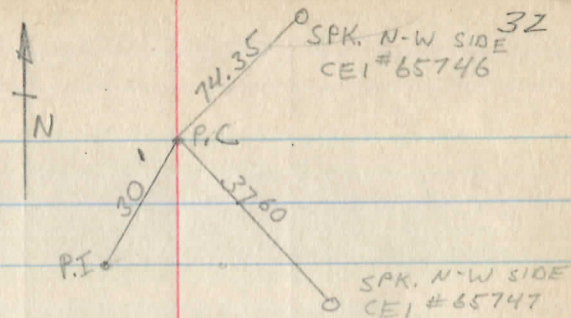
⊕ PARK NORTH  
P.C. I.P. Fd.

⊕ LUCERNE POT. I.P. Fd.

IN FRONT OF HOUSE # 8330

⊕ LUCERNE POT. I.P. Fd.

IN FRONT OF HOUSE # 8374









H. Patterson  
D. Wenzel  
G. Winston

Summit Drive

B.M. Levels

3/24/72 35°

B.M. # 177	4.42	1200.83		1196.41
T.P.	1.90	1193.03	9.70	1191.13 ✓
B.M. # 1	0.06	1182.64	10.45	1182.58 ✓
T.P.	0.89	1172.40	11.13	1171.51 ✓
T.P.	1.10	1161.76	11.74	1160.66 ✓
B.M. # 2	6.90	1159.20	9.46	1152.30 ✓
B.M. # 3	9.17	1167.41	0.96	1158.24 ✓
T.P.	0.30	1156.76	10.95	1156.46 ✓
B.M. # 4	0.40	1150.45	6.71	1150.05 ✓
T.P.	0.37	1138.90	11.92	1138.53 ✓
T.P.	0.19	1127.93	11.16	1127.74 ✓
T.P.	0.73	1117.31	11.35	1116.58 ✓
B.M. # 5	0.26	1109.09	8.48	1108.83 ✓
T.P.	0.19	1097.91	11.37	1097.72 ✓
B.M. # 6	0.31	1089.06	9.16	1088.75 ✓
T.P.	0.44	1079.18	10.32	1078.74 ✓
T.P.	1.75	1069.44	11.49	1067.69 ✓
B.M. # 7	2.82	1061.82	10.44	1059.00 ✓
B.M. # 8	11.48	1070.80	3.00	1058.82 ✓

(see pg 39 for Ref)

G.C. B.M. # 177 N.W. & S.R. 306 & Summit Dr.

(± 30 N. of 4)

Top E. side vit. sewer clean out, N. side Rd. House # 8432.

Spk. N. side 15" Maple SW. of Maple Dr. & Summit Dr.

N. edge Top of Gas shot off Box - 2' E. of st sign (Sw. of Summit Woodmere)

Bent. spk N. <sup>side</sup> 12" Maple W. side E. Dr. House # 8275 (S. side Rd.)

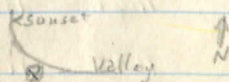
Spk. SE. side <sup>8"</sup> Elm. W. side Rd - 70' W. of House # 8200 Rd.

Spk W. side 12" Pine E. side Rd. House # 12022

Spk N. side 8" Pine

Tel. # 7992

Spk N. side C.E.T. # 275681 ± 150' E. of Woodmere (S. side Rd. Valley)



1070.80

T.P.	7.16	1075.85 <sup>3</sup>	4.11	1065.89 <sup>1</sup>
B.M. #9	5.74	1068.81 <sup>7</sup>	10.38	1062.87 <sup>9</sup>
B.M. #10	0.94	1067.85 <sup>8</sup>	1.00	1066.81 <sup>9</sup>
T.P.	0.02	1056.81 <sup>3</sup>	11.54	1058.89 <sup>2</sup>
B.M. #11	6.15	1058.84 <sup>2</sup>	9.22	1048.89 <sup>9</sup>
B.M. #12	11.65	1068.80 <sup>0</sup>	3.89	1049.85 <sup>3</sup>
B.M. #13	6.82	1068.81 <sup>3</sup>	7.21	1056.89 <sup>7</sup>
GC B.M. #152			2.65	1060.86 <sup>4</sup> 1060.50

SPK N. side 20° cherry SW. of Valley Dr. & Lake Shore Dr.  
 SPK W. side 24° Maple NW of Valley Dr. & Overlook Dr.  
 SPK N. side 22° cherry ± 40 S. of Lake Shore sta. 210  
 SPK N. side 24° Cottonwood ± S. of Lake Shore sta.  
 NW of S. Hdwall <sup>spillway</sup> Lakeshore Dr. 200 W. of S.R. 306  
 S.R. 306 opp Lakeshore Dr (see pg 41 for Ref.)

