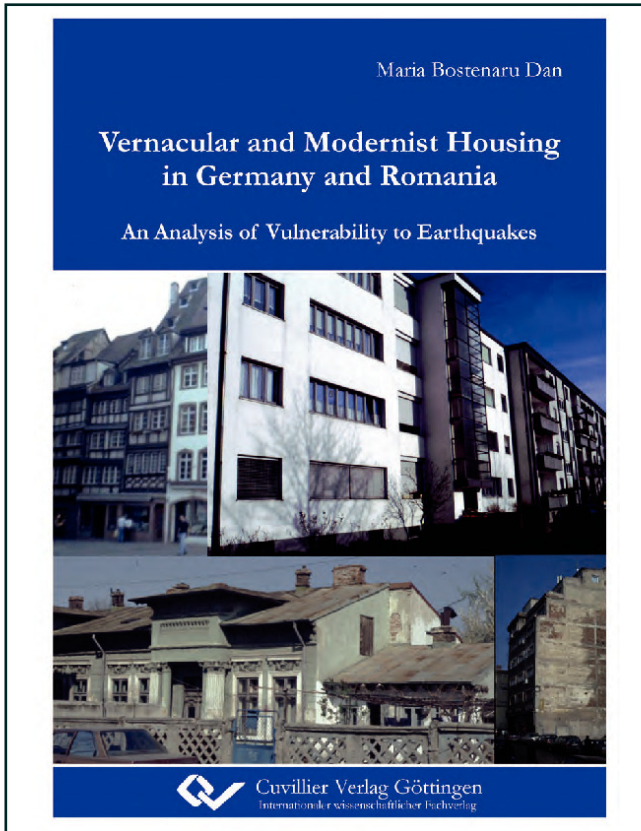




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Vernacular and Modernist Housing in Germany and Romania
An Analysis of Vulnerability to Earthquakes



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**Traditional housing in Germany:
Half-timbered house in the "border triangle"
(Fachwerkhaus in Dreiländereck)**

(Report # 108 in the "World Housing Encyclopedia"
<http://www.world-housing.net/>)

Summary

This type of construction can be found in both the urban and rural areas of Germany, Switzerland, northern France, and England. The main load-bearing structure is timber frame. Brick masonry, adobe, or wooden planks are used as infill materials depending on the region. This report deals with the two latter types, because they are located in areas where strong earthquakes occur every century. However, this construction has proven particularly safe, and some of the buildings have existed for 700 years. These buildings have characteristic windows and a rectangular floor plan, with rooms opening to a central hall, which were later replaced by a courtyard. Typically, each housing unit is occupied by a single family. While in the past this was the housing of the poor, today affluent families live in these historic buildings. The load-bearing structure consists of a timbered joists and posts forming a single system with adobe or wooden infill. The walls consist of a colonnade of pillars supported by a threshold on the lower side and stiffened by crossbars and struts in the middle. On the upper part they are connected by a "Rahmholz." The roof is steep with the gable overlooking the street. The floors consist of timber joists parallel to the gable plane with inserted ripples. The only notable seismic deficiency is the design for gravity loads only, while numerous earthquake-resilient features - the presence of diagonal braces, the achievement of equilibrium, the excellent connections between the bearing elements, the similar elasticity of the materials used (wood and eventually adobe) and the satisfactory three-dimensional conformation - have completely prevented patterns of earthquake damage. Since 1970, buildings in Switzerland are regulated by earthquake codes (latest update 1989). The 2002 edition will incorporate EC8 recommendations.

1. General Information

This kind of building can be found in Switzerland (fig. 2-2) in regions located at a specific distance from mountainous areas, in northern France (figures 2-6 and 2-7), and in southern (fig. 2-3) to central (fig. 2-5) Germany as well as in Tirol. Uhde (1903) documents the existence of such buildings in France in Normandie, Bretagne and Alsace (Dreux, Laval, Annonay, Bayeux/stone infilled), Morlaix, Dol, Yville, Compiègne/stone infilled, Rouen, Rheims, Abbeville, Boulogne,

Beauvais, Angers, Lisieux, St. Brioux, Caen, Strassbourg). Except in central Germany, these areas are affected by Alpine earthquakes with epicenters originating in Switzerland. The earthquake on the 22nd of April, 1884 was recorded to badly damage the area of Essex in England. Buildings of this type remained nevertheless well preserved. Some of many half timbered house in the town centre of Colchester, Essex, England are illustrated on <http://www.camulos.com/virtual/guidec.htm> (2004), the Virtual Tour of Colchester. Uhde (1903) documents such buildings in England (Shrewsbury, Coventry, Cheshire, Lanchshire, Darthmouth, York, Bristol, Chester). This type of housing construction is commonly found in both rural and urban areas.

See figure 2-1 for examples of urban and rural buildings of this type in southern and central Germany.

This construction type has been in practice for less than 100 years.

