



Figure 1. Brightwater Wastewater Treatment Plant Site near Route 9 and Route 522 in southern Snohomish County, Washington. Base is composite Landsat image.

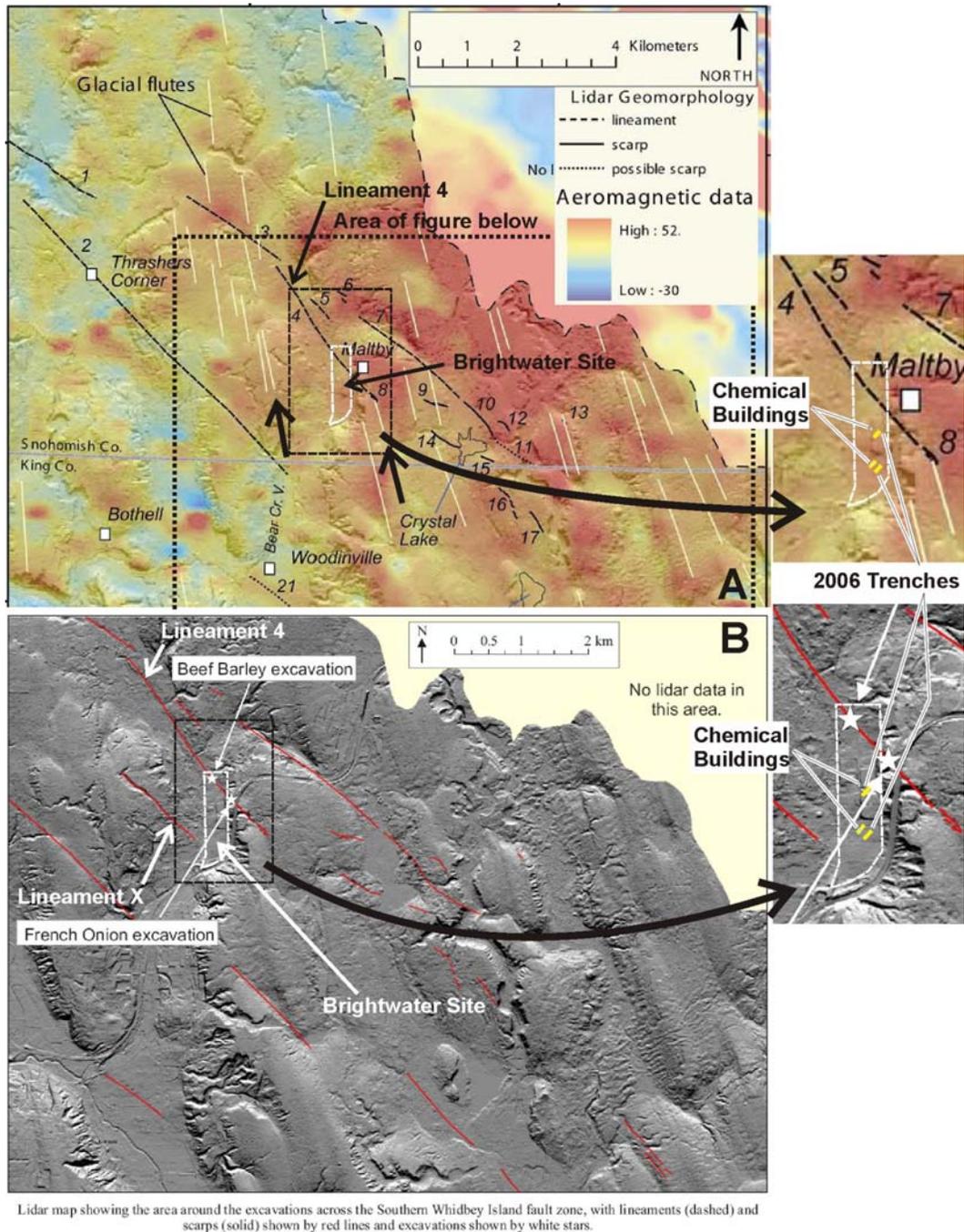


Figure 2. Aeromagnetic data, LiDAR geomorphology, and LiDAR scarps and lineaments in the Brightwater site vicinity. A. From Blakely et al. (2004, Figure 15A). Black numbers refer to lineaments discussed in Blakely et al. (2004). Notation to Lineament 4 was added for this report. White lines are “glacial flutes” (glacially scoured upland ridges). Heavy black arrows point to glacially scoured ridges to east and west of Brightwater site. B. From Sherrod et al. (2005a). Red lines represent lineaments and scarps in LiDAR data. Brightwater site, Lineament 4, and Lineament X notations were added for this report.