East view

				1057.19
B.M. #13	9.45	1066.24		1056.79
T.P.	11.48	1076.79	0.93	1065.31
T.P.	11.08	1085.67	2.20	1074.59
B.M. #14	9.24	1090.63	4.28	1081.39 <sup>43</sup>
B.M. #15			6.16	1084.47 <sup>97</sup>
T.P.	10.23	1098.07	2.79	1089.84
T.P.	11.26	1106.96	2.37	1095.70
T.P.	11.62	1117.00	1.58	1105.38
B.M. #16	11.98	1128.27	0.71	1116.29 <sup>69</sup>
B.M. #17			10.06	1118.21 <sup>41</sup>

1081.84  
 NW of Light Post N. side Drive  
 1084.92 #553150  
 SPK W. side C&T Behind House # 17194



1116.58  
 Bent. spk. S. side 12° Ash 23° E. of E. view # 17133  
 1118.50  
 Bent. SPK W. side C&T NW of Behind House # 17133

SW of Prop House # 17133

1128.27 ✓

T.P.	11.84	1139.93	0.15	1128.09 ✓
T.P.	10.66	1150.57	0.02	1139.91 ✓
T.P.	10.65	1160.92	0.30	1150.27 ✓
B.M. #18			5.04	<del>1735.88</del> ✓
T.P.	11.92	1171.12	1.72	1159.20 ✓
BM #19	10.86	1177.66	4.32	<del>1766.80</del> ✓
T.P.	11.94	1189.32	0.28	1179.38 ✓
BM #20			9.75	<del>1179.57</del> ✓
T.P.	9.95	1199.02	0.25	1189.07 ✓
G.C.B.M. #177		<del>3.05</del>	3.03	<del>1195.99</del> ✓
G.C.B.M. #177	3.08	1199.49		1196.41
T.P.	0.59	1190.74	9.34	1190.15
T.P.	0.60	1180.65	10.69	1180.05
T.P.	0.57	1173.89	7.33	1173.32
B.M. #19	0.41	1167.57	6.73	1167.16
T.P.	1.87	1163.20	6.24	1161.33
T.P.	0.72	1156.37	7.55	1155.65
T.P.	0.67	1149.75	7.99	1148.48
T.P.	1.63	1142.87	7.91	1141.24

1156.24

Spk N. side CEZ #229207 S. side Rockspring (House #8451)

1162.16

Spk W. side CEZ 229960 ± 200' W. of S.P. 306 on Rockspring (House #8451)

1179.93

Spk N. side CEZ ? In rear of House #8441 Summit

1196.36

1196.36

1142.87

T.P.	0.90	1136.02	7.75	1135.12
T.P.	0.45	1128.37	8.10	1127.92
B.M. <sup>#16</sup>	0.88	1117.46	11.79	1116.58
T.P.	1.02	1110.45	8.03	1109.43
T.P.	1.35	1104.03	7.77	1102.68
T.P.	1.36	1097.23	8.16	1095.87
T.P.	1.17	1091.42	6.98	1096.25
T.P.	2.09	1086.30	7.21	1084.21
B.M. <sup>#14</sup>	0.66	1082.50	4.46	1081.84
T.P.	1.89	1076.50	7.89	1074.61
T.P.	0.83	1069.95	7.38	1069.12
T.P.	0.85	1062.62	8.18	1061.77
B.M.			5.45	1057.17

+

-

GC <sup>#177</sup>	3.65	1200.00	<del>12.4</del>	1196.35
T.P.	1.58	1188.84	12.74	1187.26 <sup>27</sup>
B.M. <sup>#1</sup>	6.34		6.34	1182.50 <sup>(5.1)</sup>
T.P.	1.07	1177.46	12.45	1176.39 <sup>(4.8)</sup>
T.P.	0.98	1165.44	13.00	1164.46

S.R. 306 &amp; Summit Dr. N.W. #1 M 9

24" Maple  
20'  
4' Oct 2  
#

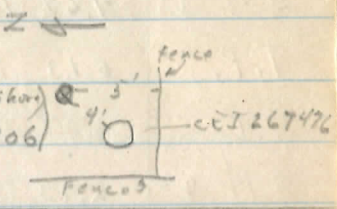
Summit Dr.

