



## 2. POLICY ON STORMWATER QUANTITY MANAGEMENT

### D. No Net Loss Floodplain Storage Policy

Floodplains exist adjacent to all natural and man-made streams, regardless of contributing drainage area or whether they have been previously identified or mapped. Due to potential impacts of floodplain loss on peak flows in streams and on the environment, disturbance to floodplains should be avoided. When the avoidance of floodplain disturbance is not practical, the natural functions of floodplain should be preserved to the extent possible.

In an attempt to strike a balance between the legitimate need for economic development within Tippecanoe County and the need to preserve the natural functions of floodplains to the extent possible, compensatory excavation equivalent to the floodplain storage lost shall be required for all activities within floodplain of streams located in Tippecanoe County where drainage area of the stream is equal or larger than one square mile. This requirement shall be considered to be above and beyond the minimum requirements provided in the applicable flood hazard areas ordinance currently in effect in Tippecanoe County.

Computations must show no net loss of floodplain storage for 10-year, 50-year, and 100-year storm events. That is, the post-development 10-year floodplain storage along a stream shall be the same as the 10-year pre-development floodplain storage along the stream within the property limits or at a location approved by the Tippecanoe County Drainage Board; The post-development 50-year floodplain storage along a stream shall be the same as the 50-year pre-development floodplain storage along the stream within the property limits or at a location approved by the Tippecanoe County Drainage Board, and the post development 100-year flood plain storage along the stream shall be the same as the 100-year pre-development flood plain storage along the stream within the property limits or at a location approved by the Tippecanoe County Drainage Board.

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Theoretically, aside from potential negative impacts on floodplains' environmental habitat, the negative impacts of eliminating the floodplain corridor flood storage volume on the peak discharge and water surface elevation is expected to be minimal if the regulatory floodway is preserved. However, even eliminating the floodplain storage of the flood fringe areas will have negative impacts on the peak discharges and water surface elevations, particularly if cumulative impacts are considered.

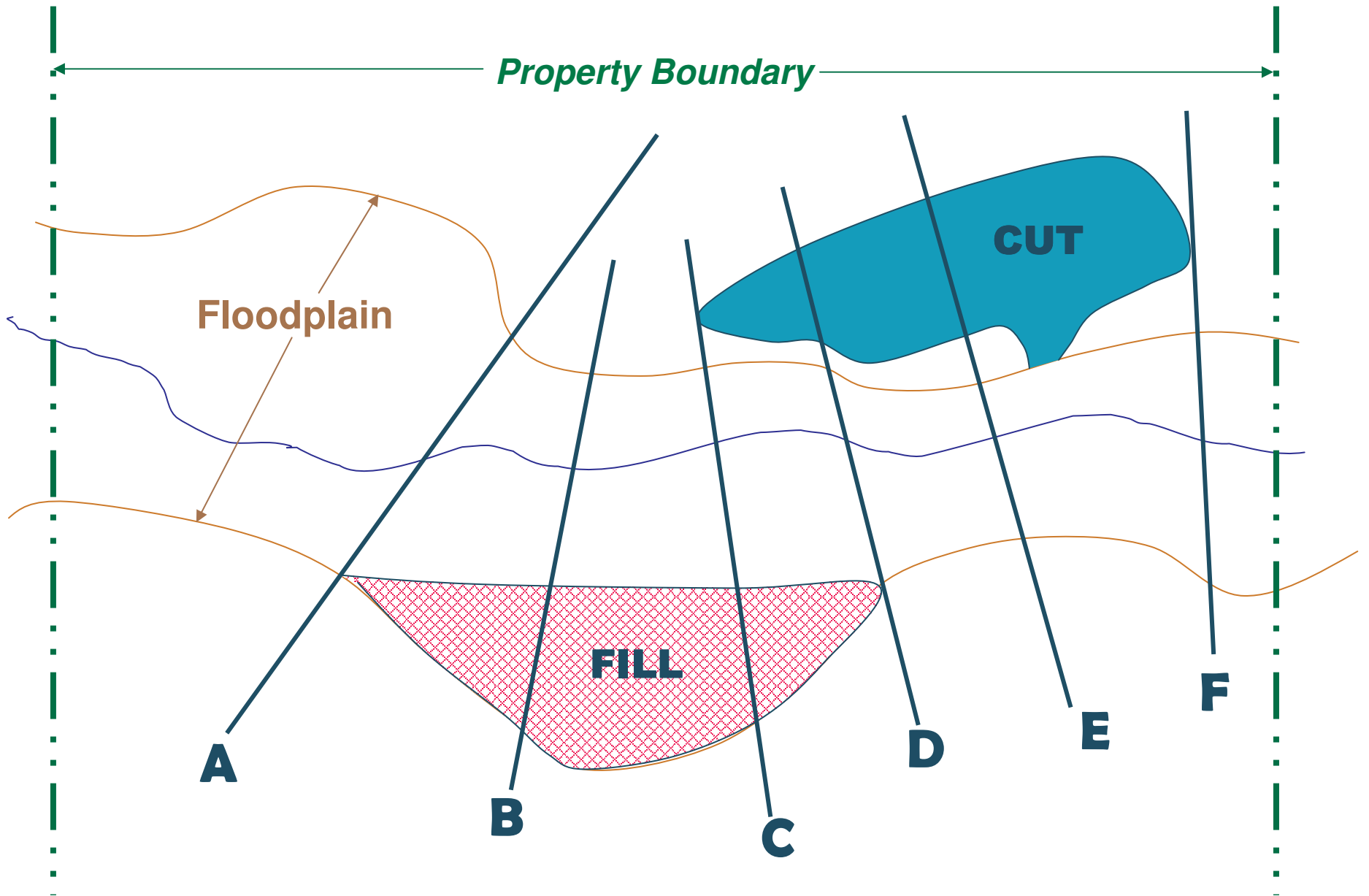
It should be noted that while the regulatory floodway and floodplain calculations are based on peak discharge values that are set based on a macro examination of a 1% annual chance (100-year) flood, the actual peak discharge experienced in the stream from day to day is very much affected by the flood storage within the watershed and within the floodplain. When flood waves move downstream in a stream channel, the peak discharge and the shape of the flood hydrograph changes as the flood wave is "routed" downstream. The more floodplain storage volume available, the more pronounced will be the attenuation in the flood hydrograph peak. Such attenuation is not related to what peak discharge value is or was used for delineation of the regulatory floodplain. However the noted attenuation has a lot to do with the storage volume available in the flood fringe areas and how it gets accessed and slowly released. Current popular hydraulic modeling techniques, such as HEC-2 or HEC-RAS are generally not refined enough to examine the impacts of eliminating floodplain storage in flood fringe areas on peak discharges.

