

a green architectural appraisal

or

An architect's appreciation of
Park-McCullough's carriage barn

by Jane Griswold Radocchia

The Park-McCullough House's carriage barn in North Bennington, Vermont, is pleasing to look at. Its roof angles, trim details, cupola, and crowning weather vane have an inherent sense of proportion and stability that is elegant. This building can also be seen today as "original green", or "built to the weather", designed to maximize the comfort of its inhabitants all year round without technology.

"Green building" refers to ways to minimize the impact of new construction on global warming. In the United States today, buildings create about thirty percent of our carbon emissions, a significant contribution to global warming. One cost-effective way to reduce this impact is to build with the climate.

Vermonters have been building to our specific climate conditions for generations, a practice architectural historians call "original green." Our ancestors had neither electricity, central heat, nor air conditioning, so they learned to fashion their buildings to make daily living more comfortable. They understood the basic environmental forces of sun, wind, rain, and temperature. Intimate with their surroundings, they also understood how the topography and geography of their own land created specific micro-climates.

Their solutions were simple, inventive, brilliant, and in today's buildings too often ignored.

The carriage barn at the Park-McCullough mansion was built in 1864 as part of Trenor and Laura Hall Park's summer house to provide space for their horses, carriages, equipment ('tack'), hay, feed, and housing for the staff. Both the house and barn were designed by the prolific architect Henry Dudley of the New York firm of Diaper and Dudley. Dudley had migrated from England in 1851 and settled in Troy, N.Y., where he designed several buildings before relocating to New York City. He was an accomplished designer, and he understood weather.

Trenor W. Park, as Dudley's client, expected the newest technology in his grand new home: gas lights, central heat, indoor toilets, hot and cold running water. Closely involved in the design and construction of his house, Park changed several aspects of the design, but none of his changes affected how the buildings would work with the climate. Both men understood how to build to the weather in North Bennington. The carriage house remained as it was originally designed until 1902, when Park's daughter, Lizzie, and her husband, house the family's new automobile.¹ They, too, built to the weather.

So, what design elements of 1865 do we mostly fail to notice today?

The aesthetic siting of the carriage barn had few constraints. It could be placed wherever on the site it fit best. Architecturally, the final site serves as a backdrop to the house without diminishing or stealing the focus of the big main building nearby. The main facade looked back to the house, gardens, and pond.

The practical setting of the barn, though, was constrained by several considerations: the sun, the wind, the tilt of the earth on its axis, and the seasons, all simply givens. The carriage barn was skillfully designed to work with these elements.

¹ The original plans identified the building as the "Stabling." The Stabling was built in 1865 -1866, designed by the same firm as designed the House and is reported to have used many of the same builders and supplies that worked on the House. When renovations were made in 1901-02 the Stabling became the Carriage House. "The Park-McCullough House, Historic House and Museum" North Bennington, VT: Park-McCullough House Association, n.d.

To take advantage of the sun's warmth, the building was oriented to its seasonal changes. The east end, or front, would get the morning sun; the long south side, sun all day; the west side, afternoon sun; and the north side, a brief bit of sun in mid-summer. In this part of Vermont the wind blows mainly from the west, sometimes the north. Wind is good for cooling in summer but in winter "wind chill" makes us colder. To work with the North Bennington micro-climate, the carriage barn faces east. Its doors all face the mild east or the sunny south. West walls have only small windows.

The building's main entrance - wide double doors tall enough for carriages and horses - is set back. Aesthetically, the setback makes the door more visible and important. It also makes the hay door above it easily accessible for wagons, which can park underneath and unload. While not immediately obvious, the recessed space protects against wind and gathers sunlight, making a sun pocket. Gardeners know that sheltered sunny nook in their garden where daffodils will bloom; this recessed entry creates a sheltered sunny place for horses and people.

Many buildings have a double entry that functions like an air lock: you enter through a door into a little vestibule, close the door behind you, then open another door to go into the main space. Cold air is kept out of a warm space and vice versa. It's not practical to have a double entry on a barn. Imagine how big the air lock would need to be for a carriage! So this recessed entry is a pretty good substitute because the doors can be opened without the wind rushing in, and on a sunny day in winter, heat may even come in.

The cupola, with all its roof angles and arched vents, plus its weather vane with Trenor Park's monogram, is a great architectural flourish at the top of the Park-McCullough carriage barn. The cupola is also an important part of the cooling system. A vent above a hay loft is essential because stored hay, especially if it's damp, can get hot enough to burst into flame. So the vents let that heat escape. They also help to keep the

barn cool because heat rises. As that air goes out, replacement air has to come in from somewhere else. An opening - a door or window - lower down in the building, lets fresh cooler air in. If the vent at the top is smaller than the opening below, the quantity of air coming in is greater than the quantity that can easily go out. More air wants to go out, and as it does so it makes a breeze. In summer, when windows and doors to the hay loft are open, a breeze will keep the carriage house, the workers, and the horses cool.

