

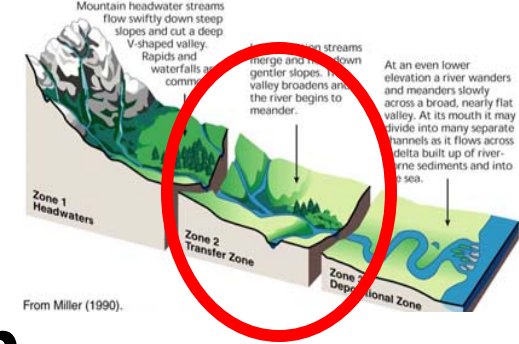
Introduction to Stream Deflectors

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This training was prepared by the U.S. Department of Agriculture (USDA) team of Otto Gonzalez-USDA Foreign Agricultural Service (Team Leader), Jon Fripp (Civil Engineer) and Chris Hoag (Wetland Plant Ecologist)-USDA Natural Resources Conservation Service (Civil Engineers). Fripp and Hoag were the primary authors of this material. The U.S. AID provided funding support for the USDA team.

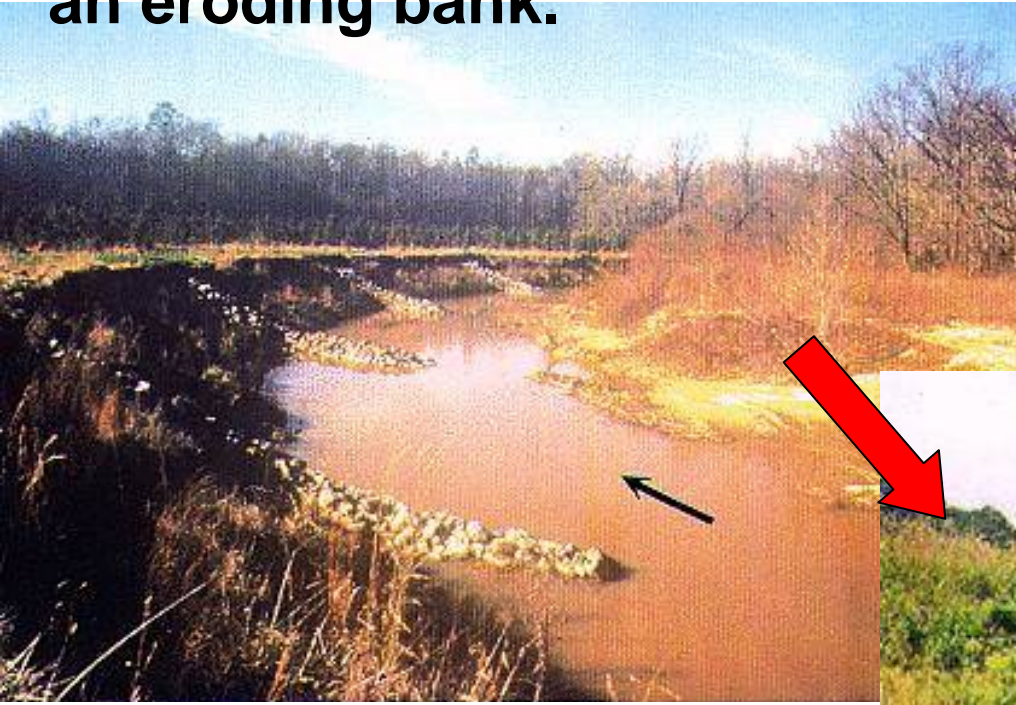
Stream Deflector Protection

- Usually Used in Transport Zone
- Diverts Stream Energy Away from the Stream Bank



What is a stream deflector?

Answer: A stream deflector is a structure that extends into the stream from the bank to redirect streamflow away from an eroding bank.



Stream Deflectors:

- **Are low structures that are oriented upstream, into the flow.**
- **Slow water velocities**
- **Induce sediment deposition**



They can be big

Hard Points and/or Kickers



**Stone
Spurs**



They can be smaller

Stream Deflectors Design Criteria

- Understand basic principles of how stream deflectors work
- Stone Size
- Alignment
- Design
 - Profile
 - Key into bed
 - Key into bank



There are a lot of different types.

