AECOM Imagine it. Delivered.

Prepared For:
United Technologies Corp.
Farmington, CT

Prepared by:
AECOM
Morrisville, NC
June 2018

TR-3 North Wall Soil Characterization Sampling and Analysis Plan

UTC/Carrier Site
Thompson Road, Syracuse, NY

.

Corrective Action Order - Index CO 7-20051118-4

NYSDEC Site Registry #734043

Prepared for:

United Technologies

9 Farm Springs Road
Farmington, Connecticut 06032

Prepared By:

AECOM Technical Services, Inc.
1600 Perimeter Park Drive, Suite 400
Morrisville, North Carolina 27560

Contents

List of Tables

List of Figures

List of Appendices

1.0 Introduction

This Sampling and Analysis Plan (SAP) has been developed to initiate the second phase of the Interim Corrective Measure (ICM) in the vicinity of the TR-3 North Wall located at the United Technologies Corporation (UTC)/Carrier Corporation facility (Carrier) on Thompson Road, Syracuse, New York (hereinafter referred to as the Site). The Site and the location of the TR-3 North Wall are shown on **Figure 1**. The first phase of the ICM consisted of utility relocation and installation of a barrier consisting of a sheet pile wall and horizontal extraction well along the TR-3 North Wall to prevent contamination south of the wall from migrating to Sanders Creek. The second phase of the ICM will addresses contamination in saturated and unsaturated soil situated between the sheet pile wall and Sanders Creek (hereinafter referred to as the Subject Area). The ICM is being performed pursuant to the requirements of a Corrective Action Order (CO 7-20051118-4) dated February 13, 2006 negotiated between UTC and the New York State Department of Environmental Conservation (NYSDEC).

Previous investigations are summarized in the *Former Building TR-3 North Wall Investigation*, prepared by EnSafe, Inc. (EnSafe), which was submitted to the NYSDEC in February 2015 and the *IRM Pre-Design Investigation Report (PDI)*, prepared by AECOM Technical Services, Inc. (AECOM), which was submitted to the NYSDEC in July 2016. The results from the site-wide groundwater monitoring and sampling performed in November 2017 are presented in the *Annual Site-Wide Groundwater Monitoring 2017* report, prepared by AECOM.

Findings from the investigations confirmed the presence of chlorinated volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and petroleum oil-related VOCs in shallow subsurface soils and groundwater in the vicinity of the TR-3 North Wall, including the area between the wall and Sanders Creek. The figures from the previous investigations that illustrate the soil investigation findings are included in **Appendix A**.

The Subject Area is approximately 12,700 square feet and extends to approximately 20 feet (ft) in depth (to the underlying confining clay layer). The Subject Area is shown on **Figure 2**. Generally the soil above the groundwater table is described as fill material. The soil below the water table is described as interlayered silty clay and clayey silt with some silty sand layers. The depth to the underlying confining clay layer decreases closer to Sanders Creek. Depth to groundwater ranges from approximately 3.5 ft to 5.8 ft below ground surface (bgs) based on the 2017 groundwater monitoring event. Cross sections of the area completed as part of the PDI are included for reference in **Appendix A**.

As recommended in the PDI, AECOM is submitting this SAP to better define the area where soil remediation is required and to further evaluate the soil remediation options for the Subject Area.

1.1 Site History

Historical information provided by Site personnel indicates that the former TR-3 building was originally constructed in the early 1950s with two later additions. The building was used to manufacture various air conditioner components. These former manufacturing operations included the use of electrical transformers and various oils (e.g., hydraulic, compressor), which potentially contained PCBs. The former TR-3 building also contained a degreaser that used the chlorinated solvent trichloroethene (TCE).

The Storm Water Treatment Plant (SWTP) was constructed in the early 1990s at the northeast corner of the TR-3 building. The TR-3 building was demolished in 2010/2011. Following demolition, the floor slab and north wall of the building were left in place. The remaining portion of the wall, referred to as TR-3 North Wall, acts as a retaining wall to accommodate the approximate 7 ft elevation drop from the south to the north side of the wall.

In 2016/2017, a sheet pile wall was installed north of the TR-3 North Wall along with a horizontal extraction well with the intended purpose of providing hydraulic control of groundwater upgradient of the sheet pile wall. Also, various utility relocation efforts were performed for execution of the work.