Eaves do important work, too. From a practical perspective, they help to keep the rainwater that drips off of a building's roof away from its walls. This is vital because rainwater on the walls will become trapped inside those walls, which leads to mildew, mold, and rot. Similarly, eaves keep icicles from forming directly on a building's outer walls, which is bad because an icicle on the wall will become an icicle dripping down the wall, leading again to water inside the wall.

Eaves that stick out six inches are barely deep enough to keep rain off; a nine to twelve inch overhang is better. The carriage barn's eaves are eighteen inches deep. Originally copper gutters, now worn out and removed, sat in curved brackets running along the roof edge, adding four inches more depth to the overhang of the eave as well as redirecting the water.

Eaves are also for play, of course, because they make the carriage barn fun to look at. Without eaves, this building would be an awkward box with bumps. The length of the eaves, their edge moldings, and the rows of brackets underneath, all come together to create a roof that visually shelters what's inside and delights the eye. The decorative corbels, or brackets, facing both ways at the ends of the dormer windows and at the barn's corners are frosting on the cake.

The eaves here have one other job, quite visible in the accompanying picture. This is the south view of the west end of the barn. The eaves keep the summer sun from shining in the windows. This photograph was taken in early May, when the shadow line

of the eaves is below the small windows in the stable. The sun will not shine in these windows again until late August. With the extra four inches of gutter, the windows would be shaded earlier and later in the year. Because the sun's path across the sky changes with the seasons, due to the earth's tilt and rotation around the sun, in winter the sun will be low enough in the sky to shine below the eaves, and into those windows, bringing light and heat to the space inside.

The layout of the interior space is a further refinement of how the barn works with the weather. In the drawing, north is to the top, south to the bottom, the horse stalls to the west (left) and main door to the east (right).

The carriage barn was designed to create a logical, efficient progression of spaces from the horse stalls to the carriages to the front door, with stops along the way for harnessing and tack. The space overhead is used for hay and grain storage while additions on the sides of the building provide staff quarters and an equipment repair area.

The carriage barn was also laid out to maximize the comfort of occupants all year round. The long working side faces south, where general purpose rooms are designed to prepare carriages for use, with a tack room to hold bridles, saddles, and horse paraphernalia. Next comes the store room for harnesses, the grooming room with double doors facing south, and then the stable on the west end. Horse stalls need only small windows set high in the wall. Thus, with only a few small openings the stable also becomes a barrier to cold winter wind, helped in part because the horses' own heat will keep the stable warm, making it a buffer for the main barn.

The north side of the main carriage space, holding carriages not in use, can be closed off in winter by twelve-foot-long sliding doors. A people door, only three feet wide, between the hall the north bay, bearing the McCullough monogram, speaks to this north side's regular separation from the main bay.

Two chimneys in the carriage barn serve stoves in rooms designed for people: the

grooms' quarters on the north side and the tack room on the south. The tack room, a working space, is in the middle of the building. Almost entirely surrounded by the carriage and store rooms, it is buffered from the elements. It has a large window to let in natural light, and warmth from the winter sun. In addition, this room is set in a sun pocket that's protected from the weather by south- and east-facing walls. With a coal stove, this room would have been a cozy place to mend tack and talk about horses.

The room for washing carriages is also protected by its location: in the center, beside the tack room, under the hay loft. The water used to wash the carriages drained down the sloped tin floor into the cellar. That water would not have been quite so cold here in winter, in a room buffered on all sides. Above it all is the hay loft, filled with fabulously good insulation (hay), which disappears in summer when it is not needed, and reappears each fall.

Last of all, there are those large windows, which let in the welcome winter sunshine and light, and can be opened across from each other in good weather to encourage summer breezes. And so we return to the cupola, the "original green" air conditioning.

These designs were common knowledge before the widespread use of central heat and air conditioning allowed us to forget. They can also be seen in the design of the Park-McCullough house itself. They are still in use in older buildings all around us.

Bibliography

Fitch, James Marston with Wm. Bobenhausen, *American Building*. New York: Oxford University Press, Inc., 1999.

Rudofsky, Bernard. *Architecture Without Architects, a Short Introduction to Non-Pedigreed Architecture*. Albuquerque, NM: University of New Mexico Press, 1964.

Lstiburek, Joseph.. *Buider's Guide to Cold Climates*, Building Science Corporation, Westford, MA, 2006

Olgyay, Victor. *Design With Climate*, Princeton, NJ: Princeton University Press, 1973.

McHarg, Ian L. *Design with Nature*. Garden City, NY: The Natural History Press, 1969.

Numbers, M. Joe. "Finding the Sweet Spot." *The Best of Fine Homebuilding*, (Winter 2008), p. 50-55.

Fry, Maxwell and Jane Drew. *Tropical Architecture*. Huntington, NY: Robert E. Kreiger Publishing Co., 1964.

where do we add the US Dept. of Energy? can we add it as a website?

Endnotes