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Topographic Reconstruction: The Theory and Practice

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I. INTRODUCTION

It is generally accepted that under natural conditions, an approximate dynamic equilibrium exists between geomorphic processes and the resulting landforms. The character of the equilibrium is determined by the environmental setting including geology, climate, topography, soil, and biota. Geomorphic processes proceed at low to moderate rates due to an approximate balance between the forces operating on or beneath a surface and the resistances offered by near-surface materials. Under these conditions, landscapes and the component landforms are stable. In this context, stability refers to a state in which small perturbations of the variables defining a geomorphic system do not lead to progressive change toward a new equilibrium but a return to the previous state. Large perturbations of one or more variables, however, may cause the system to seek a new equilibrium resulting in accelerated process rates and requiring reclamation to minimize land degradation and recover land values.

The reclamation of disturbed lands involves several sequential steps: (i) site characterization, (ii) reclamation planning and engineering, (iii) material management, (iv) topographic reconstruction, (v) replacement of topsoil or suitable substitute, (vi) surface manipulation, (vii) soil amendment, (viii) revegetation, (ix) irrigation, if needed, and (x) monitoring and maintenance. This chapter is primarily concerned with material management and topographic reconstruction. Previously, these two steps were termed “grading and shaping” but recent laws and improved technologies require and support comprehensive topographic reconstruction. Other steps in reclamation are discussed elsewhere in this volume. Although much of the forthcoming discussion is based upon our experiences on mined lands and waste-disposal sites, the principals are applicable to other types of land disturbances.