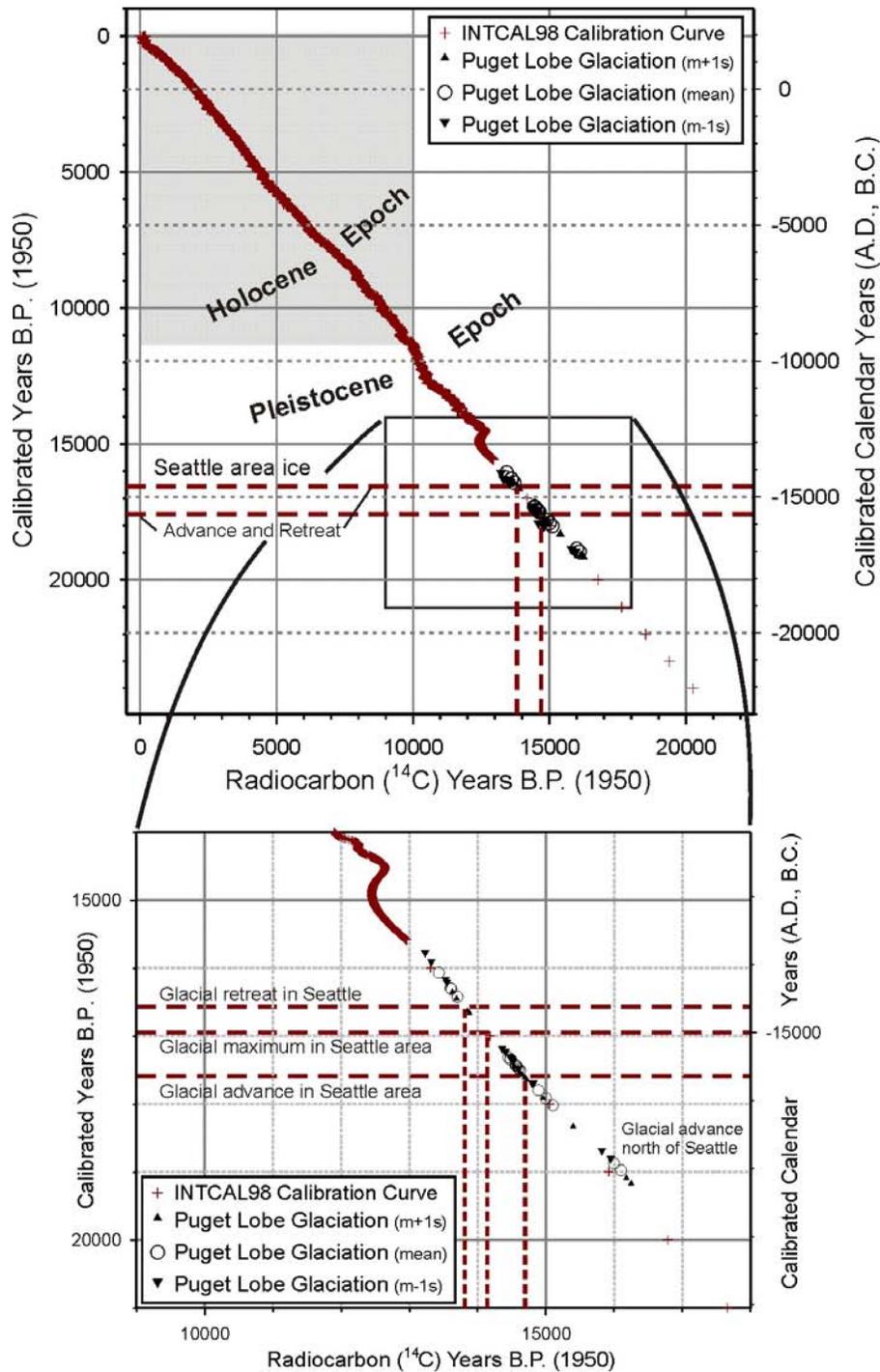


Figure 3. Relations among radiocarbon ages and calibrated years before present for the period during the most recent advance and retreat of glacial ice in the Puget Sound region. INTCAL98 calibration curve from Stuiver et al. (1998) (URL <http://radiocarbon.pa.qub.ac.uk/calib>). Ages for advance and retreat of Puget Lobe of the Cordilleran Ice Sheet from Porter and Swanson (1998).



Figure 4. Chemical building and seismic trench locations. Aerial photograph base showing land use as of 2000. NAD 83 HARN, Washington State Plane North Zone feet.

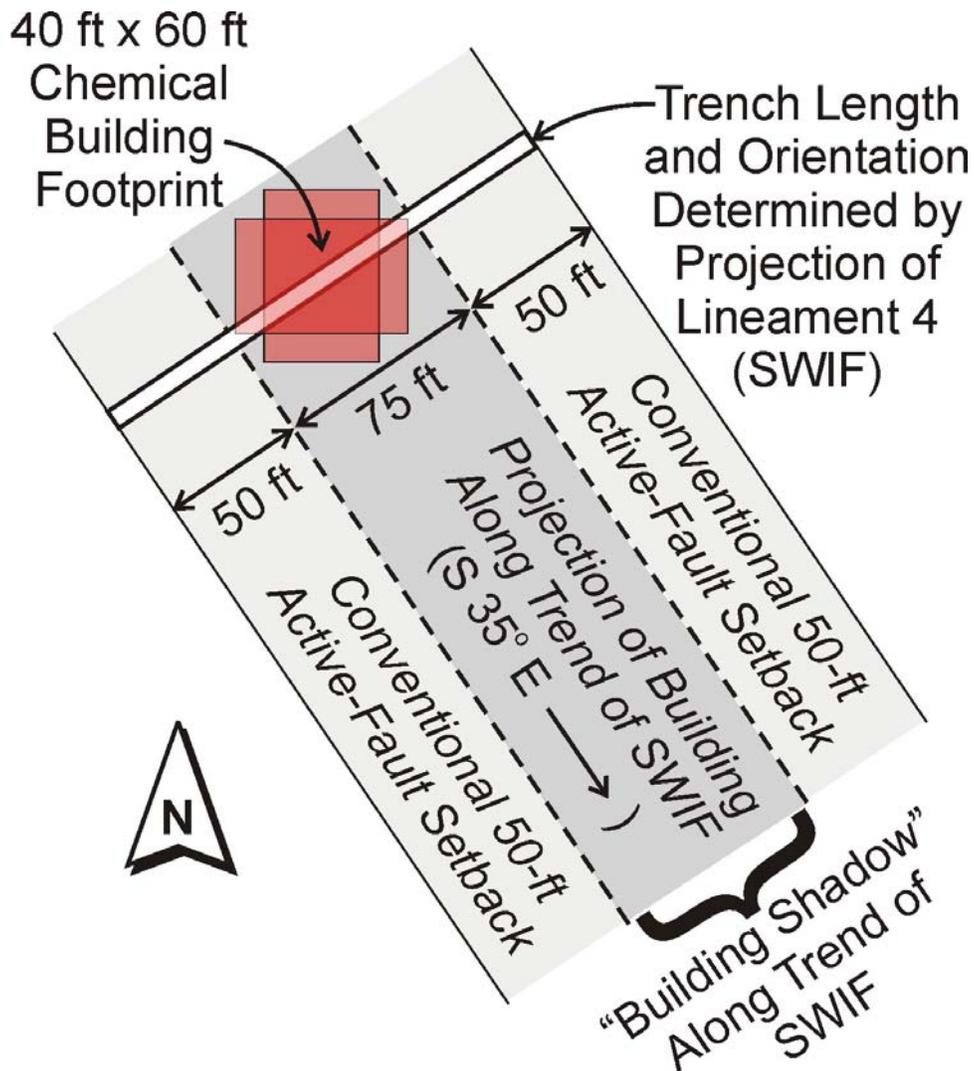


Figure 5. Diagram illustrating the reasoning for length and orientation of seismic trenches at the Brightwater site.



Figure 6. Photographs of Trench South 1. A. View looking northeast at main trench with sloping sides. B. View looking southwest at main trench with hand-excavated vertical walls and benches. C. View looking east at Trench South 1a with Trench South 1 visible to right. D. View looking east at main trench with hand excavated bench (right) and Trench South 1a (left). E. View looking north at Trench South 1b across sloping wall of main trench. F. View looking northwest at Trench South 1c, which consists of two hand excavated vertical faces separated by a bench.

