

## Stream Crossing Guidance -- Constructed Banks Connected to Natural Stream Banks

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Purposes:

- 1) Focuses flow within natural channel dimensions, providing deeper water for fish passage at low flows,
- 2) Built-in armoring to protect footings/abutments from scour, and
- 3) Provides for terrestrial animal passage along a relatively smooth and flat surface connected to natural stream banks away from the crossing at all four corners.







Banks foundations are built up in layers with finer material (e.g., 6-inch-minus gravel) “watered in” to fill voids and to provide a relatively flat surface for animals.

**Phillips  
2018**



**Charleston  
2020**



**Freeport 2018**

**Banks are continuous and connect at all four corners of the crossing to the natural banks.**



**Whitefield 2020**

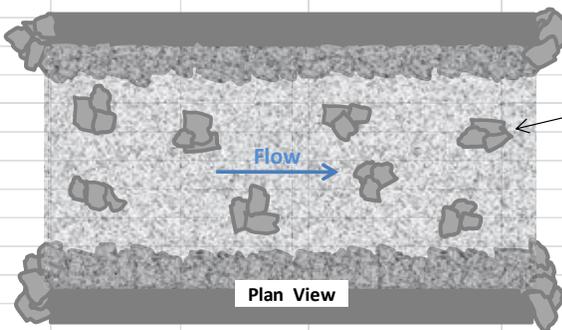
Starks 2017



Banks are built of large rock, with voids filled by smaller rock and fines "watered in", with a relatively flat top surface. Note active/low-flow channel.

**Bed and Bank Schematic: (Typical 1.5-3% gradient stream)**

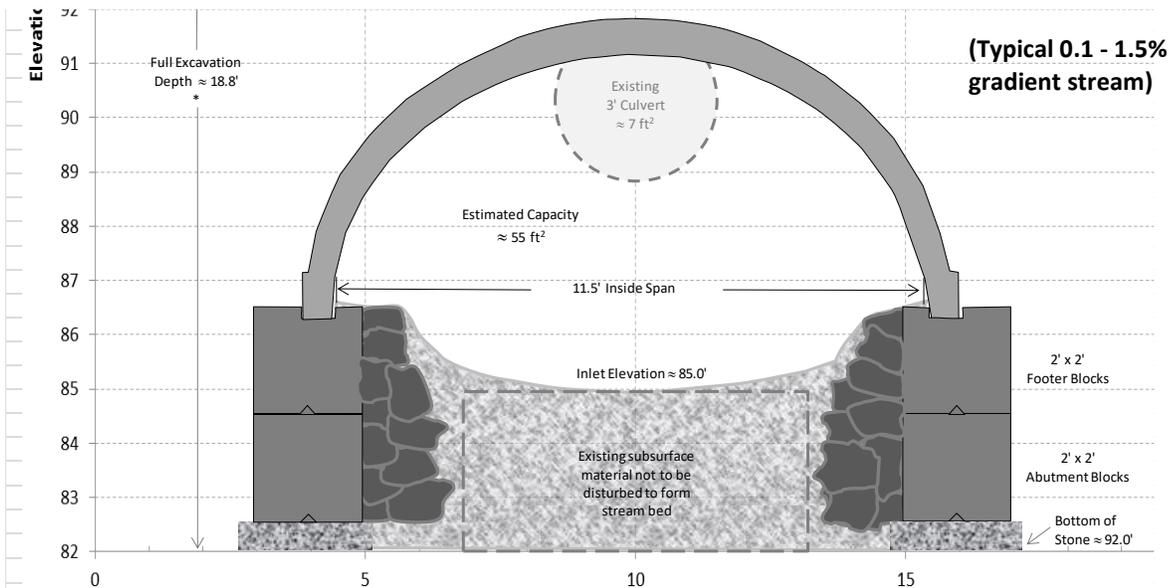
**General schematic examples ONLY**



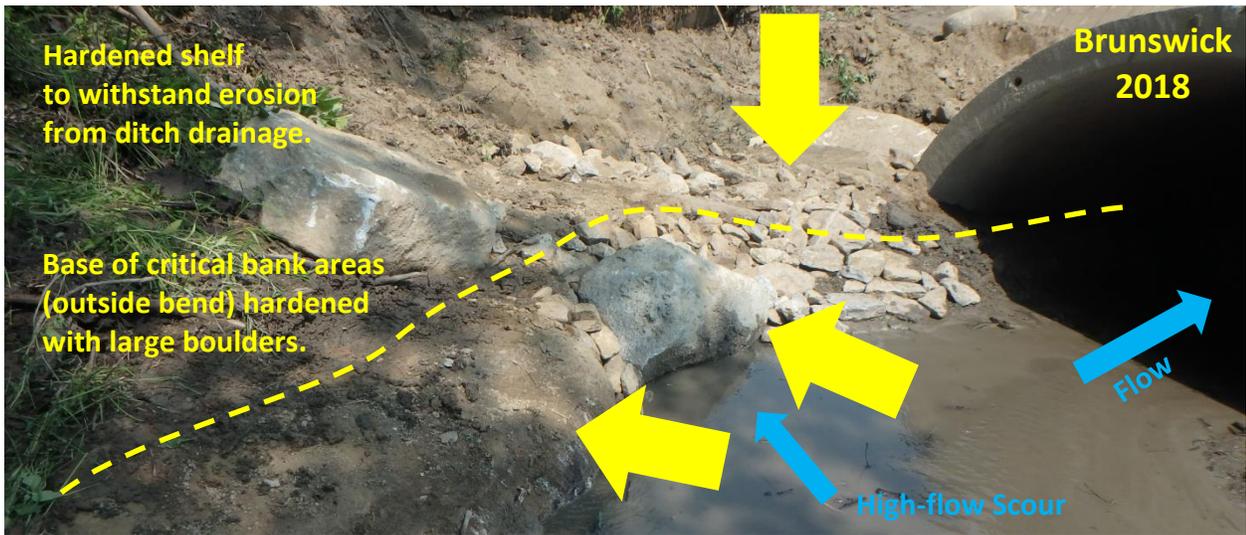
Banklines are composed of 6-18 inch (average intermediate dimension – not longest or shortest measure) competent, angular to sub-angular rock.

