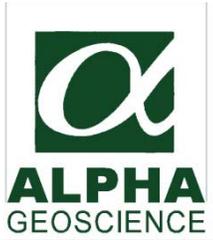


APPENDIX C

FRACTURE TRACE ANALYSIS REPORT



Geology

Hydrology

Remediation

Water Supply

September 5, 2014

Mr. Mark Williams
Sterling Environmental Engineering, P.C.
24 Wade Rd
Latham, NY 12110

Re: Fracture Trace Analysis
Troy Belting & Supply
Watervliet, NY

Dear Mr. Williams:

This report was prepared by Alpha Geoscience (Alpha) for Sterling Environmental Engineering, P.C. (Sterling), to present the results of a fracture trace analysis conducted for the Troy Belting & Supply site at 70 Cohoes Rd, Watervliet, NY (Figure 1). The fracture trace analysis was conducted in order to assist Sterling in the placement of monitoring wells at the site and surrounding area, based on the premise that ground water flow through bedrock is predominantly along bedrock fractures, which can be oriented parallel to bedding planes or at some angle relative to them. In order to evaluate bedrock fracture patterns in the area, Alpha reviewed historical aerial photographs and topographic maps of the site and surrounding area, reviewed the geological literature pertaining to the area, and visited bedrock outcrops in the area.

A stereo-pair of aerial photographs from 1952 that covers the site was obtained from EDR, Inc., in order to document photo-linears which may reflect underlying bedrock structure (fractures, joints, faults). The photographs from 1952 (versus more recent years) were chosen because there is a better chance on older photographs to see conditions prior to ground disturbance from development. Much of the area between the Hudson River and the uplands to the west, however, already had been reworked by 1952 during construction of several railroads, roads, and canals.

Figure 2 shows the traces of the bedrock fractures that were observed on the 1952 aerial photographs, along with those obtained from topographic contours. Figure 2 also shows the location of the abandoned Erie Canal (upgradient from the site), the abandoned Champlain Canal (downgradient from the site) and a former channel of the Mohawk River at its confluence with the Hudson River, all of which were visible in the 1952 photographs. Much of the former Mohawk River channel and the abandoned canals were likely filled in during construction of I-787 and Route 7. The majority of the bedrock fracture traces observed in the aerial photographs and topographic maps were found to be in the uplands west of the site.

The area between the uplands and the site had been too disturbed by previous construction activities to be able to detect natural linear features. The major fracture trend derived from the photograph analysis is oriented NW-SE, with a secondary orientation of N-S. There is an additional, minor fracture set that is oriented SW-NE.

A site visit was made on March 11, 2014 to inspect bedrock outcrops in the area and measure orientations of bedrock fractures and bedding planes. Snow cover in the area was extensive and likely obscured many of the available outcrops west of the site. Outcrops were found along the D&H railroad about a mile north of the site and in the ditch along the northern edge of the site. Bedding could not be discerned from foliation and cleavage at these outcrops and to do so would require a more intensive study. The bedrock at both locations is described as being part of the Waterford Flysch Zone of the Cohoes Melange by Plesch (1994) and Kidd et al (1995). This type of bedrock is extremely fissile shale and siltstone with slaty to phacoidal cleavage. The result of this is that there are several planes of weakness along which the rock tends to split or fracture. The strike, or trend, of these planes was measured consistently to be oriented in the SW-NE direction (Figure 2), specifically N40°E. The dip of the planar fabric averaged approximately 68° toward the southeast. The angle of dip varied greatly within each of the outcrops but was consistently eastward. This is consistent with the bedding or cleavage plane dips measured by Plesch (1994) at outcrops west of the site (Figure 2).

Several joints or fractures were observed cross-cutting the general trend of the bedding and cleavage at the railroad outcrops (i.e., striking SE); however, these could not be measured with accuracy as the outcrops had been exposed for a considerable number of years and likely affected by slumping and freeze/thaw. The day of the field visit was quite warm (about 50°F) and considerable snow melt was occurring above the southern of the two railroad outcrops. Water was seeping into the bedrock above and west of the outcrop and apparently traveling down along the bedding/ cleavage planes and seeping from the outcrops. Water was not preferentially seeping from the cross-cutting joints/fractures; instead, it appeared to be controlled by the bedding/cleavage planes.

It is Alpha's opinion that ground water flow in the bedrock at the site is likely dominated by the SW-NE bedding, foliation and cleavage orientation observed at the outcrops at the site and along the railroad track north of the site. The NW-SE fractures or joints observed in the aerial photographs, if they extend to the site, likely are too widely spaced to serve as the major conduits for shallow ground water flow in the bedrock. It is more likely that ground water, especially shallow ground water, follows the bedding-cleavage-foliation as these planes have weathered sufficiently near the surface to transmit water more readily. It is easier for ground water to flow along these planes than it is across them.

