

CR 343 (4) Slope Stakes

CR 343 (4)
Slope Stakes

HELDYNE
FREDERICK POST

FIELD BOOK

No. 9340-100



SUMMARY SHEET
ENGINEER'S ESTIMATE
 STATE ROAD COMMISSION OF UTAH
 DEPARTMENT OF HIGHWAYS

R-21

Name of Project CR 343(4) 10TH WEST Project No. CR 343(4) 1975
 County of CACHE Length Ft. Miles
 Type Station Surfacing Ft. Wide
 Made by to Station
 Checked by: QD. 41

NO.	QUANTITY	UNIT	ITEM	PRICE	AMOUNT
1	1	L.S.	MOBILIZATION P 81	\$1,000.00	1000.00
2	1	L.S.	CLEAR & GRUB P 81'A'	\$1000.00	1000.00
3	2,117	CU. YD.	ROADWAY EXCAVATION P 85	\$1.50	1058.50
4	32,654	TONS	GRANULAR BORROW P 82	\$11.00	321654.00
5	6020	TONS	UNTREATED BASE COURSE P 83	\$2.75	16555.00
6	329.1	CU. YD.	EXCAVATION FOR STRUCTURES P 84'A'	\$3.50	1151.85
7	4681.95	LN. FT.	RIGHT-OF-WAY FENCE P 80'A'	\$1.25	5852.44
8	31	BR. BT.	BRACED POSTS P 80'A'	\$50.00	1550.00
9	10	M.G.	METAL GATE - 16' P 80'A'	\$150.00	1500.00
10	1	M.G.	METAL GATE - 20' P 80'A'	\$200.00	200.00
11	120	LN. FT.	12" PERE M.P. UNDER GRADE P 82'A'	\$6.50	780.00
12	110	LN. FT.	12" PIPE CULVERT P 83'A'	\$7.00	770.00
13	1055	LN. FT.	18" PIPE CULVERT P 84	\$9.00	9495.00
14	1	L.S.	WELL SYSTEM P 85'A'	\$2000.00	2000.00
15	1	L.S.	SPECIAL DI & GRATE P 85'A'	\$1000.00	1000.00
16	1	L.S.	DIVERSION BOX & GATES P 86	\$1000.00	1000.00
17	5	MKR.	RIGHT-OF-WAY MARKERS P 88'A'	\$30.00	150.00
18	3	SIGN	30" STOP SIGNS P 87'A'	\$150.00	450.00
19	2	SIGN	WARNING SIGNS P 88	\$150.00	300.00
20	3	M.H.	ADJUST EXISTING MANHOLES P 87	\$300.00	900.00
21	1	L.S.	ROADSIDE CLEAN-UP P 89	\$100.00	100.00
TOTAL PAY					79466.79

Index

Page

Slope Stakes

2

Benchmarks

10

Culverts

20

ALIGNMENT

12

$2/33$ $\rightarrow 3^2 \leftarrow 3^2$ -28 -24 $4:1$ $4:1$ 

	Sub gr. 24 33 -1.24	Finish Gr 21 33 -43	Profile Gr.	Finish gr 21 33	Sub Gr 24 33
214	57 ¹	57 ²	4458 ³	57 ²	57 ¹
213	57 ⁴	58 ²	58 ⁶	58 ²	57 ⁴
212	57 ²	58 ⁵ -0.24	58 ³	58 ⁵	57 ²
211	58 ⁰	58 ⁸	59 ²	58 ⁸	58 ⁰
210	57 ⁸	58 ⁶	4459 ⁰	58 ⁶	57 ⁸
209	57 ⁶	58 ⁴	58 ⁸	58 ⁴	57 ⁶
208	57 ⁴	58 ²	58 ⁸	58 ²	57 ⁴
207	57 ²	58 ⁰	58 ⁴	58 ⁰	57 ²
206	57 ⁰	58 ⁸ +0.22	58 ²	57 ⁸	57 ⁰
205	56 ⁸	57 ⁶	58 ⁰	57 ⁶	56 ⁸
+28				57 ²	56 ⁴
204	56 ³	57 ¹	4457 ⁵⁴	57 ¹	56 ³
	58 3 33 58/97 61				

Ditch Gr.	ELEV. 50	CATCH PT.		DITCH	ELEV. 50 3
61 ³	54 ¹	7 ² F3 ⁰	HL 59 ⁵³ - 4 ²²	4 ⁹ CO ⁵	3 ¹ 36 ⁷
48		36 ²	TP 55 ²¹ - 6 ⁰⁶	38 ¹	
54 ⁵		6 ² F3 ⁰		6 ⁰ CO ⁸	F2 ¹ 35 ¹
62		36 ²		39 ¹	
54 ²	6	6 ² F3 ⁰		5 ⁶ CO ⁸	5 ³⁵ F2 ⁸ 35 ⁵
5 ²		38 ²		38 ²	
55 ³	6 ⁵⁵	6 ⁶ F3 ⁰ + 6 ⁴⁷	- 6 ⁸⁵	6 ¹ CO ²	5 ²⁵ F2 ⁷ 35 ¹
51 ⁸⁰		36 ³	EL 6 ²⁷ EL 54 ⁸⁰	35 ²	
4455 ⁵	6 ⁵³	4 ² F2 ⁴		6 ¹ φ	6 ⁰⁰ F2 ³ 35 ⁵
		33 ²		33 ⁵	
No. 11		4 ⁴ F1 ¹		5 ³ F1 ³	5 ⁴
		28 ²		29 ⁵	
4455 ⁹	5 ⁰¹	5 ¹ FO ⁹		6 ³ CO ³	5 ³⁴ F2 ¹ 38 ³
H16 ⁵⁵		27 ²		35 ¹	
54 ⁸	4 ⁷⁸	4 ⁸ FO ⁵		5 ⁸ CO ⁹	5 ²¹ F2 ² 38 ²
		26 ³		37 ²	
54 ⁸	5 ⁴¹	4 ² φ		5 ⁷ CI ²	5 ⁵² F2 ⁴ 38 ⁹
		24 ³		37 ²	
54 ⁴		5 ⁰ FO ³		5 ⁶ CI ⁵	5 ³⁰ F2 ⁴ 38 ²
+50	115 ⁴²	25 ⁵	F1 ¹	F2 ²	39 ²
H16 ¹⁰	54 ⁰				F2 ³ 38 ³
115 ³²					F2 ⁴ 38 ⁹
	3 ¹	3 ²⁶	4461 ⁶⁵	-3 ¹¹	BM 4458 ³²
		7 ¹⁹ +	4461 ⁵⁰		BM 4454 ^{31 21}

	Sub Gr 2433	Finish Gr 2133	Profile	Finish Gr 2133	Sub Gr 2433
224+50	54 ¹	54 ⁸	4455 ²⁸	54 ⁸	54 ¹
+0.5	54 ²	55 ⁰	55 ⁴	55 ⁰	54 ²
224-	54 ²	55 ⁰	55 ⁴	55 ⁰	54 ²
223	54 ⁵	55 ³	55 ⁷	55 ³	54 ⁵
222-	54 ⁰	55 ⁶	56 ⁰	55 ⁶	54 ⁰
221-	55 ¹	55 ⁹	56 ³	55 ⁹	55 ¹
220-	55 ⁴	56 ²	56 ⁶	56 ²	55 ⁴
219-	55 ⁷	56 ⁵	56 ⁹	56 ⁵	55 ⁷
218-	56 ⁰	56 ⁸	57 ²	56 ⁸	56 ⁰
217-	56 ³	57 ¹	57 ⁵	57 ¹	56 ³
216-	56 ⁶	57 ⁴	57 ⁸	57 ⁴	56 ⁶
215-	56 ⁹	57 ⁷	4458 ¹	57 ⁷	56 ⁹

