

July 20, 2012

Mr. Todd Hileman  
Village Manager  
Village of Glenview  
1225 Waukegan Rd.  
Glenview IL 60025

Mr. Richard A. Nahrstadt  
Village Manager  
Village of Northbrook  
1225 Cedar Lane  
Northbrook, IL 60062

Subject: Union Pacific Railroad  
UPRR Restoration at Shermer Road

Dear Messrs. Hileman and Nahrstadt:

Union Pacific Railroad has retained Alfred Benesch & Company (Benesch) to provide the following information regarding the derailment restoration at Shermer Road:

- Task 1: Monitor the top of rail profile and alignment daily to determine if the track is moving more than would typically be expected.
- Task 2 Prepare calculations to determine if utilities in the corridor are subject to additional load stresses due to the placement of temporary fill and railroad live load.
- Task 3 Prepare slope stability analysis to estimate the factor of safety of the temporary embankment.

### **Summary of Benesch Activities and Findings - July 13 through July 19**

#### **Task 1**

Benesch initiated work for this assignment on July 6, and collected topographic field survey that included locating existing Shermer Road, the temporary stone embankment, and the top of rail for both main tracks. This information was used to develop our "Situation Plan", and the engineering model of the site.

The tops of rail of both main tracks were surveyed daily from July 13 to July 19. After our review of the survey data and plots that were prepared from that data, we have concluded that the tracks have not experienced movement beyond what would typically be expected for new track construction. Benesch will continue to collect survey data on a daily basis until directed to cease such operations, and will report to the Village on a weekly basis.

#### **Task 2**

We were directed to prepare calculations to estimate the incremental stresses placed on the 4 known Village-owned utilities in the corridor. Samples of the temporary embankment material were collected on July 11, and the sieve analysis was completed on July 12. The characteristics of the in-situ materials were determined by soil

borings that were made on July 13, 2012. Based on the findings of the sieve analysis and the soil borings we were to calculate the incremental stresses on the utilities. Our review of each is summarized below:

24" Glenview Sanitary (south of manhole/along tracks) – Reinforced Concrete Pipe with liner (RCP)

Field survey has revealed that the sanitary sewer runs on the north edge of UPRR ROW line, and is at the north edge of the new embankment, placing negligible additional stresses on the pipe.

24" Glenview Sanitary (north of manhole) – Reinforced Concrete Pipe (RCP)

Field survey has revealed that the new embankment does not currently cover any portion of this line, and is therefore not pertinent to the study.

8" Northbrook Sanitary – Vitrified Clay Pipe (VCP)

Field survey has revealed the 8" VCP sewer is buried beneath the original embankment. The new embankment does not currently cover any portion of this line, and is therefore not pertinent to the study.

10" Northbrook Water Main – Ductile Iron Pipe (DIP)

We assumed that the cover over the water main to be 5-feet. Based on the information currently available for the water main we believe that the pipe will not be overstressed by the temporary embankment material. ]

**Task 3**

Slope Stability & Settlement Calculations

Analyses were performed for the crushed concrete embankment using circular failures generated using the Simplified Bishop method of slices. The results of slope stability analyses provided safety factors against failure of 1.3 for both the short-term (undrained) and long-term (drained) conditions assuming a 1.5(H):1.0(V) side slope and loaded coal cars on both tracks. A factor of safety of 1.3 is considered adequate to assume the slope will remain stable over the short and long terms.

Calculations were also prepared to estimate the amount of consolidation (settlement) of the soils beneath the existing utilities due to the weight of the crushed concrete. The greatest settlement potential be for the shallow utilities. Based on book values for soil properties the estimated settlement beneath the weight of the crushed concrete for a utility located 5' below the street level is 0.5-inch, which would occur at the intersection of the centerline of the tracks and the centerline of the underlying, buried street. The estimated settlement of the utility at the toes of the embankment is negligible (less than 1/4"). Calculations to estimate any additional settlement of the utilities under the weight of a loaded train were not performed as the duration of any stand time is minimal. Settlement from a passing train is not expected to occur because of the cohesive nature of the soils beneath the utilities.

Please let me know if you have any questions or if we can be of further assistance.



EXPIRATION DATE 11-30-2013  
DATE: 07-13-2012

Richard D. Conrath, P.E.  
Vice President

RDC:r