CHAPTER 4 — SITE INVESTIGATION OVERVIEW

The purpose of this chapter is to provide an overview of geotechnical site characterization issues for design of SMSE wall systems. Site reconnaissance, subsurface investigation, and a combination of in situ and laboratory testing should be conducted. Evaluation of the engineering properties of the local soil and rock is required because these materials provide both loading and support for the shoring system, as well as foundation support for the MSE wall component.

Site investigations and testing programs are necessary to evaluate the technical and economic feasibility of an SMSE wall system for a project application. The extent of the site investigation should be consistent with the scope of the specific project (i.e., critical nature of the structure, project location, size and budget) and the project constraints (i.e., geometry, constructability, and performance).

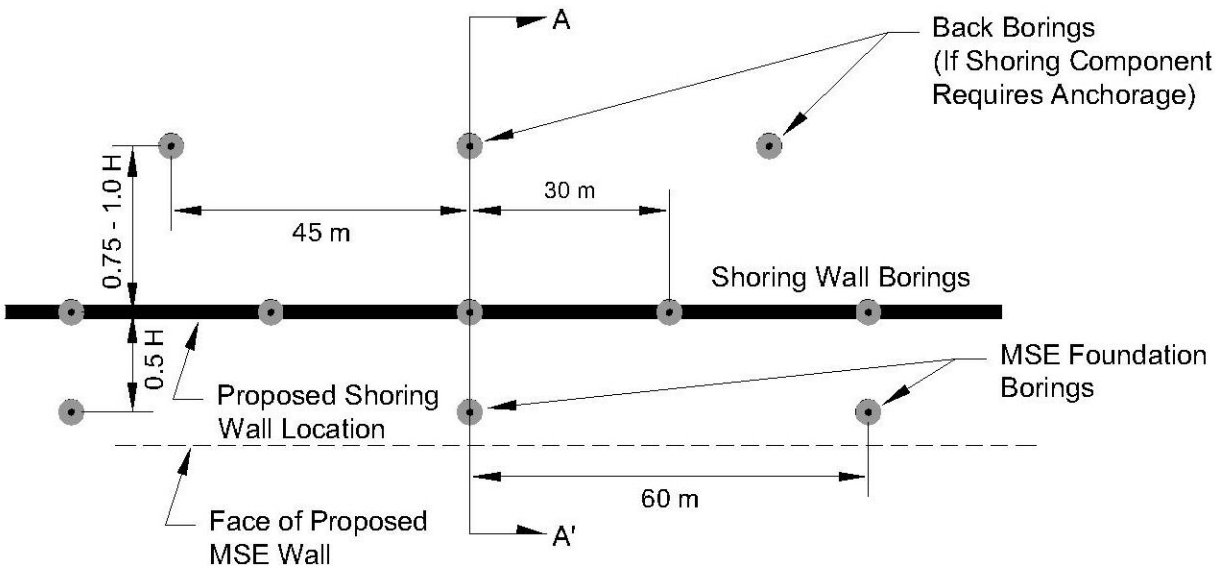
4.1 FIELD RECONNAISSANCE

Prior to conducting a geotechnical investigation involving drilling and sampling, a field reconnaissance of the proposed wall alignment should be completed. Also, available documents should be reviewed to obtain information regarding site conditions (i.e., geology, known hazards, location of utilities). The field reconnaissance and literature review assists in the decision process regarding use of an SMSE wall system, as discussed in chapter 2.

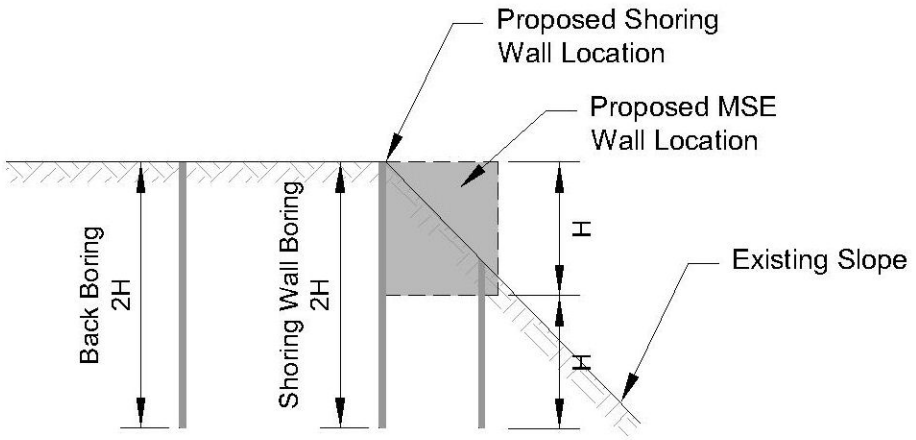
4.2 GEOTECHNICAL INVESTIGATION

The purpose of the geotechnical investigation is to characterize soil/rock and groundwater conditions, conduct in situ field testing (i.e., standard penetration tests), and obtain samples for laboratory testing. Data obtained during the geotechnical investigation is used to estimate material parameters required for the MSE wall design, such as strength, bearing capacity and unit weight of foundation soils; estimate material parameters for design of the shoring wall such as pullout resistance and frictional characteristics of retained soils; evaluate chemical properties of earth materials; and develop design sections including phreatic or groundwater conditions, depth to bedrock, and soil stratigraphy.

Figure 12 illustrates recommendations for preferred locations of subsurface borings for an SMSE wall system. The investigation program illustrated in figure 12 may be revised (reduced or increased) at the discretion of the geotechnical engineer based on site access, available budget, project schedule, etc. Detailed information and guidance on subsurface investigations is provided in other references. (See references 12, 13, and 14.)



Typical Boring Layout



Section A-A'

Figure 12. Diagram. Ideal boring layout for SMSE wall system design.

The soil and rock stratigraphy at the project site, including lateral extent, thickness, and elevations, as well as groundwater conditions, including perched zones and seasonal fluctuations, may be evaluated from the project-specific geotechnical investigation. Several site conditions may be identified during the subsurface investigation that could significantly affect the SMSE wall system selection and design, including:

- Weak soil or rock layers susceptible to sliding instability which affect global and/or local stability.

- High plasticity, soft, or organic soils susceptible to excessive settlement or bearing capacity failure (affecting MSE wall component) and long-term creep (affecting shoring component).

- Lack of locally-available or cost effective import soils for use as reinforced fill.
- Obstructions, boulders, and cemented layers that may impact drilling (if required for shoring component) and wall excavation.
- Cohesionless soils that exhibit poor stand-up time and hole instability (influences type of shoring system).
- High groundwater table or perched groundwater zones which may necessitate dewatering of excavations during construction and influence design and constructability of the SMSE wall system.
- Soil materials with a high potential for corrosion or chemical attack which would affect design of walls incorporating steel and concrete components.