	+	1165.44	-	
B.M. <sup>#2</sup>			13.16	1152. <sup>11</sup> 28
T.P.	7.07	1160.65	11.96	1153. <sup>(61)</sup> 58
B.M. <sup>#3</sup>	7.95	1166.17	2.43	1158. <sup>(26)</sup> 22
T.P.	0.42	1154.32	12.27	1153.90
B.M. <sup>#4</sup>			4.32	1150. <sup>03</sup> 00
T.P.	1.20	1142.56	12.96	1141.36
T.P.	0.38	1130.18	12.76	1129.80
T.P.	0.22	1119.71	10.69	1119.49
B.M. <sup>#5</sup>	0.25	1109.18	10.78	1108. <sup>9.01</sup> 93
T.P.	0.96	1098.83	11.31	1097.87
B.M. <sup>#6</sup>	0.01	1088.89	9.95	1088. <sup>97)</sup> 88
T.P.	1.42	1078.59	11.42	1077.47
T.P.	1.05	1067.39	12.55	1066.34
B.M. <sup>#7</sup>	2.97	1062.30	8.06	1059. <sup>40)</sup> 33
B.M. <sup>#8</sup>	13.29	1072.34	3.25	1059. <sup>17)</sup> 05
T.P.	6.32	1071.13	7.53	1064.81
B.M. <sup>#9</sup>	5.68	1068.92	7.89	1063. <sup>38</sup> 24
B.M. <sup>#10</sup>	0.55	1067.74	1.73	1067. <sup>(34)</sup> 19
T.P.	0.53	1056.59	11.68	1056.06

1056.59

B, M, #1	116.60	1053.91	9.28	1047.31 <sup>491</sup>
B, M, #2	2.61	1058.14	4.38	1049.53 <sup>70</sup>
B, M, #3	6.36	1063.37	1.13	1057.01 <sup>19</sup>
G.C., Mon.			2.67	1060.70 <sup>88</sup>

1060.55 GC Mon 70' N. of Lak. shore  
 (18 cm) Dr. 42' E. of S.R. 306



Overlook Dr.

BM #10	<del>1.69</del> 8.69	1076.03	<del>8.69</del> 8.69	1067.34
T.P.	<del>0.78</del> 10.28	1085.09	<del>10.28</del> 12.2	1074.81
T.P.	5.88	1090.73	<del>5.88</del> 0.24	1084.85
B.M. #21	12.20	1098.59	4.34	1086.39
T.P.	10.63	1208.43	0.79	1097.80
B.M. #22	12.59	1216.37	4.65	1203.78
T.P.	13.20	1229.25	0.42	1215.95
B.M. #23	10.14	1235.41	3.98	1225.27
T.P.	13.11	1247.17	1.35	1234.06
T.P.	11.67	1256.18	2.66	1244.51
B.M. #2			4.58	1251.60
B.M. #2	2.63	1154.93		1152.30
T.P.	1.29	1144.02	12.19	1142.74

Spk. W. side 24" Maple NEX Lakeshore & Overlook Drs

S.E. corner of N. Damm wing wall

Spk. E side 29" Maple sta. 8+55.17 left

Spk. N. side 18" Ash S.W. corner @ Venbak, Rock spring

Spk N. side 15" Maple SW. of Maple & Summit Drs.  
(1142.23)

1144.02

T.P. 3.26 1134.45 12.83 1191.19

B.M. #23 4.62 1130.66 8.41 1126.04

T.P. 0.13 1118.96 11.53 1118.83

T.P. 3.08 1109.44 12.60 1106.36

B.M. 22 2.93 1107.48 4.89 1104.55

T.P. 0.82 1097.03 11.27 1096.21

B.M. 2 1.59 1088.64 9.98 1087.05

T.P. 1.95 1077.74 12.85 1075.79

B.M. #10 10.28 1067.46

(1131.17)

(1126.01)

(1118.79)

(1106.31)

(1104.49)

(1096.14)

(1086.97)

(1075.70)

(1067.36)

Maple Dr.

