

Hydraulic Considerations For Corrugated Polyethylene Pipe

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Preface

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Introduction

Corrugated polyethylene drainage pipe is available in single wall (corrugated interior), and dual wall (smooth interior), designs. Dual wall corrugated polyethylene pipe is designed with a strong corrugated outer wall and a smooth interior wall to improve long-term hydraulic efficiency. In fact, this type of corrugated polyethylene stormwater drainage pipe offers up to 50% more capacity than comparably sized corrugated steel and significantly more capacity than reinforced concrete pipe.

Smooth interior pipe won't snag debris or encourage sediment, even on shallow grades, and these superior hydraulics allow pipe systems to be downsized compared to traditional materials, reducing material and labor costs.



Overview of Hydraulic Considerations

The actual sizing of drainage pipes can be a tedious process. Fortunately, simplification procedures are available to make pipe selection faster and easier. The material in the following sections provides two methods – both based on the Manning's formula – which simplify the corrugated polyethylene pipe selection process.

Discharge curves provide one way to size pipe. Graphs are utilized once the design capacity requirements and slope have been established. Each corrugated polyethylene pipe product has its own discharge curve based on its Manning's "n" value.

Another method of sizing pipe involves conveyance factors and allows the designer to develop product options easily. Use of this method frequently results in more than one satisfactory pipe type and size for a given drainage need, thereby revealing the most cost-effective solution.

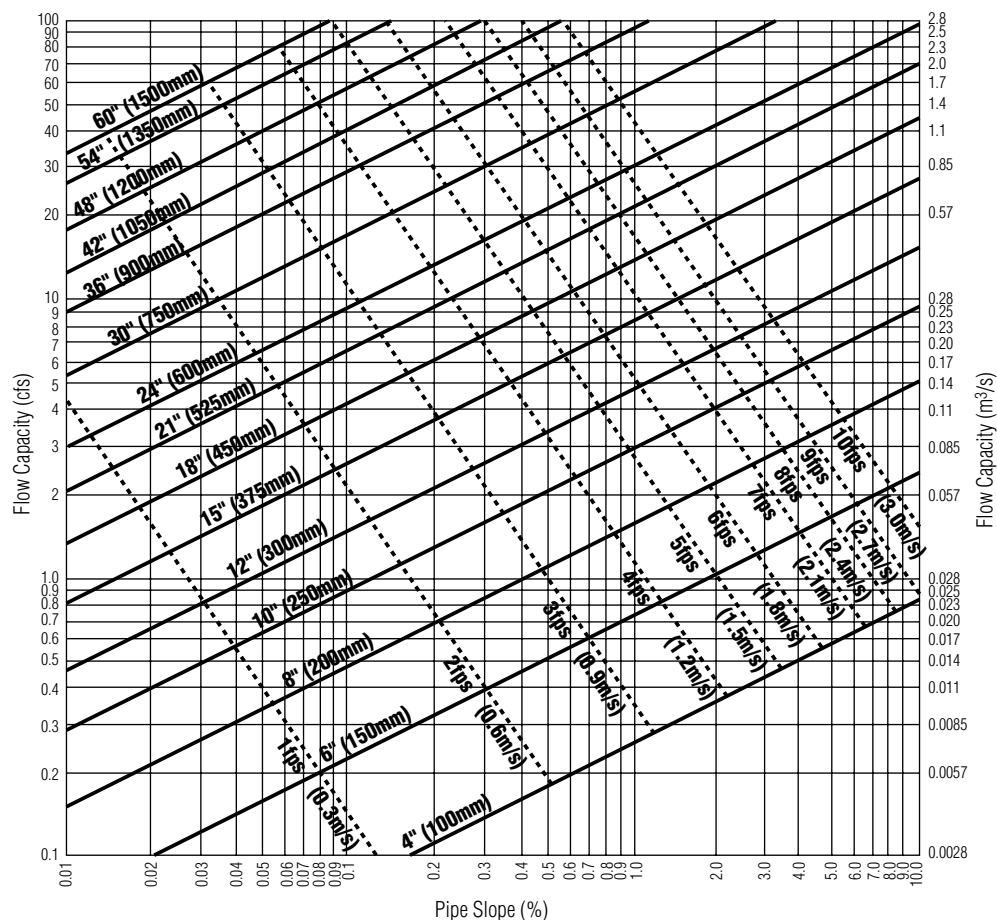
Final pipe selection also should include a review of the velocity conditions. Higher flow velocities help keep sediment in stormwater from settling along the bottom of the smooth interior corrugated polyethylene pipe. A reduction in sediment can also reduce maintenance requirements and help ensure the hydraulic function of the pipe continues throughout its design life.

Discharge Curves

The mathematical relationship of the terms included in the Manning's formula is often shown graphically through discharge curves. The curves aid in the sizing of pipe once the required capacity and slope have been determined.

Discharge curves for two types of polyethylene pipe are shown in Figures 1 and 2.

Figure 1: Discharge Rates for Corrugated Polyethylene Pipe With a Smooth Interior (assumes $n = 0.010$)



Note: Actual "n" values may vary at the engineer's discretion.

Solid lines indicate pipe diameter.

Dashed lines indicate approximate flow velocity.