CONTECH®
ENGINEERED SOLUTIONS
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Aluminum Drop Structures

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Open Channel Flow Control

Vertical drop structures have proven successful in controlling waterway soil erosion for nearly 35 years. Although a variety of channel flow energy dissipation techniques are available, few offer the economics and durability of drop structure constructed from prefabricated aluminum components.

CONTECH Aluminum Drop Structures, available in different sizes and configurations, permit the designer to reduce flow velocities by modifying the channel grade. In a typical application, several low-overfall drop structures are placed strategically within the channel reach. Since each drop structure represents a portion of the channel's total natural elevation change, the designer can manipulate channel grade and reduce flow velocities.

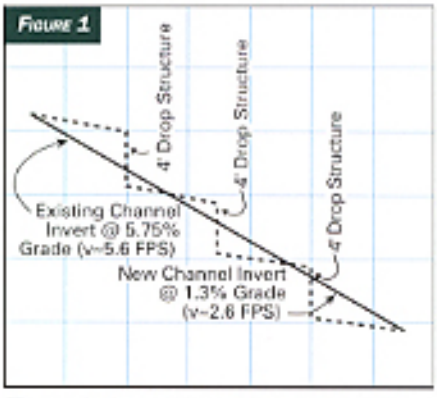
Figure 1 illustrates how flow velocities can be managed by using vertical drop structures to modify the waterway slope.

Versatile design, plus durability

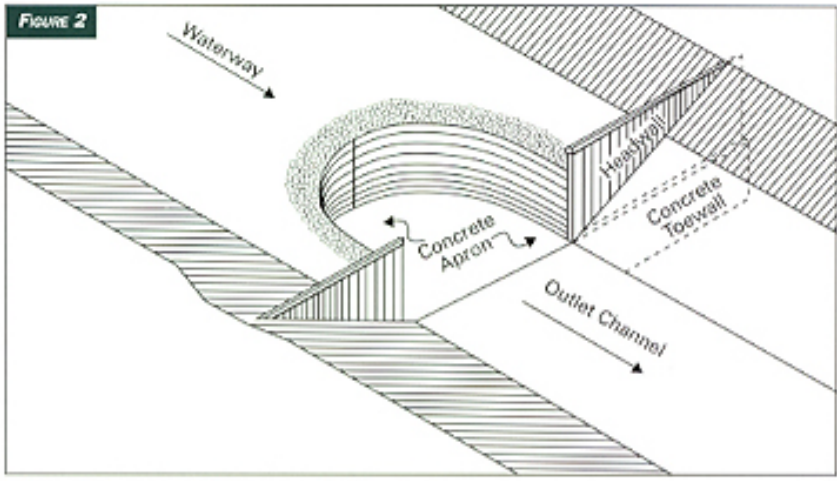
CONTECH Aluminum Drop Structures encompass two basic configurations:

- Drop toe wall structures (for overfall heights between 1.9 nand 4.0 feet) have a semicircular weir, aluminum headwalls and concrete toewalls and a reinforced concrete apron.
- Drop spillway structures (for overfall heights of 5.0 and 6.0 feet) are similar to drop toewall structures with the addition of downstream headwalls, wingwalls and extended concrete apron for added stability and downstream flow control in the presence of potentially higher hydraulic forces.

