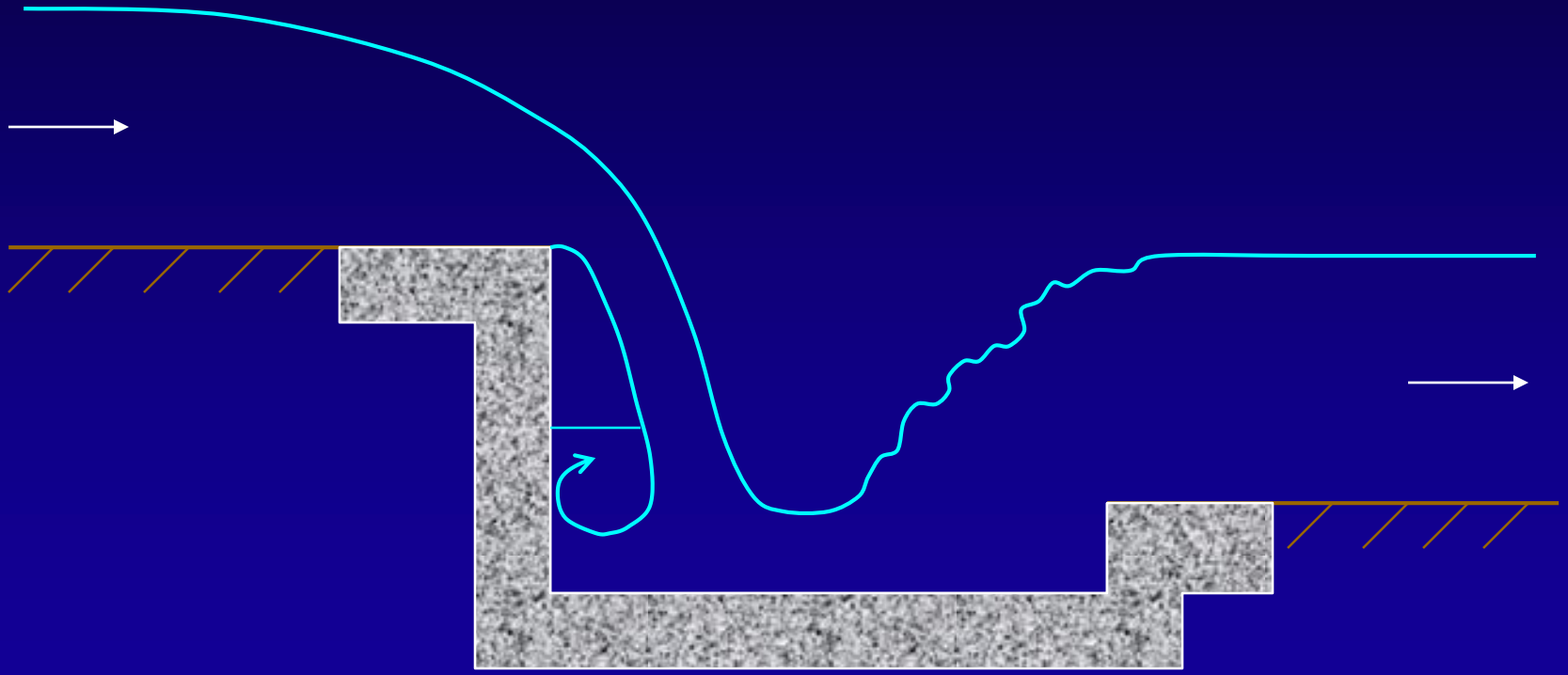
Modeling Drop Structures in HEC-RAS Version 3.1

Modeling Drop Structures

- Overview
- Modeling a Drop Structure as an Inline Structure (Weir).
- Modeling a drop structure with cross-sections through the drop.
- Example using Lab Data.

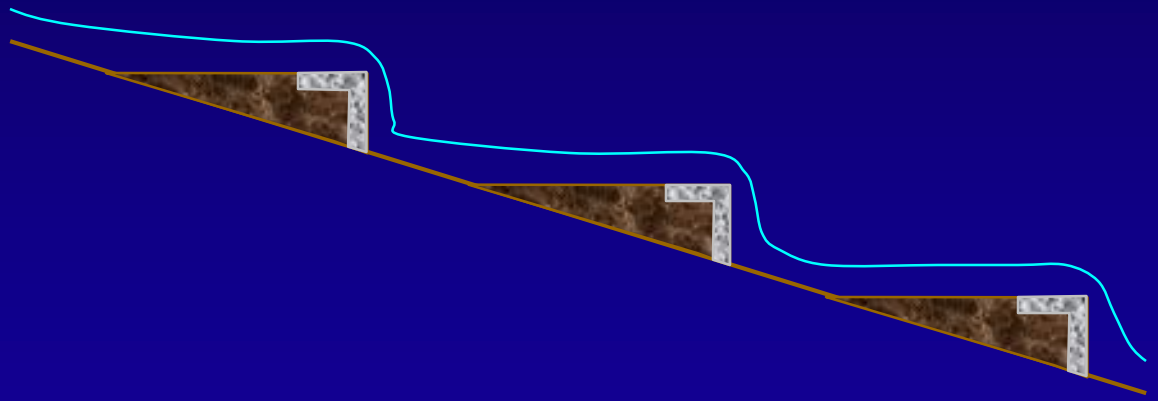
Overview

- What is a Drop Structure?



Overview

- Why do we use Drop Structures ?



Overview

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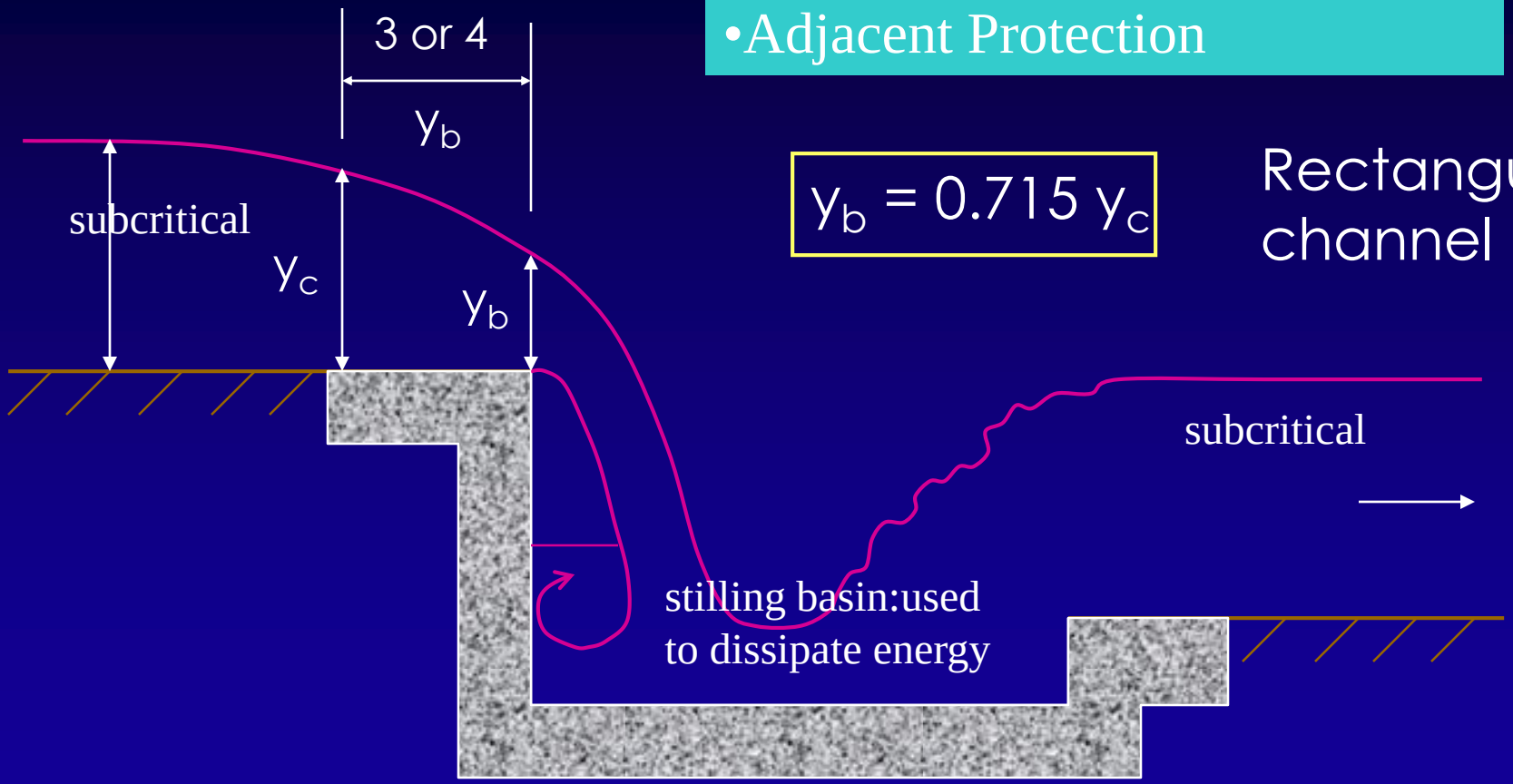
Components of Drop Structure

