

HECRAS Tributary Junctions

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Junctions

- Defined as two or more streams which come together or split apart.
- **Constructed by drawing reaches together to a common point.** Draw the line representing the tributary in the direction the water will flow (the line ends at the main stream).
- For splitting flow, draw lines in the direction water will flow.
- Can be modeled using the energy equation or momentum equation.



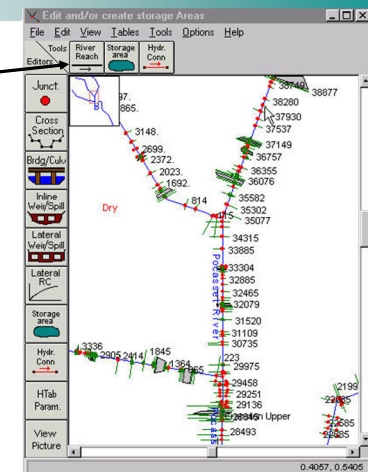
Junctions - 6 Types

1. Subcritical flow - flow combining
2. Subcritical flow - flow splitting
3. Supercritical flow - flow combining
4. Supercritical flow - flow splitting
5. Mixed flow - flow combining
6. Mixed flow - flow splitting



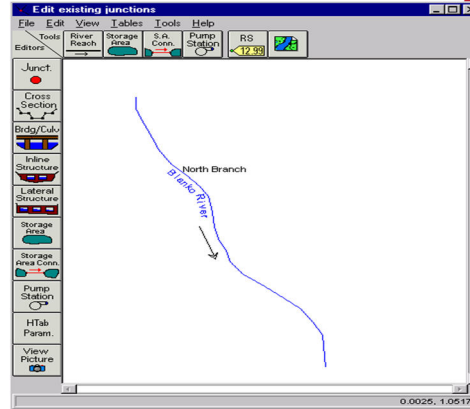
Junctions

- Press the River Reach button and cursor turns to a pen.
- Hold down the left mouse button and draw in the direction of flow.
- Release and press left mouse button to change line direction (gives shape to the schematic).
- At the end of the reach double click the left mouse button. This will terminate the reach drawing.



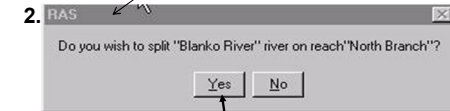
Construction of a junction

- Draw first the main river Reach
- Draw the tributary to the proximity of the future junction. Double click to the end.
- This triggers a sequence of data requirements (1 thru 4) for entering a tributary and junction

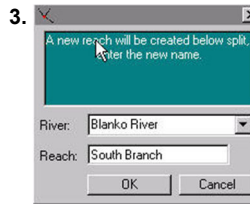


The tributary request a name

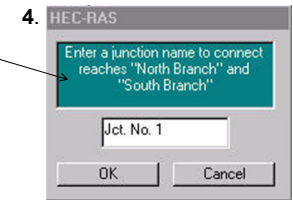
A splitting of the main river is requested.



Select "Yes".

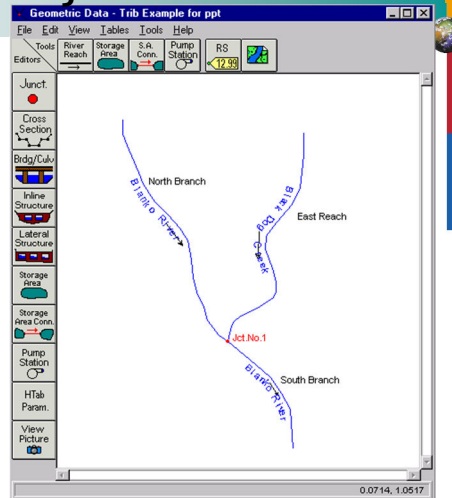


A name for the split river and the junction are requested

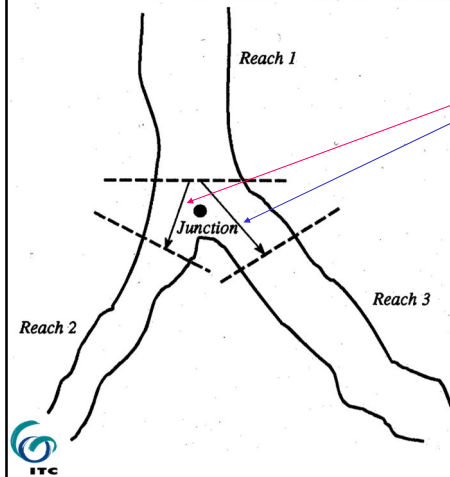


Construction of a junction

- Schematic of Blanko River with the Black Dog Creek tributary.
- Blanko River is split between the North Branch and South Branch at Junction No. 1



Junctions



- Each of these reach lengths are entered in the **Junction Data** window.
- The downstream reach length shown on the **upstream cross-section** data window should be set to zero.




