PAPE-DAWSON ENGINEERS
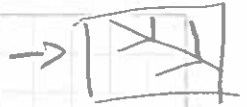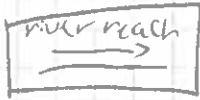
Hec rus how to start

Cross section

button to set to geometry interface → ⊠

1) Create line ↗ river reach line
   doesn't matter how it looks
   - it will ask for reach & river name but
   however in

button → [river reach →]

2) - Download the excell document
   - You can use either lidar or survey I'd use
     survey its easy.
   - Click cross section
     ↳ Options → Add Cross section
        name 1, then 2, then 3 ... all the way
        48
   - Copy & paste the excell station & elevation data
     into the corrisponding cross section.
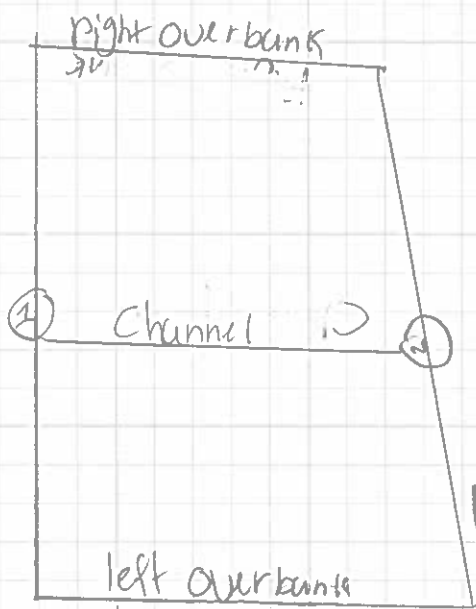
button → [cross section]

Reaches

- Download the PDF that has lines & a River

- You are going to need to either print the PDF off or
  put it in Autocad.

- You are measuring 3 point between 2 cross sections

right overbank

① Channel ②

left overbank

These are called Reaches

*note   imagine you are looking
         downstream to upstream
  -- if the cross sections are real
     where is you left hand &
     right hand that cooresponds
     to the left & right overbank

helpful hint   cross section
         Start at 48 & 47 it
            will be easier

The scale is 1 in to 100 ft

you measure at the end of the line

Reaches Continued

- Next you will put the info into the corrisponding XS, where it says downstream reach lengths

- Then put in manning's n value Just use .025
  * **note** if you start at station 48 & put in the manning's #'s then click the down arrow it will auto apply to the next value.

Possible error note

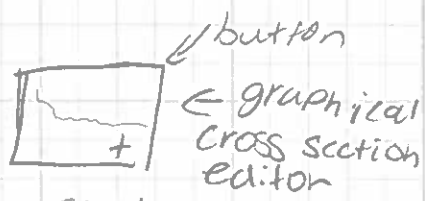A couple of the cross sections have replicated values. Change the bottom value

EX: 33.60 (station)   4881 (elevation)

Change→ 33.61   4881

Any time you make a change either click apply data or click the up or down arrow it will apply
you will know it applied cause the changes will go from red to black

Bank Stations

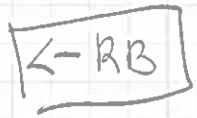Bank stations represent where the banks of a river is.

1) In the cross section editor click [button] ← graphical cross section editor

You will then click the button with a red circle this allows you to select the first point it will select the left bank first you can the press [button →] ← RB to make right bank to appear.

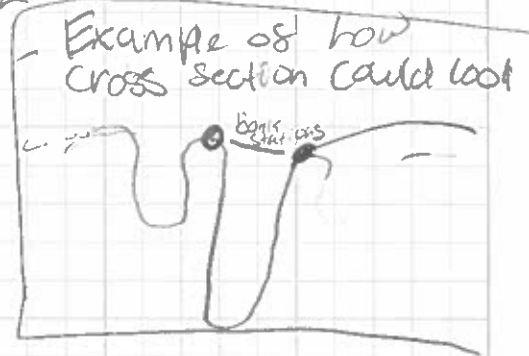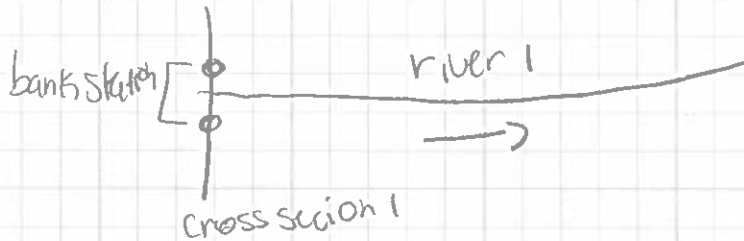*(left margin, vertical)* This is all done in the cross section data editor

PAPE-DAWSON ENGINEERS

Bank Stations continued,

Typically the bank station sit where the channel goes through. You want the red dots to sit on either side of the cross section + river.

Example

bank station river 1

cross section 1

Example of how cross section could look

bank stations

At this point save the geometry data this is the data we've been creating.

