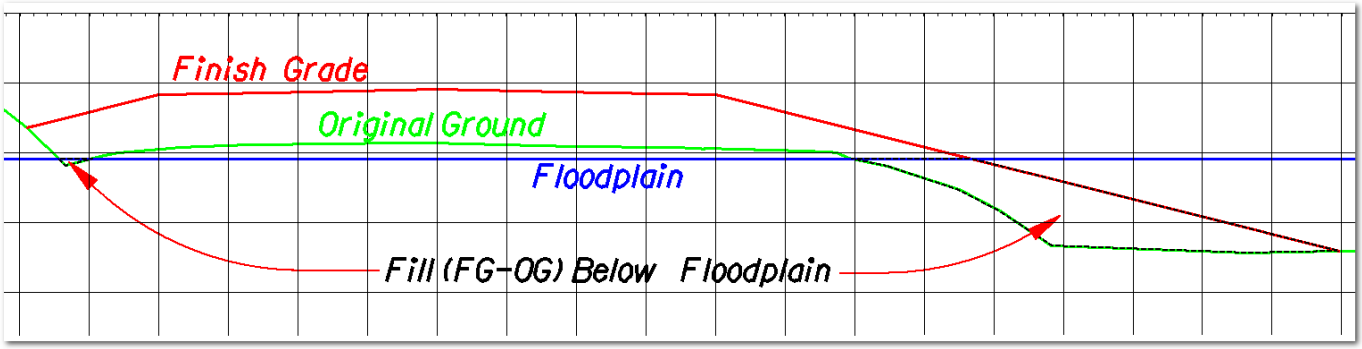
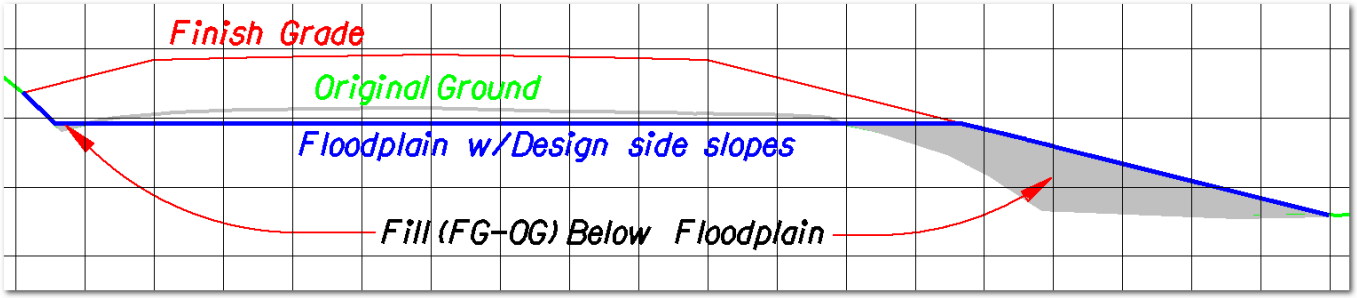
Fill Below Floodplain

Given a design surface, an existing surface, and floodplain elevation, there is a need to calculate the amount of fill that will be placed in the roadway prism that is below the floodplain elevation. Mathematically, we are looking for the areas that are bounded by either just the OG and floodplain, and areas that are bounded by all three surfaces (see right side below).



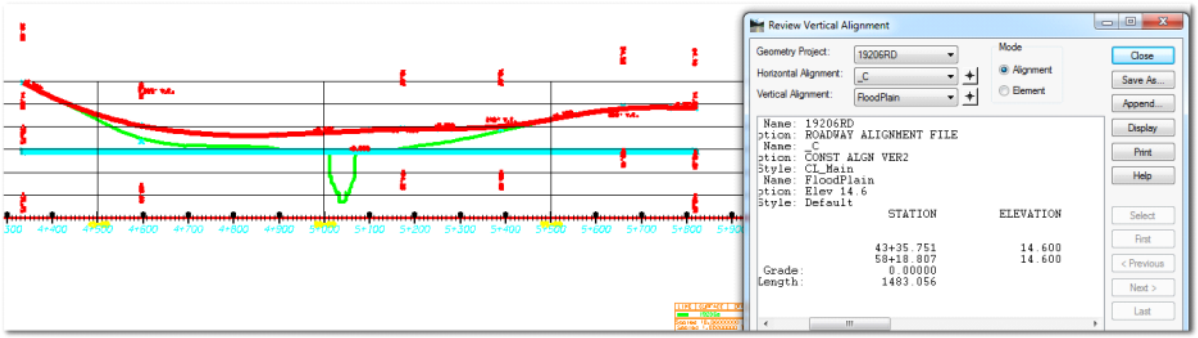
InRoads Cross Section End-Area Volume calculations will find the difference between <u>two</u> surfaces - so an initial goal is to combine the design finish grade surface with the floodplain surface to produce a floodplain that has the design fill slopes incorporated where necessary. A cross section end-area volume report may be generated to produce the Fill Below Floodplain (see below).