	Sub Gr 2433	Finish Gr 2133	Profile	Finish Gr 2133	Sub Gr 2433
4450	54 ¹	54 ⁸	4455 ²⁸	54 ⁸	54 ¹
4451	54 ²	55 ⁰	55 ⁴	55 ⁰	54 ²
4452	54 ⁵	55 ³	55 ⁷	55 ³	54 ⁵
4453	54 ⁰	55 ⁶	56 ⁰	55 ⁶	54 ⁰
4454	55 ¹	55 ⁹	56 ³	55 ⁹	55 ¹
4455	55 ⁴	56 ²	56 ⁶	56 ²	55 ⁴
4456	55 ⁷	56 ⁵	56 ⁹	56 ⁵	55 ⁷
4457	56 ⁰	56 ⁸	57 ²	56 ⁸	56 ⁰
4458	56 ³	57 ¹	57 ⁵	57 ¹	56 ³
4459	56 ⁶	57 ⁴	57 ⁸	57 ⁴	56 ⁶
4460	56 ⁹	57 ⁷	4458 ¹	57 ⁷	56 ⁹

Sub Gr	Finish Gr	Profile	Finish Gr	Sub gr.
24.23	21.33		21.33	24.23
-1.24	-.43			
231-	51 ⁷	52 ⁵	4452 ⁸⁹	52 ⁵ 51 ⁷
230-	53 ³ 3 ⁷	54 ¹	54 ⁵	54 ¹ 53 ³
229+50	54 ¹ 2 ²	54 ²	4455 ²⁸	54 ² 54 ¹
228-	54 ¹ 2 ²	54 ²	55 ³	54 ² 54 ¹
228-	54 ¹ 2 ²	54 ²	55 ³	54 ² 54 ¹
+0.5 227-	54 ¹ 2 ²	54 ²	55 ³	54 ² 54 ¹
+1.0 226-	54 ¹ 2 ²	54 ²	55 ³	54 ² 54 ¹
+1.0 225-	54 ¹ 2 ²	54 ²	55 ³	54 ² 54 ¹
22.4 +50	reprof	54 ²	4455.28	54 ² 54 ¹

13th

5

230+67.5 pt under fence.

-622

EL 4451³¹ BM

4451²

FD⁷
27¹

51⁵

5⁵ F1²

5³ C0³

F1²
31⁵

29¹

32⁷

51²

F2²
33⁹

52²

4² F1⁴

5⁵ ϕ

F2¹
32⁷

29²

32⁷

52⁰

5⁷ F2²

5³ C0⁴

F2¹
32⁷

33¹

HI 4457⁵⁸
BM 4453²³

+4⁵⁵
-3²⁴

34³

51⁵

F2⁸ 5²

F1⁹

4⁴ C1¹

F2⁶
34⁷

35⁵

39¹

51⁰

5² F3³

F3⁴

5⁴ C0⁶

F3¹
36⁷

37.5

39¹

50⁵

5³ F3⁴

F3²

5⁵ C1³

F3⁶
36⁷

37⁹

43²

4450²

F4¹
40⁷

HI SL 37 34

51⁰
55³
13⁴
4452.48
4⁵⁵
40³
37²

57.1

52

~~46~~
19

27

4.10

4457.13

4453.03

211-

TP

+5.18

63.52

-3.56

58.39

BM North
of Gosn.

210

209

208

207

206

205

5-15-75

4.19

62.53

58.39

204.

5-7-75

7.05

62.55

-7.29

4455.50

BM North
of Gosn.

+3.56

61.25

58.32

sh.

8

sh.

58.0

4459.2

58.0

5.6

5.1

5.6

57.8

4459.0

57.8

4.3

3.2

4.3

57.6

4458.8

57.6

5.0

3.2

4.9

57.4

4458.6

57.4

5.1

3.2

4.5

57.2

4458.4

57.2

5.3

4.2

4.8

57.0

4458.2

57.0

5.5

4.5

5.0

56.8

4458.0

56.8

5.2

4.2

5.3

56.3

-1.2

4457.54

56.3

6.2

5.3

6.2

219-

56.7
- 5.2

4456.9
4.7

56.7
5.2

218-

56.0
- 4.2

4457.2
4.4

56.0
4.2

TP +6.19 60.88 -8.88 54.69

217-

56.3
- 7.3

4457.5
6.8

56.3
7.3

216-

56.6
- 7.2

4457.8
6.5

56.6
7.2

215-

56.9
- 6.7

4458.1
6.2

56.9
6.7

214-

57.1
- 6.5

4458.3
6.2

57.1
6.5

213-

57.4
- 6.2

4458.6
5.7

57.4
6.2

212-

57.7
- 5.2

4458.9
5.4

57.7
(5.2)

63.57
6.88

227 TP +4⁵⁵ 58⁶³ -5¹² 54⁰⁸

54.1
5²

4455.3
4²

54.1
5²

226

54.1
1 5²

4455.3
4²

54.1
5²

225

54.1
15²

4455.3
4²

54.1
5²

TP +6²² 59²⁵ -7⁰⁵ 53⁰³

224

54.2
16⁷

4455.4
6²

54.2
6⁷

223

54.5
16⁴

4455.7
5⁹

54.5
6⁴

222-

54.8
16¹

4456.0
5⁶

54.8
6¹

221-

55.1
15⁸

4456.3
5³

55.1
5⁸

220

55.4
15⁵

4456.6
5⁰

55.4
5⁵

6088

231

51.7

4462.9

51.7

230

53.3

4464.6

53.3

5.3

229

722

4459.28

54.1

4465.8

54.1

5.0

228

54.1

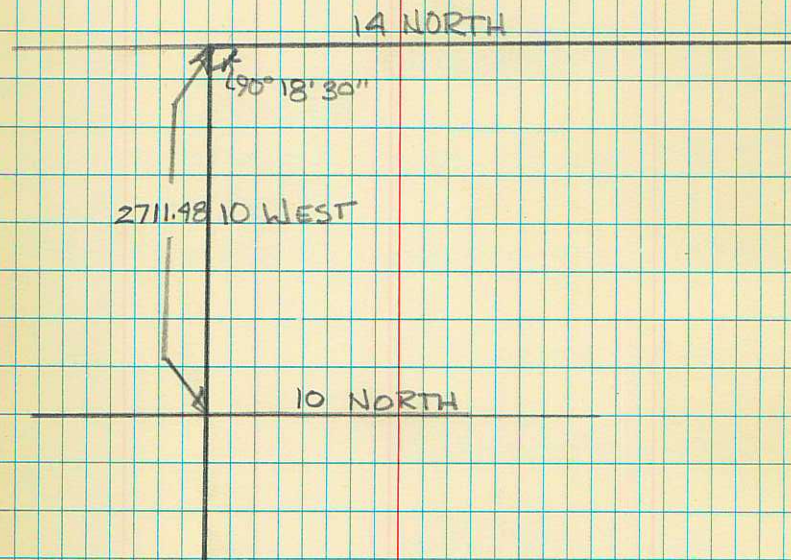
4466.3

54.1

4.5

49

4.5



INSIDE CURVE

ELEV.

+

HI

14

STA.

DEF.

