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### **Assumed Design/Calculation Values**

PPI-BoreAid is provided by PPI and eTrenchless Group Inc. to provide users with the ability to perform a preliminary analysis of PE pipe suitability for HDD projects. It is offered in good faith and believed to be accurate at the time of its preparation. Information is offered without any warranty, expressed, or implied, including warranties of merchantability and fitness for a particular purpose. PPI and eTrenchless Group Inc. assumes no responsibility for regulatory compliance or compliance data.

Many design parameters and material properties are assumed in the calculations to facilitate a user-friendly web tool. Whenever possible, suggested parameters as outlined in ASTM F1962 are utilized. The following is a list of assumed values in PPI-BoreAid. To perform a more advanced analysis by varying these parameters, the full version of BoreAid is necessary.

- Coefficient of friction between pipe and ground at surface – 0.5 without rollers, 0.1 with rollers
- Coefficient of friction in lubricated borehole – 0.3
- Water unit weight – 62.38 lb/ft<sup>3</sup>
- Slurry unit weight – 93.57 lb/ft<sup>3</sup>
- Ballast unit weight - 62.38 lb/ft<sup>3</sup>
- Hydrokinetic pressure – 10 psi
- Live load – 0 psi
- Typical Sandy-Clay properties:
  - Dry unit weight – 107 lb/ft<sup>3</sup>
  - Saturated unit weight – 126 lb/ft<sup>3</sup>
  - Friction angle – 20
- Typical Silty-Sand properties:
  - Dry unit weight - 113 lb/ft<sup>3</sup>
  - Saturated unit weight – 130 lb/ft<sup>3</sup>
  - Friction angle - 27
- Typical Sand properties:
  - Dry unit weight – 119 lb/ft<sup>3</sup>
  - Saturated unit weight – 134 lb/ft<sup>3</sup>
  - Friction angle – 36
- For Lithified Rock, an ovality of 3% is assumed in the collapse calculations but no earth pressure or deflection is calculated.
- The silo width is equal to the bore diameter

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In addition, the assumed properties of PE pipe are:

Property / Ref. PPI PE Handbook, 2nd ed.	<i>MDPE</i>	<i>HDPE</i>
	PE 2708	PE 4710
ASTM D3350 Cell Classification	PE234373	PE445574
PIPE DENSITY (G/CM3) / p. 47	0.943	0.960
1 HOUR ELASTIC MODULUS (PSI) /p. 99, 73°F	59,000	78,000
10 HOUR ELASTIC MODULUS (PSI) /p. 99, 73°F	50,000	65,000
1 YEAR ELASTIC MODULUS (PSI) /p. 99, 60°F, Deflection	35,400	40,000
50 YEAR ELASTIC MODULUS (PSI) /p. 99, 60°F, Collapse	25,960	29,000
POISSON RATIO / p. 76	0.45	
SAFE PULL TENSILE STRESS (PSI) / 12 hr duration	1,000	1,330
ALLOWABLE DEFLECTION For Pressure Pipes / p. 437		
DR 21	7.5%	
DR 17, 15.5, 13.5	6	
DR 11	5	
DR 9	4	
DR 7.3	3	
ALLOWABLE DEFLECTION For Non-Pressure Pipes (gravity flow) / p. 437	7.5%	

For more information, please contact [support@ppiboreaid.com](mailto:support@ppiboreaid.com)