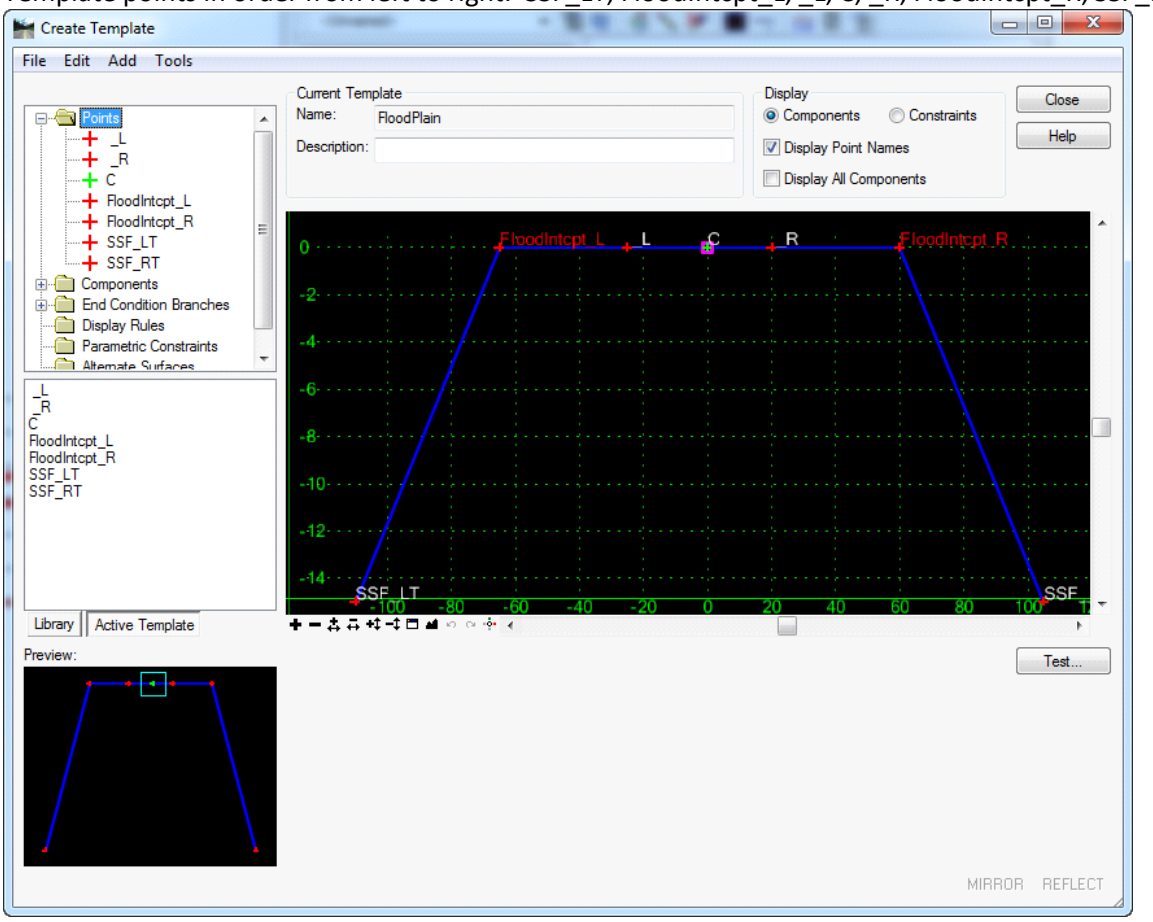
One method to create a floodplain surface that has design side slopes is to use the Roadway Modeler to create the floodplain. A floodplain template may be pushed along the design horizontal alignment, using a floodplain vertical alignment. The floodplain corridor can use target aliasing to intersect the design corridor side slopes and can use point controls on an additional component to locate the design catch points (see dark blue line above).