B.M. #23 0.13 1126.14 1126.01

T.P. 0.68 1115.41 11.41 1114.73

B.M. #24 1.14 1105.82 10.73 1104.68

T.P. 0.36 1093.19 12.99 1092.83

T.P. 0.13 1081.15 12.17 1081.02

T.P. 2.24 1071.08 12.31 1068.84

B.M. #9 7.66 1063.42

(1104.67)

1063.35

(1063.42)

Vert. spk. N.W. Root 36" oak 30'E sta.

H. Patterson  
G. Winton

Chillicothe Rd.

Check Levels

4/3/72 36°

GC # 177 1.665 1198.015 1196.35 Conc. Man. NW \* Summit \* SR 306

T.P. 1.77 1190.665 9.12 1189.895

T.P. 0.325 1182.820 8.17 1182.495

T.P. 0.01 1172.72 10.11 1172.71

T.P. 0.56 1163.39 9.89 1162.83

T.P. 0.785 1155.445 8.68 1154.71

T.P. 0.985 1148.03 8.45 1147.045

T.B.M. # 1.255 1140.450 8.835 1139.195 (1139.24)

Top. N. end 18° C.M.P. Dr. # 12106 Chillicothe Rd.

T.P. 0.99 1131.01 10.43 1130.02

T.P. 0.57 1122.79 8.58 1122.42

T.P. 0.63 1115.015 8.605 1114.385

T.P. 0.68 1107.305 8.39 1106.625

T.P. 0.925 1099.780 8.45 1098.855

T.P. 1.00 1092.285 8.495 1091.285

T.P. 0.41 1084.125 8.57 1083.715

T.P. 0.52 1074.415 10.23 1073.895

T.P. 2.71 1069.405 7.72 1066.695

T.P. 4.705 1068.105 6.005 1063.400

T.P. 4.31 1068.09 4.325 1063.780

GC # 181 7.32 1060.79 (1160.75)

Conc. Man opp. Lake Shore on E. side S.R. 306

H. Petterson  
G. Winton

Woodmeve Dr.  
+ Park Dr.

4/4/72 35° cold

B.M. #3	0.45 <sup>+</sup>	1158.71		1158.26
T.P.	1.92	1152.3 <sup>6</sup> X	8.2 <sup>7</sup> ✓	1150.4 <sup>4</sup> X
B.M. #25	0.99	1144.1 <sup>3</sup> X	9.22	1143.1 <sup>4</sup> X
T.P.	1.00	1132.5 <sup>0</sup> X	12.63	1131.5 <sup>0</sup> X
T.P.	0.55	1122.8 <sup>79</sup> X	10.26	1122.2 <sup>4</sup> X
T.P.	0.06	1111.0 <sup>3</sup> X	11.82	1110.9 <sup>7</sup> X
T.P.	2.09	1100.7 <sup>0</sup> X	12.4 <sup>2</sup> X	1098.6 <sup>1</sup> X
B.M. #26	1.30	1098.6 <sup>2</sup> X	3.38	1097.3 <sup>2</sup> X
T.P.	0.86	1087.6 <sup>1</sup> 3	11.87 ✓	1086.7 <sup>5</sup> X
T.P.	0.17	1074.6 <sup>4</sup> X	13.14	1074.4 <sup>7</sup> X
T.P.	2.4 <sup>5</sup> X	1066.5 <sup>1</sup> X	10.58	1064.0 <sup>6</sup> X
B.M. #8			7.30	1059.2 <sup>1</sup> X (OK)
B.M. #8	9.58	1068.75		1059.17
T.P.	11.71	1080.22	0.24	1068.51
T.P.	7.4 <sup>3</sup>	1087.44	0.21	1080.01
B.M. #27	11.07	1092.78	5.73	1081.71 (1081.72)
T.P.	13.22 <sup>+</sup>	1104.89	1.11	1091.67
T.P.	8.88	1113.23	0.54	1104.35
B.M. #28	11.15	1122.36	2.02	1111.21 (1111.24)