- Control Section
- Energy Dissipation Section
- Adjacent Protection



$y_b = 0.715\ y_c$

Rectangular channel

Overview

- How can we Model a Drop Structure with HEC-RAS ?
  - Inline Weir Option
  - Using Cross Sections

Overview

- Which is more appropriate?
  - Inline Weir Option - probably better if just interested in elevations upstream and downstream of structure.
  - Using Cross Sections - better if interested in profile through the structure.

Cross-Section Locations

When placing cross-sections near and through a drop structure, they need to be placed where the water surface and velocity are changing rapidly (this applies when using an inline weir also).

Modeling a Drop Structure as an Inline Weir

- The standard weir equation is used:

$$Q = CLH^{3/2}$$

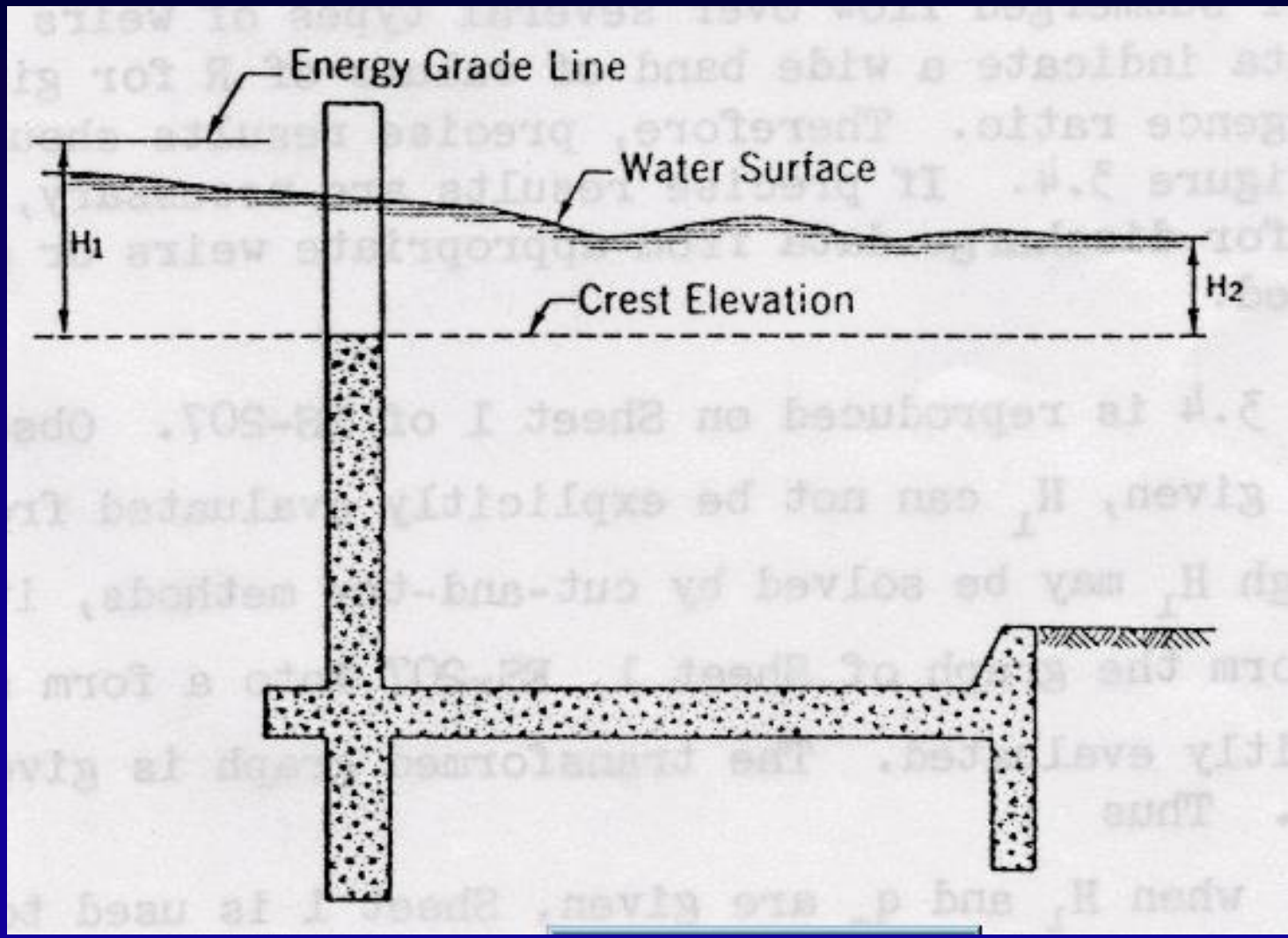
  - where: C = 2.6 - 4.0 (dependent on shape)