Design often requires an engineer

This introduction is going to cover the basics

You may want to get more detailed training

How Do Stream Deflectors Work

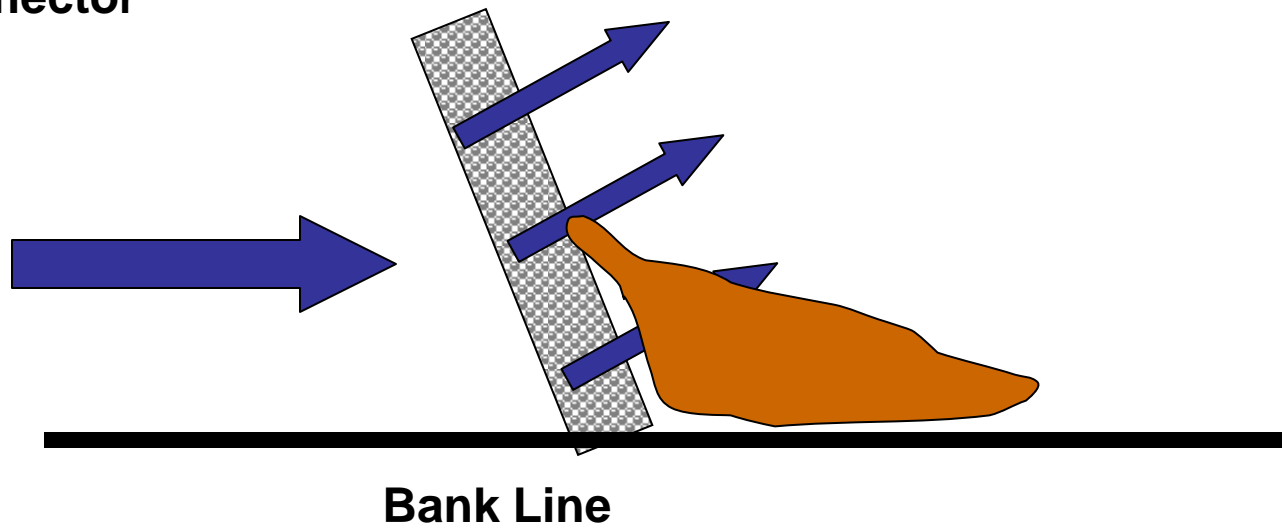
These structures slow stream velocity near bank

Question: Why is this useful when you want to stop bank erosion?

Answer: Slower velocity = less erosion

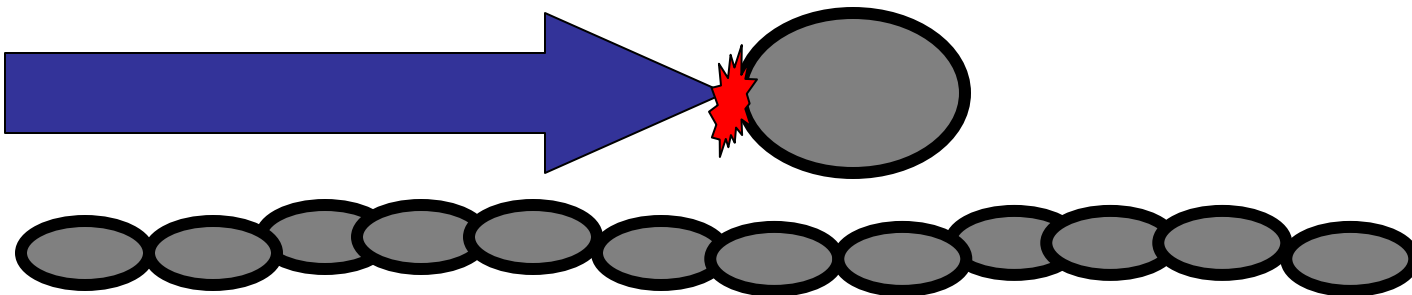
Typically the protection is 3-4 times the length of the deflector