Bed roughness elements are to be set in clusters of larger rock, 12-18 inches, with 3-6 inches protruding above the stream bed -- minimum of 3 pieces per cluster to lock together.

Banklines are meant to connect to the natural stream banks on both sides upstream and downstream to improve scour protection and terrestrial organism passage. Additional smaller rock and fine material is necessary for filling voids in the larger material to provide a stable bed and banklines. Fines must be watered into bed and banks to fill voids, and to avoid stream flow percolating into bed and banks.



**(Typical 0.1 - 1.5% gradient stream)**



Phillips 2016



Phillips 2018





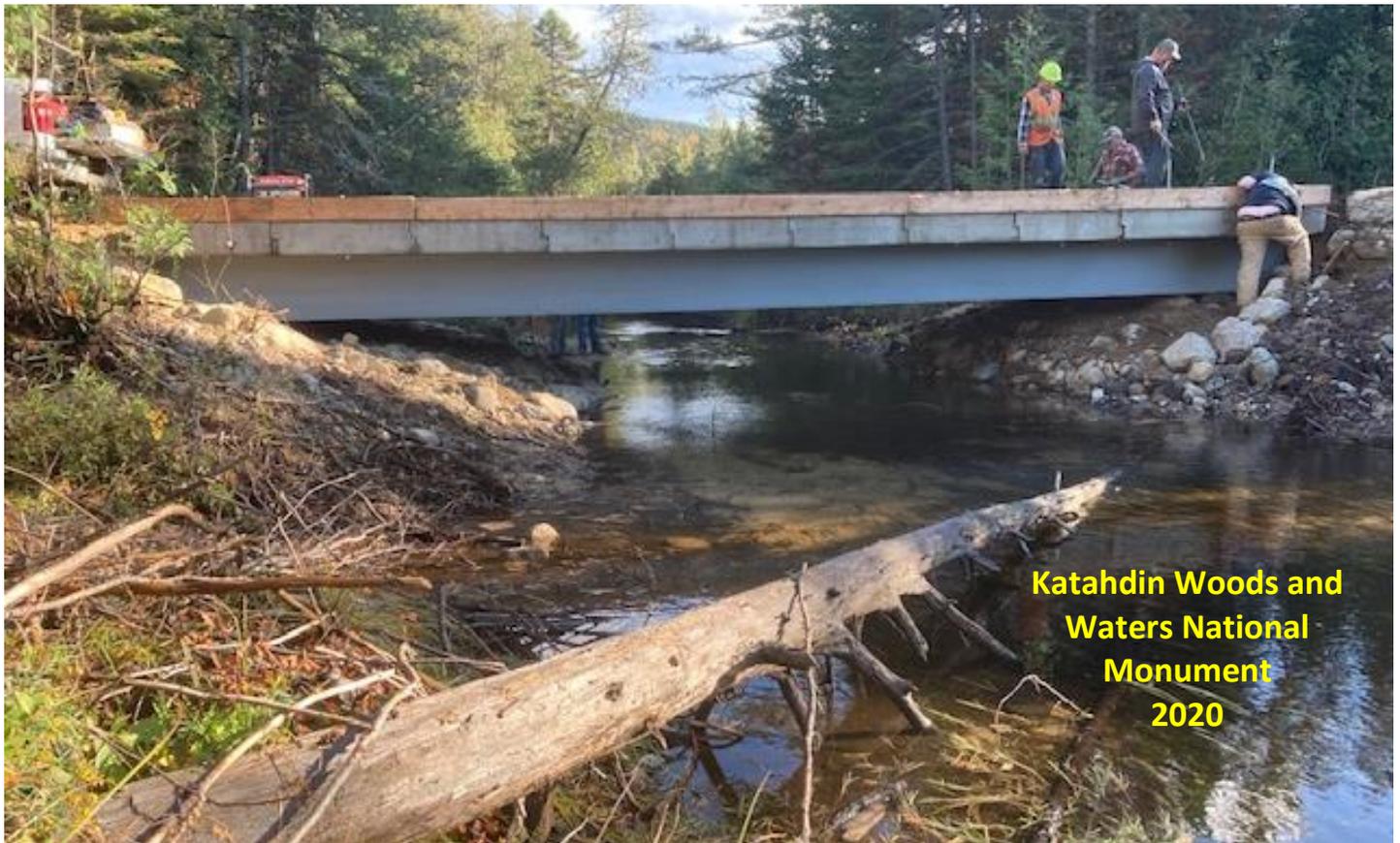
Phillips 2019



Farmington  
2020









**Katahdin Woods and  
Waters National  
Monument  
2020**



**Newburgh  
2017**