DITCH

F.B. #10

TELEDYNE

416

FIELD / TRANSIT BOOK

Property of Hendricks Co. Surveyors

Address Gournt. Cent.

Telephone 745 9237

This Book is manufactured of a High Grade 50% Rag Paper having a Water Resisting Surface, and is sewed with Nylon Waterproof Thread.

INDEX

LATH = 4.15 0+00 6.60
4.45 Lock 1 4.85
END = 6.70 2.55 Fill

STA	+	HI	-	ELEV
TBM	4.59	109.59		100.00
0+00			3.75	100.84
0+19			6.09	98.50
1+00			6.40	98.19
2+00			7.32	97.27
3+00			8.88	95.71
4+00			9.39	95.20
⊙			-6.44	98.15
π	3.93	102.08		
5+00			7.91	94.17
6+00			8.91	93.17
7+00			9.60	92.48
7+80			9.69	92.39

STEVE H

1996 MAR 7 LEDGEWOOD CLEARING J BARNETT ①

TBM PK NAIL IN POWER POLE AT NE COR OF LOT 50 = 100.00

℄ of LEDGEWOOD LANE

FL of CENTER CMP 18"

℄ of SWALE

" "

" "

" "

1st TURN.

℄ of SWALE

" "

" "

FL of 36" CMP at crossing of M.P. 353

STA	+	HI	−	ELEV.	
TBM	3.37			913.92	R/R SPIKE EAST SIDE POLE
				910.55	CORRECT ELEVATION
0+00			12.08	901.84	
—			7.20	906.72	GROUND SHOT
1+00			6.33	907.59	"
2+00			6.81	907.11	"
3+00			7.18	906.74	"
4+00			7.48	906.44	"
5+00			7.62	906.30	"
⊙			7.64	906.28	
π	6.06	912.34		904.72	
6+00			6.76	905.58	GROUND SHOT
7+00			5.80	906.54	"
8+00			6.40	905.94	GAS LINE CROSSING
⊙			5.20	907.14	
π	4.36	911.50			
9+00			5.26	906.24	GROUND SHOT
10+00			5.04	906.46	
11+00			5.87	905.63	
12+00			6.07	905.43	
13+00			6.00	905.28	

J BARNETT
B SCOTT
(3)
4-29-99

LOVE HE DRAIN

TBM = R/R SPIKE SET EAST SIDE POWER POLE 2.30' SOUTH OF N.W. COR / MH 802 ON COUNTY RD 1025 E. YELLOW FLAGGING AROUND POLE

BREATHER ON TRACT 1 PHILLIPS PROPERTY

3+60 EXISTING MAN HOLE

NOTE: AT 8+00 & 8+40 TWO GAS LINES
① MARATHON 8" LINE ELEV TOP = 902.66
② EQUILON 12" LINE ELEV TOP = 900.05

STA	+	HI	-	ELEV.	911.50
14+00			6.22	905.28	GROUND SHOT
⊙			6.31	905.19	
π	3.65	908.84			
15+00			4.72	904.12	GROUND SHOTS
16+00			5.38	903.46	
17+90			9.61	899.23	BEE HIVE AT 950N LOVETHE
18+00			5.93	902.91	3'X5' CMP PIPE
18+28			6.14	902.70	"
			2.22	906.62	℄ CO RD 950N
19+00			6.55	902.29	GROUND SHOT
20+00			7.50	901.34	"
21+00			8.45	900.39	"
⊙			8.46	900.38	
π	5.50	905.88			
22+00			4.70	901.08	GROUND SHOT
23+00			6.05	899.83	"
24+00			5.75	900.13	"
⊙			5.75	900.13	
π	4.35	904.48			
25+00			5.62	898.86	GROUND SHOT
26+00			5.96	898.52	"
27+00			6.37	898.11	"
28+00			6.50	897.98	"
29+00			6.49	897.99	"

LOVETHE DRAIN

(4)

NOTE:

AROUND 12+50 AND 14+00 THERE ARE TWO GAS LINES.

① PANHANDLE EASTERN 20" LINE ELEV TOP 899.76

② PANHANDLE EASTERN 24" LINE ELEV TOP 900.78

SHOT THE INV OF TILE 3.68 LOWER

INV NORTH SIDE

INV SOUTH SIDE

℄ COUNTY RD 950N

NOTE:

AROUND 22+00 AND 23+00 THREE GAS LINES

① Panhandle EASTERN 30" LINE ELEV 896.50 TOP

② PANHANDLE EASTERN 30" LINE ELEV. 896.16 TOP

③ IND GAS 16" LINE ELEV. 894.08 TOP

5 of 5

904.48

STA	+	HI	−	ELEV	
		904.48			
30+00			7.32	897.16	
31+00			7.50	896.98	
32+00				893.21	OUTLET OF LOVETTE DRAIN
				892.26	E of 30" CMP
				897.66	TOP of Headwall

TBM PK NAIL IN Power Pole West side of Dr
(Anderson 10142E 1000N)

STA	+	HI	−	ELEV	912.02
	3.93	915.95			
0+00			7.92	908.03	FENCE line Stand-PIPE
1+00			8.00	907.95	GROUND SHOTS
2+00			8.09	907.86	"
3+00			8.03	908.92	"
4+00			7.68	908.27	"
PROPOSED MANHOLE			6.75	909.20	"

INV of LOVETTE TIE North of Margene Dr

NOTE! THE NEXT FIVE shots ARE From THE white Stand Pipe IN THE FENCE ON MR. Boffo's property North to the INLET on South side of 1000N.

PLACED A BM ON POWER POLE WITH (PK) S.E. COR OF 1000N AND 1025E. TBM = 912.25

WE WILL START THIS PROJECT AT THE NORTH SIDE OF COUNTY RD 1000N AT THE NEW INLET.

GR SHOT AT NEW INLET AT 86TH NORTH SIDE.

TBM = PK IN POWER POLE WESTSIDE OF DR. ANDERSON 10142 E 86TH 912.02

SIDE SHOT TO POWER POLE FOR NEW TBM, NORTH OF 86TH ST. 70' FROM ℄ NORTH ON THE WESTSIDE OF SWALE going through WINGS MEADOWS. 912.68

STA	+	HI	−	ELEV.	912.25
	2.05	914.30			
⊙			3.05	911.25	
⊼	3.40	914.65			
			2.63	TBM POWER POLE WESTSIDE DR. ANDERSON 10142 86TH 912.02	
0+00		914.65	6.05	908.60	SWALE
1+00			6.15	908.50	SWALE
2+00			6.35	908.30	SWALE
3+00			6.35	908.30	PROPOSED INLET

STA	+	HI	−	ELEV.	912.02
	3.72	915.74			
			3.06	912.68	
1+00			7.40	908.34	SWALE
2+00			7.24	908.50	"
3+00			7.25	908.49	"
4+00			7.15	908.59	"
5+00			7.10	908.64	"
6+00			7.05	908.69	"
⊙			6.98	908.76	
⊼	5.64	914.40			
7+00			4.85	909.55	SWALE

914.40

STA	+	HI	−	ELEV	
7+90		914.40	4.03	910.37	
8+00			3.92	910.48	
9+00			2.83	911.57	
10+00			2.85	911.55	
⊙			0.80	913.60	
⊼	5.55	919.15			
11+00			6.80	912.35	
⊙			5.46	913.69	
⊼	4.70	918.39			
1+00			6.40	911.99	GROUND shots
1+65			6.32	912.07	
2+50			6.30	912.09	
3+00			6.12	912.27	
4+00			6.07	912.32	
5+00			6.00	912.39	
6+00			5.80	912.59	
7+00			5.62	912.77	
8+00			5.60	912.79	
9+00			5.40	912.99	
⊙			5.35	913.04	
⊼	6.05	919.09			
10+00			6.11	912.98	
11+00			5.95	913.14	

AT THIS STA THERE IS A SWALE THAT HEADS EAST FOR 500 FEET

SIDE SHOT to POWER POLE WEST OF SWALE AT STA 7+00 AND 7+90 TBM = 912.70

START OF SWALE GOING EAST

START OF SWALE GOING BACK NORTH

919.09

STA	+	HI	−	ELEV
		919.09		
12+00			5.55	913.54
13+00			5.22	913.87
14+00			4.66	914.43
15+00			5.05	914.04
⊙			3.36	915.73
↗	5.90	921.63		
16+00			7.85	913.78
17+00			7.79	913.84
18+00			7.58	914.05
19+00			7.63	914.00
19+75			7.24	914.39

FB10 LOVETT DRAIN

T	BS	FS	I ⇒	XPKNAIL
1	2	2	X PKNAIL	
		100	B.1.5	Top of BANK W. & E.
		101	B.5	E. Top of Bank
		102	B.5	
		103	P.6	W. Edge Pavement 20' EP- EP
		104	B.2	W. Bank
		105	B.2	
		106	I.7	30" RCP
		107	I.3	30" RCP
		108	F.3..7	Flow Line
		109	B.4	E. Bank
		110	B.1	W. Top Bank
		111	I	4" PVC
		112	B.2	
		113	F.3	
		114	DTS.4.7	Small tree in Bank
		115	B.5	
		116	P.6	
		117	P.8	20'E.P.-EP E. edge of Pavement
		118	P.8	
		119	P.8	
		120	P.6	
		121	B.5	

BROWNSBURG TOPO (9)

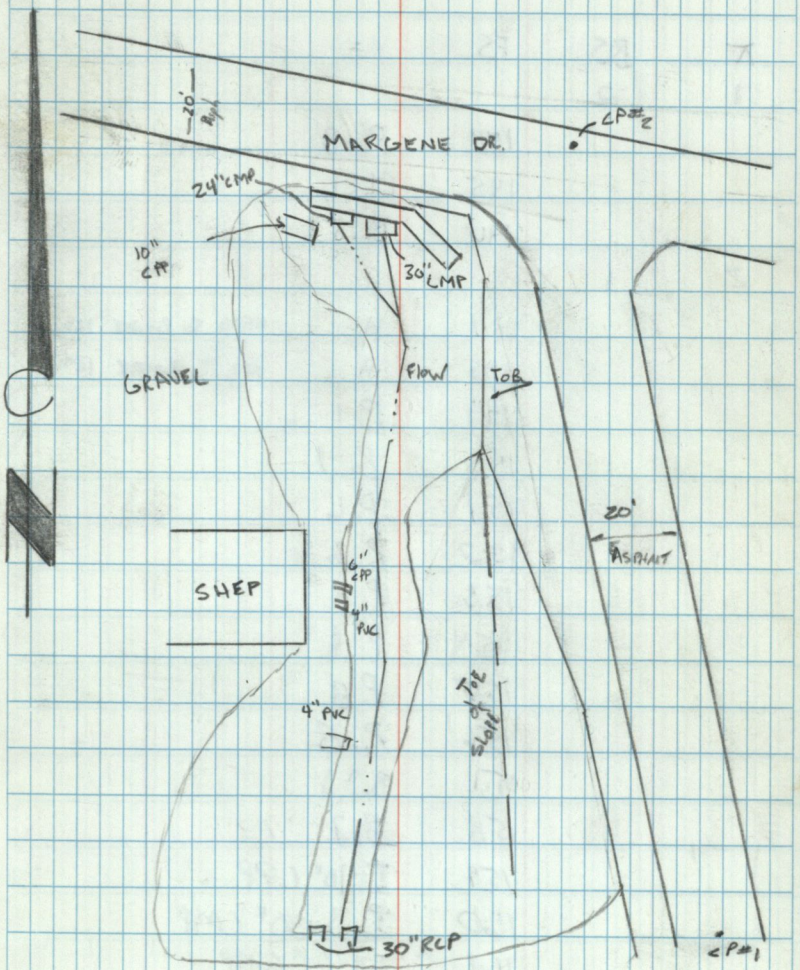
TM I.Stegemiller 7/7/94
BP B.PICKETT 85° SUNNY

6:00 A.M. - 1:00 P.M.

FB 10 LOVETT DRAIN

⊼	BS	FS	I ⇒
1	2		
		122	B.4
		123	F.3
		124	B.4.7
		125	B.2
		126	I 4" PVC
		127	I 6" CPP
		128	H.I Shed
		129	H.I Shed
		130	B.1
		131	B.2
		132	F.3
		133	B.2
		134	F.3
		135	F.3.4
		136	I.3 30" CMP
		137	I 10" CPP
		138	I.4 24" CMP
		139	B..2
		140	B.5
		141	P.6
		142	P.C6
		143	P..6

BROWNSBURG TOPO 01 (10)



FB 10 LOVETT DRAIN

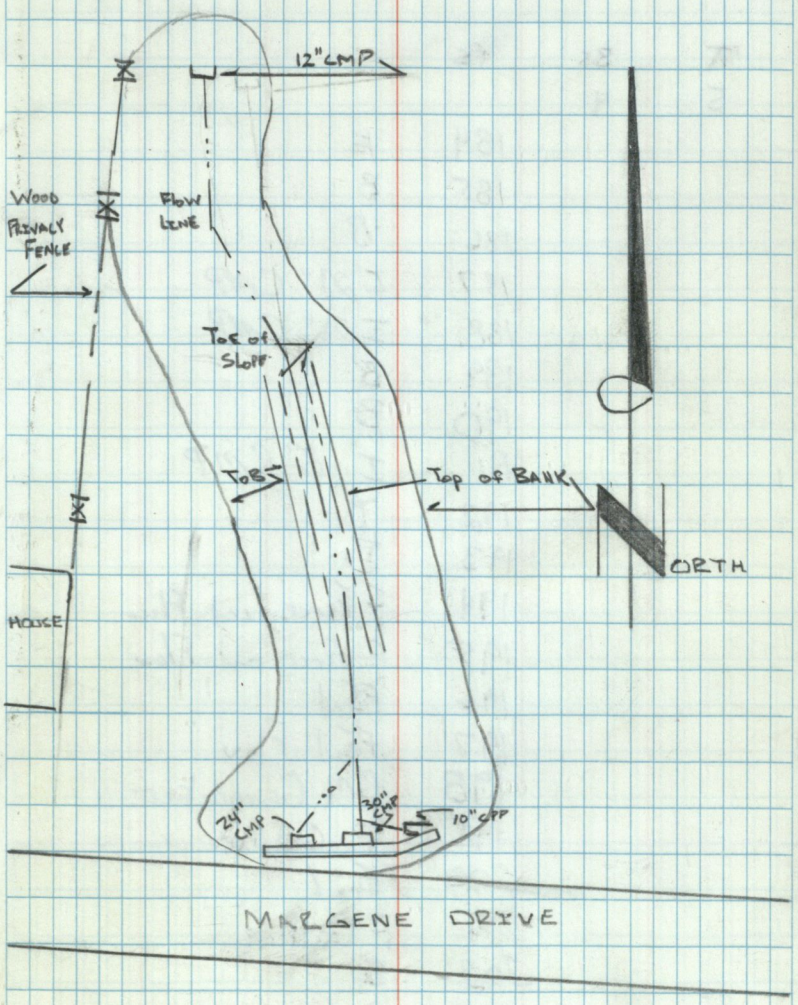
X	BS	FS		
1	2			
		144	P..8	
		145	CLCL	
		146	B..5	
2	1			
		147	H	SHED TO ROTATE 128
		148	H	SED TO ROTATE 129
		149	B.1	
		150	B..1	
		151	P.6	
		152	P..6	
		153	P.8	
		154	P..6	
		155	P.8	
		156	P..8	
		157	B.2.1	
		158	B.2	
		159	I 10" CPP	
		160	I.3 30" CMP	
		161	I.4 24" CMP	
		162	F.3..4	
		163	B.1	
		164	B..2	