Top Gas shot off Base SW of Woodmeve Summit

Vert. spk. W. side 15" ~~Maple~~<sup>cherry</sup> opp. 17058 ~~25'~~<sup>Park</sup> 25' East

spk. W. side double 12" Ash 15' E. of ~~2~~<sup>Park N.W. of Lot</sup> House #17137

(4/5/72)

spk. W. side 15" Maple 20' E. of Woodmeve. (Komer #17141)

Vert. spk. N.W. side 15" Maple opp Drive 17074 (English)

4/5/72

1122.36

T.P. 11.85 1134.07 0.14 1122.22

T.P. 13.33 1147.25 0.15 1133.92

B.M. #25 4.16 1143.09 (105)  
OK

## Lucerne Dr.

B.M. #8 9.17 1068.34 1059.17

T.P. 1.04 1056.55 12.83 1035.51

B.M. #29 5.28 1052.25 9.58 1046.97 (104699)

T.P. 11.90 1058.75 5.40 1046.85

T.P. 13.33 1071.60 0.48 1058.27

B.M. #30 8.26 1079.85 0.01 1071.59 (107163)

B.M. #31 8.80 1078.38 -10.27 1069.58 (106963)

T.P. 9.06 1088.26 0.15 1078.23

B.M. #32 10.74 1098.44 3.76 1088.58 (1083,59)

B.M. #33 3.35 1088.05 12.76 1088.88 (1081.78)

T.P. 0.28 1078.88 12.02 1078.04

T.P. 0.92 1068.98 12.22 1068.08

B.M. #34 8.83 1068.75 6.07 1054.98 (1056.05)

G.C. #182 4.00 1059.75 (1059.75)

Vert. spk. N.W. root Double 24" Ash SE + Park + West Hill Drs.

Vert. Spk. N.W. root 36" Maple S. side Lucerne Dr. opp Park.  
E. side #8340

spk S. side CEZ, #279010

N. side Lucerne Dr. Sta.

E. line House #8402

Spk S. side CEZ #194984

N. side Lucerne Dr. Sta.

E. line House #8474

spk S. side CEZ #194989

N. side Lucerne Dr. Sta.

spk W. side CEZ<sup>th</sup>

E. side SR.306 opp. Lucerne Dr.

H. Patterson  
G. Winton

West Hill Dr.

46

4/6/72

	K2		ETC.
BM# 29	0.85	1047.62	1046.97 <sup>7</sup>
T.P.	2.99	1047.84	12.97 <sup>+</sup> 1034.85
BM# 34 <sup>5</sup>	6.05 <sup>+</sup>	1041.52	2.37 <sup>-</sup> 1035.47 (1035.48)
T.P.	3.71	1038.31	6.92 <sup>+</sup> 1034.60
BM# 36	5.83 <sup>+</sup>	1037.32	6.82 1031.49 (1031.50)
BM# 37	1.33	1035.24	3.41 <sup>-</sup> 1033.91 (1033.94)
T.P.	2.76 <sup>+</sup>	1025.18 <sup>7</sup>	12.83 <sup>-</sup> 1022.47 <sup>1</sup>
B.M.# 38	7.25 <sup>-</sup>	1022.93	9.49 1015.88 <sup>68</sup> (1015.73)
T.P.	12.95	1035.17	0.71 <sup>+</sup> 1022.22
T.P.	12.95	1047.91	0.21 1034.96
T.P.	8.07 <sup>+</sup>	1053.48	2.50 <sup>-</sup> 1045.41
GC # 235		4.38 <sup>-</sup>	1049.10 <sup>2</sup> (1049.10) 106

Vert. spk NW. root Double 24" Ash SE of York (West Hill)  
SW of Base on Phil Pambin Memorial (Ball field)  
(at W. Prop line House # 8208)  
Top 20" C.M.P. X Rd Culvert. Niend. Sta. West Hill Dr.  
spk. N side 12" Pine S. side Rd 30' E of E. Dr. of Mul Groves  
spk side. Tel. Pole N.E. X West Hill & Chag. Botanical Rd.

