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Frost Protected Shallow Foundation

By: Christopher Brooks

This Tradewind Corp. home is using the Legalett Slab on Grade System.

Every homebuilder takes satisfaction in finding a product or system that not only does the job right, but also saves time and money. A Frost Protected Shallow Foundation (FPSF) is such a cost-effective system. Often these are particularly useful at jobsites where there are difficult problems with the property, such as extensive earth movement, over excavation and drainage issues.

“A Frost Protected Shallow Foundation is a good way to go on many homes,” said Albert “Con” Constable, a class A general contractor and owner of Constable Constable Construction Inc./KASE LLC in Elkton, Va. Constable Construction (540-421-0121) recently completed a 3800-square-foot custom ranch with a full walk-out basement in Harrisonburg, Va., using the FPFS approach. This Craftsman-style retirement home includes four bedrooms, four baths and two half baths. The 2900-square-foot finished basement includes a media room and a recreation room (55-foot by 26-foot) featuring a full bar with kitchenette.

“In the course of budgeting out this project, the owners decided to eliminate the second floor and finish out the basement space,” he said. “They felt they would get more use from the basement, as well as more square footage finished for the money. The total finished area is now 6,550 square feet.”

The FPSF was a great benefit in the building process of this home.

“The use of a FPSF system enabled us to get a jump on finishing the basement space,” Constable said. “It was a budget and time consideration. CertainTeed’s T-Rock fits the bill. It was cheaper than the conventional approach in terms of framing the wall, insulating and drywall finishing. The T-Rock product is the finished wall surface, poured in place with the concrete foundation wall.”

CERTAINTEED’S T-ROC

Consisting of CertainTeed GlasRoc paperless gypsum board permanently laminated to a high R-value expanded polystyrene (EPS) foam insulation, T-Roc panels install easily in conventional concrete wall forms and eliminate the need for stud frame out, batt insulation and drywall. According to Steve Gross, director of marketing for CertainTeed’s foundation business (certainteed.com) in Valley Forge, Penn., once the concrete has set, the forms are removed, revealing insulated basement walls, ready for final finishing.

“The T-Roc Thermal Laminate Foundation Insulation System offers a streamlined approach to insulating and finishing poured concrete walls,” Gross said. “T-Roc is more economical than traditional methods and can be installed with far less labor in a fraction of the time without compromising performance or a quality finished look.”

By incorporating the GlasRoc gypsum board – with reinforcing glass mats that are fully embedded into a water-resistant core – the panels offer superior moisture resistance, as well as protection against mold and mildew growth. The EPS foam, which is treated with non-toxic Perform Guard, protects the panels from termite infestation.

“The idea was to save several steps to achieve similar results,” Constable said. “Then there is the bonus of eliminating any moisture problems during and after construction. T-Roc is safe against the elements with its moisture proof sealed cell insulating foam and exterior grade fiberglass wall board. The soil at this site is red clay. The majority of the basement is in ground and the red clay soil does not drain well.”

The crew was able to complete the job successfully and on schedule, keeping the poured walls, and the T-Roc straight and plumb. “A must when using T-Roc,” Constable added. “The interior finish can only be as straight as the poured wall that it is a part of. This home is unique in the long runs of open walls in the basement. We were able to ‘pre-finish’ the poured wall along the entire exterior of the areas to be finished.”

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IMPACT OF THE LAND

Homebuilding challenges that require the use of FPSFs are often generated by the land conditions, according to Todd Watts, president of Tradewind Construction (tradewind.ca) in central Ontario, Canada.

“Land characteristics and environmental concerns often require the use of FPSF’s,” Watts said. The company started with the construction of ICF homes over a decade ago, moving from residential and incorporating the large construction of multi-story residences.

“Low lying areas or areas that have a high water table often need FPSFs for their homes; also lakefront property, and areas that are subject to moving heavy equipment and to digging and in some instances over-digging. Many people will buy a property with trees that might be hundreds of years old and should be preserved. Excavation of deep Foundation can disturb roots, resulting in damage or slow death of these trees.”

Homebuilders and contractors need to look for an FPSF product that has been tested and true for years, according to Watts.

“This isn’t something new, and it’s finally getting its due because of the conscious energy and environmental impact at the build site,” he said. “Although we started in the insulated concrete form (ICF) construction we had to quickly adapt and source other products that paired well with the speed of construction, durability and energy efficiency of the ICF envelope, while insuring all these products meet and exceed architects,’ engineers’ and homeowners’ requirements.”

Watts uses radiant-heated FPSFs manufactured by Legalett (legalett.ca). “These hot air slabs (FPSFs) are the latest addition to achieving these attributes, incorporating radiant heating into the system,” Watts said. “Builders should search for the system that supplies a training course, pre-cut and cut-list with schematics that are pre-engineered to land elements of the home and the structure of the home – ICF, stick-frame, and brick or stone faced.”

The most common mistake that builders have using FPSFs, Watts explained, is the base.

“The base should be scrapped of all organics (grass and roots), then 6 to 8 inches of ¾-inch clear stone spread and leveled for the footprint of the dwelling and past by at least a foot. This clear stone area is the drainage or weeping tile of the home. The whole idea is to allow any water that may come to the area of the home to flow under and through, but not staying under the dwelling.”

LEGALETT SYSTEM

Watts recently used the Legalett system for a 3,300-square-foot stone and stucco home in Peterborough, Ontario, that is a duplex. The parents live on one side, and their adult daughter and her live-in caretaker live in the other side. “The homeowners wanted to be close to their daughter but, also giving her space with her caretaker,” Watts said. “The two residences are separated by a common laundry area.

“This home had to be warm and comfortable in winter and cool in the summer, and wheelchair friendly. With the Legalett slab this was accomplished with ease. We used Logix (logixicf.ca) ICFs combined with the slab to create a perfect climate controlled envelope.

“This system creates a slab envelope that has little chance of heat escaping from the radiant slab because of the ‘edge elements.’ These are precut and formed foam panels that create a tray, combined with the 6 inches of foam panels for the base to hold concrete and radiant pipes.”

Watts noted the ICF envelope and the Legalett Radiant slab is a closed-loop system, meaning the air is circulated through the pipes back to the heater unit and then warmed again and pushed through the loop again. The air never escapes, therefore creating a healthily air environment in the home as well, unlike a regular ductwork furnace that pushes dust and germs through the house, which was very important for this home.

BELOW GRADE CONSIDERATION

With the property situated in a low area or basin, it was extremely important to make any possible run-off water be blocked or diverted from reaching neighboring properties by a foundation wall. “The slab with its 6- to 8-inch clear stone base allows run-off water from above to go under and through the footprint of the house. The clear stone allows this to happen,” he said.

“The Legalett system gives an economical and worry-free solution to the building envelope in areas in which a concrete-block foundation may have been used and water could be trapped in the months prior to, then freezing in winter causing the foundation to heave or crack from the ice.

“This system and the in-house engineering team take every condition and building envelope into consideration before determining and engineering the system to the specific site. This is key; no two sites are the same. Other manufacturers use the same technique and sequence of engineering for all their slabs, but not Legalett.”

Based in Bucks County, Penn., Contributing Writer Christopher Brooks writes about the home – inside and out – for consumer and trade magazines.