    L = Length of weir

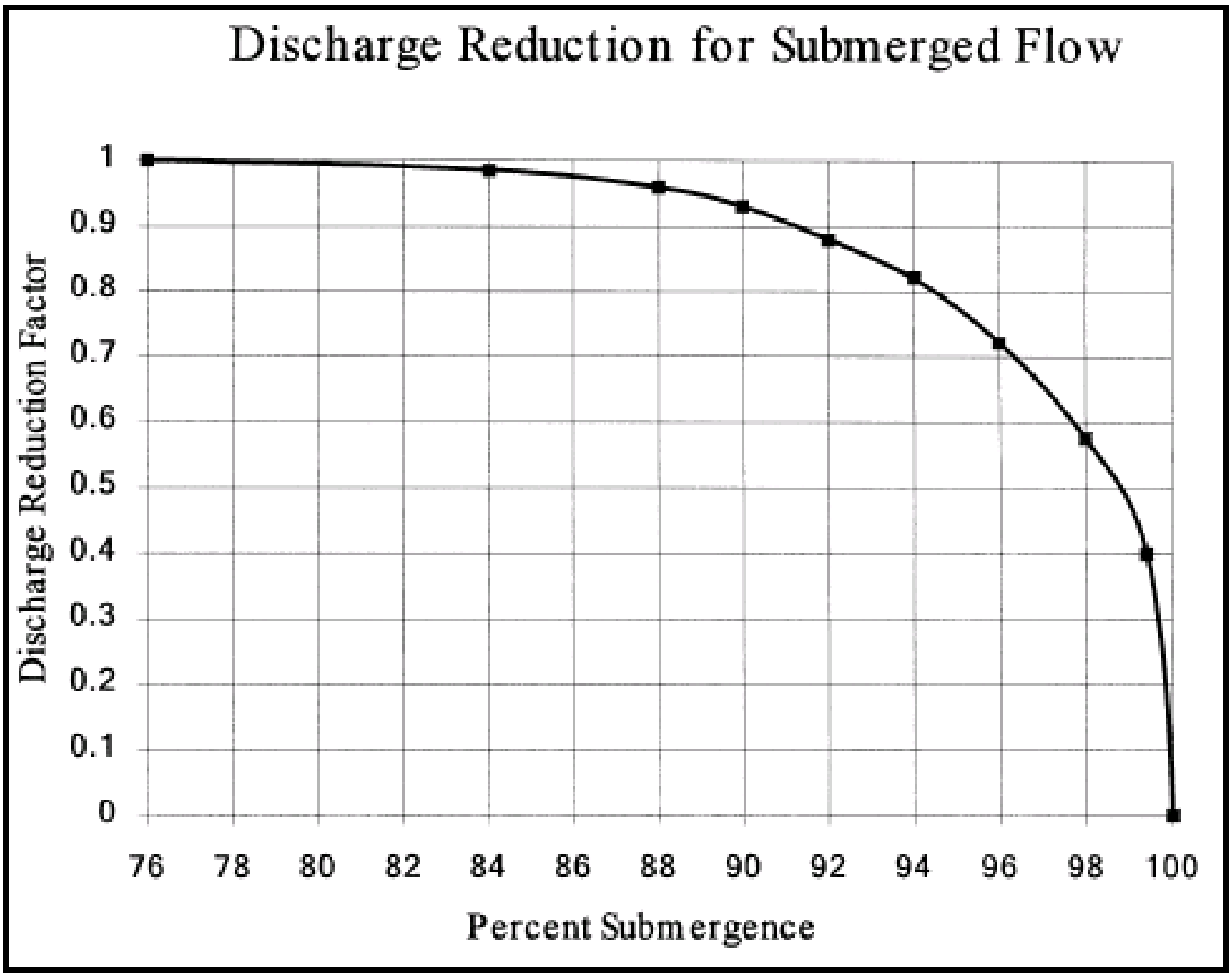
    H = Upstream Energy Head

Inline Weir - Submergence

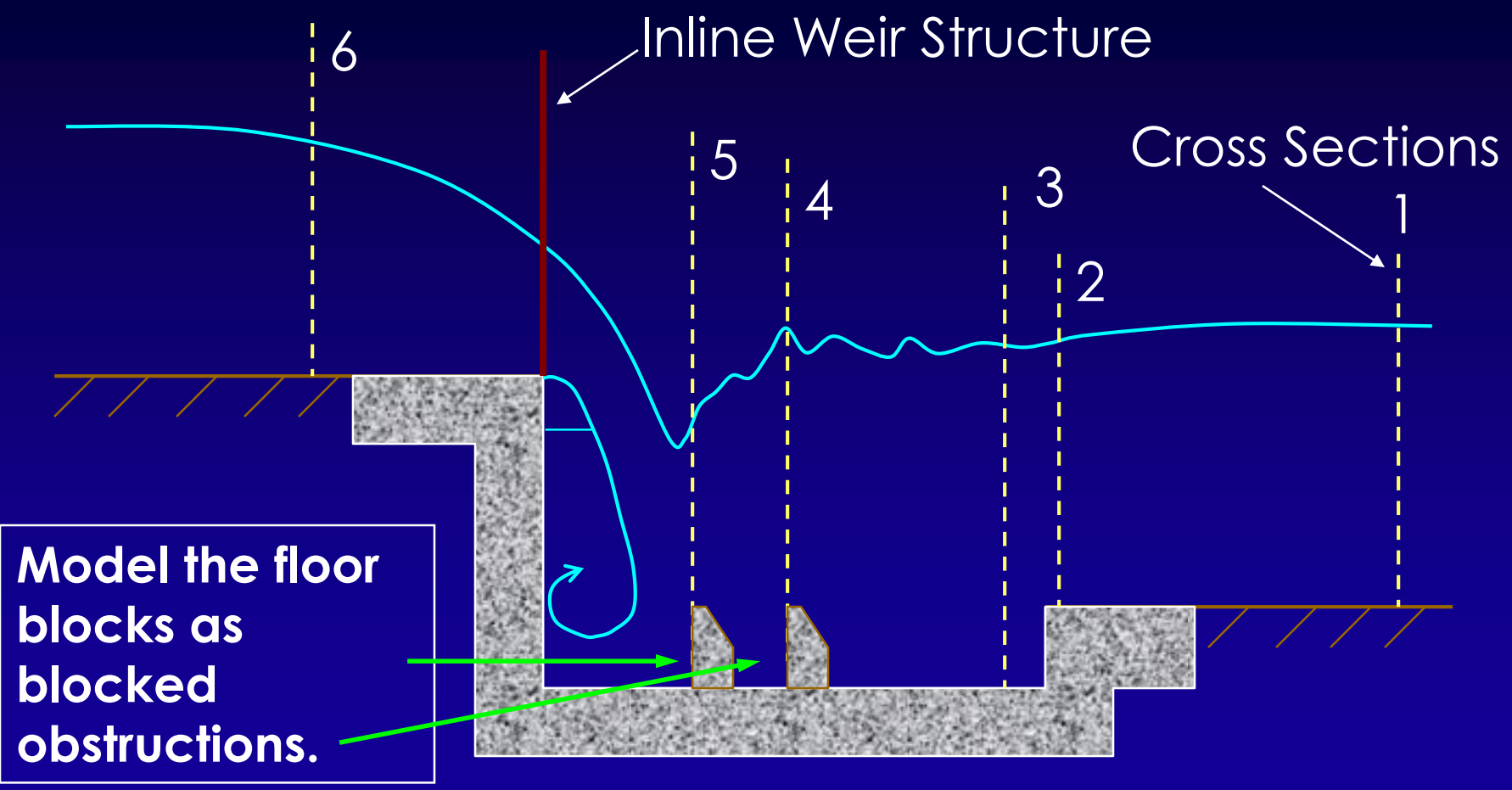
Submergence is defined as H_2/H_1



Inline Weir - Submergence

