

12x12H

SCALE: $\frac{1}{2}" = 1"$

Directions:

1. Extend roof line at proper slope all the way to the chosen gutter width line. Vertical rises on 12 Horizontal are given.

2. Mark the clearance below the roof slope projection as follows:

12H: 7-12V $\frac{1}{4}"$ ($\frac{1}{2}"$ full scale)

12H: 0-6.9V $\frac{3}{8}"$ ($\frac{3}{4}"$ full scale)

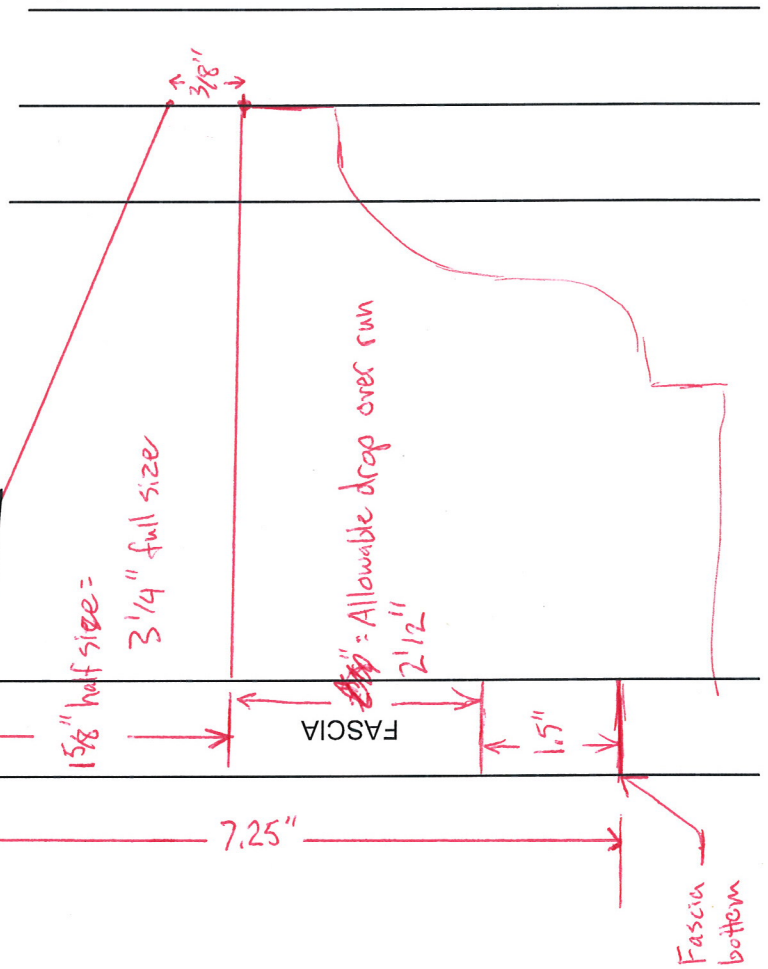
3. Transfer clearance mark back to fascia

4. Measure to roof slope line to get initial drop at high end of gutter. (Measurement will be half-scale)

5. Compute proposed gutter drop based on slope and length to see if it will fit on fascia board.

6. If roof sheathing or shingles have appreciable thickness and overlap fascia, draw in on diagram and account for this distance.

