

Excavations for Multi-Shaft Footings

(closely spaced drilled shafts)

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ISSUE

Bridge designs at times require two or more shafts placed in a single footing. On occasion, the shafts are closely spaced. This causes an issue when drilling the shafts and meeting the requirements of Item 416. Please provide direction on this issue or some notification to the designers to try and get the necessary separation between the shafts.



Item 416 (2004)– Drilled Shaft Foundations

416.3 Construction:

A. Excavation.

If caving conditions are encountered, stop drilling and adopt a construction method that stabilizes the shaft walls.

Do not excavate a shaft within 2 shaft diameters (clear) of an open shaft excavation, or one in which concrete has been placed in the preceding 24 hours.



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BACKGROUND:

The restriction was developed and included in ITEM 416 because of potential issues with stability and breaching the web of material between adjacent shafts.



Excavations for Multi-Shaft Footings

IMPACT:

Impacts the construction of drilled shaft walls and most of our multi-shaft footings falling into this spacing category.



Excavations for Multi-Shaft Footings

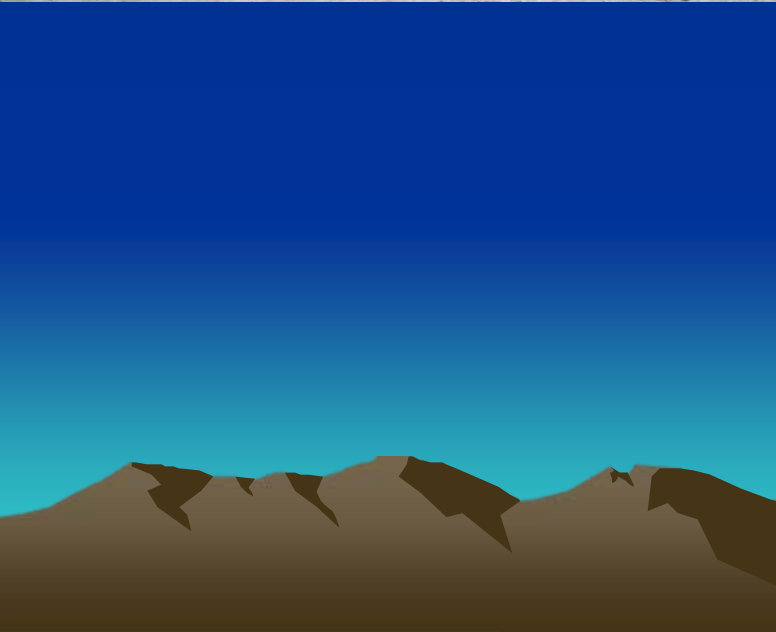
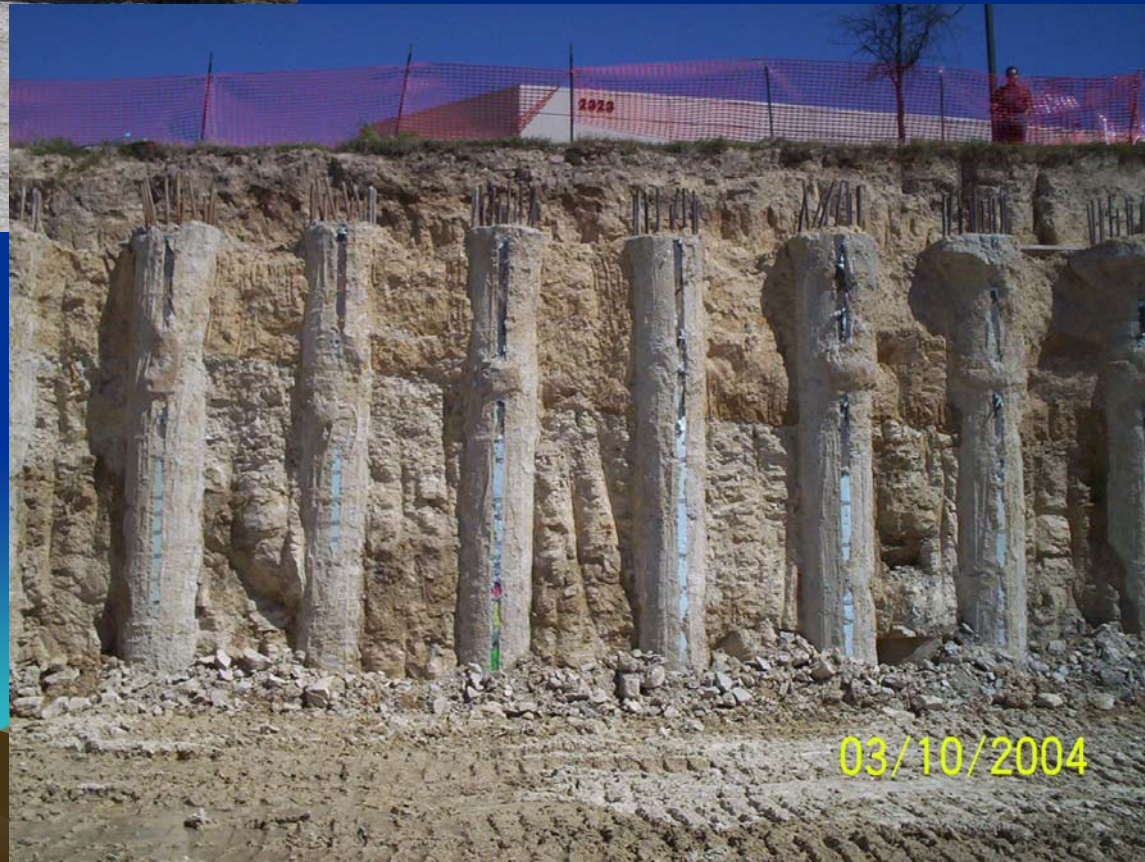
Construction Consideration:

Drilled Shaft Walls-

The contractor will need to develop a shaft excavation sequence. Normally there are sufficient shafts in a wall to not adversely affect the contractor's schedule.



