Collin College PSTC Site Geology and Pier Installation

GME Consulting Services, Inc.

GME Project No. 17.05.0004

Site Geology

The existing Collin College campuses are all located on soils and rock of the Austin Chalk geologic formation. The Austin Chalk formation in this area of north Texas is distinguished by dark expansive surface clay strata, underlain by tan clays, then tan weathered limestone under which exists the parent gray limestone bedrock. The clays and weathered limestone were formed by natural weathering of the bedrock over geologic time. The Public Safety Training Center project site is located in an unmapped area of the Austin Chalk that was physically changed over time from erosion and deposition generated by Honey Creek and the east Fork of the Trinity River both located to the north. A Quaternary strata resulted from the erosion and deposition, replacing the eroded residual clays and weathered limestone with alluvially deposited silty clays, sandy clays and sands. Given the site proximity to both Honey Creek and East Fork of the Trinity, the depth to groundwater at the site is shallow. This unmapped condition was discovered by GME during the geotechnical investigation and clearly communicated in the report provided to the bidding contractors. Collin College also specifically communicated these conditions to the bidding contractors during the prebid meeting for the project. These very same conditions exist at sites along the Trinity River system and major creek drainage areas in the DFW area.

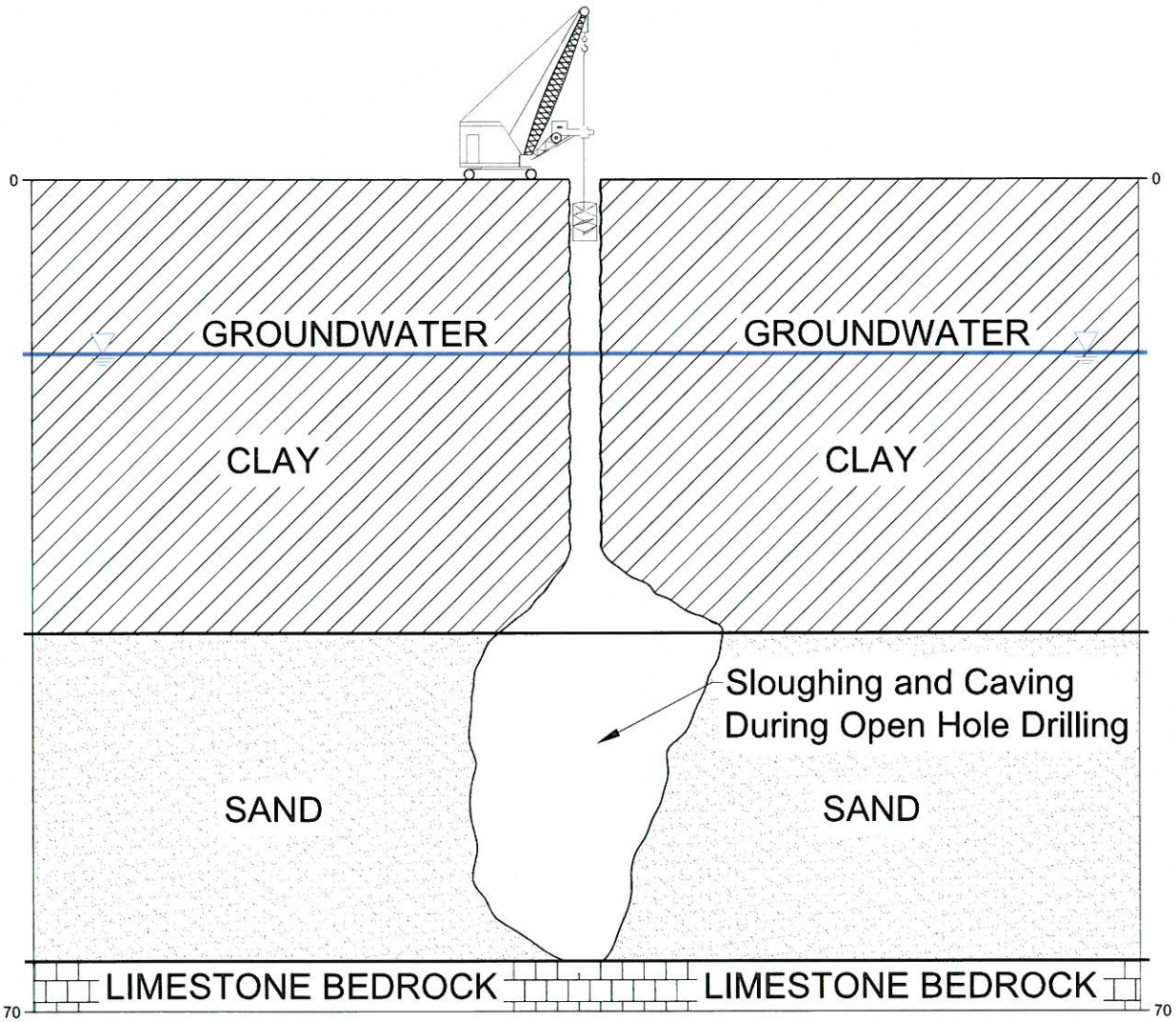
Foundation Installation

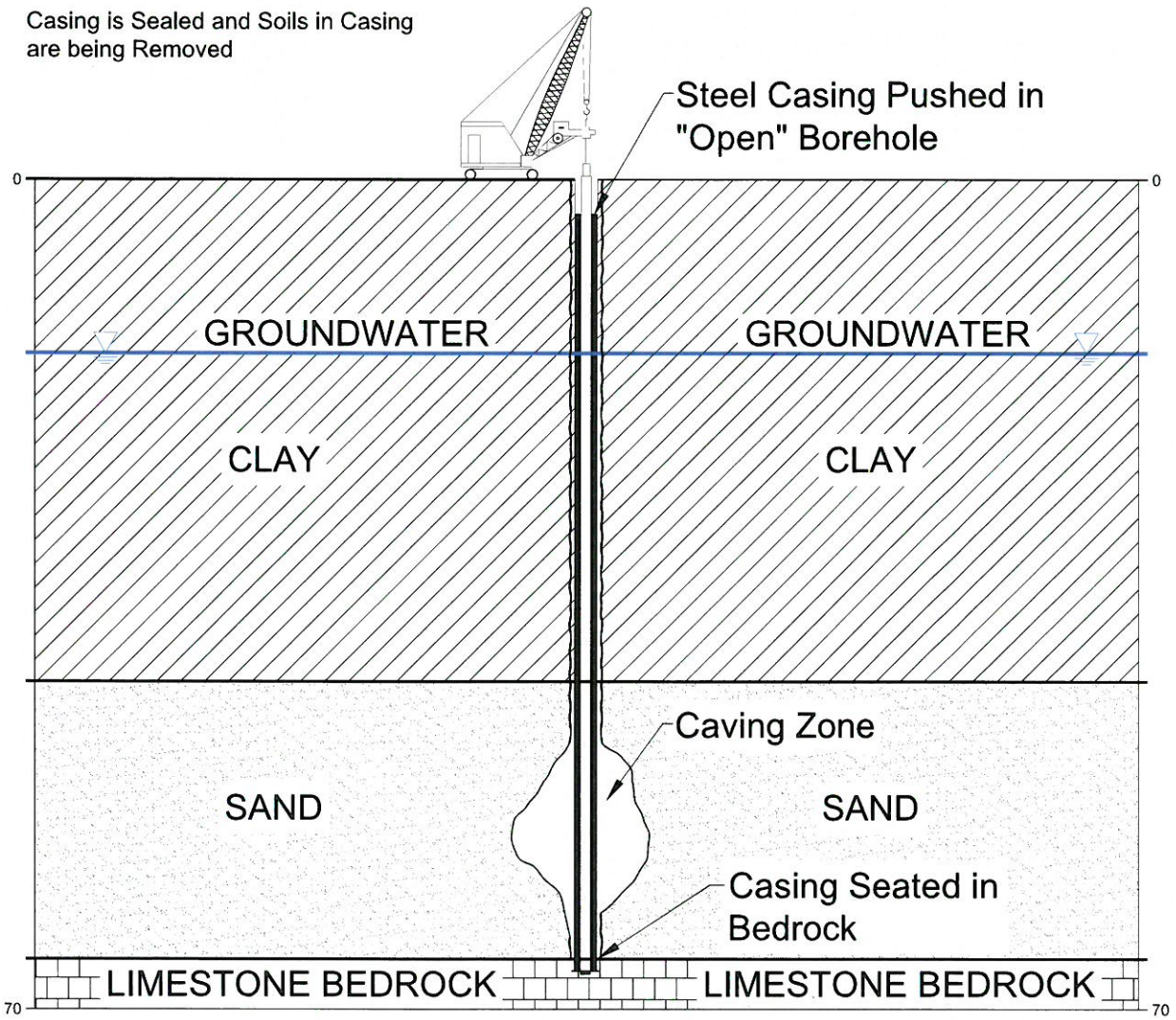
The subsurface soils at the PSTC site consist of alluvial clays, silts and sands. The depth to groundwater at the site is relatively shallow and the depth to foundation bearing (bearing strata is relatively deep for this area of DFW. The site soils combined with relatively shallow depth to groundwater and deep bearing strata clearly indicate that the foundation piers must be cased. Given these conditions, the contractor must apply installation methods appropriate for excavating the pier shaft in weak or cohesionless soils (sands) below the groundwater table in order to minimize or prevent excessive caving during excavation to set the casing in order to control the pier hole (and concrete) volume during installation.

