

# Pipe Lining

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# Agenda

- **Inlet Configurations**
- **Options**
- **Common Mistakes**
- **Clarifications**



# Inlet Configurations

- Mitered



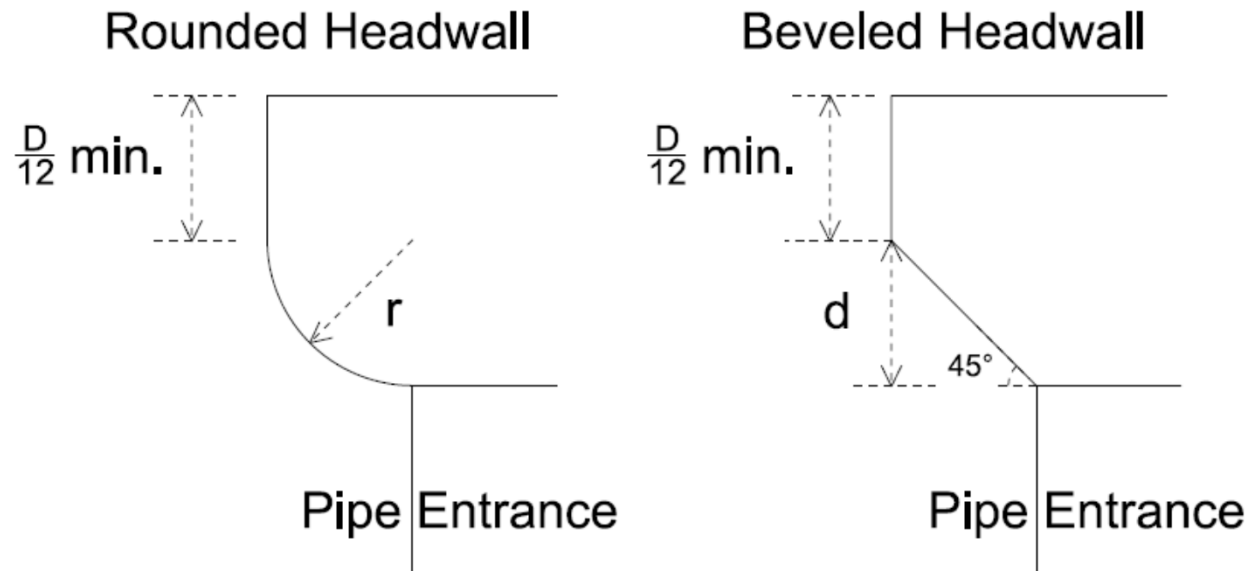
# Inlet Configurations

- Mitered



# Inlet Configurations

## ■ 1:1 Beveled Headwall



$$r(\text{in}) = \frac{D}{12}$$

$$d(\text{in}) = \frac{D}{24}$$

D = rehabilitated pipe internal span in inches

# Option Sequence: HDPE

## ■ HDPE

- HDPE as mitered to conform to slope
- HDPE with headwall or beveled headwall
- HDPE with bored pipe
  - HDPE: mitered to conform to slope
  - Bored Pipe
    - "Smooth HDPE"
    - Thin edge projecting
    - Minimum size of 18"



# Option Sequence: HDPE

- Only smooth wall



# Option Sequence: CIPP

## ■ CIPP

- CIPP same as existing entrance or mitered
- CIPP with headwall or beveled headwall
- CIPP with bored pipe





# Option Sequence: Paved Invert

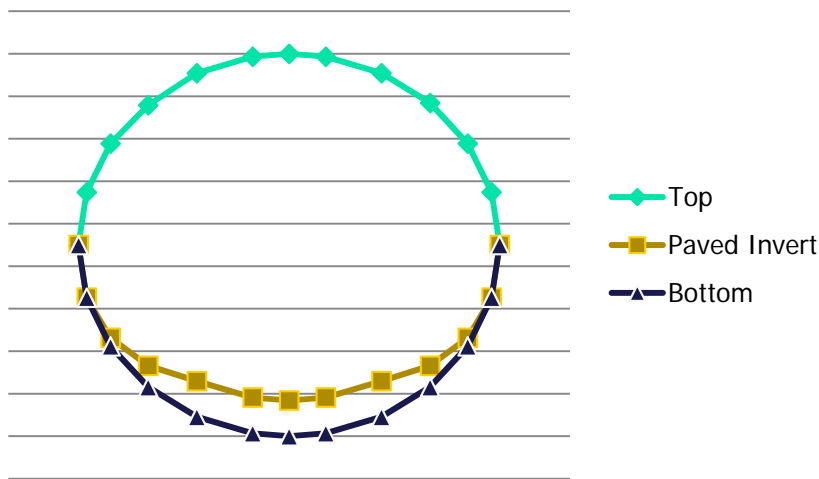
## ■ Paved Invert

- Match existing entrance
- Paved Invert with headwall or beveled headwall
- Paved Invert with bored pipe
- Sizing
  - 5 in thickness
  - CMP: Up to about  $\frac{1}{4}$  rise
  - CMPA: Up to the vertical location