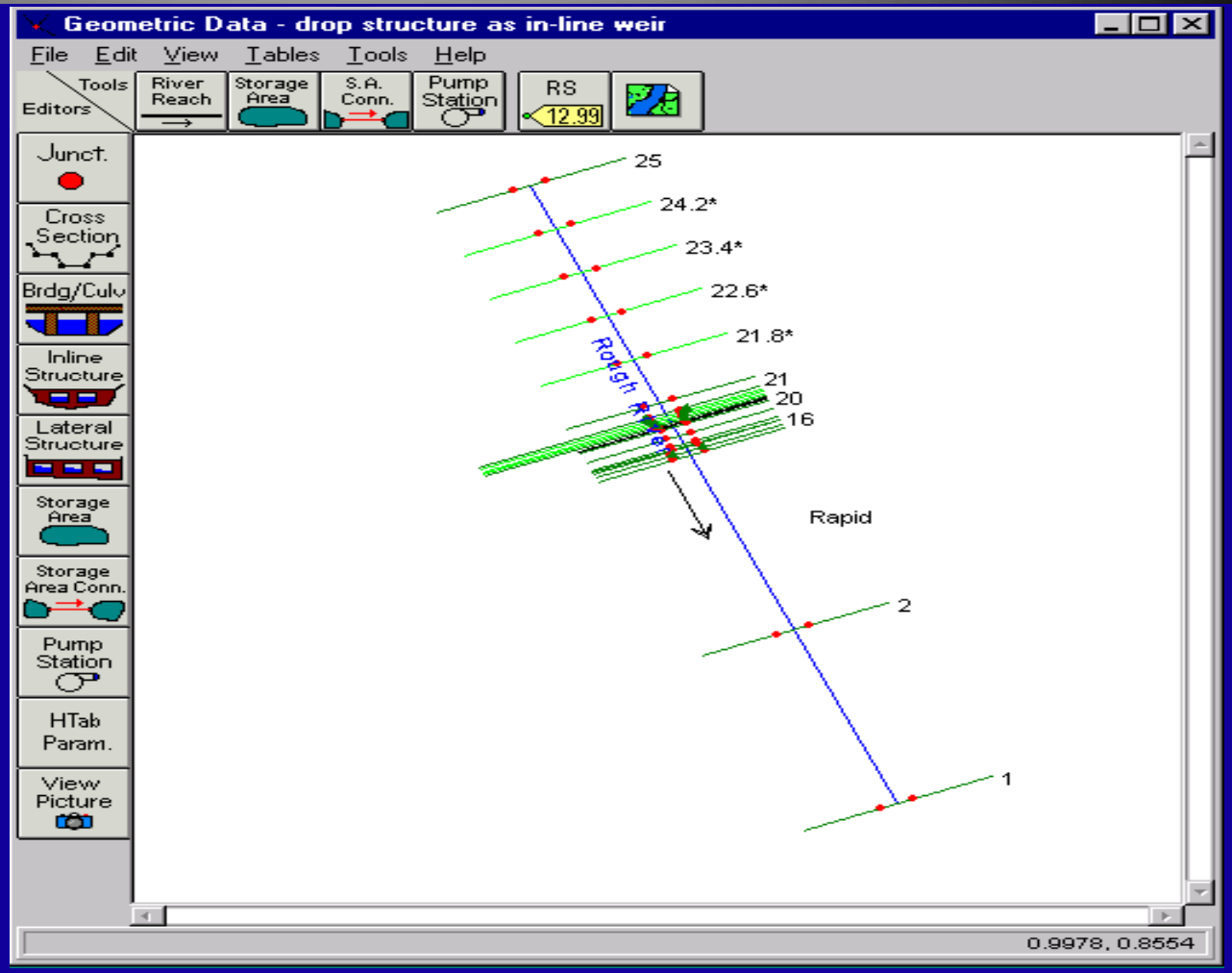


Inline Weir - Cross Section Layout



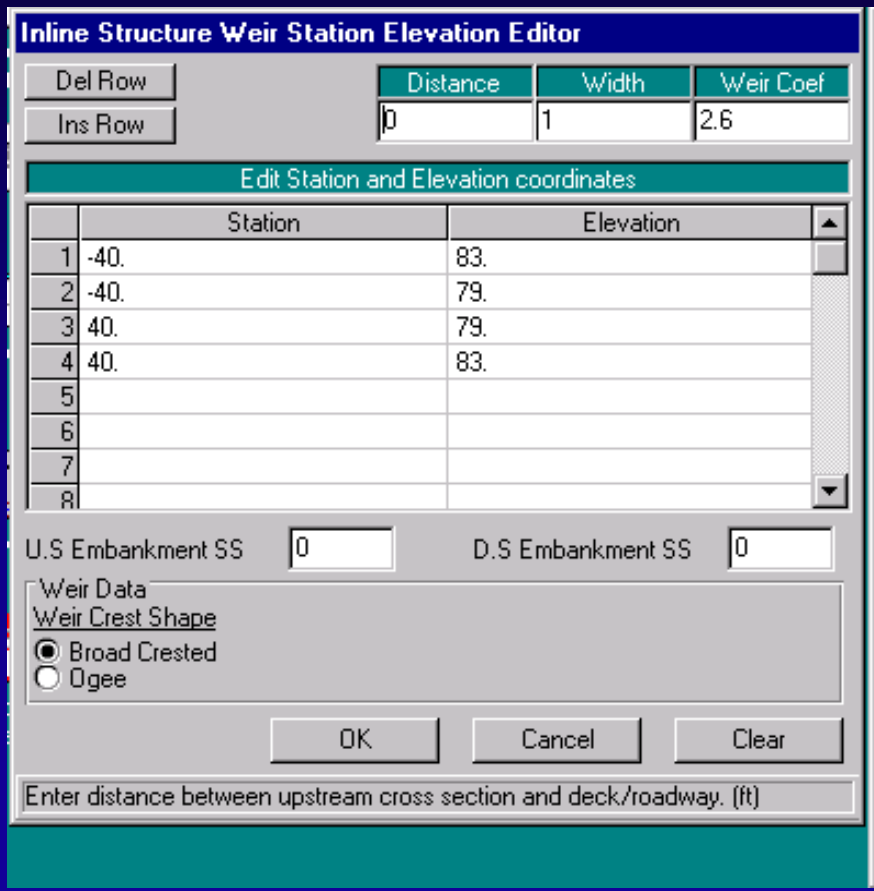
Modeling a Drop Structure as an Inline Structure

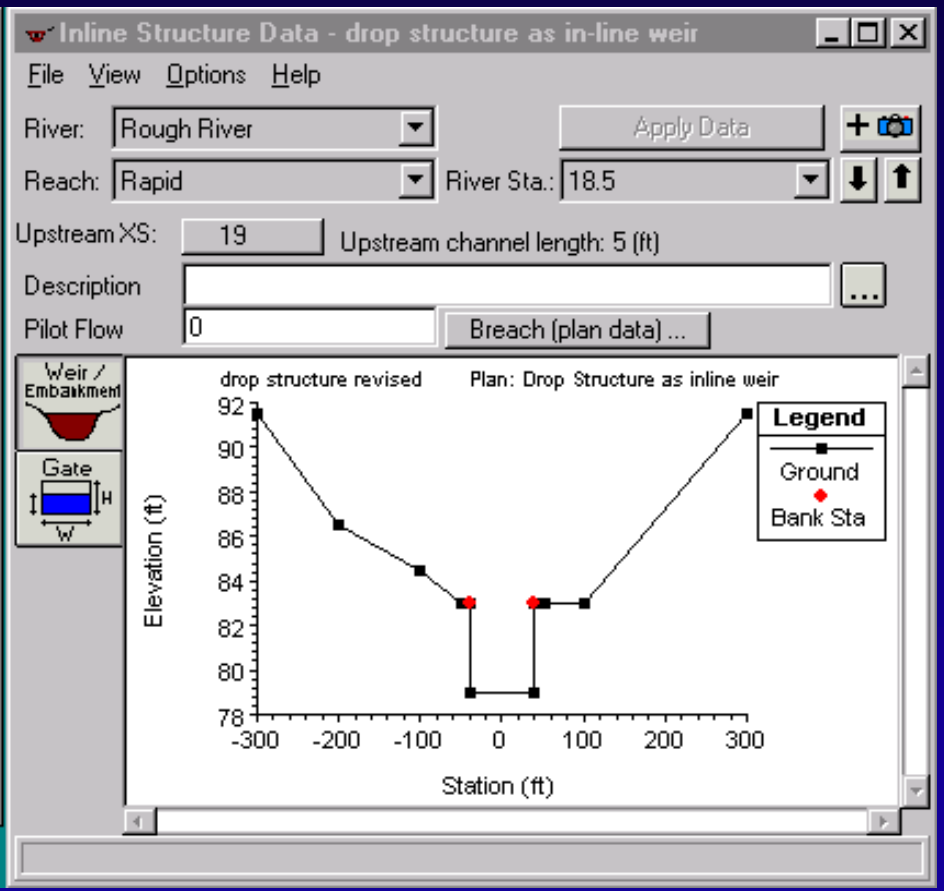
Under the "Geometric Data"click on "Inline Structure"