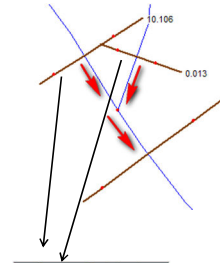
Junctions - Reach Lengths

- For cross sections upstream of the junction, the reach length should be zero (in the cross section interface).
- Cross sections should be as close to the junction as possible.
- Go into the Geometric Cross Section editor to change these lengths.
- Distance across the junction is generally, the average distance that water will travel between cross sections across a junction.



How it should look like?

- None of the sections cut each other or overlap!!
- Upstream sections (0.106 and 0.013) should have downstream reach lengths equal zero in the cross section editor.
- The lengths should be stated in the junction Data that appears pressing 



Downstream Reach Lengths		
L0B	Channel	R0B
0	0	0

Manning's n Values		
L0B	Channel	R0B
0.035	0.025	0.035

Junction Data - Base Geometry - Momentum Junction

Junction Name: **Pottsville** [Apply Data]

Description: Division of Upper Reach and Lower Reach at ...

Length across Junction	Junction Length (ft)	Tributary Angle (Deg)
From: Spruce Creek - Lower Reach		
To: Spruce Creek - Upper Reach	80	
To: Spruce Creek - Spruce Creek	70	45

Steady Flow Computation Mode: Energy Momentum Add Friction Add Weight

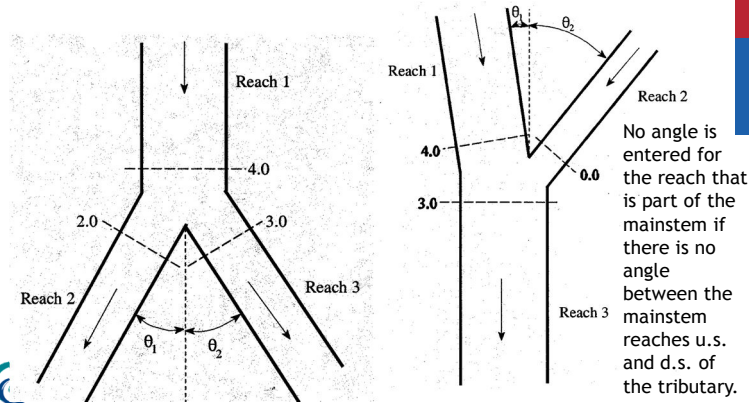
Unsteady Flow Computation Mode: Force Equal w/S Elevations Energy Balance Method

OK Cancel Help



Junctions - Energy vs Momentum

Where angle of tributary can cause significant energy losses, it is more appropriate to use the momentum equation.



Junctions



or, point the mouse at the junction, left click and select "Edit Junction".

Junction Data

Junction Name: **Jct. No. 1** [Apply Data]

Description: [Empty]

Length across Junction	Length (ft)	Tributary Angle (Deg)
From: Blanko River - South Branch		
To: Blanko River - North Branch	50	
To: Black Dog Creek - East Reach	40	

Computation Mode: Energy Momentum Add Friction Add Weight

OK Cancel Help

Edit length across junction (ft)



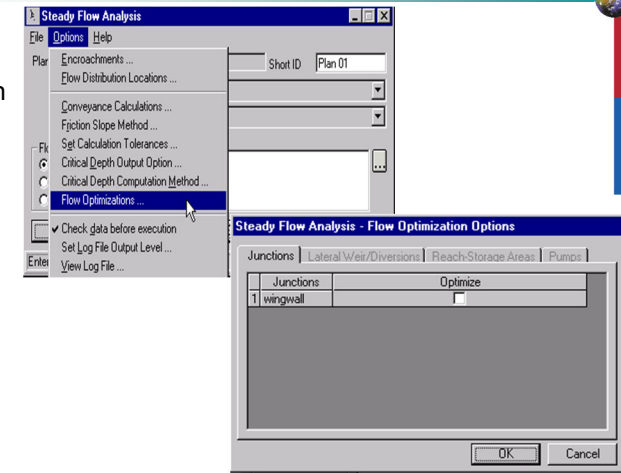
Junctions - Split Flows

- For split flows, i.e. when the stream is divided or split apart in the downstream direction, the program can optimize the amount of flow going in each direction.
- The user must estimate the initial flows going in each direction. It only is available for steady flow analysis.



Junctions - Split Flows

The optimization is found under the steady flow analysis window .



Junctions - Cross Section Locations

- 3 Criteria for XS's near junctions:
- Locate them close to junction. Another cross section may be transferred if representative.
- Cross-Sections should not overlap (the ends may touch upstream of junction for example).
- Should be located where flow is essentially one-dimensional.



End of lecture

