

ECLIPSE ENGINEERING INC.

July 23, 2009

Mr. Stewart Hansen
EverLog™ Systems
Missoula, MT 59801

Re: Assessment of EverLog™ Building System

Mr. Hansen,

We have reviewed the EverLog™ Building System to provide our professional opinion on how it compares to other building systems available throughout the construction industry. The purpose of this paper is not to provide specific engineering data, but a comparison to alternative building systems.

The EverLog™ building system incorporates insulated precast concrete log sections, which are manufactured to resemble traditional wood log and timber profiles. EverLogs™ are assembled in the same manner as a traditional log structure with the log courses stacked on top of each other. The wall logs have a vertical hollow core that may be grouted or reinforced as necessary for the local code requirements. Ledgers for floor and/or roof framing may be fastened to the concrete logs using conventional concrete anchors.

Eclipse Engineering, Inc. is a structural engineering consulting firm based out of Missoula, MT, with offices in Bend, OR and Spokane, WA. We are licensed as professional engineers in all 50 states and Washington D.C. We have had the opportunity to provide our services on projects across the United States and have worked with a variety of building departments under some of the most severe design loading conditions. We have provided engineering services on structures which include 300 psf snow loads in Montana, Seismic categories E & F in Southern California and Alaska, unstable soil conditions in Colorado, Texas, and the San Francisco area, and 140 mph hurricane wind speeds in the coastal areas of Florida.

We have worked with several types of building systems including wood stick framed structures, masonry, steel, aluminum, fiberglass reinforced plastic, timber, and log structures. We have also worked within the realms of residential, commercial, educational, and industrial structures. Working with such a diverse range of materials and projects has given us the experience and perspective to understand the types of structural systems that are available and identify the benefits or downfalls to each system.

The following are contrasts between traditional wood log elements and EverLogs™ elements:

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SETTLEMENT:

Wood Logs: Wood logs retain a considerable amount of moisture during fabrication and construction. There are options to use kiln-dried (KD) wood logs, but the wood is allowed to have up to 19% moisture content and will continue to dry for several years. Moisture loss can cause the following problems.

- i. As the logs dry, the diameter of the logs shrink, which causes the overall structure to settle. This settlement is not always uniform and requires very specific detailing to avoid damage to interior fixtures, doors, and windows.
- ii. Depending on the climate and time of year, there is often a moisture variation from the interior and exterior environment – and this often reverses as the seasons change. As the moisture changes, the logs will continue to move slightly as they swell or shrink.

EverLogs™: Concrete does shrink slightly, but is minimal and only noticeable in the first 30 days. EverLogs™ are allowed to cure for at least this period of time. Any shrinkage in the concrete logs will be complete before arriving on the jobsite, so the completed concrete log system will not settle.

MOLD, ROTTING, AND DECAY

Wood Logs: If the moisture in the logs is not properly addressed, and the logs not properly sealed, it could cause mold, rotting, and/or decay. Wood logs require maintenance to keep the wood sealed to avoid moisture damage. Natural wood when wet provides an environment for mold spores to thrive, which becomes a health hazard. Any rotting or wood decay can promote insect infestation and will create a structural deficiency and possible failure.

EverLogs™: Concrete does absorb moisture, but does not provide an environment to harbor mold spores. Concrete does not rot or decay with moisture, and maintains a consistent strength throughout moisture variations.

FIRE HAZARD

Wood Logs: Wood logs can catch fire and will fuel a fire once started. A typical wood log will have cracks along the length, which may add to its character, but also provides fire the ability to spread quickly and burn completely through the log, which ends in catastrophic failure of the structure.

EverLogs™: Concrete logs will not combust and will not fuel a fire once started.

INSULATION

Wood Logs: Wood logs are a poor insulator. With wood logs, the insulation value is difficult to determine because of the individual characteristics of each log. In stick frame construction, the studs are often referred to as cold joints because the cold can be transferred through the wood stud, but not the insulation. With wood logs, there is no insulation, so the entire log is in a sense the cold joint. Some may argue that the wood logs “feel good or warm” on the inside. The wood will absorb heat, and does feel good to the touch, but transfers that heat through the wall, where it is lost outside, which means it takes more energy to condition the space.

EverLogs™: With the insulated concrete logs, the inside face of concrete is allowed to absorb the heat, and because the insulation does not let it pass through the wall, it can be radiated back into the room when the inside temperature goes down. Besides the obvious benefit to having an insulated wall it also has a better insulation system, which is referred to as a heat sink.

INSECTS

Wood Logs: Wood of all kinds can provide a food source and nutrients for insects like carpenter ants, termites, flies, etc. Once infested, the wood can be quickly damaged beyond repair.

EverLogs™: Concrete logs are not susceptible to insect infestation and do not contain a food source for insects to live or breed.

STRENGTH AND STRUCTURAL BENEFITS

Wood Logs: Wood logs are strong, but do not have a precise or consistent strength. The allowable strength varies greatly between species, sizes, moisture, and shapes. These inconsistencies in strength demand large safety factors to ensure that the structure is safe. While wood logs can be designed for site specific loads, the design is typically over-built to compensate for the variances in strength.

EverLogs™: Concrete is extremely strong in compression and by adding steel reinforcement becomes strong in tension and flexure. Typical minimum concrete stress is approximately 5 times stronger than standard wood logs in compression. In hurricane prone areas, such as Dade County Florida, concrete has an advantage because of its weight, which can be used as ballast in high wind events. One common failure in high wind areas is uplift on the roof, which will tear the roof structure away from the building walls. The concrete wall system is constructed with a wood cap plate anchored to the top log course. The roof framing can be anchored or strapped to the cap plate to resist any uplift or lateral forces during a wind event. EverLogs™ can be designed precisely as required for specific design loads, which provides a more efficient use of materials.

In our opinion, the concrete log system is superior to a traditional wood log structure in many ways and provides a more environmentally responsible building system. The EverLog™ System can be used for virtually any type of project in any location. Your system makes it easy for an engineer to review the specs and provide information on the building shell system. Having the ability to form and sculpt the logs into specific shapes gives the opportunity to create a better performing house while still maintaining the aesthetic appeal.

The EverLogs™ system should always be designed and reviewed by a licensed professional engineer to verify the specific load requirements for each project. As with any building, the components must be reviewed and used within their designed intent.

I understand that this report is general in nature and we have not provided specific structural design capacities or requirements. If you or your clients have any questions on this or would like more specific information, please feel free to contact me at any time.

Sincerely,



Rolf Armstrong, PE
Principal
Eclipse Engineering, Inc