HDPE or PVC

ONE DESIGNERS PERSPECTIVE
HDPE – WHERE, WHY, AND WHY NOT

Where should you use HDPE?
HDPE – WHERE, WHY, AND WHY NOT

Where should you use HDPE?

• Shifting soils (landfills/slopes/sand)
TRUMP LINKS – FERRY POINT
HDPE – WHERE, WHY, AND WHY NOT

Where should you use HDPE?

- Shifting soils (landfills/slopes)
- Corrosive soils (DI fittings?)
HDPE – WHERE, WHY, AND WHY NOT

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- Shifting soils (landfills/slopes)
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- Challenging terrain
HDPE – WHERE, WHY, AND WHY NOT

Where should you use HDPE?

• Shifting soils (landfills/slopes)
• Corrosive soils (DI fittings?)
• Challenging terrain
• Directional boring
HDPE – WHERE, WHY, AND WHY NOT
HDPE – WHERE, WHY, AND WHY NOT

Where should you **not** use HDPE?

- Certain bridge crossings
HDPE – WHERE, WHY, AND WHY NOT

Where should you not use HDPE?

• Certain bridge crossings
• Cost is a significant concern
AS MUCH AS $250,000 PREMIUM
HDPE – WHERE, WHY, AND WHY NOT

Where should you not use HDPE?

• HDPE = $0.80 - 0.82/lb

• PVC = $0.78 – 0.80/lb

• 12” DR11 4710 HDPE = 18.5 lb/ft = $15.17/ft
• 12” CL200 PVC = 15.8 lb/ft = $12.32/ft
• 14”DR11 4710 HDPE = 22.3 lb/ft = $18.29/ft
HDPE – WHERE, WHY, AND WHY NOT

Where should you **not** use HDPE?

- Certain bridge crossings
- Cost is a significant concern
- Where large temp swings occur
• Thermal Expansion of HDPE

• Pressure de-rate with temperature increase
Where should you **not** use HDPE?

- Certain bridge crossings
- Cost is a significant concern
- Where large temp swings occur
- Water with high chlorine content
VERY STRONG OXIDIZING AGENT!
Las Vegas, NV; HDPE Service Line Failures:

Las Vegas Valley Water District (LVVWD) delivers water to over 1 million people in the Las Vegas Valley. Beginning in the early 1970’s LVVWD began using polyethylene (HDPE) service laterals to deliver water from the mains to homes. In 1980, large numbers of HDPE service lines began to fail. Of the 80,000 HDPE service lines originally installed, about 56,000 are still in service, but the District is experiencing about 1500 failures per year.¹ One of the key causes of the failures as determined by LVVWD is oxidation of the HDPE service line which leads to brittle failure and cracking.²
HDPE – WHERE, WHY, AND WHY NOT

HYBRID SYSTEMS?
ABSOLUTELY!

• PVC MAINLINE/ HDPE LATERAL
  • FEWER 2” FITTING LEAKS OVER TIME

• HDPE MAINLINE / PVC LATERAL
  • EASIER LATERAL REPAIRS/CHANGES
HDPE – WHERE, WHY, AND WHY NOT

HDPE STANDARDS STILL A MOVING TARGET!

Working on standards that everyone can agree on

PPI and manufacturers = no de-rating for unknown surge
ASABE (ANSI/ASAE S376.2) revised 2015 = De-rate
same as other thermoplastic material (ie 72-78% of PR)
HDPE – WHERE, WHY, AND WHY NOT

Thermal expansion

- HDPE: 1.2” / 10 deg F / 100 ft
- PVC: 0.33” / 10 deg F / 100 ft
- Ductile Iron: 0.07” / 10 deg F / 100 ft

Example: 300’ bridge in Las Vegas
July: High temp = 115, Low temp = 80
HDPE: 1.2 x 3.5 x 3 = 12.6”
PVC: .33 x 3.5 x 3 = 3.46”
DI: .07 x 3.5 x 3 = 0.74”
TRIAL AND ERROR (ERRORS ARE BAD)

FITTING PRESSURE RATING IS NOT ALWAYS THE SAME AS THE PIPE PRESSURE RATING!

- 4710 DR11 PIPE = 202 psi
- DR9 MOLDED FITTING = 250 psi
- DR11 MOLDED FITTING = 200 psi
- DR17 MOLDED FITTING = 125 psi

WHAT ABOUT A FABRICATED FITTING?
TRIAL AND ERROR (ERRORS ARE BAD)

WHAT ABOUT A FABRICATED FITTING ??
VARIES BY MANUFACTURER!

2” THROUGH 12”

- MOLDED 90 = 200 psi
- 5-SEGMENT 90 = 161 psi (80%)
- 3-SEGMENT 90 = 126 psi (63%)
- 14” – ANY GUESSES?
TRIAL AND ERROR (ERRORS ARE BAD)

YOU CAN’T GET 14” (or larger) FITTINGS MOLDED

- DR11 5-SEGMENT 90 = 161 psi
- DR11 3-SEGMENT 90 = 126 psi
- DR9 5-SEGMENT 90 = 202 psi
- DR9 3-SEGMENT 90 = 164 psi

TO KEEP THE 200 PSI RATING, YOU NEED TO GO TO 5-SEGMENT DR9 FITTINGS FOR DR11 PIPE FOR THIS MANUFACTURER.
TRIAL AND ERROR (ERRORS ARE BAD)

WHAT HAVE WE LEARNED ??

• MATCH WALL OF PIPE AND FITTING OR NOT MORE THAN 1 DR DIFFERENCE (MACHINE TO MATCH)

• BEWARE OF PRESSURE DERATING

• USE MOLDED FITTINGS UNLESS YOU HAVE NO OPTION (14” +)

• EVERY WELD IS A POSSIBLE LEAK
TRIAL AND ERROR (ERRORS ARE BAD)

WHAT HAVE WE LEARNED ??

REMEMBER THERMAL EXPANSION?

• DERATE FOR TEMPERATURE (per PPI)
  • \( \leq 80 \) DEGREES = 1.0
  • 100 DEGREES = 0.78
  • 120 DEGREES = 0.73

Example: 6” DR11 HDPE, 4710 material
In Las Vegas @ 120 degrees?
200 psi x .73 temp = 146 psi (x .72 SURGE = 105 psi)
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![Figure #1](image)

*Figure #1
PESL Failures by Month
Note Significant Increase in Failures During Summer Months*
TRIAL AND ERROR (ERRORS ARE BAD)

WHAT HAVE WE LEARNED ??

- Size for size, PVC v HDPE:
  - 12” CL200 PVC: 5 fps = 1650 gpm (0.26/100’)
  - 12” DR11 HDPE: 5 fps = 1298 gpm (0.29/100’)
  - 6” CL200 PVC: 5 fps = 450 gpm (0.57/100’)
  - 6” DR11 HDPE: 5 fps = 351 gpm (0.62/100’)
TRIAL AND ERROR (ERRORS ARE BAD)
TRIAL AND ERROR (ERRORS ARE BAD)

6000 GPM @ 125 PSI (Internet Photo)
DO YOUR HOMEWORK!!
CAUTION

YOU HAVE REACHED THE LAST PAGE OF THE INTERNET

TURN OFF YOUR BROWSER AND GO BACK TO WORK THERE'S NOTHING ELSE TO SEE HERE