

A103-a Permanent Bracing Commentary

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by
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Permanent bracing is designed and specified by the Project Engineer/Architect or Building Designer for the structural safety of the building. It is the responsibility of the Building Designer to indicate size, location, and attachment for the permanent bracing as required by the design analysis of the structure in question. Permanent bracing should provide sufficient support at right angles to the plane of the truss to hold every truss member in the position assumed for it in the design. In addition, permanent bracing should be designed to resist lateral forces imposed on the completed building by wind or seismic forces. In general, it is desirable to design and locate all bracing so that it may work together with other structural parts of the building (such as shear walls, portal frames, bearing walls, columns, beams, etc.) to achieve total structural integrity.

Permanent Building Bracing is made up of three elements: bracing at the top chord sheathing plane, bracing at the bottom chord ceiling plane, and bracing perpendicular to the web plane.

Top Chord Sheathing Plane:

This permanent bracing is designed to resist lateral movement of the top chord. If plywood floor or roof sheathing is properly applied with staggered joints and adequate nailing, a continuous diaphragm action is developed and additional bracing in the plane is generally not required. If purlins are used, spacing should not exceed the design buckling length of the top chord and should be adequately attached to the top chord. It is recommended that permanent diagonal bracing be applied to the underside of the top chord to prevent lateral shifting of the purlins.

Bottom Chord Ceiling Plane:

This permanent bracing is required to maintain the truss design spacing and to provide lateral support to the bottom chord to resist buckling forces in the event of stress reversal due to wind uplift or unequal roof or floor loading. For multi-bearing trusses or cantilever conditions, portions of the bottom chord become compression members and should be braced laterally to resist buckling in the same manner as the top chord of simple span trusses. Permanent diagonal bracing between the permanent lateral bracing is designed to transfer lateral forces due to wind or seismic loading into side walls, shear wall, or other resisting structural elements.

Web Member Plane:

During truss design, individual members are checked for buckling, and continuous lateral bracing is specified, as required, to shorten the buckling length of web members. The Project Engineer/Architect or Building Designer specifies how the continuous lateral braces are to be anchored or restrained to prevent lateral movement since truss members braced in this fashion, tend to buckle together, i.e. in the same direction, under load.

Permanent diagonal bracing, otherwise known as cross bracing, is required to spread the out of plane lateral forces imposed on the continuous lateral bracing, from the truss members, under load conditions. The design of the cross bracing system, i.e. cross bracing arrangement, the member sizes, spacing, and type of anchorage/attachment, is the responsibility of the Building Designer. The design of the cross bracing system will take into account the type of building, location of resisting structural elements [shear walls/side walls], truss span, type of roof, and truss configuration.

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