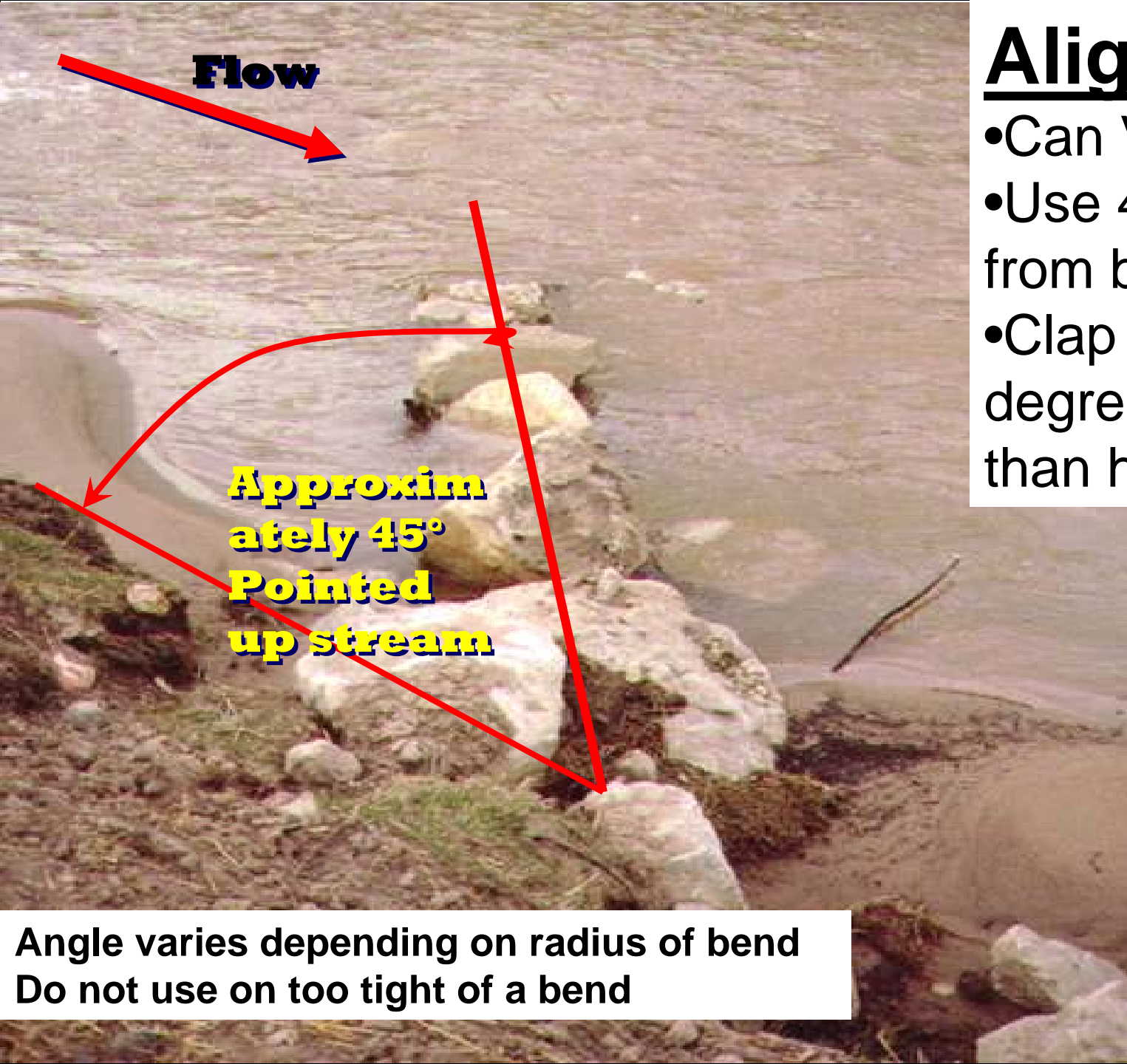
Sediment that is naturally in the stream will drop out of the flow when the water slows



Stone size

- The force of the river or stream hits the deflector directly
- Therefore the stone must be larger than riprap on bank
- Suggest that the minimum size is twice the calculated riprap size





