REGIONAL VARIATION IN STABLE LANDFORMS
-And How Critical Elements Can Be Used To Design Reclamation Landforms[1]

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Abstract. Long-term stability against erosion is a primary criterion for reclamation landform design. Conventional reclamation design elements include constant-gradient slopes combined with various methods to redirect and slow runoff from the slopes. These methods can include gradient terraces, rip-rap, erosion control blankets, rock-filled gabions, concrete linings or blocks, etc. Reclamation landforms built using these methods depart considerably from the stable natural landforms surrounding them, both in performance and appearance.

Designing a reclamation landform that is as stable as pre-disturbance natural landforms has long been a criterion for designers. Other reclamation landform criteria that are desirable include providing habitat niches that support diverse populations of vegetation and animal life, providing acceptable runoff water quality, requiring no maintenance, and having low construction costs.

Designing a reclamation landform that is similar to the stable natural landforms in a project area can provide a high degree of confidence that all these criteria can be met. The stable landforms in a project area have integrated the affects of soil properties, vegetation, and local climate to achieve stability. The designer must understand the essential elements of those stable landforms and how to incorporate them into the reclamation design. The GeoFluv™ approach identifies these essential elements, measures them in the project area, and uses them as inputs to a reclamation landform design process.

This paper discusses these essential design elements, and compares the results of using these values measured in different areas of the eastern and western United States to design reclamation landforms. The comparison is made by using the same three dimensional surface file as a starting point, and then introducing the regional variables into the design process to complete the designs for stable landforms according to fluvial geomorphic principles for each area. The resulting landform designs vary significantly, as required for stability in the respective regions, because of the local differences in soil properties, vegetation, and local climate. The various designs can be expected to perform similarly as stable landforms in the respective areas. Cost variation among the designs for material handling can be evaluated and the designs can be optimized to the lowest cost consistent with meeting all other required reclamation design criteria.

Additional Key Words: design, erosion, fluvial geomorphic, landform, reclamation, stability

