

Engineering and Structural Synopsis Of Cultured Log Systems™



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Beaudette Consulting Engineers, Inc (BCE) was engaged to evaluate and analyze the structural and sustainability characteristics of the Cultured Log System™ prior to patent application. BCE has justified the concrete log wall assembly conceived and designed by Cultured Log Systems™ for several specific buildings. In addition, we have performed supplemental engineering justification for the concrete log walls to meet the most extreme design requirements in the United States and Canada. We welcome all questions and comments.

Beaudette Consulting Engineers is presently licensed in 48 states and 2 Canadian provinces. BCE has a national reputation as log and timber frame engineers, with clients throughout the US.

In conjunction with a wood engineering expertise, BCE regularly designs steel, masonry, cast-in-place concrete and precast concrete projects in the Pacific Northwest. While the cultured log wall assembly obviously and exactly replicates a wood log wall visually, it has strength and fire resistive qualities, which far exceed conventional wood log wall capabilities. Depending on the joint preparation, the wall assembly can meet three and four hour firewall ratings. The insulated precast concrete wall section (i.e. interior structural concrete wythe, interior insulation layer and an exterior concrete wythe) offers an insulated wall assembly, again, not achieved with traditional wood log walls. The concrete log assembly is entirely distinctive in its design; material usage and structural load transfer approach.

DESIGN:

The design concept of utilizing a reinforced concrete sandwich panel section to produce a linear “log” profile is exclusively one of a kind. The typical insulated concrete wall panel has a flat plate profile. The typical precast panel is long and wide with a relatively thin thickness. The typical precast concrete beam is not insulated and is utilized as an independent structural element. The concrete log assembly is an insulated and stacked series of concrete beam members, which is exclusively unique.

MATERIAL USAGE:

Developing a “log” profile out of reinforced concrete is a distinct usage of materials. The concrete log wall assembly is stable, non-combustible, insulated, resistant to deterioration, resistant to insect infestation and significantly more resistant to mold growth than wood.

This is in stark contrast to the typical wood log wall assembly that takes years to stabilize. Wood logs shrink and crush against one

another thus allowing overall settlement of several inches in many cases. In a wood log structure, settlement allowances are required at all windows, doors and all other non-settling elements.

The concrete log assembly is obviously fire resistant and non-combustible. The wood log wall is obviously not.

Thermal ratings for a wood log wall are very difficult to define and are entirely dependent on settlement gaps and moving log-to-log interface conditions. The concrete log assembly has a rated and defined cross section.

The wood log wall is susceptible to cyclic moisture deterioration and material rotting. The concrete log is not vulnerable to deterioration. A major issue with wood is insect infestation. Wood is a natural source of nutrients for insects and is totally subject to plagues of termite, ants, flies and most all other insects.

Concrete does not have the natural nutrients, which support mold growth. Moisture and nutrients are two key ingredients required for mold growth. The concrete log is a very distinctive and desirable usage of materials.

STRUCTURAL APPROACH:

The structural load transfer concept utilized by Cultured Log Systems™ is unique. BCE has justified the typical Cultured Log Systems™ wall assembly to transfer gravity loads well in excess of any required in worse case code designated loading conditions. High roof snow loads are easily accommodated and concentrated loads are easily transferred.

We have justified the wall assemblies for the worse case seismic design requirements in conjunction with high snow loads. Structures in high snow, high seismic areas (Mammoth Lakes CA., Lake Tahoe NV, Yellowstone Park, etc.) require that a certain percentage of snow is on the roof in a severe seismic event. Cultured Log Systems™ meets or exceeds these requirements.

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