CHORD

$$232 + 43^{47} 44^{\circ} 50' 45'' = 359.50$$
$$\begin{array}{r} 54 \overline{) 14} \\ \underline{52} \\ 2 \end{array}$$

232 ~ 39°53'29" 322.40

$$\begin{array}{r} 54 \overline{) 12} \\ (49) \end{array}$$
$$T = 250.00$$

231+50	34° 11' 33"	282,50
--------	-------------	--------

$$\Delta = 89^{\circ} 41' 30''$$
$$\begin{array}{r} 53 \overline{) 7} \\ \underline{59} \end{array}$$
$$R = 251.35$$

231+ 28° 29' 38" 239.82

$$L = 393.47$$
$$\begin{array}{r} 54 \overline{) 540} \\ \underline{(54)} \end{array} *$$

230.50 22°47'42" 194.76

$$\frac{54}{11} \frac{32}{(4-2)} *$$

230 ~ 17°05'47" 147.78

$$\begin{array}{r} 59 \overline{) 93} \\ \underline{(43) \times} \end{array}$$

229+50	11°23'51"	99.34
--------	-----------	-------

$$\frac{5493}{(46)^*}$$

229~	541'56"	49.92
------	---------	-------

$$\begin{array}{r} 54 \ 54 \\ \hline (4 \ 6)^* \end{array}$$

PC. 228-50

$$\begin{array}{r} 4454 \overline{) 6} \\ (45) \end{array}$$

777

59 08

445/3

Bm 10th W. 14 Nov

OUTSIDE CURVE

STA. DEF. CHORD

232+11⁶⁷ 44°50'45" 325.86

53⁸⁰
(52)

232~ 43°23'54" 317.48

53⁷⁰
(54)

T=229.80

231+50 37°11'55" 279.36

Δ=89°41'30"

53⁴⁰
(52)4

R=231.04

231~ 30°59'56" 237.98

L=361.67

53⁴
(52)*

230+50 24°47'57" 193.81

53³
(58)*

230~ 18°35'57" 147.38

53³
(58)*

229+50 12°23'58" 99.22

53¹⁵
(55)*

229~ 6°11'59" 49.90

53⁹
(52)*

228+50 0°00'00"

54¹

7.27

59.02

445.13

	ELEV	GR.	CUT	AREA	AVR. AREA	LENG	CUR.FT.
1+06	53 ⁶	53⁶	0	0			
0+96	53 ⁸	551	1 ⁶	5 ⁶			
					28	8	224
0+88			0	0			
					43 ⁸	13	5694
0+75			2 ⁵	8 ⁷⁵			
					87 ⁵	25	21875
0+50	54 ⁵	552	2 ⁵	8 ⁷⁵			
					87 ⁵	25	21875
0+25			2 ⁵	8 ⁷⁵			
					43 ⁸	17	7446
0+8			0	0			
					18	8	144
0+00	55 ³	554	0 ¹	35			
							59274

Sta 204+08
18" X 96" pipe Culvert.
96' ahead S.H.

X 10° RP 73 536
0+96 55 554

204+08 ✓
0+50 52 552

0+00 55 554 (544)

X 10° RP 55 554

21.95 cu yds

~~21.96 cu yds~~

HI 6088

445431 6 52

Summary 204+03

21.95 cu yd.

St. Exc.

~~21.9~~ cu yd

~~pay~~

18" pipe

96⁰ ft.

~~pay~~

CHKD

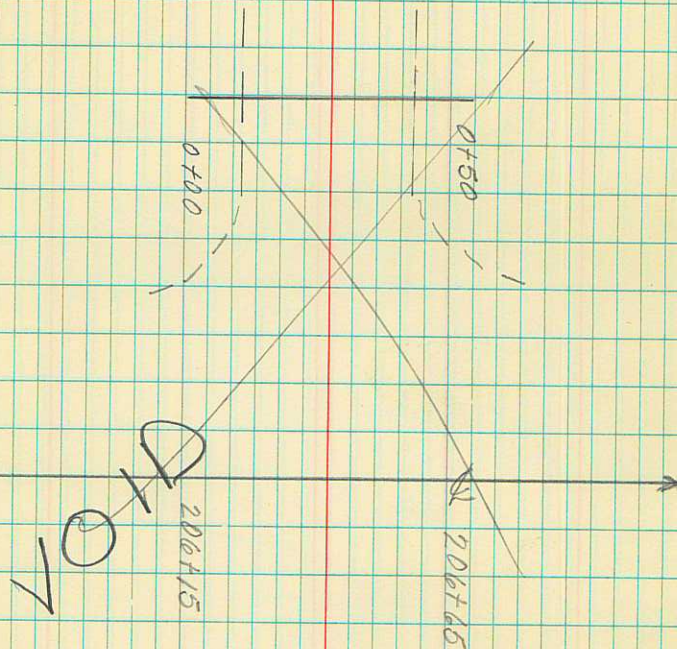
6-9-75

M.D. (w.)

5th 206+15 to 206+65

Drive way

Not required for drainage. - not placed. GPK



*

+

HI

-

EL

Cut

Pipe was shortened 10' due to moving inlet structure.

EL OF PIPE AT
2+89

2+89

6⁵

4453⁰

55⁸

C2⁸

(2.0)

2+10

5⁰

56⁷ 53³

C3⁴

(2.5)

1+75

6¹

56³ 53⁴

C2⁸

(2.5)

0+50

6⁵

55⁸ 53⁸

C2⁰

0+00

0+10

542⁴

4454⁰

C1⁵

(C3⁰ FROM
LINE ON CAT)

EL EXISTING METAL PIPE,
(15") WEST END.

9⁴⁴

4452²

EL EXISTING 15"
METAL PIPE, EAST END

8²⁷

4454⁰

386

4462²⁵

4458³⁹

57

Area
Area
length
CUT

8.8

695.2

8.8 79

8.8

8.8 35 308

8.8

7.9 25 197.5

7.0

6.2 40 248

5.3

Sub Tot = 1448.7 Cu. Ft.

or 53.7 Cu yd. ✓

fy

CHKD 6-9-75 M.D.W.

	+	HI	-	ELEV
1+42			65	
1+36			57	
1+06			52	
1+02			60	
0+98			40	
0+91			52	
0+36			45	
0+36				
0+09			45	
0+06			53	
0+06			55	

446082

Sta 208+83 to Sta 209+83

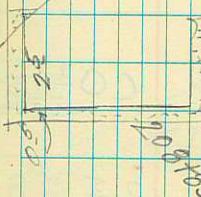
57A

24" x 140' pipe Culvert
18" x 240'

See page 63

Sta EOC.

