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MEMORANDUM

TO:	Sarah McInnes, PE	DATE:	November 20, 2019
COMPANY:	PennDOT, District 6	SUBJECT:	Geophysical Report Review
ADDRESS:	7000 Geerdes Boulevard King of Prussia, PA 19406	PROJECT NAME/NO.:	Sunoco Boot Road Geophysics 18C15018.04
FROM:	Mia Painter, PG Jeremy Brown, PE	CC:	Bruce Shelly, PE, AECOM

Schnabel personnel observed geophysical data collection performed by Rettew at the Boot Road Sunoco pipeline site on October 7-8, 2019. Our Site Observation Reports are attached. We also reviewed the report that Rettew provided for this work, dated October 22, 2019, titled *Geophysical Survey, Sunoco Pipeline, LP Pipeline Project, S3-00460 Boot Road GPR Survey at Wilson Drive, East Goshen Township, Chester County, PA, RETTEW Project No. 09303003*.

The Rettew report presents a summary of the data collection methods, procedures, location plans, plan-view slices of the GPR data collected across the site, and two profile slices of the GPR data over two anomalies identified. The report does not include information about how the GPR data was converted from time to depth, although our field representative observed a depth calibration at a pipe visible in a nearby inlet. Note that the depth scales on the example profiles in the reports are different from each other.

While the plan-view depth slices show an overview of the area of interest, they do not allow for distinguishing between anomalies related to utilities versus settlement, and there are several locations in the depth slices that show high amplitude anomalies that are not specifically discussed in the text or in the figures. We assume Rettew has reviewed the profiles in detail and would have called out additional settlement-related anomalies if observed; however, the report does not make this clear. We would have liked to see additional example profile slices from anomalies throughout the area surveyed and, in particular, in the area where inadvertent return of drilling fluids had been previously noted and where the pipelines cross under the roadway.

We agree with Rettew's summary that, based on the data presented in the report, the anomalies identified in the report do not appear to represent open voids or active settlement and likely do not have an impact on current road conditions. In addition, we did not visually observe depressions or sinkholes in the area of interest during our site visit.

SIGNED:

Mia Painter, PG
Associate

JJB:MAP:AWC:hcf

Attachments: Site Observation Reports (2)

SENT VIA: First Class Mail Overnight Service Email Other

SITE OBSERVATION REPORT

Date of Observation:	10/7/2019	Project:	Sunoco Boot Road Geophysics
Schnabel Rep:	Steve Penzone	Project Number:	18C15018.04 Task Number(s): 01
Schnabel PM's:	Jeremy Brown, PE, Mia Painter, PG	Weather	Mostly Sunny, windy
Arrival Time:	08:30	Departure Time:	14:00
Geophysics Contractor:	Rettew	Client Rep:	Sarah McInnes, PE, Not on-site
Air Temp ° F:	58-79	Client:	AECOM / PennDOT District 6-0

SCHNABEL ENGINEERING, LLC (SE) representative above visited the site on October 7, 2019, to observe geophysical data collection performed by Rettew, as requested by PennDOT. Our representative had previously visited the site to observe an initial phase of geophysical data collection on June 22, 2019.

It is our understanding that the geophysical data collection is associated with a 20 inch Sunoco pipeline installation project. We understand the Sunoco pipeline alignment is on the northeast side of Boot Road at the south end of the area of interest, and angles to be located within Boot Road at the northern end of the area of interest. The Rettew report includes a location plan with the approximate pipeline location.

The Rettew representative on site was Bill Steinhart and an assistant. The area of interest was identified in an email from Bill Steinhart to Sarah McInnes, PE, on October 3, 2019. Attachment 1, site sketch, shows an outline of the proposed survey area.

DESCRIPTION OF OBSERVATIONS

Prior to observing geophysical data collection, our representative performed a visual site reconnaissance along the north and south sides of Boot Road from Wilson Drive to Carriage Drive. We did not observe significant changes to the area of interest since our prior visit on June 22, 2019, except previously active utility work on the north side shoulder of Boot Road appeared to be complete. The SE rep did not observe open sinkholes, holes, or depressions in the proposed survey area.

