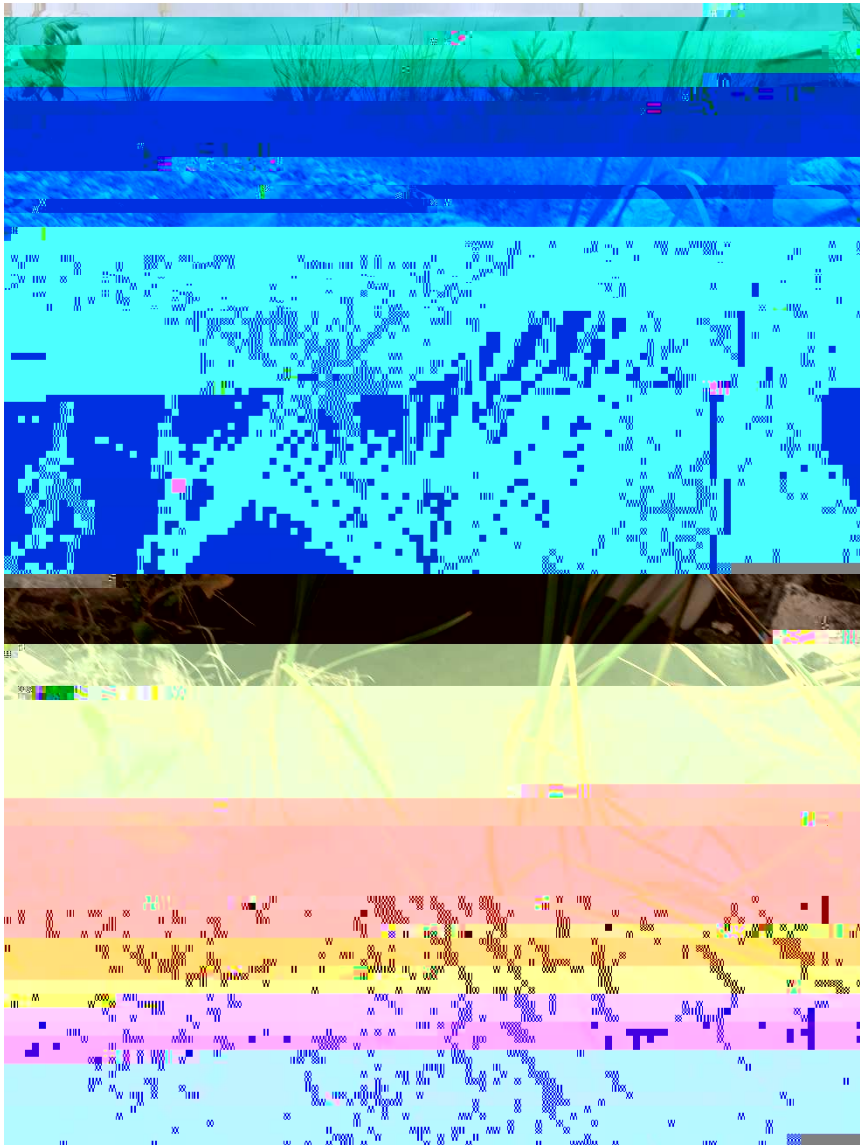
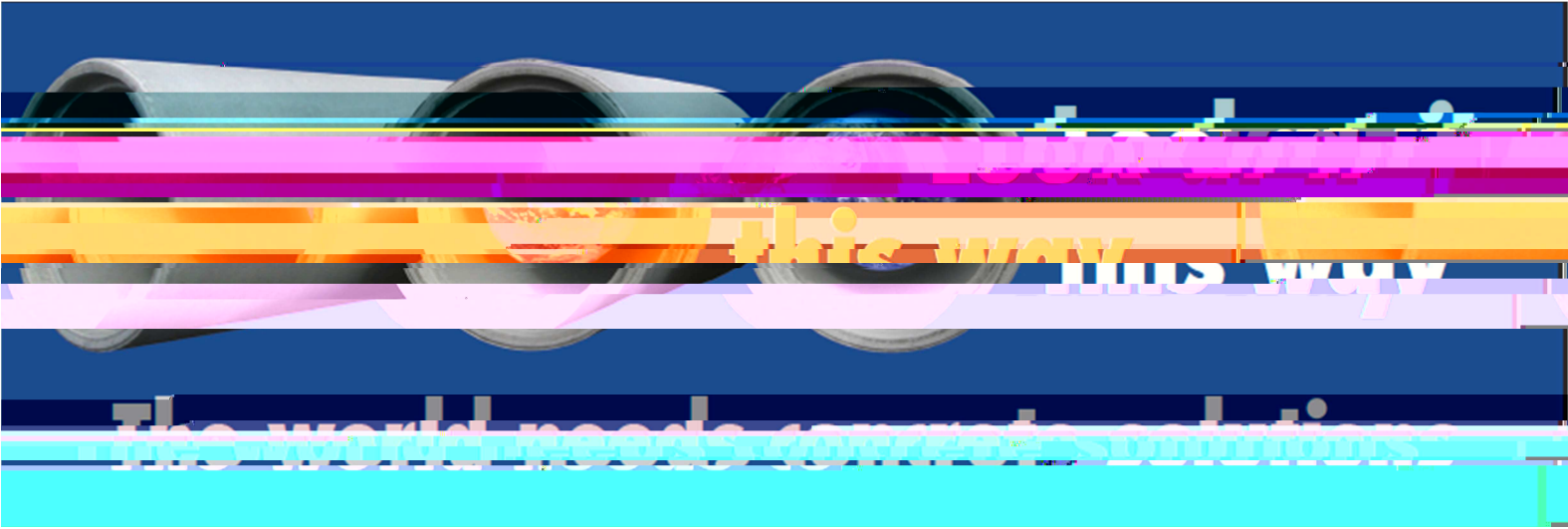