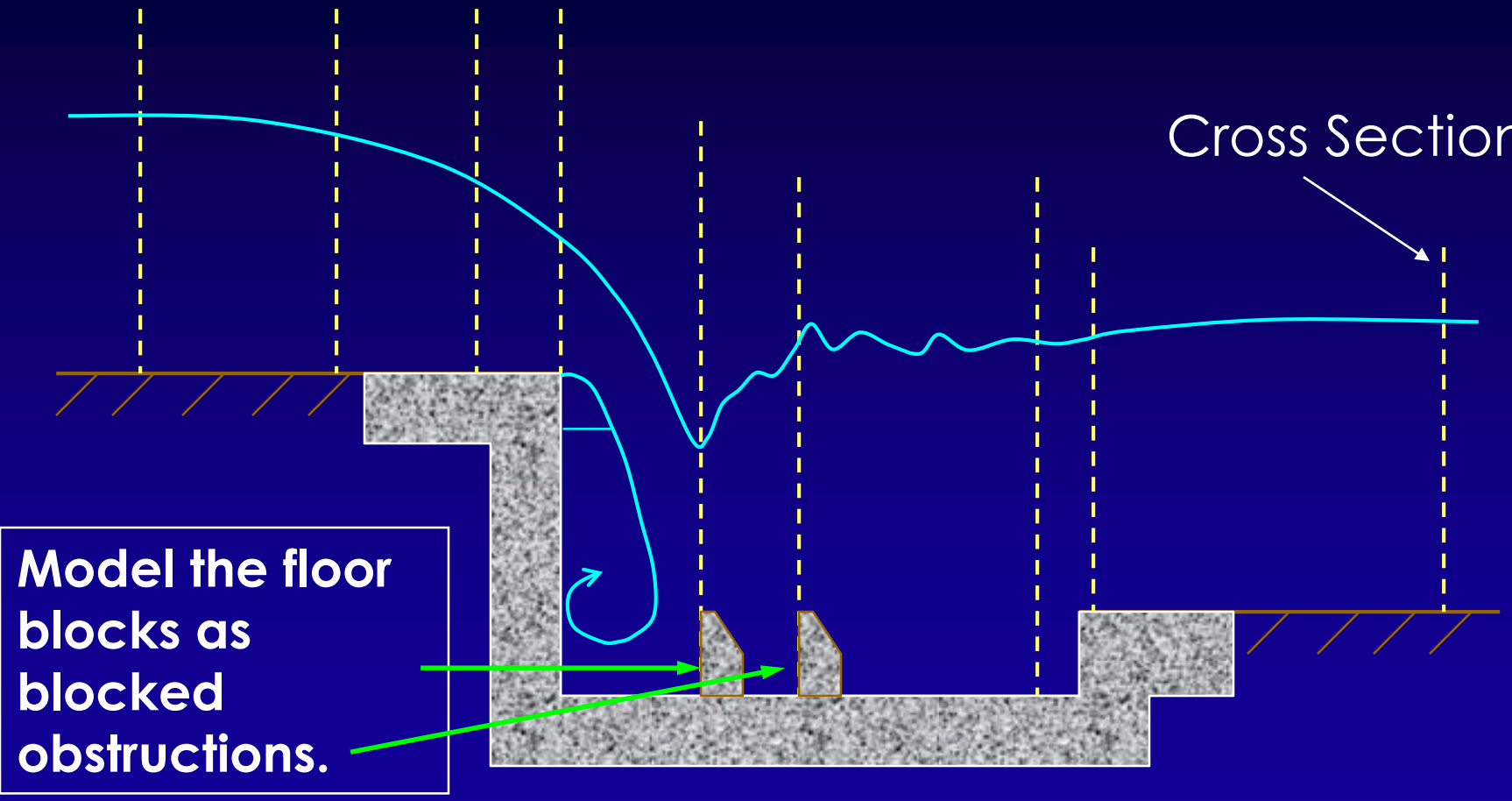
Modeling a Drop Structure as an Inline Structure

