

# The Potential for Pre-Laramide Fault Inheritance in the Livingston Fault, Boulder County, CO



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*The following is an excerpt from a longer piece. For the full text, please scan the QR code.*

## **Abstract**

This study focused on the structural geology along a section of the Livingston fault to assess its potential for pre-Laramide fault features. The Livingston fault is one of many northwest-striking faults in the Boulder County area known to be active during the Laramide orogeny (70-50 Ma), but no in-depth mapping has been done since the 1990s. Since then, the knowledge of deformation mechanisms has drastically expanded. A combination of fieldwork and work in the lab was used to map and assess brittle features attributed to the Laramide and potential older features along the fault. Fieldwork involved mapping the extent of brittle deformation and taking measurements of brittle and ductile features and recording kinematic indicators, as well as sample collection. Several samples were prepared into thin sections and analyzed under a petrographic microscope for microstructures. Multiple sites in the study area exhibit mylonitic (ductile) foliation that are older than 70 Ma and likely Precambrian in age. Several of these mylonite zones occurred directly along a north-northwest striking segment of the Livingston fault and are oriented parallel to cataclasite and fault surfaces. Both the brittle and ductile features display variations that cannot be fully explained by the data here, but opens the door for multiple paths of study that would assess regional sense of motion and timing of deformation events. Ultimately this study offers compelling evidence for pre-Laramide fault inheritance along the Livingston fault and highlights a need to revisit faults in the Front Range that have not been studied in depth since the 1990s and investigate the potential for pre-Laramide fault inheritance along them, applying modern knowledge of deformation. Perhaps additional findings may be found and help to answer questions regarding the history of the Front Range and the Rocky Mountains at large, on a variety of timescales.