Typical Drilled Shaft Wall



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Construction Consideration:

Multi Shaft Footing-

This specification requirement prevents a contractor from placing adjacent shafts in the same day. This may result in numerous mobilizations within a construction site to install required shafts.



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Construction Consideration:

Multi Shaft Footing-

The soil reaction to excavation will be a function of the soil/rock type, geologic structure, moisture conditions and contractor means and methods. The District may choose to waive this restriction based on past experience with excavations in similar profiles.



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Construction Consideration:

Multi Shaft Footing-

The Key is to prevent concrete communication between drilled shafts.

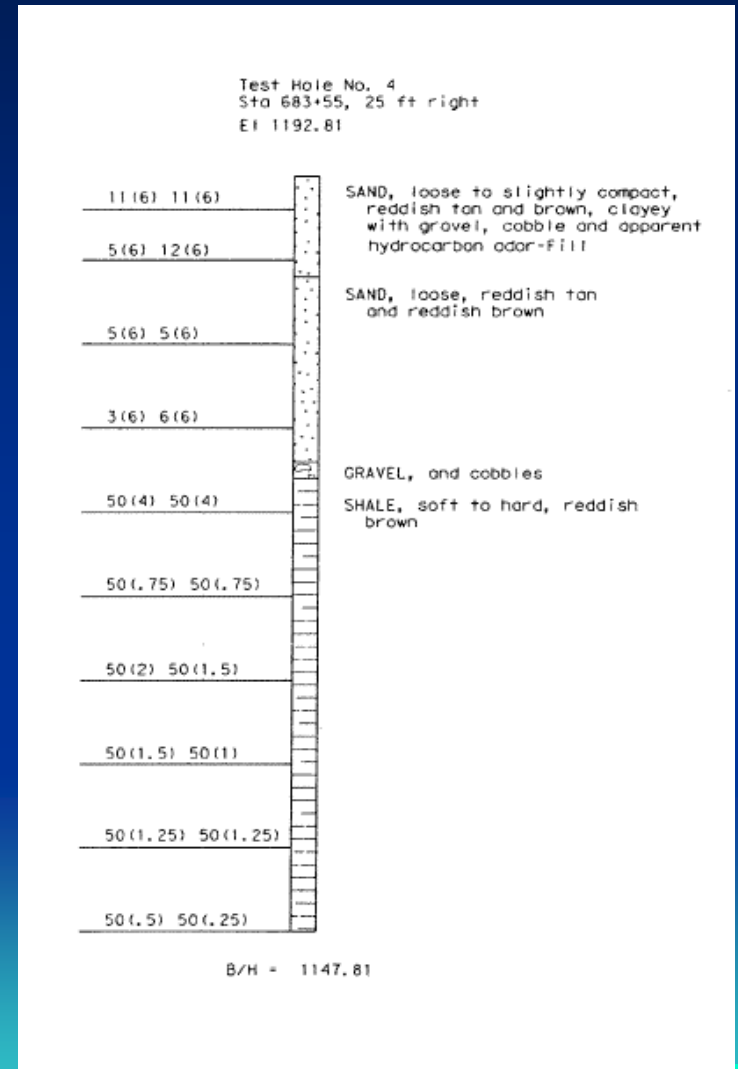
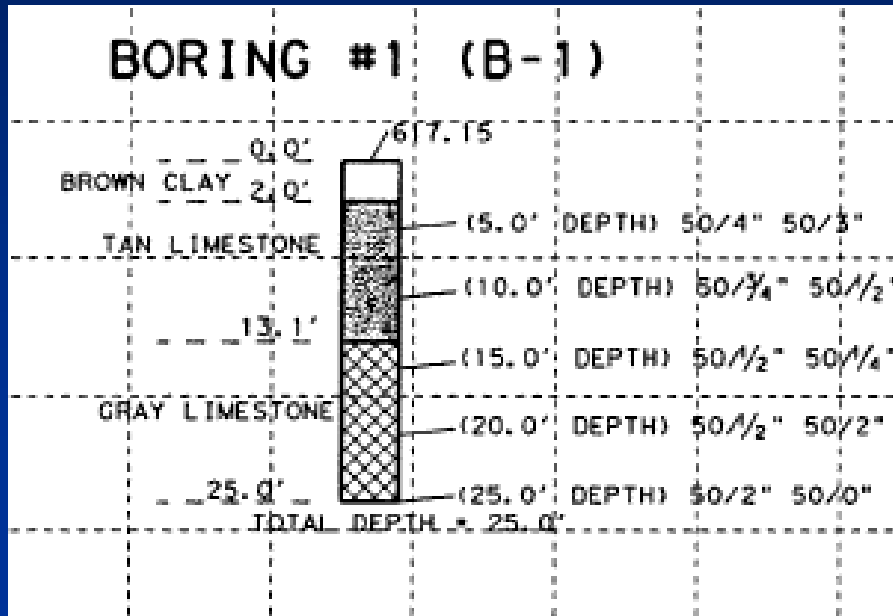
Experience developed in site soils will aid in determining the necessary construction sequence to prevent construction delays and destabilization of soils during construction.



Two Shaft Footing



Influence of Soil Type



Design or Construction Issue?

Design

- Consider when 3D or closer
- Sum Perimeter of group or look at sum of individual
- Dependent on Soil Profile
- Need to Consider the Efficiency of the Group and adjust accordingly.