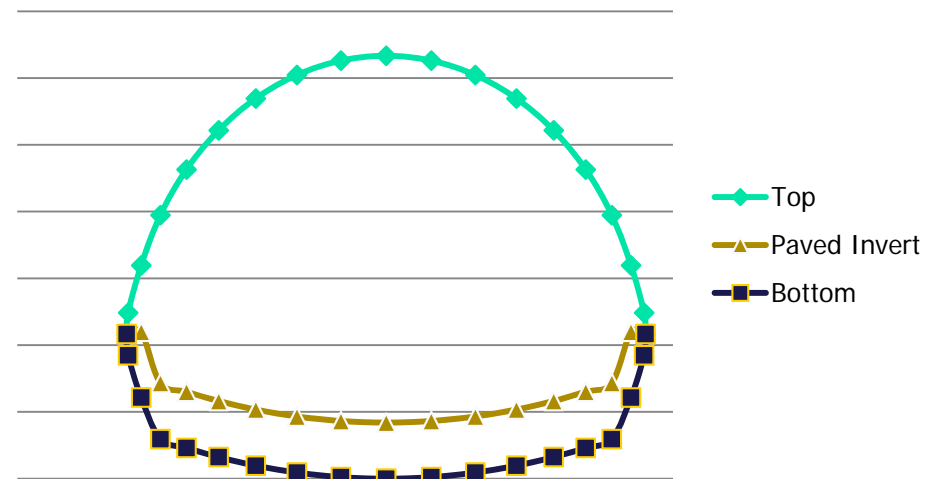


# Option Sequence: Paved Invert

CMP Paved Invert



CMPA Paved Invert



- Standard drawing coming soon

# Option Sequence: Paved Invert



# Option Sequence: Replacements

- **Corrugated, Semi-smooth, and Smooth**
  - Details to be discussed later
- **Contracts**
  - Provide documentation for the requested options.



# Common Mistakes

## ■ Dos

- Determine legal drain status
- Mitered to conform to slope
- Place liners at bottom of pipe
- May increase backwater
  - contained in R/W or upstream channel
  - Documentation
  - Contact Hydraulics



