Whistling Pines Drainage Calculations:

Inlet Between Lots 14 & 15 (SS Sta. 0+00, Inlet No. 1):

Runoff, Q_{100} = 64.6 cfs (off-site flow from detention calculations)

Inlet control available head, HW = 3 ft. (inv. = 435, ground = 438)
30" pipe HW/D = 1.2
From attached nomograph 30" Q = 40 cfs

Use double 30", capacity = 80 cfs

Inlets at Sta. 5+75 (SS Sta. 1+50, Inlet No. 2):

Area North of Lot 15 & West of Lot 19:
Drainage area, A = 1.2 acres
Runoff Coefficient, C_{100} = 0.70

Length of overland flow = 120 feet, Slope of overland flow = 2%
Length of gutter channelized flow = 280 feet, Slope of channelized flow = 3.9%

From attached nomographs with overland flow roughness coefficient = 0. 40, channelized flow roughness coefficient = 0.02, t_c = 14.2 minutes
i = 8.0 in/hr (100 year flood)

Flow From Inlet at SS Sta. 0+00:

Length of overland flow = 150 feet, Slope of overland flow = 3%, n = 0.40, t_c = 13.1 min.
Length of shallow conc. flow = 675 feet, Slope of, shallow conc. flow = 3%, n = 0.03, t_c = 7.3 min.
Length of natural channel flow = 850 feet, Slope of channel = 2%, n = 0.03, t_c = 12.2 min.
Length of pipe flow = 125 feet, Slope of pipe flow = 0.8%, n = 0.012, t_c = 0.3 min.
Total T_c = 32.9 min.
i = 5.4 in/hr (100 year flood)

Q_{100} = 67.5 cfs (from computation sheet)

Inlets at Sta. 7+00 (SS Sta. 2+70, Inlet No. 3):

Area North of Lot 29 & West of Lot 21:
Drainage area, A = 1.3 acres
Runoff Coefficient, C_{100} = 0.70

Area of Lot 14 & north half of Lot 13:
Drainage area, A = 0.3 acres
Runoff Coefficient, C_{100} = 0.70

From attached nomographs with overland flow roughness coefficient = 0. 40, gutter flow roughness coefficient = 0.02, t_c = 13.7 minutes
i = 8.1 in/hr (100 year flood)

Flow From Inlet at SS Sta. 1+25 to 2+55:

Length of overland flow = 150 feet, Slope of overland flow = 3%, n = 0.40, t_c = 13.1 min.
Length of shallow conc. flow = 675 feet, Slope of, shallow conc. flow = 3%, n = 0.03, t_c = 7.3 min.
Length of natural channel flow = 850 feet, Slope of channel = 2%, n = 0.03, t_c = 12.2 min.
Length of pipe flow = 125 feet, Slope of pipe flow = 1.0%, n = 0.012, t_c = 0.3 min.
Length of pipe flow = 130 feet, Slope of pipe flow = 1.20%, n = 0.012, t_c = 0.3 min.
Total T_c = 33.2 min.
i = 5.3 in/hr (100 year flood)

Q_{100} = 72.1 cfs (from computation sheet)

Inlets at Sta. 9+25 (SS Sta. 5+20, Inlet No. 4):

Area south of street west of Sta. 7+00 & south half of Lot 13:
Drainage area, A = 0.7 acres
Runoff Coefficient, C_{100} = 0.70

Area North of street & southwest half of Lot 28:
Drainage area, A = 0.4 acres
Runoff Coefficient, C_{100} = 0.70

Area west of street & east of Lot 20:
Drainage area, A = 1.8 acres
Runoff Coefficient, C_{100} = 0.70

From attached nomographs with overland flow roughness coefficient = 0. 40, gutter flow roughness coefficient = 0.02, t_c = 15.1 minutes
i = 7.7 in/hr (100 year flood)

Flow From Inlet at SS Sta. 2+55 to 5+20:

Length of overland flow = 150 feet, Slope of overland flow = 3%, n = 0.40, t_c = 13.1 min.
Length of shallow conc. flow = 675 feet, Slope of, shallow conc. flow = 3%, n = 0.03, t_c = 7.3 min.
Length of natural channel flow = 850 feet, Slope of channel = 2%, n = 0.03, t_c = 12.2 min.
Length of pipe flow = 125 feet, Slope of pipe flow = 0.8%, n = 0.012, t_c = 0.3 min.
Length of pipe flow = 395 feet, Slope of pipe flow = 2.0%, n = 0.012, t_c = 1.3 min.
Total T_c = 34.2 min.
i = 5.2 in/hr (100 year flood)

Q_{100} = 81.1 cfs (from computation sheet)

Proposed 18" at Sta. 9+25:

Drainage area, A = 2.2 acres
Runoff Coefficient, C_{100} = 0.70
Rainfall intensity, i_{100} = 6.7 in/hr (100 year flood)
Runoff, Q_{100} = (0.70)(6.7)(2.2) = 10.3 cfs

The proposed 18" drainage pipe (1.0% slope) has a capacity of 11.3 cfs.

Proposed 42" to Detention Pond:

Q_{100} = 81.1 cfs

The proposed 42" drainage pipe (1.0% slope) has a capacity of 126.0 cfs.

The proposed 42" drainage pipe (1.0% slope) has a capacity of 126.0 cfs. The velocity of the pipe discharge at the maximum capacity rate is 13.1 fps, which is greater than 7 fps, therefore rock riprap erosion protection will be required at the pipe outlet.