Fill Below Floodplain

1. Create child vertical alignment named FloodPlain at floodplain elevations.
   Eg. FloodPlain elevation is constant at 14.6', placed two vertical PIs, one at alignment beginning and one at end, both with elevation 14.6' (used key-in se= station, 14.6)

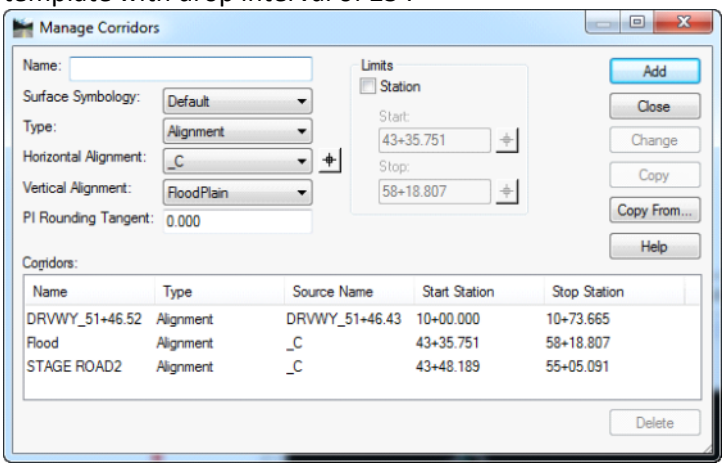


2. Create FloodPlain template with flat constrained center components about as wide as the paved design roadway, attach a 0%, infinite end condition on both sides, and attach another 1:3 fill , infinite end condition onto both sides. Intent is that the first end condition will be successful in targeting the design corridor using target aliasing and the second end condition will be point controlled to the design corridor catches.
   Template points in order from left to right: SSF_LT, FloodIntcpt_L, _L, C, _R, FloodIntcpt_R, SSF_RT

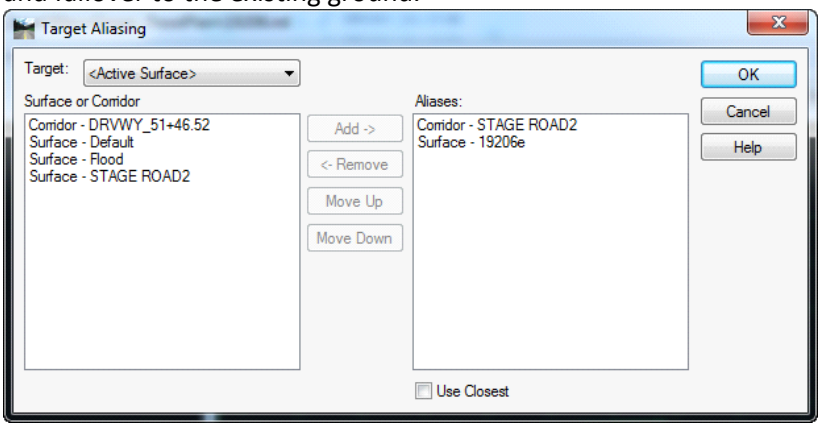


Fill Below FloodPlain

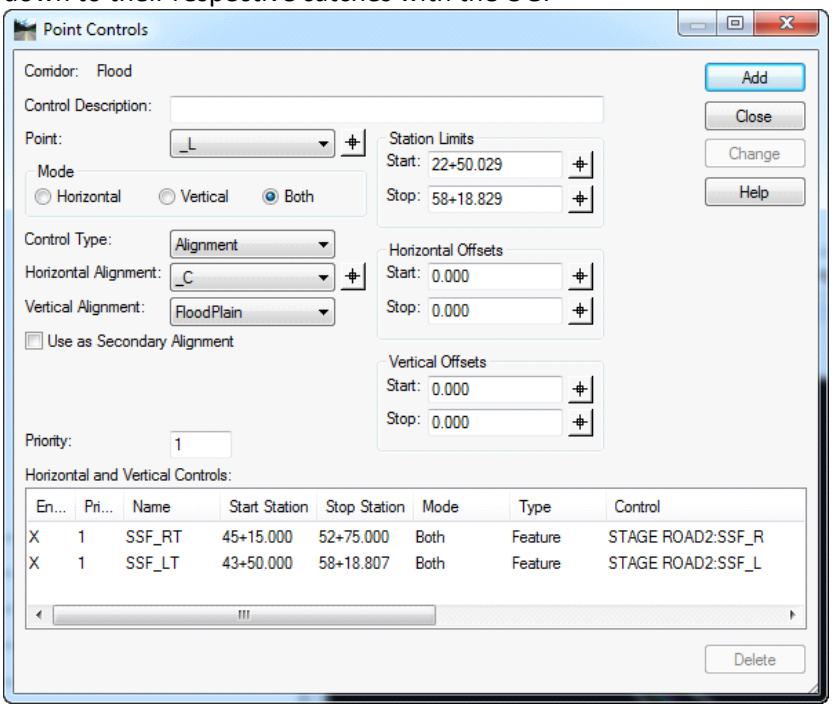
3. Create a corridor with the same horizontal source as the design, but use FloodPlain vertical. Apply template with drop interval of 25'.