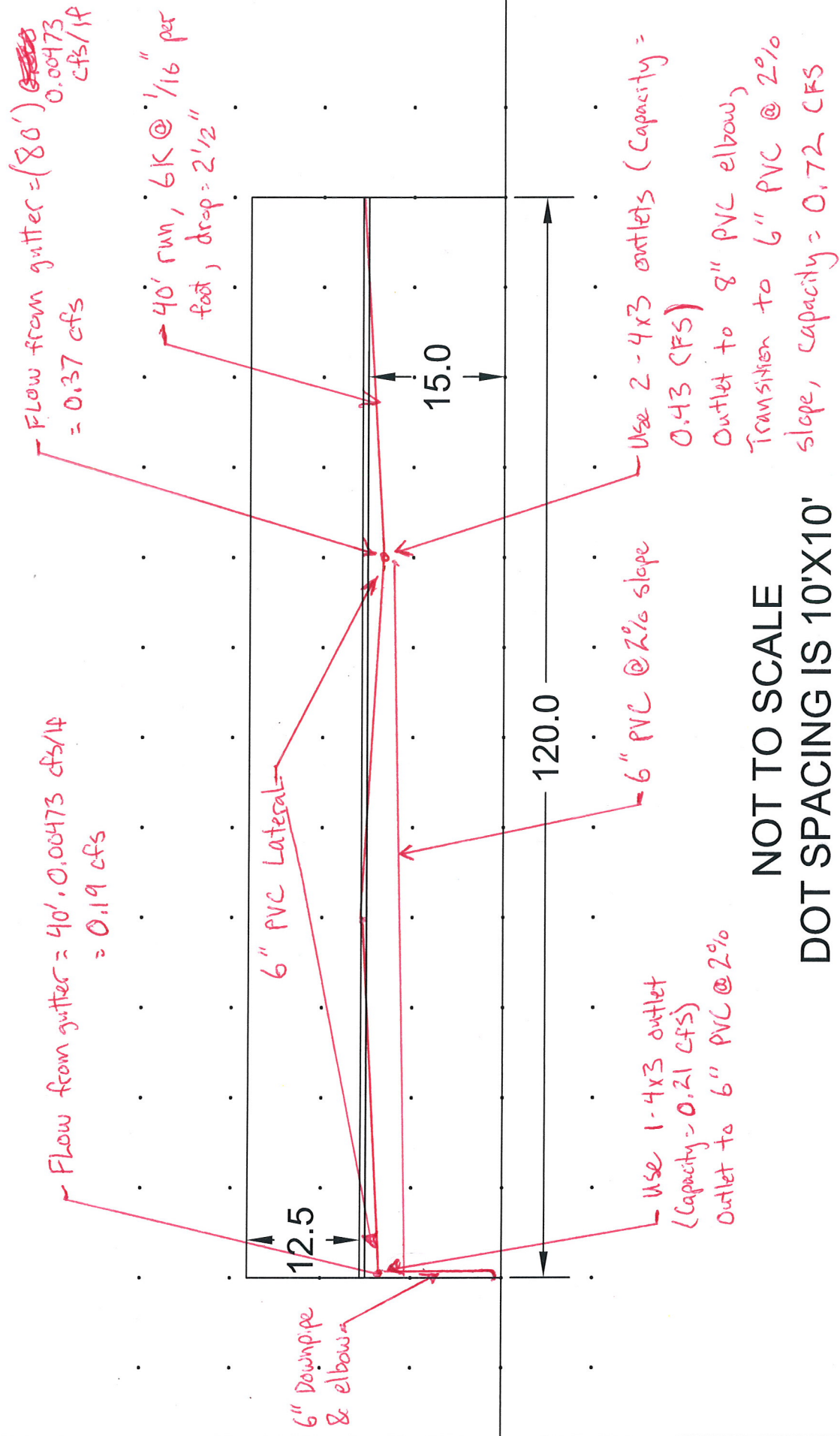
5K 6K 7K



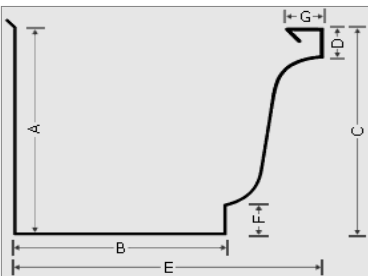
$$\frac{12.5}{30} = \frac{X}{12}$$

$$X = 5$$

The fascia is 7¹⁴ " tall.