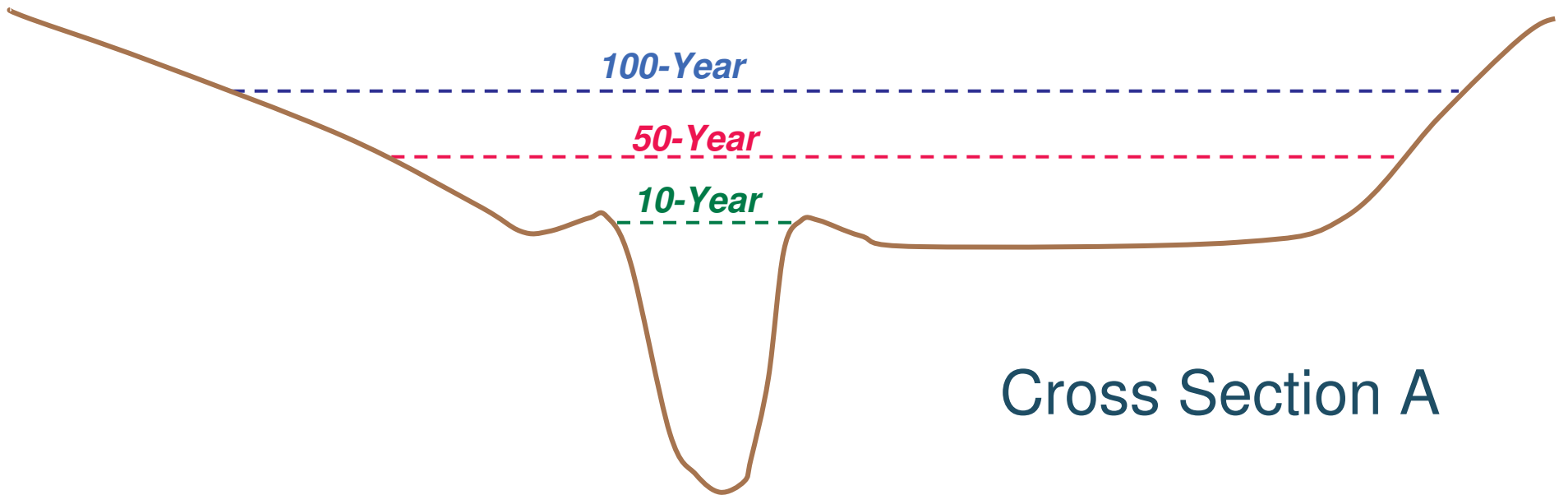
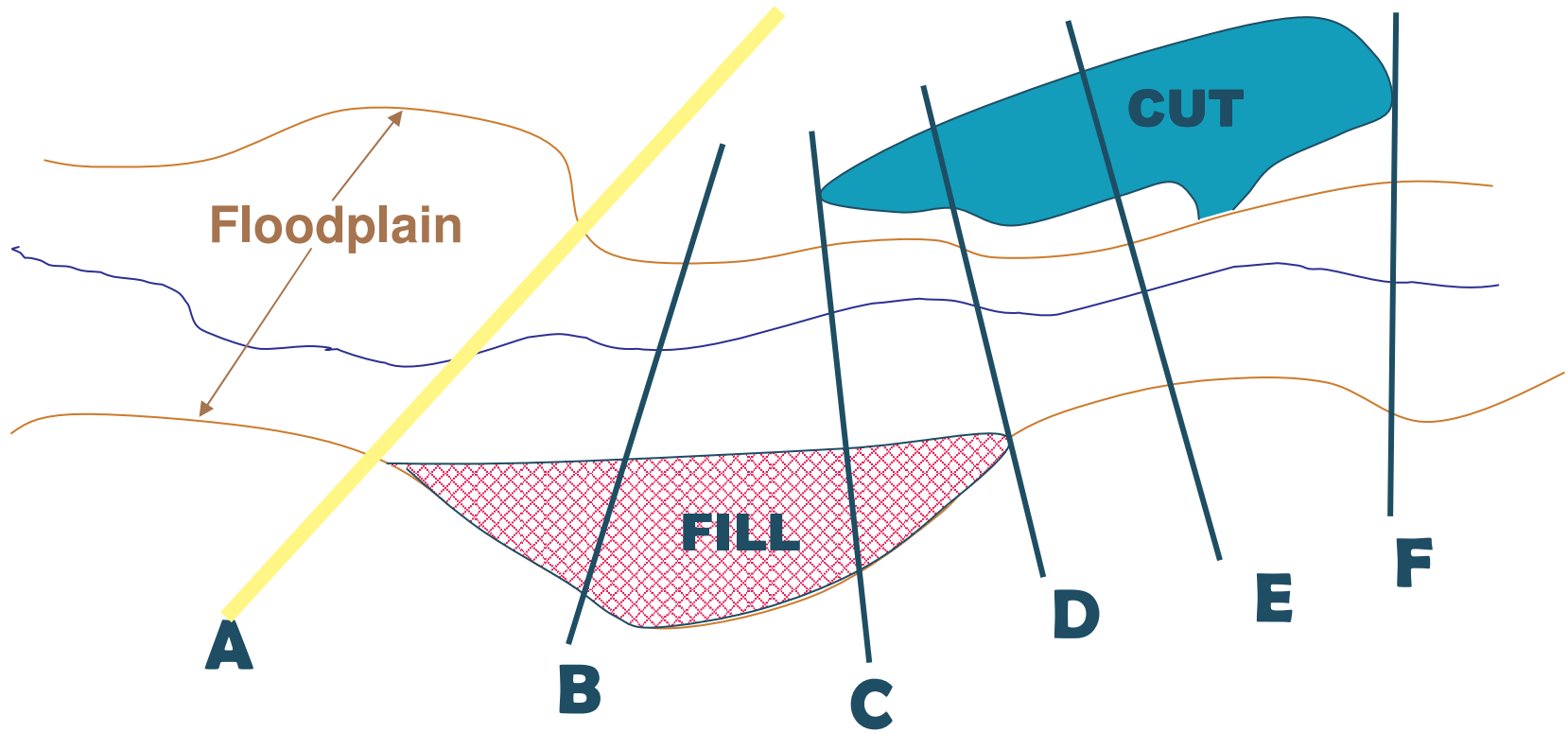
In an attempt to strike a balance between the legitimate need for economic development within Tippecanoe County and the need to preserve the natural functions of floodplains to the extent possible, compensatory excavation equivalent to the floodplain storage lost shall be required for all activities within the floodplain of streams located in Tippecanoe County where the drainage area of the stream is equal to, or larger than, one square mile. This requirement shall be considered to be above and beyond the minimum requirements provided in the applicable flood hazard areas ordinance currently in effect in Tippecanoe County. The Tippecanoe County Drainage Board and/or Tippecanoe County Surveyor may alter the compensation ratio, based on extenuating circumstances, for a specific project.

