

*Approved as Corrected
Signed by [Signature]*

RETURN TO:
Land Development
101 West Costilla, Suite 122
Colorado Springs, CO 80903

DRAINAGE REPORT

MASTER PLAN
RUSTIC HILLS NORTH CENTER
(Rustic Hills North
Filing Number One)
(Rustic Hills North
Filing Number Two)

COX & ASSOCIATES

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December 30, 1971

COX AND ASSOCIATES
Post Office Box 5151
Security, Colorado

Mr. DeWitt Miller
Director of Public Works
City Hall
Colorado Springs, Colorado

Mr. Miller:

Transmitted herein is the Master Drainage Plan for Rustic Hills North Center (A proposed shopping center complex) which includes Rustic Hills North - Filing Number 1, and Rustic Hills North - Filing Number 2, in the city of Colorado Springs, Colorado.

If any questions arise, please contact me at your convenience.

Sincerely,
Cox and Associates



Keith Martin, P.E.

KM/bg

GENERAL DESCRIPTION:

Rustic Hills North Filing Number 1, and Filing Number 2 is located in the Southwest one-quarter of Section 2, Township 14 South, Range 66 West of the 6th P.M., in the city of Colorado Springs, El Paso County, Colorado; Containing a total of 4.88 acres. Both subdivisions lie Northeast of the intersection of Palmer Park Boulevard and Academy Boulevard northbound lane, and within the Sand Creek Drainage Basin. The terrain of both subdivisions slope gently to the Southeast on an approximate one percent slope. Included in this report is a drainage plan and calculations for Rustic Hills North Center, a proposed shopping center immediately east and south of the aforementioned subdivisions. Both these subdivisions lie within the boundaries of the proposed shopping center, consequently we prepared the drainage report to reflect the entire area rather than the individual subdivisions.

EXTERIOR DRAINAGE:

External drainage enters the proposed shopping center from the east as shown on the Drainage Plan.

The drainage from the existing two 36 inch R.C.P. storm sewers under Academy Boulevard will contribute approximately 72 C.F.S., the total 72 C.F.S. will be contained in the proposed 54 inch reinforced concrete pipe extending easterly across this property to the existing Sand Creek Greenbelt Drainageway. In addition, 38 C.F.S. drainage runoff on

Academy Boulevard will be directed to a ten (10) foot drop inlet at the intersection of Academy Boulevard and Shopping Center driveway.

INTERIOR DRAINAGE:

This entire Rustic Hill North Center has been divided into nine (9) zones. The detailed drainage plan indicated both the amount and direction of flow of the surface runoff. The entire area develops a runoff of 74.4 C.F.S. All surface water will be contained either in the streets or the reinforced concrete pipes as shown on the Drainage Plan. All runoff water will be directed to the existing Sand Creek Greenbelt Drainageway.

CALCULATIONS

RATIONAL FORMULA $Q = Aci$

A = Area of watershed in acres

c = Coefficient of runoff

i = Intensity of rainfall in inches per hour

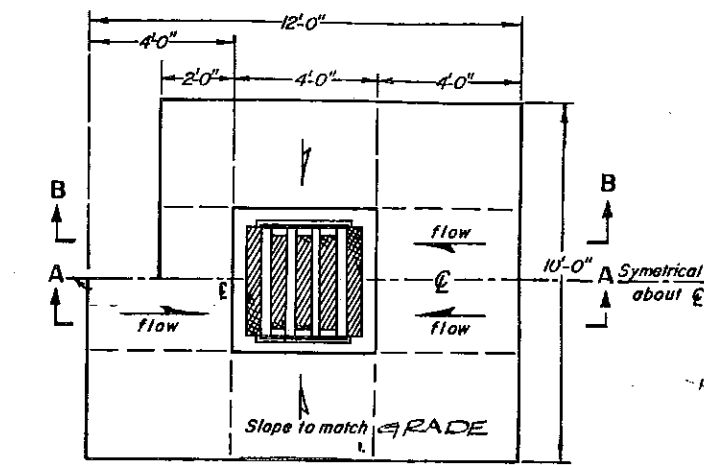
ZONE	A (Acres)	C (Coefficeint)	i (Intensity)	C.F.S. Q		
1	9.0	x	2.0	x	.9	16.2
2	5.6		2.0		.9	10.1
3	6.7		2.0		.9	12.1
4	2.1		2.0		.9	3.8
5	9.6		2.0		.9	17.3
6	1.4		2.0		.9	2.5
7	1.5		2.0		.9	2.7
8	4.1		2.0		.9	7.4
9	1.3		2.0		.9	2.3
	<u>41.3</u> Acres					<u>74.4</u>

STANDARD M-604-BA

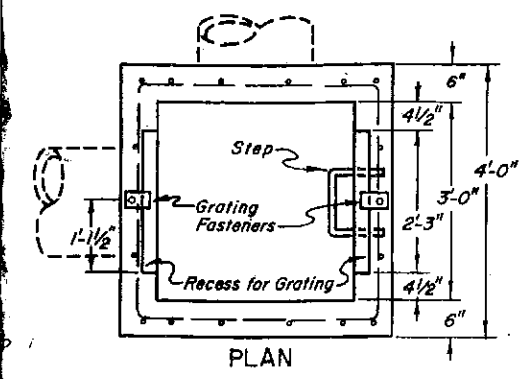
(JUNE 1, 1967)

