

SECTION 1. INTRODUCTION

1. **PURPOSE AND SCOPE.** This manual was prepared to provide guidance in the use of pressure grouting as a means to correct existing or anticipated subsurface problems. Information on procedures, materials, and equipment for use in planning and executing a grouting project is included, and types of problems that might be solved by pressure grouting are discussed. Methods of pressure grouting that have proven to be effective are described, and various types of grouts and their properties are listed.

2. GENERAL CONSIDERATIONS.

a. Purposes of Pressure Grouting. Pressure grouting involves the injection under pressure of a liquid or suspension into the voids of a soil or rock mass or into voids between these materials and an existing structure. The injected grout must eventually form either a gel or a solid within the treated voids, or the grouting process must result in the deposition of suspended solids in these voids. The primary purposes of pressure grouting a soil or rock mass are to improve the strength and durability of the mass and/or to reduce the permeability of the mass.

b. Problems Related to Strength. Typical problems involving strength properties of a soil or rock mass include: (a) insufficient bearing capacity for structural elements such as footings, slabs, or mats; (b) insufficient strength to preclude sliding failures of embankments or cut slopes; (c) inherent mass instability of fractured rock formations; (d) sloughing or complete closure of vertical or horizontal tunnels; and (e) general structural weaknesses due to underground caverns or solution channels or due to voids that develop during or following construction.

c. Problems Related to Permeability. Problems related to permeability of a—soil or rock mass include: (a) reduction in strength of foundation materials due to high seepage forces; (b) loss of impounded water from a reservoir or storage area; (c) high uplift forces at the base of a water-retaining structure; (d) piping erosion through or under an earth dam; and (e) inability to complete excavations, shafts, or tunnels extending below the groundwater table due to caving and sloughing.

d. Selection of Methods of Treatment. Problems of the nature described above can often be treated by pressure grouting. However, other methods of treatment may be equally satisfactory and adaptable to the project. The selection of pressure grouting as the method of treatment should be based on an evaluation of all pertinent aspects of the problem, i.e., engineering needs, subsurface conditions, economic considerations, and availability of qualified supervisory personnel. In some respects, pressure grouting is an art based on natural and scientific laws but it requires experience and engineering

judgment. Rigid rules for the exercise of this art cannot be established, and only general procedures and guides can be presented in this manual. For these reasons, the services of personnel experienced in grouting should always be utilized.