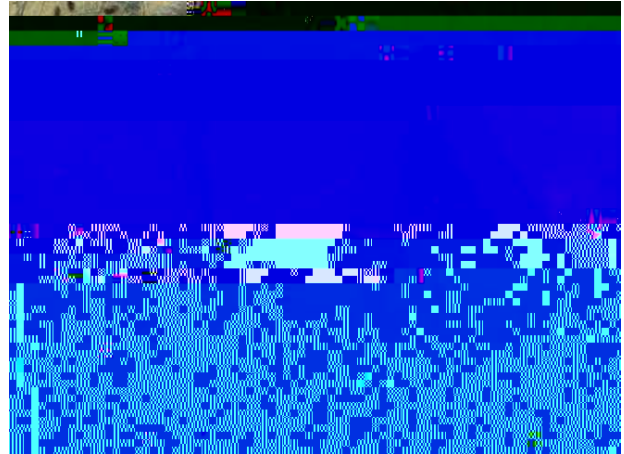
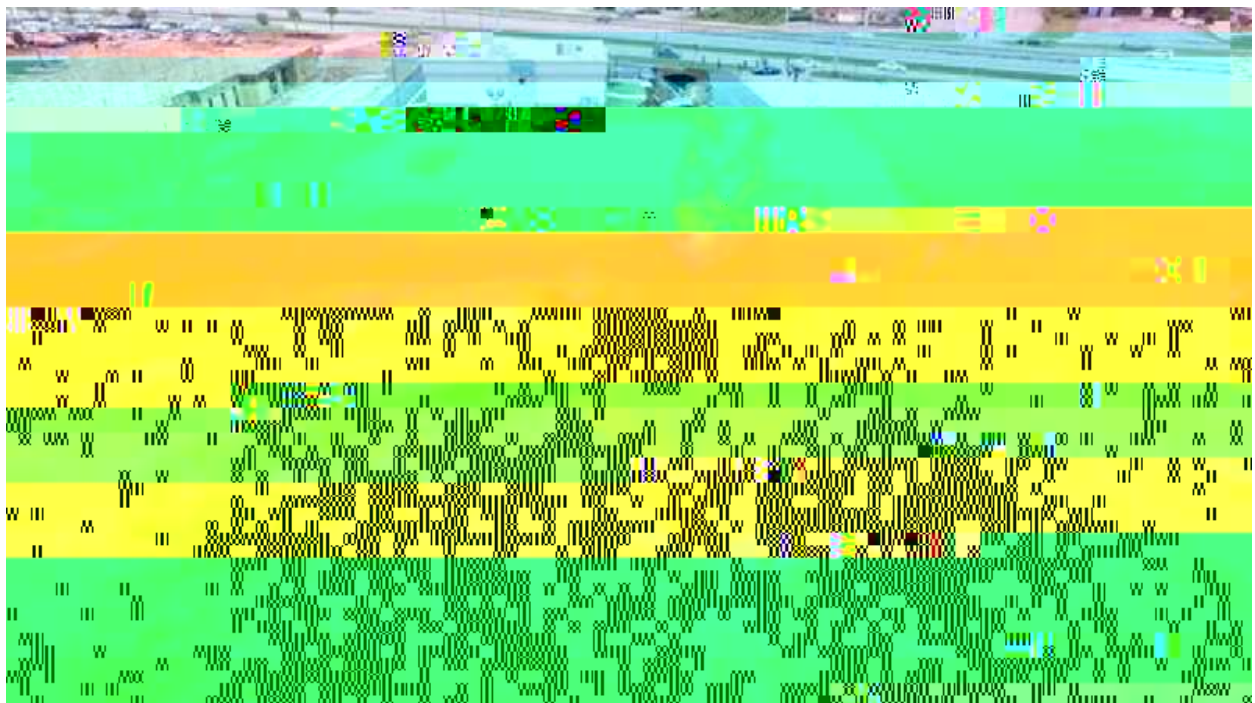