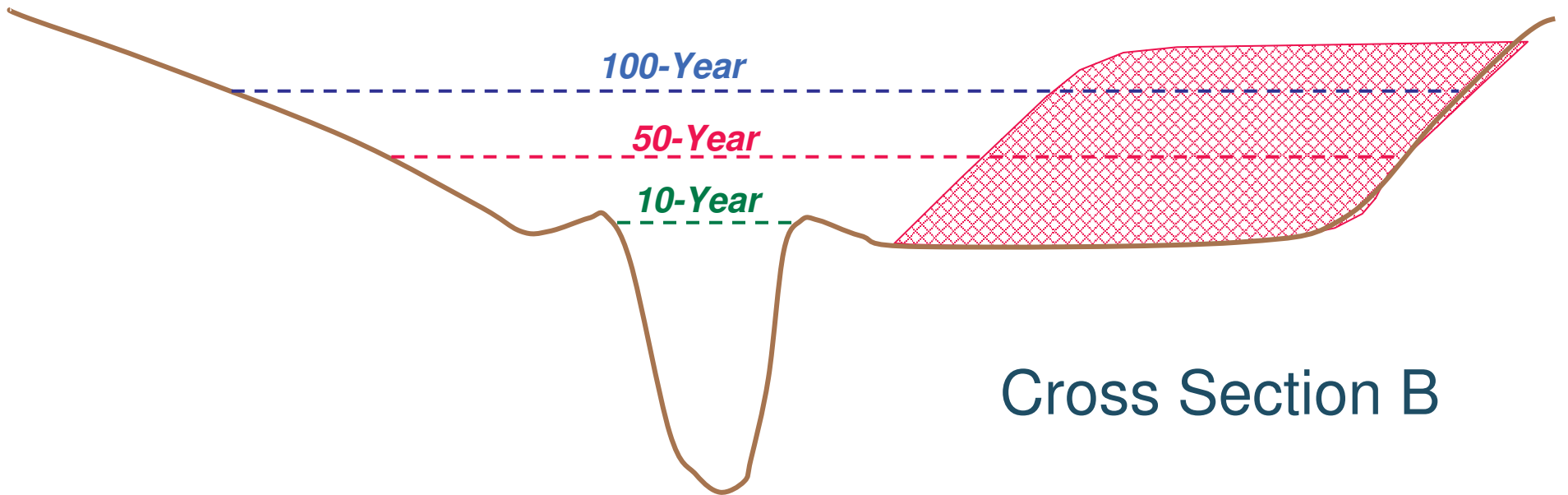
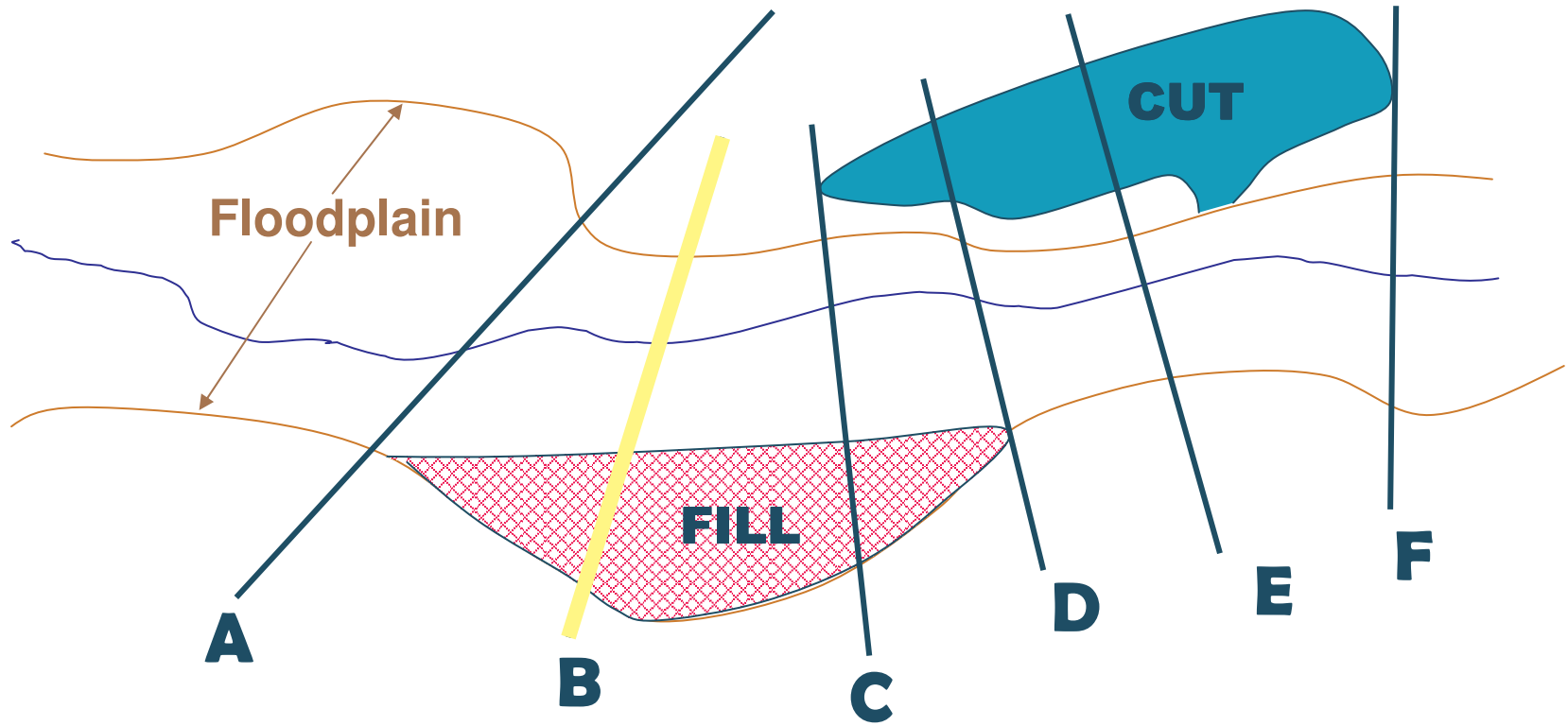
Note that by definition, compensatory storage is the replacement of the existing floodplain and, in rare exceptions, the floodway storage lost due to fill. Compensatory storage is required when a portion of the floodplain is filled, occupied by a structure, or when as a result of a project a change in the channel hydraulics occurs that reduces the existing available floodplain storage. The compensatory storage should be located adjacent or opposite the placement of the fill and maintain an unimpeded connection to an adjoining floodplain area.

