

BUILT TO LAST

From Potatoes to the Bakery to the Laundry – Some Turn to Welded Wire Reinforcement Wall Panel Solutions

The Opportunity:

- Since 1968, the Hutterian community in the Northwest U.S. has been raising potatoes
- A white potato is about 80 percent water and 20 percent solids.
- Prolonged storage requires cool steady temperatures and constant 99% humidity.
- 40,000 tons of potatoes stored in a single building require durable walls and a high-insulation environment.
- Stronger walls and floors with insulation contribute to the building's environment -- a delicate balance between temperature and humidity.

The Outcome:

- The fresh potato storage period has been extended from March to July. Potato storage buildings are filled in September, after harvest.
- Concrete potato storage buildings have a longer life than other building types and are a fortress against outside elements.
- The structure is resistant to daily environmental wear.
- Tough potato storage buildings withstand considerable abuse from the rough machine loading and transporting process.



The difference between russet and rust is only two letters and a matter of degrees. How water and humidity is handled for the potato means the balance between success and failure of this critical crop.

That's why the russet knows water as friend and foe and one Hutterite colony turned to welded wire reinforcement (WWR). Their storage building supplier used WWR to reinforce precast concrete walls. The walls are constructed with inner and outer layers of concrete like a sandwich with insulation between to create a more reliable method to preserve the potato crop. It is reported that in the U.S. alone, we eat five billion pounds of french fries each year and the Hutterian Brethren of the Northwest U.S. have no intention of leaving us languishing in the drive-thru.

So important is the potato, in fact, that the United Nations has declared 2008 as the International Year of the Potato. The potato is the fourth most important food crop in the world, and a staple of the economic viability of this Hutterian colony.

Years of Experience

The Hutterites are experts at farming – particularly potato farming. They are astute about seeking out the latest technology and they doggedly erect structures that last.

“The Hutterian Brethren completely embrace modern technology,” said Chuck Prussack PE, vice president and general manager, Central Pre-Mix Prestress Company, Spokane, WA, producer of the pre-stressed, pre-cast concrete, reinforced with WWR, and used in several types of Hutterian buildings. He said, “We’ve worked with the Hutterian Brethren for more than 40 years. They always try to purchase for the generations to come -- seeking out solutions that are low maintenance and last for a long time.”



According to Richard Read, in his 1999 Pulitzer prize-winning article “The French Fry Connection,” in *The Oregonian*, “Colonies have had to adapt to changing and challenging farming conditions over the past many years. Highly technical equipment, such as global positioning systems (GPS) coupled with auto-steer are utilized regularly.”

“It is interesting that the Hutterian Brethren use GPS to plant their perfectly placed rows of potatoes,” Prussack said.

And now, they have added walls and floors that use WWR and pre-stressed steel strand. With welded wire reinforcement, the spacing of steel wire is uniformly controlled, reducing the variability and risk that can result from human assembly.

All Eyes on the Potato

The Hutterian potato farming in the northwest U.S. began about 40 years ago, in the late '60s. The colonies using the welded wire reinforced concrete walls in their potato storages are located close to Spokane and just over the border into Oregon. The area is definitely the home for a good potato, generating some 20 percent of all of U.S. potatoes.

Hutterite colonies are described as “almost exclusively farming communities, though many have diversified their operations in the last 10 to 20 years. ... most colonies farm on average about 4000 acres.”

Read’s article noted: “Farmers in the Columbia Basin, the vast watershed in Eastern Washington and Oregon, irrigate huge tracts to produce more Russet Burbank potatoes per acre than anywhere else in the world.” On their own Web site.

WWR Tech Facts

Structural WWR is being used more frequently in tilt-up wall panels and is specified for structural slab reinforcement in structures built every day. Slab on ground foundations are specified with WWR as the structural slab reinforcement on expansive soils. There are many shrinkage compensating slabs cast on ground that require steel reinforcement to handle tensile stresses when the slab expands and to hold the slab in position when it shrinks. WWR is the first choice reinforcement for many of these applications. Structural welded wire reinforcement is used for tie-backs on retaining walls, as well as related earthwork reinforcement for reinforced soil embankments.

Consult with WRI members for availability and the ability to furnish reinforcement materials.

WRI members can provide the exact area of steel required for your various wall and ground slab applications.



The concrete walls are being lifted into place in the laundry/bakery building. Concrete wall and roof panels are reinforced with welded wire sheets.

According to the Washington State Potato Commission, it is “the climatic conditions, rich volcanic soil, abundant water and long growing season that result in eastern Washington State producing the highest yield per acre of potatoes in the world. Though the number of commercial growers number approximately 300, together they plant more than 160,000 acres annually, harvesting averages of 30 tons per acre, twice as much as the average yield in the United States.”

The Potato Journey

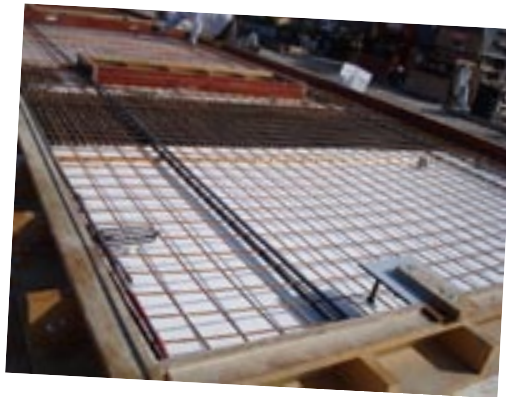
Like many other crops, potatoes are harvested in early Fall. The biology books will tell you that a potato skin changes its chemical structure after it is harvested. Despite the fact that a potato is about 80% water, the outer layers thicken and harden after harvest. The storage process refined by the Hutterians forestalls that chemical change by regulating the storage environment to within a tenth of a degree.

