July 9, 2013

TJX Companies, Inc.
770 Cochituate Road
Framingham, MA 01701

Attention: Mr. Jon K. Nelson

Reference: **Pre-Loading (Surcharge) Recommendations**
Project Carrier
State Route 82 Site
Pendergrass, Georgia
S&ME Job No. 1801-13-201, Report No. 423930A

Dear Mr. Nelson:

S&ME, Inc. has performed a subsurface exploration at the site and presented the results of that exploration in our Report of Subsurface Exploration, dated May 23, 2013. The work was performed in general accordance with S&ME's Proposal No. AG1-13-175 dated April 29, 2013, as authorized by Mr. Jon Nelson. During a telephone conversation on July 8, 2013, we were asked to evaluate and address the use of pre-loading ("surcharging") of the most heavily loaded slab areas as a way to reduce post construction settlement of the slab.

BACKGROUND

Our understanding of the project, the findings of our field exploration, our conclusions, recommendations and limitations were presented in our May 23, 2013 report, and for brevity, will not be repeated herein. We were informed in a July 8, 2013 telephone call from the architect, Mr. Richard Leonard of MacGregor Associates Architects that the rack designer had concerns regarding the loading within the high bay area in the eastern portion of the proposed building relative to our recommendations. At the time of our exploration, we were under the impression that floor loads would not exceed 300 psf. During the July 8 telephone conversation, we were informed that the current design will impart an area of load of about 1,000 psf and the slab is to be constructed as a "superflat" slab (F_M = 100). The designers have stated a criterion for differential slab settlement to be one quarter inch (¼") over 50 feet. Because the high bay area of the building transitions from deep cut with dense material along its western perimeter to 20± feet of fill along the building's eastern building line, there is a concern that differential slab settlement will exceed the designer's criterion. Thus, during a subsequent telephone call with other members of the design team, it was decided that preloading would be the most cost effective procedure to help reduce post construction slab settlement. We note that because of the initially anticipated slab loads (300 psf), no quantitative laboratory testing was performed during our subsurface exploration. Thus, our supplemental analysis and recommendations are based solely on past experience and empirical relationships. Soil properties not specifically tested could affect the overall performance of the planned structure.

DISCUSSION

Borings 5, 6, 9, 14, 15, 18, 19, and 24 were drilled within the approximate area of planned high bay racks. Generally, the borings to the west, in the higher elevation areas, encountered moderate to high consistency soil, partially weathered rock, and refusal materials, while the borings further to the east penetrated moderate consistency soils to their termination depth. We note that there is a low lying area extending through the northeast corner of the building. Boring 6 in this area encountered topsoil fill which we recommended to be removed prior to mass grading.

While we have not performed a rigorous settlement analysis, we anticipate that construction and placement of 20± feet of fill will cause post construction settlement of the slab to be in excess of the designer's limit criterion. Thus, we recommend use of a pre-load fill. Our previous recommendations regarding site preparation, removal of old fill, and structural fill placement remain applicable.

RECOMMENDATIONS

To induce approximately 75 % of the estimated load-related post construction settlement of the heavily loaded slab areas, we recommend that a pre-load embankment be constructed over the heavily loaded slab areas. We estimate that pre-loading in accordance with the recommendations below will result in post-construction heavily loaded slab area total settlement of about ½ inch or less.

The pre-load embankment should be 15 feet tall, and the western crest (Elevation 919± feet) should generally overlie the existing Elevation 908 feet contour line. Thus, to the north, the western boundary of the surcharge will extend about 5 bays into the building area, while to the south it will cover about 3 bays. Furthermore, we recommend extending the surcharge at least 30 feet beyond the northern, eastern, and southern building lines. This is the minimum size of pre-load embankment that we believe will result in adequate preconsolidation of soils in the areas of concern over a reasonable time period. This is necessary due to stress dissipation in the soil profile along the edge of a loaded area. The pre-load embankment should be constructed with sideslopes (all four sides) not steeper than 1 ½H:1V.

The pre-load embankment should be constructed of fill soils (or other materials if available) that can be placed and compacted to achieve an in-place unit weight of 100 pcf or more. Excavated on-site soils can be used for this purpose, and we expect that they will be of sufficient unit weight when placed and compacted to at least 90 percent of their standard Proctor maximum dry density (ASTM D-698) at a moisture content of not less than 3 percent dry of their optimum moisture content determined by the same test. Higher degrees of compaction can be used to limit the pre-load soil's capacity to absorb additional moisture (from exposure to rain during the duration of the process). This will also facilitate reuse of the soil as compacted structural fill after the pre-loading process is complete.

We estimate that a minimum of about 45 to 60 days will be required for the pre-load induced settlement to be 90 percent completed. If you desire for the settlement waiting period to be shortened, additional fill can be placed to increase the load and thus induce more settlement to occur causing the desired overall settlement magnitude to be reached quicker.

We recommend that settlement monitoring points be established prior to, and monitored during the pre-loading process. This can consist of wood or metal plates with attached vertical steel rods that can be extended as preload embankment fill placement progresses. The settlement monitoring points should be established on a 100- to 150-foot grid, prior to pre-load fill placement. The monitoring points should be read daily during fill placement and twice weekly thereafter. The data should be referenced to a benchmark in a "cut" area at least 100 feet away from the pre-load area and in a location that will not be disturbed by the ongoing construction. The settlement monitoring data should be forwarded to us for review.

We suggest the settlement monitoring points consist of a two-foot by two-foot square of ½ inch plywood with a 1 inch steel water pipe flange bolted to the center. The plywood should be placed on a flat, firm subgrade, after the area has been stripped of any soft cultivated soil or topsoil. One-inch threaded steel water pipe should be threaded into the flange and extended upward above the preload fill soil level. To prevent soil friction from the preload fill, a 1 ½ or 2-inch diameter PVC pipe should be placed over the steel water pipe as a sleeve. To aid in surveying, the pipes can be extended upward in sections as the fill is placed.

We have also been asked to provide a modulus of subgrade reaction for use in the slab design. We understand that the slab will be "semi-flexible", not really being a rigid mat or a flexible slab. Therefore, the structural engineer indicated that the k_s value should be somewhat of a hybrid between the k_s values typically used in the design of rigid mats and flexible slabs. Based on the consistency of the residual materials and anticipation of well-compacted structural fill being placed, we suggest use of a modulus of subgrade reaction (k_s) of up to 80 pci.[1]

CLOSING

S&ME appreciates the opportunity to be of continued assistance on this project. Please contact us at your convenience if there are questions regarding the information contained in this brief report.

Sincerely,

S&ME, Inc.

Richard Mockridge, P.E.
Principal Geotechnical Engineer
Ga. Reg. No. 12692

Timothy J. Mirocha, P.E.
Principal Geotechnical Engineer
Ga. Reg. No. 21386

[1]Reference Foundation Analysis and Design, Joseph E. Bowles, 3rd Edition, Table 9-1