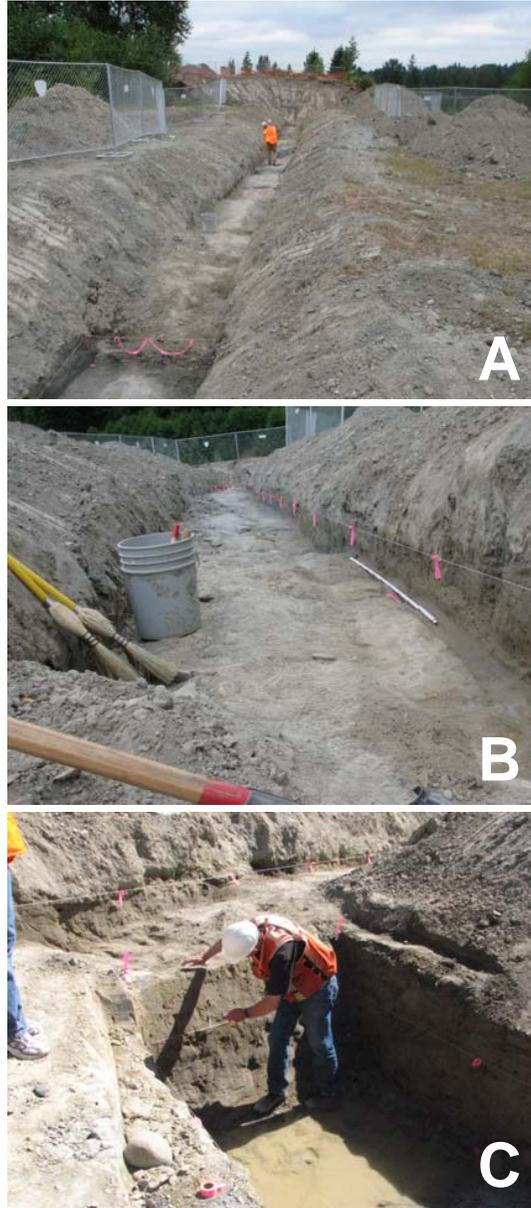


Figure 7. Photographs of North Trench. A. View looking southwest along trench showing sloped walls above with small vertical walls below; steep slope at southwest end of trench is visible in distance. B. View looking northeast along trench. C. View looking south at pit excavated adjacent to North Trench.



Figure 8. Photographs of Trench South 2. A. View looking southwest at Trench South 2a showing terraced walls. B. View looking east at Trench South 2a showing terraced walls. C. View looking southwest at Trench South 2a with beginning of excavation of Trench South 2b visible to right; note that the pad has been excavated by 3 feet. D. View looking northeast at Trench South 2b under construction (right) and Trench South 2a (left). E. View looking northeast at Trench South 2b with northeast end of Trench South 2a visible. F. View looking southwest at Trench South 2a (right) and Trench South 2b (left).



Figure 9. Liquefaction features in Trench South 1 and Trench South 1c.

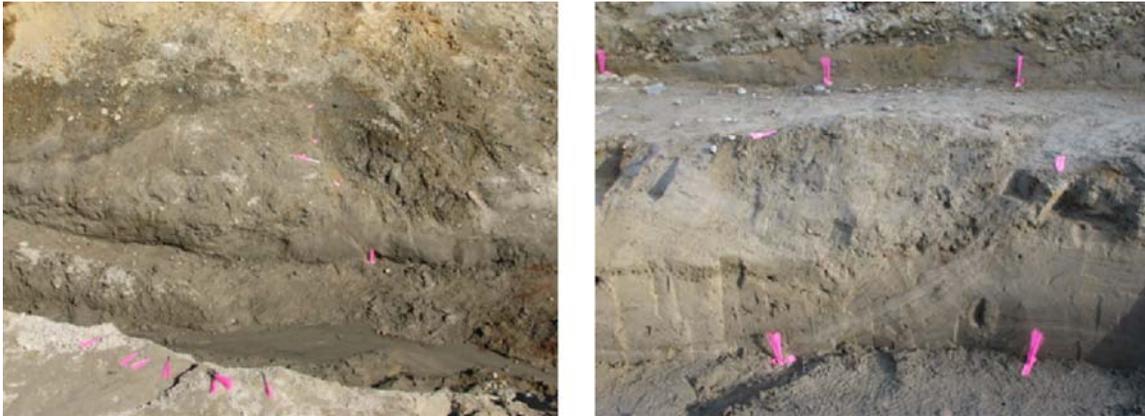


Figure 10. Curvi-planar feature at about Sta 0+28 in Trench South 1 and on the opposite side of the excavation in Trench South 1c.



Figure 11. Undeformed deposit of very dense stratified gravelly sand-sandy gravel overlying the curvi-planar feature in Trench South 1c.



Figure 12. Base of the diamict unit at the location of the curvi-planar feature in Trench South 1 and Trench South 1c.



Figure 13. Thin fine sand and silt filaments along the curvi-planar feature in Trench South 1c.



Figure 14. Bodies of till with bedded sandy coarse gravel, massive sand, and thinly bedded sand in Trench South 1a.

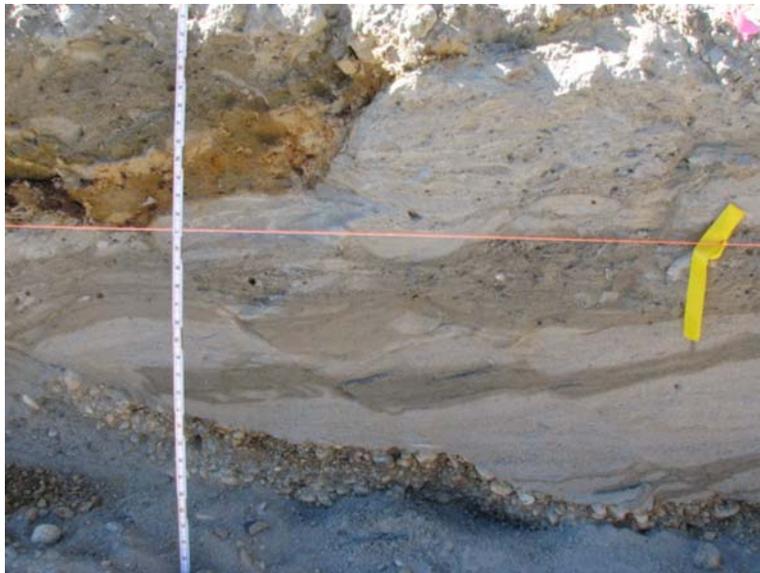


Figure 15. Two small glacial faults with approximately one inch of down-to-the-east normal separation observed in a sand unit at Sta 0+47 to 0+50 in Trench South 1b.

