

Exeter Stone Walls

By Gary Boden

In a previous article, *The Mysterious Stone Stacks of Exeter*, I discussed an investigation into the probable origin and age of stacked stone structures in the woods of western Exeter. Timothy Ives, Principal Archeologist with the Rhode Island Historical Preservation and Heritage Commission, has written a comprehensive paper (Ives, 2013) about the occurrence of stone structures throughout New England. He reviews the existing historical knowledge and considers their cultural significance from various perspectives. In this article I want to discuss an aspect of a more common structure – the rough stone walls that we see every day as we travel the back roads of Exeter.

Although they appear to be mostly simple lines of stones running off into the woods, these walls have a more detailed back story. Robert Thorson, professor of Geology at the University of Connecticut, in his book *Stone by Stone: The Magnificent History of New England's Stone Walls*, tells how they came to cover the landscape. Much of the following information comes from that book. Thorson identifies the years between 1775 and 1825 as the peak of stone wall building in southern New England. This area



might be considered as the epicenter of stone walls in America, resulting from a combination of geology, history, and agriculture. It has been estimated that there may have been as much as a quarter million miles of stone walls at one time, although only about half that remain today.

The story begins with understanding how the stones came to exist in the first place. At the end of the last period of glaciation on the North American continent, after the ice sheet melted, the landscape was littered with boulders of all sizes, many of them buried in sandy deposits. The great weight of ice as it flowed slowly to the southeast, had broken up the bedrock into sand, mud, and roughly rounded stones, carrying it to what would eventually become Rhode Island. Over several thousand years this mixture called till, was sorted by wind, water, and weather. With more passing millennia, as plants grew and decayed on the formerly barren ground, a thick organic soil eventually developed.

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Archeological evidence indicates that Native Americans may have entered the region as much as five thousand years before the arrival of European settlers. Although they may have constructed stone piles or erected simple monument stones, it generally is believed that they did not build stone walls until they learned the practice from the English. For boundaries they observed natural, not artificial, features of the land. The radically different English concept of land occupation produced subdivision and intensive management. Between the founding of Providence in 1636 and King Phillip's War in 1675, settlements stayed close to the coastline along Narragansett Bay, but as the number of settlers increased more land

came under their control. At the beginning of the 18th century the colonial government began to sell off vacant land in southwestern Rhode Island and the forests were about to undergo a drastic transformation.

The process of what was called land improvement occurred in steps – exploration of the woodlands first, then finding and marking boundaries of a tract. Monumentation of the land as described in old deed recordings employed such things as marked trees, heaps of stones, and wooden stakes. The work of surveying angular dimensions on irregular terrain was difficult because of inaccurate compass readings and the heavy labor of dragging measuring equipment through the vegetation. After plots were established the land could be cleared. Earliest boundary fencing was wooden due to the relative abundance of trees and scarcity of stones. Rough log fence and pole fence styles came first, eventually to be replaced by post-and-rail where the land owners had time or inclination to upgrade them.



As fields and pastures replaced forest and a curious thing began to happen. Each spring new stones that had not been visible before broke the soil surface through a process called frost heaving. This can happen only when the insulating layers of leaf-litter are removed and the freezing goes deep. Water seeps into the sandy soil and clings to the grains by surface tension. Freezing expands its volume and attracts more moisture. Cold penetrates downward, a bond forms between frozen soil and the top of a stone, lifting it slightly and creating a void beneath it. Soil next to the void fills in and when the stone resettles during thaws it is prevented from returning as deeply. Repetition of the process eventually brings the stone to the surface. A process of “frost-push” also can happen when freezing occurs under stones in shallow soils. At a quarter inch movement per year, even well-buried stones reach the surface in a few decades. A century ago the New England poet Robert Frost observed the almost mystical strength of the cold in the first lines of his poem, Mending Wall:

*Something there is that doesn't love a wall,
That sends the frozen-ground-swell under it,
And spills the upper boulders in the sun,
And makes gaps even two can pass abreast.*

Much of Rhode Island’s land was tamed and fenced by the end of the 18th century. At that time the composition of fencing began to switch from wood to stone for several coincident reasons. First, a growing shortage of suitable timber was matched by the appearance of a reasonable substitute. Furthermore, the permanence of stone ended the continuing need to replace decaying wooden fences. It also provided a clever way to dispose of the growing problem of stone-littered fields. Abundant labor provided by large farm families made the work practical.



