

**FOUNDATION PERFORMANCE  
ASSOCIATION**

# **DESIGN OF DRILLED SHAFTS IN EXPANSIVE SOIL, PART 2**

**Foundation Performance Association Meeting 11 Dec 13**

**By Bob Lytton, Ph.D., P.E., and Nicole Wylie, P.E.**

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## **DESIGN PROCEDURE FOR DRILLED CONCRETE PIERS IN EXPANSIVE SOIL**

**Document no: FPA-SC-16**

**Developed by: FPA Structural Committee & Dr. Bob Lytton**

**Committee chairs: Main Committee - Ron Kelm, P.E.  
Subcommittee - Nicole Wylie, P.E.**

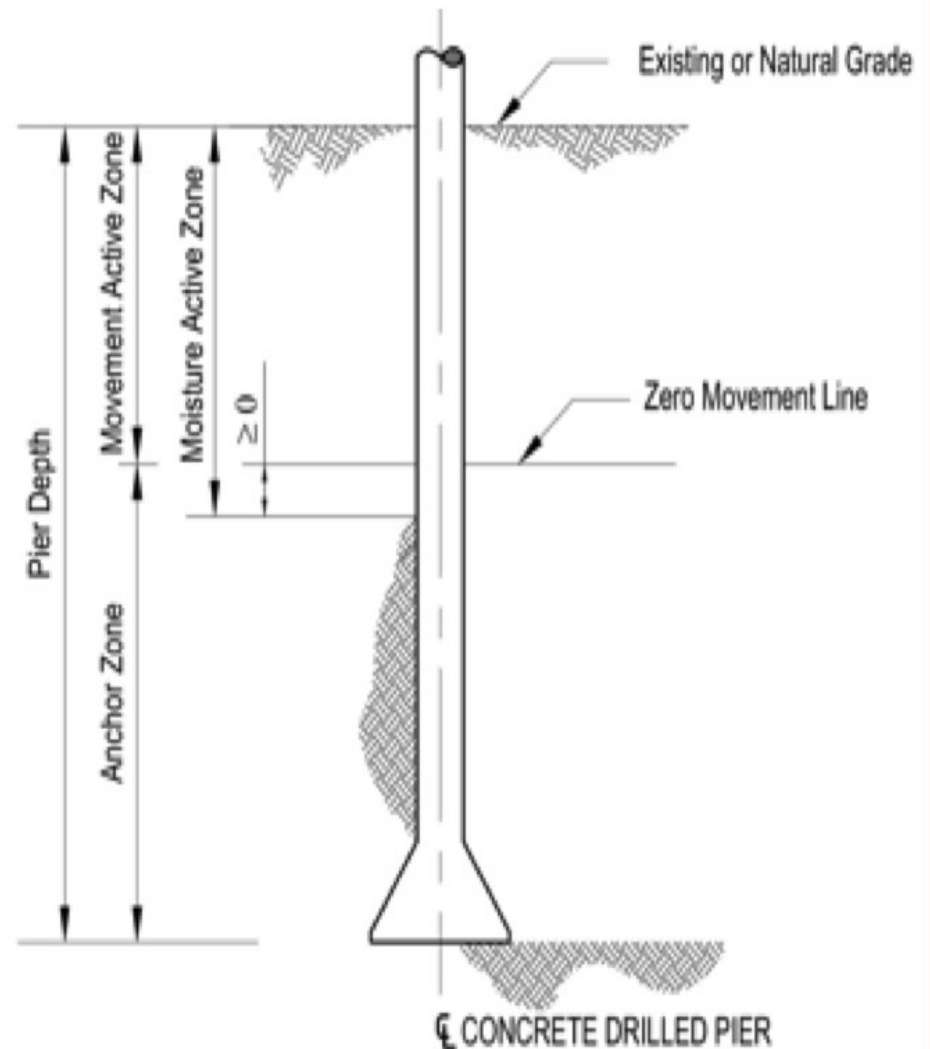
**Sanctioned: March 2012**

**To Be Completed: In 2014**

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## How it began...

- Limited data in geo reports; no suction
- Challenge to Dr. Lytton in 2011
- Dr. Lytton presented Dec 2011 to FPA
- Paper sanctioned March 2012



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# SC-16 Subcommittee Members

Steve Bache

Greg Carr

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Steve Schilder

Nicole Wylie

Gary Beck

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Ron Kelm

Gerald Lowe

Nabil Mimouni

Rob Riedel

Michael Skoller

+ 15 Auditors

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# The Method

**Input: basic data from a geotech report**

**Output: approximate suction and  
minimum pier size/length**

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# SOIL INPUT FOR SUCTION:

Atterberg Limits

Moisture Content

Dry Density

Unconfined Compression

## OUTPUT:

Equivalent Suction,  $h_m$

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# **INPUT FOR PIER DESIGN:**

## **FOR EACH CLAY LAYER:**

LL, PL, % fine clay, water content, dry density, and depth

## **FOR EACH SAND LAYER:**

Water content, N60, dry density, whether sand is silty or clean, and depth

## **ALSO**

Equivalent Suction, Thornthwaite Moisture Index,  
Min. Load at Top of Pier, Water table depth, overburden,  
trial pier length and trial diameters of pier and bell .

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## OUTPUT:

Pier design is adequate or inadequate.

Iterate as needed.

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## **LIMITATION:**

The FPA recommends using suction data.

However, when no suction-based design information is available, this procedure can be used as an alternative for the geotechnical or foundation design engineer to use to more accurately design or analyze the design of drilled concrete piers in expansive soil.

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# WHERE THE PAPER STANDS

In committee review, meeting monthly

Working on spreadsheet

Will need to test and refine method

Paper will be available to the public,  
spreadsheet given only to FPA members.

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# The Structural Committee's next challenge for Dr. Lytton:

Determine a  
suction  
envelope  
based on  
limited test  
data.