DOT SPACING IS 10'X10'

ROOF RUNOFF STRUCTURE DESIGN																																																																									
Adapted from spreadsheet by NRCS Walton Area																																																																									
Client : Tim			Project: Gutter Exercise, 1 possible solution																																																																						
County : Montgomery			By: TC				Date: 1/15/2015																																																																		
Town : Fultonville			Checked: TC				Date: 1/15/2015																																																																		
Field No: A12b																																																																									
Plan Roof Area =	3600	Only enter information into:		Cells																																																																					
Roof Slope (x/12) =	5	Total Flow 0.567 cfs 0.00473 cfs/LF		Is project part of a manure management system. (If yes, design for a 25 yr, 5 min precipitation design capacity. If no, design for a 10 yr, 5 min precipitation)																																																																					
Adjusted Area =	3780								ft ²																																																																
Length of Gutter =	120								ft																																																																
				Enter 5 min rainfall (inches): 0.54 0.15012 cfs/1000 ft ²																																																																					
Step 1 Compute capacity of selected gutter size using "Manning's Equation".																																																																									
<div style="display: flex; justify-content: space-between;"> <div> <p>q = capacity of gutter, ft³/sec</p> <p>A = cross sectional area of gutter</p> <p>R = A_g / wp</p> <p>S = Gutter Slope (typ 1/8" or less) 1/16 in/ft</p> <p>wp = wetted perimeter of gutter, inches</p> <p>n = Roughness Coefficient 0.012 (smooth steel)</p> </div> <div style="text-align: center;"> $Q = \frac{1.49}{n} A R^{\frac{2}{3}} S^{\frac{1}{2}}$ </div> <div> <p>= 0.3258 ft³/sec</p> <p>= 20.67 in²</p> <p>= 1.530 in</p> <p>= 13.47 in</p> </div> </div>																																																																									
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th colspan="8" style="background-color: #f2f2f2;">GUTTER DIMENSIONS</th> </tr> <tr> <th>Size</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> <th>G</th> </tr> <tr> <td>6K</td> <td>4 7/8</td> <td>3 7/8</td> <td>4 5/8</td> <td>1</td> <td>6</td> <td>5/8</td> <td>9/16</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <th colspan="8" style="background-color: #f2f2f2;">K SERIES GUTTER DIMENSIONS (STANDARD IN INCHES)</th> </tr> <tr> <td>5K</td> <td>3 7/16</td> <td>3 5/16</td> <td>3 7/16</td> <td>5/8</td> <td>5</td> <td>9/16</td> <td>9/16</td> </tr> <tr> <td>6K</td> <td>4 7/8</td> <td>3 7/8</td> <td>4 5/8</td> <td>1</td> <td>6</td> <td>5/8</td> <td>9/16</td> </tr> <tr> <td>7K</td> <td>5 7/8</td> <td>4 9/16</td> <td>6</td> <td>1</td> <td>7</td> <td>5/8</td> <td>5/8</td> </tr> <tr> <td>Other</td> <td>7 1/4</td> <td>5 3/8</td> <td>7</td> <td>1</td> <td>8</td> <td>5/8</td> <td>5/8</td> </tr> </table> <p>(consider what size downspouts are applicable with your chosen gutter size)</p>										GUTTER DIMENSIONS								Size	A	B	C	D	E	F	G	6K	4 7/8	3 7/8	4 5/8	1	6	5/8	9/16	K SERIES GUTTER DIMENSIONS (STANDARD IN INCHES)								5K	3 7/16	3 5/16	3 7/16	5/8	5	9/16	9/16	6K	4 7/8	3 7/8	4 5/8	1	6	5/8	9/16	7K	5 7/8	4 9/16	6	1	7	5/8	5/8	Other	7 1/4	5 3/8	7	1	8	5/8	5/8
GUTTER DIMENSIONS																																																																									
Size	A	B	C	D	E	F	G																																																																		
6K	4 7/8	3 7/8	4 5/8	1	6	5/8	9/16																																																																		
K SERIES GUTTER DIMENSIONS (STANDARD IN INCHES)																																																																									
5K	3 7/16	3 5/16	3 7/16	5/8	5	9/16	9/16																																																																		
6K	4 7/8	3 7/8	4 5/8	1	6	5/8	9/16																																																																		
7K	5 7/8	4 9/16	6	1	7	5/8	5/8																																																																		
Other	7 1/4	5 3/8	7	1	8	5/8	5/8																																																																		
																																																																									
