DRAINAGE PLAN
FOR
KEN JOHNS
WEST SIDE AUTO CENTER
AT
COORS BOULEVARD
BETWEEN
CALABACILLAS ARROYO
AND
IRVING BOULEVARD

Prepared for:

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Job No. 6 290 4

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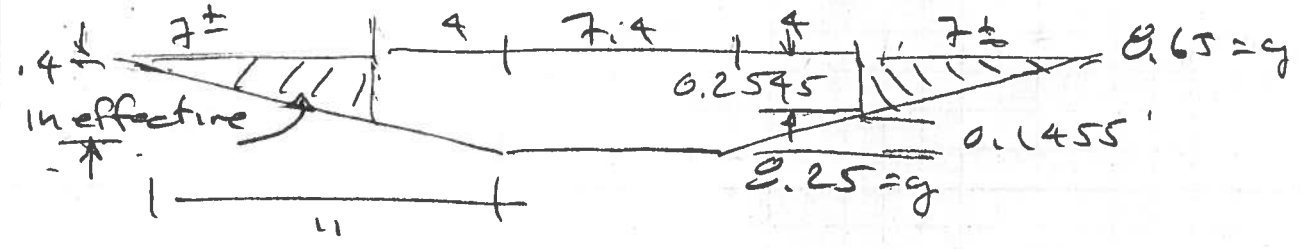
KEN JAMES WESTSIDE | 10/1/93 TAG

Revised grate & location hydraulic calcs

Double C pocketed in access easement

by approach section hydraulics

S = .015, n = .017 asphalt
area not in front of pocket ineffective



from Qpro file MANTRAP.WQ1 by TAG

@ y_g = 0.11455 ft A = 1.077 ft² P = 7.691 ft Q = 3.1 cfs

✓ Q capacity @ y = 0.4

A = 1.077 + .0.2545 (4+4+7.4) = 4.2218 ft²
P = 7.691 + 2(0.2545) = 8.2000 ft

$Q = \frac{1.49}{.017}\sqrt{.015}\ A\left(\frac{A}{P}\right)^{2/3} = 10.7345\ A\left(\frac{A}{P}\right)^{2/3}$ Manning

= 29.105 >> 11.57

✓ y = 0.31
A = 1.077 + (.1545)(15.4) 3.4563
P = 7.691 + 2(.1545) = 8.000
$Q = 1C\ A\ (A/P)^{2/3}$
$= 10.7345 \cdot 3.4563\ (3.4563/8)^{2/3} = 21.2$

✓ y = 0.2
A = 1.077 + (.0545)(15.4) = 1.9163
P = 7.691 + 2(.0545) = 7.800
Q = 8.0653

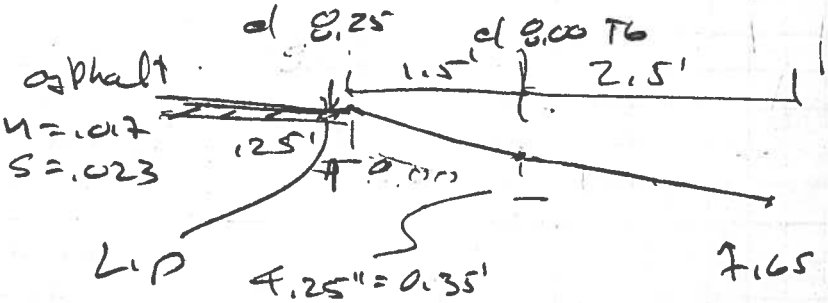
✓ y = .23
A = 2.3793 P = 7.96 Q = 11.50 ≈ 11.57

y = 0.24 A = 2.5323 P = 7.96 Q = 12.77 > 11.57

Use y = 0.23 V ≈ 4.87 fps Fr ≈ 1.8

Reused grate & location

Double "C" in pocket



Consider weir on 3 sides of grate (not against curb)
from DWG 2205

$L = 2 + 3.2 + 3.2 + 2 = 10.4$

Use $C = 3.0$ $Q = C\ L\ H^{3/2}$ $Q = 11.57$ design

$H^{3/2} = [Q/(CL)] = \frac{11.57}{3 \cdot 10.4} = 0.3708$

$H = 0.516 \approx 0.52'$

✓ @ upstream (high) side of grate)
8.00 + 0.52 = 8.52'

✓ effective flow area depth & elev @ L.P
$y = 0.23'$ prev page
8.25 + 0.23 = 8.48

Since 8.52 barely above 8.48 don't expect jump on that basis,
inlet will suck up flow, so don't expect jump in inlet
say OK

✓ depth compared to normal top of curb
TC = edge of inlet + 6.5" = 8.00 + 0.54 = 8.54
WSN " " 0.52 = 8.52
nominally OK

Revised grate & location

18 RCP $n = .013$ $L_{new} = 134'$ $S_{new} = .015$

$134 * .015 = 2.01'$

downstream MH inv in = 42.10 out = 42.00

from MANCIRC.WQ1 (approx, THR) @ 1.5% slope
Q = 11.57 cfs

$y_c = 1.11$ ft $V = 8.24$ fps $H_v = 1.05'$ $E_s = 2.17$ ft
$Fr = 1.38$

⇒ probl jump, ok, location not needed

elev at inlet

	42.10	inv @ downstream MH
	2.01	↳ slope
3.26	1.50	½ dia of pipe
	1.26	1.2 * Hv
	0.5	free board
	47.37'	

42.10
+ 2.01
44.11 = inv out

FILE=MANCIRC.WQ1
Manning's equation for flow in circular pipes
flowing just full or less, with sediment (crud) dept

Q = (1.49/n)*A*R(2/3)*S^(1/2)

Units are feet, seconds, radians; slope is ft/ft
n=Manning's roughness; A=flow area; S=slope=bed slop
R=hydraulic radius=A/P where P=wetted perimeter=Pw;
Theta=radian angle from a downward vertical to the w
Test case: 60" rcp part-full, no crud
FILE=MANCIRC.WQ1
10/01/93
KEN JOHNS WESTSIDE SW COR COORS & WESTSIDE
PIPE JUST FULL CAPACITIES, + MISC
01-Oct-93 5-6

n	0.013
Slope ft/ft	0.015
Diameter ft	1.5
Depth of water	1.111968
Depth of crud	0
Theta water	2.074445
Theta crud	0
Area	1.404642
Pwet	3.111668
R hyd	0.451411
Velocity fps	8.238269
Q cfs	11.57
Hv=v^2/2g	1.054851
Specific Energy	2.166819
Froude No.	1.377413