-file → Save geometry data
- Give it a name. ex: geo data

Then save the project on the main interface
file → Save project
give it a name ex: Buckbrush

Then exit out of program completly
this will force Hec-Ras to reposition
the cross sections on the river.
                                    If problem message proffessor.

reopen the file.

Running HecRas

Next well core setting up to run the file without the culverts.

Click the button → $\boxed{\text{q} \rightarrow}$ ← Steady flow Data

Enter 2 profiles ← this is next to $\boxed{\text{reach boundary conditions}}$
your first one will be at 200 cfs
the second one will be at 850 cfs

Now click reach boundary conditions
    You want this to run at normal depth

To find the upstream bed slope $\dfrac{XS4_1 - XS46}{channel distance}$ ← elevation

To find the downstream bed slope $\dfrac{XS34 - XS33}{Channel distance}$ ← elevation

The elevation values need to be
the bottom of the channel.

Input those slopes. Then file → Save flow sketch
  - whatever name
           ↙ button

Next click $\boxed{\text{👤}}$ ← Preform Steady flow Simulation
           Run flow regime as mixed.

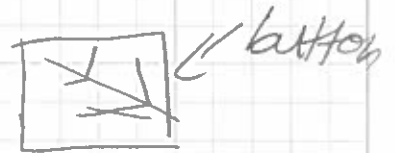It should run if not there is a problem + message professor.

Culverts

Next on main interface ← very important

Click file → save project as
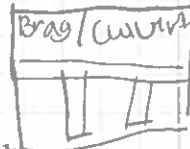
Save name as like buckbrush wash w/ culverts.

This will make a project with the current geometry data so you don't have to change anything except for what I'm about to tell you.

Go back to the geometry editor ← button

You are adding a culvert between 37 & 38 name it 37.5

To do this click bridy/culvert

Then go to options → add bridge/culvert name it 37.5 ← this will put it between cross section 37 & 38.

You will need bounding cross sections 37 & 38 will be the bounding cross section. This is because you need 60 ft between 37 & 38 at least.

You will also need two more cross section these are on the other side of 37 & 38.

To do this Tools → XS interpolation → between 2XS's

- You will do County the interpolation to be between XS 39 to 38 & 37 to 36

Where it says Maximum distance change to set location and just do the half way point on the channel distance.
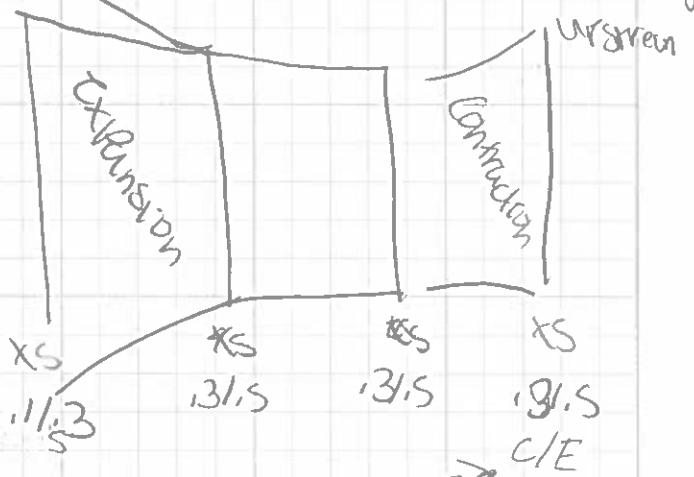
Then click Interpolate New XS's

The reason you need 4 XS's between a Culvert is b/c you are mimicing a contraction/expans that happens.

example

You will need to change the coefficients so go those XS's it the cross section editor. its at the bottom where it says c [Contraction/Expansion]

downstream
upstream
expansion
contraction

XS
XS .3/.5
XS .3/.5
XS .3/.5
.... .1/.3
C/E

now go back to the bridge/culvert Data click road/Deckway. You will need to fill in Distance, width, 2 upstream Station/high cord, & 2 downstream Station/highco

highcord the highest elevation points in the boundry XS's you known it's upstream cuse it the first cross section by bounding XS's

Culvert Continued

Click Culvert on bridge culvert Data

Change Shape to box

Span + Rise set by yourself can't be over the Deckway
or under the elevation

Distance between XS this is the area
where the culvert sits

Culvert length how long the culvert
is should be at least the road-
way which is 50ft

Click the button for

entrance loss coeff, exit loss &
Manning's for top it will depend

on the culvert & material.

Upstream + downstream invert elev
is the bottom of the Channel
elevation.

barrels are the amount of barrels in a culvert dee
between 3-9 on this project.

It will create the location Based on the centerline
they shouldn't overlap or should have a gap between

file Save geometry data

then repeat page 4 for this One.

If you get an error that says length is to long!
your culvert length + barrel length shouldn't be over the distance
between XS's

* note you can move the
points, It's like is you
excavated the area
you want the culverts
bottom to sorta
Sit Flesh w/ the
bottom of Channel
To do this
go to cross section
then graphical cross section
editor you can then
just move the points
where you want them

Change anything that needs to be change

Add ineffective flowpaths

ask proffessor.