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Example comparison figures

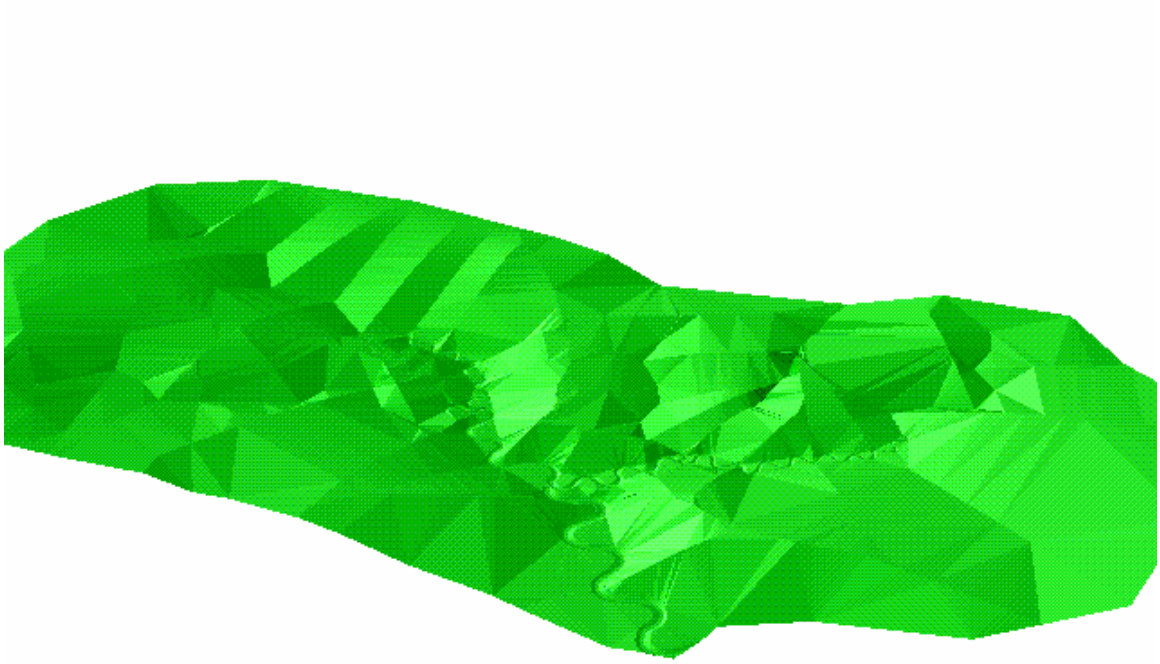

Figure 1. Area with higher drainage density, shorter ridge to head of channel distances.

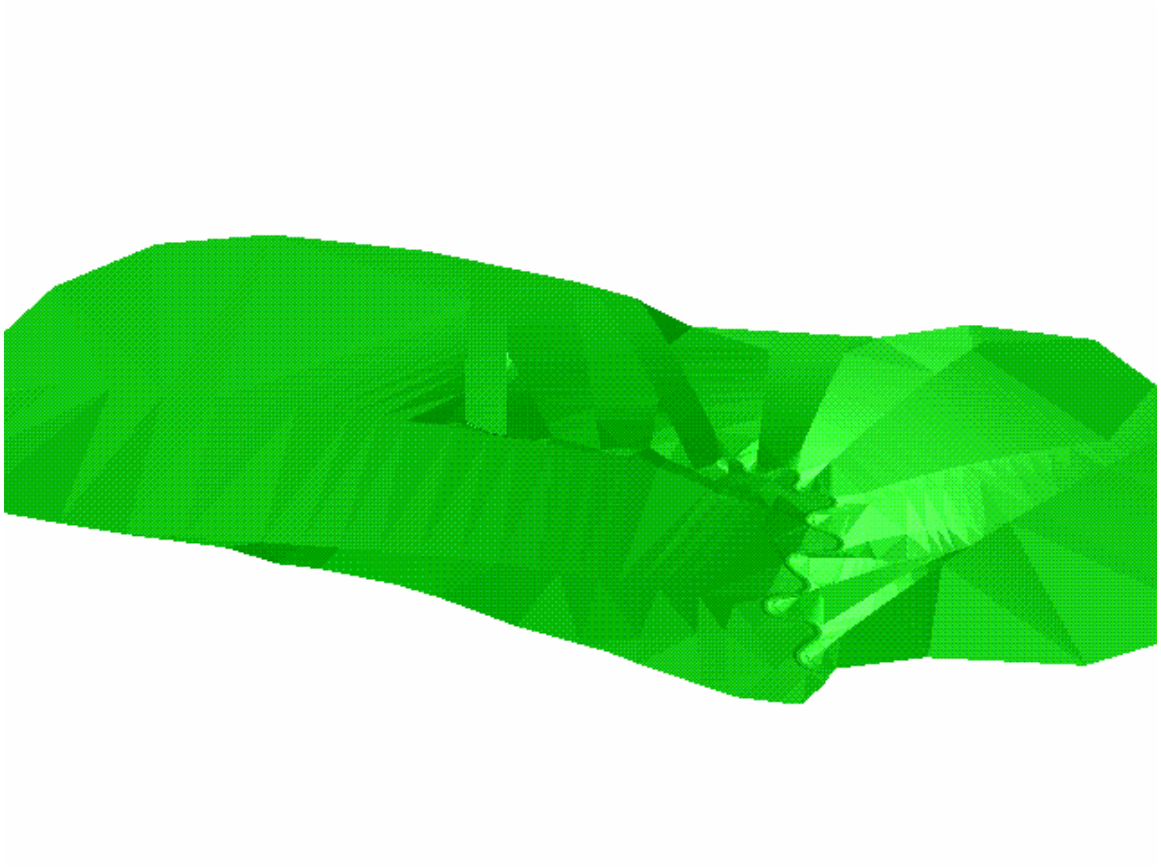

Figure 2. Area with lower drainage density, longer ridge to head of channel distances.