

**LAWRENCE B. KARP**  
**CONSULTING GEOTECHNICAL ENGINEER**

FOUNDATIONS, WALLS, PILES  
UNDERPINNING, TIEBACKS  
DEEP RETAINED EXCAVATIONS  
SHORING & BULKHEADS  
CEQA, EARTHWORK & SLOPES  
CAISSONS, COFFERDAMS  
COASTAL & MARINE STRUCTURES

SOIL MECHANICS, GEOLOGY  
GROUNDWATER HYDROLOGY  
CONCRETE TECHNOLOGY

February 18, 2013

Thomas N. Lippe, Esq.  
329 Bryant Street, Suite 3D  
San Francisco, CA 94107


Subject: Central Subway Phase 2, North Beach Construction Variant, San Francisco  
Proposed Termination & Extraction of TBMs in Block 101 (Pagoda Theater)  
Supplement No. 2 to Reports of February 5 & 13, 2013

Dear Mr. Lippe:

I have been provided with a 2/13/13 report by SFMTA "Central Subway Program - North Beach Retrieval Shaft Site Relocation - Process, Engineering Approach, and Environmental Investigation" from the SFMTA Program Director, Central Subway Project through the SFMTA Director of Transportation prepared for the SFMTA Board of Directors. I was asked to comment about the design/construction discussed in the report even though it is not stamped and signed by a licensed engineer (B&P Code §6735). Missing from the Supplemental EIS/EIR (SFPD 2013) was that excavation walls were intended to be secant piles drilled to 70 foot depths, the intended excavation will be 45 feet x 49 feet x 42 feet deep, and internal bracing will not interfere with TBM extraction, the "need for dewatering the Pagoda site" and "dewatering will only be required within the excavation, not outside of it or in neighboring properties", and, "exact construction methods necessary to minimize settlement of adjacent structures could not be identified until construction was proceeding". The excavation depth is the same as noted in my 2/13/13 Supplement No. 1 Report, 42 feet. SFMTA's report, prepared by non-engineers, is very critical of me but there are no design drawings and it is not recognized that my original report of 2/5/13 was based on PD's Addendum to Supplemental EIS/EIR (SFPD, 2013), as referenced and quoted (from page 17 ¶13) that the excavation at the Pagoda site was intended to be "70 feet below grade level" for the "retrieval shaft structure". The SFMTA report also effectively dismisses the historical and particularly sensitive immediately contiguous buildings (i.e. 721 Filbert, 1719 Powell) as well as nearby residences, all having brick foundations.

Secant piles are sequentially drilled shafts that intersect each other to form a solid wall. Primaries (soft piles) are drilled apart in rows (or curves) closer together than the pile diameter. Primary shafts are augered and spoils removed through casing that is withdrawn as concrete is placed using tremie methods (concrete displaces water in the hole so it rises and is pumped out with low water loss). Secondary shafts (hard piles) are augered between and arched into both of adjacent primaries, and wet-set reinforced with steel. In the saturated sand at the Pagoda site, it would be at this stage (casing/augering, and reinforcing) and afterwards (tolerance deviation from verticality, joints between overlapping piles, and movement) when groundwater and sand will be lost. At depth of 36 feet below groundwater level (GWL), hydrostatic pressures are 16 psi plus head beyond that will force water and sand into the excavation. Pressure is only reduced as the GWL drops outside the wall. When water is lost, increases in effective stress with vibrations from hard pile installations will densify the sand, and buildings will settle differentially. The only method to actually minimize water and sand flowing into the excavation and simultaneous drawdown of the GWL with minimum building damage is to construct a circular wall of soft piles with large overlaps acting in ring compression, however this has not been suggested and it would be inconsistent with the planned development.

Yours truly

  
Lawrence B. Karp