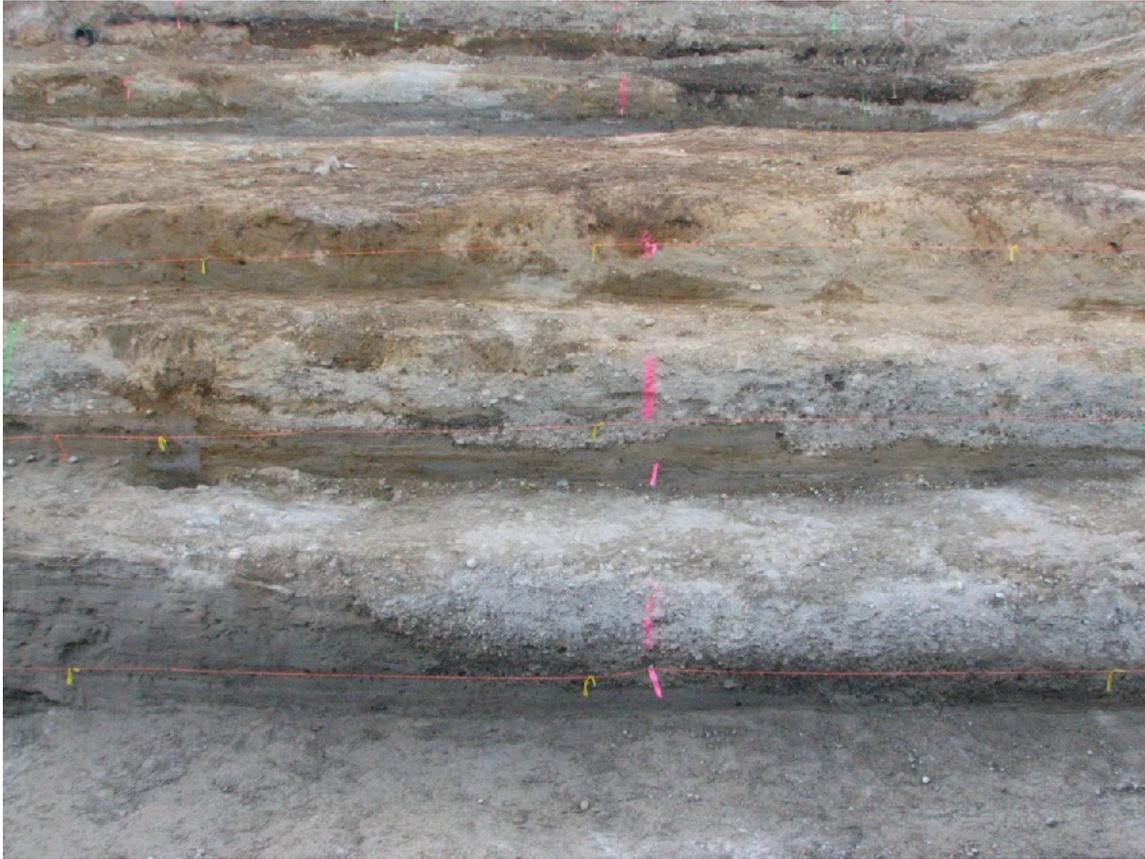


Figure 16. Cut-and-fill structures in Trench South 2a.



Figure 17. Inclined beds in Trench South 2a.

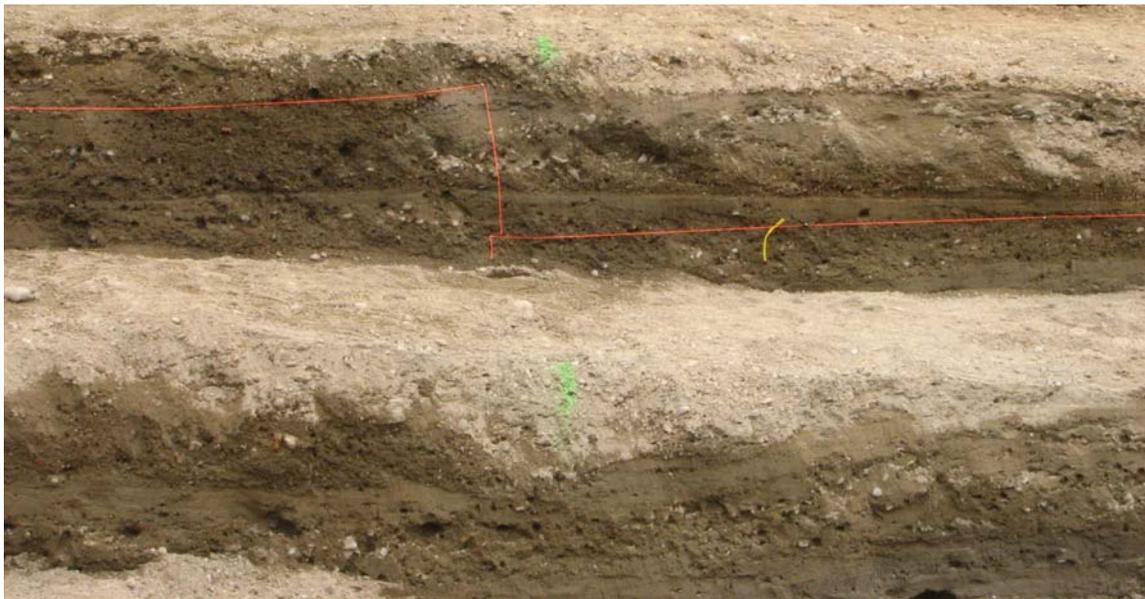


Figure 18. Gently dipping recessional deposits overlying inclined beds in Trench South 2a.



Figure 19. Liquefaction feature at Sta 0+97 in Trench South 2a showing disturbed sand containing moderately large rotated fragments of laminated silty sand.



Figure 20. A small, steeply dipping liquefaction "fault" on the bench above the liquefied zone in Trench South 2a at Sta 0+99.



Figure 21. Gravel channel above liquefaction feature at Sta 1+05 in Trench South 2a. The shape and configuration of this channel is similar to a feature described by Obermeier (1996, Figure 7.10) in Charleston, SC, which he interpreted to be a filled crater created by liquefaction in an event that predated the 1886 Charleston earthquake. The liquefaction feature appears to be eroded and preferentially backfilled with late-stage Vashon recessional deposits.

