PARSONS
BRINCKERHOFF

One Penn Plaza
New York, NY 10119
Main: 212-465-5000
Fax: 212-465-5096

www.pbworld.com

Letter No. CM1358T15-PB-NYCT-L002
April 25, 2013

Mr. Frank Mondello, P.E
Capital Program Management
New York City Transit
2 Broadway
New York, NY 10004

Subject: **CM 1358 Task 15 Steinway Tunnels**
Interim Evaluation – Sovereign Injectable Waterproofing System

Dear Mr. Mondello:

The purpose of this letter is to provide an interim evaluation of the pilot testing of Sovereign NOH2O in the Steinway Tunnels.

Two 75' long test zones were grouted in September and October 2012, with the work finished in a race against the clock as the system was being shut down at the approach of Hurricane Sandy. The zones were Track C1 Station 69+84.5 to 70+59 and Track C2 Station 70+82.5 to 71+65. Sovereign will revisit these zones in May, when a work train will be available, to finish grouting off injection holes, some of which were still open and leaking, to check the polyurethane beards for evidence of Sovereign compound penetration, and to take two small diameter cores, one in the test zone and one outside of the test zone.

Parsons Brinckerhoff believes that the product has greatly reduced the flow of water through these reaches of the Steinway tunnels, which were selected as test areas because they appeared to be the worst reaches with respect to evidence of past inflows and failed repairs. However, it must be said that this is a qualitative judgment. We plan to count drips and compare them with our initial inspection after Sovereign finishes up in May. The moisture readings definitely trended down when we measured before & after injection (on C1 only). The trend can be attributed to the grouting and not to other influences in the tunnel, such as changes in air flow or moisture content, because multiple readings were taken under different environmental conditions. We believe that the product will prove to be more durable than polyurethane over time. With its rubbery consistency, it should bridge over opening and closing cracks more easily, but this will require observation after many thermal cycles over time to verify.

PARSONS BRINCKERHOFF

In addition to the injection behind the liner, we have also injected NOH2O into machined replacement bolts for leaking and damaged bolts from the original cast iron construction. The bolt wrapped with Teflon was not flexible enough to deal with misaligned holes and corroded flanges, and some leaks were not stopped even after two bolt replacements. The injection bolts have performed very well, with only one or two not completely sealing off the leaks on the first pass. The few bolts that did not seal on the first pass could be regrouted and so were eventually sealed.

Our field engineer has also worked with Sovereign to inject NOH2O through new grout ports placed in the cast-iron webs at locations where the original grout ports were either missing or damaged. This trial repair also worked very well, based on the field engineer's observation that flows stopped.

We will issue a final letter after Sovereign has finished its work in the test zones and taken cores, but understand that an interim evaluation is needed. Please let us know if you need further information or more detailed information. The work was described in detail in an interim draft report issued to NYCT on December 21, 2012.

Very truly yours,
PARSONS BRINCKERHOFF

Donna Roberts

Donna M. Roberts
Project Manager

cc: R. Shah, H. Chong, Z. Aqeel, Y. Shukla, S. Chandramouli, R. Favis, NYCT CPM
K. Ott, D. Moolin, L. Gonzalez, PB
File