

Pit or Junction Losses

EXTRAN uses a point junction formulation for calculating the depth of water in a junction. The use of a point junction formulation has been questioned by Joliffe [1981] who suggests a momentum junction formulation is superior for predicting the combination of pipe flows, and a weir formulation is superior to the point junction formulation for dividing flows.

The point junction formulation is only adequate when the head loss at pits are small [Price, 1981]. An energy balance at manhole (j) for all incoming and outgoing conduits (i) can be formulated as:

Equation 49:
$$\sum h_i + \frac{V_i^2}{2 \cdot g} - \Delta H_j = h_m + \frac{V_m^2}{2 \cdot g}$$

The lost head is given by:

Equation 50:
$$\Delta H_j = K_e \cdot \frac{V_j^2}{2 \cdot g}$$

The loss coefficient of the junction is related to the following parameters and variables:

1. The depth of flow in the connecting conduits.
2. The depth of flow in the manhole.
3. The angle between the incoming and outgoing conduits. This is assumed to be 180° in the EXTRAN Model.
4. The type of flow (subcritical or supercritical flow).
5. The geometry of the manhole and conduit.