Mitigation Visit Report Creek Road Middlebury, VT
DR-4330

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The purpose of this visit was to give mitigations suggestions for Creek Road in Middlebury, Vermont. During the July 1st event the bank of Otter Creek along Creek Road slipped toward the creek at five sites. The sites are located on the aerial photo below.

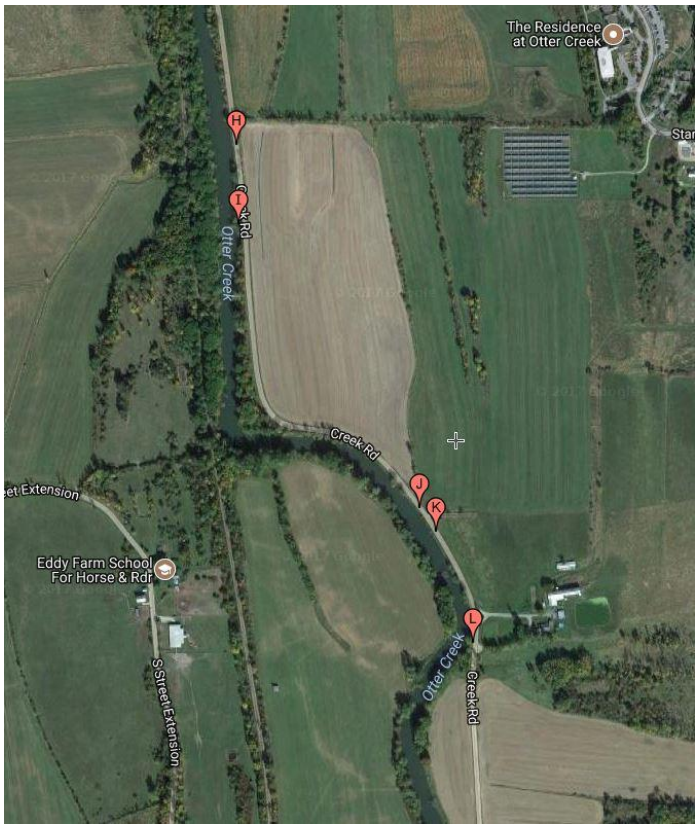
Site 1 "H" (43.990974 -73.164001)

Site 2 "I" (43.989769 -73.163963)

Site 3 "J" (43.985512 -73.160187)

Site 4 "K" (43.985168 -73.159843)

Site 5 "L" (43.983498 -73.159058)



All of the sites are situated between Creek Road and the bank of Otter Creek. The grassed bank area widths vary between 6 and 20 feet. The bank height above the water surface is approximately 6 feet. Some sections are stabilized with mature trees and brush. Others are covered with grass only.

The fields to the east of Creek Road slope gently toward the road. During high water on Otter Creek, field drainage water is trapped on the fields. This action causes the roadway embankment and creek bank soils to remain saturated long after the creek water levels have subsided.

Some of the sections were previously surfaced riprapped with 8-inch stone. It is not clear if the riprap extended down the bank. In any case, the riprap size was too small to resist the creek near-bank velocities.

Site 1 "H"

◄ Grassed section of the bank rotated downward about 8 inches. Note that there are no trees on this section. The shoulder of the road did not move.

This section was previously armored with 6-inch stone. The stone is clearly visible in one of the tension cracks. ▼

The bank material does not contain sufficient internal friction to support itself when saturated. The stone riprap added additional weight that that could not be supported.

Repair/Mitigation
Do not add more stone or weight. Repair using mechanically stabilized bio-engineering techniques. Insert geotextile, geogrids or geocell layers to add internal friction. Place large rip below water level to protect the bank toe.

Site 2 "I"

◄ Bank section is tree-lined. Some trees are leaning toward the creek. The shoulder of the road did not move.

Not clear if this section was previously riprapped between the shoulder edge and the trees. Some large stones were visible in the grass. ►

Repair/Mitigation
Cut leaning trees, but do not remove root balls. Do not add more stone or weight.

Repair using mechanically stabilized bio-engineering techniques. Insert geotextile, geogrids or geocell layers to add internal friction.

Site 3 "J"

About 6 feet of the bank slipped. The fact that there are no trees on this failed section and that riprap is exposed near the surface suggests the section was previously surface riprapped. ▼

The deep ditch on the east side of the road encourages saturation of the road embankment. ►

Repair/Mitigation
Do not add more stone or weight. Repair using mechanically stabilized bio- engineering techniques.

Insert geotextile, geogrids or geocells layers to add internal friction. Use thick geotextiles that add internal drainage or insert thin layers of free-draining crushed rock. Place large rip below water level to protect the bank toe.

