

2009 International Building Code Section 1604.4 Q&A

1604.4 Analysis. Load effects on structural members and their connections shall be determined by methods of structural analysis that take into account equilibrium, general stability, geometric compatibility and both short and long-term material properties. Members that tend to accumulate residual deformations under repeated service loads shall have included in their analysis the added eccentricities expected to occur during their service life.

Any system or method of construction to be used shall be based on a rational analysis in accordance with well-established principles of mechanics. Such analysis shall result in a system that provides a complete load path capable of transferring loads from their point of origin to the load-resisting elements.

The total lateral force shall be distributed to the various vertical elements of the lateral-force-resisting system in proportion to their rigidities, considering the rigidity of the horizontal bracing system or diaphragm. Rigid elements assumed not to be a part of the lateral-force-resisting system are permitted to be incorporated into buildings provided their effect on the action of the system is considered and provided for in the design. Except where diaphragms are flexible, or are permitted to be analyzed as flexible, provisions shall be made for the increased forces induced on resisting elements of the structural system resulting from torsion due to eccentricity between the center of application of the lateral forces and the center of rigidity of the lateral-force-resisting system.

Every structure shall be designed to resist the overturning effects caused by the lateral forces specified in this chapter. See Section 1609 for wind loads, Section 1610 for lateral soil loads and Section 1613 for earthquake loads.

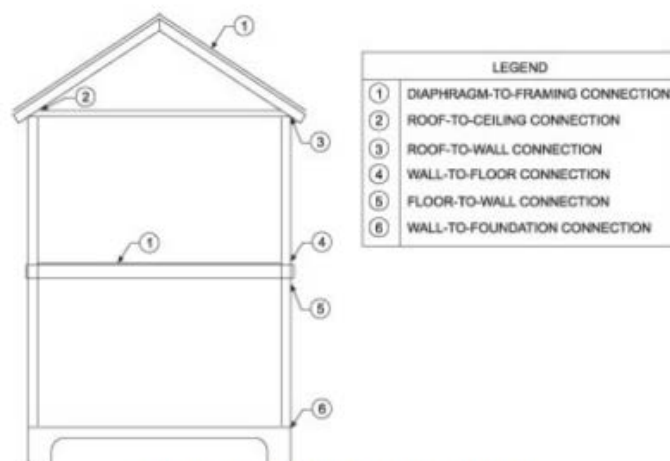
Q: What is meant by the term “complete load path” noted in Section 1604.4, and how would you describe its application to design requirements?

A: A complete system designed to transfer all forces from their point of origin to the load-resisting elements is required to ensure the stability of a structure.

There are two types of load paths: vertical and lateral. The forces must be physically transferred from the point of origin through the various structural elements to the foundation and finally to the supporting soil below. The vertical load path includes beams, joists, girders, trusses, posts, columns, walls, foundation elements, and the soil that supports the structure.

The lateral load path includes diaphragms, walls, bracing, moment frames, boundary elements, retaining walls, foundation systems, and the soil that supports the structure. To ensure complete load path continuity, the connections of the above structural members should be adequately designed and fastened together by direct mechanical attachment or anchorage.

See Figure 16-10 for a sample checklist of load path elements.
[16-10]



TYPICAL LOAD PATH ELEMENTS
FIGURE 16-10