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Preface

P-1. Purpose and scope. This manual is organized to be used as a field reference. Chapter 1 through 4 discuss piles, equipment, and installation. Information concerning design (less that of sheet piling structures) is provided in chapters 5 through 7 for use when tactical and logistical situations dictate original design. These chapters are of primary interest to engineer staff officers planning pile construction when the standard installations, facilities, equipment and supplies of the Army Facilities Component System (AFCS) are not used. The appendix presents information on piling materials not currently available through military supply. The glossary contains terms frequently used in pile design and construction, acronyms, and abbreviations used in this manual.

P-2. User information. The proponent agency of this publication is the US Army Engineer School. Submit changes for improving this publication on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forward to US Army Engineer School, ATTN: ATZA-TD-P, Fort Belvoir, Virginia 22080-5291.

CAUTION

The Engineer News Formula
should be used only when designing
piles with a bearing capacity of
50 kips (50,000 pounds) or less.

CHAPTER 1

BASIC CONSIDERATIONS

Section I. DEFINITIONS AND CLASSIFICATIONS

1-1. Definitions.

a. Piles. A pile is a long, columnar element made of timber, steel, concrete, or a combination of these materials (discussed in chapter 2). Piles transmit foundation loads to deeper strata that sustain the loads safely and prevent settling of the supported structure. Piles derive their support from a combination of skin friction along the embedded lengths and end bearing at the tips or bottoms (figure 1-1).

b. Piers. A pier is a pile used to support a horizontal supporting span such as a bridge or archway.

c. Sheet piles. Sheet piles are generally prefabricated or precast members driven vertically into the ground to form a continuous vertical wall. Sheet piles protect bearing piles against scour and the danger of undermining a pier foundation (figure 1-2). They form retaining walls (bulkheads) for waterfront structures (figure 1-3).

d. Friction/end-bearing piles. A pile embedded in soil with no pronounced bearing stratum at the tip is a friction pile (figure 1-4). A pile driven through relatively weak or compressible soils into rock or an underlying stronger material is an end-bearing pile (figure 1-5).

e. Batter piles. Piles driven at an angle are batter piles. They are used to resist heavy lateral or inclined loads or where the foundation material immediately beneath the structure offers little or no resistance to the lateral movement of vertical piles. Batters are driven into a compressible soil to spread vertical loads over a larger area, thereby reducing settlement. They may be used alone (battered in opposite directions) or in combination with vertical piles (figure 1-6). Batter piles can be driven at slopes of 4 degrees to 12 degrees with ordinary driving equipment.

f. Compaction piles. Compaction piles are driven to increase the density of loose, cohesionless soils (figure 1-7) and to reduce settlement, since shallow foundations on very loose deposits of sand or gravel may settle excessively. Piles with a heavy taper are