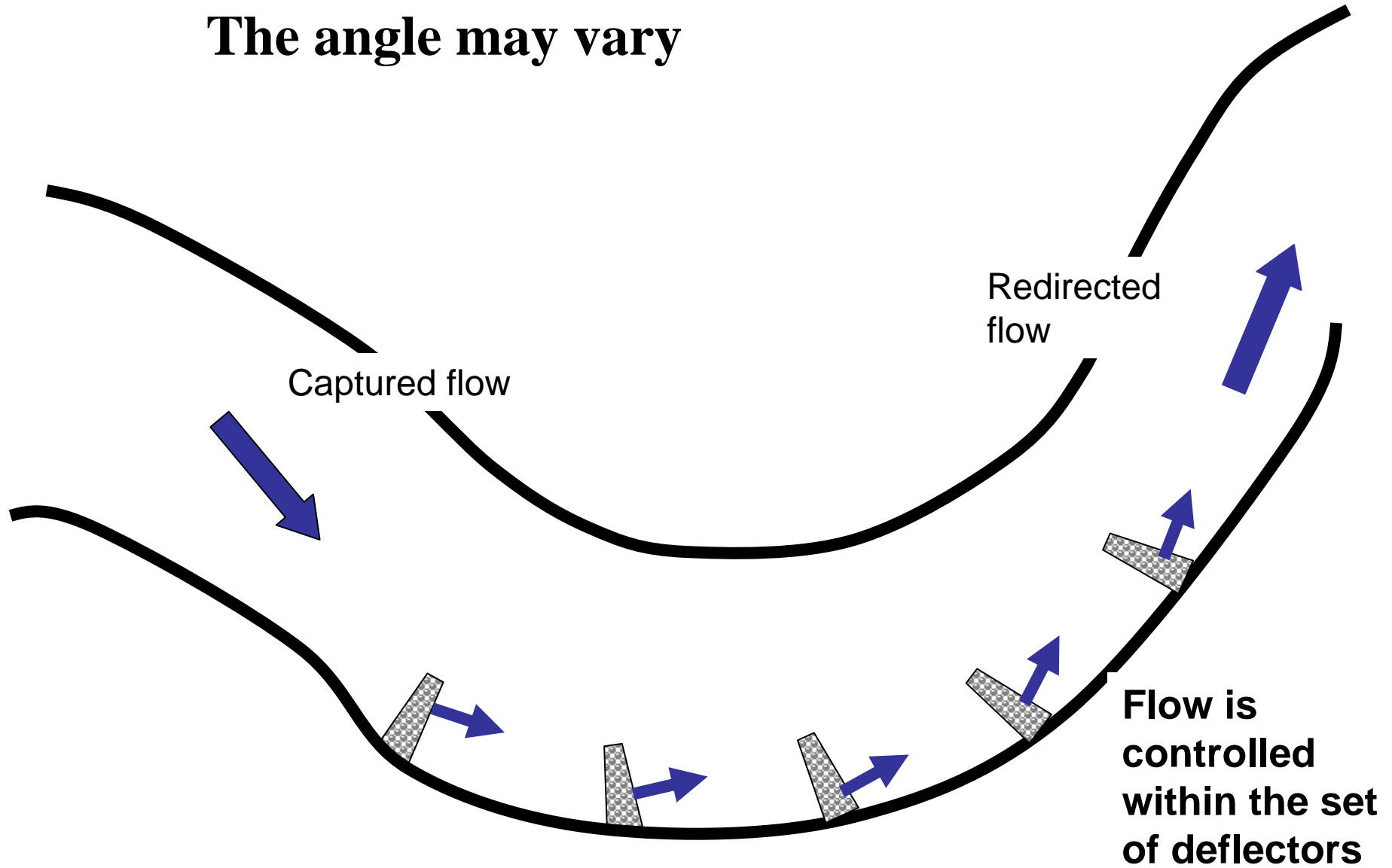
Alignment

- Can Vary
- Use 45 degrees from bank
- Clap a 90 degree angle than half

Angle varies depending on radius of bend