FEDERAL ROAD REGION NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
9	COLORADO			

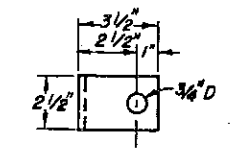
REVISIONS				
(R-1)	9-13-67	Grate Detail & Quant.		M.R.H.
(R-2)	12-18-67	Connect to skewed culvert, General Note		M.R.H.
(R-3)	1-19-68	Note & Dept. Name		M.R.H.



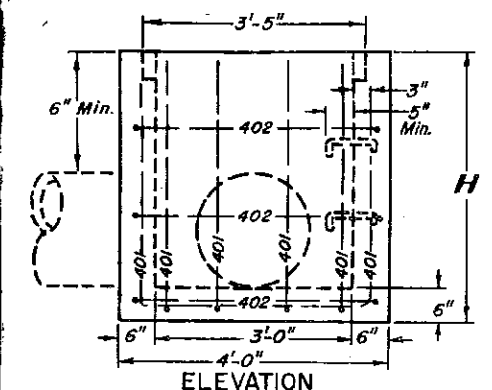
LAYOUT OF INLET



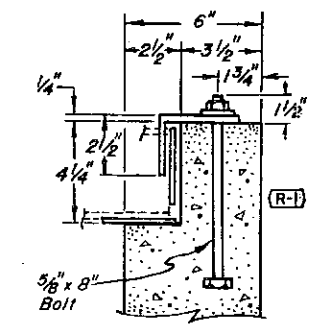
PLAN



DETAIL OF RECESS AND GRATING FASTENER (2 REQUIRED)



ELEVATION CONCRETE INLET



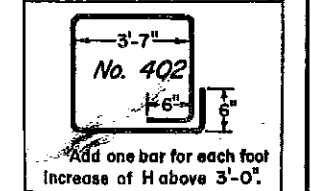
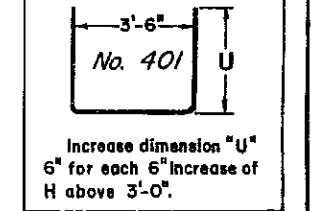
SECTION D-D

QUANTITIES FOR ONE INLET

H	CLASS "A" CONCRETE (CU. YDS.)	REINF. STEEL (LBS.)	NO. STEPS REQ'D.
3'-0"	1.0	83	0
3'-6"	1.1	89	0
4'-0"	1.2	105	0
4'-6"	1.4	111	1
5'-0"	1.5	127	2
5'-6"	1.6	134	2
6'-0"	1.7	150	2
6'-6"	1.9	157	3
7'-0"	2.0	172	3
7'-6"	2.1	178	3
8'-0"	2.3	194	4
8'-6"	2.4	201	4
9'-0"	2.5	217	4
9'-6"	2.7	223	5
10'-0"	2.8	239	5
11'-0"	3.0	261	6
12'-0"	3.3	283	6

BAR LIST FOR H=3' AND BENDING DIAGRAM

MARK	NO. REQ'D	HGT. "U"	LENGTH
401	9	2'-7"	8'-8"
402	3		15'-4"



All bars to be 1/2" Dia. - Cut or bend around pipes as required.

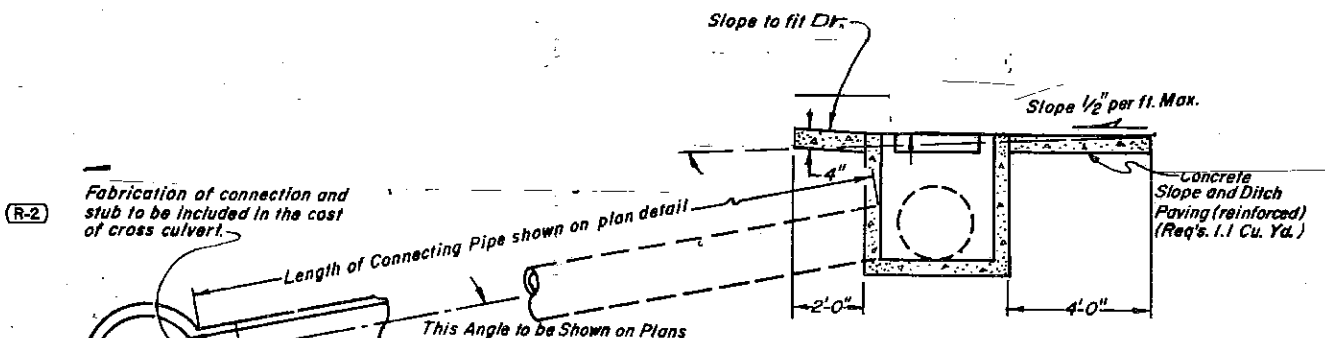
* Note: Includes Volume occupied by pipes. (R-3)