Whistling Pines Gutter Capacity Calculations:

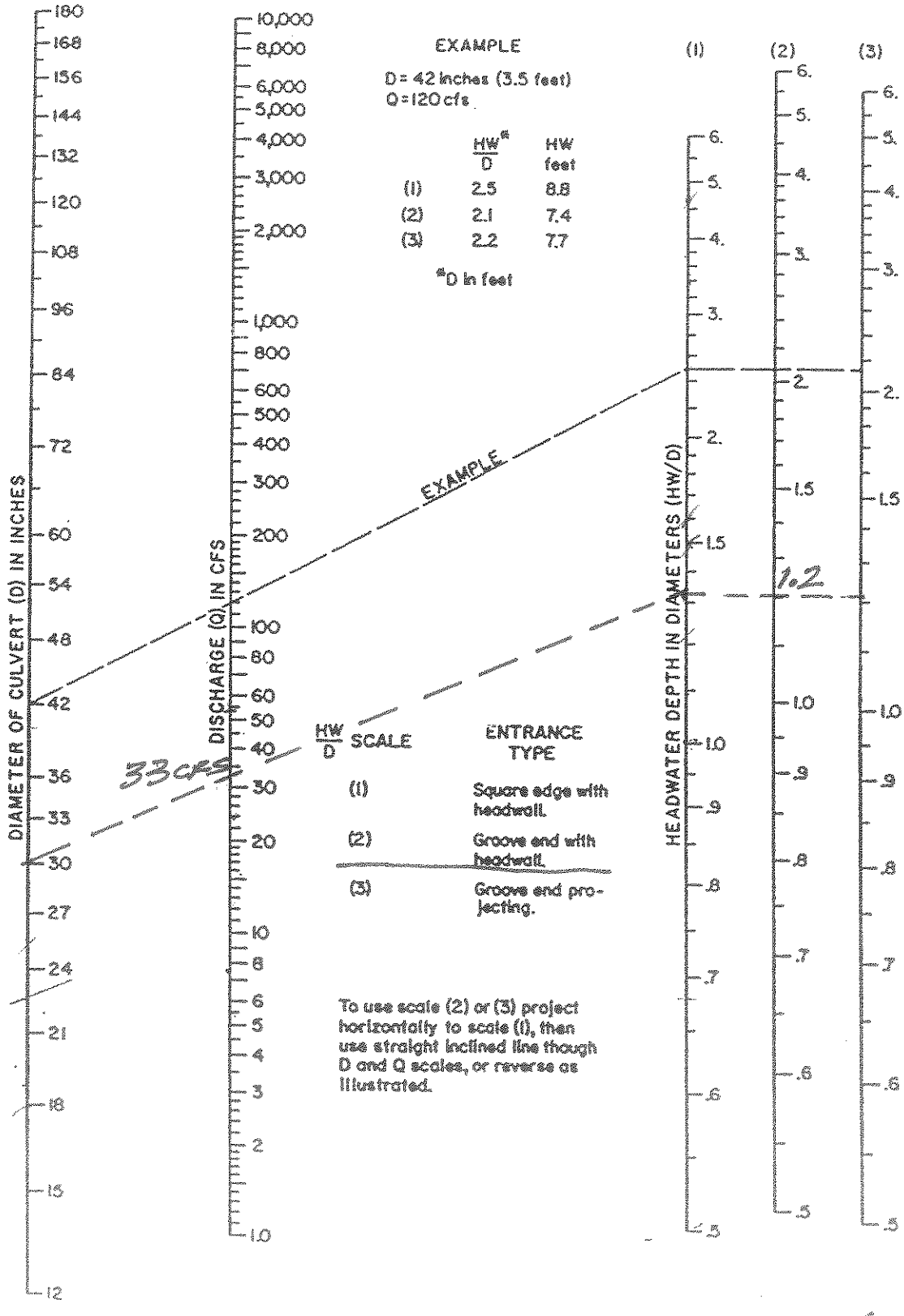
Gutter Capacity, $Q = \frac{0.56}{n} S_x^{1.67} S^{0.5} T^{2.67}$

n = 0.015
Sx = 0.33/13 = 0.025
T = 13'

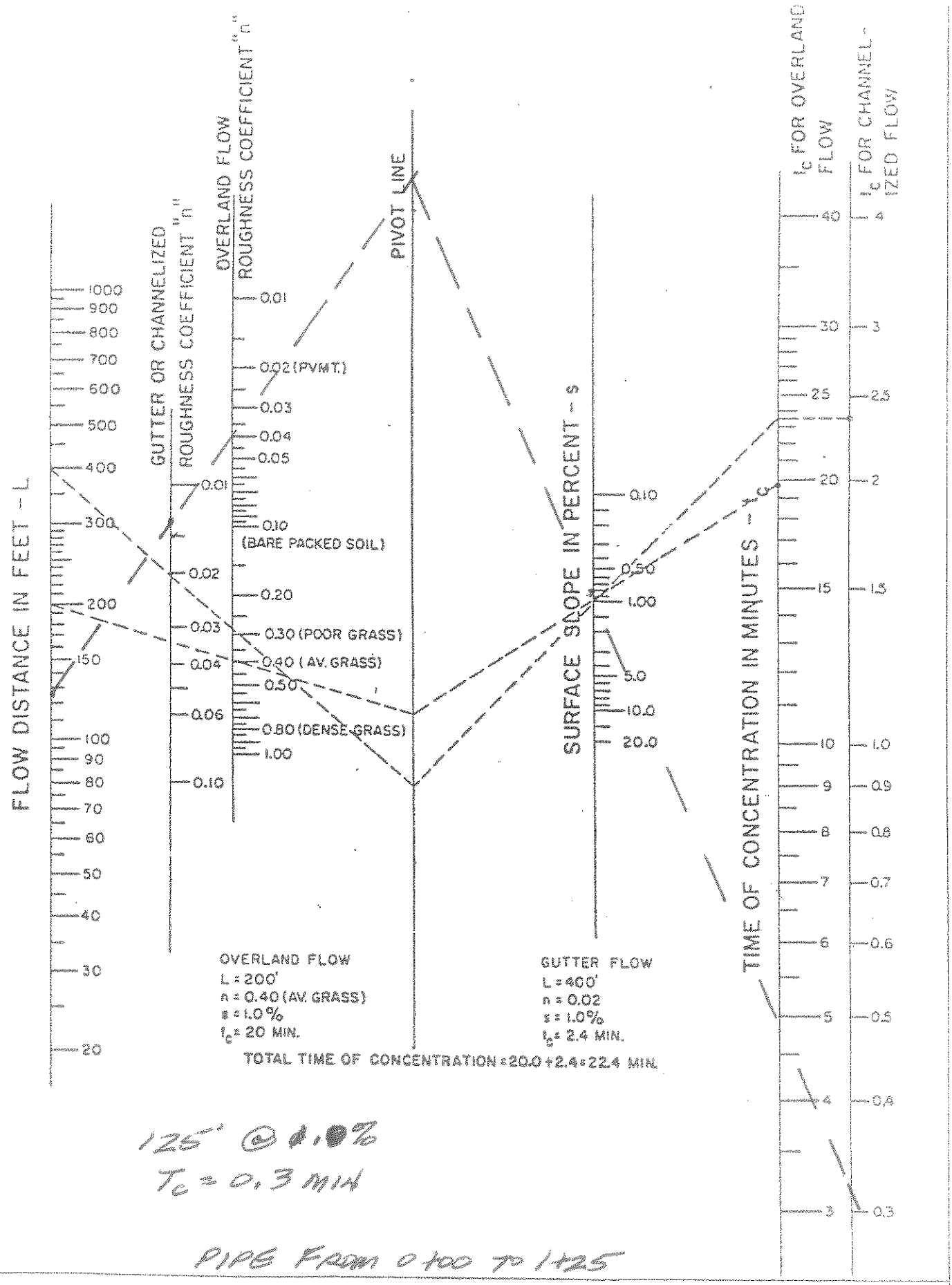
$Q = 73.9 S^{0.5}$ (single gutter capacity)