Cut - 12 ft
 $65 \times 65 \times 10 = 42.26 \text{ cu ft}$
 0.440
116 G yd



Steel-

Floor - 80.45 / 36 ft

Walls - 30.13 = 39

Vol - $90.75 = 225$
 9.75

$475 \times 665 = 65.1$

Amount of R. NO RAY

55%

0+00

PCC

8 18" pipe

Floor: $45 \times 45 \times 0.5 = 10.13 \text{ cu ft}$

Walls: $(0.5 \times 45 + 45 \times 0.5) \times 1.5 = 6.75 \text{ cu ft}$

Minus pipes $(- 0.75 \times 1.5 \times 0.5) \times 2 = -1.77$

7.5 cu ft

or

0.56 cu yd
NO RAY

FE EL ~~WEST~~ END
OF PIPE

1+44

1+30

0+30

0+00
E EAST END
PIPE

53⁶
78² 54⁵ C0²
2.5
5⁶ 56⁷ C2⁸
57⁰ C3² FROM
54⁰ LINE

4462²⁵

AREA AVE AREA LENG. CU FT

See page 63 for this pipe

3.15
5.95 14 83.2
8.75
8.75
9.22 100 875²
8.75
9.22 100 928²
8.75
9.22 100 262.50
8.75
10.15 30 304.5

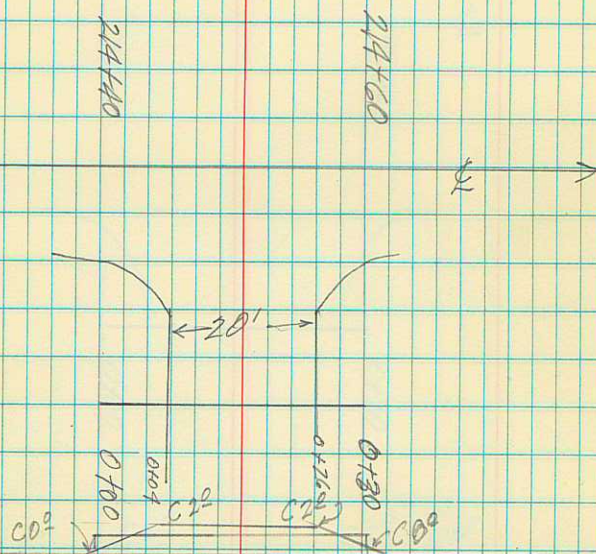
1220⁸
1315⁸
PA 45.21 cu yds
CHCD 15 25 2704

Sta ²¹²⁺¹⁰ ~~211+20~~ to ²¹²⁺⁴⁰ ~~211+50~~

59

12" X 30' Pipe Culvert on
Driveway

30' 12" pipe *GLL*
Pay



Pipe placed in full pay for 12' length.

	Cut	Area	Area	L	Vol
0+00	0	0	32	4	12
0+04	22	62	62	22	132
0+26	22	62	32	4	12
0+30	0	0			

$$156 \text{ Cu.ft.} = 5.8 \text{ Cu.yd.}$$

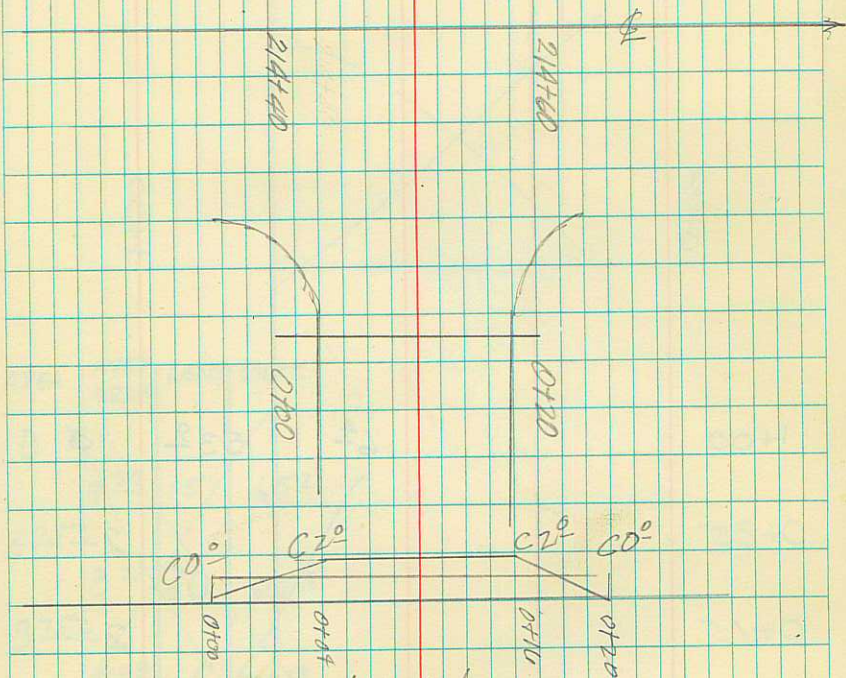
Pay *GLL*

CARD 6-9-15 *MDW*

Sta 214+40 to Sta 214+60

12" x 20' pipe Culvert at
Drive way

20' of 12" pipe pay. *gll*
placed in pit.



	Cut	Area	Area	L	Vol
0+00	0	12	3	4	12
0+04	20	20	6	12	72
0+16	20	20	6	12	12
0+20	0	12	3	4	

96 cu ft = 3.6 cu yd ✓
pay *gll*

CHKD 6-9-75 *MDW*

	+	HI	-	EL	CUT
1+00			6 ⁴	53 ²	0
0+85					2 ⁵
0+15					2 ⁵
0+00			5 ^{6.3}	54 ²	CO ⁴
	5 ³	4460 ³⁴		4455 ²¹	

213 + 85⁰⁰

18" ALUMINUM X 100'

