



7.2 • The analogy between a tree and road network structure. How many connotations are implied?

at least connect to another branch, or to a limb or the trunk. For the road network, this means that principal routes should all connect up, to form a single contiguous network. This equates with the property of *arteriality* (Box 3). It reinforces the establishment of differentiation and ordering (conditions 1 and 2); indeed, it may suggest them in the first place.

The fourth condition is the *allowable connections* between different types of element. As applied to roads, this condition may be referred to as *access constraint*. It suggests that a residential road should not connect directly to a motorway, except via intermediate distributors.

We can pause in our progress through the tree analogy, to consider where we have got to so far. Already we have four separately identifiable conditions of hierarchy (although they seem to be linked in some ways). These four kinds of conditions can be seen manifested in actual street typologies used in practice. Some examples are given in Table 7.1. In the examples in Table 7.1 – and road networks in general – the structural conditions are normally cumulative: those lower in the table are assumed to incorporate the structural conditions higher in the table. The full set of four conditions represents what conventional road hierarchy is about.

From these first four structural conditions, we have a fairly comprehensive sense of hierarchy – but not as yet any suggestion of the actual configuration of routes. In other words, although these four conditions are embodied in the structure of a tree or a road network, we have yet to make any specification for the ‘tree’ structure of mathematical abstraction (a branching structure with no circuits). As far as the road network is concerned, although a ‘hierarchical’ network may have access constraint, there is not yet a suggestion that minor roads might not form a complete

Table 7.1 Four kinds of road hierarchy relating to the first four structural conditions in Figure 7.3

Structural condition (Figure 7.3)	Example of typology/hierarchy
1. Differentiation	Streets and squares; Poundbury (Figure 2.9)
2. Ordered ranking	Typologies based on street width (form), traffic flow (use), etc.
3. Necessary connections	Designation by arteriality – as with national inter-urban networks (Figure 3.15)
4. Allowable connections	Access constraint built into modern road layouts; conventional urban road hierarchy

Note: In road networks, the structural conditions are normally cumulative: those below are assumed to incorporate those above.