A localized northeast flow direction following the trend of the bedding-cleavage-foliation planes is consistent with the former location of the stream at the site prior to development. The 1952 aerial photographs indicate that the stream originally flowed northeast across the

Mr. Mark Williams

Page 3

September 5, 2014

site (noted in blue on Figure 2). The path of this stream cuts diagonally through the present location of the Troy Belting and Supply building (Figure 3). The former position of stream is also indicated on a 1928 USGS topographic map of the site (Figure 4). This stream has since been rerouted around the building and much of its upstream reach is now conveyed by underground piping. The location of the backfilled stream may still present a preferential pathway for shallow ground water flow at the site.

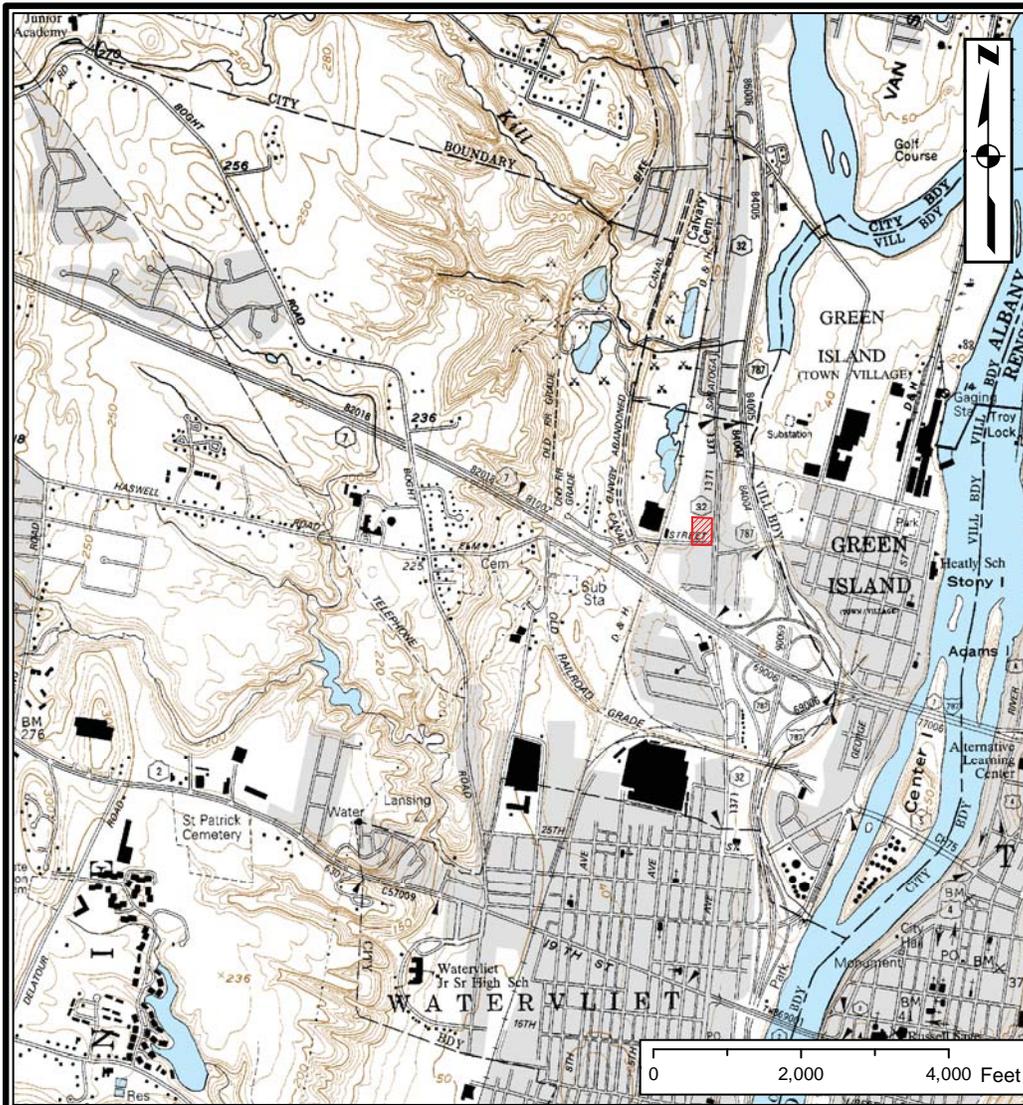
Thank you for the opportunity to assist Sterling on this project. Please let me know if you have any questions.

Sincerely,
Alpha Geoscience

A handwritten signature in black ink that reads "Steven M. Trader". The signature is written in a cursive style with a large, stylized 'S' at the beginning.