Net used

N

1+00

0+00

AREA	AVER AREA	LENG	CUT.
D			
825	438	15	652
825	875	70	612 ⁵
19	528	15	761 ²
			754 ³³

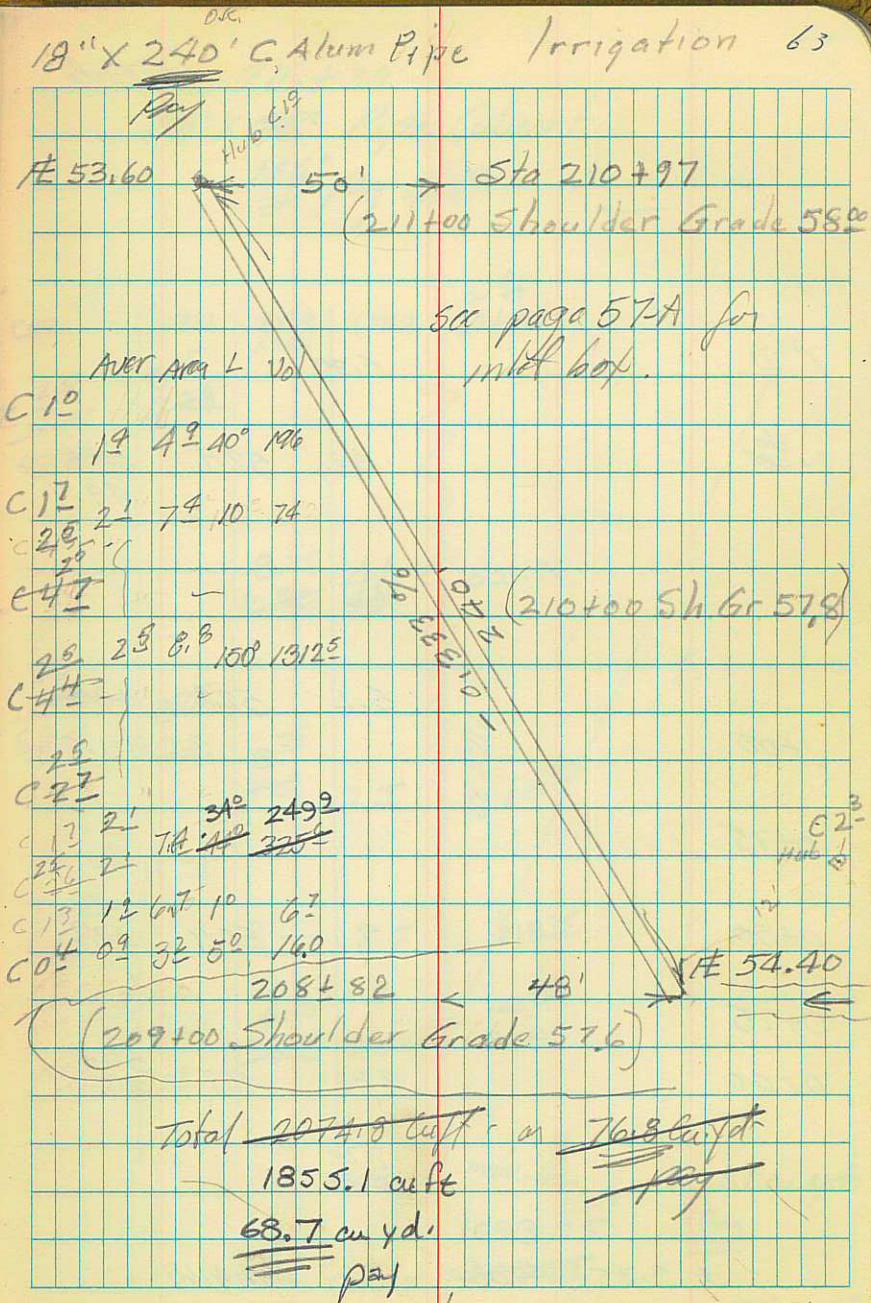
No pay

Sta	+	-	Elev
B.M.			5899
	4.92	6331	
48' R.I. of Sta	208+80	95' H	538
0+00	10/10	85	544
0+05		82	541
0+06		62	
+40		73	
+50	Hub	64	569
1+00		48	585
+50	Hub	48	585
2+00		79	554
+40	Hub	87	546

cutlet 210+97 50' H

~~Sta 215+20 to Sta 216+40~~
~~Under Drain System~~

Sta	Apr, 17, 1975	Snow	Ground
BM	+	Grade	Elev
	5.10	63.49	4458.30
		↓	
2+40	Outlet	53.60	8.9
2+00		53.73	8.1
+90		53.76	5.4
1+50		53.90	4.9
1+00		54.07	5.0
0+50		54.24	6.6
0+40		54.26	7.5
0+06		54.38	6.5
0+05		54.38	7.8
0+00	Inlet	54.40	8.7
G.L. 12			
W.E.M.			
Pres. W.			



64

18" X ~~96~~ Pipe Culvert

136' pay GJK

14 Place

L +	5.30		
1 + ³⁶ 40	5.1	52.9	49.6 49.7
1 + 00	5.2	52.8	49.0 49.8
0 + 75			
0 + 50	7.1	50.9	49.9
0 + 25			
0 + 00	8.30	48.7	50.0 49.7
	7.76 8.97		
+ 3.35	4458.00	4454.65	

CUT	AREA	AVER AREA	LENG	cu ft
2.5 C 3.2 C 4.2	8.25 11.25			0.496
		8.75	61 10.82 40	533.75
2.5 C 3.8 C 3.0	8.75 10.5	8.75	25	216.75
		8.75	25	218.75
2.5 C 4.8	8.75	8.75	25	218.75
C 2.5 F 0.3	8.75 10.5	4.90 2.82	25	122.50 0.400
under drain				40.51 cu yds
TOTAL CU. FT.				1093.75 987.75

under drain 40.51 cu yds
1093.75 pay

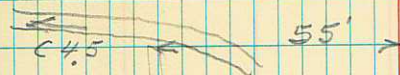
CHKD 6-9-75 MDW

217±32 Outlet 12" x 120' Underdrain

216±12 end 12" x 120' Underdrain

May 2, 1975

65



placed 120' 12" Underdrain
pay off

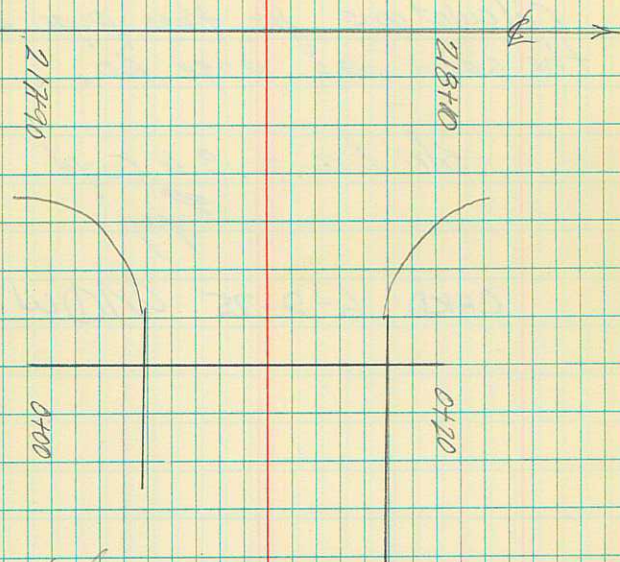
Cut 20' 40' >

Av. Cut = 3.25' 3 mos. off
Av. w = 2.5' 3 mos. off

$3.25 \times 2.5 \times 120 = 975 \text{ cu. ft.}$
or $\underline{36 \pm} \text{ cu. yds.}$

CHKD 6-9-75 MOW

Sta 217+90 to 218+10
 12" x 20' pipe Culvert at
 Drive way



calculations for this pipe are
 the same as page 60.

3.6 Cuyd
 ⇒ pg 67K ✓

CHKO 6-9-75 NDW

Sta 223+30 to 223+50 El.
12" x 20' pipe

20' placed G.M.
pay

Calculations for this pipe are
the same as page 60.

Sta Exc. = 3.6 Cu yd.
pay

CHKD 6-9-75 M.D.W.

Sta 220+90 to Sta 221+10
12" x 20' pipe Culvert
Driveway

0+90 6²² 4451⁶ C1⁶

0+80 6²⁵ 4451⁵ C1⁵
GR. 8² 8² 30⁰ 2⁰
0+75

0+05 2⁵
⊙
OFFSET 5¹³ 4452⁷⁰ C2²

0+00 7⁷ 4450⁻
GR 49⁸

0-10

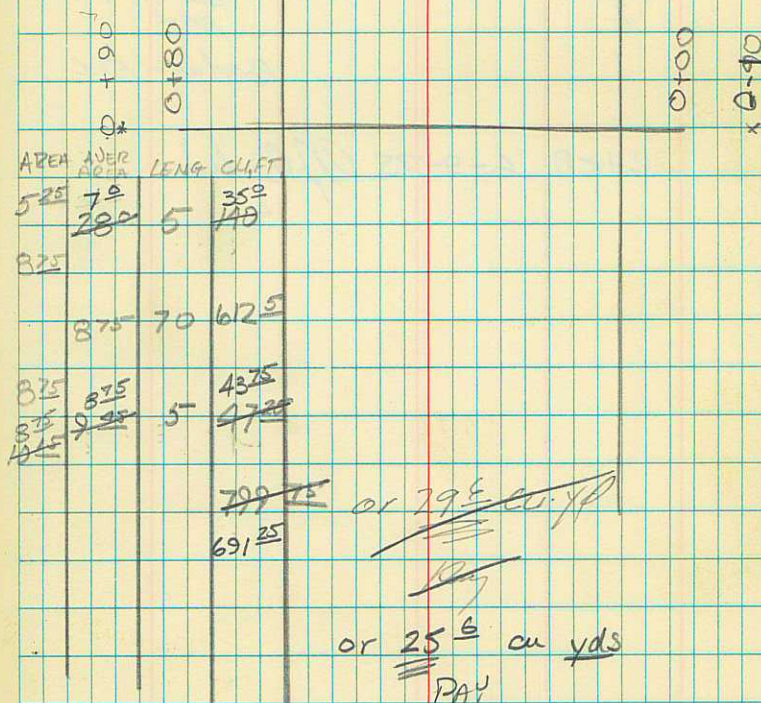
4 83 4457⁸³ 4453⁰⁰

223+98⁰⁰ 18" x 80' AI PIPE

69

in place
pay 8.11

N



CHKD. 6-9-75 O.D.W.