West Hill Ext.

BM# 37	9.24	1043.19	1033.95 <sup>4</sup>
T.P.	11.73	1053.95	0.97 <sup>-</sup> 1042.22
T.P.	6.74	1060.65	0.04 1053.91
BM# 39	0.91	1060.65	0.71 <sup>3</sup> 1059.97 OK
T.P.	0.78	1054.69	6.74 1053.91
T.P.	0.91	1043.42	12.23 1042.48 <sup>6</sup>
BM		9.49	1033.95 (OK)

spk N. side 12" Pine S. side Rd 30' E of E. Dr. of Mul Groves  
NE. side  
spk. 12" cherry W. side West Hill Ext. opp. House # 8122

BM <sup>#</sup> 30	0.23	1071.82		1071.59
BM <sup>#</sup> 30A			12.50	1059.32
BM <sup>#</sup> 31	1.54	1071.12		1069.58
BM <sup>#</sup> 31A			6.99	1064.13
BM <sup>#</sup> 32	3.98	1082.51		1083.53
T.P.	4.14	1088.91	2.74	1084.97
BM <sup>#</sup> 32A	10.90	1089.97	9.84	1079.07
BM <sup>#</sup> 32			6.43	1083.54

Vent.  
 spk. N.W. root 36" Maple SE of Park & Lucerne Dr  
 spk. W. side CEZ<sup>#</sup> ~~8131~~ Park Dr.

NE of Bottom Patio steps **8131** (Blank)

NE of Bottom Patio step

## OVERLOOK DR EXT.

BM <sup>#</sup> 18	2.57	1158.85		1156.2 <sup>4</sup> <sub>E</sub>
T.P.	0.17	1147.24	11.28	1147.07
T.P.	0.73	1135.75	9.22	1138.02
BM <sup>#</sup> 42	0.		6.78	1131.97 <sup>3</sup>
T.P.	11.77	1150.26	0.26	1138.49
T.P.	9.25	1159.40	0.11	1150.15
BM <sup>#</sup> 18			3.12	1156.2 <sup>4</sup> <sub>E</sub>

spk. N. side CEZ<sup>#</sup> 279203 S. side Rockspring (House # 8431)

spk. N. side CEZ<sup>#</sup> 290553 Behind House<sup>#</sup> 8429 Rockspring

4/7/72

B.M. # 35	11.63	1042.11	1035.48
BM # 40		1.07	1046.04
BM # 41		2.49	1044.62
BM # 35		11.63	1035.48

SW 4<sup>th</sup> of Base on Phil Pembin Memorial (Ball field)S Tel Pole  
SPK N. W. Side { CET # 59 P 26 N.E. of Ball fieldS Tel Pole  
SPK N.E. Side { CET # 59 P 30 Behind House # 8242 Valley

G.C. Mon 177	1196.35
G.C. Mon 182	1060.88
G.C. Mon 235	1049.18
BM #1	1182.51
# 2	1152.31
3	1158.26
4	1150.05
5	1109.01
6	1088.97
7	1059.44
8	1059.17
9	1063.38
10	1067.34
11	1047.47
12	1049.70
13	1057.19
14	1081.84
15	1084.92
16	1116.58

BM # 17	1118.50
18	1156.24
19	1167.16
20	1179.93
21	1086.92
22	1104.49
23	1126.01
24	1104.67
25	1143.14
26	1097.32
27	1081.72
28	1111.24
29	1046.99
30	1071.63
30-A	1059.36
31	1069.63
31-A	1064.18
32	1083.59
32-A	1079.13

1118.50  
 1156.24  
 1167.16  
 1179.93  
 1086.92  
 1104.49  
 1126.01  
 1104.67  
 1143.14  
 1097.32  
 1081.72  
 1111.24  
 1046.99  
 1071.63  
 1059.36  
 1069.63  
 1064.18  
 1083.59  
 1079.13

BM # 33	1081.78
34	1056.05
35	1035.48
36	1035.50
37	1033.94
38	1015.73
39	1059.93
40	1046.04
41	1044.62
42	1131.93
43	1139.24















