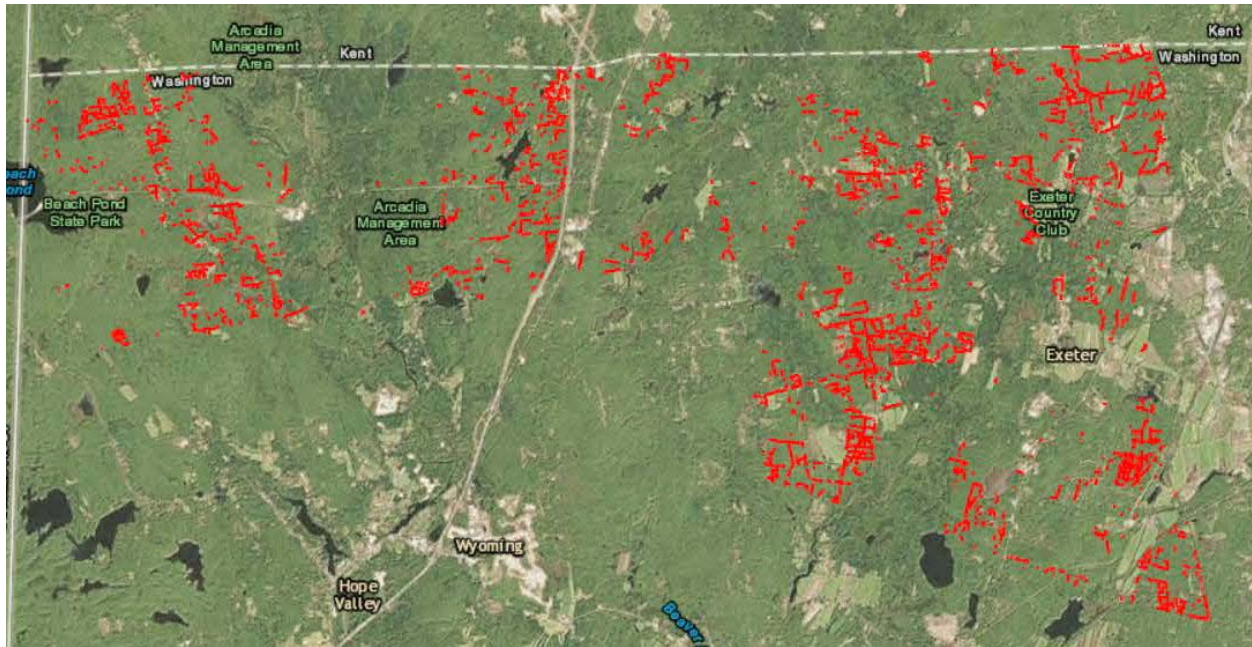
Research on the distributional patterns of stone walls shows that rectangular fields between two and four acres are common. Mathematical models demonstrate that this configuration and size is most efficient in terms of clearing stone from a field to its edges. It also optimized the effort related to turning draft horses around at end of rows and to the physical space needed for disposal of the stones. Fields much smaller or larger are wasteful of the energy to clear them productively.

Stones near the perimeter of a field first were moved to the edge to start the wall. Stones too large to lift could be rolled. Centrally located stones that were farthest from the developing walls could temporarily be piled and later moved with sledges. The height of walls also relates to energy efficiency. Most New England stone walls are thigh high because of the dimensions of the human body. Lifting a stone is difficult and maximum strength is generated by the legs between the knees and hips. At the waist, body strength decreases so lifting and placing stones from waist height is easiest.