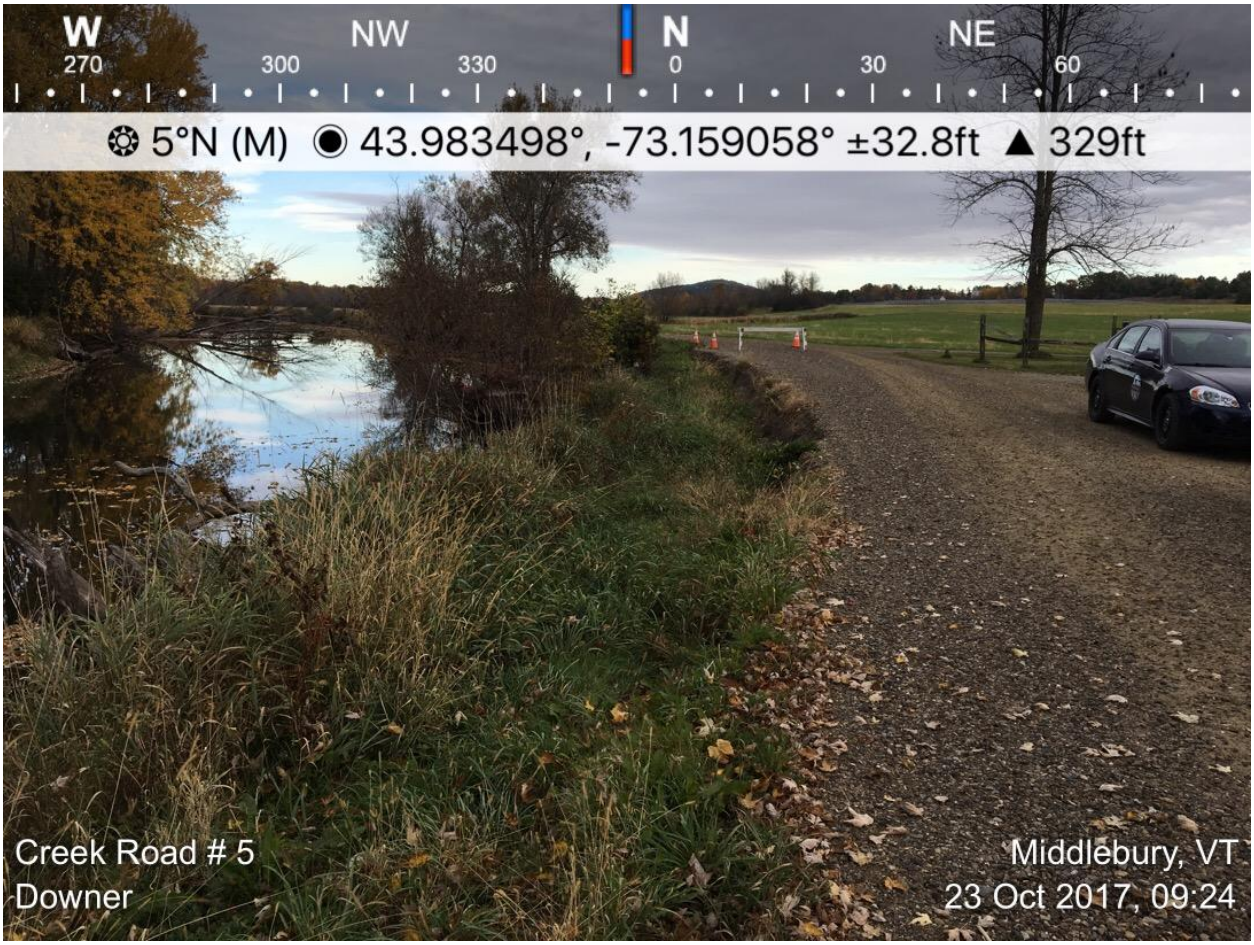
Site 4 "K"

◄ Section was previously cleared of trees and riprapped.

Repair/Mitigation
Do not add more stone or weight. Repair using mechanically stabilized bio-engineering techniques.

Insert geotextile, geogrids or geocells layers to add internal friction. Use thick geotextiles that add internal drainage or insert thin layers of free-draining crushed rock. Place large rip below water level to protect the bank toe.

Site 5 "L"



This section of bank slipped downward about 2 feet. The slightly back sloping of the grassed area suggests a rotational failure occurred; probably resulting from saturated soils coincident with erosion at the bank toe.

Repair/Mitigation
Cut leaning trees, but do not remove root balls. Do not add more stone or weight.

Repair using mechanically stabilized bio- engineering techniques. Insert geotextile, geogrids or geocell layers to add internal friction. Place large rip below water level to protect the bank toe.