BROWNSBURG TOPO

FB 10 — LOVETT DRAIN

T	BS	FS		
2	1			
		165	F.3	
		166	F.3	
		167	S	
		168	S	
		169	B	
		170	B	
		171	B	
		172	A	
		173	I..3	12" CMP
		174	FE	FENCE COR.
		3	X	CPPK NAIL
3	2	175	B.1	W. Top of BANK
		176	B.1	
		177	H.10	HOUSE (ATTACHED GARAGE)
		178	H.10	
		179	FE..10..1	FENCE END BANK w FENCE
		180	A	SPOT ELEVATION
		4	X	CP PK NAIL
4	3	5	X	CP PK NAIL
		181	X	PK NAIL SECTION CORNER (?)
5	4	182	X	RBR W/CAP FND AM SURVEYING
		183	B	RBW

BROWNSBURG — TOPO — 12



FB10 LOVETT DRAIN

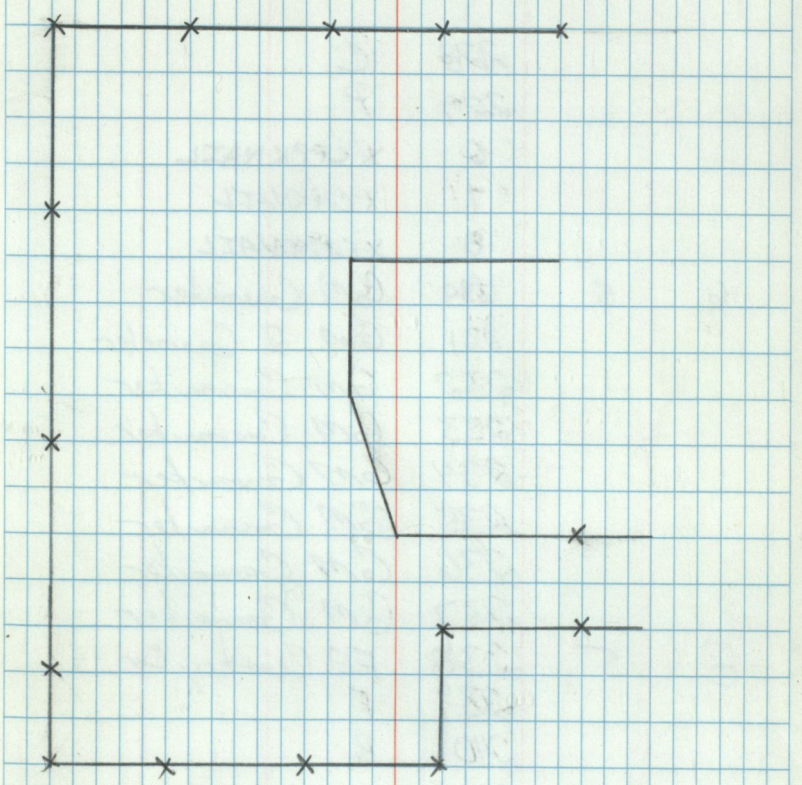
T	BS	FS	
5	4		
		184	F
		185	B
		186	B
		187	I 21" CMP
		188	I 21" CMP
		189	B
		190	B
		191	I 8" CMP
		192	B
		193	B
		194	F Fence and Flow
		195	F Fence and Flow
		196	FE.1
		197	FE.1 Flow
		198	GM Gasmarker
		199	F Gasline
		200	FE..1
		201	F Gasline
		202	B
		203	A
		204	GM Gasmarker
		205	F

BROWNSBURG TOPO 13

FB10 LOVETT DRAIN

π	BS	FS	
		206	A
		207	B
		208	FE. 1
		209	FE. 1
		210	FE. 1 Flow
		211	A
		212	FE
		213	A
		214	A
		215	B
		216	S
		217	F *
		218	S
		219	B
		220	FE
		221	B
		222	B
		223	B
		224	FE
		225	I 30" CMP
		226	I 30" CMP
		227	P

BROWNSBURG TOPO (14)



FB10 LOVETT DRAIN

T	BS	FS	
		228	C
		229	P
		6	X CPPKNAIL
		7	X CPPKNAIL
		8	X CPPKNAIL
6	5	230	GM Gasmeter
		231	GM. 2 Gasmeter
		232	GM Gasmarker
		233	GM Gasmarker
		234	GM Gasmarker
		235	GM Gasmarker
		236	GM Gasmarker
		237	GM Gasmarker
8	5	238	FE Cemetry Cor
		239	F
		240	B
		241	A
		242	A
		243	F
		244	B
		245	F
		246	F

BROWNSBURG TOPO

FB10 LOVETT DRAIN

T	BS	FS	
		247	F
		248	F
		249	F
		250	F
		251	F Blowhole
		252	F
		253	F
		254	F Blowhole
7	5	255	X ironbolt
		256	FE.I
		257	FE..I
		258	X 3/8" RBR FND
		259	F
		260	B
		261	B
		262	A
		263	P
		264	P
		265	P
		266	P
		267	I 54" x 36" Squash CMP
		268	I Squash CMP

BROWNSBURG TOPO 16

FB10 LOVETT DRAIN

T	BS	FS	
		269	I 8" CMP
		270	I 8" CPP
		271	F
		272	B
		273	B
		274	F
		275	B
		276	B
		277	F Lath
		278	B
		279	B
		280	F Breather
		9	x CPPK Nail
9	7	281	F
		282	B
		283	B
		284	B
		285	B
		286	F
		287	P Gravel Drive
		288	P Gravel Drive
		289	" " "

BROWNSBURG TOPO (17)

FB10 LOVETT DRAIN

	BS	FS	
		290	P Gravel Drive
		291	B
		292	B
		293	F
		294	F
		295	A
		296	F
		297	A
		298	A
		299	GM Gasmarker
		300	A
		301	F Gasline
		302	A
		303	A
		304	F Gasline
		305	A
		306	A
		307	F
		308	A
		309	H (house)
		310	F
		311	A shot 3A east of shed

BROWNSBURG TOPO

FBID LOVETT DRAIN

	BS	FS	
		312	H (boxsled)
		313	Center line of gravel Dr
		314	—
		315	H (garage)
		316	—
		317	Q Hole
		10	x CSPK Nail
10	9	318	GM Gas Marker
		319	—
		320	—
		321	—
		322	—
		323	—
		324	—
		325	—
		326	F
		327	A
		328	A
		329	A
		330	F
		331	A
		332	FE.1
		333	FE.1 Flow

BROWNSBURG. Topo (19)

—

FB10 LOVETT DRAIN

⊼	BS	FS	
		334	FE..1
		335	FE.1
		336	F Blowhole
		337	F Blowhole
		338	A
		339	FE
		340	FE Flow
		341	FE
		342	center of gravel drive
		343	———
		344	———
		345	GM Gasmarker
		346	——
		347	——
		348	——
		11	X CPPK Nail
	*	349	X TBM RR SPIKE
11	10	350	A
		351	B
		352	F Blowhole
		353	B
		354	A
		355	F

BROWNSBURG TOPO (20)

ELEV. = 910.55

FB 10 — LOVETT DRAIN

T	BS	FS	
		356	I
		357	B
		358	B
		359	C center of gravel Dr
		360	——
		361	I
		362	F
		363	B
		364	A
		365	B
		366	A
		367	F Blowhole
		368	F
		12	X CPPK Nail
12	11	369	C center of drive
		370	——
		371	——
		372	I 12" CMP
		373	——
		374	A
		375	—
		376	——
		377	B

BROWNSBURG — TOPO — 21

FB10 LOVETT DRAIN

STA	(+) BS	HI	(−) FS	ELEV.
	RR SPIKE IN PP			
TBM MINOR PLAT 802	4.01	914.56		910.55
⊙	5.92	915.06	5.42	909.14
S. Box Top of Box			6.11	908.95
N. Pipe Invert			12.29	902.77
Bottom of Box			12.47	902.59
N. Box Top of Box			6.46	908.60
S. Pipe Invert			12.99	902.87
Bottom of Box			12.35	902.71
⊙	5.12	914.28	5.92	909.16
TBM RR SPIKE MP802			3.72	910.56
	15.05		15.06	

BROWNSBURG Topo (22)

FB10 LOVETT DRAIN

TP	BS	FS	
		378	F
		379	B
		380	A
		381	SP Manhole
		382	F
		383	I 8" CMP
		384	—
		385	—
		386	C centerline of dr
		387	—
		388	A
		389	F
		390	A
		391	—
		392	F
		393	A
		394	A
		395	F
		396	A
		397	C centerline of Dr
		398	—
		399	—
		400	Q Breather

BROWNSBURG TOPO

FB1D — LOVETT DRAIN

T	BS	FS	
		401	A
		402	F
		403	A
		404	C centerline of Asphalt Rd.
		405	—
		406	—
		407	H
		408	—
		409	I 12" CMP
		410	—
		411	F
		412	A
		413	—
		414	—
		415	F
		416	A
		417	—
		418	F
		419	A
		420	—
		421	F
		13	X CPPK Nail
13	12	422	P

BROWNSBURG — TOPO (24)

FB10 LOVETT DRAIN

	BS	FS	
		423	F
		424	F
		425	P
		426	—
		427	F
		428	A
		429	—
		430	—
		431	—
		432	—
		433	—
		434	A Swamp/bear line
		435	—
		436	A
		437	F
		438	—
		439	A Swamp
		440	—
		441	—
		442	A
		443	A Woods
		444	—
		445	F

BROWNSBURG TOPO 25

FB10 LOVETT DRAIN

TP	BS	FS	
		446	A
		447	—
		448	A Swamp / beanfield
		449	F
		450	A
		451	—
		452	F
		453	A
		454	—
		455	F
		456	A
		457	—
		458	F
		459	A
		460	—
		461	P
		462	Crown
		463	P
		464	ST inlet
		465	—
		466	I 12" CMP
		467	—
		468	P

BROWNSBURG Topo (26)

FB10 LOVETT DRAIN

PT	BS	FS	
		469	Crown
		470	P
		471	X RR Spike
		472	ST Beehive
		473	I 24" CMP
		474	XF RR Spike
		475	x RR Spike
		14	x CP Hub
14	13	476	[same as pt 14 above]
14	13	477	I 18" CMP
		478	F
		479	I 18" CMP
		480	—
		481	F
		482	I 15" CMP
		483	—
		484	F
		485	B
		486	—
		487	—
		488	B
		489	F
		490	—

BROWNSBURG Topo 27

π	BS	FS	
		491	B
		492	—
		493	F
		494	I 10" CMP
		495	—
		496	B
		497	F
		498	B
		499	I 18" RCP
		500	—
		501	Center line of swale
		502	I 18" CMP
		503	—
		504	F
		505	I 12" CMP
		506	—
		507	F
		15	X CP Hub

FB 10

DRUDGING TECH.

JEFF KREUDA

800 - 273 - 5532

FB10

BEEHIVE @ NE COR OF	INN.
1000N + 1000E	
SW INV.	2.10
BOTTOM OF BOX	2.62
BEEHIVE IS IN AIR	0.38
FROM TOP OF CASTING	
TO TOP OF ARCH	

9/3/99 T B. PICKETT

95° SUNNY

FB-10

STA		(+) B.S.	HI	(−) F.S.	ELEV. 908.95
TBM INLET SOUTH 1000 N.		6.61	915.56		908.95
INLET NORTH S. 1000 N.				6.95	908.61 ✓
BEE MIDE INTER 1000 N & 1000 E NE SIDE INV.				9.67	905.89
Bottom of Box				10.34	905.22
	TC			7.84	907.72
0+00	℄ 1000 N 1000 E			5.00	910.56
1+00	℄			5.74	909.82
	EP			6.22	909.34
	WB			6.20	909.36
	WS			7.50	908.06
	FL			7.70	907.86
	ES			7.60	907.96
	EB			6.10	909.46
1+56	15" CMP S. INV.			7.66	907.90
1+87	N. INV.			7.55	908.01
2+00	EB			4.70	910.86
	ES			7.00	908.56
	FL			7.50	908.06
	WS			7.20	908.36
	WB			5.60	909.96
	EP			5.40	910.16
	℄ RD			5.00	910.56
3+00	℄ RD			4.00	911.56
	EP			4.90	911.16

BROWNSBURG LOVETTE 2-9-00

1000 N.

TBM = S. Box Top of Box 908.95

TOP S. INLET 6.61
TOP N. INLET 6.95

PP 0+82 ⇒ 20' ℄ TB-21'

TBIV CURVE 0+38 ⇒ 48' ℄ TB'-TB 2.2'

8' TS ⇒ TS'

PP 2+30' ⇒ 20' ℄

PP 3+45 ⇒ 20' ℄

STA.		+ BS	HI.	− FS	ELEV. 915.56
3+00	WB			4.30	911.26
	WS			6.80	908.76
	FL			7.10	908.46
	ES			7.10	908.46
	EB			5.00	910.56
3+53	18" CMP S. INV			7.05	908.51
	N. INV				
⊙					
⊙		4.88	916.82	3.62	911.94
4+05	℄ RD			4.70	912.12
	EP			5.00	911.82
	WB			5.00	911.82
	WS			7.50	909.32
	18" CMP N. SIDE			8.20	908.62
	ES			8.00	908.82
	EB			5.20	911.62
5+00	EB			5.40	911.42
	ES			7.50	909.32
	15" CMP S. INV			8.59	908.23
	WS			7.90	908.92
	WB			5.40	911.42
	EP			5.30	911.52
	℄ RD			5.00	911.82
5+33	15" CMP N. INV.			8.57	908.25

		BS	HI	FS	916.82 ELEV.
6+05	℄ RD			5.20	911.62
	EP			5.50	911.32
	WB			5.50	911.32
	W.S.			8.00	908.82
	18" CMP S INV			8.05	908.77
	ES			8.00	908.82
BURIED TELEPHONE	EB			5.50	911.32
6+34	18" CMP N.INV.			7.92	908.90
7+00	EB			6.70	910.12
	ES			8.20	908.62
	FL			8.50	908.32
	WS			8.30	908.52
	WB			6.60	910.22
	EP			5.60	911.22
	℄ RD			5.40	911.42
7+61	18" CMP S. INV			8.05	908.77
7+85	N. INV.			8.10	908.52
8+00	℄ RD.			5.50	911.32
	ED			6.00	910.82
	EB			6.60	910.22
	ES			8.00	908.82
	FL			8.30	908.52
	WS			8.00	908.82
	WB			6.60	910.22
9+00	WB			6.70	910.12

GAS 6+05 → 15' ℄

6+03 → 42' ℄ TELEPHONE

6+08 - FLAG 24.5' ℄ RD - D = 23"
6+09 - FLAG 34.5' ℄ RD - D = 30"

8+75 BURIED TELEP. 40' ℄

STA		+ BS	HI	− FS	916.82 ELEV
9+00	WS			7.90	908.92
	FL			8.00	908.82
	EP			7.80	909.02
	EB			6.30	910.52
	EP			5.80	911.02
	℄ RD			5.30	911.52
9+70	15" CMP S. INV.			7.97	908.85
9+95	N INV.			7.70	909.12
10+00	EB			6.80	910.02
	ES			7.80	909.02
	FL			8.10	908.72
	WS			7.60	909.22
	WB			6.20	910.62
	EP			5.70	903.42
	℄ RD			5.20	911.62
10+05	15" CMP S. INV.			8.25	908.57
10+30	N INV			7.89	908.93
⊙		5.52	919.82	5.52	911.30
⊼		7.24	918.54	7.24	
11+00					
11+28	BURIED TELEPHONE	40' OFF ℄ RD.			
	℄			7.10	911.44
	EP			7.40	911.14
	WB			7.70	910.84
	WS			9.55	908.99
	FL			9.80	908.74

T-BOX 11+28' → 40' ℄ RD

STA		+ BS	HI	FS	918.54
11+00	ES			9.70	908.84
	EB			8.00	910.54
12+00	℄			7.05	911.49
	EP			7.40	911.14
	WB			8.10	910.44
	WS			9.40	909.14
	15"CMP S.INV			9.50	909.04
	ES			9.50	909.04
	EB			8.70	909.84
12+25	15CMP N.INV			9.42	909.12
13+00	℄			6.65	911.89
	EP			6.90	911.64
	WB			7.50	911.04
	WS			9.75	908.79
	FL			9.55	908.99
	ES			9.45	909.09
	EB			8.50	910.04
14+00	℄ RD			6.05	912.49
	EP			6.25	912.29
	W B			6.70	911.84
	WS			9.60	908.94
	FL			9.85	908.69
	ES			9.65	908.89
	EB			7.25	911.29
14+23	18CMP S.INV			9.25	909.29

FBOX 13+87 → 42'℄RD.