MATERIAL LIST FOR GRATING, FASTENERS

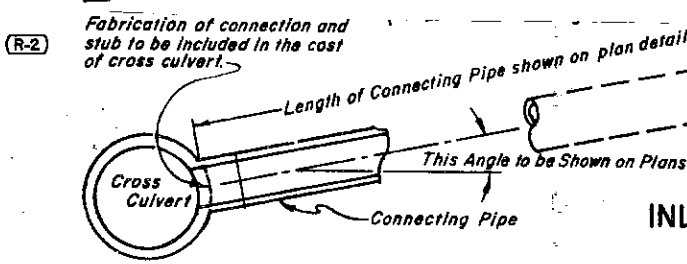
PART	NO. REQ'D.	SIZE	LBS. PER UNIT	WEIGHT - LBS.
Strap Iron	2	3 1/2 x 1/4 x 2'-2 5/8	2.98/lb.	13.2
Strap Iron	2	3 x 1/4 x 2'-2 5/8	2.6/lb.	11.5
Beam	4	4 I 7.7 x 3'-4"	7.7/lb.	102.7
Fastener	2	6 x 1/4 x 2 1/2"	1.0 ea.	2.0
Bolt	2	5/8 x 8"	0.8 ea.	1.6
Washer	2		0.1 ea.	0.2
TOTAL WEIGHT				131.2

GENERAL NOTES

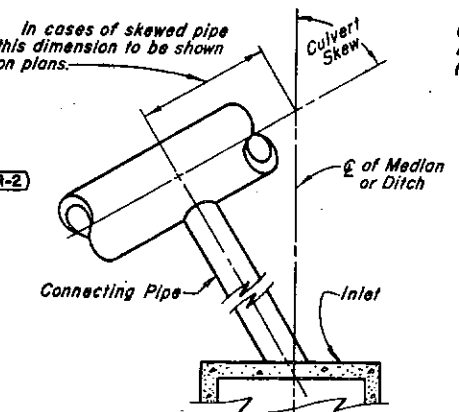
- All work shall be done in accordance with the Standard Specifications applicable to the project.
- All concrete shall be Class "A" or Class "D".
- For detail of Inlet Step, see M-Standard "Steps for Manholes and Inlets".
- All reinforcing bars shall be deformed, of intermediate grade, and shall be tagged with the station number and bar designation.
- All edge distances not marked "clear" are to center of bar.
- Concrete slope and ditch paving shall conform to Section 507. Reinforcement for concrete slope paving shall be 4 x 4, 10/10.
- Grating shall conform to Section 604.
- Inlet grating shall be galvanized as described for Frames, Grates, Covers and Steps in Section 712.
- Steps or ladder will be required when inlet depth exceeds 3'-6"



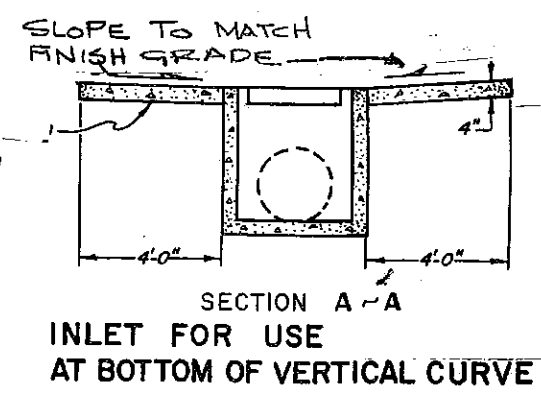
SECTION B-B INLET FOR USE ON GRADE (FLOW FROM ONE DIRECTION)