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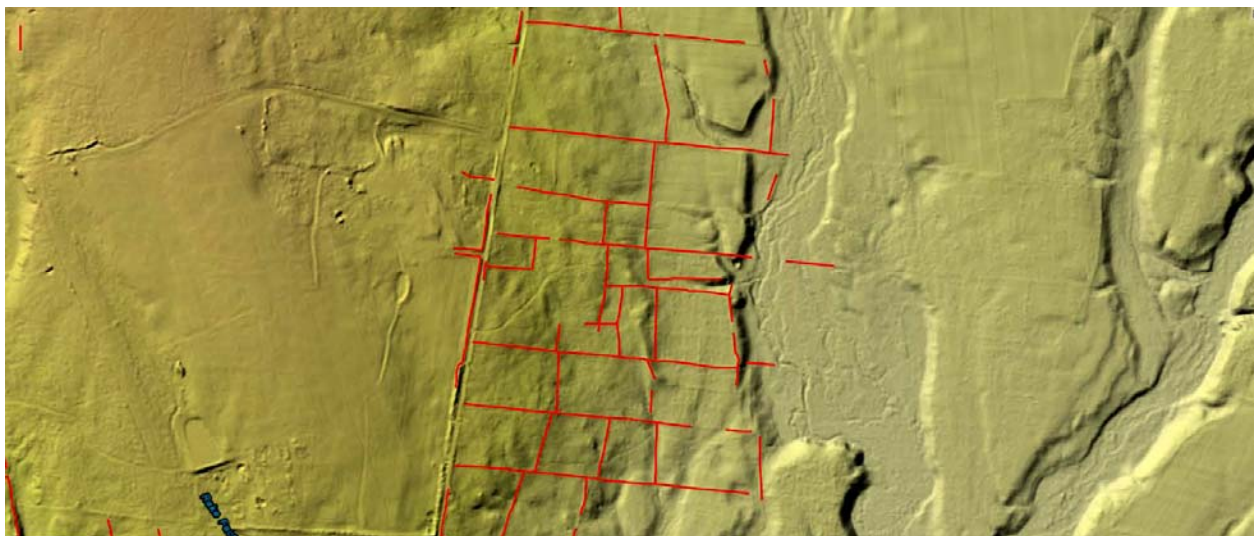
When we see unbroken forest where fields used to be, a question about what happened naturally comes to mind. The land in Exeter was abandoned a little over a century after it was first settled and cleared. Several factors that shifted the population westward were in play: crashes of agricultural prices during the panics of 1819 and 1837, the opening of the mid-western territories with their fertile soils, completion of the Erie Canal in 1825 and beginning of an overland railroad in 1829 enabled the movement of agricultural products over greater distances in shorter times. Productivity and efficiency were becoming more important for increasing yield and the small farms of Exeter began to fade against competition. After abandonment the fields eventually succumbed to natural succession and the forests returned in the late 19<sup>th</sup> century. When the automobile became widely available in the mid 20<sup>th</sup> century, the countryside began repopulating but the forests have been left mostly intact.

After reading Thorson's book I became curious about how abundant stone walls were in Exeter. I had noticed that they seemed to be more plentiful on upland slopes and scarcer in the lowlands. Direct measurement of the walls would be a daunting task, even if permission was granted by every landowner. Modern technology, however, provides an alternative. Aerial photographs with excellent resolution are now publicly available on the internet (ArcGIS), allowing anyone to map the walls. The following image shows the tracing of miles of stone walls within Exeter's town boundaries overlaid on a satellite image. Although heavy growth of white pine obscures the ground in places, it is quite clear that walls are not uniformly distributed. Concentrations occur mainly on Escoheag Hill/Mount Tom, the slopes to the east of Boone Lake, a swath running north-south to the west of the Queens River, and



concentrations in the northeast and southeast corners of town. The soils in these areas are stony sandy loams suitable for grazing animals, particularly sheep which were commonly raised here in the 18<sup>th</sup> century.

The next image shows a network of walls on sloping land between Glen Rock road and the Queens River valley. In this mosaic, fields range between one half and twelve and a half acres with an average of about five acres. The landscape has an unusual appearance because the image is produced by LiDAR. LiDAR is a remote sensing technology that measures distance by illuminating with a laser and analyzing the reflected light. The term combines "light" and "radar" although some say it is an acronym for Light Detection and Ranging. LiDAR is used to make high resolution maps with applications in archaeology, geography, geology, forestry, etc. It was developed in the 1960s to take advantage of the focused



imaging of the laser and radar's ability to calculate distances. LiDAR uses different wavelengths of light and a narrow laser-beam to capture physical features with very high resolution. One advantage over other imaging techniques is the ability to penetrate the forest canopy and create elevation models that reveal micro-topography otherwise hidden by vegetation. When an airborne laser targets a point on the ground, a pulse of light is reflected by the surface and a sensor records the reflected energy and the time it took to return. Thousands of such measurements are combined with positional data to create a group of three-dimensional spatial coordinates (latitude, longitude, and height) that are translated into images by a computer. LiDAR is so sensitive to abrupt elevation changes that it sometimes is hard to distinguish between a wall and the edge of a field or road.

Most of Exeter's stone walls have been standing for about two hundred years. Without disturbance they will last for many more. Next time you pass a stone wall seemingly out of place as it cuts a straight line through the forest, reflect on the long history, natural forces, and human effort that put it there.

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#### References

Ives, Timothy M., 2013. *Remembering Stone Piles in New England*. Northeast Anthropology, No. 79-80. pp. 37-80.

Thorson, Robert M., 2002. *Stone by Stone: The Magnificent History of New England's Stone Walls*. Walker & Company, New York. 287pp.

#### Resources

ArcGIS Online is a collaborative, cloud-based platform that allows anyone to use, create, and share maps. See <http://www.arcgis.com/home/index.html>

For information about LiDAR see <http://lidar.cr.usgs.gov/>

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