STA		(+) BS	HI	(-) FS	918.54 ELEV
14+54	18"CMP N. INV			9.19	909.35
15+00	℄			5.00	913.54
	EP			5.30	913.24
	WB			5.20	913.34
	WS			9.30	909.24
	FL			9.50	909.04
	ES			9.50	909.04
	EB			7.50	911.04
15+15	15"CMP S. INV			9.04	909.50
15+40	N. INV			8.84	909.70
16+00	℄ RD			4.25	914.29
	EP			4.60	913.94
	WB			4.70	913.84
	WS			8.80	909.74
	FL			9.30	909.24
	E.S.			9.05	909.49
	EB			4.80	913.74
17+00	℄			4.75	913.79
	EP			5.20	913.34
	WB			5.30	913.24
	WS			8.70	909.84
	FL			8.85	909.69
	ES			8.90	909.64
	EB			6.35	912.19
17+10	12"CMD S. INV			8.93	909.61
17+45	N. INV			8.75	909.79

T-Box 16+37 → 40' ℄ RD.

STA		(+) BS	HI	(−) FS	919.17 ELEV.
⊙				5.48	913.06
π		6.11	919.17		
18+00	℄			5.80	913.37
	ED			6.11	913.06
	WB			7.00	912.17
	WS			9.70	909.47
	FL			9.80	909.37
	ES			9.60	909.57
	EB			7.75	911.42
18+15	12" CMP S. INV			9.72	909.45
18+44	N. INV			9.50	909.67
19+00	℄ RD.			6.00	913.17
	EP			6.15	913.02
	WB			7.15	912.02
	WS			9.30	909.87
	FL			9.40	909.77
	ES			9.20	909.97
	EB			8.05	911.12
19+50	15" CMP S. INV			9.64	909.53
19+75	N. INV.			9.48	909.69
20+00	℄			5.95	913.82
	EP			5.70	913.47
	WB			6.80	912.37
	WS			9.20	909.97
	FL			9.35	909.82
	ES			9.20	909.97
	EP			7.55	911.62

GAS LINE DEPTH @ ℄ DITCH 5½ INCH (29℄ 14' ROAD) 12" MARKER
18+50 MARKER. -18+62 FIAG
T-Box 18+95 → 39' ℄

		(+) B.S	HI	(−) FS	919.17 ELEV
21+00	℄ RD			4.95	914.22
	EP			5.40	913.77
	WB			5.95	913.22
	WS			9.00	910.17
	15" CMP S. INV			9.40	909.77
	EB			9.20	909.97
	EB			6.50	912.67
21+30	N. INV			9.42	909.75
21+80	12" CMP S. INV.			9.27	909.90
22+05	12" CMP N. INV.			9.33	909.84
22+05	℄ RD.			5.50	913.67
	EP			5.85	913.32
	WB			6.05	913.12
	WS			8.70	910.47
	ES			8.85	910.32
	EB			6.30	912.87
23+00	℄ RD			6.23	912.94
	EP			6.40	912.77
	WB			6.30	912.87
	WS			7.60	911.57
	℄			8.90	910.27
	ES			8.65	910.52
	EB			6.55	912.62

T-80 x 21+56 → 37' ℄ RD.

STA		BS	HI	FS	ELEV.
TBM	1000 N SOUTH INLET	8.47	917.42		908.95
TBM	PK IN POWER POLE			3.74	913.68
0+41	TC NE			8.74	908.68
	BOTTOM OF BOX INVE. 24 CMP			11.89	905.53
				11.45	905.97
0+00	& & 1000 N 125 E			5.40	912.02
1+00	&			5.30	912.12
	EP			5.60	911.82
	E. BANK			6.00	911.42
	E SLOPE			8.00	909.42
	FL			8.20	909.22
	W. SLOPE			8.20	909.22
	W BANK			6.55	910.87
1+11	INV 12" (S) CPP			8.07	909.35
1+40	INV 12" (N) CPP			7.71	909.71
2+00	&			5.05	912.37
	E.P.			5.30	912.12
	E BANK			6.05	911.37
	E. SLOPE			7.65	909.77
	FL			8.05	909.32
	W SLOPE			7.90	909.52
	W BANK			6.35	911.07
2+75	INV 12" (S) CMP			8.12	909.30
3+00	&			4.90	912.52

1025 E 20' EP-EP

E.P TO E.B => 8'

TOB TO TOB => 18'

TOB TO TOS => 7'

TOS - TOS => 4'

TS 0+48 => 38.5' -> &

917.42

STA		BS	HI	FS	EL
3+00	E.P			5.30	912.12
	E. BANK			5.80	911.62
	E SLOPE			7.50	909.92
	INV 12" CMP (N)			7.75	909.67
	W SLOPE			7.60	909.82
	W BANK			6.35	911.07
4+00	℄			5.35	912.07
	E.P			5.75	911.67
	E. BANK			6.35	911.07
	E. SLOPE			7.80	909.62
	FL			7.95	909.47
	W SLOPE			7.95	909.47
	W BANK			7.00	910.42
⊙				5.49	911.93
		6.74	918.67		
4+53	INV 12" CMP S			8.92	909.75
4+80	INV 12" CMP (N)			8.65	910.02
5+00	℄			6.60	912.07
	EP			7.05	911.62
	E BANK			7.30	911.37
	E SLOPE			8.80	909.87
	FL			9.00	909.67
	W SLOPE			8.90	909.77
	W BANK			8.20	910.47

TS 3+77 => 38.0' → ℄

					918.67
STA		BS	HI	FS	EL
5+31	INV 12" CMP (S)			8.80	909.87
5+60	INV 12" CMP (N)			8.62	910.05
6+00	℄			6.40	912.27
	E.P.			6.65	912.02
	E BANK			7.45	911.22
	E SLOPE			8.45	910.22
	FL			8.80	909.87
	W SLOPE			8.80	909.87
	W BANK			8.40	910.27
6+75	INV 12" CMP (S)			8.82	909.85
7+00	℄			5.80	912.87
	E.P			6.10	912.57
	E. BANK			6.45	912.22
	E SLOPE			8.25	910.42
	INV 12" CMP (W)			8.74	909.93
	W SLOPE			8.55	910.12
	W BANK			7.45	911.22
8+00	℄			5.25	913.42
	E.P			5.65	913.02
	E. B			6.20	912.47
	E. S			8.35	910.32
	FL			8.65	910.02
	W S			8.35	910.32
	W B			6.45	912.22

TS. 6+34 => 38.0' → ℄

GAS FLAG 6+99 => 23.5' ℄ 44" DEPTH

					918.67
STA		BS	HI	FS	EL
8+09	INV 12" CMP (S)			9.04	909.63
8+31	INV 12" CMP (W)			8.85	909.82
9+00	℄			5.20	913.47
	E.P			5.60	913.07
	E.B			6.10	912.57
	E S			8.40	910.27
	F L			8.55	910.12
	W S			8.50	910.17
	W B			6.35	912.32
9+58	12" CMP (S)			8.48	910.19
9+82	12" CMP (W)			8.41	910.26
10+00	℄			5.25	913.42
	E.P			5.50	913.17
	E.B			5.85	912.82
	E.S			7.90	910.77
	F L			8.40	910.27
	W S			8.40	910.27
	W B			7.00	911.67
11+00	℄			4.90	913.77
	E.P			5.15	913.52
	E B			5.50	913.17
	E S			8.05	910.62
	F L			8.30	910.37
	W S			8.20	910.47
	W B			6.15	912.52

TS 9+28 ⇒ 37.5' → ℄

					918.67
STA		BS	↑	FS	EL
11+33	15" CMP (S)			8.29	910.38
11+59	15" CMP (N)			8.08	910.59
12+00	℄			4.55	914.12
	E.P			4.85	913.82
	E B			5.40	913.27
	E.S			7.65	911.02
	F L			8.04	910.63
	W S			7.95	910.72
	W B			7.15	911.52
①				4.83	913.84
		5.25	919.09		
12+41	15" CMP (S)			8.66	910.43
12+67	15" CMP (N)			8.79	910.30
13+00	℄			5.45	913.64
	E.P			5.60	913.49
	E B			6.25	912.84
	E.S.			8.35	910.74
	F L			8.60	910.49
	W S			8.50	910.59
	W B			7.10	911.99
13+70	15" CMP (S)			8.51	910.58
13+96	15" CMP (N)			8.60	910.49
14+00	℄			5.75	913.34
	E.P			6.00	913.09

T.S 11+75 ⇒ 37.50' → ℄

					919.09
STA		BS	↗	FS	EL
	E.B			6.50	912.59
	E.S.			8.35	910.74
	FL			8.75	910.34
	WS			8.50	910.59
	WB			7.45	911.64
15+00	℄			5.50	913.59
	E.P			5.80	913.29
	E.B			6.30	912.79
	E S			8.35	910.74
	15" CMP (S)			8.38	910.71
	WS			8.05	911.04
	WB			7.00	912.09
15+24	15" CMP (N)			8.22	910.87
15+50	15" CMP (S)			8.62	910.47
15+77	15" CMP (N)			8.46	910.63
⊙		5.71	920.21	4.59	914.50
16+00	℄			5.85	914.36
	EP			6.15	914.06
	EB			6.65	913.56
	ES			8.95	911.26
	F			9.30	910.91
	WS			9.10	911.11
	WB			6.80	913.41
16+85	SINV 15" CMP			9.32	910.89

T.S 14+21 ⇒ 38.0' → ℄

TS 16+70 ⇒ 37.0' → ℄

					920.21
STA		BS	T	FS	ELEV
17+05	℄			4.60	915.61
	EP			4.80	915.41
	EB			5.70	914.51
	ES			9.00	911.21
	(N) INV 15" CMP			9.33	910.88
	WS			9.00	911.21
	WB			6.20	914.01
17+40	(S) INV 15" CMP			9.28	910.93
17+81	(N) INV 15" CMP			9.06	911.15
18+00	℄			4.70	915.51
	EP			5.00	915.21
	EB			5.60	914.61
	ES			8.90	911.31
	F			9.10	911.11
	WS			8.90	911.31
	WB			7.70	912.51
18+62	(S) INV 15" CMP			9.08	911.13
18+89	(N) INV 15" CMP			8.94	911.27
19+00	℄			5.20	915.01
	EP			5.50	914.71
	EB			6.20	914.01
	ES			8.70	911.51
	F			8.90	911.31
	WS			8.80	911.41

TS 19+16 ⇒ 36.5' → ℄

920.21

STA		BS	↑	FS	ELEV
	WB			7.10	913.11
20+00	℄			5.30	914.91
	EP			5.60	914.61
	EB			6.10	914.11
	ES			8.85	911.36
	(S) INV 12" CMP			9.32	910.89
	WS			9.00	911.21
	WB			7.30	912.91
20+20	(N) INV 12" CMP			8.82	911.39
20+42	(S) INV 12" CMP			8.91	911.30
20+70	(N) INV 12" CMP			8.88	911.33
21+00	℄			5.40	914.81
	EP			5.70	914.51
	EB			6.10	914.11
	ES			8.70	911.51
	F			8.90	911.31
	WS			8.90	911.31
	WB			8.10	912.11
21+95	℄			5.30	914.91
	EP			5.55	914.66
	EB			6.20	914.01
	ES			8.45	911.76
	(S) INV 15" CMP			8.80	911.41
	WS			8.70	911.51

TS ⇒ 21+62 38.5 → ℄

920.21

STA		BS	(+) HI	FS	ELEV
	WB			7.50	912.71
22+22	(N) INV 15" CMP			8.62	911.59
22+93	(S) INV 12" CMP			8.50	911.71
23+15	(N) INV 12" CMP			8.49	911.72
24+00	℄			4.45	915.76
	EP			4.70	915.51
	EB			4.80	915.41
	ES			7.90	912.31
	F			8.20	912.01
	WS			8.10	912.11
	WB			5.10	915.11
23+20	℄			4.75	915.46
	EP			5.00	915.21
	EB			5.40	914.81
	ES			7.90	912.31
	F			8.10	912.11
	WS			7.90	912.31
	WB			6.55	913.66

STA	BS	HI	FS	ELEV.
1000N + 1025E				
NE Cor of STORM INLET 44" DEPTH	8.96	917.64		908.68
GAS FLAG 6+99			5.80	911.84
TC			8.96	908.68
1000N + 1030E				
NW TC of ST. INLET	6.97	914.69		907.72
GAS FLAG 6+08			5.25	909.44
GAS FLAG 6+09			4.90	909.79
TC			6.97	907.72

FB 10 MARK A. GIBBS

STA	BS	HI	FS	ELEV
NE COR of EAST HEADWALL	4.80	104.80		100.00
E INV.			12.74	
W INV.			12.85	

TOWER IN BROWNSBURG

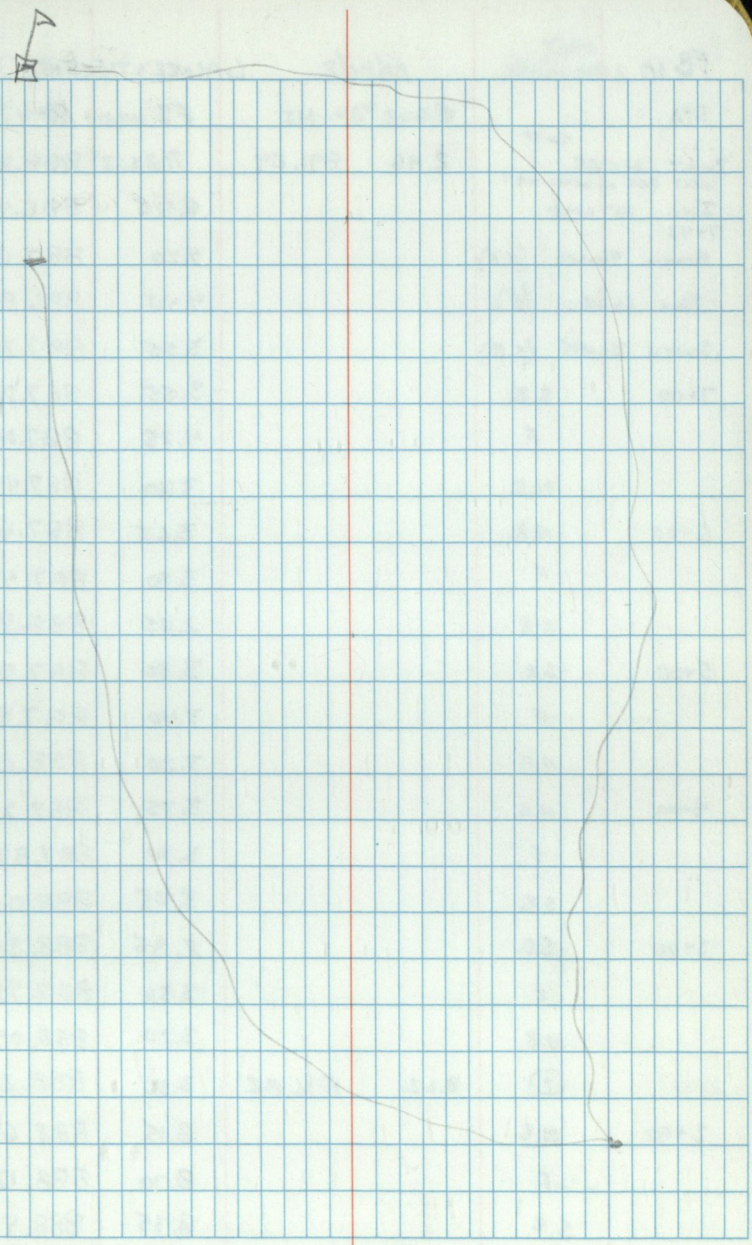
NORTHERN ACRES

MARCH 13, 2000

$\bar{x} =$

$\hat{p} =$

Point	(−) BS	HI	(+) FS	Elev.
BM #1				900.00
101	-5.25	894.75		
500			7.75	902.00
T.P. #1				



