ONTARIO TRUSS REPORT

Photovoltaic Solar Panel Design Considerations for Wood Roof Truss Systems

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Has the solar panel industry put the cart before the horse when it comes to providing sufficient information to home owners and builders to ensure both existing and new roof structures will continue to adequately support the specified roof loads required by the Ontario Building Code?

Although solar panel manufacturers provide the design dead weight of their panels, this information is only one small piece of the puzzle when determining the design loads applied to the supporting roof truss system below. Individual panels are mounted on a grid of rails supported on brackets that are fastened to the trusses to form the overall panel array. In a typical installation, the horizontal rails are placed up to 4' o/c supported with brackets installed on every second or third truss (4' to 6' o/c). As a result, each bracket supports up to 24 square feet of the solar panel array.

The issue often overlooked is that the specified snow and rain load required by the OBC is not supported directly on the roof system. It would in fact be uniformly loaded on the panel array above the roof surface. Unless a means of snow clearing is implemented (which in most cases cannot be guaranteed for the life of the structure), each bracket will transfer a point load to the roof below of a minimum 624 lbs *(21 PSF specified live load (OBC minimum allowed) plus solar panel weight of 5 PSF x 24 square feet per bracket).*

In existing roof truss systems where panels are applied using typical methods, rather than each truss equally sharing a uniformly distributed roof load as they were likely originally designed to do, a number of the trusses could be carrying far in excess of their original design load and pose a real risk of structural failure. When retrofitting solar panels onto an existing roof truss system, the Ontario Wood Truss Manufacturer's Association (OWTFA) recommends that the owner consult with a professional engineer familiar with roof truss design and construction prior to installing the panels. In some instances, it might even be established that the cost of the structural retrofit might outweigh the benefit of the solar panel installation and ultimately through this approach, save the owner time and money early in the process.

In new or proposed solar panel installations, it is not sufficient to simply propose an increase in the design dead load to offset the panel weight alone. The builder must have their project engineer or consultant engineer provide the following information: 1) Design the specified load pattern for the roof structure resulting from the solar panel and panel rail support grid system 2) Clearly dimension the location of each point load on the structural drawings of the roof so the individual wood truss element at that location can be properly designed and 3) Provide a means of fastening the rail system to the truss members so as not to damage or reduce the truss member cross section during installation. In practical terms, it would be very difficult to accurately fasten the rail brackets with a lag bolt through the roof shingles, sheathing and land in the centre of the 1.5" wide truss top chord as is typically proposed by most manufacturers.

Without this information, the OWTFA member truss plant would not have adequate design data to proceed with an appropriate solution for structural roof truss system required. Further, simply stating "roof to be designed for solar panels, by Truss Manufacturer" (or similar) is not acceptable since it would be the responsibility of the project engineer to determine the effects of load distribution, sliding snow, drift potential and wind effects induced by the addition of a solar panel array to the roof system.

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The Ontario Wood Truss Fabricators Association (OWTFA) represents the common interests of the truss industry in Ontario, including promoting the use of wood trusses in residential, commercial and agricultural structures. For more information please contact Mike Phillips, Executive Director of the Ontario Wood Truss Fabricators Association (OWTFA) at 416-235-0194 or www.owtfa.com.