The common method for addressing this condition is to advance the pier excavation mixing the existing clays with the groundwater and adding drilling fluid as necessary to maintain the walls of the pier excavation in a stable condition until the casing can be installed and sealed in the bearing strata. Once the casing is installed, the slurry/drilling fluid on the inside of the casing is

pumped out, and excess soil is cleaned out and the bearing strata is penetrated per design and the concrete placed and casing removed.

The contractor at PSTC elected not to employ slurry drilling or any other method of casing installation that would effectively retain the walls of the pier excavation during drilling and at the same time minimize the concrete volume required to install the pier. Rather, the contractor excavated each pier shaft without any method for stabilizing the excavation walls during drilling resulting in collapse of the excavation at depths where the softer or sandy soils were encountered. As the excavation walls collapsed into the excavation, the drilling contractor continued to remove material from the excavation until they advanced the excavation deep enough to set their casing into the bearing strata. As a result, the pier excavation was very irregular (due to caving) and significantly larger than required if performed with more efficient methods that stabilize the walls of the excavation. As the contractor continued to remove caving soils from the pier excavation, he created a large void or collapsed zone below the water table and the requirement for a much larger volume of concrete than normal to complete the pier.


0
0
GROUNDWATER
GROUNDWATER
CLAY
CLAY
Sloughing and Caving
During Open Hole Drilling
SAND
SAND
LIMESTONE BEDROCK
LIMESTONE BEDROCK
70
70


Casing is Sealed and Soils in Casing are being Removed
Steel Casing Pushed in "Open" Borehole
0
0
GROUNDWATER
GROUNDWATER
CLAY
CLAY
Caving Zone
SAND
SAND
Casing Seated in Bedrock
LIMESTONE BEDROCK
LIMESTONE BEDROCK
70
70