Ditch Excavation

Sta 223+28 to 223+98 1+ = 70'

223+98 to 228+48 = 450'

Total 520'

$$\frac{15+35}{2} \times 1 \times 520 \times \frac{1}{27} = 48.1 \text{ Cu yd}$$

for
Roadway Exc.

CHKD 6-9-75 M.D.W.

225 + 90 to 226 + 10

No pipe

72

226 + 90 to 227 + 10 RT
12" X 20' pipe

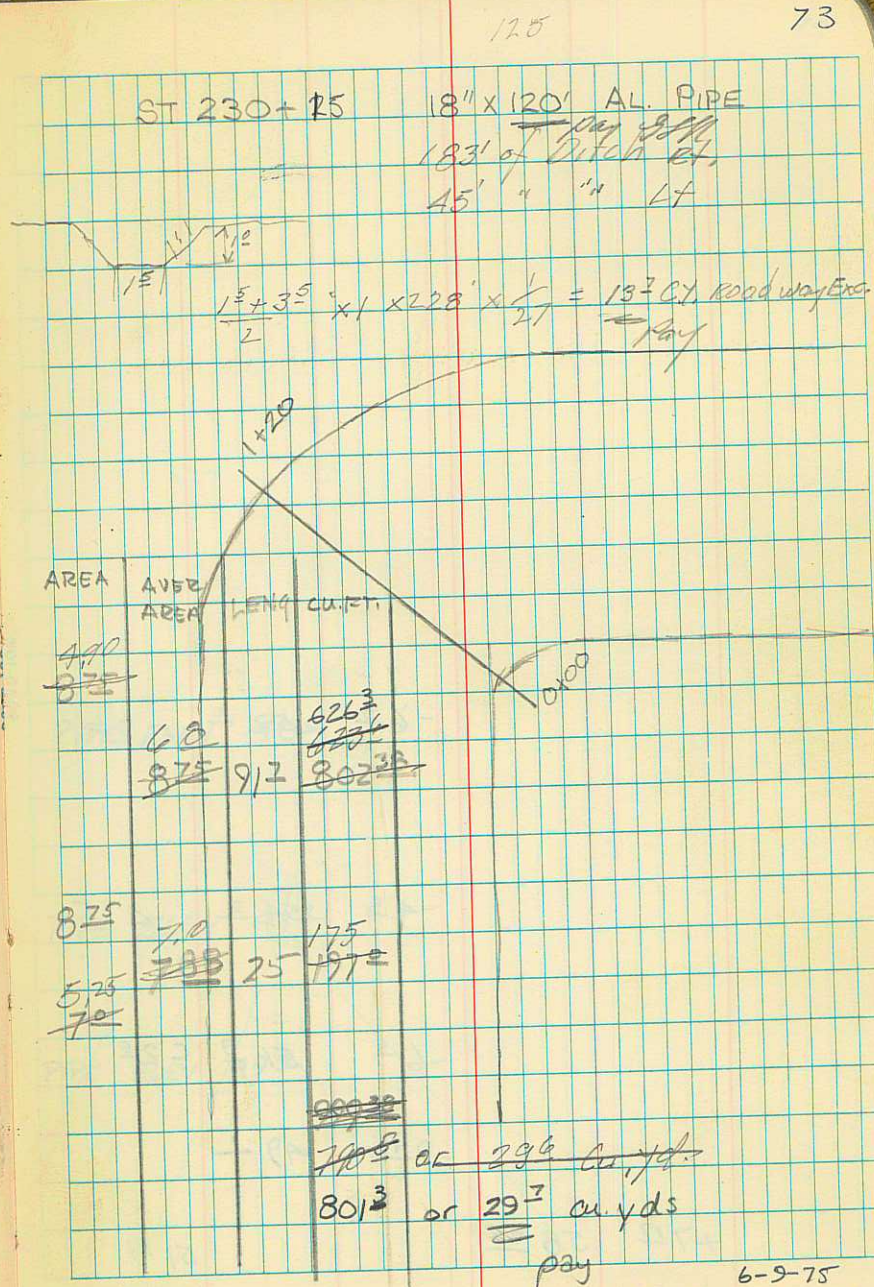
Play 8 ft

Calculations for this pipe are the
same as page 60.

3.6 cfd. per
ft

CHKD 6-9-75 M.D.W.

	+	HI	-	EL	CUT
SEWER REVISION					
ELEVATION 4-10-75					
FE OF EXISTING DITCH			7 ²	49 ²	Ø
1+50					C1 ⁴
1+26 ⁷			5 ²	51 ² 49 [±]	C2 ⁵
0+60					C3 ⁶
0+25					C2 ⁵
					C1 ⁵
0+00			4 ²	52 ² 50 [±]	C2 ⁰
0-10			4 ²	52 ²	C2 ⁰
FE EXISTING DITCH			6 ²⁹	50 ⁸	Ø
BM	5 ⁷⁷	4457 ⁰⁹		4451 ³²	



6-9-75
CHKD. M.D.W

~~-6³ 52² C2²~~

~~-4³ 54² 4⁵~~

~~-6⁶ 51⁹ C2⁵~~

~~-94 49¹~~

+7¹² 58¹⁸

51³¹

PIPE ELEV. 50²

PIPE ELEV. 49²

PIPE ELEV. 49⁴

5-9-75

COOL WINDY

T PWARD

DITCH CUTS

P E. MICKELSEN

STATION

+

HI

-

CUT

221

78 81 C 03

220

72 82 C 06

219

72 85 C 19

218+50

72 86 C 15

218

86 88 02

218

220

221

Sta 228+00 to 228+44
Well System

Changes

- A. 24" pipe to 36" pipe
Casing at Contractor's request.
- B. 33 from well to sand to
23 feet due to error in plans.
- C. Cover

Complete in place. 6-3-76
GPK

Roadway Excavation.