FB 10

GARNER'S FIELD

T B. SLOTT

A B. HAHN

B. PILKET

3/14/89

45° SUNNY

TOPO BROWNSBURG

STA		BS	HI	FS	ELEV
BOAT SPIKE GW PP WEST END of GRASS WAY		2.46	891.29		888.83
INV. 18" CMP 7+43				8.85	882.44
NORTH BANK (N.B.)				4.20	887.09
FLOW LINE (F)				4.40	886.89
SOUTH BANK (S.B.)				3.55	887.74
7+00	S.B.			3.55	887.74
	F			4.25	887.04
	N.B.			3.80	887.49
6+00	N.B.			3.65	887.64
	F			3.80	887.49
	S.B.			2.85	888.44
5+00	S.B.			3.30	887.99
	F			3.40	887.89
	N.B.			3.20	888.09
4+00	N.B.			3.35	887.94
	F			3.40	887.89
	S.B.			3.25	888.04
3+00	S.B.			2.95	888.34
	F			3.30	887.99
	N.B.			3.20	888.09
	⊙	8.62	896.82	3.09	888.20
2+00	N.B			8.15	888.67
	F			8.70	888.12
	S.B.			8.35	888.47

FB 10 J-97L-4

STA		BS	HI	FS	ELEV
1+00	S.B			7.90	888.92
	F			8.80	888.02
	N.B			8.90	887.92
INV. 39" CMP (W) ×54" ARCH				9.79	887.03
	N.B			7.25	889.57
	S.B			7.15	889.67
E.P OVER FLOW (WEST)		0+00		5.15	891.67
& " "				4.85	891.97
E.P " " (EAST)				5.15	891.67
TBM S. PP J-97L-4				3.39 W	893.43
E. INV 39" CMP ×54" ARCH				9.23	887.59
	N.B			7.55	889.27
	S.B.			7.70	889.12
-1+00	S.B.			7.05	889.77
	F			8.55	888.27
	N.B.			6.95	889.87
	⊙	8.25	897.13	7.94	888.88
-2+00	N.B.			6.80	890.33
	F			8.70	888.43
	S.B.			6.80	890.33
-3+00	S.B.			6.45	890.68
	F			8.15	888.98
	N.B.			6.00	891.13

STA		BS	HI	FS	ELEV.
-4+00	N.B			5.85	891.28
	F			7.55	889.58
	S.B			6.85	890.28
W INV	12" CMP			7.42	889.71
E INV	12" CMP			6.84	890.29
S INV	30" x 59" CMP			8.77	888.36
S EP				5.20	891.93
	℄			4.85	892.28
N. EP.				5.10	892.03
N INV	30" x 59" CMP			8.45	888.68

FB10 — NORTHERN ACRES

STA		BS	HI	FS	ELEV
USGS BM		4.78	897.85		893.07
T.C				8.62	889.23
S. INV	12" N-12			11.08	886.77
E. INV.	12" N-12			11.03	886.82
0+00	S.B			7.65	890.20
	N.B			6.35	891.50
0+50	N.B			4.35	893.50
	F			7.95	889.90
	S.B.			6.55	891.30
1+00	S.B.			5.60	892.25
	F			7.60	890.25
	N.B.			3.05	894.80
1+50	N.B.			4.50	893.35
	F			7.45	890.40
	S.B.			3.90	893.95
2+00	S.B.			2.70	895.15
	F			7.25	890.60
	N.B.			3.50	894.35
⊙		4.86	899.14	3.57	894.28
2+50	N.B			4.50	894.64
	F			8.75	890.39
	S.B.			4.05	895.09

BROWNSBURG

TOPO

FB10

STA		BS	HI	FS	ELEV.
3+00	SB			3.80	895.34
	F			8.30	890.84
	NB			3.80	895.34
3+50	NB			3.95	895.19
	F			8.05	891.09
	SB			4.05	895.09
3+92	SB			5.50	893.64
WINN N	21"x37" CMP	= 30"		8.26	890.88
WINN S	23"x37" CMP	= 30"		8.34	890.80
	NB			4.75	894.39
W E.P.	KATHY			5.50	893.64
E	"			5.00	894.14 OK
E E.P.	"			5.45	893.69
4+42	SB			5.35	893.79
E.INN. S	23"x36"	= 30"		8.30	890.84
E.INN. N	21"x37"	= 30"		8.19	890.95
	N.B.			5.35	893.79
5+00	SB			4.55	894.59
	F			7.75	891.39
	NB			4.10	895.04
5+50	NB			4.30	894.84
	F			7.30	891.84
	SB			4.70	894.44

FB 10

STA		BS	HI	FS	ELEV
6+00	SB			4.95	894.19
	F			7.05	892.09
	NB			5.10	894.04
6+50	NB			4.50	894.64
	F			6.85	892.29
	SB			4.70	894.44
7+00	SB			4.10	895.04
	F			6.70	892.44
	NB			4.30	894.84
	⊙	9.66	902.61	6.19	892.95
7+47	S.B			6.45	896.16
W INV N	24" CPP N-12	DIANA		10.54	892.16
W INV S	24" CPP N-12	"		10.64	891.97
	NB			6.50	896.11
W EP	DIANA			5.60	897.01 ok
"	"			5.30	897.31 ok
E EP	"			5.70	896.91
8+10 ✓	SB			6.20	896.41
E INV S.				9.89	892.72
E INV. N.				9.95	892.66
	NB			5.90	896.71
8+50 ✓	NB			5.50	897.11
	F			9.80	892.81
	SB			6.30	896.31

STA		BS	HI	FS	ELEV
9+00 ✓	SB			5.45	897.16
	F			9.70	892.91
	NB			5.25	897.36
9+50 ✓	NB			6.75	895.86
	F			9.40	893.21
	SB			7.35	895.26
10+00 ✓	SB			4.60	898.01
	F			9.60	893.01
	NB			5.30	897.31
10+50 ✓	NB			3.30	899.31
	F			9.50	893.11
	SB			4.00	898.61
	⊙	7.23	900.79	9.05	893.56
11+13 ✓	SB			4.90	895.89
WINV	19"x30" RCP	24"		8.15	892.64
	NB			5.30	895.49
W EP	SHELIA			5.50	895.29
℄	"			4.95	895.84 ok
E EP	"			5.40	895.39 ok
11+54 ✓	SB			~~4.94~~ 4.80	895.99
E INV	19"x30" RCP	24"		7.79	893.00
	NB			5.35	895.44

FB 10

STA		BS	HI	FS	ELEV
12+00 ✓	SB			2.70	898.09
	F			6.65	894.14
	NB			3.85	896.94
12+50 ✓	NB			3.45	897.34
	F			6.10	894.69
	SB			2.55	898.24
13+35 ✓	SB			3.00	897.79
	F			5.55	895.24
	NB			2.45	898.34
14+00 ✓	NB			1.35	899.44
	F			5.35	895.44
	SB			2.25	898.54
14+50 ✓	SB			1.55	899.24
	F			5.30	895.49
	NB			1.30	899.49
14+94 ✓	NB			2.10	898.69
W INV	12" RCP			5.45	895.34
	SB			2.50	898.29

FB 10

STA		BS	HI	FS	ELEV
NORTH PIPE					
E INV 30" CMP		8.89	108.89		100.00
E E.P				5.40	103.49
℄				5.20	103.69
W EP				5.55	103.34
W INV	30" CMP			9.03	99.86
SOUTH PIPE					
E INV	18" CMP			8.80	100.09
E E.P				5.35	103.54
℄				5.15	103.74
W E.P				5.50	103.39
W INV	18" CMP			8.91	99.98
S. BANK				4.1	104.79
FLOW				8.76	100.13
N. BANK				4.76	104.13

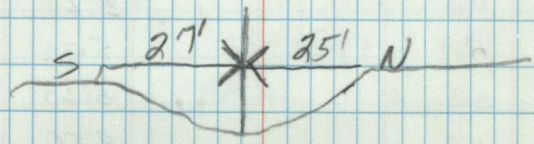
T B. PICKETT

R B. SCOTT

3/2/00

CLOUDY

50°



MIKE BUDD PROPERTY

POND INFLOW

3-30-00

FB-10

TBM S. PP 1-92L-4 — 893.43

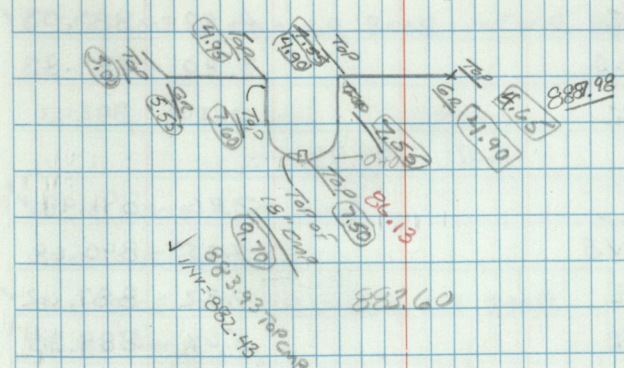
STA		BS	HI	FS	ELEV
0+00	SEE DETAIL PAGE 2	0.20	893.63		
1+00	NB			6.15	887.48
	FL			6.35	887.28 ✓
	SB			5.60	888.03
2+00	NB			5.65	887.98
	FL			5.80	887.83 ✓
	SB			5.55	888.08
3+00	NB			5.60	888.03
	FL			5.70	887.93 ✓
	SB			5.60	888.03
4+00	NB			5.55	888.08
	FL			5.75	887.88 ✓
	SB			5.40	888.23
5+00	NB			5.40	888.23
	FL			5.60	888.03 ✓
	SB			4.80	888.83
6+00	NB			5.00	888.63
	FL			5.80	887.83 ✓
	SB			4.80	888.83
7+00	NB			5.00	888.63
	FL			5.70	887.93 ✓
	SB			4.30	889.33

T Barnett — Sunny 50° — 3-30-00

& Hahn B.

3/30/00

Detail.



5+70 2" PVC going into 4" Field Tile

DEPTH 1.5 = coming from Garner's House

16" TILE REPAIRED with 15" SINGLE WALL PIPE.

STA		BS +	HI	FS −	ELEV
9+66	NB		893.63	3.50	890.13
CMP CR 800E WEST SIDE	FE			6.60	887.03 ✓
	SB			3.80	889.83
TBM				0.20	893.43
		1.51	894.94		
℄ CR 800E				2.96	891.98 ✓
8+02	NB			4.25	890.69
CMP EAST S. CR 800E	FE			7.32	887.62 ✓
	SB			5.64	889.30
9+00	NB			4.42	890.52
	FE			6.66	888.28 ✓
	SB			4.93	890.01
9+50	NB			4.66	890.28
	FE			6.50	888.44 ✓
	SB			4.75	890.19
10+00	NB			4.79	890.15
	FE			6.31	888.63 ✓
	SB			4.54	890.40
10+50	NB			2.90	892.04
	FE			6.50	888.44 ✓
	SB			4.43	890.51
11+00	NB			3.06	891.94
	FE			5.90	889.04 ✓
	SB			4.02	890.92

FE AT CMP UNDER CR 800E. NEW FE 886.66.

℄ CR 800E OVER PIPE

12 FROM FE to TB

EAST SIDE OF CMP UNDER CR 800E.

TB 12' FROM FE

12' FROM FE

12' FROM FE

12' FROM FE

12' FROM FE

12' FROM FE

20' FROM FE to EP CR 725N

12' FROM FE

16' FROM FE TO EP AT CR 725N.

12' FROM FE

STA		B.S	HI	F.S.	
12+00	SB			4.65	890.29
	FL			5.40	889.54 ✓
	NB			3.10	891.84
	FL			6.60	888.34 ✓
	HW			3.25	891.69
STA		B.S	HI	F.S.	888.83
			895.53	6.70	
1+00				12.47	Actual FL 883.06
4+00				10.45+1.33 11.78	883.75

12' From FL

18' From FL to EP CR 725N.

EXISTING CMPA - SOUTH SIDE INV / UNDER CR 725N

TBM Point for H.W. / CHECK

Boat Spike in S.W.PP

18" Plastic Tile / Bell Repaired Before

Location 5' From S.B of GRASS WATERWAY

Top of 18" Clay Tile Add 18" To Shot

3FT Deep - 11' South of STA 4+00

*REPAIR BLOW HOLE AT GUNNEY'S

FB 10

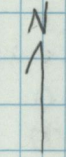
Trans

J. Stegemiller, J. Surber, B. Hahn

Stevenson Drain

Transit

	BS	HI	FS	Elev
Top of tile 18" (1.5' thick)	7.13			100.00
	+ 19.5/12			
	8.76	108.76		100.00
Blowhole Top Tile			9.09	
			+ 19.5/12	
			10.72	98.04
⊙ Ground Shot			7.23	101.53
⊼	4.28	105.81		
Open Ditch 1			8.31	97.50
" " 2			8.30	97.51