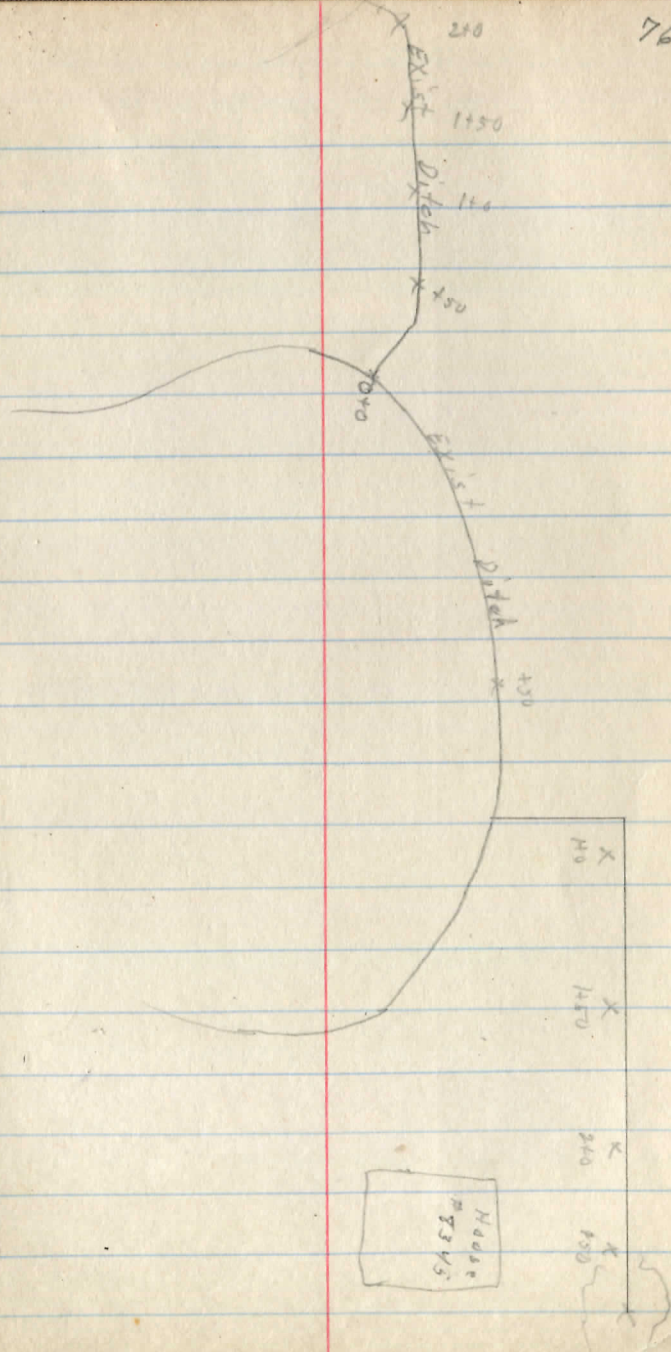


H. Patterson  
 D. Wenzel  
 G. Winton  
 3/25/72 38° Clear

W. Craig Dr.

B.M. 5.11 105.11 100.00

0+0	7.35
+50 N.	6.72
1700 N.	6.22
+50 N	6.03
2+00 N	6.09
+50 N.	6.25
+75 N	6.75
3+25 N.	6.25
+50 S	7.55
1+00 S	7.93
+50 S	8.27
2+0	8.50
+50	8.70
3+0	9.22
+50	9.60
4+00 + Two Ditches	10.00
B.M.	5.11