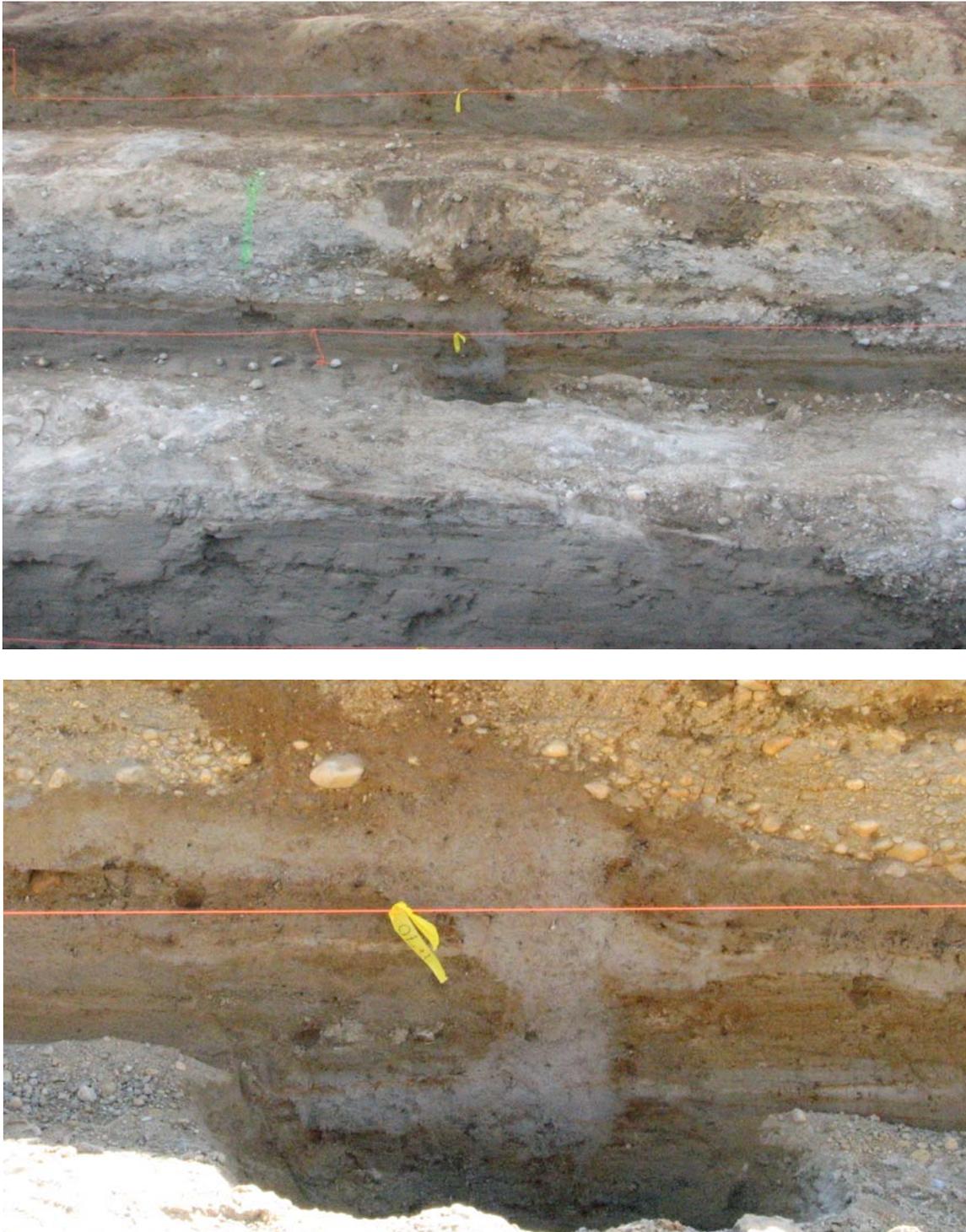


Figure 22. Liquefaction- feature exposed at Sta 1+70 in Trench South 2a.



Figure 23. Several small glacial faults at Sta 0+72 in Trench South 2a.

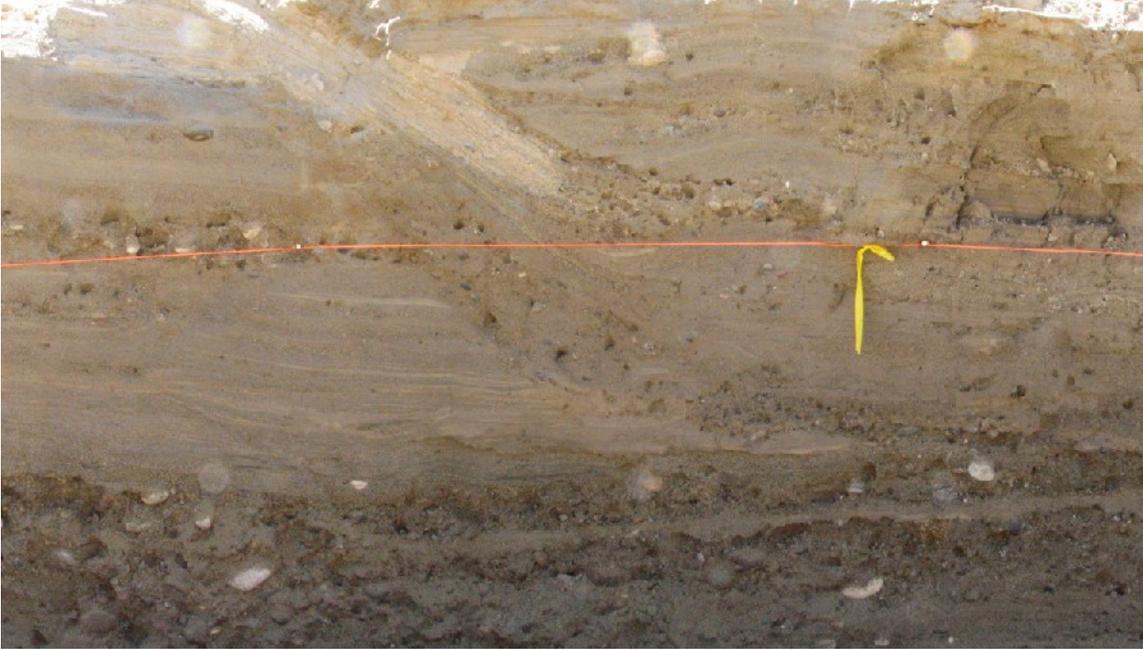


Figure 24. Buttress unconformity feature exposed in Trench South 2a at Sta 1+57.



Figure 25. Glacial erratic boulders at Sta 0+96 and Sta 1+10 in Trench South 2b.



Figure 26. Esker-form gravel deposit at Sta 0+65 in Trench South 2b.



Figure 27. Buttress unconformity at Sta 1+22 in Trench South 2b.



Figure 28. Contorted beds and small glacial or liquefaction faults in sand and silt layers adjacent to buttress unconformity in Figure 26.