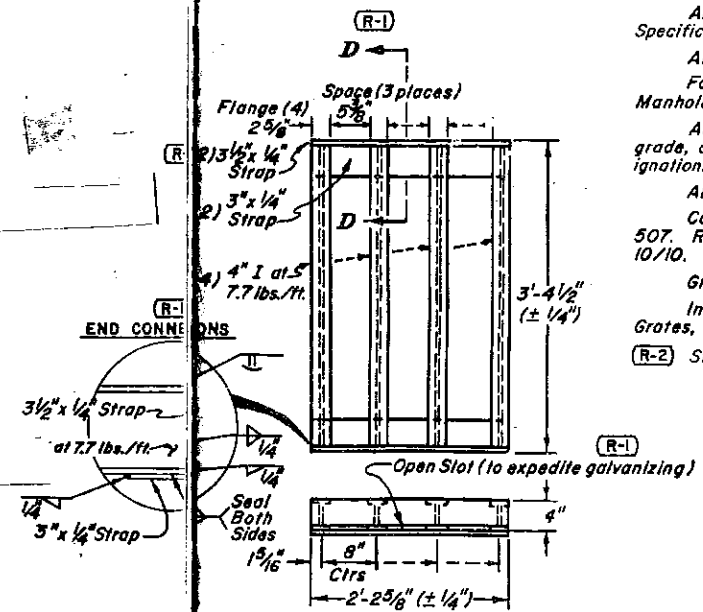
SECTION C-C DETAIL SHOWING INLET CONNECTED TO A CROSS CULVERT



SECTION A-A DETAIL SHOWING INLET CONNECTED TO A SKEWED CROSS CULVERT



SECTION A-A INLET FOR USE AT BOTTOM OF VERTICAL CURVE

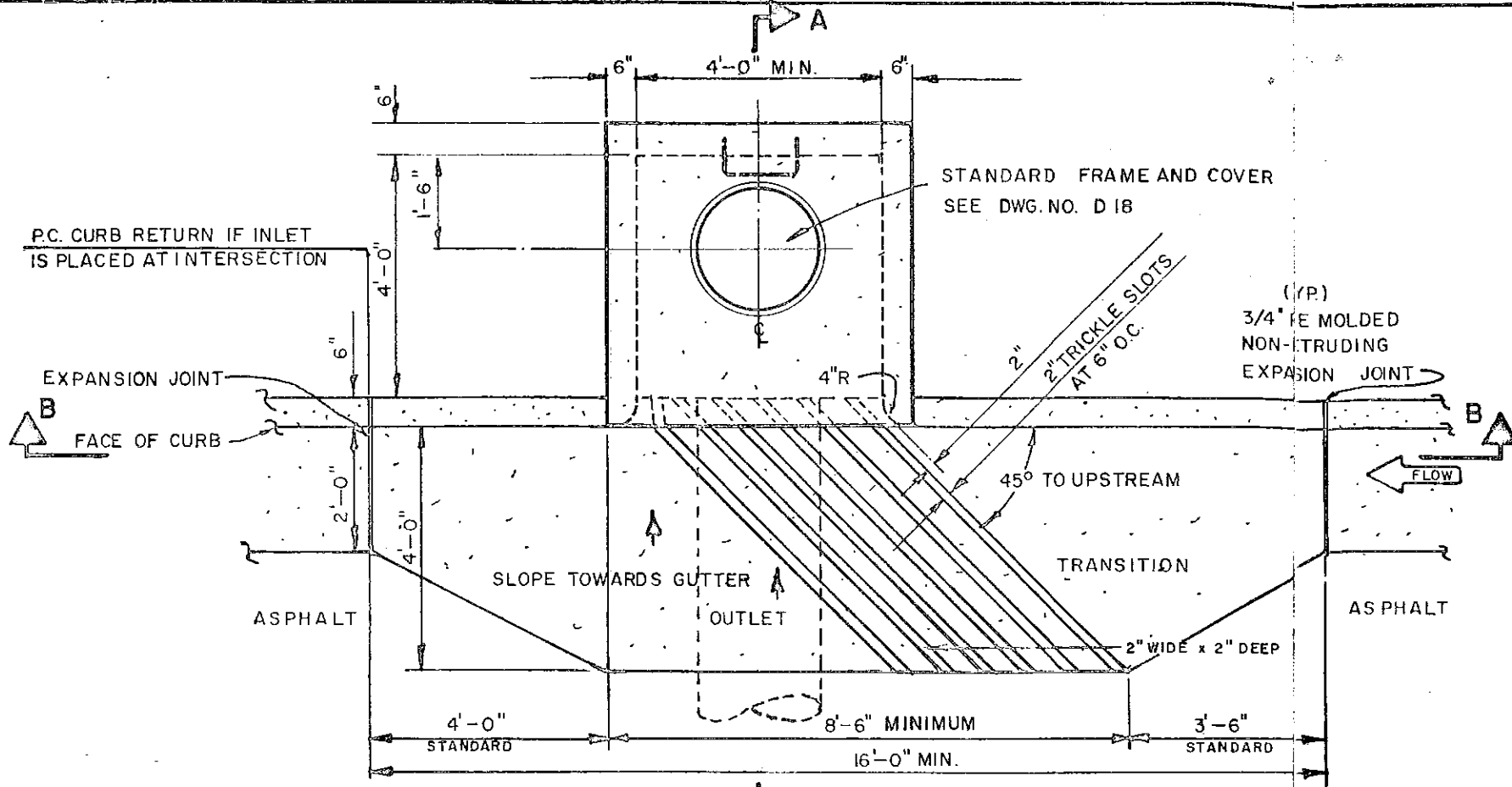


DETAIL OF GRATING

DEPARTMENT OF HIGHWAYS
STATE OF COLORADO
DIVISION OF HIGHWAYS

INLET, TYPE C

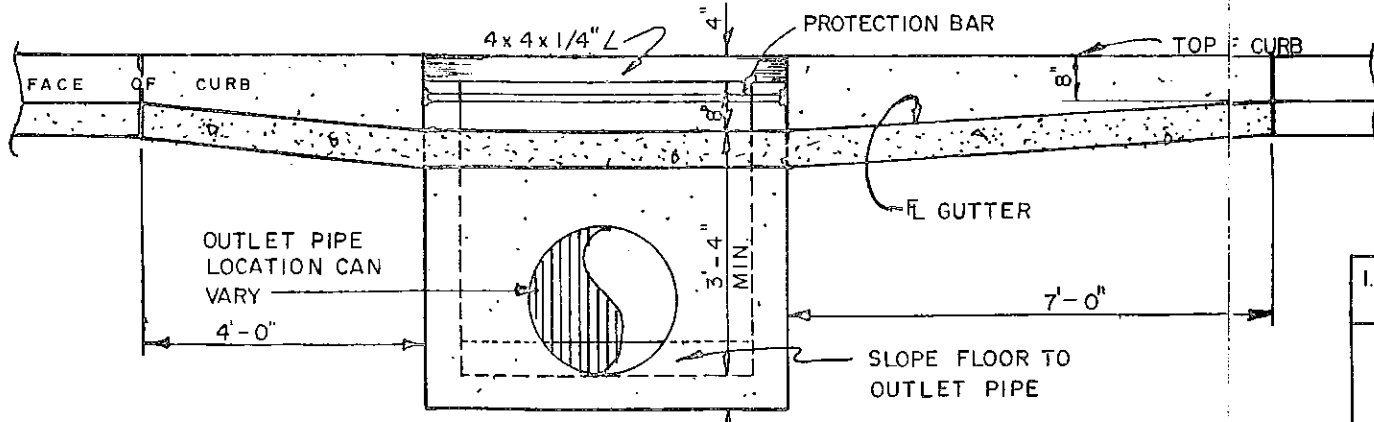
Designed by D. B. R. Approved by J. R. B. Staff Design Engineer
Made by J. R. B. Checked by R. S. M. Date: JUNE 1, 1967



PLAN VIEW 3/8" = 1'-0"

NOTES

CONNECTION PIPE OR OUTLET PIPE MAY VARY AS TO LOCATION WITHIN INLET
 CURVATURE OF LIP AT GUTTER AND SIDE OPENINGS SHALL BE MADE WITH CURVED FORMS
 DEPTH AND LENGTH OF INLET MAY VARY. LENGTH SHOULD VARY BY INCREMENTS OF 2'-0"
 WALL THICKNESS SHOULD INCREASE TO 8" IF DEPTH IS GREATER THAN 4'-0" AND TO 10" AT DEPTHS OVER 8'-0"
