

**RESPONSE 6**

## ACTIVE FACE RUN-ON CONTROL BERM SIZING

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### 1.0 OBJECTIVE

Develop run-on control berm design for the active waste working face.

### 2.0 DESIGN CRITERIA

- 1) The proposed soil berm is at 2-foot high as measured from the invert of the channel to the top of berm, with the invert sloped at 2% in the direction of flow. The side slope of the soil berm are 4H:1V and 2H:1V.
- 2) The allowable flow velocity in the proposed diversion channel is 5 ft/sec.
- 3) Manning's equation is used to calculate the channel flow capacity.
- 4) Rational method is used to back-calculate the allowable drainage area based on the channel flow capacity.

### 3.0 METHOD

I) Mannings's equation

$$Q = \frac{1.49}{n} AR^{2/3} S^{1/2}$$

Where:

Q = flow rate  
A = cross-sectional area of the flow  
R = hydraulic radius  
S = slope  
n = Manning's n for grass-lined channels = 0.035

II) Rational Method

$$Q = CIA$$

Where:

Q = Runoff flow rate;  
C = Runoff coefficient = 0.7 for slopes greater than 5% (Reference 1);  
i = Rainfall intensity coefficient (Reference 1, TxDot data as shown in Table 2);  
A = Drainage area.



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#### 4.0 CALCULATIONS

Using Manning's equation the channel capacity is calculated as 27.4 cfs as shown in Table 1.

Using 27.4 cfs as a limiting factor, the maximum subbasin drainage area for the proposed run-on control berm is calculated as 4.1 acres as shown in Table 2.

**Table 1: Channel Flow Capacity**

Q (cfs)	Slope (ft/ft)	Left Side Slope (H:1V)	Right Side Slope (H:1V)	Channel Depth (ft)	Bottom Width (ft)	Mannings n	Max Velocity (fps)	Max Normal Flow Depth (ft)	Shear Stress (lb/ft <sup>2</sup> )	Available Freeboard (ft)
27.4	0.02	2	4	2	0	0.035	5	1.4	1.8	0.6

**Table 2: Runoff Calculation**

County	Coefficient	2-year	5-year	10-year	25-year	50-year	100-year
<b>Bell</b>	e (in)	0.798	0.78	0.773	0.771	0.754	0.751
Baylor	b	56	69	77	90	93	102
Bee	d (mins)	8	8.5	8.5	8.5	8.5	8
<b>Bell</b>	Intensity (in/hr)*	5.6	7.1	8.1	9.5	10.3	11.6
Bexar	Coefficient	2-year	5-year	10-year	25-year	50-year	100-year
Blanco	e (mm)	0.798	0.78	0.773	0.771	0.754	0.751
Borden	b	1422	1753	1956	2286	2362	2591
Bosque	d (mins)	8	8.5	8.5	8.5	8.5	8
Bowie							
Brazoria							

* for Time of Concentration	10	Minutes at a Minimum
C =	0.7	For Slopes Greater than 5%
A =	4.1	Acres
Q =	27.4	cfs = channel flow capacity from Table 1

## **5.0 CONCLUSION**

A typical run-on control berm of 2 ft high is proposed. Based on results of the flow capacity analysis, the maximum drainage area for the proposed run-on control berm will be limited to 4.1 acres.

## **6.0 REFERENCE**

- 1) Texas Department of Transportation "Hydraulic Design Manual" Revised March 2004.