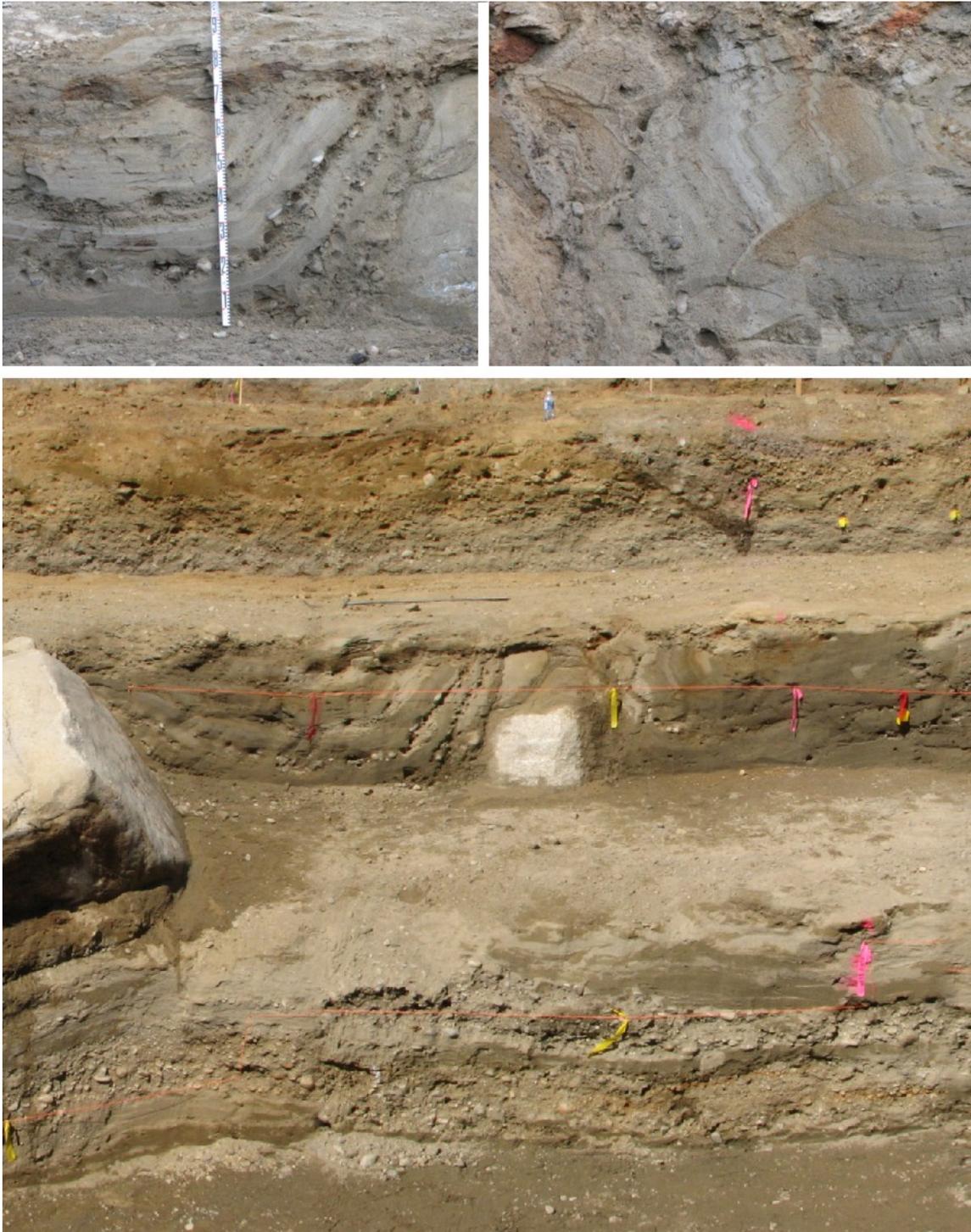


Figure 29. Local deformation in silt deposits adjacent to glacial erratic boulder at about Sta 0+93 and Sta 1+00 in Trench South 2b.



Figure 30. Cracks in the diamict in the North Trench.

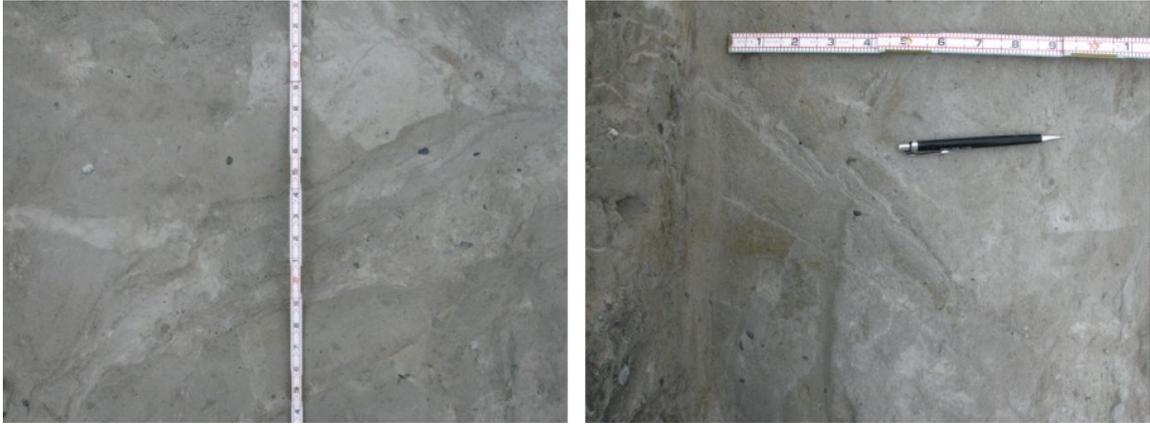


Figure 31. Very small component of left lateral separation on crack in the North Trench.



Figure 32. Simple tension cracks in the North Trench.