Do not use on too tight of a bend

Deflectors are often used in groups

The angle may vary



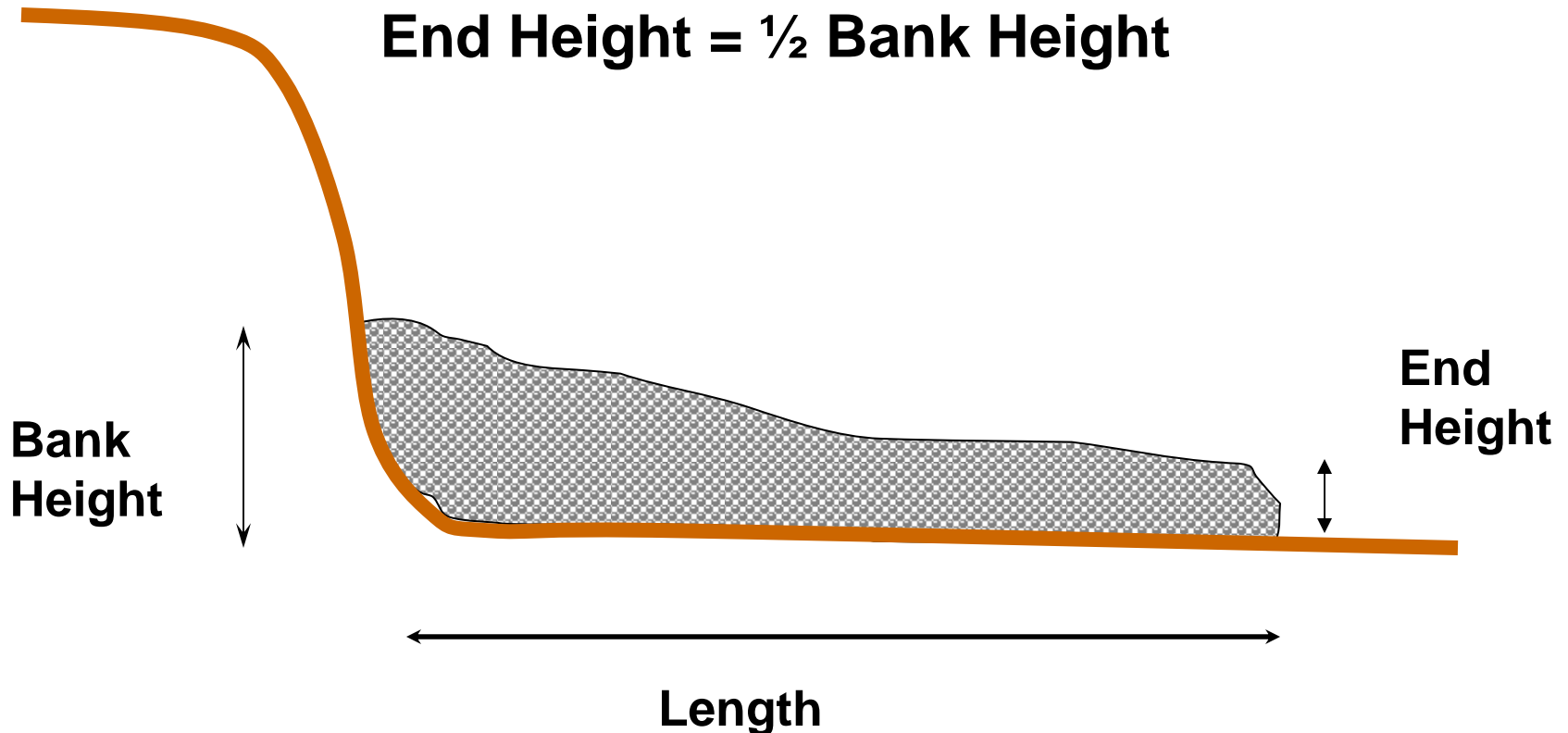
keeps the same basic curve