A series of windows allow for entry of weir characteristics

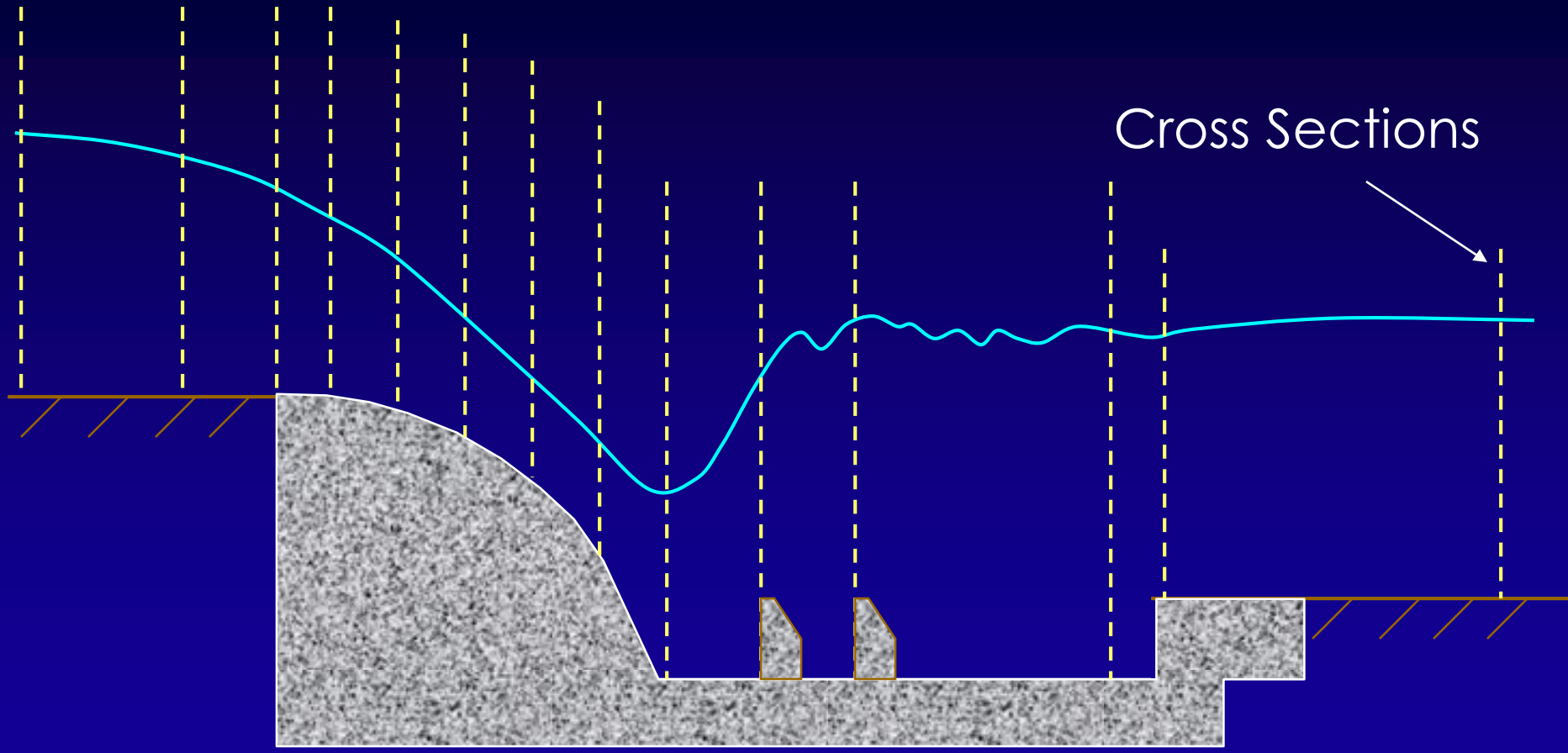




Modeling a Drop Structure with Cross Sections

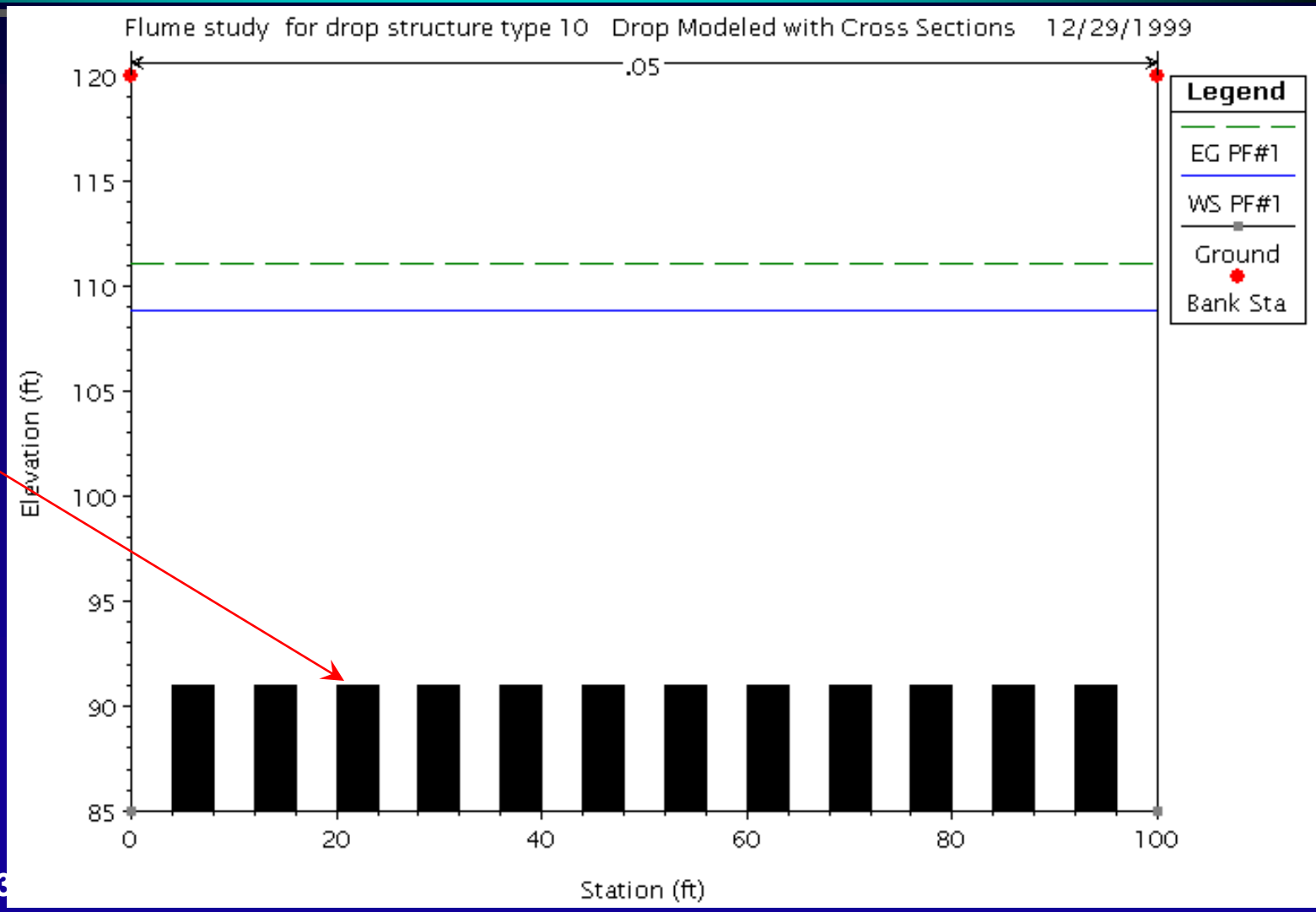


Cross Section Layout for Ogee Shapes Drop Structure



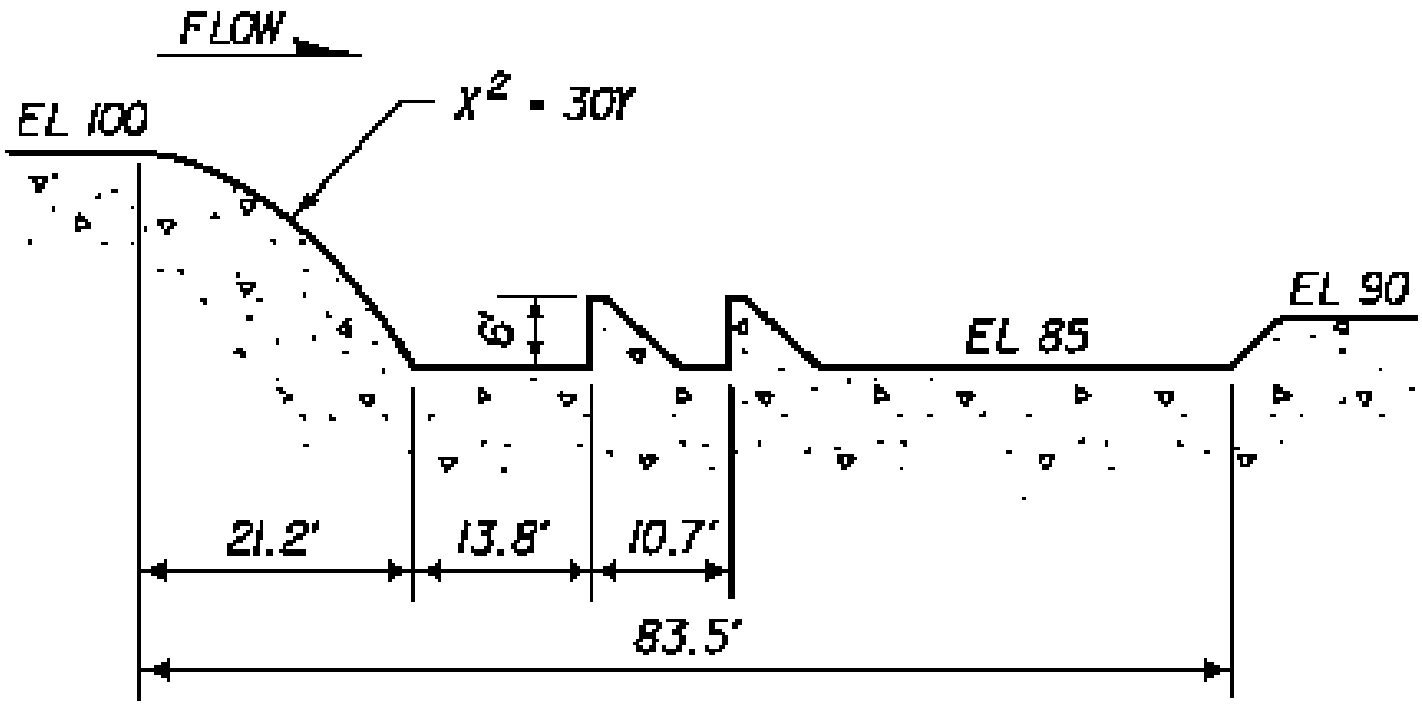
