SCS/NRCS Hydrographs

The Soil Conservation Service (SCS) of the U.S. Department of Agriculture has published a significant catalog of hydrologic methods over several decades. (The name of the agency was changed to the Natural Resources Conservation Service (NRCS) in 1994). Two synthetic hydrographs are described here.

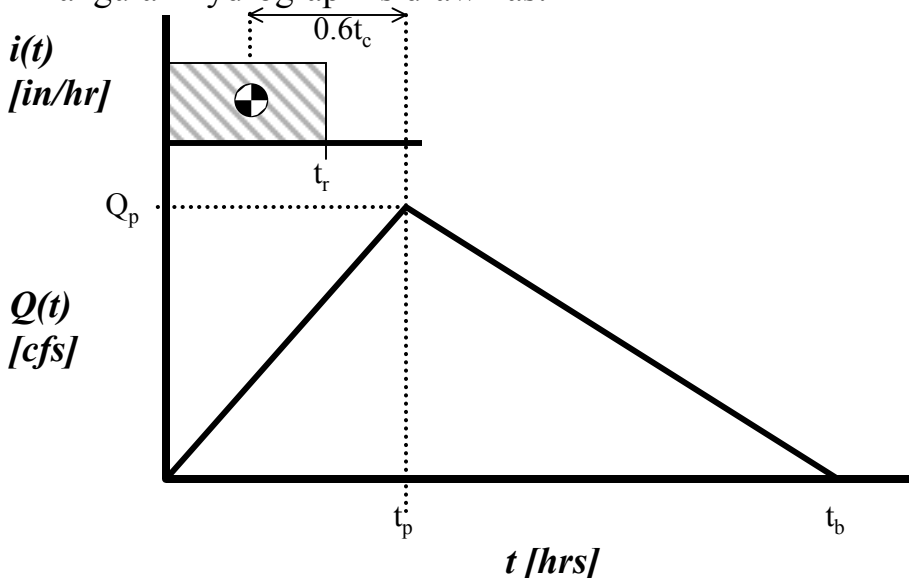Two hydrograph shapes: triangular and curvilinear. Both shapes use the following parameters:

Time to peak, t_p (hrs):

$$t_p = \frac{t_r}{2} + 0.6 \cdot t_c \quad \left(= \frac{t_r}{2} + t_L \right)$$

Peak discharge, Q_p (cfs):
[RO is Runoff Depth (in)]

$$Q_p = \frac{484 \cdot A}{t_p} \cdot RO$$

Base time, t_b (hrs):

$$t_b = \frac{8}{3} t_p$$

The Triangular Hydrograph is drawn as:

The Curvilinear (or "Dimensionless") Hydrograph is tabulated as:

t/t_p	Q/Q_p	t/t_p	Q/Q_p
0	0	1.7	0.460
0.1	0.030	1.8	0.390
0.2	0.100	1.9	0.330
0.3	0.190	2.0	0.280
0.4	0.310	2.2	0.207
0.5	0.470	2.4	0.147
0.6	0.660	2.6	0.107
0.7	0.820	2.8	0.077
0.8	0.930	3.0	0.055
0.9	0.990	3.2	0.040
1.0	1.000	3.4	0.029
1.1	0.990	3.6	0.021
1.2	0.930	3.8	0.015
1.3	0.860	4.0	0.011
1.4	0.780	4.5	0.005
1.5	0.680	5.0	0.000
1.6	0.560		

To draw the hydrograph, the t/t_p values are multiplied by t_p and the Q/Q_p values are multiplied by Q_p to yield a set of 33 points to be plotted. Thus the hydrograph shape is always the same but is "stretched" by t_p and Q_p: