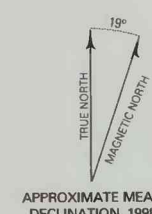


**EXPLANATION**

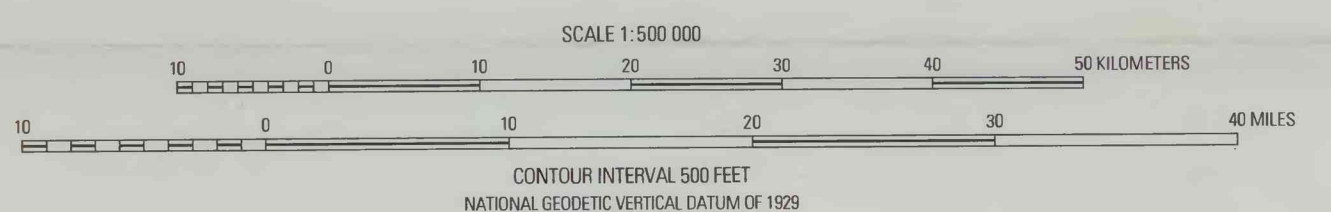
Ground failures induced by the April 13, 1949, Olympia earthquake and the April 29, 1965, Seattle-Tacoma earthquake are indicated by the following symbols

- ▲ Landslides (1949)
  - △ Landslides (1965)
  - Ground settlement (1949)
  - Ground settlement (1965)
  - ◆ Ground cracks (1949)
  - ◇ Ground cracks (1965)
  - Sand boils (1949)
  - Sand boils (1965)
  - ★ Miscellaneous effects (1949)
  - ☆ Miscellaneous effects (1965)
- Includes rotational slides (slumps), translational slides, rockfalls, soil falls, lateral spreads, flows, and avalanches
- Settlement of the ground surface not clearly related to landsliding
- Includes surface cracks in soil and rocks, and cracks in foundations, sidewalks, patios, and so forth that are possible indicators of ground settlement and (or) incipient landsliding
- Ejection of ground water or ground water and sediment from cracks or vents at the ground surface
- Includes broken underground water pipes and gas lines, permanent bridge and piling displacements, bent or broken well pipe, disruption or change in water well or spring flow, and other effects that are commonly associated with ground failure but are not in themselves conclusive evidence of ground failure

120 Location number corresponding to ground failures described in table 31



Base from U.S. Geological Survey, Washington State, 1982  
Lambert conformal conic projection based on standard parallels 33° and 45°  
50,000-meter grid, zones 10 and 11: Universal Transverse Mercator  
1927 North American datum



**LOCATION MAP OF GROUND FAILURES  
IN THE CASCADE RANGE, WASHINGTON, REGION**

By  
Alan F. Chleborad and Robert L. Schuster  
1998