H. Patterson  
D. Mangel  
G. Winton

Caves & Dines Rd.  
Anthony Bugare

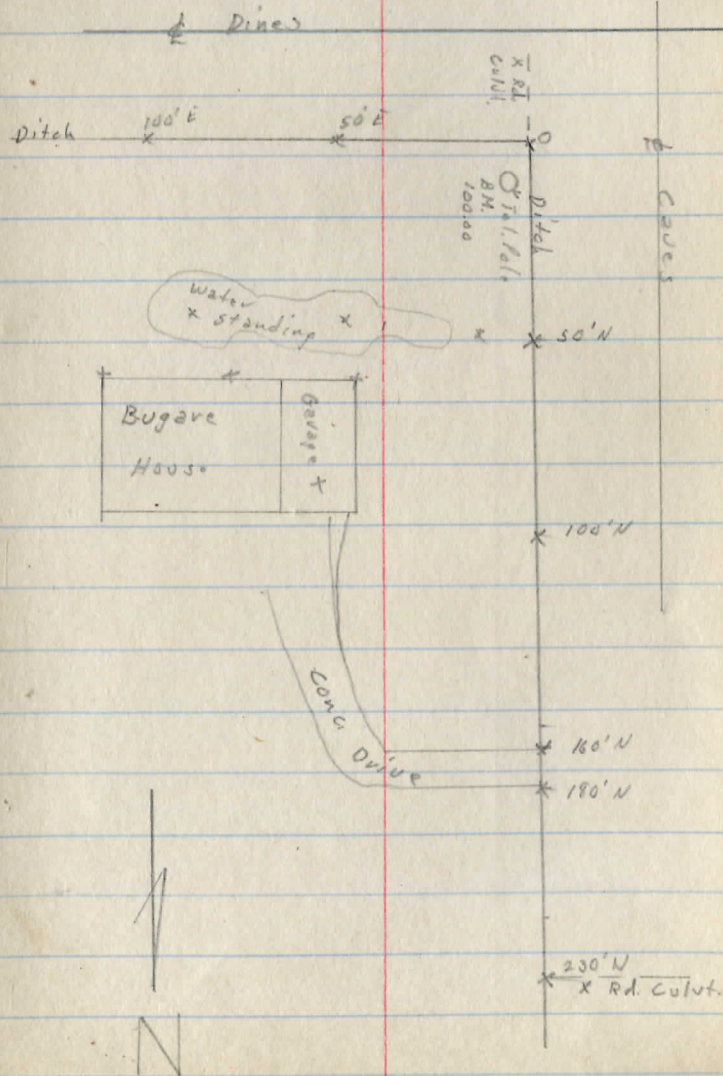
3/25/72 30° clear

BM	2.70	102.70	100.00
100' E on Dines	3.69	99.01	
50' E. *	4.46	98.24	
0	6.06	96.64	
50' N. on Caves *	6.59	96.11	
100' N.	7.31	95.39	
160' N. <sup>6.00</sup> Dr. pipe 12" CMP	8.48	94.22	
170' N. <sup>11.00</sup> Dr. pipe (Conc. Drive)	8.71	93.99	
230' N. Fl. x rd. culvt.	11.11	91.59	
24' E. in Swale	6.00	96.70	
50' E. " "	6.00	96.70	
70' E. " "	5.66	97.04	
SE A House	4.64	98.06	
M. d. House S. side	5.12	97.58	
SW. x <del>House</del> Garage	5.56	97.14	
Floor Level Garage	5.55	97.15	

24  
50  
70

78

spt N.W side ~~ET~~ Tel #86 # 53 S 30 NE & Caves & Dines Rd.





$\Delta$  A

0.96

$\frac{9.49}{2.53}$

$\overline{A}$

2.41

$\frac{5.16}{2.55}$

$\Delta$  B

95.65

$\overline{A}$

100.00  
 $\frac{2.61}{102.61}$

95.65

105.16  
 $\frac{9.49}{95.67}$

50.00  
407.00  
939.  
337.  
600  
2989.

16769.53  
3 35.70  
6 60.00  
26 65.80

1152.60  
1126.27  
26.33

1152.30  
1126.04  
26.26

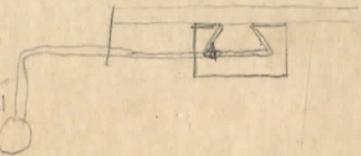
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205530

1152.60  
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48.82

1152.30  
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1152.60  
1082.05  
65.25

1151.60  
1086.39  
65.21



75.00  
597.35  
60.00  
102.21  
20.00  
854.56

575  
2775

870  
625  
245

#177

1196.35

#182

1060.88

3.98

4.14

10.90

19.02

2.74

9.84

6.42

19.00

