

## Sample Work; Water Resources Commissioner, Muskegon County

Some of our larger drain projects have taken years to execute—because of state and federal permits, utility and railroad coordination, obtaining easements, and bonding. Many people still don't fully understand what our office does. Following are several "before and after" photos that help tell the story.

Sta 135 Pierson Drain **before**: a flashy system deposited so much sediment in the stream it became very wide and shallow. This creek can't move water well or support most aquatic life. A flashy system means runoff enters it fast; water levels rise quickly, churn through the system and tear it up. Most of the downed trees were uprooted by surging water.



Sta 135 Pierson Drain **after**: Debris and excessive sediment removed, steep banks are stabilized with rock, a cross vane is built with downed trees and rock to centralize water flow.



Sta. 63 Furman Drain; **before**. Twin culverts do not pass water effectively. Note the culvert on the left is nearly closed off. This can back-up water and cause scouring damage on the other side of the culvert.



Sta. 63 Furman Drain; **after**. A larger single culvert passes water more effectively. The rock rip rap prevents erosion and scouring damage around the culvert and roadway. Note; scouring is the act of water eating away the soil along stream banks. When this soil settles out of the water column it is called sediment, which clogs the drainage system and smothers aquatic life.

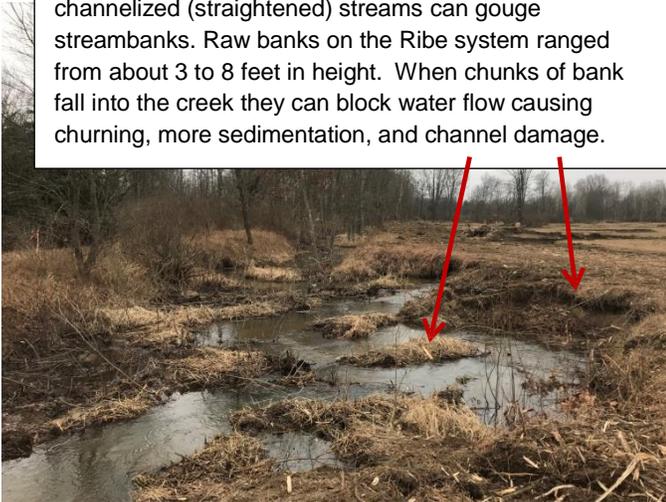
Sta 158 Kuis Drain **before**: stream channel choked with vegetation and sediment behind homes. The stagnant water gave off an objectionable smell.



Sta 158 Kuis Drain **after**: channel cleaned out, and meanders were created to maintain a more natural flow. The "J" hook helps narrow the stream to push water along.



Sta. 96 Ribe Drain **before**: surging water from channelized (straightened) streams can gouge streambanks. Raw banks on the Ribe system ranged from about 3 to 8 feet in height. When chunks of bank fall into the creek they can block water flow causing churning, more sedimentation, and channel damage.



Sta. 96 Ribe Drain **after**: banks sculpted to a more natural flow pattern. Meanders temper fast water. Banks are stabilized with rock and coconut logs. The blanket on the banks covers seeded areas to prevent erosion until grass can be established. Vegetation can grow through the blanket.



Where grade changes suggest, "riffle zones" of rock are established. This helps control water surges, lets sediment drop out before the "run" and oxygenates the water. Oxygen is important in breaking down pollutants. Organisms in the stream also appreciate it! This is the Ribe, but we have used this technique on several drains.