Buildings – or potato storages – are filled each September after the harvest. Each concrete building is about 25 feet high, 350 feet long by 300 feet wide. Each has four bays and each bay accommodates approximately 10,000 tons of potatoes. That’s a heavy load! The Hutterite colonies have 17 potato storages in the Northwest U.S.



According to Hutterian potato farmer Paul Wollman, “We have air system pipes running underneath the floor and WWR in the concrete floor slabs. In the walls, the important thing for us is that we were looking for a connection between two concrete layers with insulation sandwiched between, to create wall panels that wouldn’t conduct any heat or cold. The cool air rises through the potato pile and the temperature is maintained to within a 10th of a degree and high 99% relative humidity. Inside, you can almost

see droplets on the ceiling. We start off each storage at about 60 degrees, cool to 55 degrees about three weeks later, and then bring the temperature down to a constant 46 degrees.” The concrete, welded wire reinforced walls with insulation sandwiched between ensure strength, a constant environment, and are free of the rust of a common steel building.



Sheets of welded wire reinforcement are laid onto concrete panels.

And next on the potato journey? Paul Wollman’s harvest is sent to area processing plants owned by ConAgra Foods® of Minnesota; McCain Foods, Inc., of Illinois; and J.R. Simplot Co., of Idaho. These companies are all major suppliers of frozen potato products for the fast food industry, among others.

“This is a state-of-the-art storage system,” Wollman said. “Each and every potato comes out of storage just the way it went in. They aren’t soggy or light. Idaho may have the potato fame, but Washington grows them best. Our potatoes are a great product in every way.”

Uses of reinforced panels evolve

“Wall panels used to be made with individual pieces of rebar and included hours of tying,” Prussack said. “But today, if we have any repetition of walls at all, we use welded wire reinforcement. Sometimes the materials are a little more expensive but we have found time and time again that the labor savings and cycle time savings mean a large bottom line benefit. Every single time we conduct this analysis at Central Pre-Mix Prestress Co., we come to the same conclusion: welded wire reinforcement (WWR) is the way to go.”

Caring for the Colonies

Down the road a way – in Stanfield, Oregon – Wollman’s brother-in-law Andy Stahl is overseeing the construction of a large laundry and baking kitchen to serve his colony. The durable, exposed aggregate finish, pre-cast building has welded wire reinforcement in many of its roofs and walls.

In this case, Stahl wasn’t looking for a change but took the advice of his supplier, Prussack. “We do things for the long run, for sure,” Stahl said, “and Central Pre-Mix Prestress

Company folks advised me that the reinforced walls would be very durable.”

The communal bakery and laundry facilities are typical for a Hutterite colony. As Vance Youmans wrote in Columbia Magazine, in the Fall of 2000, Hutterite colonies “strive for complete self-sufficiency; they raise virtually everything they need for their sustenance, buying only what they cannot produce on their own land...”

The bakery and laundry will be 160 feet wide by 160 feet long -- roughly in the shape of a “T” Some areas are as wide as 70 feet; others as small as 42 feet. It’s a totally private building supporting only community activities. They plan to complete the building in 2008.

“The key to success in the agrarian life of the Hutterites has been their willingness to adapt to the dictates of the land on which they live...” Youmans wrote. “Though dressing and living by guidelines hundreds of years old,

Where Do You Find Engineering Education on WWR?



Purdue University is a great place to start.

Bob McCullouch Ph.D., P.E., along with Purdue University’s School of Engineering in Indiana, has recently led an educational effort around welded wire reinforcement. Funded by a grant from Wire Reinforcement Institute member Ivy Steel & Wire, they have created a Web site exclusively about Welded Wire Reinforcement (WWR). The site contains information resources for designers and construction engineers about WWR’s advantages, uses, design resources, and construction procedures. An on-line library is available as well as various design and construction examples, and access to an online professional development class on design basics.

Visit this site at www.wire-reinforcement.com

Excellence Set in Concrete®



the Hutterites, paradoxically, engage in the acquisition of the most modern farming technology—a practice that allows them to conduct extremely successful agrarian operations.”

It's no secret that this includes using welded wire reinforced concrete for their buildings.



Loads of uniformly controlled welded steel reinforcement sheets are trucked to Central Pre-Mix's plant for production of a Hutterian laundry and bakery.

About the Wire Reinforcement Institute (WRI)

Headquartered in Hartford, CT, WRI is the world's leading association of manufacturers, allied industries and professionals engaged in the production and application of structural welded wire reinforcement (WWR) and related products for concrete reinforcement. The Institute advances the concrete industry by providing technical, outreach and promotional programs and materials on the applications and benefits of structural WWR. WRI works closely with design firms, universities, owners, contractors and government agencies, to ensure adherence to the most accurate, up-to-date codes, standards, specifications and regulatory requirements. Through the WRI Education Foundation, the Institute funds an annual scholarship program for undergraduate and graduate civil and structural engineering students at accredited engineering universities.

Got a question? Get an answer. If you have a question on how to use WWR or where to find more information on WRI or WWR, please visit www.wirereinforcementinstitute.org or call 800-552-4WRI [4974]. Outside the U.S., please call 1-860-808-3000, X356.

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