GRAVITY SURVEY OF THE COLWOOD SECTION OF THE LEECH RIVER FAULT

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The purpose of this survey is to determine the position of the Leech River fault in an area of glacial cover between Langford Lake and Esquimalt Lagoon through the Colwood area of greater Victoria.

The approximate position of the fault is known from the early works of Clapp (1912). It crosses 60 kilometres of the southern tip of Vancouver Island, trending in an east-southeast direction from a point near the west entrance of Juan de Fuca Strait to the vicinity of Brochy Ledge in the strait immediately south of the Fairfield-James Bay area of Victoria.

The fault is a major geological boundary that marks the contact between oceanic and continental plates. The success of the gravity survey relies on the density difference between the Metchosin oceanic basalts (specific gravity ~3.0) south of the fault and the Leech River metasedimentary and volcanic rocks (specific gravity ~2.67) to the north.

The survey comprises 43 stations on three northeast-trending lines across the projected course of the fault (Figure 1). The precise route of the survey takes advantage of recently published municipal topographic bench marks (British Columbia Ministry of Environment, Map Project No. 79-087 T-C) and various well-known thoroughfares including Jacklin Road on the west, Lagoon Road on the east, and Wishart Road-Sooke Road-Old Island Highway in the centre. The gravity reference station for the survey is No. 9282-60 with a local gravity value of 980959.31, established on the window sill at the northeast corner of the main Legislative Building in Victoria.

The course and attitude of the fault is defined by inflections in the profile of observed gravity readings (Figure 2a, b, and c). The profile along Jacklin Road is most definitive owing to good spacing of the stations and probably thin glacial cover in this area. One point on the fault is indicated by a sharp inflection in readings observed near station 5. A flat profile on the north passes to a steady increase in gravity values on the south. The profile for the Wishart Road-Sooke Road section which places the fault near station 27 is similar. Control of the exact positions of the fault in this case is not as good owing to a large gap between stations 27 and 28. The Lagoon Road section is least definitive of the three lines showing only a gradual increase in gravity readings to the south. This relatively subdued profile probably results from a great thickness of relatively low specific gravity sand and gravel over the Metchosin basalts. A small notch in the profile near station 38 may mark the position of the fault.

The combined evidence from the three profiles seems to give a fairly accurate location for the Leech River fault through the Colwood area. The fault strikes 117 degrees, bisects Jacklin Road and Esquimalt Lagoon, and

