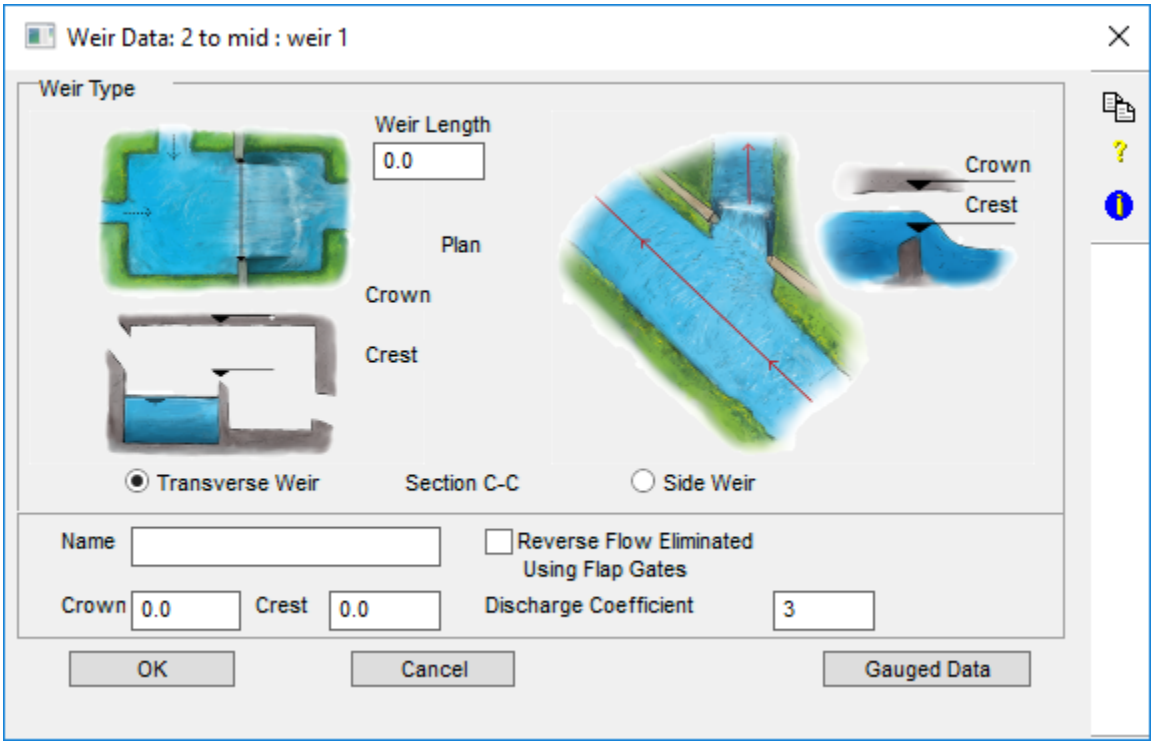
# Hydraulics Layer Weir Diversion

**Weir diversions** provide relief to the drainage system during periods of storm runoff.

The following types of weirs can be simulated:

- internal diversions (from one junction to another via a transverse or sideflow weir),
- outfall weirs which discharge to the receiving waters. These weirs may be transverse or sideflow types, and may be equipped with flap gates that prevent backflow
- special weir types including Inflatable Weirs (regulators), Bendable Weirs and User-defined Weirs.

Transverse weir and sideflow weirs are distinguished in the Hydraulics layer by the value of the exponent to which the head on the weir is taken. For transverse weirs, head is taken to the power of 1.5 while for sideflow weirs the exponent is 1.667.




Weirs are defined in terms of:

**Weir Length (G1 - WLEN).** Length of weir (feet or metres).

**Crown or Elevation of Top of Weir (RL1) (G1 - YTOP).** Crown or Top of weir is the elevation where the weir would commence orifice flow calculations. Orifice flow will occur when this elevation is reached if the weir is in a closed structure. A weir not in a closed structure may also require an elevation to commence orifice flow if it is a horizontal opening for an outlet structure of a pond. To eliminate orifice flow calculations set this elevation equal to the upstream node spillcrest value. Elevation of the weir crown uses units of (feet or metres).

**Weir Crest Elevation (RL2) (G1 - YCREST).** Elevation of the weir crest (feet or metres).

**Discharge Coefficient (G1 - COEFF).** Coefficient of discharge for the weir.

**Reverse Flow  Eliminated using Flap Gate (G1 - KWEIR).** Frequently, weirs are installed together with a tide gate at points of overflow into the receiving waters. Flow across the weir is restricted by reducing the effective driving head across the weir according to an empirical factor published by Armco(3). Note that the flap gate is only effective for a weir at an outfall node. A flap gate is ignored for a weir between two internal nodes.

**Transverse or Sideflow Weirs.** When the water depth at the weir junction exceeds the surcharge level (RL 1) the weir functions as an orifice i.e. the exponent is 0.5. The discharge coefficient for the orifice flow conditions is computed internally in the Hydraulics layer. An equivalent pipe automatically replaces the weir for the duration of surcharge.

Stability problems can be encountered at weir junctions. If this happens or is suspected of happening, the weir may be represented as an equivalent pipe. To do this, equate the pipe and weir discharge equations, e.g.:

$$(m/n)\cdot A\cdot R^{(2/3)}\cdot\sqrt{S} = C_w\cdot W\cdot H^{(3/2)}$$

***where:***

m = 1.486 for units of feet and 1.0 for units of metres

n = Manning's n for the pipe

A = Cross-sectional area

R = Hydraulic radius

S = Hydraulic grade line for the pipe

H = Head across the weir

Cw = Weir discharge coefficient

W = Weir length

**Gauged Data.** Measured time series data can be entered directly at a node or link for comparison with model results. Learn more about this parameter in the Node Gauged Data section.

A detailed discussion of Weirs and Weirs with Tide Gate Theory is discussed at the associated link locations.