



This 126,300 SF, 2-story industrial building at the east side of Philadelphia Navy Yard houses Wuxi AppTec's United States Headquarters and its Early phase clinical manufacturing and testing facility. It was completed in 2016.

Client: Liberty Property Trust

Architect: Environetics

Structural Engineer: Mainstay Engineering Group

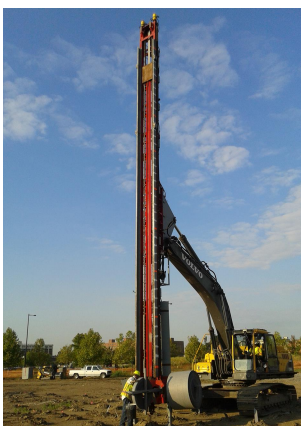
Construction Manager: Penntex Construction

Highlights: Geotechnical Investigation; Surcharging with wick drains; settlement monitoring and instrumentation; post-surcharge verification

GeoStructures performed a geotechnical investigation with detailed site characterization that showed a **25-ft thick**, soft, high plasticity **silt layer** across the site due to its close proximity to the Delaware River. This layer is sandwiched between two alluvial sand layers. Laboratory CRS consolidation testing of high-quality Shelby tubes confirmed the **high compressibility** of this layer so when loaded by the proposed building foundations and slab, this deposit will **cause a 16-inch settlement over 4-year period**. In order to construct shallow foundations, this silt layer **needs improvement** otherwise; a more expensive pile foundation with structural slab system will be required to support the building.

The ground improvement consists of **surcharging and strip (wick) drains**. The design was **optimized** considering the **cost of the additional fill** needed to construct a higher surcharge embankment **versus the cost of installing wick drains** to achieve the desired waiting period. The optimum design consisted of constructing **10-ft high embankment with 6-ft spaced wick drains with 6-month waiting period**. The surcharge height was increased to 20 ft in order to effect the removal of settlement for a mechanical room that was conceived at later stage.

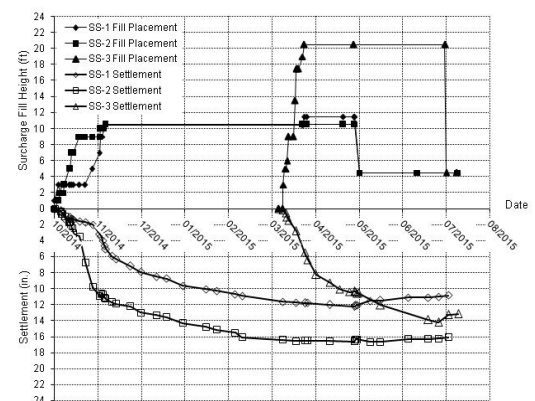
Three **vibrating wire settlement sensors** and drive-point piezometers were installed **to monitor the settlement**. 50 to 75% of the total measured settlement had occurred while the surcharge is being placed. **Sensors settlement measurements matched the predicted one**. Post surcharge in-situ and laboratory testing showed a **3-fold improvement** in the preconsolidation pressure.



Wick Drains Installation



Overview of Surcharge Embankment



Surcharge Fill Height and Settlement vs time