Removal of unsuitable material

Sta 215+60 to Sta 216+90

Aver Cut = 45

$$\begin{array}{r} 130' \\ 150' \times 50' \times 45 \times \frac{1}{27} = 1083 \frac{33}{100} \text{ Cu. Yd.} \end{array}$$

Sta 224+90 to 225+85

Aver Cut = 32

$$95 \times 50 \times 32 \times \frac{1}{27} = 528 \text{ Cu. Yd.}$$

$$\begin{array}{r} 1611 \\ \text{Sub Total } 1778 \text{ Cu. Yd.} \end{array}$$

From original Quantity

Shorts

444 Cu. Yd.

Total

$$\begin{array}{r} 2055 \\ 1778 \\ \hline 2222 \text{ Cu Yd} \end{array}$$

Adjust Man holes

209466 rates 1.0

212420 Raise 1.5

217422 Raise 2.0

total 3
pay

EAST SIDE, SOUTH TO NORTH			
FENCE TOTALS CR 343(4)			
QUANTITY	DESCRIPTION	QUAN.	DESCRIPTION
1	BR POST	330.5'	FENCE
478'	FENCE	22	POSTS
29	POSTS	1	GATE (16.1')
1	GATE (18.1')	2	BR. POSTS
2	BR. POSTS	190.5'	FENCE
304.6'	FENCE	12	POSTS
19	POSTS	1	BR. POST
1	GATE (20.0')	78.5'	FENCE
2	BR. POSTS	4	POSTS
207.5	FENCE	1	BR. POST
13	POSTS	78.2'	FENCE
1	GATE (16.3')	4	POSTS
2	BR. POSTS	1	BR POST
335.5'	FENCE	111'	FENCE
22	POSTS	6	POSTS
1	GATE (16.0')	1	BR POST
2	BR. POSTS	18.4'	FENCE
305.9'	FENCE	1	POST
19	POSTS		
1	BRACE POST		
230.75'	FENCE		
14	POSTS		
1	GATE (16.1')		
2	BRACE POSTS		

WEST SIDE - NORTH TO SOUTH.

FENCE TOTALS CR 343(4)

QUAN.	DESCRIPTION
1	BR POST
132.3'	FENCE
8	POSTS
1	GATE (16.1')
2	BR. POSTS
303.8'	FENCE
19	POSTS
1	GATE (16.0')
2	BR POSTS
392.8'	FENCE
26	POSTS
1	BR POST
396'	FENCE
25	POSTS
1	GATE (16.1')
17	POSTS
2	BR POSTS
278'	FENCE
2	BR POSTS
440.4'	FENCE
29	POSTS
1	GATE (16.0')
2	BR POSTS
69.3'	FENCE
4	POSTS
1	BR POST

80
1 gate for Quail on 10th
5th. GAK

80'A'

TOTAL QUANTITIES
FENCE

DESC.	QUANTITY	COST/UNIT	TOTAL COST
FENCE	4,681.95 ft.	\$1.25/ft	\$5852.44
POSTS	293		
BR. PST	31	\$50/BR. PST.	\$1550.00
16' GT.	89	\$150/GT.	\$13350.00
18' GT. opening only	1	\$200/GT	\$200.00
20' GT.	1		

6-9-75

M.O.W.

MOBILIZATION

CONSISTS OF TRANSPORTING EQUIPMENT
TO AND FROM THE JOB SITE, AND
MAINTENANCE OF EQUIPMENT

UNIT OF MEASUREMENT - Lump Sum
BID AMOUNT \$1,000.00

PAY CONTRACTOR \$1,000.00

6-9-75 M.O.W.

81'A' CLEARING AND GRUBBING

CONSISTS OF THE REMOVAL OF
BUILDINGS, TREES, FENCES, ETC.,
WHICH ARE WITHIN THE HIGHWAY
RIGHT-OF-WAY.

UNIT OF MEASUREMENT - LUMP SUM

BID AMOUNT - \$ 1000.00

PAY CONTRACTOR \$ 1000.00

6-9-75

M.D.W.

GRANULAR BORROW

82

CONSISTS OF FREE DRAINING
FILL MATERIAL USED TO BUILD
UP THE TYPICAL CROSS-SECTION

UNIT OF MEASUREMENT - TONS

PRICE PER UNIT - \$ 1.00

ORIGINAL ESTIMATE - 30,000 TONS

AS BUILT - 32,654 TONS

← TOTAL FROM WEIGH SLIPS.

PAY CONTRACTOR \$ 32,654.00

6-9-75

M.D.W.

82 'A'

12" PERFORATED PIPE

CONSISTS ONLY OF PIPE

UNIT OF MEASUREMENT - LIN. FOOT

PRICE PER LINEAR FOOT - \$6.50

AMOUNT OF LINEAR FEET - 120 FT.

FROM THIS BOOK (P 109)

ORIGINAL ESTIMATE - 140 FT

PAY CONTRACTOR - \$780.00

83

UNTREATED BASE COURSE

CONSISTS OF UNTREATED BASE MATERIAL.

UNIT OF MEASUREMENT - TONS

PRICE PER TON - \$2.75

ORIGINAL ESTIMATE - 5,800 TONS

AS BUILT - 6,020 TONS

FROM WEIGH SLIPS

PAY CONTRACTOR \$16,555.00

6-9-75 MOW

83'A'

12" PIPE CULVERT

CONSISTS ONLY OF PIPE

UNIT OF MEASUREMENT - LIN. FEET
AMOUNT OF LIN. FEET - 110 FT. FROM PAGE 109
PRICE PER LIN FT. - \$7.00

ORIGINAL ESTIMATE - 140 FT

PAY CONTRACTOR \$770.00

6-9-75

M.O.W.

18" PIPE CULVERT

84

CONSISTS ONLY OF PIPE

UNIT OF MEASUREMENT - LIN FT.
AMOUNT OF LIN FT - 1055 FT.
PRICE PER LIN FT - \$9.00
THIS BOOK (P 109)

ORIGINAL ESTIMATE - 932 FT

PAY CONTRACTOR - \$9495.00

6-9-75

M.O.W.

84'A'

STRUCTURE EXCAVATION

CONSISTS OF NATURAL GROUND AND/OR
BORROW REMOVED TO ALLOW FOR
THE PLACING OF PERMANENT STRUCTURE.

UNIT OF MEASUREMENT - CU. YDS.

NUMBER OF CU. YDS - (THIS BOOK, P 109)

ORG. EST. - 450 cu yds

AS BUILT - 329¹ cu yds

AMOUNT PER CU YD. - \$3.50

PAY CONTRACTOR - \$1151.85

6-9-75 M.D.W.

85

ROADWAY EXCAVATION

CONSISTS OF NATURAL GROUND
PREPARATION FOR GRANULAR BORROW,
AND THE DIGGING OF DITCHES.

UNIT OF MEASUREMENT - CU. YDS.

NUMBER OF CU. YDS (THIS BOOK, P 109)

ORIGINAL EST. - 2,500 CU YDS

AS BUILT - 2,117 CU YDS

AMOUNT PER CU. YD. \$.50

PAY CONTRACTOR \$1058.50

6-9-75 M.D.W.

85 'A'

SPECIAL DI & GRATE

CONSISTS OF PREPARATION, EXCAVATION,
AND BUILDING OF STRUCTURE, INCLUDING
MATERIALS.

UNIT OF MEASUREMENT - LUMP SUM

BID AMOUNT - \$1,000.00

(SEE PAGE 55)

PAY CONTRACTOR \$1,000.00

6-9-75

M.O.W.

DIVERSION BOX & GATES

86

CONSISTS OF PREPARATION FOR,
EXCAVATION FOR, AND CONSTRUCTION
OF STRUCTURE, INCLUDING MATERIALS.

UNIT OF MEASUREMENT - LUMP SUM

BID AMOUNT \$1,000.00

(SEE PAGE 57-A)

PAY CONTRACTOR \$1,000.00

6-9-75 M.O.W.

86'A'

WELL SYSTEM

CONSISTS OF EXCAVATION FOR AND
CONSTRUCTION OF WELL SYSTEM, AND
INCLUDES ALL MATERIALS.

UNIT OF MEASUREMENT - LUMP SUM

BID AMOUNT - \$2,000.00

(SEE P. 76)

PAY CONTRACTOR \$ 2,000.00

6-9-75 N.O.W.

ADJUST EXISTING MANHOLES.

