



Engineering Solutions,
LLC.

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To Whom It May Concern,
Regarding: Structural Solar Review

R&R Engineering Solutions, LLC is a structural engineering consulting firm that specializes in the analysis, design, repair and modifications of roof structures for both commercial and residential applications.

It's interesting to see and be a part of the solar movement which will undoubtedly change the way our society moves into the future. Solar is a wonderful alternative resource and there are many advantages for using it.

- Lowering the cost of your electric bills.
- Reduce the demand for more power from existing carbon emitting power plants.
- Creation of new jobs.

Solar panels are an investment into our homes and future. There are many incentives offered on state and federal levels to help offset the cost of these systems making them more attainable than ever.

Residential solar applications are most commonly composed of multiple modules mounted into a supporting railing system. These railing systems vary in material and configuration, however they are all engineered to withstand gravity and wind forces. Every home being installed with a solar application should be subject to a structural review of the new proposed loads. Just as any sound investment should be backed up with a guarantee that there will not be any problems, so should your existing roof system. Yet for some reasons this is not the case.

Several of the local municipalities have recently changed their position on the requirements of such documentation when following publication was released:

http://utsolar.org/index.php/news/article/renewable_energy_bills_piling_up/

This article is second hand and can be traced back to www.azcapitoltimes.com originally.

What's interesting about the entire position, is that there was absolutely no empirical data that validates these decisions. It appears that Michael Neary (a lobbyist for the solar industry) has made a public statement that has pressured some cities into making questionable decisions. Neary accused cities which required a structural review as being not "solar friendly" and stated that structural engineering "is a deal breaker". What Michael Neary fails to mention is that some cities only charges \$50.00 for a residential solar permit, which hardly classifies them as "unfriendly". Unfortunately, poor politics can influence the choices made and leave the valley and its residents exposed to precarious and potential dangerous conditions.

Many times in a residential review the solar company is asked to relocate or modify the array to allow the weight to be displaced more advantageously for the supporting members. While very few scenarios result in extreme failure, there are conditions that will be more likely to experience failure. There are failing roof systems that don't have excessive loads placed on them, but were simply under designed to start with. In the race to compete the lowest bidder wins. That having been said, trusses are designed to carry the loads originally called for in the construction documents and not much more. We can design a roof system strong enough to park cars on if that's what is specified, but if they were designed to carry more, the trusses would simply be priced out of the market.

With respect to the cost as being a "deal killer" I could not disagree more. A cost of \$600.00 per residential analysis (R&R's typical cost) constitutes just 2% of the total cost on a \$30,000 solar system. For a more expensive system that percentage is even less as it typically does not raise the cost of the analysis. 2% is NOT a "deal killer" however a catastrophic collapse might very well be. As a consumer I want to know that my investments as well as my family are safe and sound.

Should a failure happen, things will get ugly pretty fast and here's why. Many people purchasing solar panels are not having them added to their homeowner's insurance policies. In order for this to happen, the added expenses of the purchase along with the documentation that satisfies the underwriter (i.e. engineering) will have to be provided. If this process does not happen then the homeowner's insurance will not cover the solar panels, so should they depart the roof in a gust of wind you as the homeowner are going to be in part responsible. It's likely the insurance company will cover the cost to repair the structure then seek damages against the solar installer and the homeowner will do likewise to recover his investment. The prevailing argument in the industry is that solar panels are light, but little seems to have been discussed about uplift in wind conditions. We see uplift loads in excess of 400lbs per connection at times. While the hardware connection is calculated to withstand this load, the truss may not be able to, especially if the combined stress index is pushing 98% in any member to begin with.

This begs the question, who takes responsibility? If the city does not require engineering, should it be their responsibility? Following the logic, will the solar installer not argue that they complied with all known requirements and should not be responsible? The IBC & IRC is clear with regards to building codes and regulations.

- IRC 2006 R502.11.3 – Alterations to trusses. Truss members and components shall not be cut, notched, spliced or otherwise altered in any way without the approval of a registered design professional. Alterations resulting in the addition of load (e.g., HVAC equipment, water heater, etc.), that exceed the design load for the truss, shall not be permitted without verification that the truss is capable of supporting the additional loading.
- IBC 2006 2303.4.1.7 – Alterations to trusses. Truss members and components shall not be notched, drilled, spliced or otherwise altered in any way without written concurrence and approval of a registered design professional. Alterations resulting in the addition of loads to any member (e.g., HVAC equipment, water heater) shall not be permitted without verification that the truss is capable of supporting such additional loading.

Even though Mr. Neary is a credited individual whose contributions in the solar industry are many, there should be some general accountability for statements he and others present. The wood truss industry is represented by the WTCA (Wood Truss Council of America) and does provide supporting documentation which is very clear about the possibility of changes in property of a supporting member should new loads be introduced. WTCA representatives have gone on record at the last MAG meeting, stating that municipalities are "negligent" in embarking on the ideation that additional loads can be added to existing trusses without careful consideration.

We sincerely hope that Building and Safety Departments and respective City Attorneys review their current positions in regards to this issue. All structures are inherently unique and making broad generalizations about what they can or cannot withstand is in our opinion irresponsible.

Respectfully,

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