Street Section	Slope, %	Single Gutter Capacity, cfs	Maximum Flow In Section, cfs
0+00 to 1+48	2.23	11.0	3.3
3+00 to 1+48	2.04	10.6	1.5
3+00 to 5+90	3.92	14.6	8.3
5+90 to 7+00	0.52	5.3	2.3
7+00 to 9+25	0.52	5.3	3.6
12+73 to 9+25	4.79	16.2	10.7

PLOT F – HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL



INLET CULVERT AT LOT 14/15
INLET No. 1



125' @ 4.0%

T_c = 0.3 min

PIPE From 0+00 To 1+25

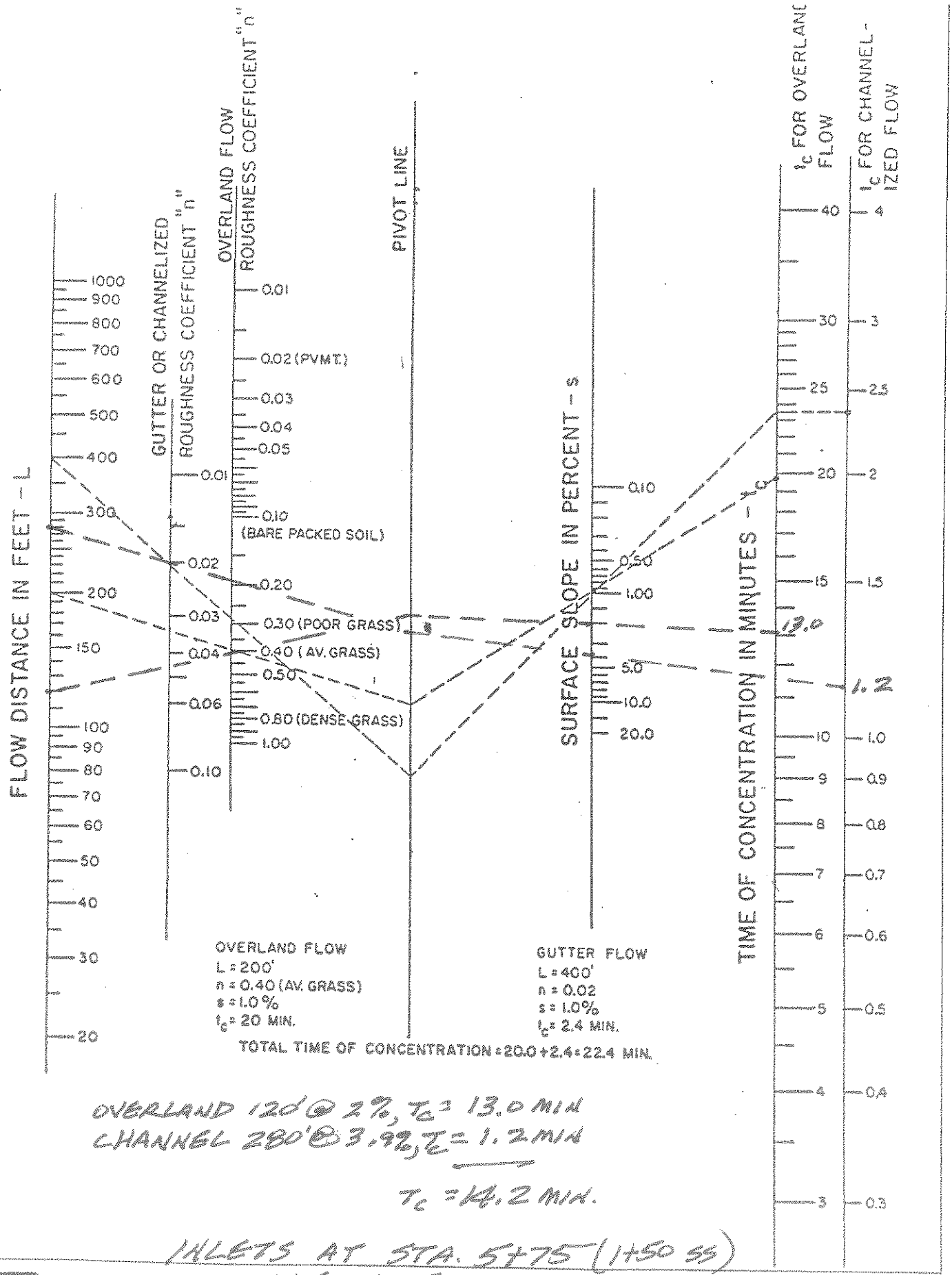
City of Little Rock

NOMOGRAPH FOR TIME OF CONCENTRATION

SOURCE: City of Fort Worth, Tx.

