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GN GUIDELINES NO.217

ANOTHER MITEK ADVANTAGE – AUGUST 2015

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Bracing wall distribution

The Australian Standard (AS) 1684 'Residential Timber Framed Construction' document states that, "Wall bracing shall be approximately evenly distributed throughout the building" and, furthermore "Shall be placed in the external walls and at the corners of the building as much as possible" (refer to clause 8.3.6.6).

This is especially important in high-wind speed areas, where the lateral forces are significantly greater.

The reason for distributing wall bracing in accordance with the above is so that any tendency for a building to twist under wind load is minimised. The idea is to align the epicentre of the wind action as close as possible with the shear centre of the bracing system. The shear centre of the bracing system can best be defined as the centre of stiffness of the building, by taking into consideration the distribution and capacity of all bracing units in the plan.

In an ideal situation, if the wind epicentre aligns perfectly with the shear centre of the bracing system, no twisting of the building will occur and the building will flex in a straight line. If they are offset, the building will rotate and the displacement would be most greatly felt at any unbraced wall edge, which could lead to plasterboard cracking.

This concept is visualised in **Figures 1 and 2**.

HERE ARE A FEW SIMPLE RULES FOR PLACING BRACING WALLS:

Rule 1: Even Distribution

Wall bracing shall initially be placed in the external walls and at the corners of the building wherever possible, with the remainder in internal walls. The total bracing capacity required in each direction should also be evenly distributed across the width as accurately as possible.

Rule 2: Area of Elevation Effect

The distribution of wall bracing should also consider the areas of elevation of each block, which have a proportional effect on the wind force applied to the building.

Using **Figure 3** as an example, 'Area of Elevation 1' in the single storey on the left is smaller than the 'Area of Elevation 2' in the double storey on the right. Consequently, the epicentre of wind action would not be in the middle of the floor plan, but within the double-storey section.

When it comes to distributing the wall bracing in the combined ground floor plan of the entire house (which includes both blocks), it is not a matter of simply distributing it evenly across the total width. The amount of wall bracing in the ground floor of the double-storey block should be proportionately higher than that in the single-storey section.

Rule 3: Bracing Wall Spacing

The final important point to highlight in regards to the distribution of wall bracing is the adherence of the maximum spacing limits between parallel bracing elements. The spacing limits are to ensure that the strength and deflection of the ceiling diaphragm, normally plasterboard, is not exceeded/excessive. It is the ceiling diaphragm which transfers the wind load on the face of the building to the bracing walls on each side.

The deeper the ceiling diaphragm, the further apart the parallel lines of bracing can span **(Figure 4)**. The steeper the roof pitch and the higher the wind speed, the less apart they can be.

The tables in Clause 8.3.6.7 of AS 1684 clearly sets out these limits. Ultimately, the spacing cannot exceed 9 m – no matter what.

For a more in depth look at the transfer of wind forces throughout a building, I recommend reading GN Guidelines No.81. T

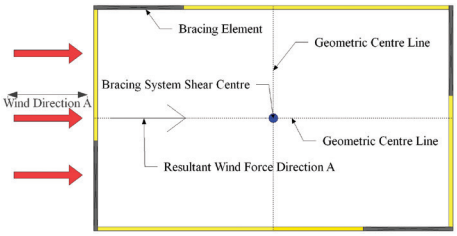

Figure 1.

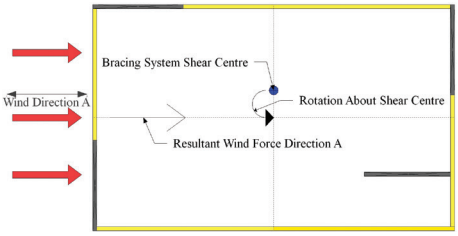

Figure 2.

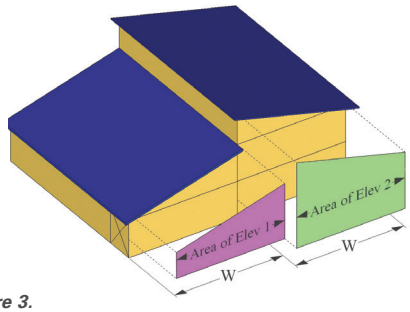

Figure 3.

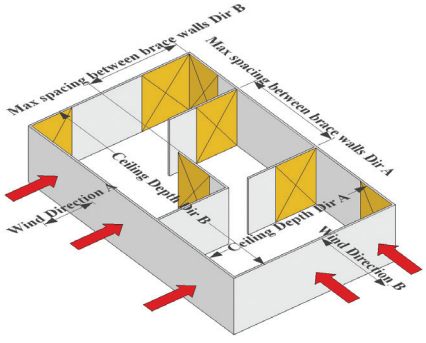

Figure 4.