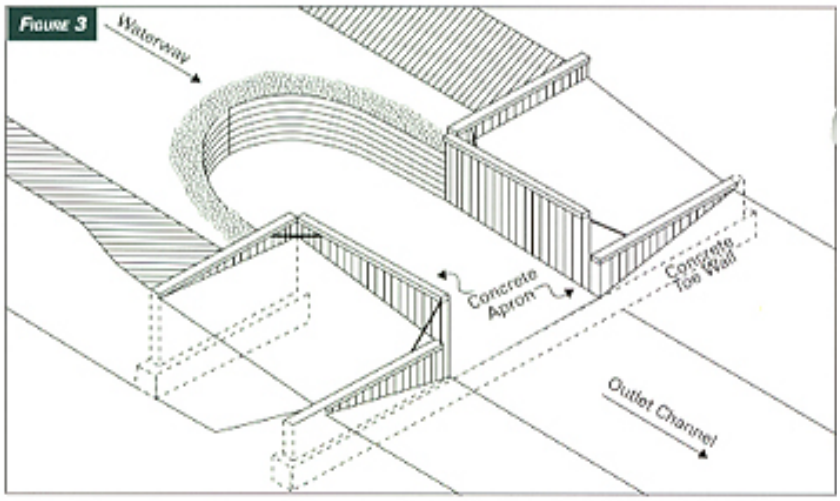
The many standard sizes of CONTECH Aluminum Drop Structures cover a multitude of applications and site requirements. Depending upon the design overfall and weir dimensions, these structures can accommodate flow capacities from 65 to 510 cubic feet per second. Various standard weir and headwall dimensions accommodate a wide range of channel widths and flow conditions.



Typical channel-grade modification using aluminum drop structures placed at intermediate points to reduce invert grade and channel flow velocities.



Typical aluminum drop toewall structure layout.



Typical aluminum drop spillway structure layout.

Table 1 shows the dimension and hydraulic performance ranges for the standard sizes of CONTECH aluminum drop toewall and drop spillway structures.

Lightweight aluminum components are ready for bolt-together field assembly without heavy equipment. Segments can be pre-assembled to minimize in-channel placement time. A major benefit of aluminum drop structures is their shorter installation time and minimum risk to the channel excavation.

Proven Design

In addition to faster installation, properly applied aluminum drop structures have predictable hydraulic characteristics, long-term structural integrity and low maintenance.

CONTECH Aluminum Drop Structures, in conjunction with poured-in-place concrete spill-ways and toewalls, are intended for those applications where drainage channel erosion control, maximum durability, corrosion/rot resistance and low upkeep are primary objectives.

Design and Use

As with most hydraulic structures, the successful application of aluminum drop structures requires a thorough study of site conditions, careful evaluation of flow and selection of the most compatible structure for the site's topography and hydrologic conditions.

The services of an experienced engineer will help ensure proper design, installation and performance. Additionally, the user and designer may benefit from the many independent papers and publications, such as *Drop Spillway Design, Corrugated Aluminum Structures for Erosion Control* and *Hydraulics of Semicircular-Inlet Drop Structures*. These and other informative materials are available from the American Society of Agricultural Engineers, the USDA-NRCS and the US Bureau of Reclamation.

Additional structure details are available from your CONTECH representative.

CONTECH Aluminum Drop Structures Solve Major Erosion Problems at New Residential Development

Straightening the natural stream flow caused massive erosion problems.

Installing aluminum drop structures permitted grade reductions, halting damaging erosion.

Vertical drop structures have proven successful in controlling The Seven Lakes Development in Clinton Township, Michigan, involved a meandering drainage ditch with a 35-foot elevation drop over a channel length of nearly 400 feet.

The developer, attempting to gain more usable land area, excavated and straightened the channel, thereby reducing its length and increasing the grade. This reconfiguration increased flow velocities so dramatically that disastrous bank erosion and tree loss occurred.

The most practical solution to this serious problem was CONTECH Aluminum Drop toewall Structures. By placing four drop structures at 100-foot intervals along the modified channel, the channel invert grade was modified to 1.0% and flow velocities were reduced nearly 70%. each drop structure was designed for 400 cfs discharge capacity.

In a residential development with homes valued to $400,000, maximizing land use and maintaining stability were important issues. The aluminum drop structures employed on this site development halted erosion and permitted the developer to successfully finish as planned.

Contech® Engineered Solutions provides site solutions for the civil engineering industry. Contech's portfolio includes bridges, drainage, retaining walls, sanitary sewer, stormwater, erosion control and soil stabilization products.

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