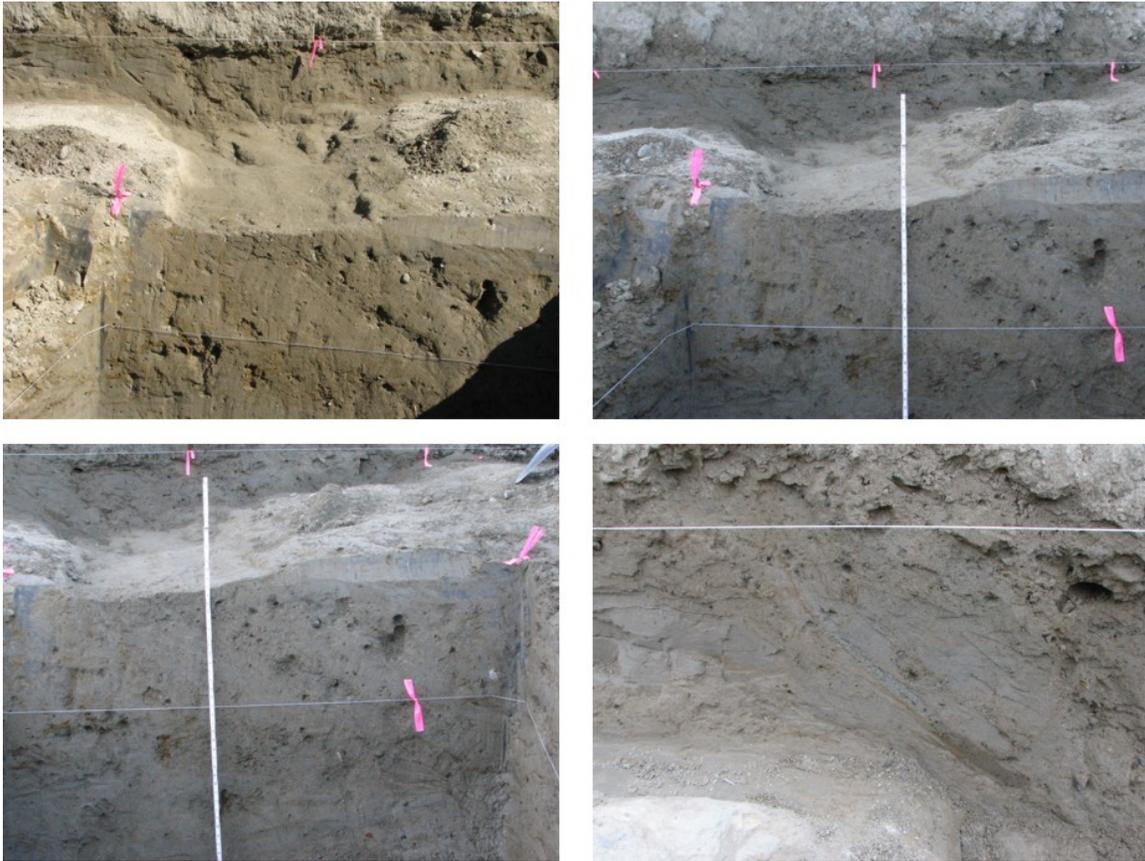


Figure 33. Curvi-planar feature exposed at about Sta 1+08 in the North Trench.

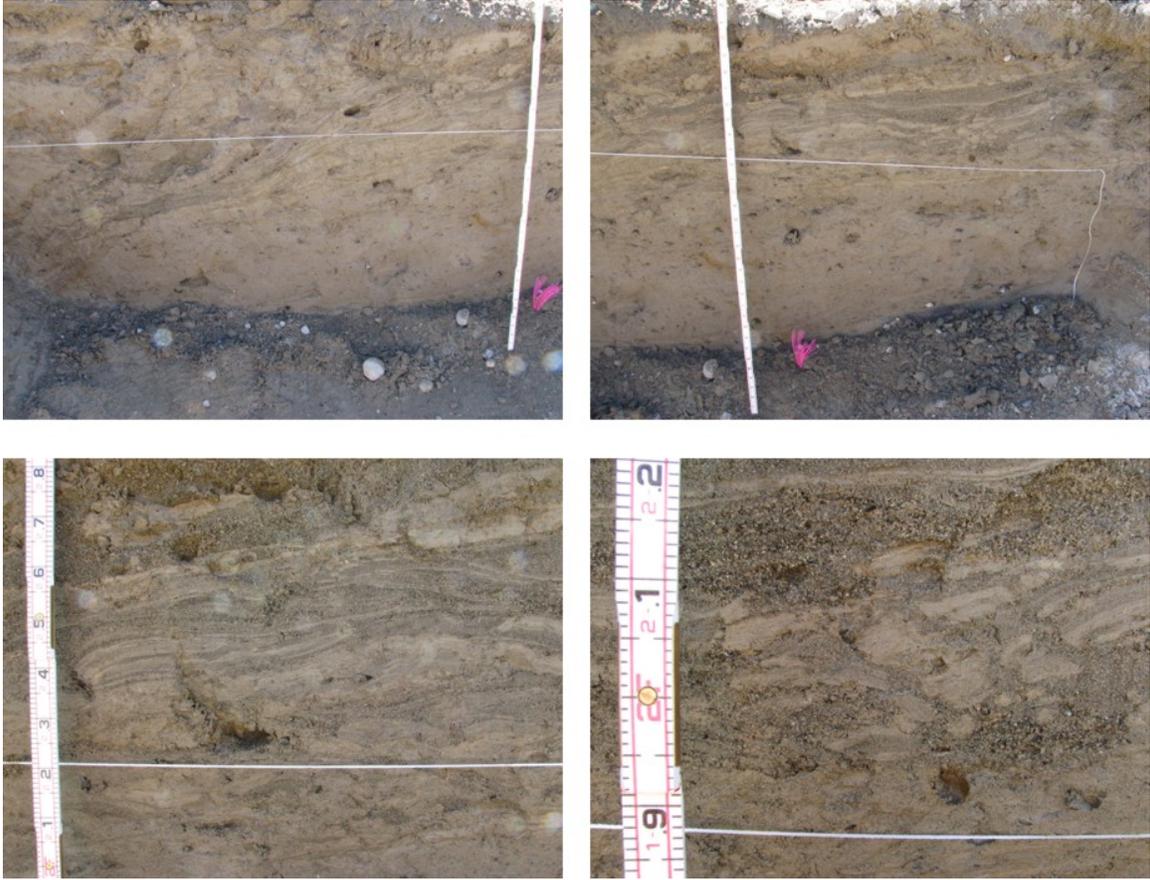


Figure 34. Wavy, thin sand and silt filaments along the curvi-planar feature exposed in small pit adjacent to the North Trench.