Currently, this type of construction is being built. In Germany, there are about 2 million houses of this type (source: <http://www.fachwerk.de/fachwerkhaus/fachwerk.html>, 2004). The "new" ones began to be built after 1970 (fig. 2-4). This type of housing has been constructed in this area since Roman times (Uhde, 1903). The first documented building is a house constructed with 2 upper and 2 roof stories in Marburg in 1320. Most of those still existing, however, are 150 years older than this one. The historical development can be seen at: http://www.fachwerk.de/fachwerkhaus/15_Jahrhundert.html (2004) - 15th century
http://www.fachwerk.de/fachwerkhaus/16_Jahrhundert.html (2004) - 16th century
http://www.fachwerk.de/fachwerkhaus/17_Jahrhundert.html (2004) - 17th century
http://www.fachwerk.de/fachwerkhaus/18_Jahrhundert.html (2004) - 18th century
http://www.fachwerk.de/fachwerkhaus/19_Jahrhundert.html (2004) - 19th century Particularly relevant ist the information on the homepage of the town of Wetzlar in mid-Germany, featuring a house from exactly 1356 (the year of the big earthquake in Basel, Switzerland); a typical middle age building:

http://www.wetzlarvirtuell.de/asp/main_frame_addr.asp?address_id=1

15 (2004) Abraxas Basel GmbH (2004) documents on the own webpage their domicile in a half-timbered house in Basel, protected as monument. The construction type is said to correspond to that of the 12th century, when the house was built: between two sandstone struts of the church of St. Martin, and that it survived the big earthquake of 1356. The back is built by a natural rock. It has several upper floors and was carefully renovated by the owners over more years: View from inside at: <http://www.meteoriten.ch/www/laden1.html> (2004); View from outside at: <http://www.meteoriten.ch/www/laden.html> (2004).



Figure 2-1: "Fachwerk" houses in Germany: a. in an urban area; b. and c. in rural areas; a. and c. southern Germany; b. central Germany. a. and c. photos by Michael Kauffmann, 2004, b. by Maria Bostenaru, 1997.

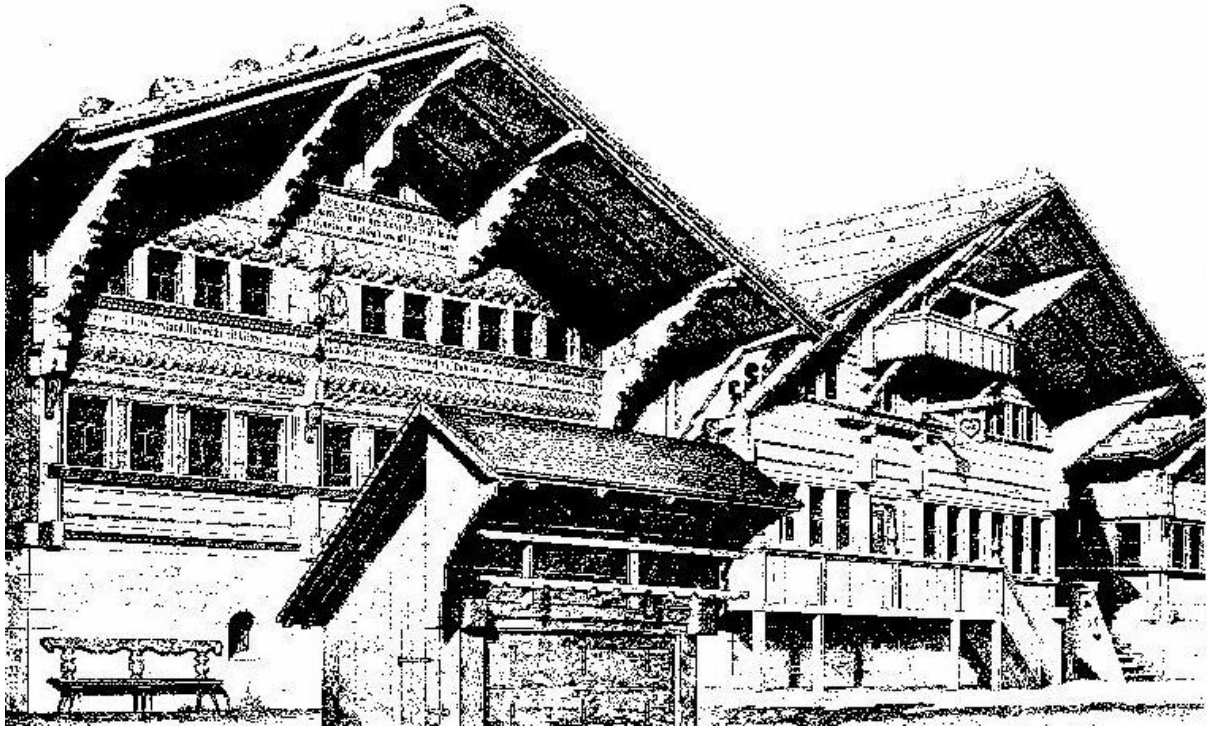


Figure 2-2: Historical houses in Switzerland. Source: Uhde (1903), Fig. 354 on page 305, after Gladbach.



Figure 2-3: House from mountainous areas from Southern Germany. Photo by Michael Kauffmann, 2004.