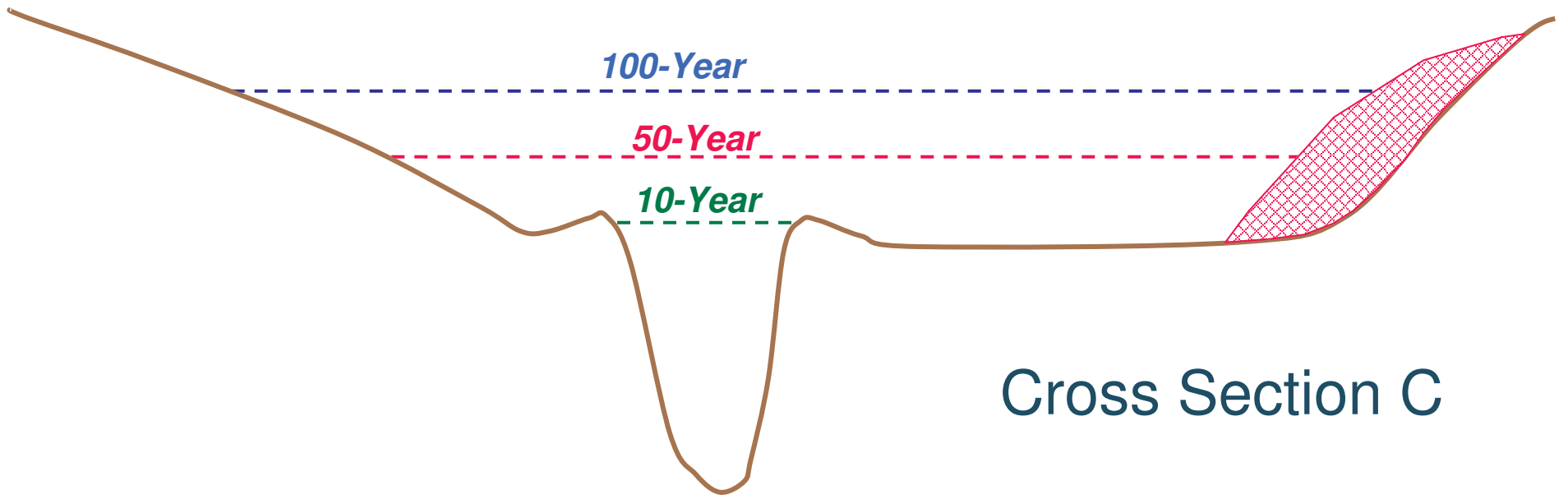
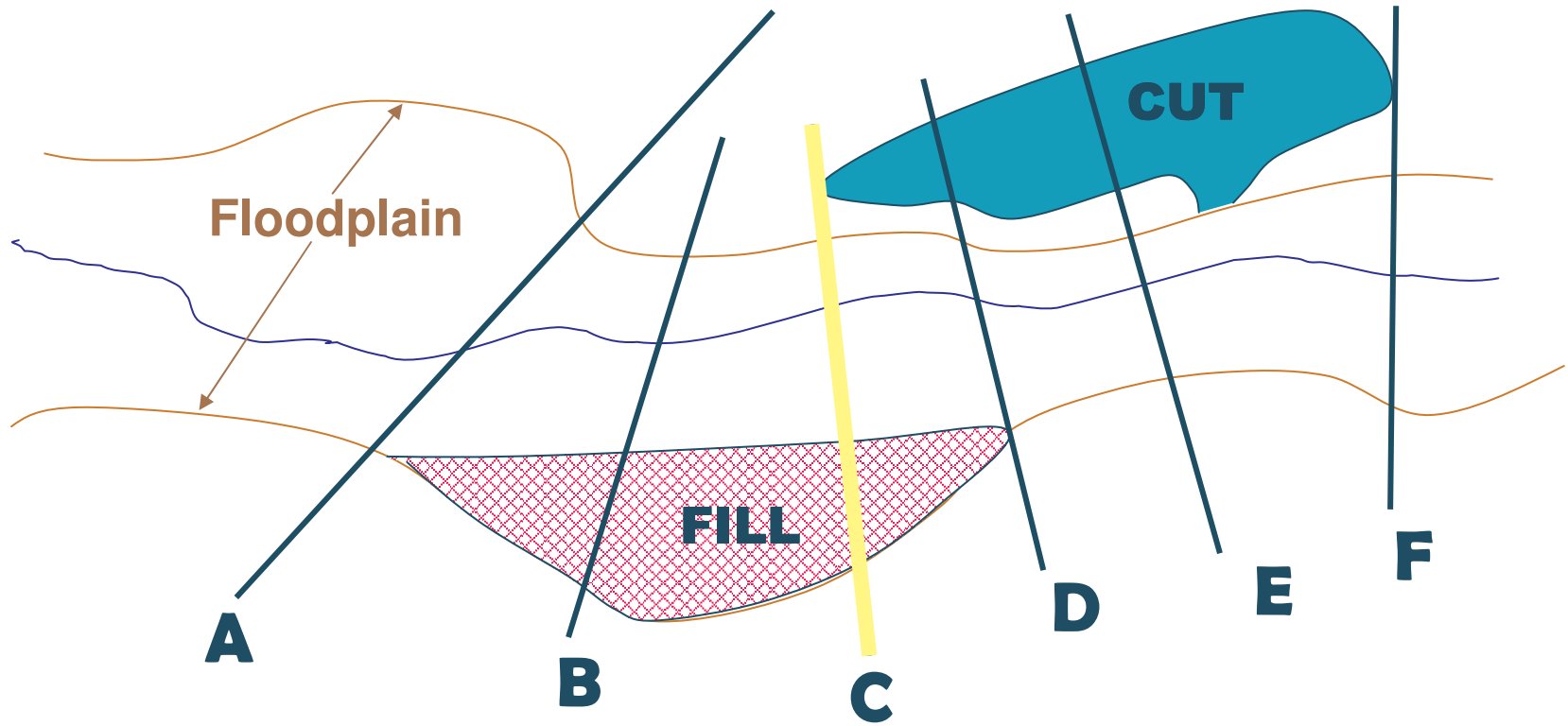
Computations must show no net loss of floodplain storage for 10-year, 50-year, and 100-year storm events. That is, the post-development 10-year floodplain storage along a stream shall be the same as the 10-year pre-development floodplain storage along the stream within the property limits, the post-development 50-year floodplain storage along a stream shall be the same as the 50-year pre-development floodplain storage along the stream within the property limits, and the post-development 100-year floodplain storage along a stream shall be the same as the 100-year pre-development floodplain storage along the stream within the property limits.

