BIGGER IS NOT ALWAYS BETTER

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As lakefront property owners who have witnessed the incredible power of ice can attest, there is no stone big enough that ice can't move it. Ice cover on our inland lakes is certainly something to be reckoned with. Ice can exert 10 to 12 tons per square feet of pressure on our shorelines. The challenge is to learn to live with ice and minimize its shoreline damage potential. One of the proven methods of mitigating ice damage, as well as wave energy, is by constructing a sloping, protective shoreline structure known as a revetment, which is designed to buffer wave energy and direct ice movement. Not to be confused with a seawall or bulkhead, which are typically solid, vertical structures constructed of metal, wood, or concrete, these revetments incorporate the principles of bioengineering and are composed of relatively small fieldstones—not oversized boulders the size of a Volkswagen! Technically speaking, any and all rock used to protect shorelines is considered riprap. Because riprap tends to be associated with larger, oversized rock, the Watershed Council generally does not use the term when discussing bioengineering practices. The best approach to limit damage from ice push is to allow ice to move inland rather that try to prevent it from coming ashore. The following are some of the important factors to consider when designing and installing a protective shoreline revetment.

SLOPE: A properly designed and installed fieldstone revetment will have a gentle slope of 3H(horizontal):1V(vertical) or flatter. A steeper slope is more vulnerable to ice shove and may also be less stable. Think of it as a wedge that assists ice up and over the shoreline rather than pushing directly into it. The top surface of the revetment, usually a layer of smaller fieldstones top-dressed over the larger fieldstones core, acts like ball bearings, allowing the ice to move freely up the slope without major disruption.

FIELDSTONE SHAPE: Field stones should be mostly round in shape. Avoid using flat, plate-like rocks, which are more easily moved by the waves. In addition, rounded fieldstones, when gathered

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together, leave small spaces between them that provide refuge unique to that location. When determining what size of stone should be used, several site factors, including nearshore water depth, and wave height must be considered. The fieldstones should vary in size. On most high-energy lakes in Northern Michigan, a nine to 12 inch diameter fieldstone is typically the maximum size necessary to anchor the revetment in place and a four inch diameter fieldstone, the minimum size. This does not factor in smaller drainstones and pea gravel used for the filter layer underneath the revetment.

COMPOSITION: The various sizes should be evenly distributed throughout the revetment. Hand placement of the fieldstone is encouraged. Careful installation can help insure the revetment is stable and voids between individual stones are minimized , which prevents wave energy from passing through the revetment and eroding the shoreline.

PLANTS: We would be remiss if we didn't mention the most important part of any shoreline: the plants. Deep-rooting native plants help knit together the soils behind the revetment, further stabilizing the shoreline. In addition, they provide food, shelter, and structure for countless birds, insects and other shoreline dependent species. Lastly remember that any shoreline work below the ordinary high water mark will require a permit from the Michigan Department of Environment, Great Lakes and Energy. (EGLE)

For more information about shoreline erosion , please refer to TOM Watershed Council's publications at **wwww.watershedcouncil.org.**