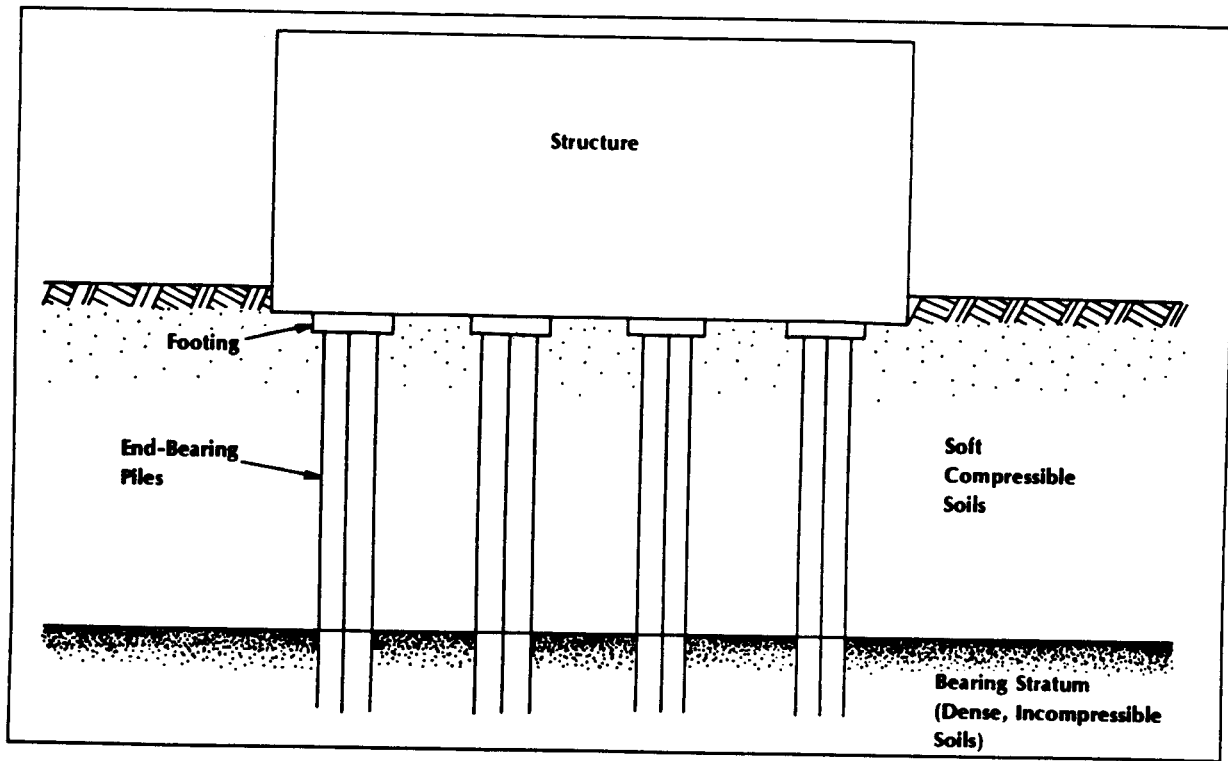


Figure 1-1 Pile foundation for structure support

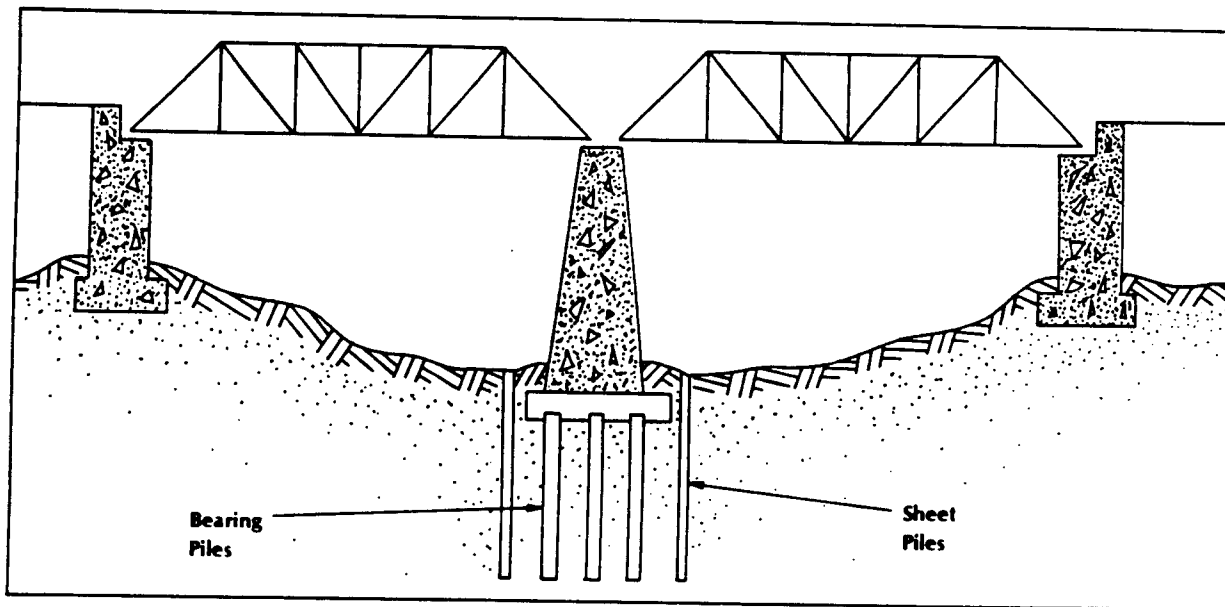


Figure 1-2 Sheet pile protecting a bridge pier