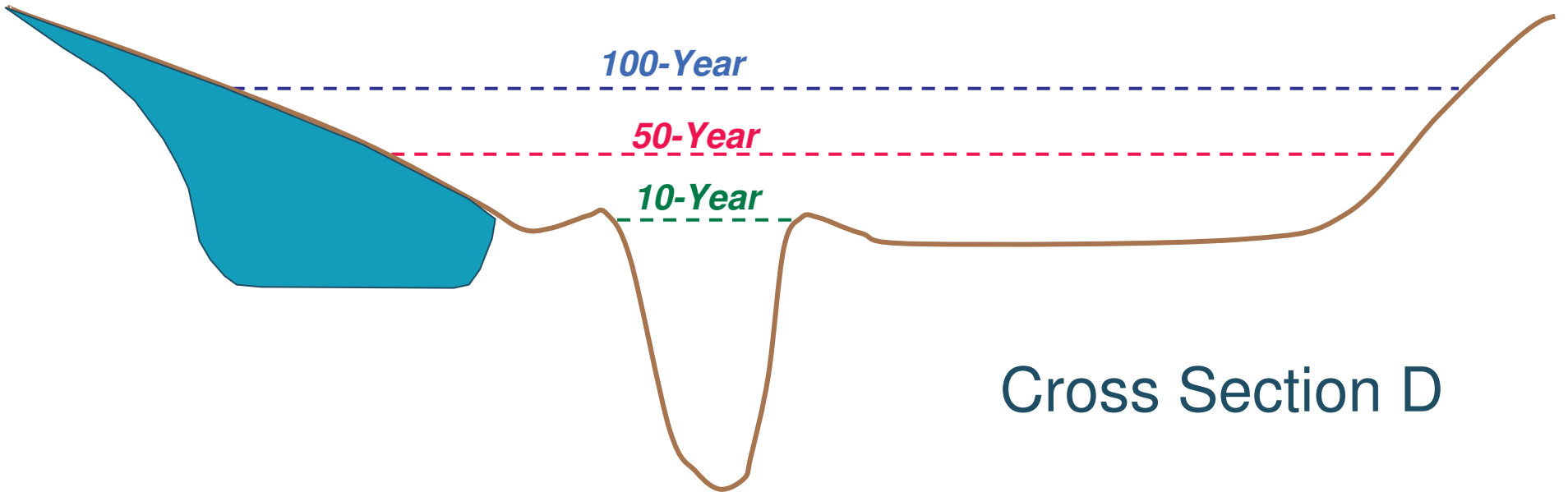
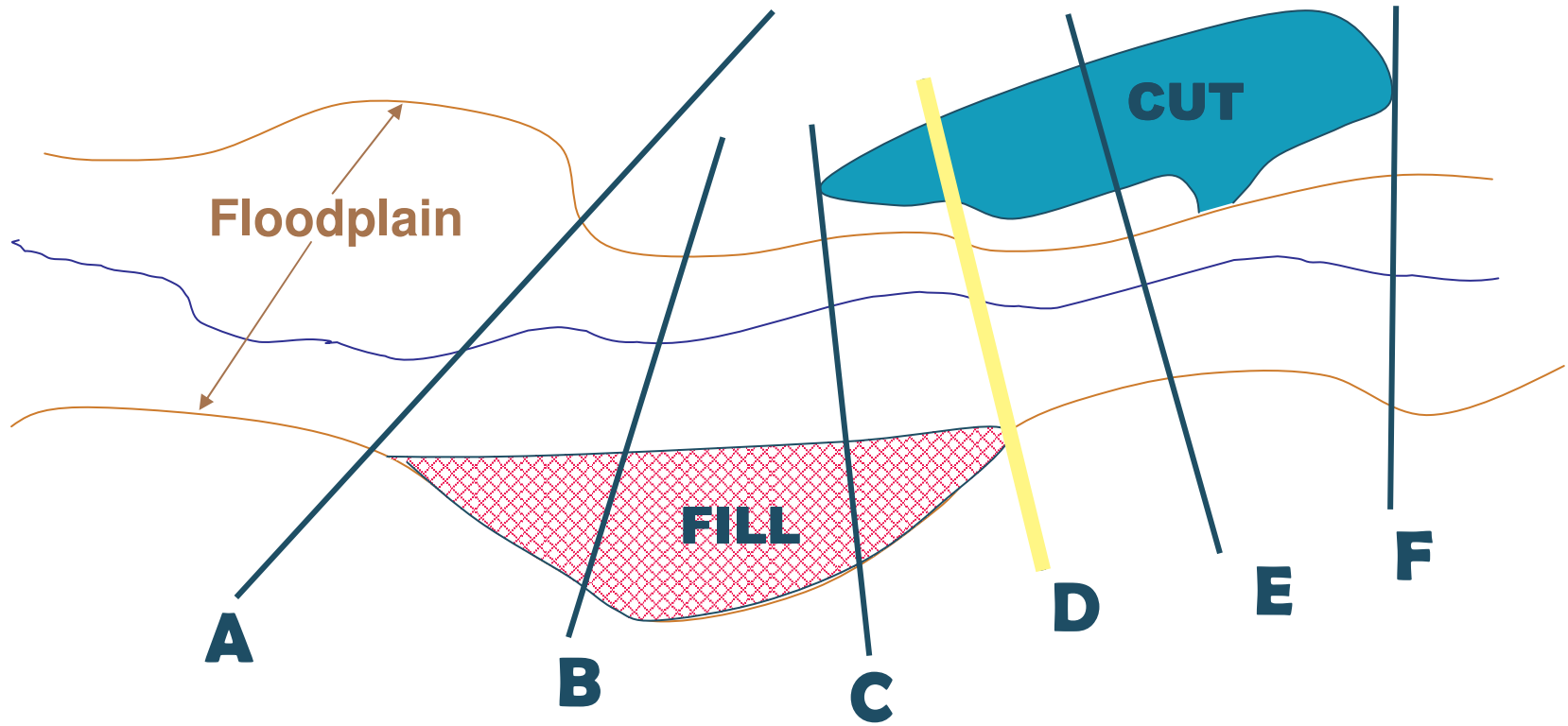
Calculations for floodplain volume shall be submitted in tabular form showing calculations by cross-section. The volume of floodplain storage under the without-project conditions and the with-project conditions should be determined using the average-end-area method with plotted cross-sections at a horizontal to vertical ratio of between 5:1 and 10:1, with 10- through 100-year flood elevations noted on each cross section. The scale chosen should be large enough to show the intent of proposed grading. Cross-sections should reflect both the existing and proposed conditions on the same plot. The location and extent of the compensatory storage area as well as the location and orientation of cross-sections should be shown on the grading plan.