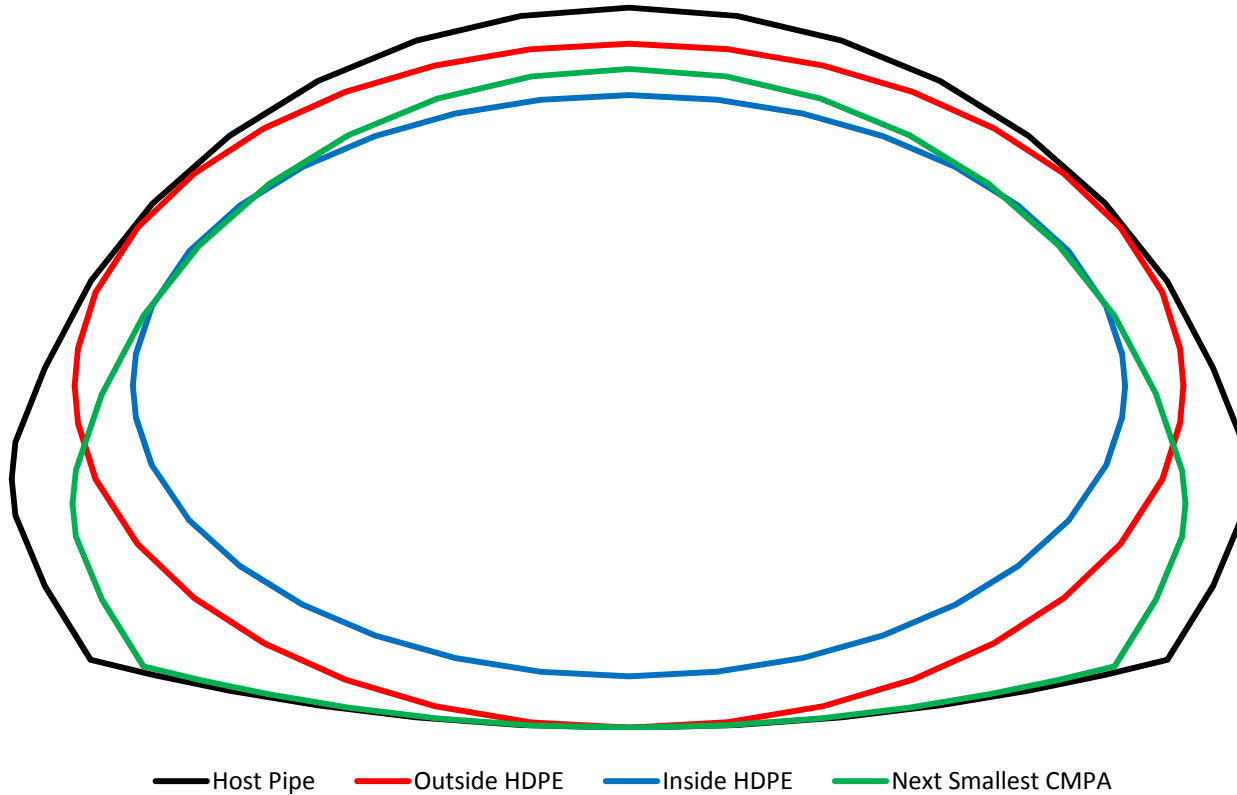
# Common Mistakes

- **Don'ts**

- Use Trapezoidal or Triangular channel
- Use next smallest CMPA for HDPE sizing



# Common Mistakes



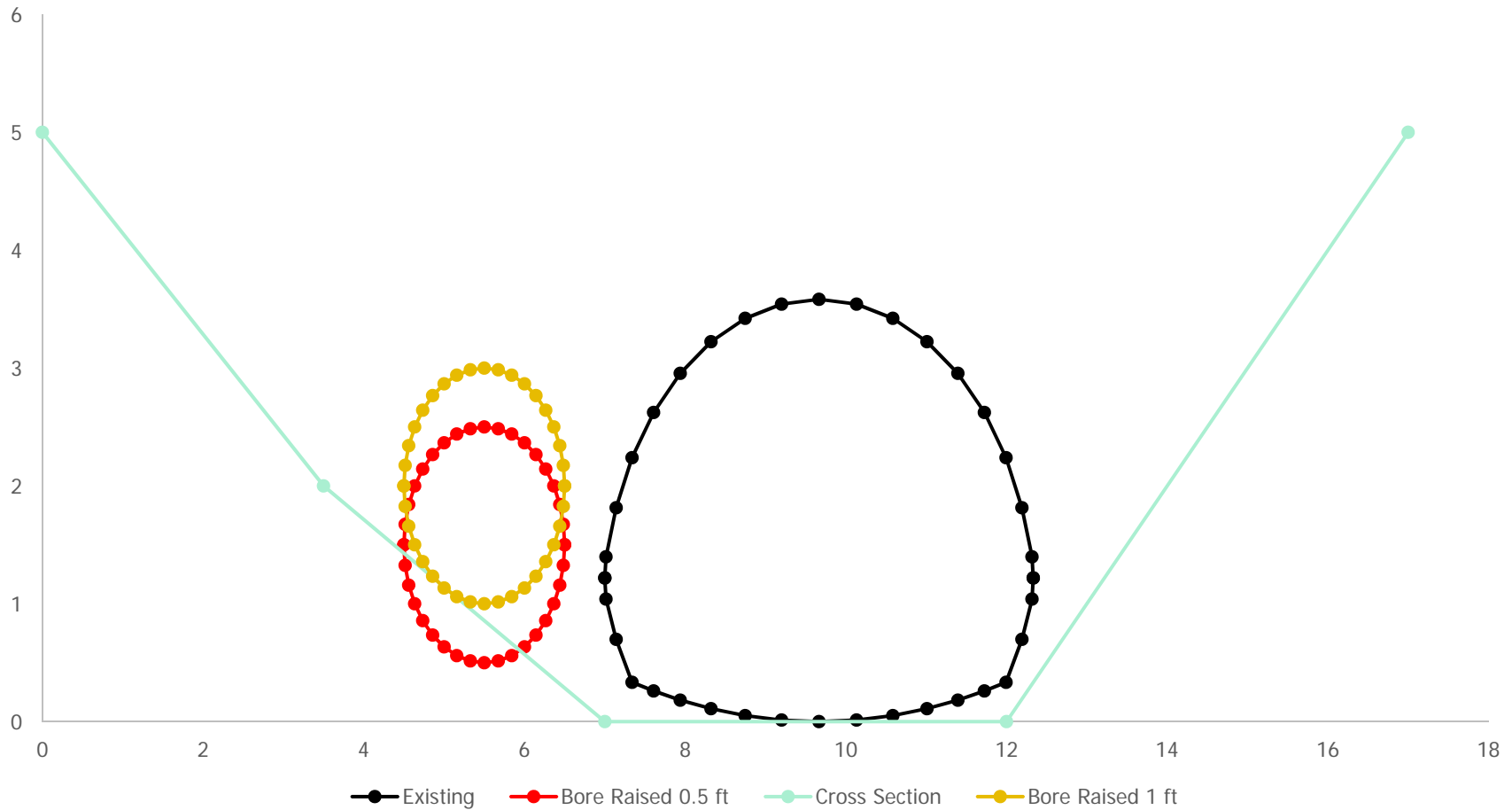
# Clarifications

- **Raise liner inverts: liner thickness**
- **Raise bored pipe inverts: min 12 in**
- **Raise paved inverts: 5 in**





# Clarifications



# Clarifications

- **Assume no scour hole**
- **Backwater calculation**
  - Determine existing backwater
  - Backwater difference based on difference in headwater elevation between existing and liner model



# Clarifications

- Existing Backwater =  $104.79 - (100.5 + 1.90) = 2.39$
- Liner Backwater =  $(105.17 - 104.79) + 2.39 = 2.77$ 
  - Not  $105.17 - (100.75 + 1.90) = 2.52$