Culverts under roadways are an essential



In addition to conveying storm water, culverts are also designed as wildlife crossing.





This lightweight CSP was washed away from a rainstorm, blocking essential access for road users

It is also important to ensure culverts are disaster proof. Climate Change is generating far more unpredictable weather patterns which means designers need to add higher factors of safety to account for larger, more intense storms. This also means specifying a pipe material that won't burn, is abrasion resistant to debris in runoff, won't corrode, and won't float away. All culverts, even concrete pipe, can float! Should lightweight culverts be used in these applications?

Hydraulically, concrete pipe will offer better performance, regardless of if your culvert design is governed by Inlet Control or Outlet Control.

Inlet Control

Inlet controlled flow occurs when the culvert barrel is capable of conveying more flow than the inlet will accept. In this case, the inlet geometry can improve the flow; all other hydraulic characteristics downstream of the inlet do not affect the culvert capacity. RCP and precast box culverts are supplied with either flared ends or headwalls. In addition to looking more aesthetically pleasing, 9586(s)-0.9585f5c9586(l)4.19158(()-70.585i)4.1714.1242(i)982.15007(n)0.590251()-5.1



Left: In addition to offering improved hydraulic performance, precast concrete headwalls are also aesthetically pleasing.
Right: A typical CSP inlet with no end treatment.

Outlet Control

Outlet controlled flow occurs when the culvert inlet is able to accept more flow than the barrel will allow. Here, all hydraulic characteristics, including entrance/exit head losses and barrel roughness, are accounted for. In addition to the benefits mentioned for inlet control, concrete pipe is also much smoother than CSP, hence a smaller diameter concrete pipe can convey the same flow as a larger CSP culvert. The following table shows the size reduction that can be achieved if the culvert is governed by outlet controlled flow:

RCP ID (mm) n=0.012	CSP ID (mm) n=0.024
305	400
381	500
457	600
533	700
610	800
686	900
762	1000
914	1200
1067	1400
1219	1600

When annual budgets are being drafted and infrastructure managers are trying to construct and maintain the most with the least cost that year, it makes sense that they would want to invest in the cheapest culvert material with the lowest initial cost. However, it is bordering on insanity when CSP culverts fail and are replaced with more CSP. When you consider the entire culvert design life, the improved hydraulic performance, and the overall protection to the public, concrete is the best choice culvert material.

The world needs concrete solutions!

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