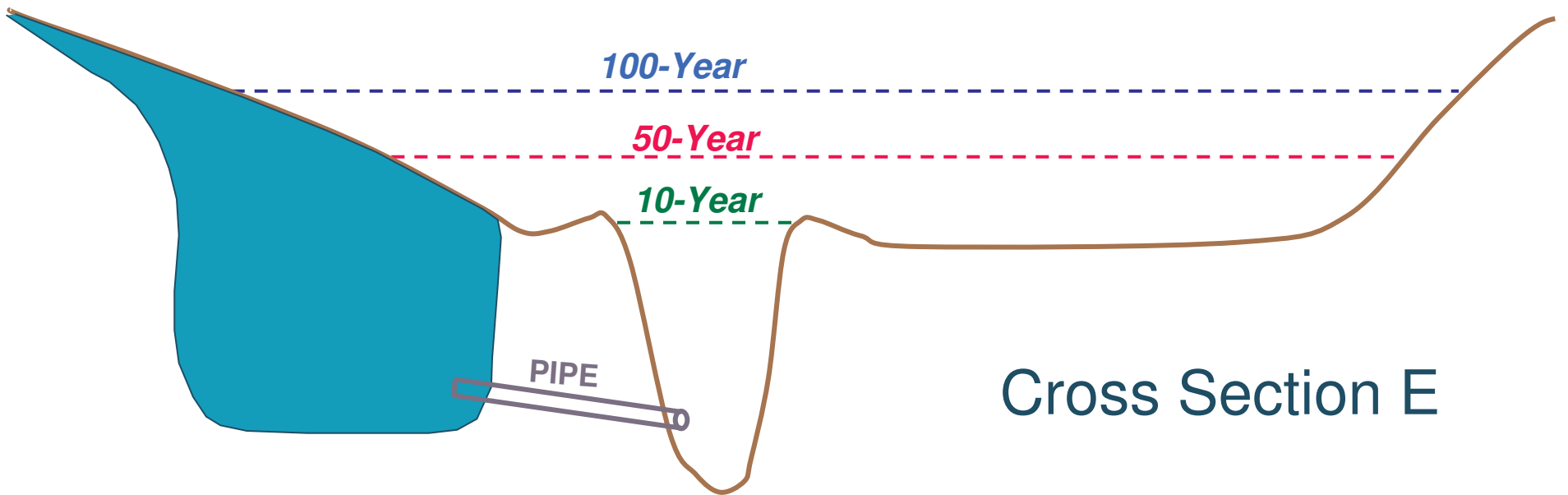
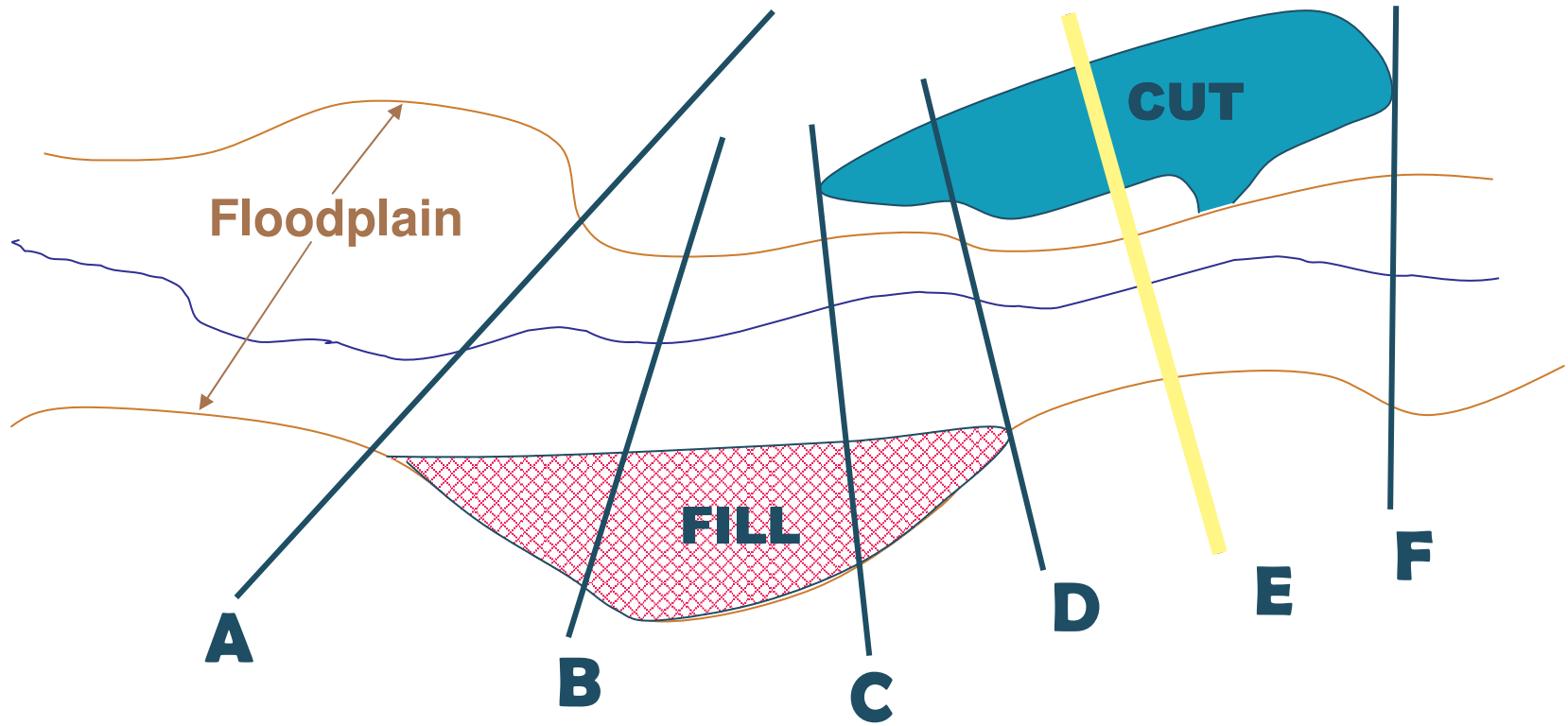