2-2

FIGURE



OVERLAND 120 @ 2%, T_c = 13.0 MIN
CHANNEL 280' @ 3.92, T_c = 1.2 MIN

T_c = 14.2 MIN.

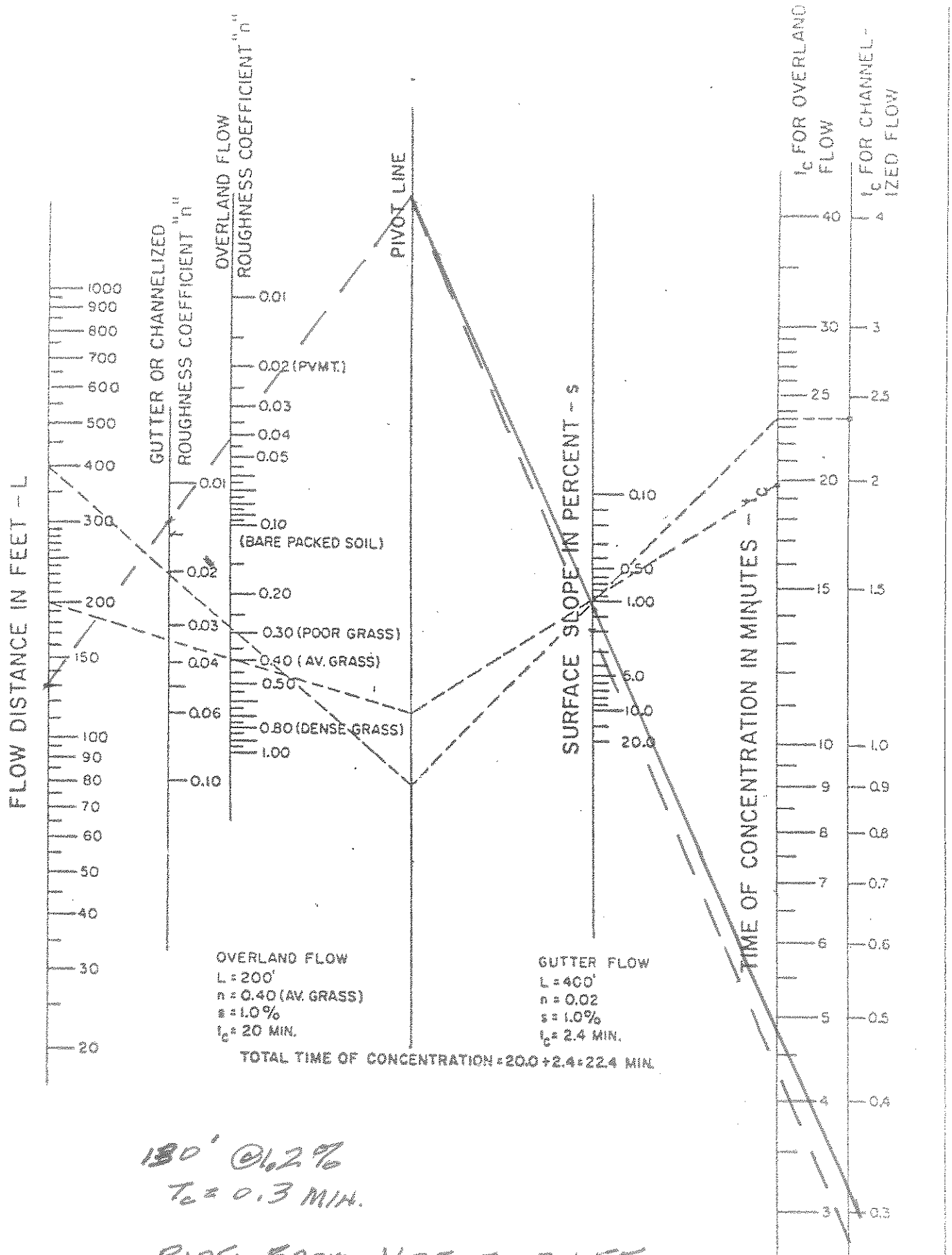
INLETS AT STA. 5+75 (1+50 SS)
INLET NO. 2

City of Little Rock

NOMOGRAPH FOR TIME OF CONCENTRATION

SOURCE: City of Fort Worth, Tx.

2-2
FIGURE



180' @ 0.2%
T_c = 0.3 MIN.