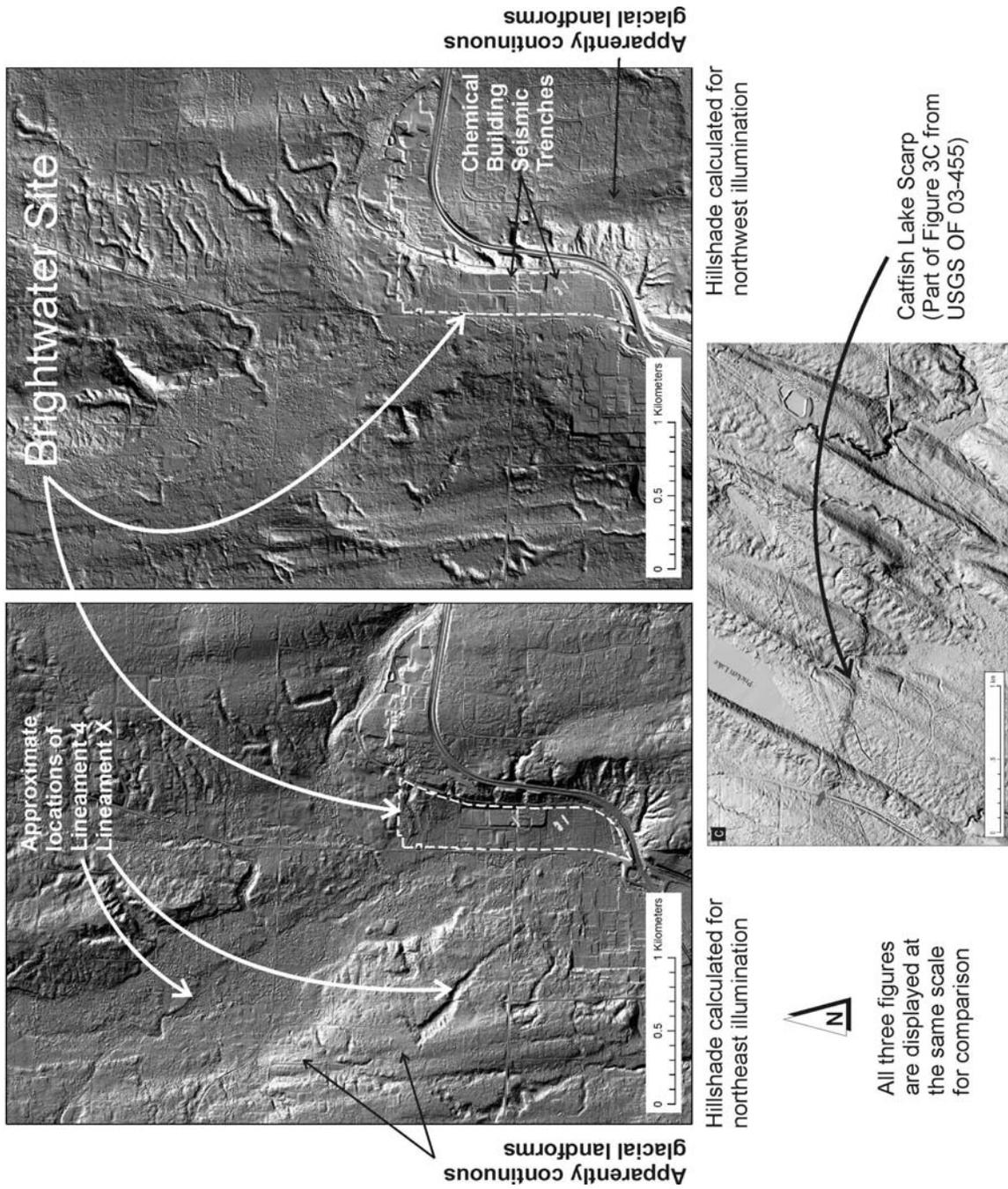


Figure 35. Comparison of LiDAR images of the Catfish Lake scarp area from Sherrod et al. (2003) and the Brightwater site area (Puget Sound LiDAR Consortium – King County data).

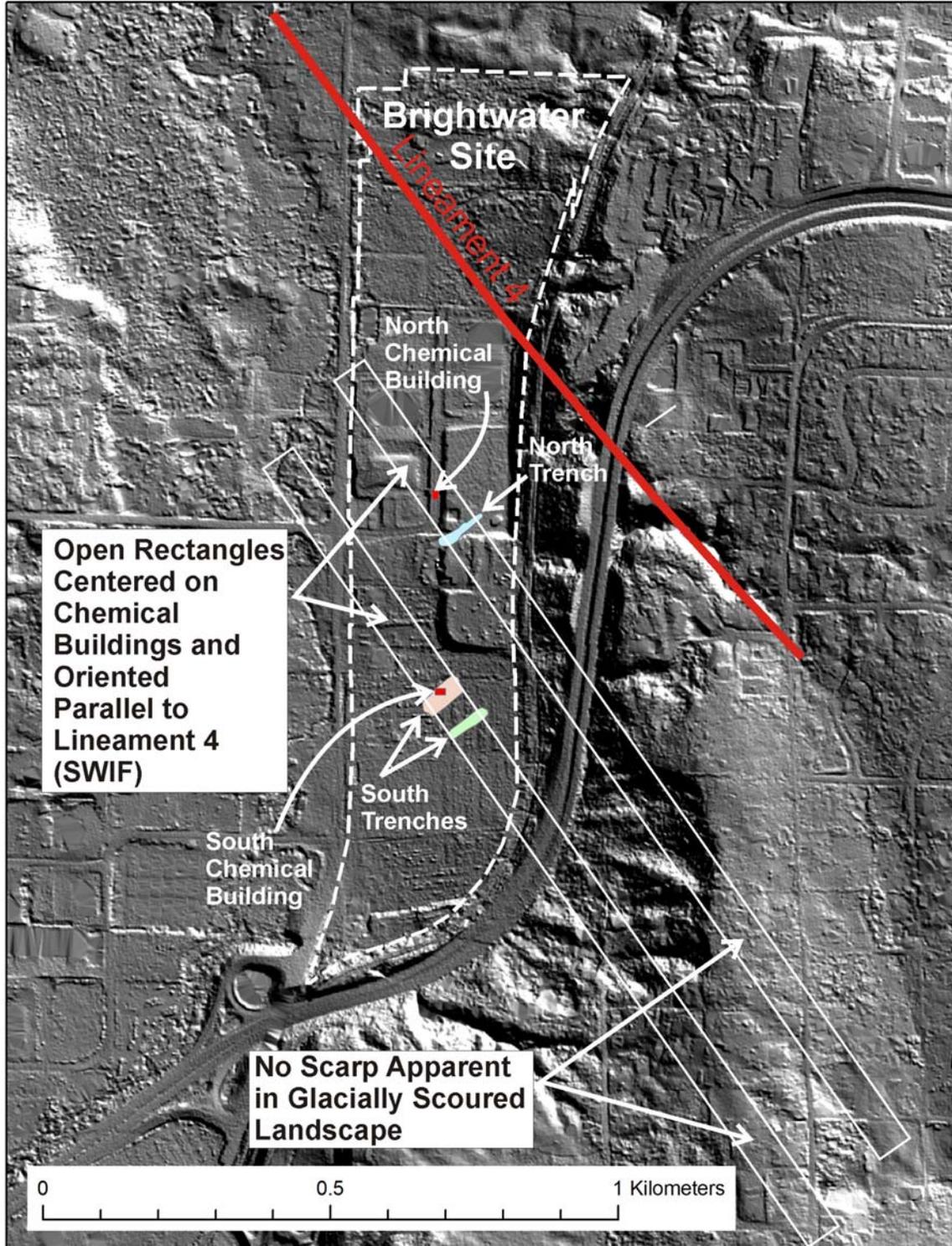


Figure 36. LiDAR image of the Brightwater site area showing open rectangles centered on the two Chemical Buildings and oriented parallel to Lineament 4 (SWIF). Lineament 4 position is from Sherrod et al. (2005a). LiDAR hillshade calculated for northeast illumination.