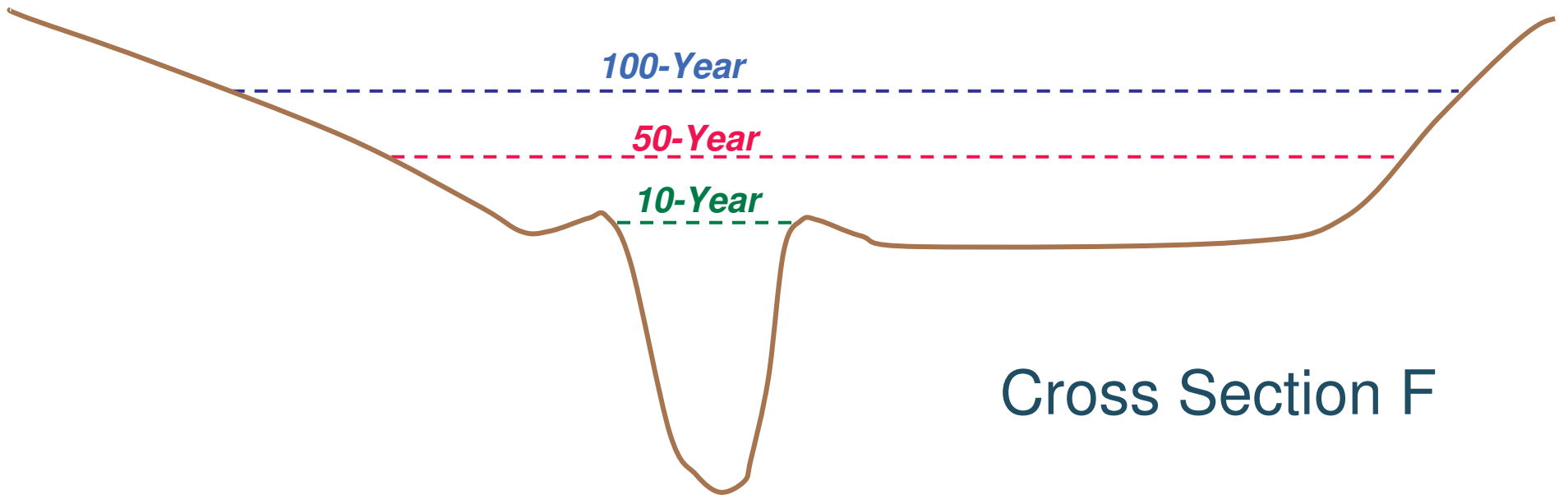
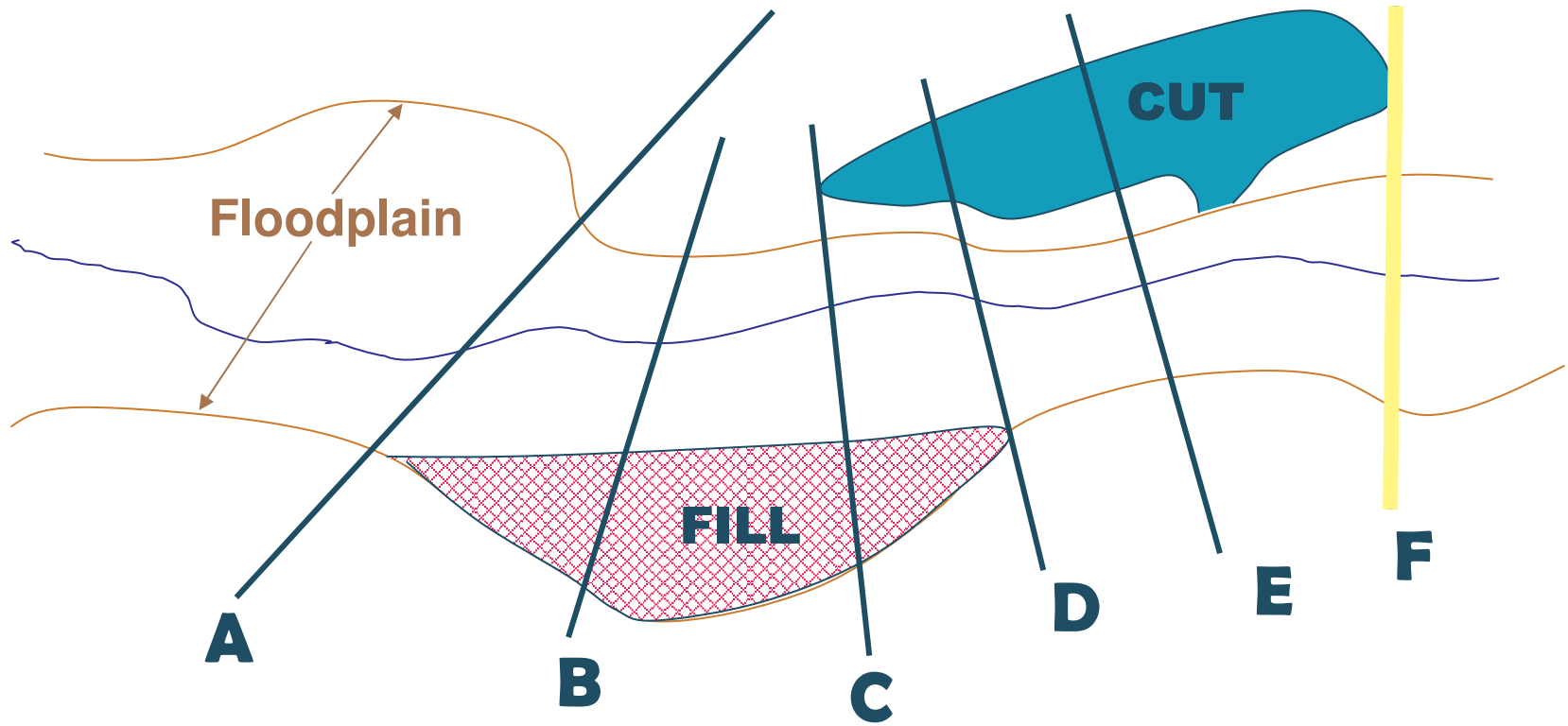