 FLOOR OF INLET SHALL BE TROWELLED TO A SMOOTH HARD SURFACE AND WILL SLOPE TOWARDS GUTTER
 MANHOLE SHOULD BE LOCATED AS SHOWN ALONG BACK WALL
 OUTLET PIPE TO BE TRIMMED TO FINAL SHAPE AND SET IN PLACE BEFORE INLET IS POURED
 PROTECTION BAR REQUIRED, 6" TO G. FROM FLOW LINE OF GUTTER
 WHEN DEPTH IS GREATER THAN 4'-0" STEPS WILL BE PLACED 17" APART WITH TOP STEP 6" BELOW INSIDE COVER
 STEPS WILL BE 3/4" PLAIN ROUND GALV. 2'-8" LONG BENT TO DIMENSIONS SHOWN ON PLAN
 WALL AND FLOOR REINFORCING AS PER DWG. D-26
 CONCRETE SHALL BE OF 3000 P.S.I. AT 28 DAYS (STRENGTH)
 IF OPENING IS GREATER THAN 4'-0" SUPPORT BARS WILL BE REQUIRED AT 3' INTERVALS SEE D-19
 SURFACE OF ALL EXPOSED CONCRETE SHALL CONFORM IN SLOPE, GRADE, COLOR FINISH AND SCORING TO EXIST OR PROPOSED SURFACES



SECTIONAL ELEVATION B-B 3/8" = 1'-0"