Design: Profile

Length < $\frac{1}{3}$ channel width

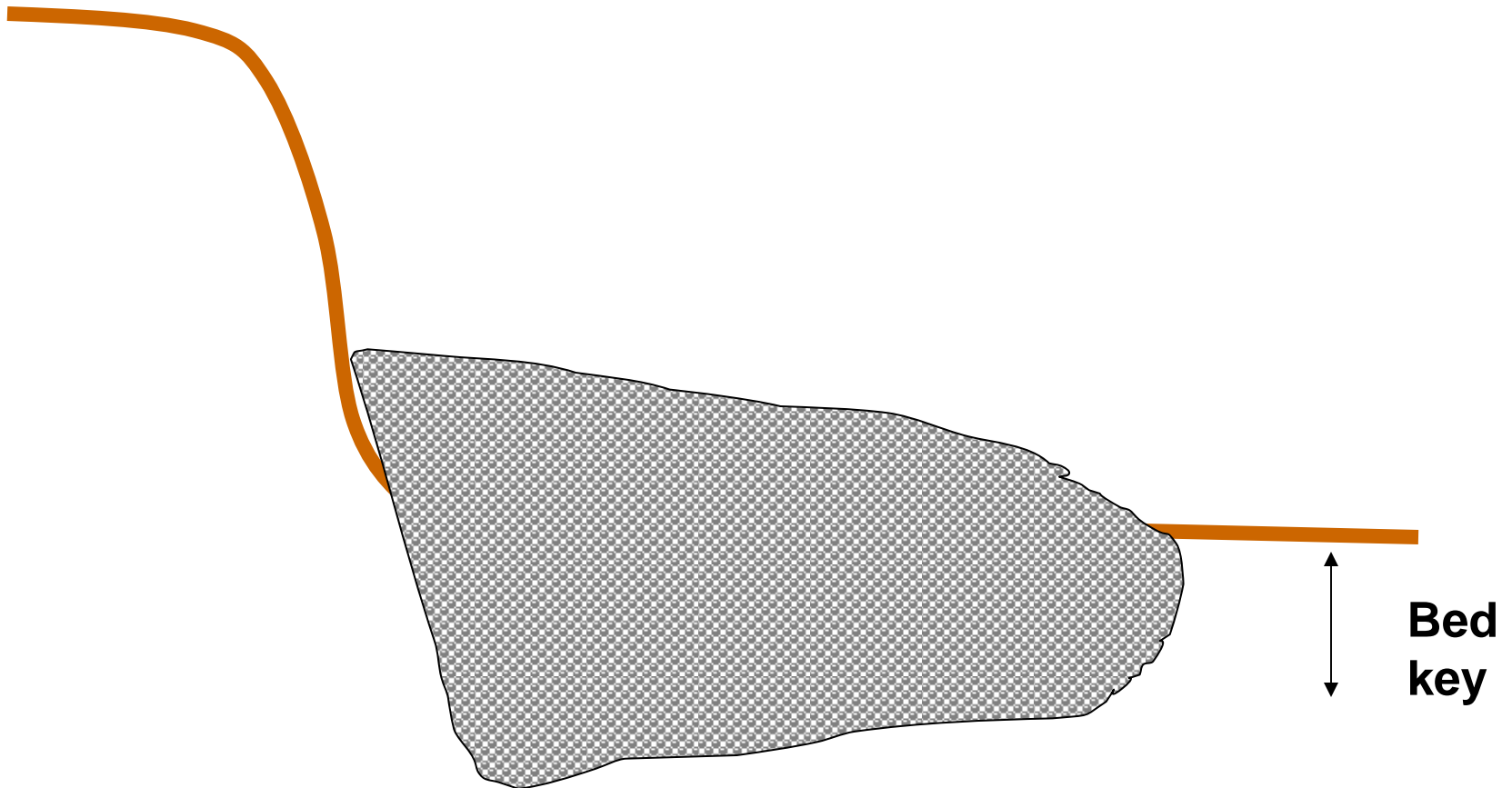
Maximum Bank Height = smaller of 1 meter
or $\frac{1}{3}$ total bank height