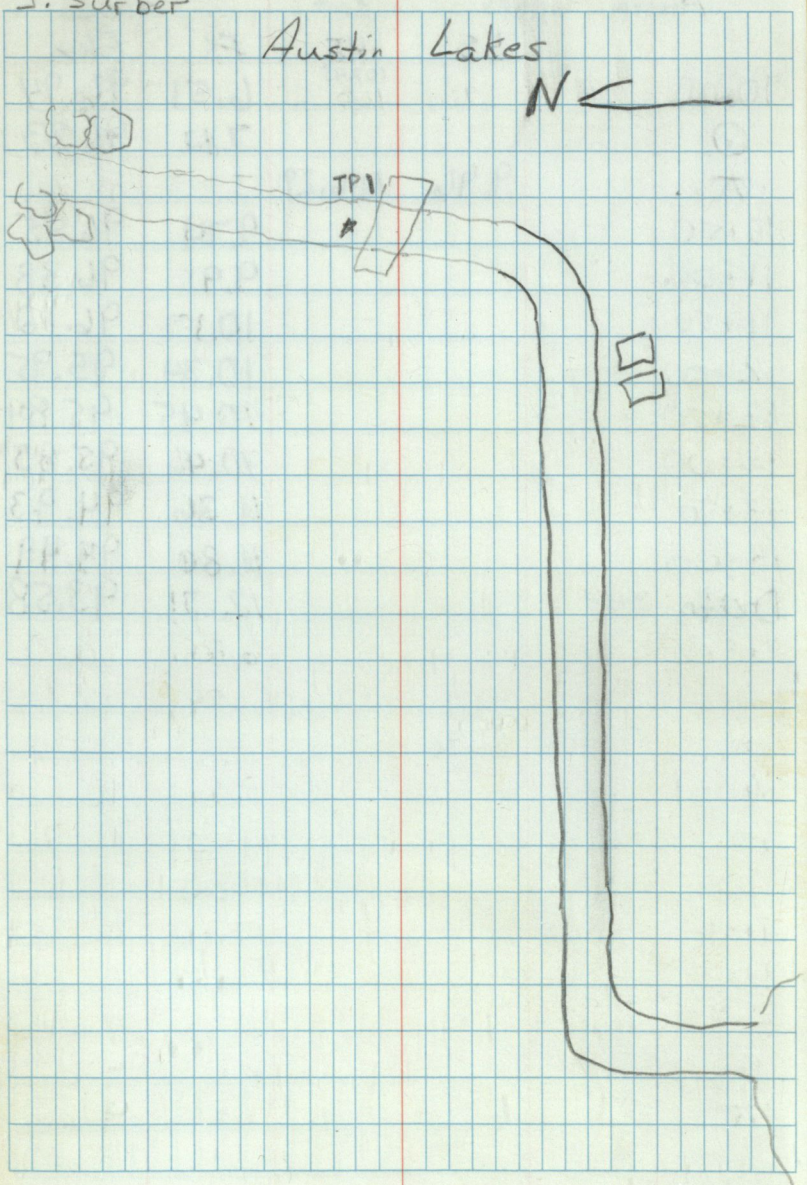
FB 10
Transit

	BS	HI	FS	Elev
End of Woods	5.70	105.7		100.00
1+00			5.84	99.86
1+50			5.86	99.84
2+00			6.10	99.6
2+50			6.47	99.23
⊙ 324°			6.39	99.31
TP	5.45	104.76		
? 3+00			5.71	99.05
3+50			5.79	98.97
4+00			5.67	99.09
4+50			5.88	98.88
5+00			6.08	98.68
5+50			6.29	98.47
⊙			6.59	98.17
TP	5.28	103.45		
? 6+00			5.35	98.1
6+50			5.73	97.72
7+00			5.70	97.75
7+50			5.69	97.76
8+00			5.59	97.86
8+50			5.78	97.67
9+00			6.21	97.24
9+50			6.32	97.13

J. Stegemiller
J. Surber

6-23-00

Austin Lakes



Austin Lakes cont'

		BS	HI	FS	Elev
10+00			103.45	6.51	96.94
⊙				7.12	96.33
⊼		9.96	106.29		
10+50				9.74	96.55
11+00				9.91	96.38
11+50				10.17	96.12
12+00				10.34	95.95
12+50				10.45	95.84
13+00				10.46	95.83
13+50				11.36	94.93
14+00				11.80	94.49
Delta	15+50			12.71	93.58

0.41% Grade

FB 10
Transit

		BS	HI	FS	Elev
Wood line	14+00	7.45	107.45		100.00
+50	13+50			7.66	99.79
1+00	13+00			7.77	99.68
1+50	12+50			8.17	99.28
2+00	about 30 feet off road	12+00		7.59	99.86
2+50	11+50			8.27	99.18
3+00	11+00			8.35	99.10
3+50	10+50			8.60	98.85
4+00	10+00			8.75	98.7
4+50	inlet 9+50			8.41	99.04
⊙	9+00			8.34	99.11
⊼		7.28	106.39		
5+50	8+50 inlet			8.10	98.29
6+00	8+00			7.49	98.90
6+50	7+50			7.65	98.74
7+00	7+00			7.97	98.42
7+50	6+50			8.03	98.36
8+00	Start of 6+00 reeds			7.96	98.43
8+50	5+50			7.91	98.48
9+00	5+00			8.15	98.24
9+50	4+50			8.19	98.20
⊙	4+00			8.13	98.26
⊼		8.26	106.52		
10+50	3+50			8.03	98.49

J. Stegemiller
J. Surber

Fairfield Heights

overcast
78°
9:30 am to 12:30 pm

Fairfield Heights cont'

		BS	HI	FS	Elev
			106.52		
11+00	3+00			8.34	98.18
11+50	2+50			8.06	98.46
12+00	2+00			8.38	98.16
12+50	1+50			8.63	97.89
13+00	1+00			8.80	97.72
13+50	0+50			9.08	97.44
HUB	TB 1			3.93	102.59
PK Nail	TB 2			3.93	102.59
⊙	0+00 invert at road			9.49	97.03
⊼		9.41	106.44		
14+50				9.28	97.16
15+00				9.61	96.83
15+50				9.78	96.66
16+00				9.74	96.70
16+50				9.78	96.66
17+00	End			9.94	96.50

0.206 % grade

BROWNSBURG

STA	BS	HI	FS	ELEV	ERROR
USC&GS B.M				893.07	
	5.99	899.06			
WEST INV 12" CPP			11.66	887.40	
EAST INV 6" CPP			11.32	887.74	
TOP OF CONCRETE			8.26	890.80	
	8.30	899.10			
USC&GS B.M.			6.03	893.07	
	14.29		14.29		0.00

TOPO — NORTHERN ACRES

T B. PICKETT — 75°C/CLOUDY

B. HAHN — 9/7/2001

USC&GS BM - BRASS DISK IN CONCRETE F77 1946

FB 10 — WINGS MEADOWS

STA		BS	HI	FS	ELEV.
INV.	BOX CUL.	•			100.00
		9.97	109.97		
TOP OF	BOX CUL.			4.27	105.70
S	SHOT ON E/W SWALE @ 86TH ST.			4.42	105.55
S	SET @ N/S & E/W SWALE			4.62	105.35
S	SHOT @ N/S SWALE			4.20	105.77
S	" " "			4.13	105.84
		5.50	111.34		
S	" @ FENCE LINE (E) " "			5.08	106.26
S	@ N/S & E/W SWALE			5.10	106.24
S	N/S SWALE 250' TO END			4.38	106.96
S	E/W SWALE @ NE BEND			4.86	106.48
S	E/W SWALE @ SE BEND			4.80	106.54
S	E/W & N/S SWALE INT.			4.55	106.79
		4.68	111.47		
END OF	N/S SWALE 250'			4.28	107.19

BROWNSBURG, IN — TOPO

STARTED @ BOX CULVERT WENT WEST TO INTERSECTION OF N./S. SWALE. THEN NORTH TO 250' PAST INTERSECTION OF E/W SWALE. THEN TO N/W BEND OF E/W SWALE. " " S/E BEND OF " " . THEN TO INTERSECTON OF THE EAST N/S SWALE & E/W SWALE. THEN 250' NORTH TO END OF EAST N/S SWALE.

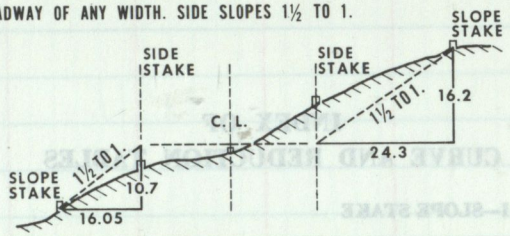
9/16/2002
KW B. PICKETT
& J. SURBER
75° SUNNY GREAT

INDEX OF
CURVE AND REDUCTION TABLES

TABLE I. SLOPE STAKE

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

ROADWAY OF ANY WIDTH. SIDE SLOPES 1½ TO 1.



Cut or Fill	Distance out from Side or Shoulder Stake.										Cut or Fill
	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

TABLE II. STADIA CORRECTION AND HORIZONTAL DISTANCES

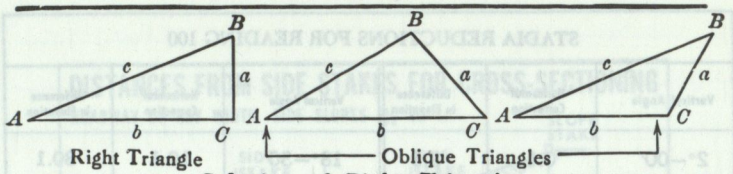
STADIA REDUCTIONS FOR READING 100

Vertical Angle	Horizontal Correction	Difference in Elevation	Vertical Angle	Horizontal Correction	Difference in Elevation
2°—00′	0.1	3.5	18°—30′	10.1	30.1
3°—00′	0.3	5.3	19°—00′	10.6	30.8
4°—00′	0.5	7.0	19°—30′	11.2	31.5
5°—00′	0.8	8.7	20°—00′	11.7	32.1
6°—00′	1.1	10.4	20°—30′	12.3	32.8
7°—00′	1.5	12.1	21°—00′	12.8	33.5
8°—00′	1.9	13.8	21°—30′	13.4	34.1
9°—00′	2.5	15.5	22°—00′	14.0	34.7
10°—00′	3.0	17.10	22°—30′	14.7	35.4
10°—30′	3.3	17.9	23°—00′	15.3	36.0
11°—00′	3.6	18.7	23°—30′	15.9	36.6
11°—30′	4.0	19.5	24°—00′	16.5	37.2
12°—00′	4.3	20.3	24°—30′	17.2	37.7
12°—30′	4.7	21.1	25°—00′	17.9	38.3
13°—00′	5.1	21.9	25°—30′	18.6	39.0
13°—30′	5.5	22.7	26°—00′	19.2	39.4
14°—00′	5.9	23.4	26°—30′	19.9	39.9
14°—30′	6.3	24.2	27°—00′	20.6	40.5
15°—00′	6.7	25.0	27°—30′	21.3	41.0
15°—30′	7.2	25.8	28°—00′	22.0	42.0
16°—00′	7.6	26.5	28°—30′	22.8	41.9
16°—30′	8.1	27.2	29°—00′	23.5	42.4
17°—00′	8.5	28.0	29°—30′	24.3	42.9
17°—30′	9.0	28.7	30°—00′	25.0	43.3
18°—00′	9.5	29.4			

Chains to Feet	
1	66
2	132
3	198
4	264
5	330
6	396
7	462
8	528
9	594
10	660

Feet to Chains	
100	1.515
200	3.030
300	4.545
400	6.060
500	7.575
600	9.090
700	10.606
800	12.121
900	13.636
1,000	15.151

TABLE III. TRIGONOMETRIC FORMULAE



Solution of Right Triangles

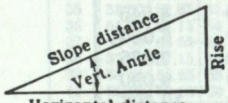
For Angle A. $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given	Required	
a, b	A, B, c	$\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)} = c\sqrt{1 - \frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90° - A, b = a \cot A, c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90° - A, a = b \tan A, c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90° - A, a = c \sin A, b = c \cos A$,

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}, C = 180° - (A + B), c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}, C = 180° - (A + B), c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A + B = 180° - C, \tan \frac{1}{2}(A - B) = \frac{(a-b)\tan \frac{1}{2}(A+B)}{a+b}$. $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a+b+c}{2}, \sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}$, $\sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}}, C = 180° - (A+B)$
a, b, c	Area	$s = \frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = 5° 10′. From Table IV. cos 5° 10′ = .9959. Horizontal distance = 319.4 × .9959 = 318.09 ft.

Horizontal distance also = Slope distance minus slope distance times (1 − cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. Cosine 5° 10′ = .9959. 1 − .9959 = .0041. 319.4 × .0041 = 1.31. 319.4 − 1.31 = 318.09 ft.

When the rise is known, the horizontal distance is approximately:—the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance $= 302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.

TABLE IV. NATURAL TRIGONOMETRICAL FUNCTIONS

Angle	Sin	Tan.	Sec.	Cosec.	Cotg.	Cosin.		Angle	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′								° ′							
0	0	0	1.	∞	∞	1.	90	8	.1392	.1405	1.0098	7.185	7.115	.99027	82
10	.0029	.0029		343.8	343.8	1.	50	10	.1421	.1435	1.0102	7.040	6.968	.98986	50
20	.0058	.0058		171.9	171.9	.99998	40	20	.1449	.1465	1.0107	6.900	6.827	.98944	40
30	.0087	.0087		114.6	114.6	.99996	30	30	.1478	.1495	1.0111	6.766	6.691	.98902	30
40	.0116	.0116	1.0001	85.94	85.94	.99993	20	40	.1507	.1524	1.0115	6.636	6.561	.98858	20
50	.0145	.0145	1.0001	68.76	68.75	.99989	10	50	.1536	.1554	1.0120	6.512	6.435	.98814	10
1	.0175	.0175	1.0002	57.30	57.29	.99985	89	9	.1564	.1584	1.0125	6.394	6.314	.98769	81
10	.0204	.0204	1.0002	49.11	49.10	.99979	50	10	.1593	.1614	1.0129	6.277	6.197	.98723	50
20	.0233	.0233	1.0003	42.98	42.96	.99973	40	20	.1622	.1644	1.0134	6.166	6.084	.98676	40
30	.0262	.0262	1.0003	38.20	38.19	.99966	30	30	.1650	.1673	1.0139	6.059	5.976	.98629	30
40	.0291	.0291	1.0004	34.38	34.37	.99958	20	40	.1679	.1703	1.0144	5.955	5.871	.98580	20
50	.0320	.0320	1.0005	31.26	31.24	.99949	10	50	.1708	.1733	1.0149	5.855	5.769	.98531	10
2	.0349	.0349	1.0006	28.65	28.64	.99939	88	10	.1736	.1763	1.0154	5.759	5.671	.98481	80
10	.0378	.0378	1.0007	26.45	26.43	.99929	50	10	.1765	.1793	1.0160	5.665	5.576	.98430	50
20	.0407	.0407	1.0008	24.56	24.54	.99917	40	20	.1794	.1823	1.0165	5.575	5.485	.98378	40
30	.0436	.0437	1.0010	22.93	22.90	.99905	30	30	.1822	.1853	1.0170	5.488	5.396	.98325	30
40	.0465	.0466	1.0011	21.49	21.47	.99892	20	40	.1851	.1883	1.0176	5.403	5.309	.98272	20
50	.0494	.0495	1.0012	20.23	20.21	.99878	10	50	.1880	.1914	1.0181	5.320	5.226	.98218	10
3	.0523	.0524	1.0014	19.11	19.08	.99863	87	11	.1908	.1944	1.0187	5.241	5.145	.98163	79
10	.0552	.0553	1.0015	18.10	18.07	.99847	50	10	.1937	.1974	1.0193	5.164	5.066	.98107	50
20	.0581	.0582	1.0017	17.20	17.17	.99831	40	20	.1965	.2004	1.0199	5.089	4.989	.98050	40
30	.0610	.0612	1.0019	16.38	16.35	.99813	30	30	.1994	.2035	1.0205	5.016	4.915	.97992	30
40	.0640	.0641	1.0020	15.64	15.60	.99795	20	40	.2022	.2065	1.0211	4.945	4.843	.97934	20
50	.0669	.0670	1.0022	14.96	14.92	.99776	10	50	.2051	.2095	1.0217	4.877	4.773	.97875	10
4	.0698	.0699	1.0024	14.34	14.30	.99756	86	12	.2079	.2126	1.0223	4.810	4.705	.97815	78
10	.0727	.0729	1.0027	13.76	13.73	.99736	50	10	.2108	.2156	1.0230	4.745	4.638	.97754	50
20	.0756	.0758	1.0029	13.23	13.20	.99714	40	20	.2136	.2186	1.0236	4.682	4.574	.97692	40
30	.0785	.0787	1.0031	12.75	12.71	.99692	30	30	.2164	.2217	1.0243	4.620	4.511	.97630	30
40	.0814	.0816	1.0033	12.29	12.25	.99668	20	40	.2193	.2247	1.0249	4.560	4.449	.97566	20
50	.0843	.0846	1.0036	11.87	11.83	.99644	10	50	.2221	.2278	1.0256	4.502	4.390	.97502	10
5	.0872	.0875	1.0038	11.47	11.43	.99619	85	13	.2250	.2309	1.0263	4.445	4.331	.97437	77
10	.0901	.0904	1.0041	11.10	11.06	.99594	50	10	.2278	.2339	1.0270	4.390	4.275	.97371	50
20	.0929	.0934	1.0043	10.76	10.71	.99567	40	20	.2306	.2370	1.0277	4.336	4.219	.97304	40
30	.0958	.0963	1.0046	10.43	10.39	.99540	30	30	.2334	.2401	1.0284	4.284	4.165	.97237	30
40	.0987	.0992	1.0049	10.13	10.08	.99511	20	40	.2363	.2432	1.0291	4.232	4.113	.97169	20
50	.1016	.1022	1.0052	9.839	9.788	.99482	10	50	.2391	.2462	1.0299	4.182	4.061	.97100	10
6	.1045	.1051	1.0055	9.567	9.514	.99452	84	14	.2419	.2493	1.0306	4.133	4.011	.97030	76
10	.1074	.1080	1.0058	9.309	9.255	.99421	50	10	.2447	.2524	1.0314	4.086	3.962	.96959	50
20	.1103	.1110	1.0061	9.065	9.010	.99390	40	20	.2476	.2555	1.0321	4.039	3.914	.96887	40
30	.1132	.1139	1.0065	8.834	8.777	.99357	30	30	.2504	.2586	1.0329	3.994	3.867	.96815	30
40	.1161	.1169	1.0068	8.614	8.556	.99324	20	40	.2532	.2617	1.0337	3.949	3.821	.96742	20
50	.1190	.1198	1.0072	8.405	8.345	.99290	10	50	.2560	.2648	1.0345	3.906	3.776	.96667	10
7	.1219	.1228	1.0075	8.206	8.144	.99255	83	15	.2588	.2679	1.0353	3.864	3.732	.96593	75
10	.1248	.1257	1.0079	8.016	7.953	.99219	50	10	.2616	.2711	1.0361	3.822	3.689	.96517	50
20	.1276	.1287	1.0082	7.834	7.770	.99182	40	20	.2644	.2742	1.0369	3.782	3.647	.96440	40
30	.1305	.1317	1.0086	7.661	7.596	.99144	30	30	.2672	.2773	1.0377	3.742	3.606	.96363	30
40	.1334	.1346	1.0090	7.496	7.429	.99106	20	40	.2700	.2805	1.0386	3.703	3.566	.96285	20
50	.1363	.1376	1.0094	7.337	7.269	.99067	10	50	.2728	.2836	1.0394	3.665	3.526	.96206	10
							82								74
							° ′								° ′
	Cosin	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle		Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle