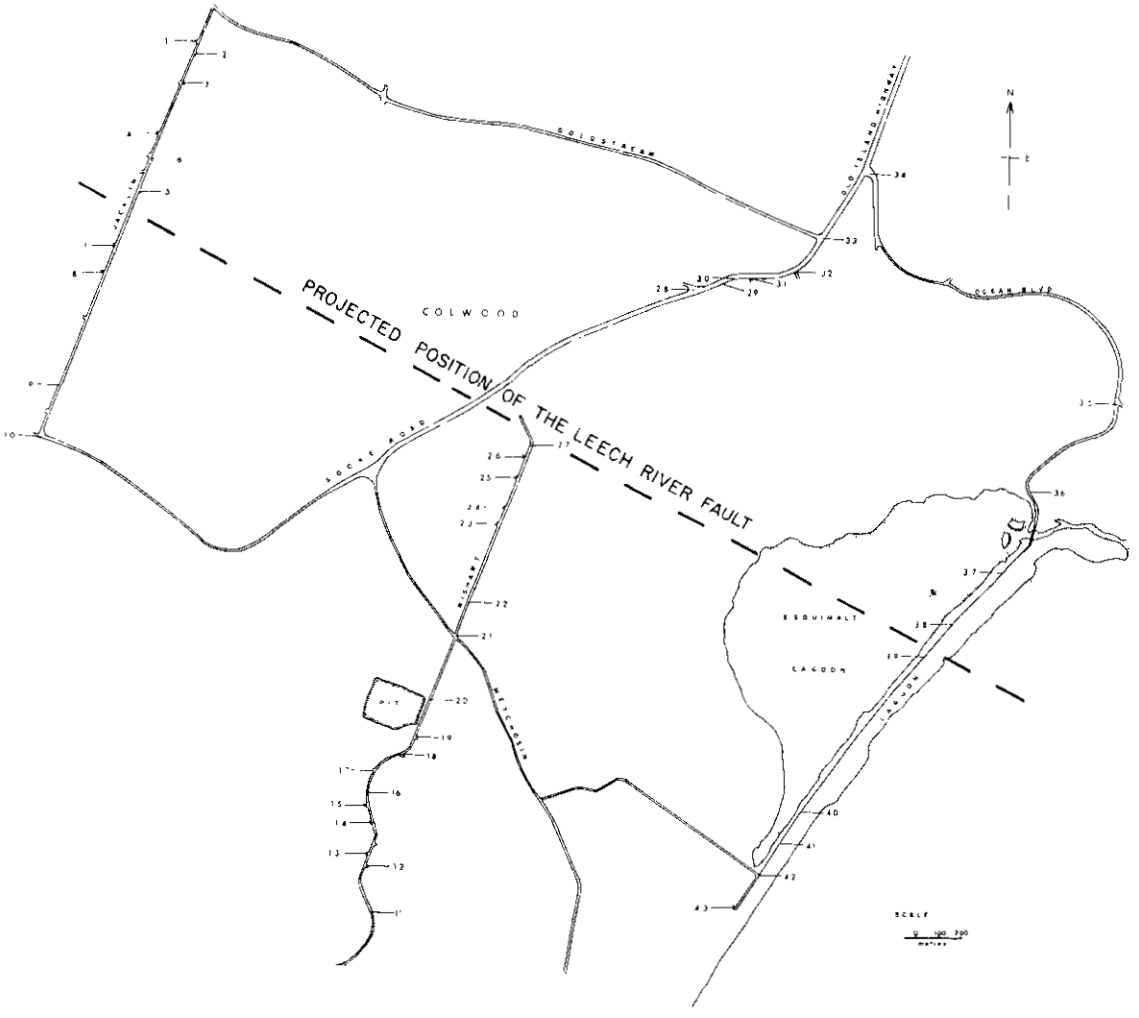

Figure 1. The projected position of the Leech River fault in the Colwood area from gravity stations on the Jacklin Road, Wishart Road-Sooke Road, and Lagoon Road sections.

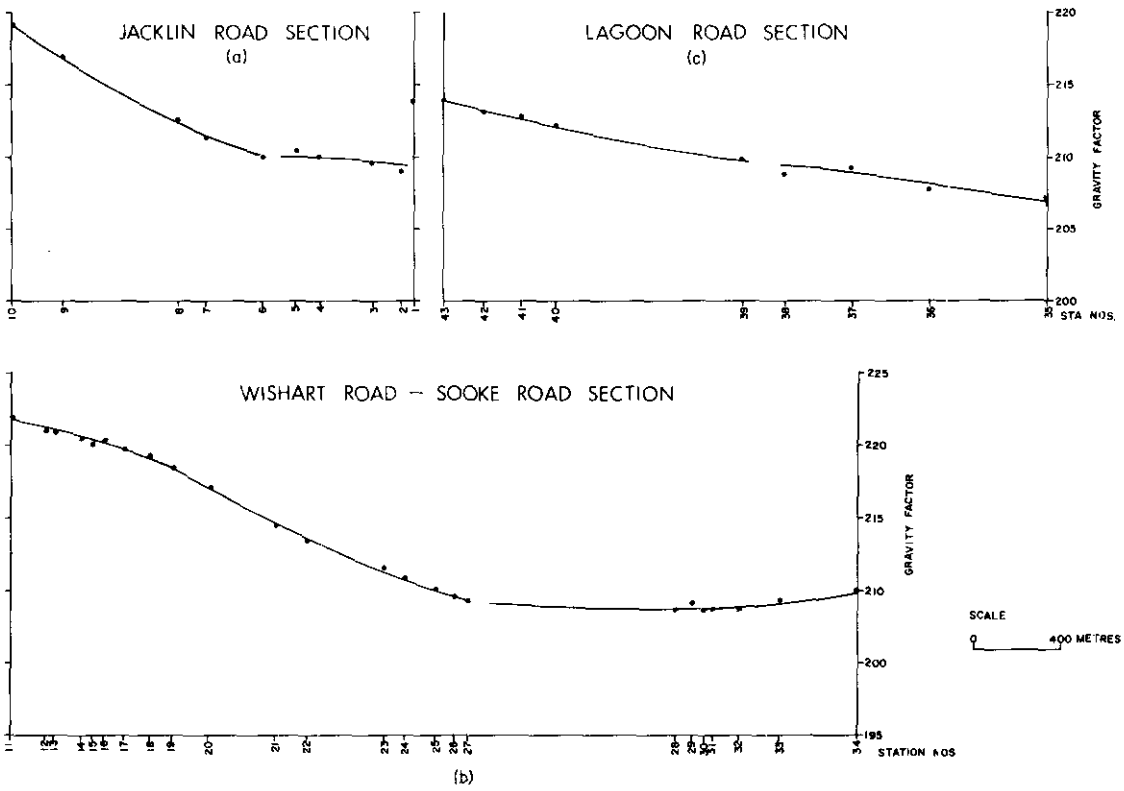

Figure 2. Relative gravity sections in the Colwood area.

passes just north of the north end of Wishart Road. The steady increase in gravity readings south of the fault suggests some decrease in thickness of sialic crust southward and suggests that the fault dips southward. There is no evidence from this study on the direction or magnitude of motion along the fault although the marked geological differences suggest that it is large. It is anticipated that additional gravity readings in the area and careful modelling of the results will provide more information about the attitude and displacement of this important fault.

REFERENCE

Clapp, C.H. (1912): Geology of the Victoria and Saanich Map-Areas, Vancouver Island, B.C., Geol. Surv., Canada, Mem. 36, 143 pp.