# Stormwater Management

## CSP Detention Systems: the most versatile way to manage stormwater

Stormwater detention systems are used to temporarily store precipitation runoff that exceeds a site's allowable discharge rate and then release it at a controlled rate over a period of time. In many urban areas, regulations have been implemented to ensure that a site's post-development runoff is equal to or less than the site's original pre-developed runoff capacity. This is being done to help prevent excess short-term flooding on neighbouring properties or stormwater systems downstream.

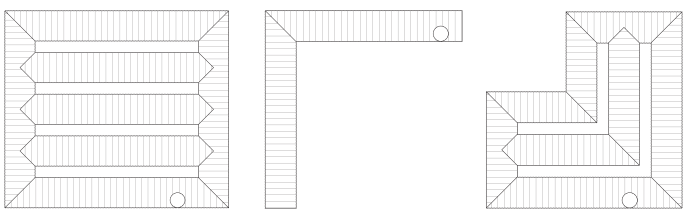
Underground stormwater detention allows for high volume runoff storage within a small footprint area. Storage structures made from Corrugated Steel Pipe (CSP) are buried underground, typically under a parking lot, road or other open land on the site. In urban areas, an underground storage system is preferable to a surface detention pond since ponds use up valuable real estate and can possibly pose other problems such as:

- Attracting unwanted waterfowl
- Attracting disease-carrying insects
- Potential safety issues for humans.

A CSP detention system provides a cost-effective solution to manage stormwater and saves valuable land space, allowing above-ground use of the site.

### Versatile

CSP detention systems can be configured in a variety of sizes, shapes, corrugation profiles, coatings and thicknesses. An almost unlimited variety of configurations can be arranged to meet site-specific needs. Example layouts include straight line, L-shaped, rectangular, and square.



For additional options on diameters, shapes, corrugation profiles, and configuration, **contact your local Armtec Representative**.

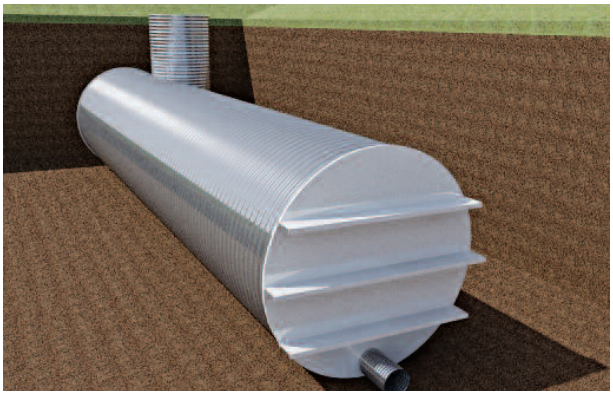
### Installation

CSP detention systems are easy to install using standard culvert installation methodologies. A wide variety of premanufactured components, such as fittings, headers, risers and bulkheads, along with straight sections of pipe, are installed by simply following the layout drawings supplied with each system.

### Durability

CSP detention systems are available in various coatings with predictable service life to meet project requirements.

**Galvanized (Z610), Aluminized Type II, Polymer Laminated**



### Maintenance and Inspection

Stormwater detention systems should be inspected at regular intervals and maintained when necessary to ensure optimum performance. Riser sections complete with ladders allow access to the underground system. To increase ease of maintenance, pre-treatment systems can be installed to remove sediment, trash and contaminants such as oil from incoming runoff.

## Stormwater Detention Sizing

### Round Pipe

| Diameter (mm) | Volume ($m^3/m$) | Min. Cover* (mm) |
|---|---|---|
| 300 | 0.07 | 300 |
| 400 | 0.13 | 300 |
| 450 | 0.16 | 300 |
| 500 | 0.20 | 300 |
| 600 | 0.28 | 300 |
| 700 | 0.38 | 300 |
| 800 | 0.50 | 300 |
| 900 | 0.64 | 300 |
| 1000 | 0.79 | 300 |
| 1200 | 1.13 | 300 |
| 1400 | 1.54 | 300 |
| 1600 | 2.01 | 300 |
| 1800 | 2.54 | 300 |
| 2000 | 3.14 | 300 |
| 2200 | 3.80 | 300 |
| 2400 | 4.52 | 300 |
| 2700 | 5.73 | 500 |
| 3000 | 7.07 | 500 |
| 3300 | 8.55 | 500 |
| 3600 | 10.18 | 500 |

### Pipe Arch

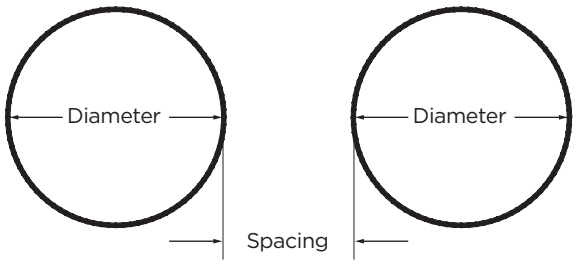
| Span x Rise (mm x mm) | Volume ($m^3/m$) | Min. Cover* (mm) |
|---|---|---|
| 450 x 340 | 0.11 | 300 |
| 560 x 420 | 0.19 | 300 |
| 680 x 500 | 0.27 | 300 |
| 800 x 580 | 0.37 | 300 |
| 910 x 660 | 0.48 | 300 |
| 1030 x 740 | 0.61 | 300 |
| 1150 x 820 | 0.74 | 300 |
| 1390 x 970 | 1.06 | 300 |
| 1630 x 1120 | 1.44 | 300 |
| 1880 x 1260 | 1.87 | 300 |
| 2130 x 1400 | 2.36 | 300 |

*__Source:__ Corrugated Steel Pipe Institute (CSPI), Handbook of Steel Drainage and Highway Construction Products.

Minimum cover may vary depending on design conditions and approval of the Engineer.

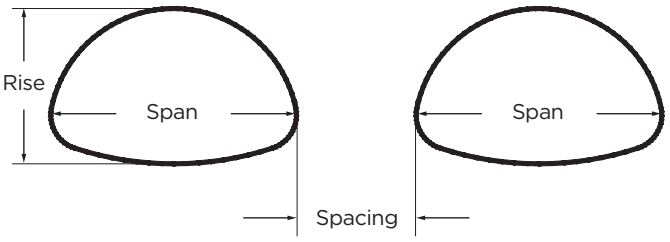
## Stormwater Detention Typical Spacing for Multiple Barrels

### Round Pipe




| Diameter (mm) | Min. Spacing* (mm) |
|---|---|
| Up to 600 | 300 |
| 600 to 1800 | 1/2 diameter of pipe |
| 1800 and over | 900 |

### Pipe Arch




| Span (mm) | Min. Spacing* (mm) |
|---|---|
| Up to 600 | 300 |
| 600 to 2130 | 1/2 span of pipe |

*__Source:__ Corrugated Steel Pipe Institute (CSPI), Handbook of Steel Drainage and Highway Construction Products.

Spacing may be reduced with the use of a Controlled Low Strength Material and approval of the Engineer.