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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 5, 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)

Dear Mr. Lippe:

Herein the subject project is evaluated with respect to feasibility and potential environmental impact resulting from the deep excavation and construction of an underground structure at the site of the former Pagoda Theater at 1731-41 Powell Street [Block 101, Lot 004], near Columbus Avenue and Filbert Street.

Project

The project is the second phase of SFMTA's Light Rail Transit Project. The first phase is a 5.1 mile light-rail line along the 3rd Street corridor that opened in April 2007. The second phase, the Central Subway Project, a 1.7 mile alignment, will extend Muni's T Third Line from the Caltrain Station to Chinatown. New stations will be 4th & Brannan (surface), Yerba Buena/Moscone at 4th & Folsom, Union Square/Market Street at Stockton & Union Square, and Chinatown at Stockton & Washington (the last three subsurface). The tunnel will be drilled using boring machines (TBMs) that are planned to be extracted from the bore at Chinatown or left in place north of the station, or with a construction variant the TBMs would be extracted from Columbus Avenue at Washington Square and that location would be used to bring materials 2,000 feet back to Chinatown. It appears logical that a station is also thought of for Washington Square on the way to Fisherman's wharf, but those variants are not included in plans. Extracting the TBMs at Washington Square, although feasible, would be disruptive. Recently another proposal, to extract the TBMs at the former Pagoda Theater in conjunction with development, is evaluated herein.

Geology

The site is situated in the northern section of the San Francisco Peninsula, which is a northwest trending range of hills composed of a heterogeneous assemblage of folded, faulted and sheared rocks of the Franciscan formation, Jurassic and Lower & Upper Cretaceous age (Mesozoic; 144 to 208 million years old). Geologic maps (Schlocker 1974) show the Pagoda site is at the contact of dune sand (*Qd*) to the west and artificial fill (*Qaf*) to the east that is comprised principally of dune sand.

Investigation

No subsurface exploration program was performed for extraction of the TBMs with development of the Pagoda site, which will involve a 75 foot deep retained excavation. An investigation was performed (Treadwell & Rollo 2008) for a different idea at the site having excavations from 5 to 16 feet deep for the formerly planned garage, however that would only be about one-sixth the depth of the TBM extraction site.

Underpinning & Shoring

The 2008 report, although intended for a relatively shallow development, was used by the Planning Department to produce a non-engineered addendum to the supplemental EIS/EIR (SFPD 2013) which has been adapted by the planning department without any regard to shoring of the excavation and mandatory protection (providing lateral support and underpinning) of buildings on adjoining properties required under 2010 SFBC §3307.1. The 75 foot deep shaft required to extract the TBMs cannot be shored using “treated zones” as there will be high lateral pressures and because of the silts and clays intermixed in the fill (Treadwell & Rollo 2008); even in clean sand that will accept microfine grout, shoring is still required.

The fill and sedimentary soils have a large percentage of fine grained materials (those that pass a No. 200 sieve) so stabilization by intrusion grouting with microfine cement, which has replaced chemical grouting, due to EPA regulations, of soils adjacent to the excavation will not work leaving, due to restricted access, lateral restraint methods being the only viable shoring alternative, with all procedures subject to lateral movement during construction and in service due to the required dewatering. Internal bracing will not work because that would interfere with TBM extraction, therefore tiebacks for soldier beams are really the only solution but tiebacks will intrude at least 40 feet into neighboring lots.

Tieback (horizontal anchors) installation require easements from land owners; at least commercial properties at Lots 005A (1701-11 Powell), 005 (1717-1719 Powell), 045 (659 Columbus), 031 (721 Filbert) and residential properties at Lots 005A (722 Union), 006 (728-730 Union), and 007 (732-736 Union). The addendum mentions nothing about acquiring the necessary easements for tiebacks or the difficulty of underpinning buildings with basements (1717 Powell, 659 Columbus, and 721 Filbert).

Groundwater

Excavating to a depth of 75 feet (to below sea level) as indicated in the addendum would be necessary will require dewatering to intercept groundwater flowing from Russian Hill toward the Bay. Dewatering will lower the groundwater table under buildings on Union, Powell, Columbus, and Filbert, some of which are more than 100 years old and historically significant as well.

The water table at 1731-1741 Powell was considered to be stabilized at Elev. 56.5 (Treadwell & Rollo 2008), or about 6 to 8 feet below street level (Elevation from 62.3 to 65.1). With the bottom of the TBM retrieval shaft at 75 feet below grade (SFPD 2013), dewatering will drop the existing phreatic surface down about 67 to 69 feet. This huge drop in groundwater will drastically influence the buoyancy of building foundations within 130 feet or more from the retrieval area.

Properties with buildings that will be affected by groundwater drawdown are the commercial properties at Lots 005A (1701-1711 Powell), 005 (1717-1719 Powell), 045 (659 Columbus), 031 (721 Filbert), 030 (729 Filbert) and residential properties at Lots 005A (722 Union), 006 (728-730 Union), 007 (732-736 Union), 007A (740A&B/738-742 & Union), 008 (744 Union), 009 (748-750 Union), and the church at 010 (756 Union). As the excavation, which must be drained, proceeds downward and the phreatic surface drops and ground is lost from pumping or during shoring operations, areal subsidence will occur and the buildings along Union, Powell, Columbus, and Filbert that were originally built to much lesser standards than are required today, are very likely to be severely damaged from differential settlement unless they are deeply underpinned. Protection of buildings that will be affected by the excavation requires years to obtain rights of entry and underpin.

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Historical

Several noteworthy buildings will be impacted by dewatering. The 721 Filbert Street garage which adjoins the Pagoda site to the west is a two story UMB former stable over a basement built in 1907 and rated as eligible for the National Register by the North Beach Survey. As noted (SFPD 2013), it is considered a potential historic resource by the Planning Department and is an historic resource for the purposes of CEQA. The proposed extraction site for the TBMs is also adjacent to a potential historic resource at 1717-1719 Powell Street immediately south of the project site, a three-story building built in 1914 that has an art deco facade. I understand the building was rated by the North Beach Survey and was determined to be a contributor to the North Beach Historic District and the Washington Square Historic District by the Federal Transit Administration’s evaluations.

Summary

The negative consequences of engineering and construction of a deep retained excavation in an urban environment are missing from the supplemental EIS/EIR addendum. The prior choice for termination of the tunnel between Washington Square and Mariani Plaza must have been made to keep the TBM extraction away from buildings. An understanding of the effect of lowering the groundwater table by dewatering and the resulting increase in effective stress under the neighboring buildings is also missing from the addendum. The project is likely to generate claims by neighbors for property damage and inverse condemnation.

The proposed excavation and subgrade construction will require shoring and subsurface drainage facilities that will draw down the groundwater table having a steep hydraulic gradient (DeLisle 1993) from levels existing under the nearby structures, a potential environmental impact. Where lateral and subjacent support for adjacent structures are likely to be impacted during excavation for the project, underpinning of nearby foundations above 9 foot levels from the curb angle will be required by the building owners (in my experience always protested) and below 9 feet by the developer pursuant to 2010 SFBC §3307.1.

In my professional opinion, the conclusion reached by the Planning Department that there would be no environmental effects from the proposed rerouting of the end of the tunnel is wrong. The project as proposed is likely to result in significant environmental impacts during construction and in service to the surrounding environment and historical resources. The Planning Department’s use of an addendum to a supplemental EIS/EIR is improper under CEQA because the proposed changes to the project will result in new or substantially more severe significant impacts.

Yours truly,

Lawrence B. Karp



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