Step 2 Compute capacity of Gutter Outlet																																																																									
<div style="display: flex; justify-content: space-between;"> <div> <p>q_d = capacity of outlet</p> <p># of outlets/downspouts 3</p> </div> <div> $q_d = 0.010457 \times A_d \times h^{0.5}$ </div> <div> <p>= 0.656172 ft³/sec</p> </div> </div>																																																																									
<div style="display: flex; justify-content: space-between;"> <div> <p>A_d cross sect. area of outlet, in² (only fill cells to be used, or enter 0)</p> </div> <div> <p>= 10 in²</p> </div> </div> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>Round</td> <td>0 in dia</td> <td>=</td> <td>0 in²</td> <td rowspan="3" style="background-color: #f2f2f2; text-align: left; padding: 5px;"> Select the Size of Outlet That Will Work With Your Chosen Gutter </td> </tr> <tr> <td>Rectangle</td> <td>2.5 in x 4 in</td> <td>=</td> <td>10 in²</td> </tr> <tr> <td>Other</td> <td colspan="2">enter cross sectional area (i.e. oval)</td> <td>= in²</td> </tr> </table> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div> <p>h = head, inches (generally the depth of the gutter minus 0.5 inch), or manually entered if using a tapered drop out of the gutter.</p> </div> <div> <p>= 4.38 in</p> </div> </div>										Round	0 in dia	=	0 in ²	Select the Size of Outlet That Will Work With Your Chosen Gutter	Rectangle	2.5 in x 4 in	=	10 in ²	Other	enter cross sectional area (i.e. oval)		= in ²																																																			
Round	0 in dia	=	0 in ²	Select the Size of Outlet That Will Work With Your Chosen Gutter																																																																					
Rectangle	2.5 in x 4 in	=	10 in ²																																																																						
Other	enter cross sectional area (i.e. oval)		= in ²																																																																						
Step 3 Determine whether the system is controlled by the gutter or outlet capacity																																																																									
<div style="display: flex; justify-content: space-between;"> <div> <p>N_d = number of down spouts</p> <p>if N_d is less than 1, the system is gutter capacity controlled. If it is equal to or greater than 1, the system is downspout controlled unless the number of downspouts is equal to or exceeds N_d</p> </div> <div> $N_d = \frac{q_g}{q_d}$ </div> <div> <p>0.497</p> <p style="color: red;">Gutter Controlled (Preferred)</p> </div> </div>																																																																									
DESIGN CONSIDERATIONS: (LF of Gutter before overflowing, LF of Gutter the Designed Downspout/s can handle)																																																																									
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">Drop of Gutter Due to Slope</td> <td style="width: 10%;">=</td> <td style="width: 10%; text-align: center;">7.5 in</td> <td style="width: 40%;">Make sure it will fit Fascia</td> </tr> <tr> <td>Run of Designed Gutter</td> <td>=</td> <td style="text-align: center;">69 ft</td> <td style="color: red;">Size of Gutter Inadequate, Consider L</td> </tr> <tr> <td>Run of Designed Downspout</td> <td>=</td> <td style="text-align: center;">139 ft</td> <td style="color: red;">Sufficient</td> </tr> </table>										Drop of Gutter Due to Slope	=	7.5 in	Make sure it will fit Fascia	Run of Designed Gutter	=	69 ft	Size of Gutter Inadequate, Consider L	Run of Designed Downspout	=	139 ft	Sufficient																																																				
Drop of Gutter Due to Slope	=	7.5 in	Make sure it will fit Fascia																																																																						
Run of Designed Gutter	=	69 ft	Size of Gutter Inadequate, Consider L																																																																						
Run of Designed Downspout	=	139 ft	Sufficient																																																																						
Underground Outlet Drain: (For smooth pipe such as PVC)																																																																									
Using total flow from above: find a pipe diameter pipe and slope (from gravity flow for smooth pipes table on right) that will work on your site given site conditions and topography layout																																																																									