SECTION 700
GEOTECHNICAL

701 FOUNDATIONS

701.01 GENERAL

The main purpose of this section is to document bridge design criteria as related to bridge foundation geotechnical issues.

Since problems requiring geotechnical and structural expertise often result in confusion concerning the responsibilities of each, another purpose of this section is to define the role of the geotechnical engineer and the bridge engineer in design problems involving both fields.

The usual procedure for designing bridge foundation substructure units is as follows:

The bridge design group will develop a preliminary location plan.

The Geotechnical Engineer will conduct a site investigation, identify borehole locations, drill and log borings, perform soil testing as appropriate, plot the boring logs and summarize the results in a Geotechnical Report. The Geotechnical Report will include a Foundation Design Report which identifies the type of foundation recommended for each substructure unit including the allowable loads and required depths.

The Geotechnical Engineer is responsible for preparing the boring logs on construction plans. They also prepare necessary special provisions for construction of the foundation elements. During construction of the bridge foundations, the Geotechnical Engineer oversees geotechnical testing, spread footing excavations and piling and drilled shaft construction. They work closely with bridge design group to jointly resolve problems requiring redesign because of changed site conditions. The bridge design group is responsible for producing the structural design and construction documents for the substructure units as part of the bridge plans.

701.02 SPREAD FOOTINGS

Where good soil materials exist near the surface, shallow foundations in the form of spread footings will normally be the recommended foundation type. For foundation units situated in a stream, spread footings shall only be used when they can be placed on non-erodible rock. Spread footings are normally not placed on embankment material.

When spread footings are the recommended foundation type, the Geotechnical Report shall contain the allowable bearing pressure, the elevation of the bottom of the footing and the estimated total settlement, differential settlement and time rate of settlement, if applicable.

The bridge design group shall size the footing to ensure that the allowable bearing pressure is not exceeded for any AASHTO Group Loading and that the footing is properly sized and reinforced to resist the maximum applied moments and shears. The bottom elevations of spread footings shall be set at the recommended depth. The minimum top cover over the top of footings shall be 500 millimeters. If the possibility for differential settlement is identified, the bridge designer shall ensure that the entire structure is capable of structurally resisting the forces induced by the differential settlement.

701.03 PILE FOUNDATIONS

When good foundation material is not located near the surface, when settlement is a problem, or for foundation units located in streams where scour is a problem, deep foundations will usually be recommended. One type of deep foundation is a driven pile. Driven piles may be either steel H piles, steel pipe piles or prestressed concrete piles. The other type of deep foundation is a bored pile.