



January 27, 2014

Mr. Chris Petykowski, P.E.,
Principal Engineer
City Of Madison - Engineering Division
City-County Building, Room 115
210 Martin Luther King, Jr. Blvd.
Madison, WI 53703

Re: Evaluation of Concrete Cores and Soils from Tree Openings between 329 and 528 State Street, Madison, Wisconsin (STS Job. No. 13068)

Dear Mr. Petykowski:

Schmitt Technical Services, Inc. (STS) has completed laboratory evaluation of concrete cores and soil from the above referenced tree opening along State Street Pedestrian Mall, in downtown Madison, WI.

PROJECT BACKGROUND

As part of the Phase II reconstruction of the State Street Pedestrian Mall, new tree planters were installed along the 300 to 500 blocks. Figure 1 shows the cross section of the new planter design. The design called for a 7 in. thick structural slab having an exposed (granite) aggregate finish.

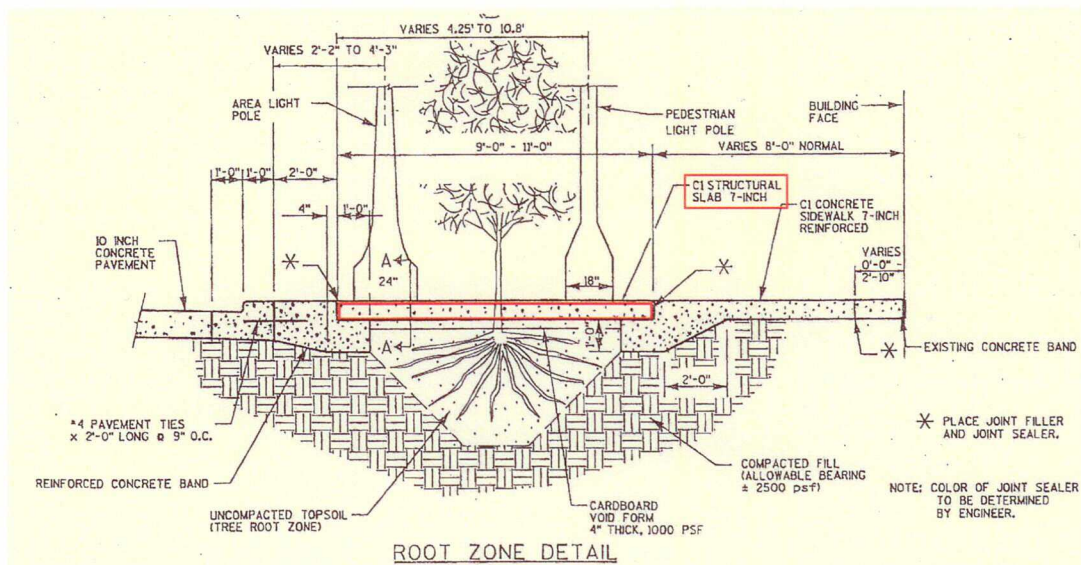


Figure 1. Cross-section of planter design showing the concrete slab in question.

Sometime this past Fall, it was determined that along joints the slabs were deteriorating from the bottom upward (Figure 2). The deterioration is in the form of bottom of the slab cracking and spalling (Figure 2) and joint surface cracking and spalling (Figure 3). The City of Madison contracted CGC, Inc. to take cores of various slabs for testing to determine the cause(s) and extent of the deterioration.



Figure 2. Oblique view of the slab showing deterioration of the slab bottom (red arrows) and corrosion of a dowel bar (yellow arrow).



Figure 3. Cracking, spalling and raveling along joints

SAMPLES AND WORK SCOPE

Four (4) concrete cores and one (1) soil sample, identified in Table 1 were delivered to STS by CGC on November 21, 2013. The concrete samples did not exhibit the reported deterioration. Therefore, two (2) more cores exhibiting the deterioration were drilled (Figures 4 through 6) by CGC and delivered to STS (by CGC) on December 4, 2013. STS was requested to perform petrographic examination on one (1) of the cores exhibiting deterioration. STS selected Core 1 for petrographic analysis. STS was also requested to perform acid-soluble chloride analysis at the top, middle and bottom of Core 1 and on the soil sample. pH measurement of the soil sample was also requested.

Table 1 –Sample Identification, Location/Description and Tests Performed		
Sample ID	Sample Location/Description	Test(s) Performed
Core 1	528 State St./Undeteriorated	Hold - Does not show the problem
Core 1A	528 State St./Undeteriorated	Hold - Does not show the problem
Core 2	409 State St./Undeteriorated	Hold - Does not show the problem
Core 3	329 State St./Undeteriorated	Hold - Does not show the problem
Hole 3	329 State St./Soil	Chloride, pH
Core 1	Deteriorated/Not Reported (Figs. 4 and 5)	Petro. Exam., Chloride
Core 2	Deteriorated/Not Reported (Figs. 4 and 6)	Hold



Figure 4. The location of cores showing the deterioration and which were subjected to laboratory testing.