Modeling Baffles in the Stilling Basin

Increase 'n' values at baffle blocks to account for increased roughness

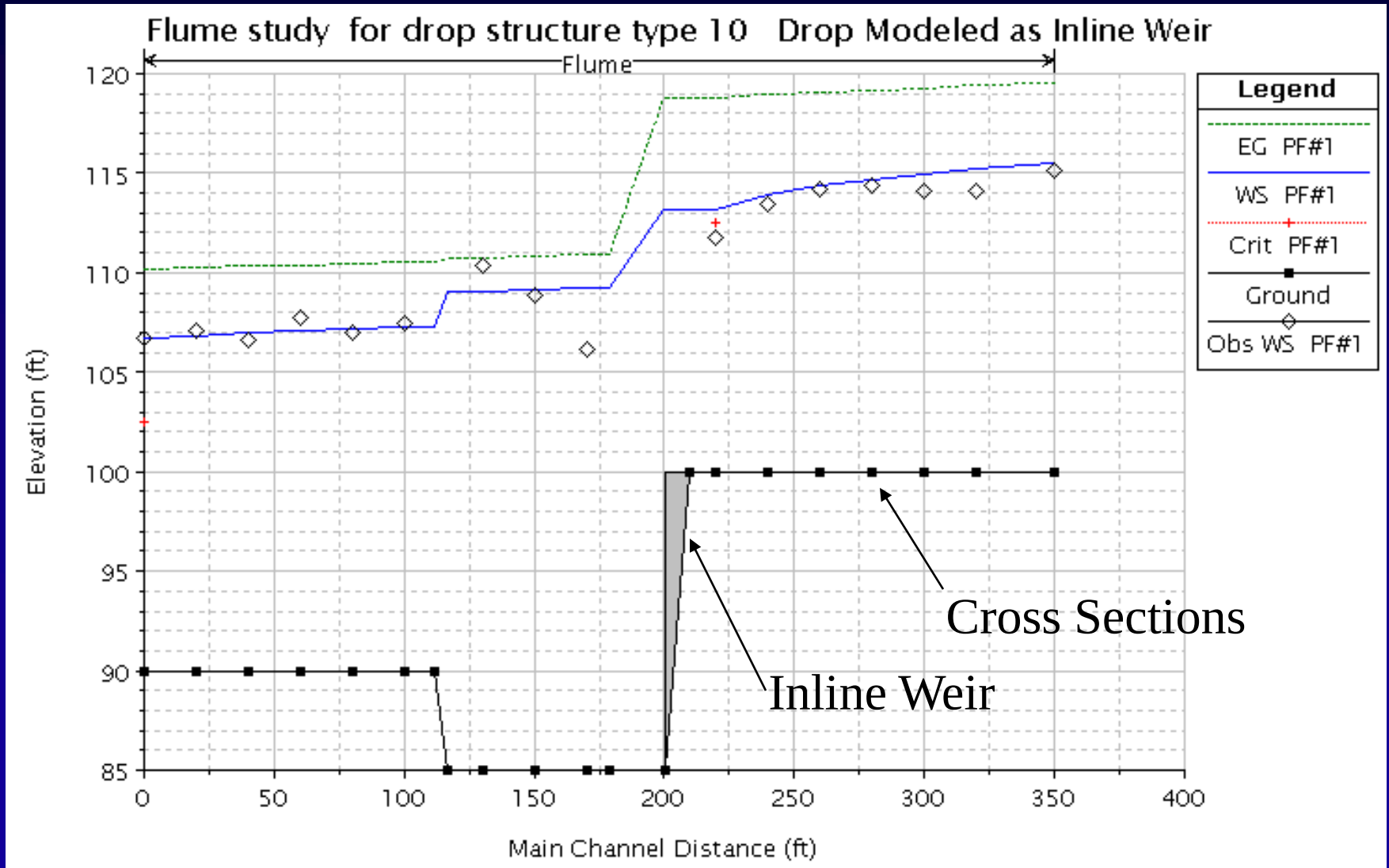


Example Using Lab Data

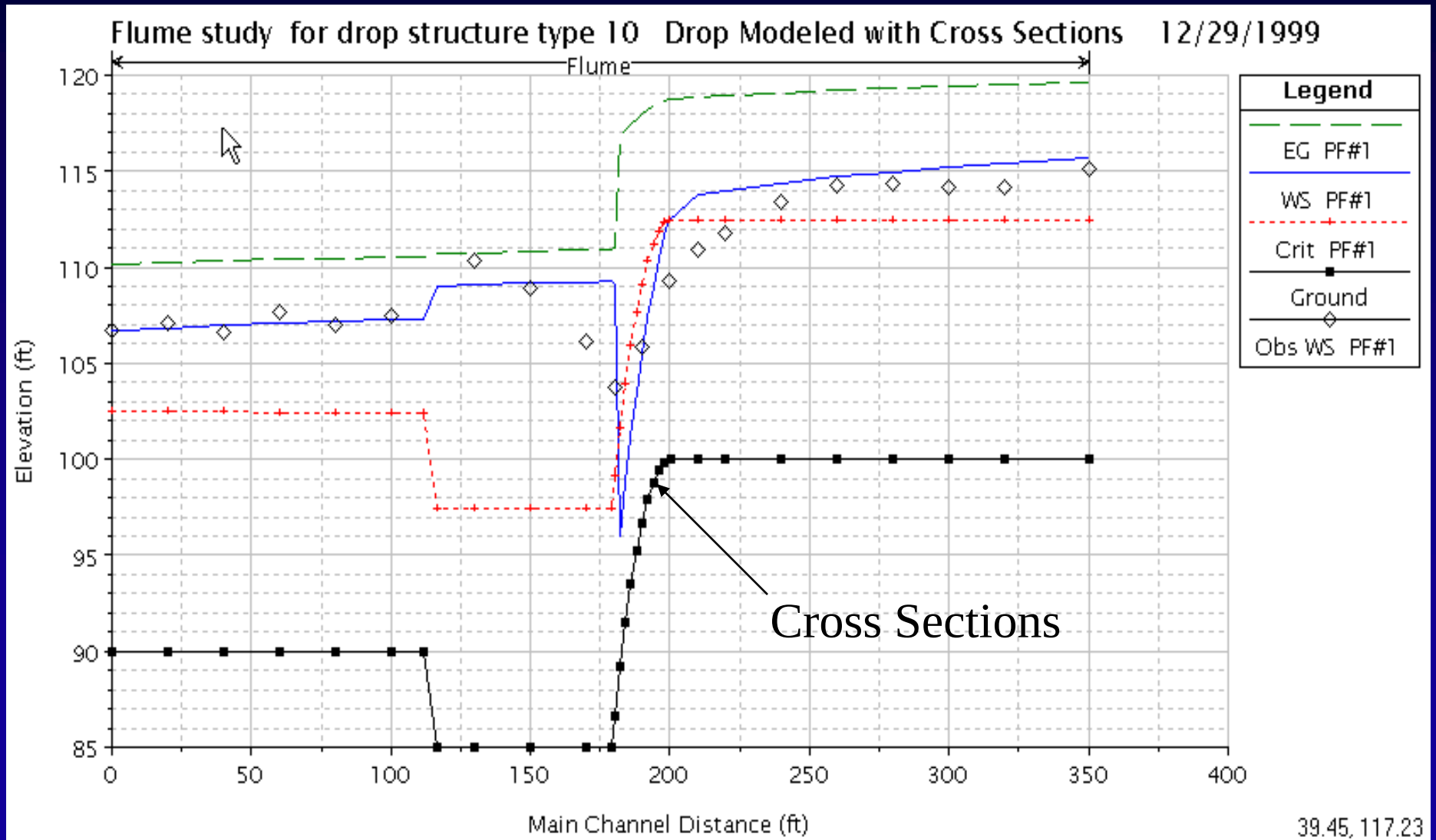
- WES Physical Model Study (WES, 1994)



