

## **A Case History of Stone Column Test Program in Glacial Deposits**

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### **ABSTRACT:**

A stone column test program was conducted for ground improvement to support an approximately 150-foot high earth embankment project near Seattle, Washington. Stone columns were initially designed to provide stable foundation subgrade for the embankment, especially for mitigating soil liquefaction and reducing subgrade settlements. The test program included three areas of stone columns installed with various control parameters such as diameter, spacing, pattern, and area replacement ratio. Each test area consisted of 32 to 42 vibro-replacement stone columns. Stone columns were installed through the post-glacial, loose to medium dense silty sand and soft to medium stiff silt, and were embedded into glacially overridden, stiff to hard silt. A series of Standard Penetration Tests (SPT) and Cone Penetration Tests (CPT) were used as verification tests in each of the three test areas before and after the installation of stone columns. Results indicated densification of the matrix in soil zones containing less than 15 percent fines. However, in some locations, disturbance in the stiff to hard silt caused a decrease in penetration resistance. As a result, an alternate construction method was proposed and stone columns were not used for subgrade improvement, since the test results could not be relied upon to verify the degree or consistency of ground improvement.