4. Tools>Target Aliasing set up as below will have the end conditions target the design corridor first and failover to the existing ground.



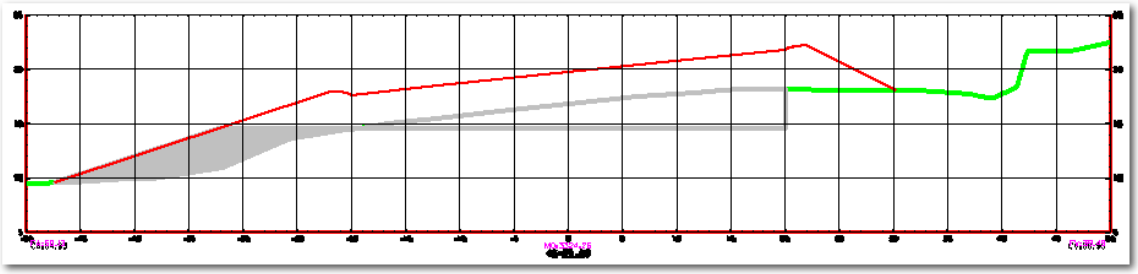
5. Point controls set up as below will cause the outer end conditions to follow the design side slopes down to their respective catches with the OG.

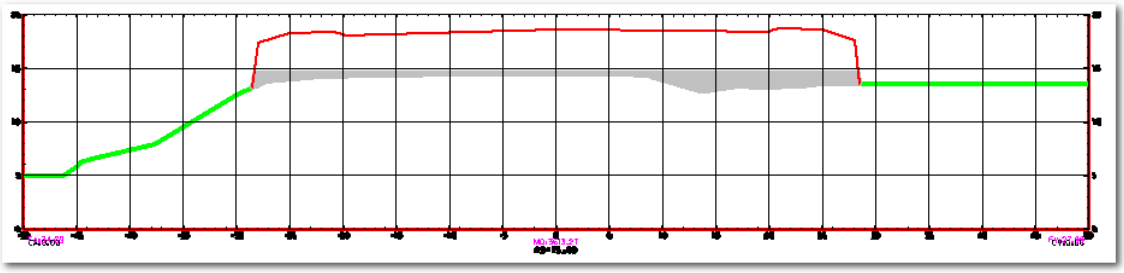


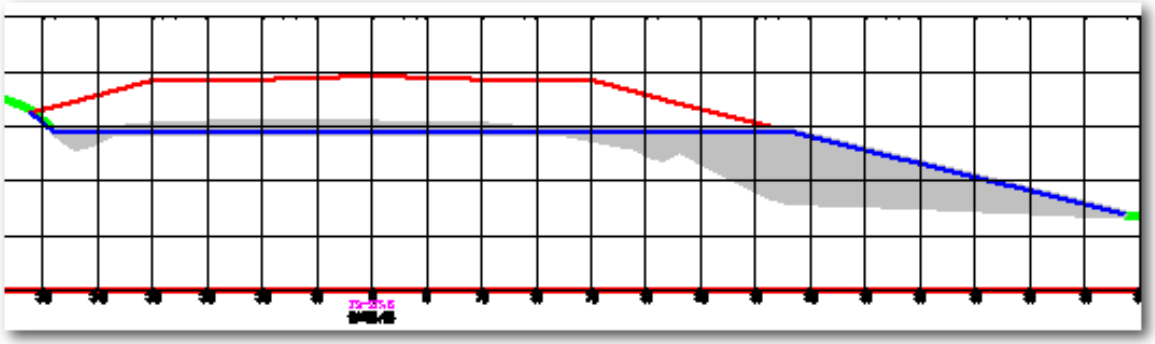
Fill Below FloodPlain

6. Create the FloodPlain surface.

End-Area Volumes were performed on cross sections, identifying the Original Ground (existing type) and the FloodPlain (Design type) as the two surfaces to be used for calculations. The Fill quantity can be used for the Fill Below the Floodplain and within the roadway prism.







Tips:
In the example project, I used the design corridor as a target alias and also used design corridor points as point controls. The design end conditions had to be successful for the floodplain end conditions to be successful. To limit the point controls to just two - I ensured that Feature Name overrides were set on all design end conditions and that they named the same two features.

If end conditions on the design corridor fail - you will not have a good point control for the second FloodPlain end conditions. The second EC will fail, invalidating the first, and you will be left with just the floodplain from around EP_L to EP_R (see topmost image above).