Steven M. Trader, CPG
Geologist

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LEGEND

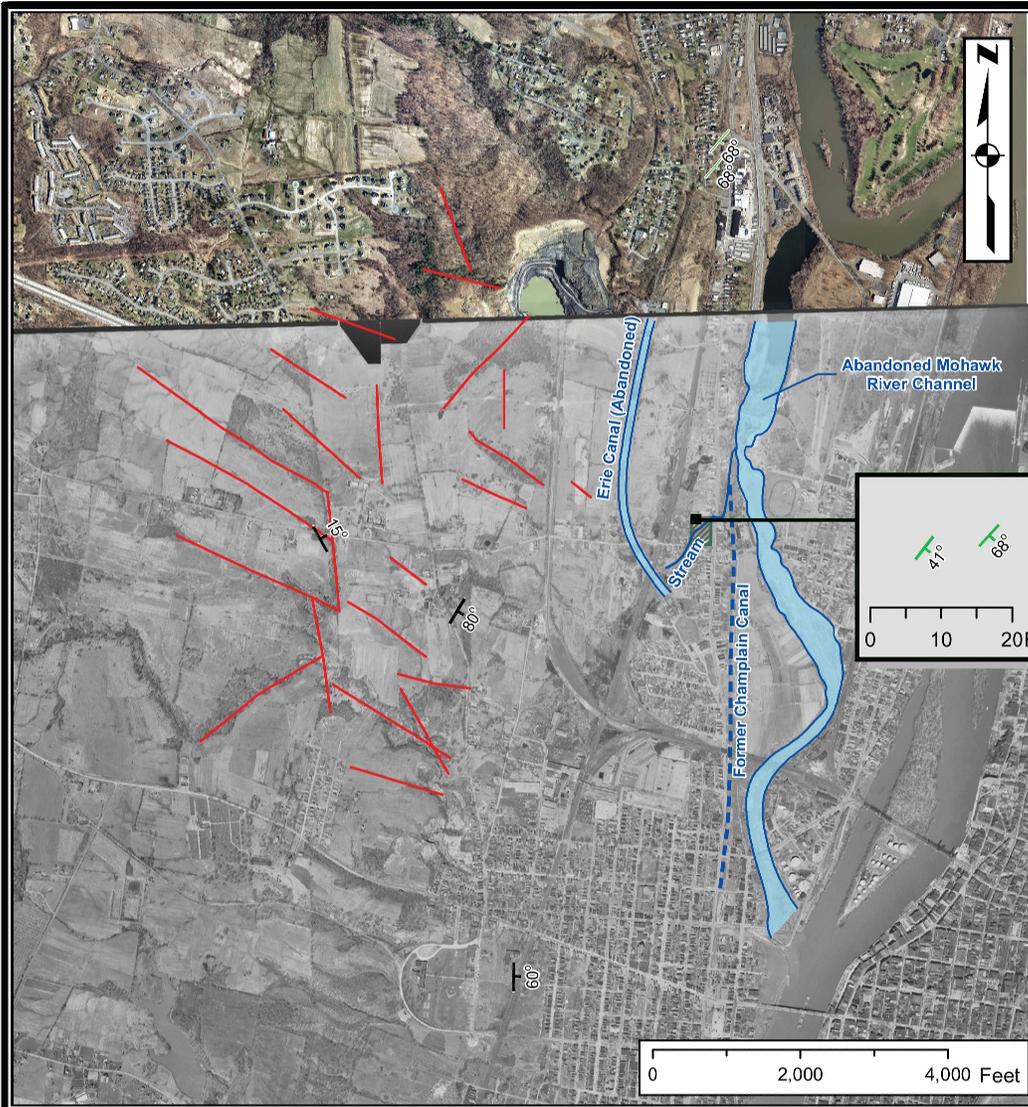
 Site Boundary (approx.)

Source:
 -NYS Department of Transportation
 Digital Raster Quadrangle
 (1:24,000 scale - UTM Zone 18, NAD 83)
 (<http://gis.ny.gov/gisdata>).



FIGURE 1
 Site Location Map

Troy Belting Fracture Trace Analysis
 Town of Colonie
 Albany County, New York



LEGEND

- Potential Bedrock Fracture Trace
- +— Strike & Dip Measurement
 - +— Alpha, 3/11/2014
 - +— Plesch, 1994
- Site Boundary (approx.)

Source:
 -Black and White Aerial image taken April 16, 1952 provided by EDR Services.
 -Albany County 6-inch Resolution Color Orthoimagery (2011), NYS Office of Information Technology Services (ITS) (<http://www.nysgis.state.ny.us>).



