HAGER CREEK WATERSHED

(Including parts of the NW ¼ of section 16, NE ¼ of section 17, SE ¼ of section 8, and the SW ¼ of section 9, Georgetown Township)

Extended Detention Basins

Extended storm water detention is required within the Hager Creek Watershed.

The extended detention basin shall be a two-stage design, see example in Appendices.

In-line detention shall not be permitted.

All inlets, outlets, and overflow structures shall be designed to have non-erosive velocities or have adequate protection against erosion and scour. Maximum velocities are given as follows:

Lining Type	Maximum Permissible Velocity (ft/s)
Bare soil	2
Well-vegetated soil	4
Erosion-resistant lining	8

All other requirements for detention basin design shall apply to extended detention basins.

Forebay

All extended detention basins shall have a forebay to capture sediment.

The forebay shall be a separate basin, which can be formed by gabions, compacted earth or berm or other suitable structure.

The capacity of the forebay shall be equivalent to 5% of the 100-year flood control volume.

The overflow weir between the forebay and detention basin shall convey the design discharge from the inlet pipe(s) without overtopping the berm.

Stream Protection/Water Quality Volume

The initial stage (lower design water elevation) shall be sized to store the stream protection volume (V_{sp}) defined as the routed volume of runoff from the 1.5-year, 24-hour rainfall event (2.16 inches) with post-development conditions. The minimum required stream protection volume is given by the equation:

$$V_{sp} = 5,000 \text{ cft per impervious acre}$$

The maximum release rate to detain this volume for at least 24 hours is 0.05 cfs per impervious acre.

The stream protection volume incorporates the water quality volume (V_{wq}) to treat the "first flush" of storm water runoff which typically carries with it the highest concentration of pollutants. Separate design criteria for water quality volume are not required.

Flood Control Volume

The flood control volume (V_{fc}) shall be sized to detain the 100-year rainfall event with a maximum release rate of 0.13 cfs per acre.

The flood control volume must be provided for all acreage contributing to the detention basin.

The forebay and stream protection volume may be included as part of the required flood control volume.

Outlet Design

The multiple-stage outlets may be designed using the orifice equation, rearranged to solve for area.

$$A = \frac{Q}{5\sqrt{H}}$$

Where
A	=	Required area (sq-ft)
Q	=	Required outflow (cfs)
c	=	Orifice Coefficient (approximately 0.6)
2g	=	Two times the gravitation constant (g = 32.2 ft/s)
H	=	Height of design high water level above center of orifice, unless tailwater elevation is higher than center of orifice.

Other outlet devices shall have full design calculations provided for review.

The outlet from the initial stage shall be designed to prevent clogging.

1. Pipes or orifice plates shall have a minimum diameter of 4 inches.

2. Riser pipes with holes or slits less than 4 inches in diameter shall have a stone and gravel filter placed around the outside of the pipe.