We observed Rettew performing ground penetrating radar (GPR) data collection. Rettew collected location and elevation data during GPR collection using a Topcon Hiper Lite Plus rover and base unit linked to the GPR module. Prior to collecting GPR data, Rettew placed the GPR antenna over a subsurface storm pipe visible in a nearby inlet and measured to the top of pipe within the inlet to measure the two-way travel time of the radar waves for the site-specific soil conditions so that a depth of investigation could be calculated and depth calibrated.

Ground Penetrating Radar Data Collection

The north lane was closed throughout the day, and Rettew performed the GPR survey in this lane and shoulder.

We observed the following equipment being used for GPR data collection: a GSSI 4-wheel cart, GSSI dual frequency 300- and 800-MHz antenna, and GSSI utility scan data visualization module. GPR scans were taken parallel to Boot Road at approximately 2- to 3-ft intervals from the curb line about 25-ft inboard of the curb (the limits of the traffic control). GPR data collection was directionally aided by the GPS system along with paint markings that Rettew placed every 2-3 ft across the roadway. The data was collected in 200- to 250-ft long sections parallel to the direction of traffic starting west

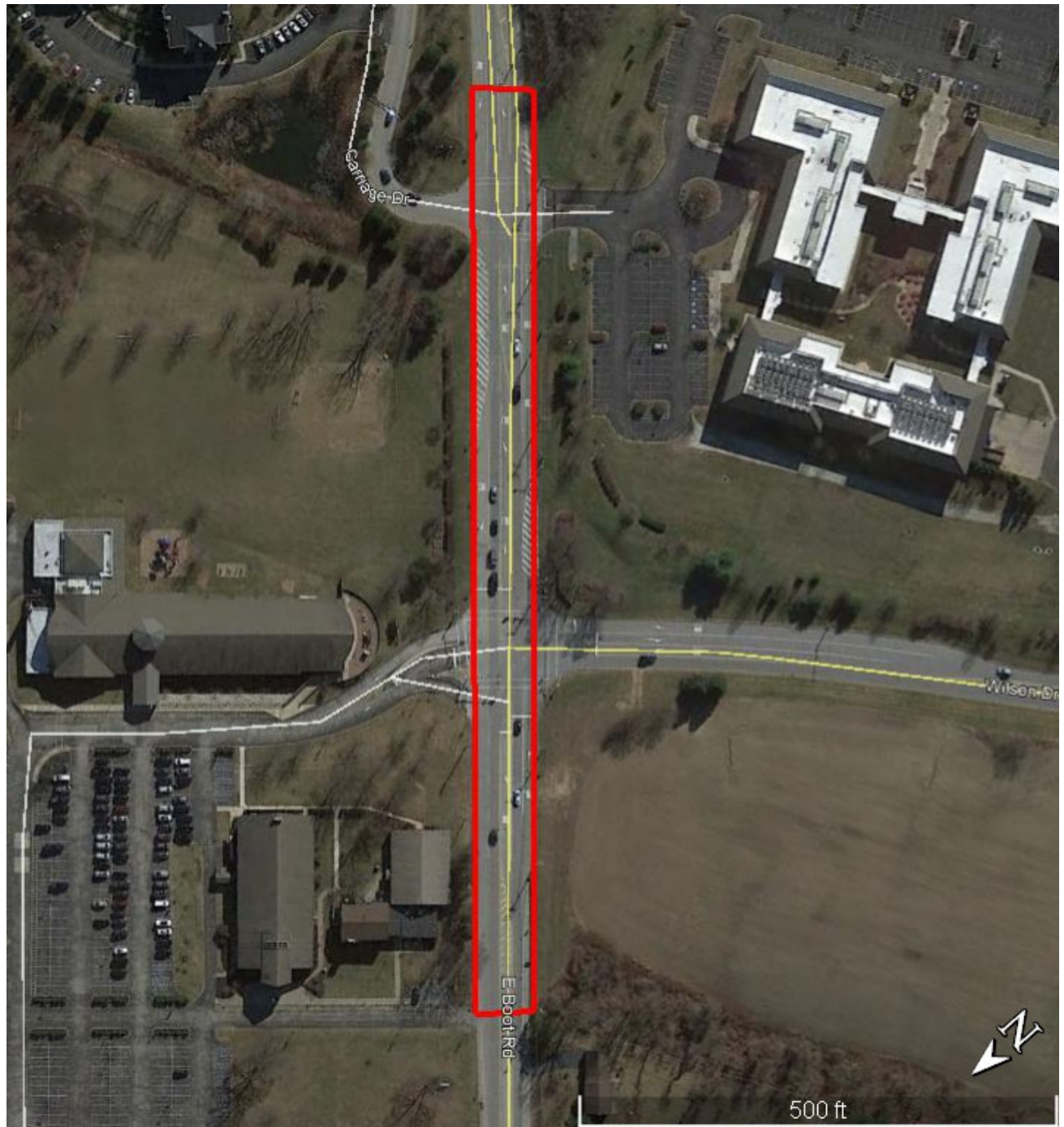
SITE OBSERVATION REPORT

of Wilson Drive and proceeding east towards Carriage Drive. After longitudinal data was collected, a transverse “zig-zag” line was collected that was spaced approximately 20-ft apart and was taken from curb to slightly past traffic controls.

Mr. Steinhart informed our representative that the approximate depth of viewing was 5 to 6 ft during data collection. We inquired about the collection rate of the GPR system; Mr. Steinhart was unsure but would provide the information tomorrow.

SP:JJB:MAP:AWC:hcf

Attachment 1 – Site Sketch



PROPOSED GPR SURVEY AREA



SUNOCO BOOT ROAD GEOPHYSICS
AECOM / PENN DOT DISTRICT 6-0
WEST CHESTER, PA
PROJECT NO. 18C15018.04

ATTACHMENT 1

SITE OBSERVATION REPORT

Date of Observation:	10/8/2019	Project:	Sunoco Boot Road Geophysics
Schnabel Rep:	Steve Penzone	Project Number:	18C15018.04 Task Number(s): 01
Schnabel PM's:	Jeremy Brown, PE, Mia Painter, PG	Weather	Mostly Sunny, windy
Arrival Time:	08:30	Departure Time:	14:00
Geophysics Contractor:	Rettew	Client Rep:	Sarah McInnes, PE, Not on-site
Air Temp ° F:	58-65	Client:	AECOM / PennDOT District 6-0