TABLE IV CONTD. NATURAL TRIGONOMETRICAL FUNCTIONS

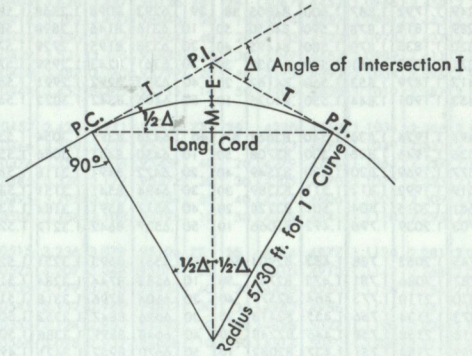
Angle	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.		Angle	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.	
° ′								° ′							
16	.2756	.2867	1.0403	3.628	3.487	.96126	74	24	.4067	.4452	1.0946	2.459	2.246	.91355	66
10	.2784	.2899	1.0412	3.592	3.450	.96046	50	10	.4094	.4487	1.0961	2.443	2.229	.91236	50
20	.2812	.2931	1.0423	3.556	3.412	.95964	40	20	.4120	.4522	1.0975	2.427	2.211	.91116	40
30	.2840	.2962	1.0429	3.521	3.376	.95882	30	30	.4147	.4557	1.0989	2.411	2.194	.90996	30
40	.2868	.2994	1.0438	3.487	3.340	.95799	20	40	.4173	.4592	1.1004	2.396	2.177	.90875	20
50	.2896	.3026	1.0448	3.453	3.305	.95715	10	50	.4200	.4628	1.1019	2.381	2.161	.90753	10
17	.2924	.3057	1.0457	3.420	3.271	.95630	73	25	.4226	.4663	1.1034	2.366	2.145	.90631	65
10	.2952	.3089	1.0466	3.388	3.237	.95545	50	10	.4253	.4699	1.1049	2.351	2.128	.90507	50
20	.2979	.3121	1.0476	3.357	3.204	.95459	40	20	.4279	.4734	1.1064	2.337	2.112	.90383	40
30	.3007	.3153	1.0485	3.326	3.172	.95372	30	30	.4305	.4770	1.1079	2.323	2.097	.90259	30
40	.3035	.3185	1.0495	3.295	3.140	.95284	20	40	.4331	.4806	1.1095	2.309	2.081	.90133	20
50	.3062	.3217	1.0505	3.265	3.108	.95195	10	50	.4358	.4841	1.1110	2.295	2.066	.90007	10
18	.3090	.3249	1.0515	3.236	3.078	.95106	72	26	.4384	.4877	1.1126	2.281	2.050	.89879	64
10	.3118	.3281	1.0525	3.207	3.048	.95015	50	10	.4410	.4913	1.1142	2.268	2.035	.89752	50
20	.3145	.3314	1.0535	3.179	3.018	.94924	40	20	.4436	.4950	1.1158	2.254	2.020	.89623	40
30	.3173	.3346	1.0545	3.152	2.989	.94832	30	30	.4462	.4986	1.1174	2.241	2.006	.89493	30
40	.3201	.3378	1.0555	3.124	2.960	.94740	20	40	.4488	.5022	1.1190	2.228	1.991	.89363	20
50	.3228	.3411	1.0566	3.098	2.932	.94646	10	50	.4514	.5059	1.1207	2.215	1.977	.89232	10
19	.3256	.3443	1.0576	3.072	2.904	.94552	71	27	.4540	.5095	1.1223	2.203	1.963	.89101	63
10	.3283	.3476	1.0587	3.046	2.877	.94457	50	10	.4566	.5132	1.1240	2.190	1.949	.88968	50
20	.3311	.3508	1.0598	3.020	2.850	.94361	40	20	.4592	.5169	1.1257	2.178	1.935	.88835	40
30	.3338	.3541	1.0608	2.996	2.824	.94264	30	30	.4617	.5206	1.1274	2.166	1.921	.88701	30
40	.3365	.3574	1.0619	2.971	2.798	.94167	20	40	.4643	.5243	1.1291	2.154	1.907	.88566	20
50	.3393	.3607	1.0631	2.947	2.773	.94068	10	50	.4669	.5280	1.1308	2.142	1.894	.88431	10
20	.3420	.3640	1.0642	2.924	2.747	.93969	70	28	.4695	.5317	1.1326	2.130	1.881	.88295	62
10	.3448	.3673	1.0653	2.900	2.723	.93869	50	10	.4720	.5354	1.1343	2.119	1.868	.88158	50
20	.3475	.3706	1.0665	2.878	2.699	.93769	40	20	.4746	.5392	1.1361	2.107	1.855	.88020	40
30	.3502	.3739	1.0676	2.856	2.675	.93667	30	30	.4772	.5430	1.1379	2.096	1.842	.87882	30
40	.3529	.3772	1.0688	2.833	2.651	.93565	20	40	.4797	.5467	1.1397	2.085	1.829	.87743	20
50	.3557	.3805	1.0700	2.811	2.628	.93462	10	50	.4823	.5505	1.1415	2.073	1.816	.87603	10
21	.3584	.3839	1.0711	2.790	2.605	.93358	69	29	.4848	.5543	1.1434	2.063	1.804	.87462	61
10	.3611	.3872	1.0723	2.769	2.583	.93253	50	10	.4874	.5581	1.1452	2.052	1.792	.87321	50
20	.3638	.3906	1.0736	2.749	2.560	.93148	40	20	.4899	.5619	1.1471	2.041	1.780	.87178	40
30	.3665	.3939	1.0748	2.729	2.539	.93042	30	30	.4924	.5658	1.1490	2.031	1.767	.87036	30
40	.3692	.3973	1.0760	2.709	2.517	.92935	20	40	.4950	.5696	1.1509	2.020	1.756	.86892	20
50	.3719	.4006	1.0773	2.689	2.496	.92827	10	50	.4975	.5735	1.1528	2.010	1.744	.86748	10
22	.3746	.4040	1.0785	2.670	2.475	.92718	68	30	.5000	.5774	1.1547	2.000	1.732	.86603	60
10	.3773	.4074	1.0798	2.650	2.455	.92609	50	10	.5025	.5812	1.1566	1.990	1.720	.86457	50
20	.3800	.4108	1.0811	2.632	2.434	.92499	40	20	.5050	.5851	1.1586	1.980	1.709	.86310	40
30	.3827	.4142	1.0824	2.613	2.414	.92388	30	30	.5075	.5890	1.1606	1.970	1.698	.86163	30
40	.3854	.4176	1.0837	2.595	2.394	.92276	20	40	.5100	.5930	1.1626	1.961	1.686	.86015	20
50	.3881	.4210	1.0850	2.577	2.375	.92164	10	50	.5125	.5969	1.1646	1.951	1.675	.85866	10
23	.3907	.4245	1.0864	2.559	2.356	.92050	67	31	.5150	.6009	1.1666	1.924	1.664	.85717	59
10	.3934	.4279	1.0877	2.542	2.337	.91936	50	10	.5175	.6048	1.1687	1.932	1.653	.85567	50
20	.3961	.4314	1.0891	2.525	2.318	.91822	40	20	.5200	.6088	1.1707	1.923	1.643	.85416	40
30	.3987	.4348	1.0904	2.508	2.300	.91706	30	30	.5225	.6128	1.1728	1.914	1.632	.85264	30
40	.4014	.4383	1.0918	2.491	2.282	.91590	20	40	.5250	.6168	1.1749	1.905	1.621	.85112	20
50	.4041	.4417	1.0932	2.475	2.264	.91472	10	50	.5275	.6208	1.1770	1.896	1.611	.84959	10
							66								58
							° ′								° ′
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle		Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle

TABLE IV CONTD. NATURAL TRIGONOMETRICAL FUNCTIONS

Angle	Sin.	Tan.	Sec.	Cosec.	Cotg.	Cosin.		Angle	Sin.	Tan	Sec.	Cosec.	Cotg.	Cosin.	
° ′							° ′	° ′							° ′
32	.5299	.6249	1.1792	1.887	1.600	.84805	58	39	.6293	.8098	1.2868	1.589	1.235	.77715	51
10	.5324	.6289	1.1813	1.878	1.590	.84650	50	10	.6316	.8146	1.2898	1.583	1.228	.77531	50
20	.5348	.6330	1.1835	1.870	1.580	.84495	40	20	.6338	.8195	1.2929	1.578	1.220	.77347	40
30	.5373	.6371	1.1857	1.861	1.570	.84339	30	30	.6361	.8243	1.2959	1.572	1.213	.77162	30
40	.5398	.6412	1.1879	1.853	1.560	.84182	20	40	.6383	.8292	1.2991	1.567	1.206	.76977	20
50	.5422	.6453	1.1901	1.844	1.550	.84025	10	50	.6406	.8342	1.3022	1.561	1.199	.76791	10
33	.5446	.6494	1.1924	1.836	1.540	.83867	57	40	.6428	.8391	1.3054	1.556	1.192	.76604	50
10	.5471	.6536	1.1946	1.828	1.530	.83708	50	10	.6450	.8441	1.3086	1.550	1.185	.76417	50
20	.5495	.6577	1.1969	1.820	1.520	.83549	40	20	.6472	.8491	1.3118	1.545	1.178	.76229	40
30	.5519	.6619	1.1992	1.812	1.511	.83389	30	30	.6494	.8541	1.3151	1.540	1.171	.76041	30
40	.5544	.6661	1.2015	1.804	1.501	.83228	20	40	.6517	.8591	1.3184	1.535	1.164	.75851	20
50	.5568	.6703	1.2039	1.796	1.492	.83066	10	50	.6539	.8642	1.3217	1.529	1.157	.75661	10
34	.5592	.6745	1.2062	1.788	1.483	.82904	56	41	.6561	.8693	1.3251	1.524	1.150	.75471	49
10	.5616	.6787	1.2086	1.781	1.473	.82741	50	10	.6583	.8744	1.3284	1.519	1.144	.75280	50
20	.5640	.6830	1.2110	1.773	1.464	.82577	40	20	.6604	.8796	1.3318	1.514	1.137	.75088	40
30	.5664	.6873	1.2134	1.766	1.455	.82413	30	30	.6626	.8847	1.3352	1.509	1.130	.74896	30
40	.5688	.6916	1.2158	1.758	1.446	.82248	20	40	.6648	.8899	1.3386	1.504	1.124	.74703	20
50	.5712	.6959	1.2183	1.751	1.437	.82082	10	50	.6670	.8952	1.3421	1.499	1.117	.74509	10
35	.5736	.7002	1.2208	1.743	1.428	.81915	55	42	.6691	.9004	1.3456	1.494	1.111	.74314	48
10	.5760	.7046	1.2233	1.736	1.419	.81748	50	10	.6713	.9057	1.3492	1.490	1.104	.74120	50
20	.5783	.7089	1.2258	1.729	1.411	.81580	40	20	.6734	.9110	1.3527	1.485	1.098	.73924	40
30	.5807	.7133	1.2283	1.722	1.402	.81412	30	30	.6756	.9163	1.3563	1.480	1.091	.73728	30
40	.5831	.7177	1.2309	1.715	1.393	.81242	20	40	.6777	.9217	1.3600	1.476	1.085	.73531	20
50	.5854	.7221	1.2335	1.708	1.385	.81072	10	50	.6799	.9271	1.3636	1.471	1.079	.73333	10
36	.5878	.7265	1.2361	1.701	1.376	.80902	54	43	.6820	.9325	1.3673	1.466	1.072	.73135	47
10	.5901	.7310	1.2387	1.695	1.368	.80730	50	10	.6841	.9380	1.3711	1.462	1.066	.72937	50
20	.5925	.7355	1.2413	1.688	1.360	.80558	40	20	.6862	.9435	1.3748	1.457	1.060	.72737	40
30	.5948	.7400	1.2440	1.681	1.351	.80386	30	30	.6884	.9490	1.3786	1.453	1.054	.72537	30
40	.5972	.7445	1.2466	1.675	1.343	.80212	20	40	.6905	.9545	1.3824	1.448	1.048	.72337	20
50	.5995	.7490	1.2494	1.668	1.335	.80038	10	50	.6926	.9601	1.3863	1.444	1.042	.72136	10
37	.6018	.7536	1.2521	1.662	1.327	.79864	53	44	.6947	.9657	1.3902	1.440	1.036	.71934	46
10	.6041	.7581	1.2549	1.655	1.319	.79688	50	10	.6967	.9713	1.3941	1.435	1.030	.71732	50
20	.6065	.7627	1.2577	1.649	1.311	.79512	40	20	.6988	.9770	1.3980	1.431	1.024	.71529	40
30	.6088	.7673	1.2605	1.643	1.303	.79335	30	30	.7009	.9827	1.4020	1.427	1.018	.71325	30
40	.6111	.7720	1.2633	1.636	1.295	.79158	20	40	.7030	.9884	1.4061	1.422	1.012	.71121	20
50	.6134	.7766	1.2661	1.630	1.288	.78980	10	50	.7050	.9942	1.4101	1.418	1.006	.70916	10
38	.6157	.7813	1.2690	1.624	1.280	.78801	52		.7071	1.	1.414	1.414	1.	.70711	45
10	.6180	.7860	1.2719	1.618	1.272	.78622	50								
20	.6202	.7907	1.2748	1.612	1.265	.78442	40								
30	.6225	.7954	1.2778	1.606	1.257	.78261	30								
40	.6248	.8002	1.2808	1.601	1.250	.78079	20								
50	.6271	.8050	1.2838	1.595	1.242	.77897	10								
	Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle		Cosin.	Cotg.	Cosec.	Sec.	Tan.	Sin.	Angle

CURVE TABLE

Table of Tangent and External to a 1° Curve



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.

