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Project: Boys and Girls Club — Date: 8/30/06
Item: Storm Sewer Capacity — By: PDF

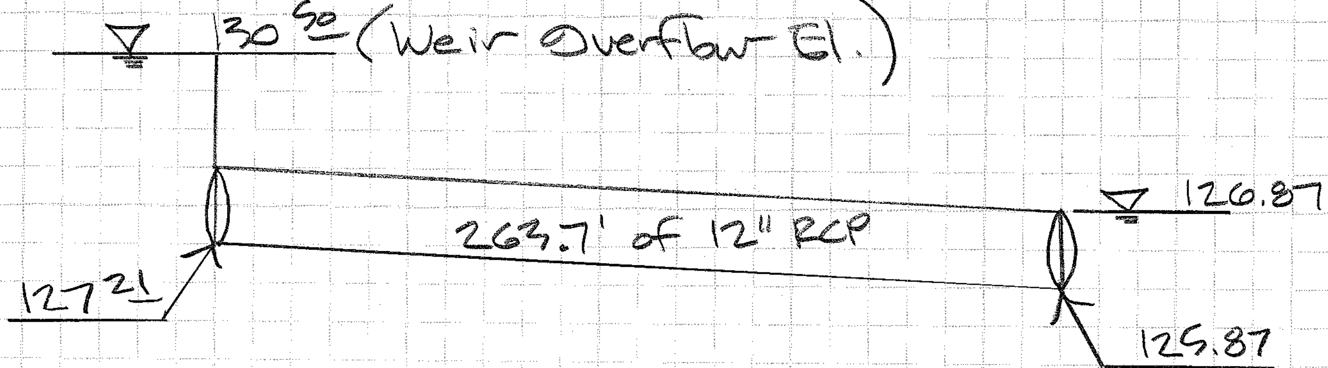
Compute the Maximum Flow through the 12" RCP Storm Sewers.

East Storm Sewer

Top of Inlet 129^{30}
Overflow Weir 130^{50}
263.7' of 12" RCP @ 0.51%
Upstream FL = 127^{21}
Downstream FL = 125^{87}

Conservatively assume Starting HGL is at the Top of the D/S End = $125^{87} + 1 = 126^{87}$

Then Head Differential would be $130^{50} - 126^{87}$ = 3.63 ft.



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$\frac{HW}{D}$ Ratio $= \frac{(130.50 - 127.21)}{1} = 3.3$

Assume Outlet Control.

$$H = \left(1 + k_e + \frac{29n^2L}{R_h^{1.33}}\right)\frac{v^2}{2g}$$

$$3.63 = \left(1 + 0.5 + \frac{(29)(0.013)^2(263.7)}{\left(\frac{1}{4}\right)^{1.33}}\right)\frac{v^2}{(2)(32.2)}$$

Solve for $v \longrightarrow 4.92$ ft/sec.

$Q = VA = (4.92)\left(\frac{\pi}{4}\right)(1)^2 = 3.9$ cfs.

Say 4 cfs Maximum Possible.

Similarly, for the West Storm

Top of Inlet 129^{30}

347.0' of 12" RCP @ 0.51%

Upstr. FL = 127^{12}

Downstr. FL = 125^{35}

Head Differential $= 130.50 - (125.35 + 1)$
$= 4.15$

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Solve for v in the energy equation.

$v = 4.66$

$Q = VA = 3.7$ cfs.

Say 4 cfs Maximum Possible

Estimate the Maximum Q that may be conveyed in either 12" Storm Sewer to be about 4 cfs (each.)

Compute "normal" flow in a 12" RCP @ 0.51%

$$v = \frac{1.49}{n} R_h^{2/3} \sqrt{S_f}$$

$$= \frac{1.49}{0.013} \left(\frac{1}{4}\right)^{2/3} \sqrt{\frac{0.5}{100}} = 3.22$$

$Q = VA = 2.5$ cfs

Estimate "Normal Flow" Q Capacity for 12" RCP Storm Sewer to be about 2 cfs.