

from urban storm runoff
FWD
USBR

$$\begin{aligned}
 P_d &= (v^2 + gd)^{1/2} \\
 &= \left(\left(13 \frac{\text{ft}}{\text{sec}} \right)^2 + 32.2 \frac{\text{ft}}{\text{sec}} (2') \right)^{1/2} \\
 &= (169 + 64.4)^{1/2} \\
 &= \sqrt{233} = 15.2
 \end{aligned}$$

5.21 L

$$D_{50} = 9 \text{ inches}$$

rip rap depth

$$\begin{aligned}
 T &= 1.75 D_{50} \\
 &= 1.75 (9') = 16'
 \end{aligned}$$

$$W = 4D = 16 \text{ ft}$$

$$\begin{aligned}
 L &= 4D = 16 \text{ ft} \quad \text{or} \quad D^{1/2} \left(\frac{V}{2} \right) \\
 &= 4 \cdot 6.5 = 13
 \end{aligned}$$

stone specific gravity 2.5

$$62.4 \frac{\text{lb}}{\text{ft}^3} (2.5) = 156 \frac{\text{lb}}{\text{ft}^3}$$

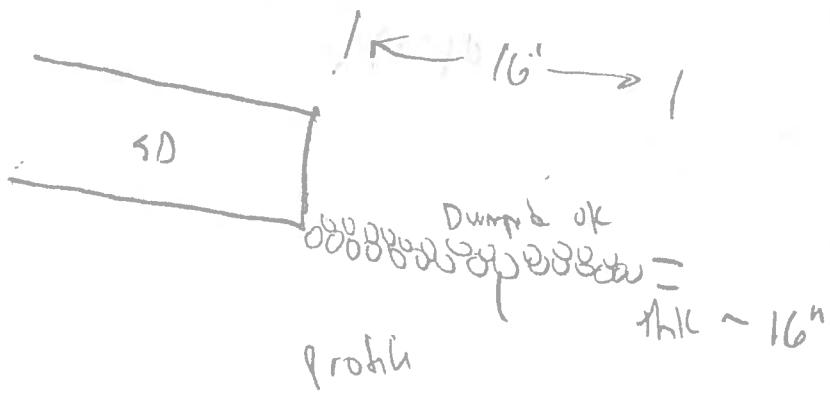
156 $\frac{\text{lb}}{\text{ft}^3}$	27 $\frac{\text{ft}^3}{\text{ft}^3}$	4200 $\frac{\text{lb}}{\text{ft}^3}$
	144 $\frac{\text{ft}^3}{\text{ft}^3}$	

Low Area 1800 $\frac{\text{lb}}{\text{ft}^3}$
40

For 40' 50' 100' Army

area 10 ft²

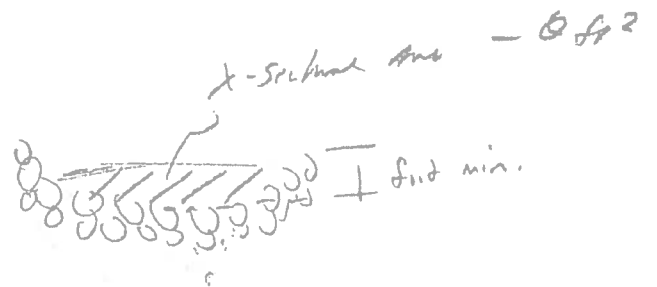
$$\begin{aligned}
 A &= 4' \\
 &= \pi r^2 \\
 &= 3.14 \cdot 4 = 12.56 \text{ ft}^2 / 1.25 = 10 \text{ ft}^2
 \end{aligned}$$



Rock size

$D_{50} = 9''$ heavy sha

$D_{51} = 12''$ lighter sha



Section A-1