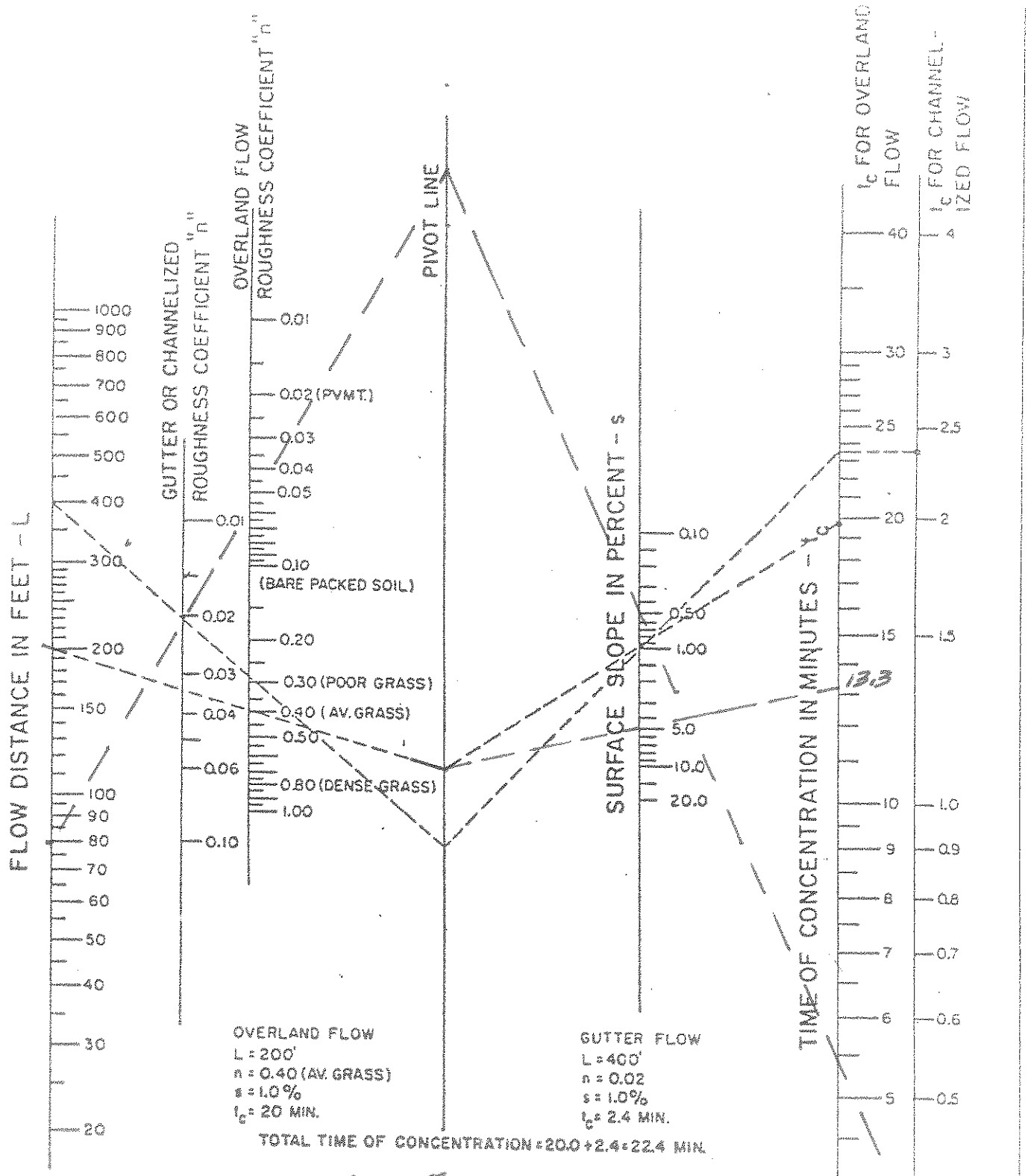
PIPE FROM 1+25 TO 2+55

City of Little Rock

NOMOGRAPH FOR TIME OF CONCENTRATION

SOURCE: City of Fort Worth, Tx.

D-2
FIGURE



OVERLAND 200' @ 5%, T_c = 13.3

GUTTER 80' @ 0.5%, T_c = 0.9

T_c = 13.7

INLETS AT STA. 7+00 (SS 2+70)