SCHNABEL ENGINEERING, LLC (SE) representative noted above visited the site on October 8, 2019, to continue to observe geophysical data collection performed by Rettew that was started on October 7, and described in a previous Site Observation Report. The Rettew representative on site was Bill Steinhart and an assistant; the same as the previous day.

DESCRIPTION OF OBSERVATIONS

Prior to observing geophysical data collection, we performed another site reconnaissance along the north and south sides of Boot Road from Wilson Drive to Carriage Drive. We did not observe significant changes to the area of interest from the prior day. Our representative did not observe sinkholes, holes, or open depressions in the proposed survey area.

Rettew performed ground penetrating radar (GPR) data collection. Rettew collected location and elevation data during GPR collection using a Topcon Hiper Lite Plus rover and base unit linked to the GPR module. After collecting GPR data, Rettew returned to the pipe and inlet used for depth calibration and repeated the depth calibration process done the day before.

Ground Penetrating Radar (GPR) Data Collection

The center and south lanes were closed throughout the day, and Rettew performed the GPR survey in these lanes and shoulder.

The following equipment being used for GPR data collection were the same as the previous day: a GSSI 4-wheel cart, GSSI dual frequency 300- and 800-MHz antenna, and GSSI utility scan data visualization. GPR scans were taken parallel to Boot Road at approximately 2- to 3-ft intervals from the south lane curb line to the limits of the traffic controls, an approximate 10-ft section in the center lane closure and 30 ft in the southern lane closure. GPR data collection was directionally aided by the GPS system along with paint markings that Rettew placed every 2-3 ft across the roadway. The data was collected in 200- to 250-ft long sections parallel to the direction of traffic, starting west of Wilson Drive and proceeding east towards Carriage Drive. After longitudinal data was collected, a transverse "zig-zag" line was collected that was spaced approximately 20-ft apart and was taken from curb to slightly past traffic controls. No transverse data was collected in the center lane closure. Mr. Steinhart informed us that the approximate depth of viewing was 5 to 6 ft during data collection and the collection rate was 18 scans/foot.