

STRUCTURAL CONCERNS WHEN REPLACING ROOFTOP HVAC EQUIPMENT

Do not be surprised if your air conditioning unit replacement triggers a structural upgrade of your building. This is a growing statistic which is shared among all building owners and tenants in the Silicon Valley which expect a relatively easy replacement of a HVAC unit which has met the end of its lifespan or intend to add additional capacity to their building. Advance Design Consultants, has been working with Aircom on providing mechanical and structural solutions to these customers to ease the pain that city requirements may inflict on unsuspecting buildings.

When you apply for permit to replace or add an air conditioning unit, the City will most likely require structural drawings and calculations to review the existing structure for its capacity to support the new equipment even if it weighs the same as the old unit. The aim is to determine if it meets the requirements of the current approved 1997 Uniform Building Code. This current building code has much more stringent loading requirements, and as such, if a building was designed and built before 1996, then the building is at risk of requiring local structural upgrades to meet the current code. Unfortunately, there is no grandfather clause in the code, or honored by any city that will allow the replacement of an air conditioning unit "in kind."

ADC and Aircom's experience seems to pertain to the specific cases of tilted-up concrete buildings. These buildings have a wood diaphragm roof supported on the walls and internal columns, with of glulam girders and 2x beams and purlins covered with plywood sheathing and roofing material. It is often found that the wooden members do not meet the load combination Dead Load (Roof Equipment) + Roof Live Load (20 pounds per square foot) required by the code.

The reasons for this might be due to the following:

1. The current code load requirements might be stricter than the code used in the original design of the structures.
2. The requirements of the NDS code for wood design have changed, especially when referring to the strength of the species wood members and the number of species now considered.
3. Large spans in the order of 50 feet or larger are usually found in this type of structure and the glulam members sized to the minimum required.
4. Spacing of the beams and purlins are maximized to reduce the building construction cost, and did not allow contingency for future changes in equipment.
5. The information available to review the structures, in most cases, is not sufficient to determine the exact type of glulam, or the species of wood used, the type of plywood, the thickness and the type of roofing material, etc. Which require conservative assumptions to be made by the structural engineer when performing the evaluations.
6. Occupancy of the building does not permit economic solutions such as adding additional columns to reduce spans and therefore increase the capacity of the existing members.

What can you do to mitigate this concern?

1. Never pre-order rooftop equipment without checking if the structure is capable of supporting the new equipment without major upgrades.
2. Choose carefully the best equipment to fit your building, including performance, weight, and shape.
3. Determine an alternative location for your new equipment closer to building columns.
4. Find a contractor with an open mind who will find the best solution for your facility.

ADC has been working through structural solutions to minimize the financial impact that the customer has to absorb over what a standard unit replacement would typically cost. If you would like more information please feel free to contact Aircom, or ADC at 408-297-1881 or e-mail ADC at MELISSA@ADCENGINEERS.COM.

About Advance Design Consultants, Inc.

Advance Design Consultants has been providing multi-discipline engineering services to the Hi-tech, Commercial, Industrial, and Residential sectors since 1984. ADC is a full service engineering firm providing Mechanical, Electrical, Plumbing and Structural engineering disciplines. Our firm possesses a tremendous wealth of mature knowledge and its level of experience and attention to detail surpasses most industry leaders. For the last 22 years, ADC has been providing quality facility surveys, preparation of studies, engineering, detail designs, cost estimates and construction support services.

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