CURVE FORMULAS

Radius: $R = \frac{50}{\sin \frac{1}{2} D}$

Length of Curve: $L = 100 \frac{\Delta}{D}$

also $L = .0174533 \times \Delta \times R$

Degree of Curve: $D = 100 \frac{\Delta}{L}$

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

Long Cord: $LC = 2R \sin \frac{1}{2} \Delta$

Middle Ordinate: $M = R\ (1 - \text{Cos}\ \frac{1}{2}\ \Delta)$

External: $E = T \tan \frac{1}{4} \Delta$

I	T	E	I=10°	I	T	E	I=20°	I	T	E	I=30°
1°	50.00	.218	+	11°	551.70	26.500	+	21°	1061.9	97.577	+
10′	58.34	.297	5° C.	10′	560.11	27.313	5° C.	10′	1070.6	99.155	5° C.
20′	66.67	.388	T	20′	568.53	28.137	T	20′	1079.2	100.75	T
30′	75.01	.491	.03	30′	576.95	28.974	.06	30′	1087.8	102.35	.10
40′	83.34	.606	E	40′	585.36	29.824	E	40′	1096.4	103.97	E
50′	91.68	.733	.001	50′	593.79	30.686	.006	50′	1105.1	105.60	.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	10′	661.25	38.031	T	10′	1174.4	119.12	T
20′	166.72	2.425	.06	20′	669.70	39.006	.13	20′	1183.1	120.87	.19
30′	175.06	2.674	E	30′	678.15	39.993	E	30′	1191.8	122.63	E
40′	183.40	2.934	.003	40′	686.60	40.992	.011	40′	1200.5	124.41	.025
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	15°	754.32	49.441	T	25°	1270.2	139.11	T
10′	258.51	5.829	.09	10′	762.80	50.554	.19	10′	1279.0	141.01	.29
20′	266.86	6.211	E	20′	771.29	51.679	E	20′	1287.7	142.93	E
30′	275.21	6.606	.004	30′	779.77	52.818	.017	30′	1296.5	144.85	.038
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		30′	830.76	59.914		30′	1349.2	156.70	
40′	333.71	9.710	20° C.	40′	839.27	61.141	20° C.	40′	1358.0	158.72	20° C.
50′	342.08	10.202	T	50′	847.78	62.381	T	50′	1366.8	160.76	T
7°	350.44	10.707	.13	17°	856.30	63.634	.26	27°	1375.6	162.81	.39
10′	358.81	11.224	E	10′	864.82	64.900	E	10′	1384.4	164.86	E
20′	367.17	11.753	.006	20′	873.35	66.178	.022	20′	1393.2	166.95	.051
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		10′	916.03	72.764		10′	1437.4	177.55	
20′	417.41	15.184	25° C.	20′	924.58	74.119	25° C.	20′	1446.3	179.72	25° C.
30′	425.79	15.799	T	30′	933.13	75.488	T	30′	1455.1	181.89	T
40′	434.17	16.426	.16	40′	941.69	76.869	.32	40′	1464.0	184.08	.49
50′	442.55	17.065	E	50′	950.25	78.264	E	50′	1472.9	186.29	E
9°	450.93	17.717	.007	19°	958.81	79.671	.028	29°	1481.8	188.51	.065
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		50′	1001.7	86.904		50′	1526.3	199.82	
10°	501.28	21.887	30° C.	20°	1010.3	88.389	30° C.	30°	1535.3	202.12	30° C.
10′	509.68	22.624	T	10′	1018.9	89.888	T	10′	1544.2	204.44	T
20′	518.08	23.375	.19	20′	1027.5	91.399	.39	20′	1553.1	206.77	.59
30′	526.48	24.138	E	30′	1036.1	92.924	E	30′	1562.1	209.12	E
40′	534.89	24.913	.008	40′	1044.7	94.462	.034	40′	1571.0	211.48	.078
50′	543.29	25.700		50′	1053.3	96.013		50′	1580.0	213.86	

$T = R \tan \frac{1}{2} I$ $E = R \text{ exsec } \frac{1}{2} I$

TABLE V CONTD. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	I=40°	I	T	E	I=50°	I	T	E	I=60°
31°	1589.0	216.3	+	41°	2142.2	387.4	+	51°	2732.9	618.4	+
10′	1598.0	218.7	5° C.	10′	2151.7	390.7	5° C.	10′	2743.1	622.8	5° C.
20′	1606.9	221.1	T	20′	2161.2	394.1	T	20′	2753.4	627.2	T
30′	1615.9	223.5	.13	30′	2170.8	397.4	.17	30′	2763.7	631.7	.21
40′	1624.9	226.0	E	40′	2180.3	400.8	E	40′	2773.9	636.2	E
50′	1633.9	228.4		50′	2189.9	404.2		50′	2784.2	640.7	
32°	1643.0	230.9	.023	42°	2199.4	407.6	.037	52°	2794.5	645.2	.056
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	10′	2266.6	432.0	T	10′	2867.1	677.3	T
20′	1715.3	251.3	.26	20′	2276.2	435.6	.34	20′	2877.5	682.0	.42
30′	1724.4	253.9	E	30′	2285.9	439.2	E	30′	2888.0	686.7	E
40′	1733.5	256.5	.046	40′	2295.6	442.8	.075	40′	2898.4	691.4	.112
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	45°	2373.3	472.1	T	55°	2982.7	729.9	T
10′	1815.7	280.8	.40	10′	2383.1	475.8	.51	10′	2993.3	734.8	.63
20′	1824.9	283.6	E	20′	2392.8	479.6	E	20′	3003.9	739.7	E
30′	1834.1	286.4	.070	30′	2402.6	483.4	.116	30′	3014.5	744.6	.168
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		30′	2461.7	506.4		30′	3078.7	774.7	20° C.
40′	1898.6	306.4	20° C.	40′	2471.5	510.3	20° C.	40′	3089.4	779.8	T
50′	1907.9	309.3	T	50′	2481.4	514.3	T	50′	3100.2	784.9	.84
37°	1917.1	312.2	.53	47°	2491.3	518.2	.68	57°	3110.9	790.1	E
10′	1926.4	315.2	E	10′	2501.2	522.2	E	10′	3121.7	795.2	.225
20′	1935.7	318.1	.093	20′	2511.2	526.1	.151	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	20′	2571.0	550.4	T	20′	3197.8	832.0	T
30′	2000.9	339.3	.67	30′	2581.0	554.5	.85	30′	3208.8	837.3	1.05
40′	2010.2	342.4	E	40′	2591.0	558.6	E	40′	3219.7	842.7	E
50′	2019.6	345.5		50′	2601.1	562.8		50′	3230.7	848.1	
39°	2029.0	348.6	.117	49°	2611.2	566.9	.189	59°	3241.7	853.5	.283
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	869.8	
40′	2066.6	361.3		40′	2651.5	583.8		40′	3285.8	875.3	
50′	2076.0	364.5		50′	2661.6	588.0		50′	3296.9	880.8	
40°	2085.4	367.7	30° C.	50°	2671.8	592.3	30° C.	60°	3308.0	886.4	30° C.
10′	2094.9	371.0	T	10′	2681.9	596.6	T	10′	3319.1	892.0	T
20′	2104.3	374.2	.80	20′	2692.1	600.9	1.02	20′	3330.3	897.5	1.27
30′	2113.8	377.5	E	30′	2702.3	605.3	E	30′	3341.4	903.2	E
40′	2123.3	380.8		40′	2712.5	609.6		40′	3352.6	908.8	
50′	2132.7	384.1	.141	50′	2722.7	614.0	.227	50′	3363.8	914.5	.340

$T = R \tan \frac{1}{2}I$ $E = R \operatorname{exsec} \frac{1}{2}I$

TABLE V CONTD. 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	5° C.	10′	4099.5	1315.6	5° C.	10	4908.0	1814.7	5° C.
20′	3397.5	931.6	T	20′	4112.1	1322.9	T	20′	4922.5	1824.1	T
30′	3408.8	937.3	.25	30′	4124.8	1330.3	.30	30′	4937.0	1833.6	.36
40′	3420.1	943.1	E	40′	4137.4	1337.7	E	40′	4951.5	1843.1	E
50′	3431.4	948.9		50′	4150.1	1345.1		50′	4966.1	1852.6	
62°	3442.7	954.8	.080	72°	4162.8	1352.6	.110	82°	4980.7	1862.2	.149
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	10° C.	73°	4239.7	1398.0	10° C.	83°	5069.2	1920.5	10° C.
10′	3522.6	996.2	T	10′	4252.6	1405.7	T	10′	5084.0	1930.4	T
20′	3534.1	1002.3	.51	20′	4265.6	1413.5	.61	20′	5099.0	1940.3	.72
30′	3545.6	1008.3	E	30′	4278.5	1421.2	E	30′	5113.9	1950.3	E
40′	3557.2	1014.4	.159	40′	4291.5	1429.0	.220	40′	5128.9	1960.2	.299
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	15° C.	50′	4383.3	1484.4	15° C.	50′	5234.9	2031.4	15° C.
65°	3650.2	1063.9	T	75°	4396.5	1492.4	T	85°	5250.3	2041.7	T
10′	3661.9	1070.2	.76	10′	4409.8	1500.5	.91	10′	5265.6	2052.1	1.09
20′	3673.7	1076.6	E	20′	4423.1	1508.6	E	20′	5281.0	2062.5	E
30′	3685.4	1082.9	.240	30′	4436.4	1516.7	.332	30′	5296.4	2073.0	.450
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	20° C.	30′	4516.9	1566.3	20° C.	30′	5389.9	2136.7	20° C.
40′	3768.5	1128.2	T	40′	4530.4	1574.7	T	40′	5405.6	2147.5	T
50′	3780.4	1134.8	1.02	50′	4544.0	1583.1	1.22	50′	5421.4	2158.4	1.45
67°	3792.4	1141.4	E	77°	4557.6	1591.6	E	87°	5437.2	2169.2	E
10′	3804.4	1148.0	.321	10′	4571.2	1600.1	.445	10′	5453.1	2180.2	.603
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	25° C.	20′	4667.4	1660.5	25° C.	20′	5565.4	2258.0	25° C.
30′	3901.2	1202.0	T	30′	4681.3	1669.2	T	30′	5581.6	2269.3	T
40′	3913.4	1208.9	1.28	40′	4695.2	1678.1	1.53	40′	5597.8	2280.6	1.83
50′	3925.6	1215.8	E	50′	4709.2	1686.9	E	50′	5614.2	2292.0	E
69°	3937.9	1222.7	.403	79°	4723.2	1695.8	.558	89°	5630.5	2303.5	.756
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	30° C.	80°	4807.7	1749.9	30° C.	90°	5729.7	2373.3	30° C.
10′	4024.4	1272.1	T	10′	4822.0	1759.0	T	10′	5746.3	2385.1	T
20′	4036.8	1279.3	1.54	20′	4836.2	1768.2	1.84	20′	5763.1	2397.0	2.20
30′	4049.3	1286.5	E	30′	4850.5	1777.4	E	30′	5779.9	2408.9	E
40′	4061.8	1293.6	.485	40′	4864.8	1786.7	.671	40′	5796.7	2420.9	.910
50′	4074.4	1300.9		50′	4879.2	1796.0		50′	5813.6	2432.9	

$T = R \tan \frac{1}{2}I$ $E = R \operatorname{exsec} \frac{1}{2}I$

TABLE V CONTD. TANGENTS AND EXTERNALS TO A 1° CURVE

I	T	E	T=100°	I	T	E	T=110°	I	T	E	T=120°
91°	5830.5	2444.9	+	101°	6950.6	3278.1	+	111°	8336.7	4386.1	+
10′	5847.5	2457.1	5° C.	10′	6971.3	3294.1	5° C.	10′	8362.7	4407.6	5° C.
20′	5864.6	2469.3	T	20′	6992.0	3310.1	T	20′	8388.9	4429.2	T
30′	5881.7	2481.5	.43	30′	7012.7	3326.1	.51	30′	8415.1	4450.9	.62
40′	5898.8	2493.8	E	40′	7033.6	3342.3	E	40′	8441.5	4472.7	E
50′	5916.0	2506.1		50′	7054.5	3358.5		50′	8468.0	4494.6	
92°	5933.2	2518.5	.200	102°	7075.5	3374.9	.268	112°	8494.6	4516.6	.360
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	10° C.	103°	7203.2	3474.4	10° C.	113°	8656.6	4651.3	10° C.
10′	6055.4	2606.8	T	10′	7224.7	3491.3	T	10′	8684.0	4674.2	T
20′	6073.1	2619.7	.86	20′	7246.3	3508.2	.103	20′	8711.5	4697.2	1.25
30′	6090.8	2632.6	E	30′	7268.0	3525.2	E	30′	8739.2	4720.3	E
40′	6108.6	2645.5	.401	40′	7289.8	3542.4	.536	40′	8767.0	4743.6	.721
50′	6126.4	2658.5		50′	7311.7	3559.6		50′	8794.9	4766.9	
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	15° C.	50′	7444.6	3664.5	15° C.	50′	8965.0	4909.9	15° C.
95°	6252.8	2751.3	T	105°	7467.0	3682.3	T	115°	8993.8	4934.1	T
10′	6271.1	2764.8	1.30	10′	7489.6	3700.2	1.56	10′	9022.7	4958.6	1.93
20′	6289.4	2778.3	E	20′	7512.2	3718.2	E	20′	9051.7	4983.1	E
30′	6307.9	2792.0	.604	30′	7534.9	3736.2	.806	30′	9080.9	5007.8	1.09
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	20° C.	40′	7696.3	3865.2	20° C.	40′	9289.2	5184.5	20° C.
50′	6457.3	2903.1	T	50′	7719.7	3884.0	T	50′	9319.5	5210.3	T
97°	6476.2	2917.3	1.74	107°	7743.2	3902.9	2.08	117°	9349.9	5236.2	2.52
10′	6495.2	2931.6	E	10′	7766.8	3921.9	E	10′	9380.5	5262.3	E
20′	6514.3	2945.9	.809	20′	7790.5	3940.9	1.08	20′	9411.3	5288.6	1.46
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	25° C.	10′	7910.4	4037.8	25° C.	10′	9567.2	5422.1	25° C.
20′	6630.1	3033.1	T	20′	7934.6	4057.4	T	20′	9598.9	5449.2	T
30′	6649.6	3047.9	2.18	30′	7959.0	4077.2	2.61	30′	9630.7	5476.5	3.16
40′	6669.2	3062.8	E	40′	7983.5	4097.1	E	40′	9662.6	5504.0	E
50′	6688.8	3077.7		50′	8008.0	4117.0		50′	9694.7	5531.7	
99°	6708.6	3092.7	1.02	109°	8032.7	4137.1	1.36	119°	9727.0	5559.4	1.83
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	5615.5	
30′	6768.1	3138.1		30′	8107.3	4197.9		30′	9824.8	5643.8	
40′	6788.1	3153.3		40′	8132.3	4218.4		40′	9857.7	5672.3	
50′	6808.2	3168.7		50′	8157.5	4239.0		50′	9890.8	5700.9	
100°	6828.3	3184.1	30° C.	110°	8182.8	4259.7	30° C.	120°	9924.0	5729.7	30° C.
10′	6848.5	3199.6	T	10′	8208.2	4280.5	T	10′	9957.5	5758.6	T
20′	6868.8	3215.1	2.62	20′	8233.7	4301.4	3.14	20′	9991.0	5787.7	3.81
30′	6889.2	3230.8	E	30′	8259.3	4322.4	E	30′	10025.0	5817.0	E
40′	6909.6	3246.5		40′	8285.0	4343.6		40′	10059.0	5846.5	
50′	6930.1	3262.3	1.22	50′	8310.8	4364.8	1.63	50′	10093.0	5876.1	2.20

$T = R \tan \frac{1}{2} I$ $E = R \operatorname{exsec} \frac{1}{2} I$

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° = 21600′ = 1296000″

Radius = arc of 57.2957790°

Arc of 1° (radius = 1) = .017453292

Arc of 1′ (radius = 1) = .000290888

Arc of 1″ (radius = 1) = .000004848

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

Curvature in feet = 0.667 (Dist. in miles)^2

Difference between arc and chord length, 0.05 feet in 11½ miles

Probable error of a single observation = $0.6754 \sqrt{\frac{M v^2}{n - 1}}$

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 center of 0.61 feet.
4. Temperature difference of 15°
5. Difference of pull of 15 lbs.