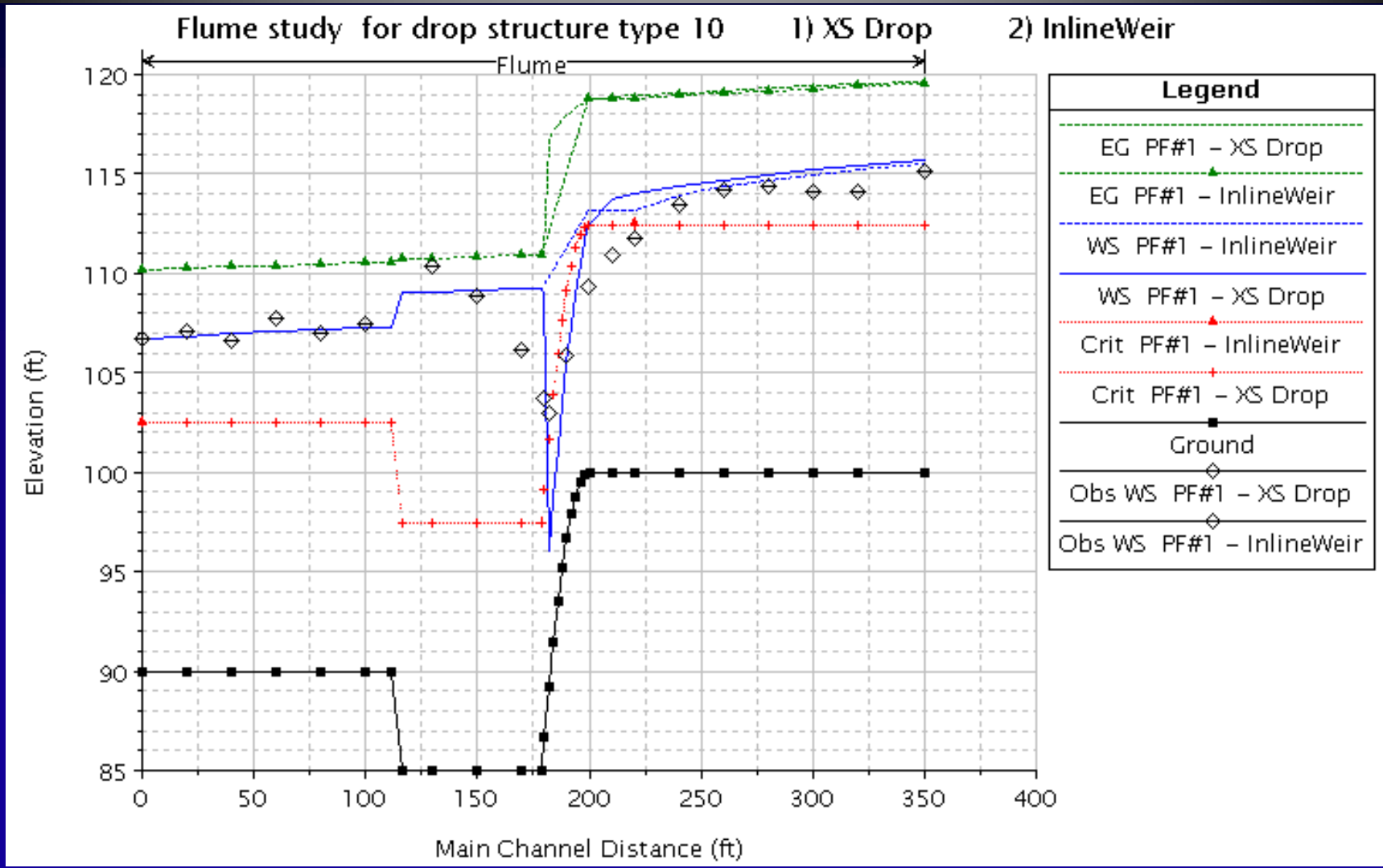
Example - Modeled as a Weir



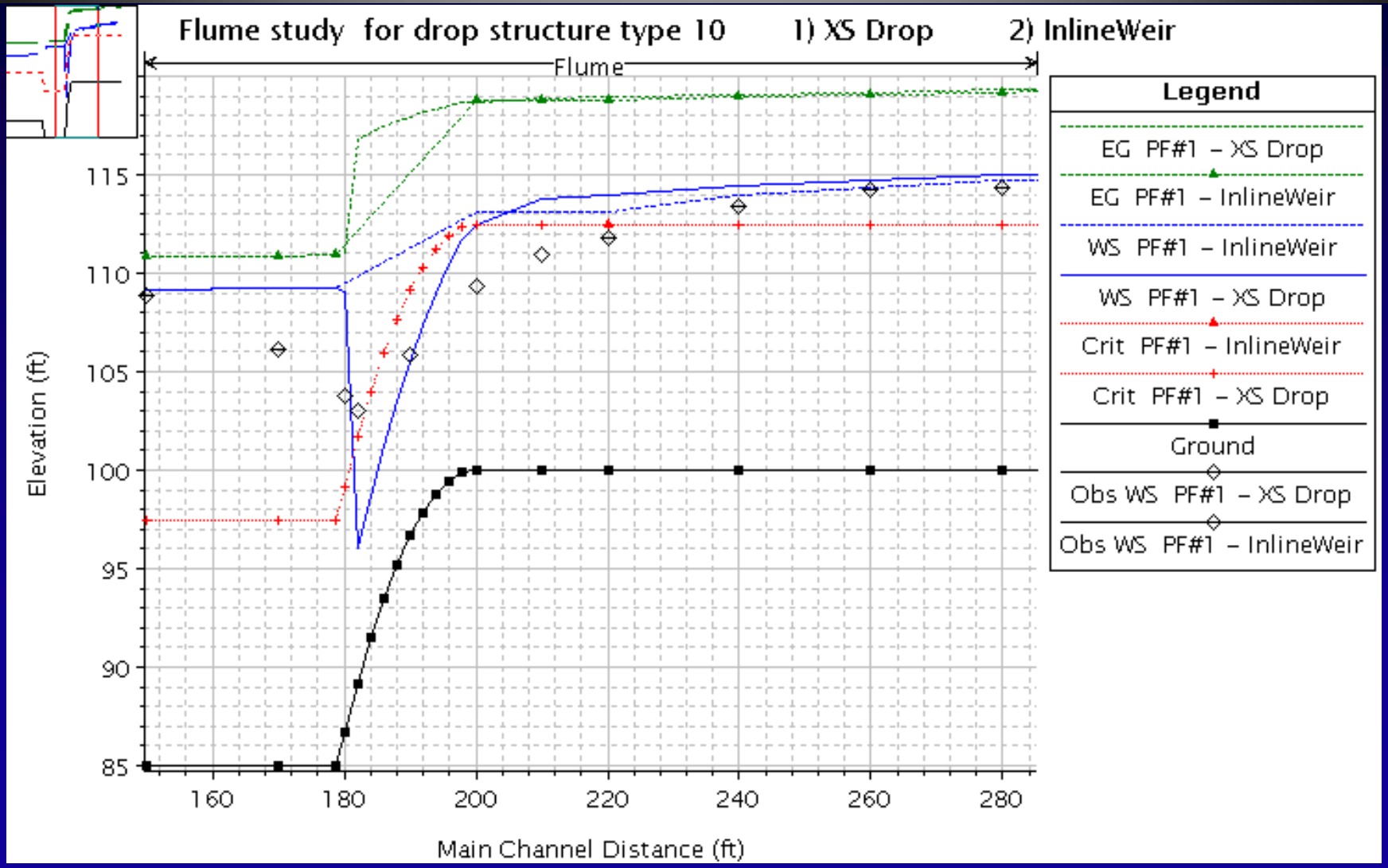
Example - Modeled with Cross Sections Only



Example - Comparison of Two Methods



Example - Comparison Zoomed In



The End