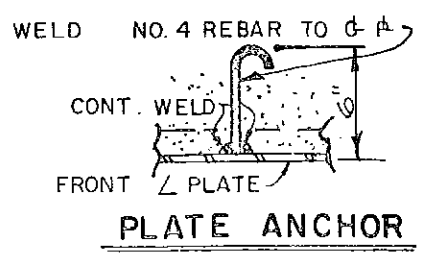
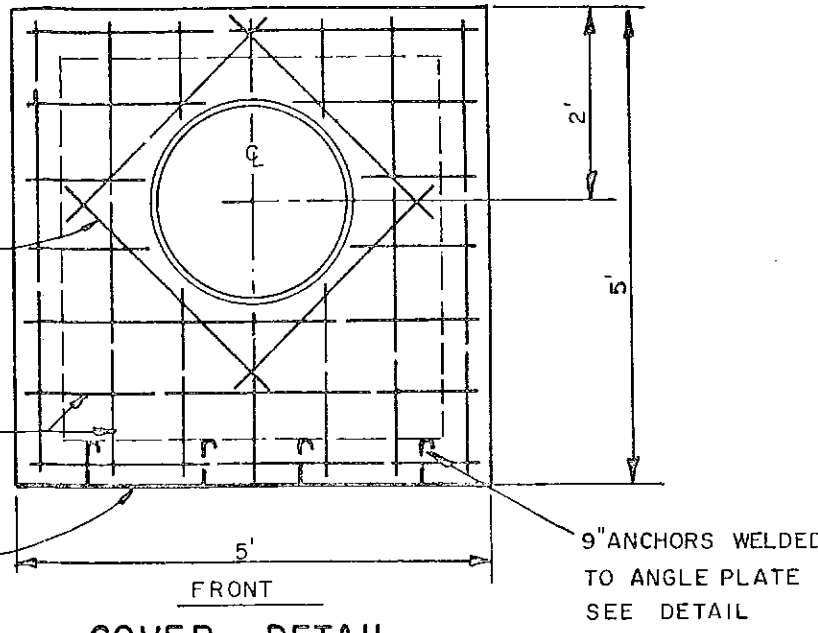
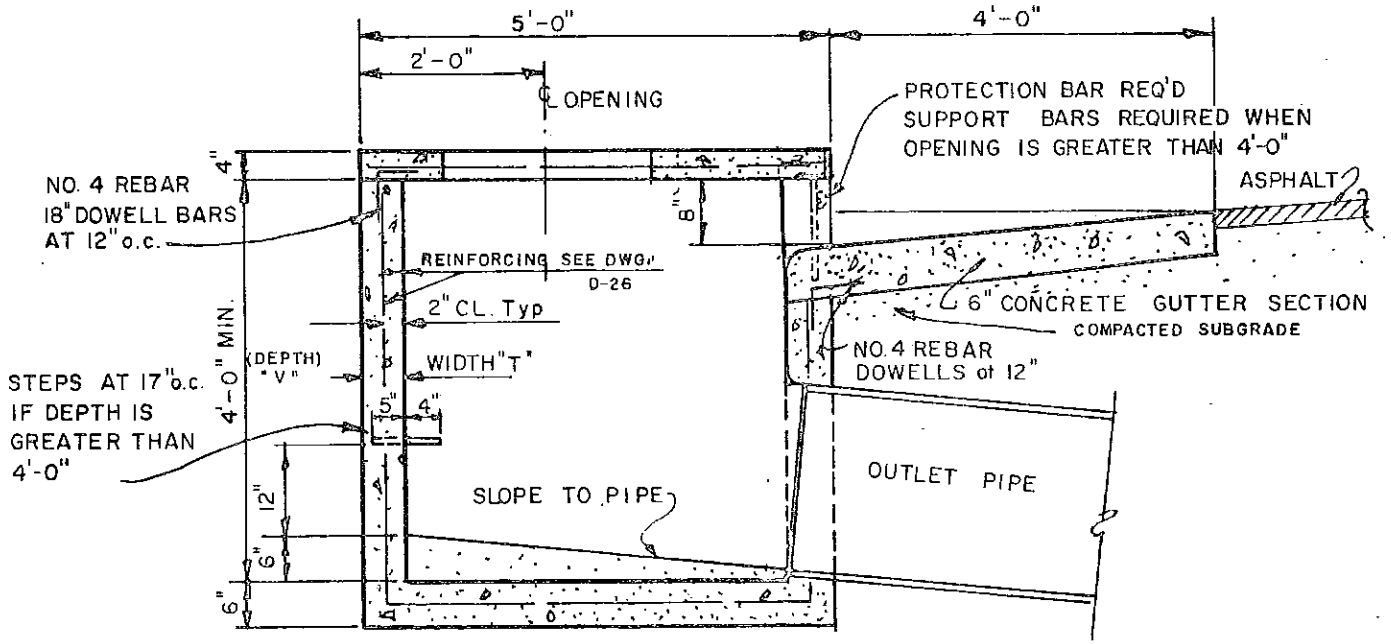


PLATE ANCHOR



COVER DETAIL



SECTION A-A 1/2" = 1'-0"

THIS DWG. REPLACES CATCH BASIN NO'S. 12 & 3 AS SHOWN ON DWG'S. D-10, D-11 & D-12

I.D. OUTLET IN.	CAPACITY		BOX REQ'D. FT.	THROAT OPENING
	CMP.	R.C.P.		
18	5.6cfs	10cfs	4	4' x 8"
21	8.4	15.5	6	6' x 8"
24	12	22	8	8' x 8"
27	16	30	10	10' x 8"
30	22	40	12	12' x 8"
36	35	51	16	16' x 8"
42	52	—	16	16' x 8"

CITY OF COLORADO SPRINGS, COLO.

STANDARD CATCH BASIN DETAILS

APPROVED BY: *R. A. Martin*
CITY ENGINEER

SCALE AS SHOWN DATE JAN. 1970 DWN BY R. A. MARTIN DWG. NO. D-10R

COST ESTIMATES

RUSTIC HILLS NORTH FILING NUMBER 1

RUSTIC HILLS NORTH FILING NUMBER 2

RUSTIC HILLS NORTH CENTER (Proposed Shopping Center)