SQUARE MEASURE

144 sq. inches = 1 sq. ft.
9 sq. ft. = 1 sq. yard
30¼ sq. yds. = 1 sq. rd.
40 sq. rds. = 1 rood.
4 roods = 1 acre
640 acres = 1 sq. mile.

SURVEYORS' MEASURE

7.92 inches = 1 link.
25 links = 1 rod.
4 rds. = 1 chain.
10 sq. chains or 160 sq. rods = 1 acre.
640 acres = 1 sq. mile.
36 sq. miles (6 miles sq.) = 1 township.

TABLE VI. INCHES TO DECIMALS OF A FOOT

In.	0	1	2	3	4	5	6	7	8	9	10	11	In.
0	Foot	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167	0
1-32	.0026	.0859	.1693	.2526	.3359	.4193	.5026	.5859	.6693	.7526	.8359	.9193	1-32
1-16	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219	1-16
3-32	.0078	.0911	.1745	.2578	.3411	.4245	.5078	.5911	.6745	.7578	.8411	.9245	3-32
1-8	.0104	.0938	.1771	.2604	.3438	.4271	.5104	.5938	.6771	.7604	.8438	.9271	1-8
5-32	.0130	.0964	.1797	.2630	.3464	.4297	.5130	.5964	.6797	.7630	.8464	.9297	5-32
3-16	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323	3-16
7-32	.0182	.1016	.1849	.2682	.3516	.4349	.5182	.6016	.6849	.7682	.8516	.9349	7-32
1-4	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.3875	.7708	.8542	.9375	1-4
9-32	.0234	.1068	.1901	.2734	.3568	.4401	.5234	.6068	.6901	.7734	.8568	.9401	9-32
5-16	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427	5-16
11-32	.0286	.1129	.1953	.2786	.3620	.4453	.5286	.6120	.6953	.7786	.8620	.9453	11-32
3-8	.0313	.1146	.1979	.2813	.3646	.4479	.5313	.6146	.6979	.7813	.8646	.9479	3-8
13-32	.0339	.1172	.2005	.2839	.3672	.4505	.5339	.6172	.7005	.7839	.8672	.9505	13-32
7-16	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531	7-16
15-32	.0391	.1224	.2057	.2891	.3724	.4557	.5391	.6224	.7057	.7891	.8724	.9557	15-32
1-2	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583	1-2
17-32	.0443	.1276	.2109	.2943	.3776	.4609	.5443	.6276	.7109	.7943	.8776	.9609	17-32
9-16	.0469	.1302	.2135	.2969	.3802	.4635	.5469	.6302	.7135	.7969	.8802	.9635	9-16
19-32	.0495	.1328	.2161	.2995	.3828	.4661	.5495	.6328	.7161	.7995	.8828	.9661	19-32
5-8	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688	5-8
21-32	.0547	.1380	.2214	.3047	.3880	.4714	.5547	.6380	.7214	.8047	.8880	.9714	21-32
11-16	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740	11-16
23-32	.0599	.1432	.2266	.3099	.3932	.4766	.5599	.6432	.7266	.8099	.8932	.9766	23-32
3-4	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792	3-4
25-32	.0651	.1484	.2318	.3151	.3984	.4818	.5651	.6484	.7318	.8151	.8984	.9818	25-32
13-16	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844	13-16
27-32	.0703	.1536	.2370	.3203	.4036	.4870	.5703	.6536	.7370	.8203	.9036	.9870	27-32
7-8	.0729	.1563	.2396	.3229	.4063	.4896	.5729	.6563	.7396	.8229	.9063	.9896	7-8
29-32	.0755	.1589	.2422	.3255	.4089	.4922	.5755	.6589	.7422	.8255	.9089	.9922	29-32
15-16	.0781	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7448	.8281	.9115	.9948	15-16
31-32	.0807	.1641	.2474	.3307	.4141	.4974	.5807	.6641	.7474	.8307	.9141	.9974	31-32
	0	1	2	3	4	5	6	7	8	9	10	11	

TABLE VII. 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
30	.02500	30	.19167	30	.35833	30	.52500	30	.69167	30	.85833
2 00	.03333	12 00	.20000	22 00	.36667	32 00	.53333	42 00	.70000	52 00	.86667
30	.04167	30	.20833	30	.37500	30	.54167	30	.70833	30	.87500
3 00	.05000	13 00	.21667	23 00	.38333	33 00	.55000	43 00	.71667	53 00	.88333
30	.05833	30	.22500	30	.39167	30	.55833	30	.72500	30	.89167
4 00	.06667	14 00	.23333	24 00	.40000	34 00	.56667	44 00	.73333	54 00	.90000
30	.07500	30	.24167	30	.40833	30	.57500	30	.74167	30	.90833
5 00	.08333	15 00	.25000	25 00	.41667	35 00	.58333	45 00	.75000	55 00	.91667
30	.09167	30	.25833	30	.42500	30	.59167	30	.75833	30	.92500
6 00	.10000	16 00	.26667	26 00	.43333	36 00	.60000	46 00	.76667	56 00	.93333
30	.10833	30	.27500	30	.44167	30	.60833	30	.77500	30	.94167
7 00	.11667	17 00	.28333	27 00	.45000	37 00	.61667	47 00	.78333	57 00	.95000
30	.12500	30	.29167	30	.45833	30	.62500	30	.79167	30	.95833
8 00	.13333	18 00	.30000	28 00	.46667	38 00	.63333	48 00	.80000	58 00	.96667
30	.14167	30	.30833	30	.47500	30	.64167	30	.80833	30	.97500
9 00	.15000	19 00	.31667	29 00	.48333	39 00	.65000	49 00	.81667	59 00	.98333
30	.15833	30	.32500	30	.49167	30	.65833	30	.82500	30	.99167
10 00	.16667	20 00	.33333	30 00	.500000	40 00	.66667	50 00	.83333	60 00	1.00000

TABLE VIII. MIDDLE ORDINATES OF RAILS

Length of Rail (feet)

C ° ′	R Feet	30 Inch	28 Inch	26 Inch	24 Inch	22 Inch	20 Inch	C °	R Feet	30 Inch	28 Inch	26 Inch	24 Inch	22 Inch	20 Inch
0-20	17189	.08	.07	.06	.05	.04	.03	8	716.8	1.88	1.64	1.42	1.20	1.01	.84
0-40	8594	.16	.14	.12	.10	.08	.07	9	637.3	2.12	1.84	1.60	1.35	1.14	.94
1-0	5730	.24	.20	.18	.15	.13	.10	10	573.7	2.36	2.05	1.78	1.50	1.27	1.04
1-20	4297	.31	.27	.23	.20	.17	.13	11	521.7	2.59	2.26	1.95	1.65	1.39	1.15
1-40	3438	.39	.34	.29	.25	.21	.17	12	478.3	3.83	2.47	2.15	1.81	1.54	1.26
2-0	2865	.47	.41	.35	.30	.25	.20	13	441.7	3.05	2.66	2.30	1.96	1.66	1.36
2-20	2456	.55	.48	.41	.35	.29	.23	14	410.3	3.30	2.87	2.48	2.10	1.78	1.46
2-40	2149	.63	.55	.47	.40	.33	.27	15	383.1	3.54	3.08	2.68	2.26	1.91	1.57
3-0	1910	.71	.62	.53	.45	.38	.31	16	359.3	3.76	3.28	2.83	2.40	2.04	1.67
3-20	1719	.78	.68	.59	.50	.42	.35	17	338.3	4.00	3.48	3.02	2.57	2.16	1.78
3-40	1563	.86	.75	.65	.55	.46	.38	18	319.6	4.21	3.67	3.18	2.70	2.28	1.87
4-0	1433	.94	.82	.71	.60	.50	.42	19	302.9	4.45	3.89	3.36	2.86	2.41	1.98
4-20	1323	1.02	.89	.77	.65	.55	.45	20	287.9	4.70	4.09	3.55	3.00	2.54	2.09
4-40	1228	1.10	.96	.83	.70	.59	.48	22	262.0	5.16	4.44	3.84	3.30	2.80	2.29
5	1146	1.18	1.03	.89	.75	.63	.52	24	240.5	5.64	4.92	4.20	3.59	3.04	2.50
6	955.3	1.41	1.23	1.06	.90	.76	.62	26	222.3	6.07	5.29	4.58	3.88	3.29	2.70
7	819.0	1.65	1.44	1.24	1.05	.89	.73								

TABLE IX. SHORT RADIUS CURVES

Radius Feet	Chord Feet	Central Angle	Deflection Angle	Deflection for 1 Foot
35	10	16-26	8-13	49.3
45	10	12-46	6-23	38.3
50	15	17-16	8-38	34.5
60	15	14-22	7-11	28.8
75	15	11-30	5-45	23.0
100	20	11-30	5-45	17.3
120	20	9-34	4-47	14.3
150	20	7-39	3-49	11.5
190	25	7-32	3-46	9.15
200	25	7-10	3-35	8.6
225	25	6-25	3-12	7.7
240	25	5-58	2-59	7.2
250	25	5-44	2-52	6.9
275	25	5-12	2-36	6.2
288	50	9-58	4-59	6.0
300	50	9-32	4-46	5.7
350	50	8-12	4-06	4.9
376	50	7-40	3-50	4.6
400	50	7-10	3-35	4.3
410	50	7-00	3-30	4.2

To find length of curve divide angle from P. C. to P. T. by central angle of chord, and multiply by length of chord.

TABLE X. RODS IN FEET, 10THS AND 100THS OF FEET

Rods	Feet	Rods	Feet	Rods	Feet	Rods	Feet	Rods	Feet
1	16.50	21	346.50	41	676.50	61	1006.50	81	1336.50
2	33.00	22	363.00	42	693.00	62	1023.00	82	1353.00
3	49.50	23	379.50	43	709.50	63	1039.50	83	1369.50
4	66.00	24	396.00	44	726.00	64	1056.00	84	1386.00
5	82.50	25	412.50	45	742.50	65	1072.50	85	1402.50
6	99.00	26	429.00	46	759.00	66	1089.00	86	1419.00
7	115.50	27	445.50	47	775.50	67	1105.50	87	1435.50
8	132.00	28	462.00	48	792.00	68	1122.00	88	1452.00
9	148.50	29	478.50	49	808.50	69	1138.50	89	1468.50
10	165.00	30	495.00	50	825.00	70	1155.00	90	1485.00
11	181.50	31	511.50	51	841.50	71	1171.50	91	1501.50
12	198.00	32	528.00	52	858.00	72	1188.00	92	1518.00
13	214.50	33	544.50	53	874.50	73	1204.50	93	1534.50
14	231.00	34	561.00	54	891.00	74	1221.00	94	1551.00
15	247.50	35	577.50	55	907.50	75	1237.50	95	1567.50
16	264.00	36	594.00	56	924.00	76	1254.00	96	1584.00
17	280.50	37	610.50	57	940.50	77	1270.50	97	1600.50
18	297.00	38	627.00	58	957.00	78	1287.00	98	1617.00
19	313.50	39	643.50	59	973.50	79	1303.50	99	1633.50
20	330.00	40	660.00	60	990.00	80	1320.00	100	1650.00

TABLE XI. LINKS IN FEET, 10THS AND 100THS OF FEET

Links	Feet	Links	Feet	Links	Feet	Links	Feet	Links	Feet	Links	Feet
1	0.66	18	11.88	35	23.10	52	34.32	69	45.54	86	56.76
2	1.32	19	12.54	36	23.76	53	34.98	70	46.20	87	57.42
3	1.98	20	13.20	37	24.42	54	35.64	71	46.86	88	58.08
4	2.64	21	13.86	38	25.08	55	36.30	72	47.52	89	58.74
5	3.30	22	14.52	39	25.74	56	36.96	73	48.18	90	59.40
6	3.96	23	15.18	40	26.40	57	37.62	74	48.84	91	60.06
7	4.62	24	15.84	41	27.06	58	38.28	75	49.50	92	60.72
8	5.28	25	16.50	42	27.72	59	38.94	76	50.16	93	61.38
9	5.94	26	17.16	43	28.38	60	39.60	77	50.82	94	62.04
10	6.60	27	17.82	44	29.04	61	40.26	78	51.48	95	62.70
11	7.26	28	18.48	45	29.70	62	40.92	79	52.14	96	63.36
12	7.92	29	19.14	46	30.36	63	41.58	80	52.80	97	64.02
13	8.58	30	19.80	47	31.02	64	42.24	81	53.46	98	64.68
14	9.24	31	20.46	48	31.68	65	42.90	82	54.12	99	65.34
15	9.90	32	21.12	49	32.34	66	43.56	83	54.78	100	66.00
16	10.56	33	21.78	50	33.00	67	44.22	84	55.44	101	66.66
17	11.22	34	22.44	51	33.66	68	44.88	85	56.10	102	67.32

8+02 EAST END PIPE UNDER- ~~SR5E~~

9+00 to ℄ CR 725N = 72'

9+50 to ℄ CR 725N = 63'

10+00 " " " 43'

10+50 " " " 29'

11+00 " " " 24"

11+15 TO INLET IN yard 25' ℄ RD.

12+00 - 25'

12+20 TO END OF PIPE -

11+90 Match Monte's PLANS (PIPE)

(W) Mr Gamma said that load of gravel at con of Field. Ask if we could have it.

894.84 / 3.25 / 891.69

894.94 / 6.60 / 888.34

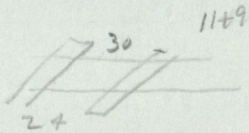
5+30

894.94

894.84 / 3.25 / 891.69

11+07 = 0+00

12+07 = ℄ DITCH S. SIDE



13+00 BOX

16+00 BOX

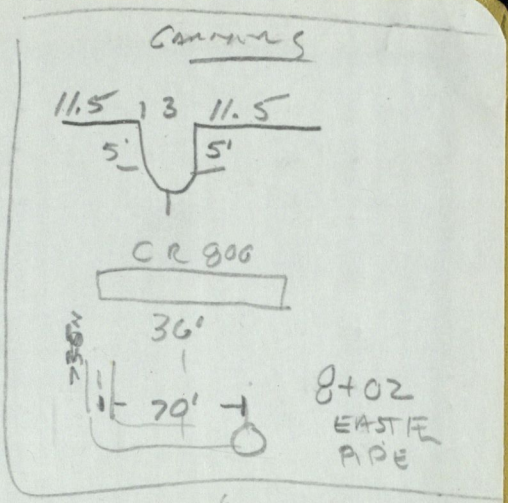
GAS LINE 18+00

18+00 BOX

21+00 BOX

912.80

893.63 / 9.70 / 883.93



893.63 / 6.35 / 887.28

.16

887.28 / 83.93 / 3.35

907.86

1+00

905.89

907.72

.67

905.22

15"

2.5

1.8

4.6

1.2

.4