



Ardaman & Associates, Inc.

Geotechnical, Environmental and
Materials Consultants

Ardaman File No. 17-33-4571

September 20, 2018

TO: Greeley and Hansen, LLC
5252 Summerlin Commons Way, Suite 104
Fort Myers, FL 33907

ATTN: Alexandra Terral, P.E.

SUBJECT: Hancock Bridge Parkway Water Main Improvements
Hancock Bridge Parkway and Moody Road
North Fort Myers, Lee Co, FL

REFERENCE: Ardaman & Associates, Inc. Report of Subsurface Soil Exploration
for the subject project dated May 21, 2018

Dear Alexandra:

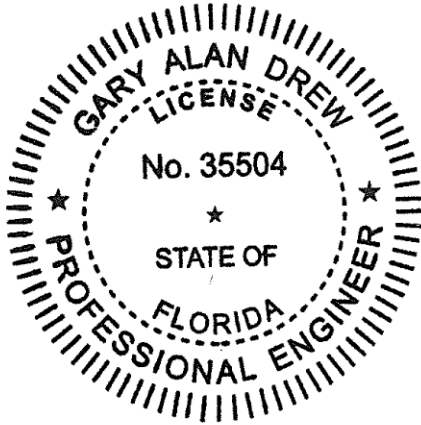
You have requested our opinion on the soil conditions to install a 12-inch water main under the creek crossing Hancock Bridge Parkway by horizontal directional drill (HDD).

For the referenced geotechnical report, test borings SPT-3 and SPT-4 were drilled on the Hancock Bridge Parkway road surface on either side of the creek. Road elevation is estimated to be about +14 feet NAVD88. Both borings disclosed similar subsurface conditions consisting of mostly medium dense sands (SP, SP-SM) to a depth of 12 feet (elev. +2 feet) where very loose and very soft silty sands (SM), clayey sands (SC) and sandy clays (CL) were encountered. These very loose and very soft soil conditions extended to an average depth at about 37 feet (elev. -23 feet). This very loose and very soft zone between 12 and 37 feet could prove problematic for HDD because of the very low shear strength of the soils and associated risk of hydraulic fracturing by the drill fluid. Below a depth of 37 feet (elev. -23 feet), both borings encountered a firm to stiff sandy fat clay (CH) stratum that continued through the 50-foot depth explored. These fat clays exhibit higher shear strength than the SPT N-Values would indicate due to carbonate cementation. Shear strength value of up to 1 to 2 kips per square foot (ksf) are typical. Shear strength issues with HDD installation within this stratum (below elev. -23 feet) are not expected.

Please call me if you have any questions.

Very truly yours,

ARDAMAN & ASSOCIATES, INC.
Florida Certificate of Authorization No. 00005950



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signed and sealed by*

on the date adjacent to the seal.

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Gary A. Drew, P.E./No. 35504
Vice President/Branch Manager

GAD/cmb