End Height = $\frac{1}{2}$ Bank Height



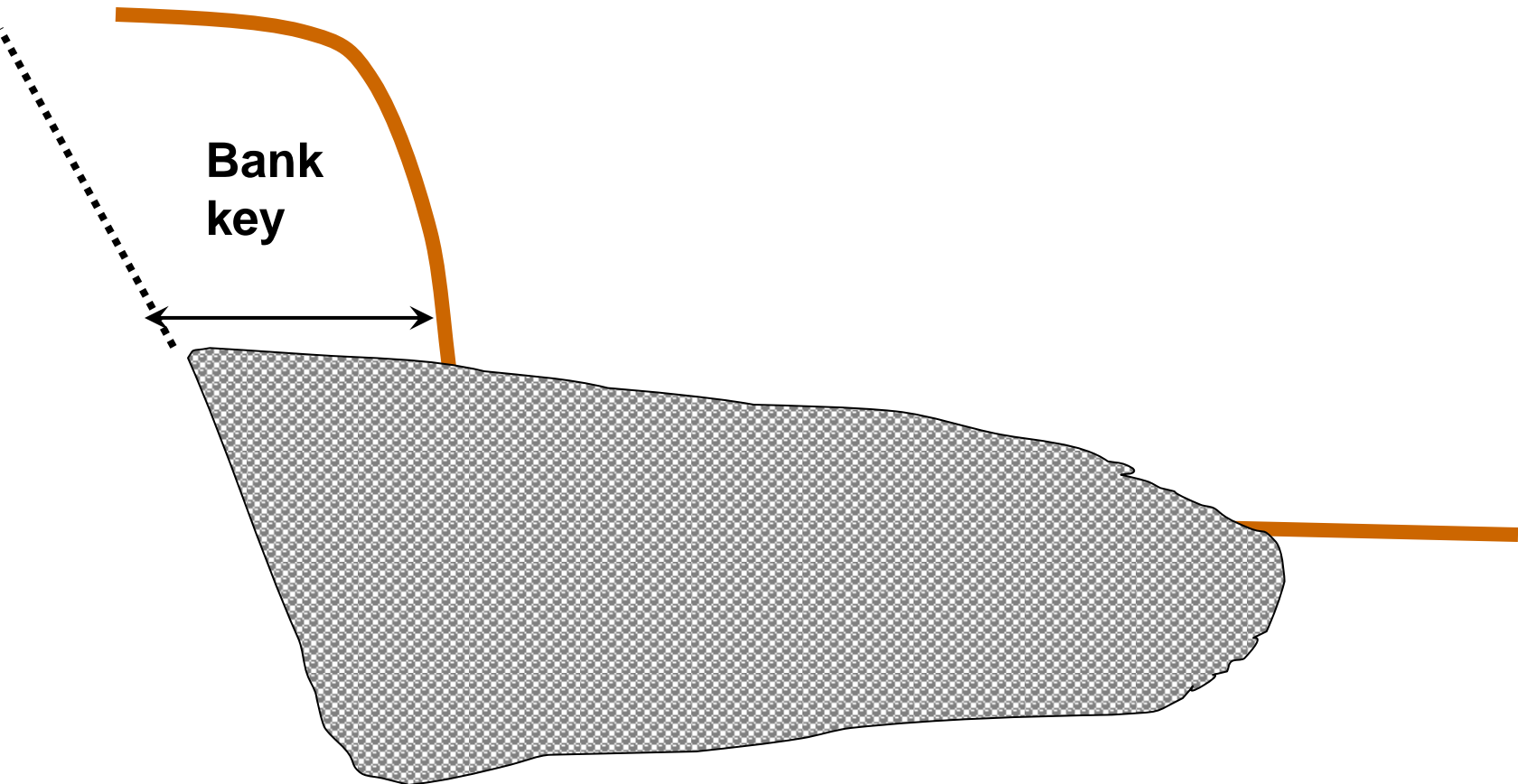
Design: Bed Key

Bed key = 1 to 2x height



Design: Bank Key

Bank key is larger of 1 meter or bank height



You need an engineer to help with the design if:

- The river has high velocities
- The river is large
- The erosion is significant
- The river system is unstable
- There is something very important on the bank
- The project will cost a lot of money
- Laws state you must have an engineer



The End