No.	Item	Unit Cost	Price
1	<i>ok</i> 4' Drop Inlet (Type C Colo. Hwy. Dept.)	2 @ \$750.00 ea.	1500.00 ✓
2	<i>ok</i> 10' Catch Basin	1 @ \$900.00 ea.	900.00
3	<i>ok</i> 54" R.C.P. Include transition from 2-36" C.M.P. to 54" R.C.P.	890 L.F. @ \$42.00	36960.00 <i>ok</i>
4	Concrete Line Sand Creek (one side)	1741 L.F. @ \$20.70	36039.00 <i>ok</i>
		Sub Total	<u>75399.00</u>
	10% Engineering and Contingencies		<u>7540.00</u>
		Total	<u>82939.00</u>

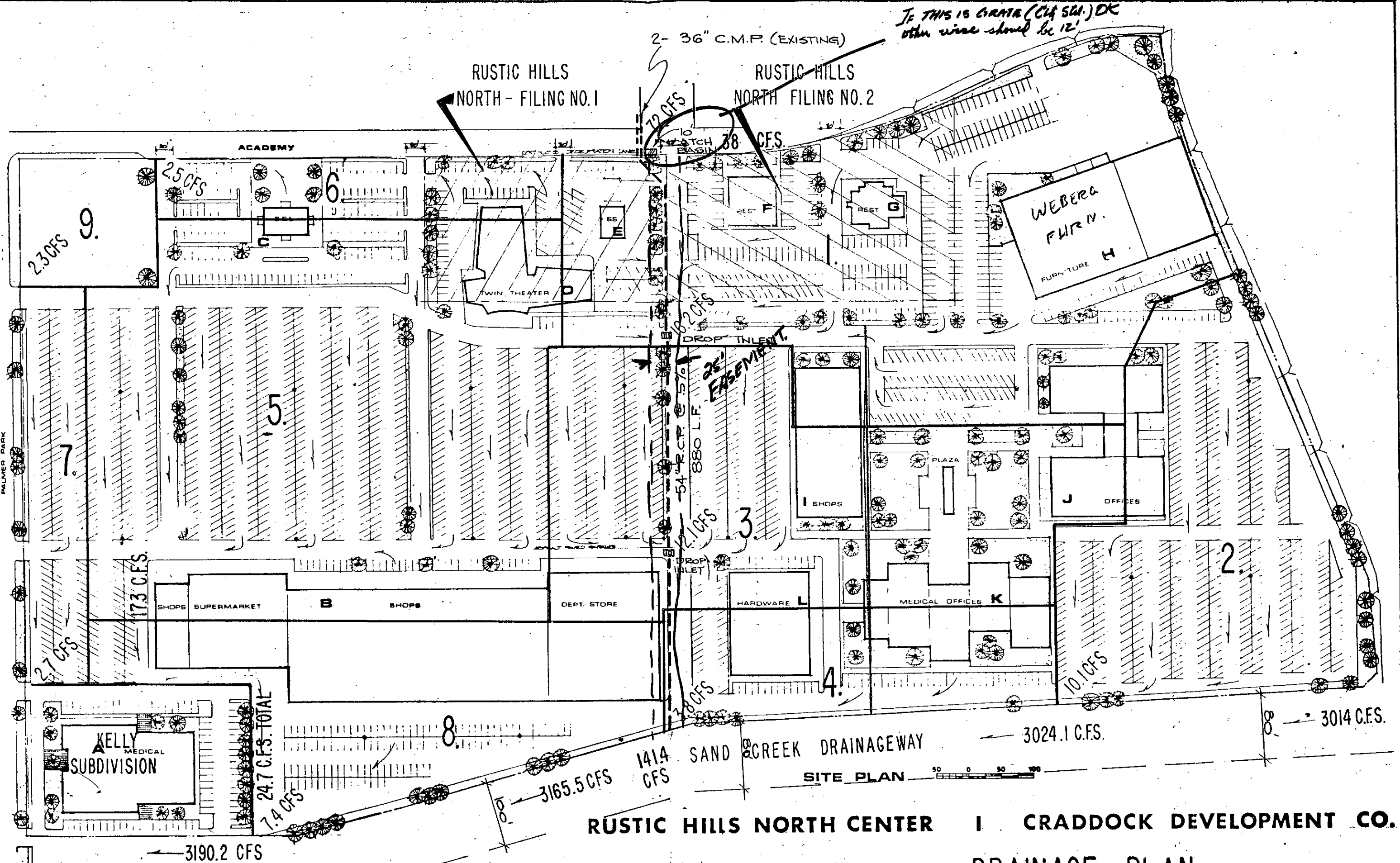
Sand Creek Drainage Fee \$752.00 per acre

Rustic Hills North Filing Number 1 - 2.33 Acres @ \$752.00
per acre = \$1752.16

Rustic Hills North Filing Number 2 - 2.55 Acres @ \$752.00
per acre = \$1917.00

Total Drainage Fee = \$3669.76

TOTAL ACREAGE: 41.3
= \$2008.20 PER ACRE



*If this is GRATE (CL 54) DC
other wire should be 12'*

2- 36" C.M.P. (EXISTING)