## COMPENSATORY CALCULATIONS FOR 50-YEAR EVENT

Cross Section	Fill Area (sq. ft.)	Cut Area (sq. ft.)	Distance Between Sections (ft.)	Volume of Fill (cu. ft.)	Cumulative Fill (cu. ft.)	Volume of Cut (cu. ft.)	Cumulative Cut (cu. ft.)
A	0	0			0		0
			150	15,000		0	
B	200	0			15,000		0
			100	15,000		0	
C	100	0			30,000		0
			100	5,000		5,000	
D	0	100			35,000		5,000
			150	0		22,500	
E	0	200			35,000		27,500
			100	0		10,000	
F	0	0			35,000		37,500

## COMPENSATORY CALCULATIONS FOR 100-YEAR EVENT

Cross Section	Fill Area (sq. ft.)	Cut Area (sq. ft.)	Distance Between Sections (ft.)	Volume of Fill (cu. ft.)	Cumulative Fill (cu. ft.)	Volume of Cut (cu. ft.)	Cumulative Cut (cu. ft.)
A	0	0			0		0
			150	22,500		0	
B	300	0			22,500		0
			100	22,500		0	
C	150	0			45,000		0
			100	7,500		7,500	
D	0	150			52,500		7,500
			150	0		33,750	
E	0	300			52,500		41,250
			100	0		15,000	
F	0	0			52,500		56,250