

Drill Displacement Column™

Pressure Grout Ground Improvement

DDC



Geologic Hazard Application

-  Soft/Loose Soil
-  Liquefaction
-  Contaminated Soil
-  Lateral Spread
-  Slope Stability

Depth Limit
80 ft (24 m)

Compatible Soils
Contaminated Soil
Sand (SP, SM, SP)
Silt (ML, MH)
Clay (CL, CH)
Undocumented Fill

Bearing Capacity Range
4,000 psf (192 kpa)
to
10,000 psf (479 kpa)

Key Advantages

Very high stiffness
No vibration
Low spoil
High capacity
Well defined concrete column
Liquefaction mitigation
Uplift-tension hold-down

Key Considerations

Impermeable
Grout with low spoil
Concrete cleanup
Flat stable pad
Gravel cushion

Comparable To

Concrete piers
Driven piles
Stone columns
Soil-cement columns
Franki piers

Overview

Drill Displacement Column™ (DDC) system is a deep, full displacement, pressure grout column, ground improvement method used to improve any soft/loose soil or contaminated soil for support of heavy loads on shallow footings and mats. The DDC offers a well-defined, grout column, with reliable, high vertical capacity in soft and loose soil. The large cavity expansion effect in the displaced soil produces the increased strength and ground improvement of the system. DDC construction produces low noise and no vibration with low spoil from the displacement tool. DDC ground improvement imitates compaction grouting on a large scale with a well-defined grout column. DDC ground improvement increases bearing capacity, increases soil stiffness & modulus, reduces soil compressibility, increases loose soil resistance to liquefaction, and increases composite soil shear strength. DDC improved soil supports heavy loads on shallow footings and mats with uniform and reduced settlement.

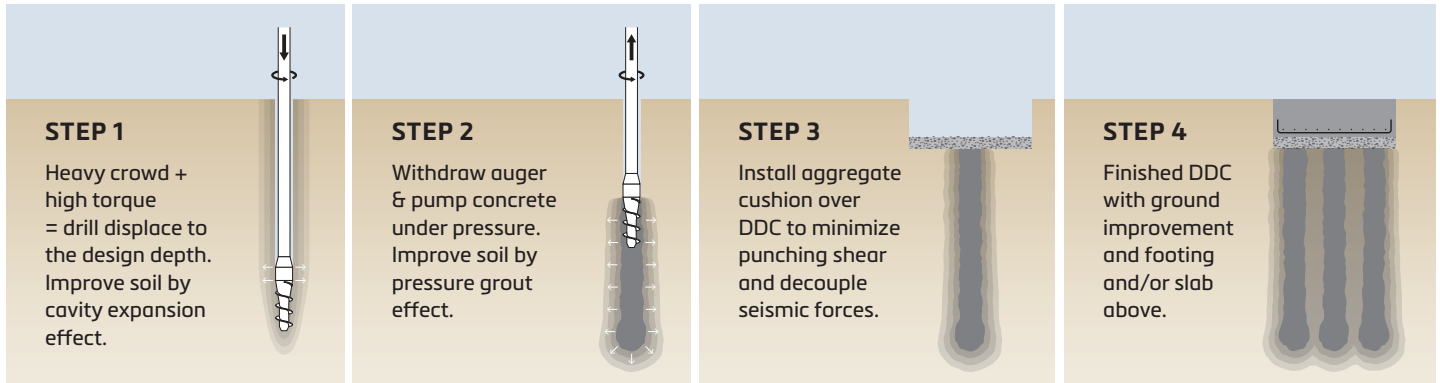
DDC Applications

Support footings, slab-on-grade, structural mats, slope/embankments, and industrial foundations. The ideal applications for DDC occur at:

- 1) Soft and loose soil sites and bay mud/sensitive soil sites.
- 2) Contaminated soil and undocumented debris fill sites.
- 3) Groundwater protection regions.
- 4) Sensitive project sites near critical structures.
- 5) Sites near occupied offices and in dense urban areas.



DDC 4-Step Construction Process



Technical Details

The **Drill Displacement Column™ (DDC)** method is an innovative upgrade to rigid inclusion ground improvement for foundation support. The DDC displacement tool is shaped to laterally displace and compact soil at the edges into the ground. The displacement tool and the pressure grout effect result in a coarse sided sand-cement column with finished diameters greater than 100% of neat tool diameter. The soil displacement produces cavity expansion effects that 1) increase shear strength, 2) increase density, 3) increase over-consolidation, 4) reduce void ratio, and 5) increase stiffness & modulus of the surrounding soil. These physical benefits of DDC construction result in reliable, high capacity, deep ground improvement columns.

DDC are sometimes installed with a single rebar for higher strength and to resist tension forces. DDC supported footings use a gravel cushion to reduce punching shear and to de-couple the footing from the DDC; typical thickness is 6" to 18" (152 to 456mm). DDC with an expanded base can achieve much higher end bearing capacity. Full-scale load tests are performed to confirm DDC design bearing capacity. Cone penetration tests are performed to confirm ground improvement in the soil within groups of DDC.

Farrell uses heavy, fixed mast, piling drill rigs to install DDC. Farrell operates Leibherr, Casagrande, and Bauer rigs. These rigs install DDC to depths of 16 to 80 feet (5 to 24m). Farrell installs DDC with full displacement tool diameters of 14" (356mm), 16" (406mm), 18" (457mm), and 24" (610mm). Partial displacement DDC tools are used in dense soil regions. The rigs are equipped with electronic monitoring to record drill torque, drill depth, drill speed, concrete pump pressures, and concrete volume for engineer review.

Drill Displacement Column™ DDC is a well-defined, very strong, ground improvement that supports your project to **Go Vertical with Confidence®**.

Testimonial



The Pierce
San Jose, CA

"I was pleased with the Farrell crew. They were great to work with. Ken Winters managed his crew and equipment well. I look forward to more work with Farrell."

Gary Cunnington
Superintendent
Clark Builders