RUSTIC HILLS
NORTH - FILING NO. 1

RUSTIC HILLS
NORTH FILING NO. 2

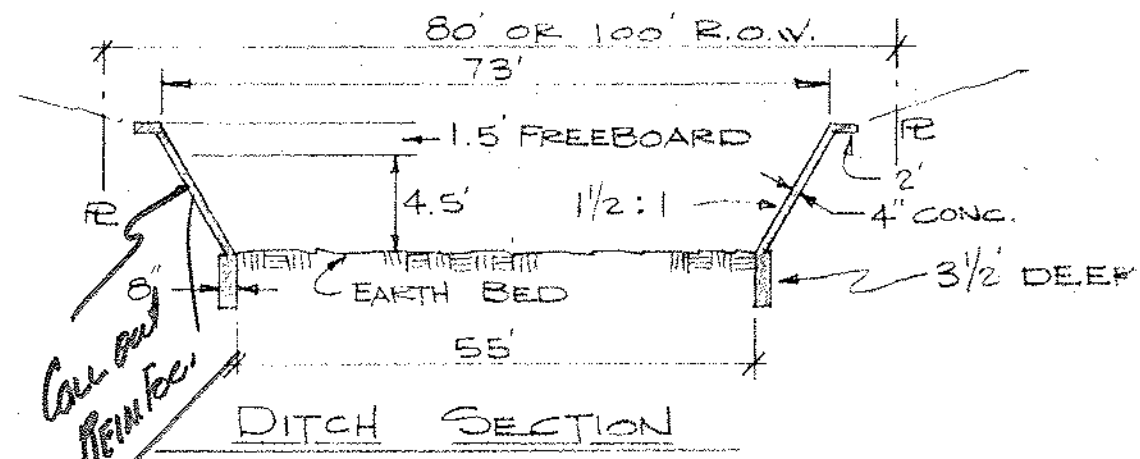
RUSTIC HILLS NORTH CENTER

CRADDOCK DEVELOPMENT CO.

DRAINAGE PLAN

SITE PLAN

SAND CREEK DRAINAGEWAY

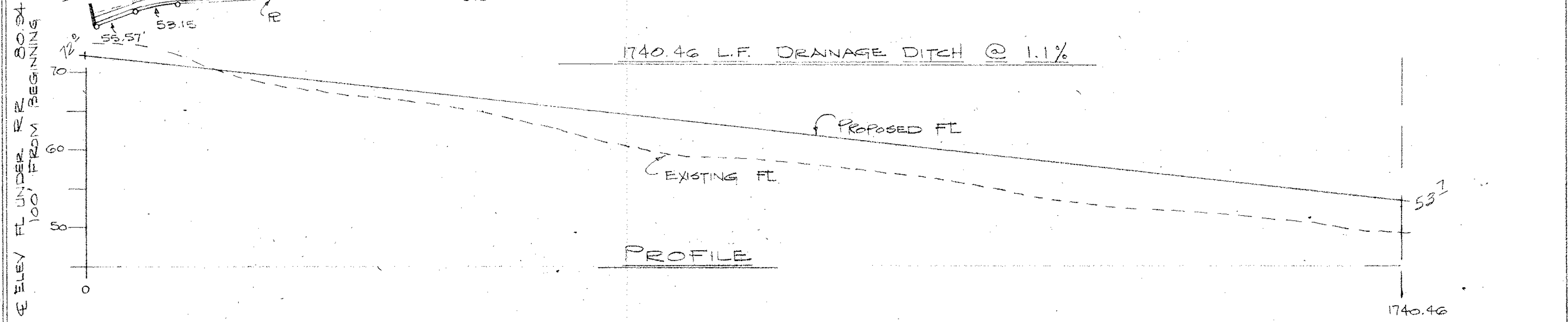
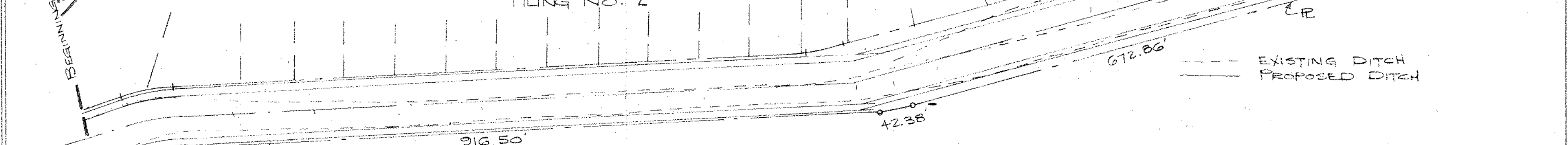


$n = \frac{1.486}{0.3} = 49.5333 \checkmark$
 $a = 277.88$
 $P = 71.22$
 $r = 3.902 \checkmark \quad r^{2/3} = 2.479 \checkmark$
 $S^{1/2} = .1049$
 $S = 1.1\%$
 $Q = 3579 \text{ C.F.S.} \checkmark$
 $\text{VELOC. } 12.9$

SAND CREEK DRAINAGEWAY

RUSTIC HILLS NORTH CENTER

NORTHGLEN PARK SUBDIVISION
 FILING NO. 2



RUSTIC HILLS NORTH CENTER
PROPOSED DRAINAGEWAY DITCH
 SKETCH