INLET NO. 3

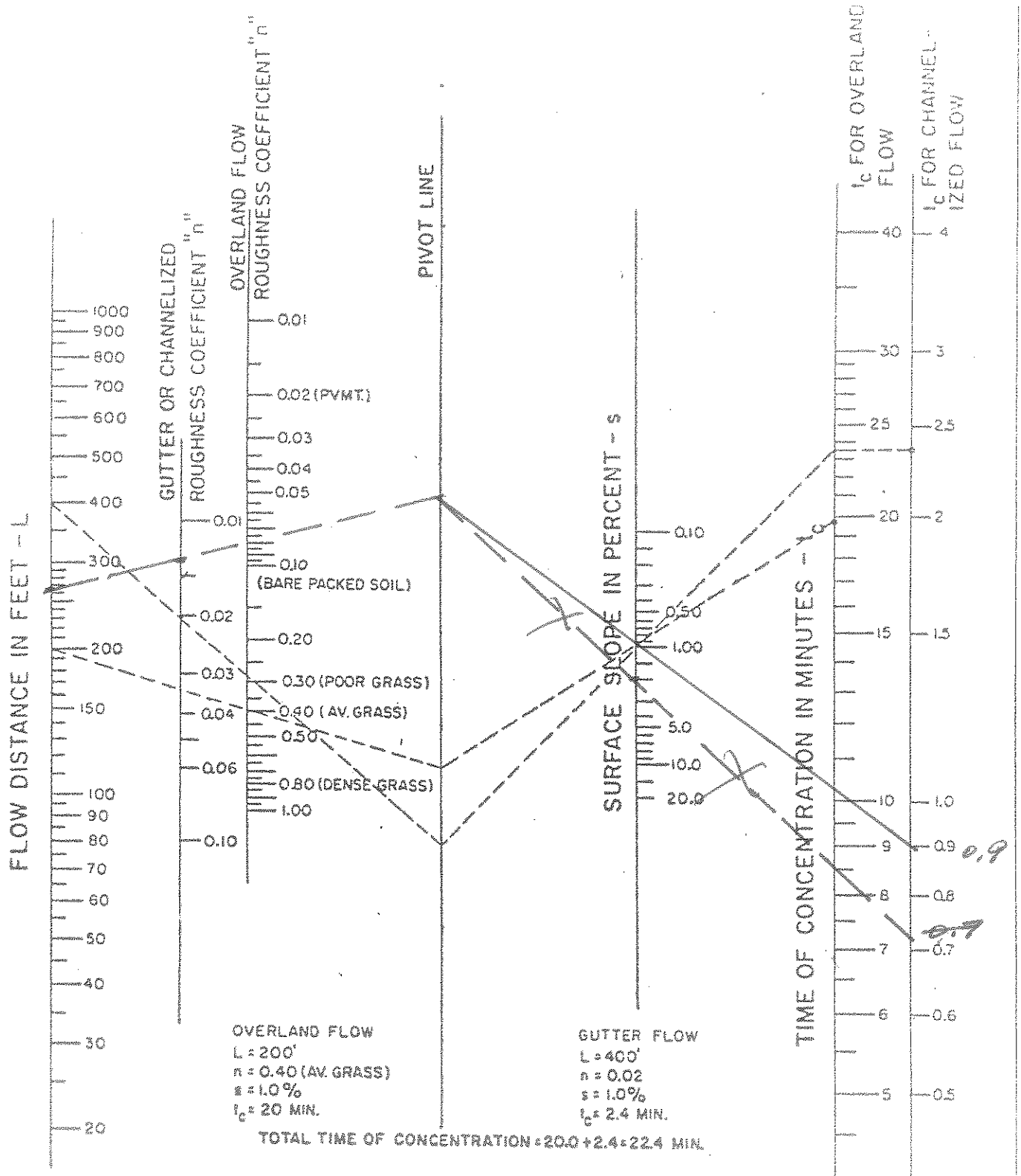
NOMOGRAPH FOR TIME OF CONCENTRATION

SOURCE: City of Fort Worth, Tx.

City of Little Rock

2-2

FIGURE



265' @ 0.02
T_c = 0.9 MIN.

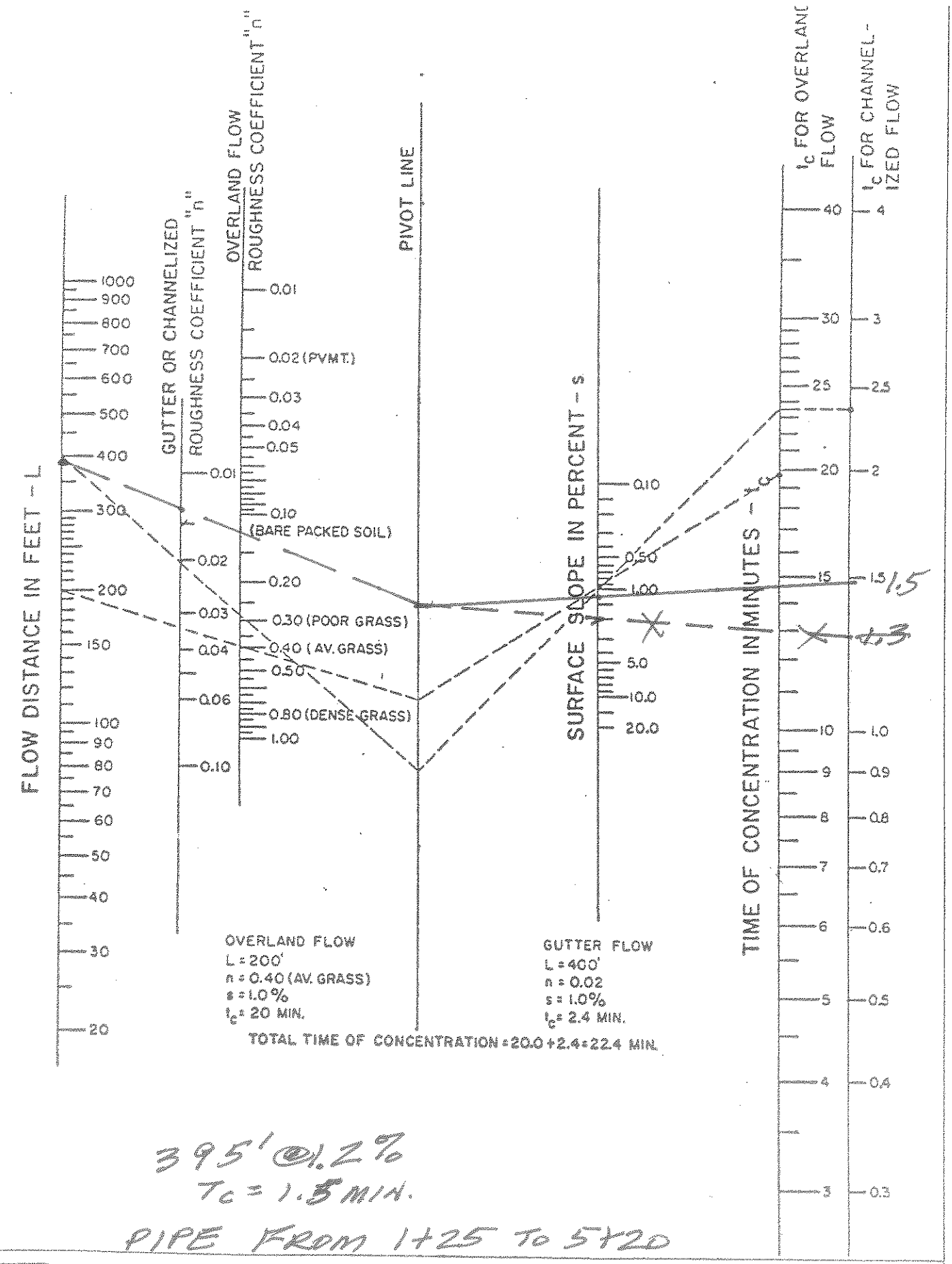
PIPE FROM 2+55 TO 5+20

City of Little Rock

NOMOGRAPH FOR TIME OF CONCENTRATION

SOURCE: City of Fort Worth, Tx.

2-2
FIGURE



395' @ 1.2%
Tc = 1.5 MIN.