87

CONSISTS OF EXCAVATION FOR, MATERIALS,
AND LABOR IN THE RAISING OF
MANHOLES FROM EXISTING GRADE
TO FINAL GRADE OF THE HIGHWAY.

UNIT OF MEASUREMENT - PER MANHOLE
AMOUNT OF MANHOLES (PG. 78)

ORG ESTIMATE - 6 MH

AS BUILT - 3 MH

PRICE PER UNIT - \$300.00

PAY CONTRACTOR - \$900.00

6-9-75 N.O.W.

87'A' 30" STOP SIGNS

CONSISTS OF THE TYPE R-1, DRWG
NO. 745-20C, AND INCLUDES A
METAL POST.

UNIT OF MEASUREMENT - SIGN
AS BUILT:

ST. 204+06 ; LEFT SIDE

ST. 228+50 ; LEFT SIDE

ST. 230+65 ; RIGHT SIDE

ORIGINAL ESTIMATE - 3 SIGNS.

PRICE PER SIGN - \$150.00

PAY CONTRACTOR \$450.00

6-9-75 MOW

WARNING SIGNS

88

CONSISTS OF SIGNS HAVE THE
PRE-FIX "W" AS DETERMINED BY
THE STATE HIGHWAY DEPT.

UNIT OF MEASUREMENT - SIGN
AS BUILT

ST. 206+56 ; LEFT SIDE;

W3-1 30"x30" DRWG NO 745-20A,
WITH METAL POST.

ST. 228+32 ; RIGHT SIDE;

W1-2R 30"x30" DRWG NO 745-20A,
WITH METAL POST

PRICE PER SIGN - \$150.00

PAY CONTRACTOR - \$300.00

6-9-75 MOW.

88'A'

RIGHT-OF-WAY MARKERS

CONSISTS OF THE PLACEMENT, EXCAVATION,
AND CONSTRUCTION, INCLUDING MATERIALS,
OF RIGHT-OF-WAY MARKERS.

UNIT OF MEASUREMENT - R-OF-W MKR.
AS BUILT:

ST. 214+00 - LEFT & RIGHT SIDE

ST. 228+00 - LEFT & RIGHT SIDE

ST. 232+43.47 - RIGHT SIDE

ORIGINAL ESTIMATE - 3 UNITS

PRICE PER UNIT - \$30.00

PAY CONTRACTOR - \$150.00

6-10-75 M.D.W.

ROADSIDE CLEAN-UP

89

CONSISTS OF THE CLEAN-UP AND

228+50 DEF. CHORD 22.87 343(6) H.M.

229+00 6°11'59" 49.06

230+00 18°35'57" 144.88

231+00 30°59'56" 233.95

232+00 43°23'54" 312.11

232+11.67 44°50'45" 320.34

$$R = 229.80 - 2.67 = 227.13$$

88'A'

RIGHT-OF-WAY MARKERS

Q

A

C

U

A

F

ROADSIDE CLEAN-UP

89

CONSISTS OF THE CLEAN-UP AND
BEAUTIFICATION OF ALL AREAS WITHIN
THE HIGHWAY RIGHT-OF-WAY.

UNIT OF MEASUREMENT - LUMP SUM
BID AMOUNT - \$100.00

PAY CONTRACTOR - \$100.00

6-10-75 MOW

PIPE CHECK 204+08

52

78

88

78

537

61

554

C 2 6

62

55 3
1 8

C 1 8

731

61 52

7 8

529

BM

4454 31

107

PIPE ELEV 53 0

PIPE ELEV 53 5

CHECK OF GRADE STAKES
 * WARD COOL & CLOUDY

φ RICHARDSON

+ HI - ELEV

213700

+503

6342

-6°

BM
 445839

85

57

28

86

63

23

108

$$\begin{array}{r}
 015 \\
 116 \overline{) 1.800} \\
 \underline{116} \\
 640 \\
 \underline{580} \\
 60
 \end{array}$$

22

110

INDEX OF CURVE AND REDUCTION TABLES

Table I—SLOPE STAKE

Table II—STADIA CORRECTION AND HORIZONTAL DISTANCES

Table III—TRIGONOMETRIC FORMULAE

Table IV—NATURAL TRIGONOMETRICAL FUNCTIONS

CURVE FORMULAE

Table V—TANGENTS AND EXTERNALS TO A 1° CURVE

USEFUL RELATIONS

Table VI—INCHES TO DECIMALS OF A FOOT

Table VII—MINUTES IN DECIMALS OF A DEGREE

Table VIII—MIDDLE ORDINATES OF RAILS

Table IX—SHORT RADIUS CURVES

Table X—RODS IN FEET, 10THS AND 100THS OF FEET

Table XI—LINKS IN FEET, 10THS AND 100THS OF FEET

TABLE X. RODS IN FEET, INCHES AND HUNDRETHS OF FEET

293 $\overline{)1.40000}$

Feet	Inches	Feet	Inches	Feet	Inches
1	12.00	21	252.00	41	492.00
2	24.00	22	264.00	42	504.00
3	36.00	23	276.00	43	516.00
4	48.00	24	288.00	44	528.00
5	60.00	25	300.00	45	540.00
6	72.00	26	312.00	46	552.00
7	84.00	27	324.00	47	564.00
8	96.00	28	336.00	48	576.00
9	108.00	29	348.00	49	588.00
10	120.00	30	360.00	50	600.00
11	132.00	31	372.00	51	612.00
12	144.00	32	384.00	52	624.00
13	156.00	33	396.00	53	636.00
14	168.00	34	408.00	54	648.00
15	180.00	35	420.00	55	660.00
16	192.00	36	432.00	56	672.00
17	204.00	37	444.00	57	684.00
18	216.00	38	456.00	58	696.00
19	228.00	39	468.00	59	708.00
20	240.00	40	480.00	60	720.00

TABLE XI. LINKS IN FEET, INCHES AND HUNDRETHS OF FEET

Links	Feet	Inches	Feet	Inches	Feet	Inches	Feet	Inches	Feet	Inches	
1	6.66	16	11.88	35	23.10	55	34.32	79	45.54	89	51.76
2	13.32	17	12.54	36	23.76	56	34.98	80	46.20	90	52.42
3	19.98	18	13.20	37	24.42	57	35.64	81	46.86	91	53.08
4	26.64	19	13.86	38	25.08	58	36.30	82	47.52	92	53.74
5	33.30	20	14.52	39	25.74	59	36.96	83	48.18	93	54.40
6	39.96	21	15.18	40	26.40	60	37.62	84	48.84	94	55.06
7	46.62	22	15.84	41	27.06	61	38.28	85	49.50	95	55.72
8	53.28	23	16.50	42	27.72	62	38.94	86	50.16	96	56.38
9	59.94	24	17.16	43	28.38	63	39.60	87	50.82	97	57.04
10	66.60	25	17.82	44	29.04	64	40.26	88	51.48	98	57.70
11	73.26	26	18.48	45	29.70	65	40.92	89	52.14	99	58.36
12	79.92	27	19.14	46	30.36	66	41.58	90	52.80	100	59.02
13	86.58	28	19.80	47	31.02	67	42.24	91	53.46	101	59.68
14	93.24	29	20.46	48	31.68	68	42.90	92	54.12	102	60.34
15	99.90	30	21.12	49	32.34	69	43.56	93	54.78	103	61.00
16	106.56	31	21.78	50	33.00	70	44.22	94	55.44	104	61.66
17	113.22	32	22.44	51	33.66	71	44.88	95	56.10	105	62.32