FIGURE 2
Fracture Traces
 Troy Belting Fracture Trace Analysis
 Town of Colonie
 Albany County, New York



LEGEND

- Approximate Stream Location From 1952 Aerial Imagery
- Strike & Dip Measurement
- | Alpha, 3/11/2014

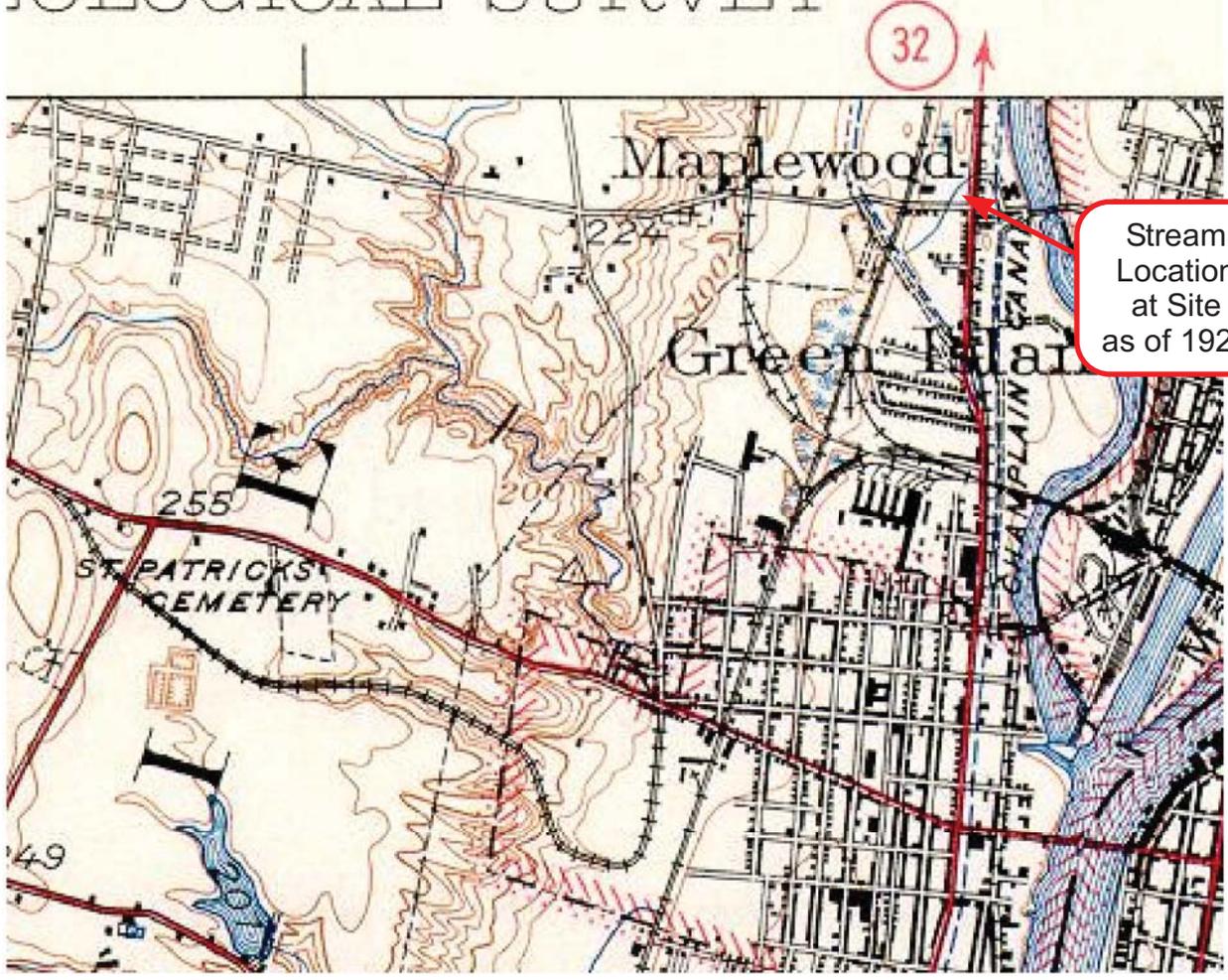
Source:
 -Albany County 6-inch Resolution Color Orthoimagery (2011),
 NYS Office of Information Technology Services (ITS)
 (<http://www.nysgis.state.ny.us>).



FIGURE 3
Troy Belting Site
 Troy Belting Fracture Trace Analysis
 Town of Colonie
 Albany County, New York

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

JUNC. U. S. NO. 4 3.5
COHOES 1.6 MI. ME



Approximate Scale:



2000 feet



FIGURE 4
USGS 15-min Troy Quadrangle
1928

Troy Belting Fracture Trace Analysis
Town of Colonie
Albany County, New York

APPENDIX D

SOIL BORING LOGS / CORE LOGS