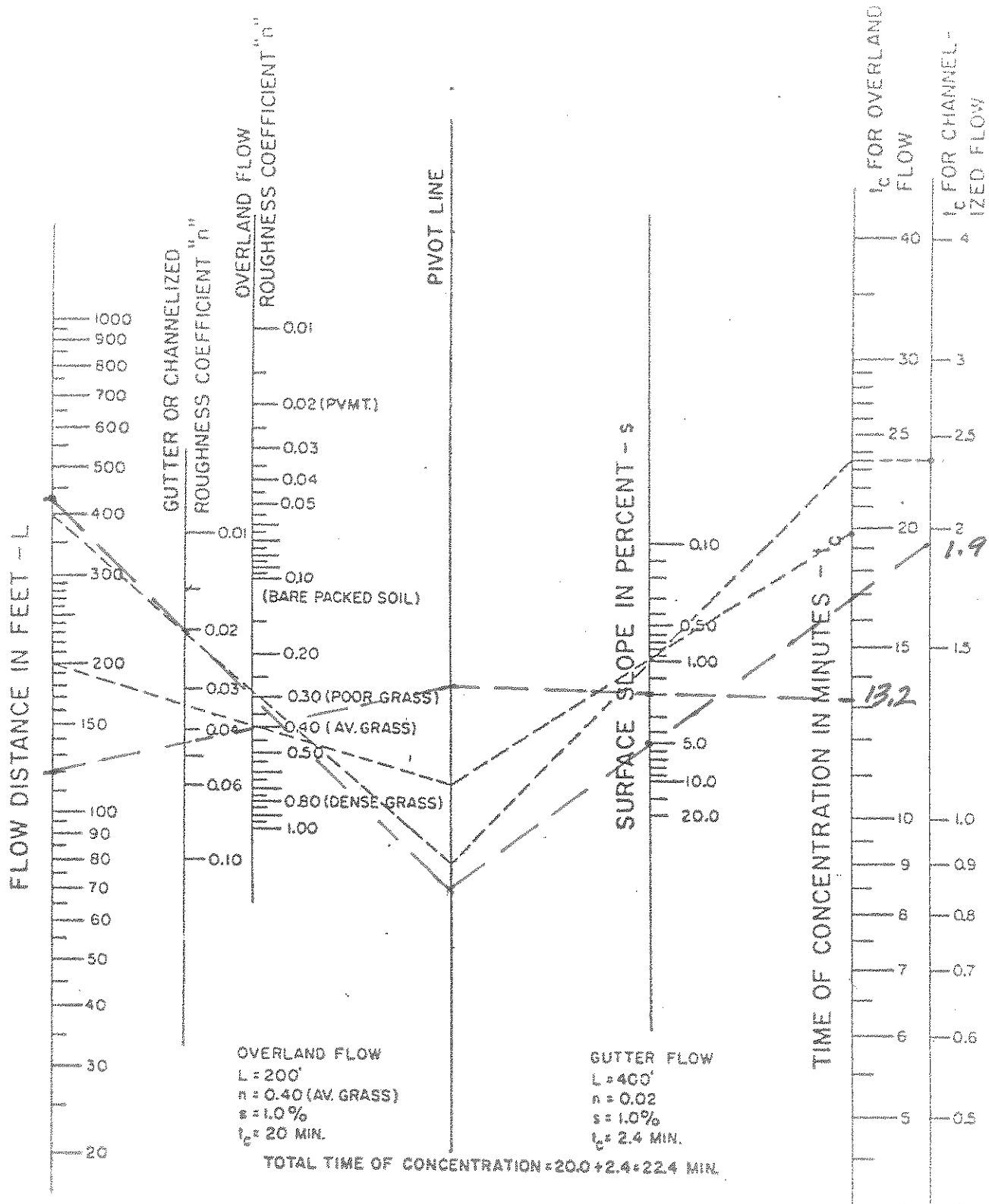
PIPE FROM 1+25 TO 5+20

City of Little Rock

NOMOGRAPH FOR TIME OF CONCENTRATION

SOURCE: City of Fort Worth, Tx.

2-2
FIGURE



OVERLAND 120' @ 2%, T_c = 13.2 MIN.
GUTTER 430' @ 5%, T_c = 1.9 MIN.
T_c = 15.1 MIN

INLETS AT 574.9+25 (SS 5+20)

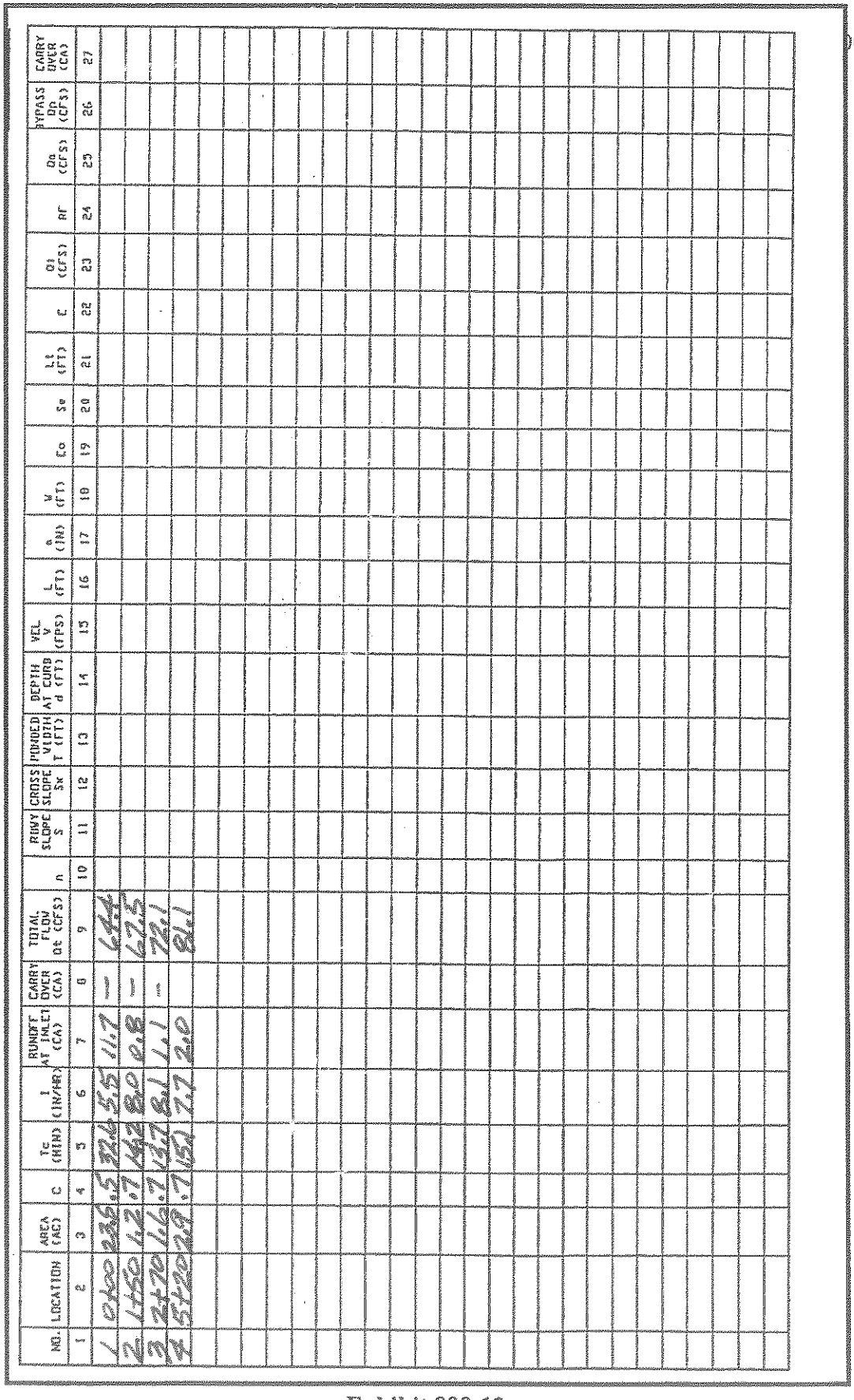
INLET No. 4

NOMOGRAPH FOR TIME OF CONCENTRATION

SOURCE: City of Fort Worth, Tx.

City of Little Rock

2-2
FIGURE



NO.	LOCATION	AREA (AC)	C	Tc (MIN)	I (IN/HR)	RUNOFF AT INLET (CA)	CARRY OVER (CA)	TOTAL FLOW Qt (CFS)	n	RDWY SLOPE S	CROSS SLOPE Sx	PONDED WIDTH T (FT)	DEPTH AT CURB d (FT)	VEL V (FPS)	L (FT)	a (IN)	W (FT)	Eo	Sw	Ll (FT)	E	Qi (CFS)	Rf	Qa (CFS)	BYPASS Qb (CFS)	CARRY OVER (CA)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	0+00	23.5	.7	22.4	5.5	11.1	—	1.44																		
2	1+50	12.0	.7	14.2	8.0	6.8	—	1.23																		
3	2+70	16.2	.7	14.7	8.1	9.1	—	72.1																		
4	5+20	28.7	.7	15.0	7.7	2.0		81.1																		

Exhibit 800-12
Inlet Flow Calculation Table

INLET NO.	LOCATION	INLET CA	OTHER CA	FROM STRUCT. NO.	TOTAL CA	INLET Tc (MIN)	PIPE Tc (MIN)	DESIGN Tc (MIN)	I (IN/HR)	PIPE Qt (CFS)	PIPE DESIGN							PIPE INVERTS			DROP INLET		
											PIPE SIZE (IN)	PIPE n	PIPE SLOPE (FT/FT)	PIPE CAP. (CFS)	PIPE Vp (FPS)	PIPE L (FT)	PIPE Tc (MIN)	INLET ELEV. (FT)	TOTAL FALL (FT)	OUTLET ELEV. (FT)	FLOW LINE (FT)	TOP ELEV. (FT)	HT. (FT)
1	0+00	11.7	–	–	11.7	32.6	–	32.6	5.5	64.4	30*	.012	.01	80	6.6								
2	1+50	0.8	11.7	1	12.5	14.2	0.3	[illegible]	5.4	67.5	30*	"	.012	108	6.9								
3	2+70	1.6	12.5	2	14.1	13.7	0.3	33.2	5.3	72.1	30*	"	.015	116	7.3								
4	5+20	2.0	13.7	3	15.7	15.1	[illegible]	34.2	5.2	81.1	42	"	.01	126	8.4								

*DOUBLE 30"

Exhibit 600-1
Storm Sewer Computations

INLET STATION	OUTLET WSE	Do	Qo	Lo	Sfo	Hf	VELOCITY HEAD LOSSES								TOTAL HGL	TOP RING OR GUTTER
							Vo	Qi	Vi	Htm	He	Hj	Hb	HL		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1+25	434.8	30	33.8	50	.004	0.2	6.9	32.2	6.6	0.7	0.3	0.7	0	1.9	436.7	
1+75	433.4	30	33.8	80	.004	0.3	6.9	33.8	6.9	0.7	0.3	0.7	0.3	2.3	435.7	
2+55	432.4	30	36.0	30	.005	0.2	7.3	33.8	6.9	0.7	0.3	0.7	0	1.9	434.3	
2+85	432.0	42	81.1	235	.006	1.3	8.4	72.1	7.3	0.8	0.4	1.1	0	3.6	435.6	
5+20	430.4	42	81.1	40	.006	0.2	8.4	81.1	8.4	1.1	0.5	1.1	0	2.9	433.3	

Exhibit 600-2
Hydraulic Grade Line