1.2 Previous Investigation

The most recent investigation was the PDI in 2016. The field work involved a geophysical survey; advancing 20 soil borings; completing four of the 20 soil borings as shallow monitoring wells and one as a deep monitoring well; performing pump and slug testing; analyzing select soil samples for VOCs, PCBs, and geotechnical parameters; and analyzing groundwater samples for VOCs and PCBs. The information obtained included the following:

1. The geophysical survey identified locations of buried utilities between Sanders Creek and the TR-3 North Wall.

2. Geotechnical data (e.g., grain size, water content, triaxial compression testing, Atterberg limits, depth to bedrock, etc.) obtained from the geotechnical borings along the proposed sheet pile alignment provided the information required for the sheet pile design.

3. The pump and slug tests provided hydraulic conductivity data required to design the groundwater extraction system on the south side of the TR-3 North Wall.

4. The installation and sampling of the two shallow monitoring wells on the north side of Sanders Creek confirmed the general absence of soil and groundwater contamination in that area.

5. The soil boring analytical results, in combination with previous investigation results, generally defined the areal extent of impacted soils between the TR-3 North Wall and Sanders Creek. The data indicate that contaminants are primarily present in the soils immediately above the confining clay unit. Elevated TCE concentrations in TR3-GB-01 indicate that a dense non-aqueous phase liquid (DNAPL - solvent) phase may be present in the vicinity of this boring.

6. Groundwater analytical results from the PDI and routine groundwater sampling events confirmed that detected VOC concentrations are localized to the TR-3 North Wall and SWTP area and present only in the upper water-bearing zone (i.e., above the confining clay unit).

The results of the ICM PDI provided sufficient data to proceed with the design of the sheet pile groundwater barrier and the groundwater extraction system with the implementation of that work occurring in 2016/2017.

2.0 Remedial Technology Evaluation

A brief remedial technology evaluation was completed and is summarized in the following section. Two treatment options were identified as potential remedial alternatives for soils in the Subject Area. The technologies that were considered applicable are:

- Excavation and Disposal
- Soil Mixing In-Situ Chemical Oxidation (ISCO) with In-Situ Solidification (ISS)

2.1 Excavation and Disposal

Physical removal of contaminated soils by excavation and off-Site disposal is an aggressive remedial approach which can occur in a short timeframe.

The following are some advantages and disadvantages of excavation and disposal:

Advantages	Disadvantages
Complete removal of contaminated soils as delineated.	Relatively high costs per unit of contaminant mass removed (excavation, transport, disposal, dewatering, shoring, backfill).
Quick time frame to reach Site-specific clean up goals.	Technical practicability challenges including: The depth of soils to be removed below the water table, in close proximity to Sanders Creek. Potential risks (e.g., breach of the confining clay layer) due to the artesian conditions existing in the lower aquifer. Complicated, atypical shoring needed to support the existing sheet pile wall.
Opportunity to backfill with low permeability material as an added protective measure to prevent contaminant migration on the downgradient side of the sheet pile wall.	The depth and proximity of contaminated material to existing infrastructure could require shoring or other engineering controls to protect structural integrity.
If completed in conjunction with the Sanders Creek remediation, creek diversion and construction water treatment system will already be in place.	If not conducted in conjunction with Sanders Creek remediation, stream diversion would likely be required during remedy implementation.
	The design would need to consider the need to install a replacement force main through this area.

The current data set would need to be augmented with the following data collection to further evaluate this specific remedy:

Horizontal and vertical grid pattern sampling to further characterize the soils (see Section 3.0 for sampling information).

2.2 Soil Mixing In-Situ Chemical Oxidation with In-Situ Solidification

In-situ chemical oxidation (ISCO) is an aggressive remedial approach that utilizes subsurface injection(s) or mechanical mixing of a strong chemical oxidant for the treatment of contaminated soil and groundwater. ISCO has also been used, although less commonly, to destroy small amounts of residual non-aqueous phase liquid (NAPL).

Oxidation is an electron transfer process. When oxidants break down organic compounds, such as chlorinated hydrocarbons, electrons are transferred from the hydrocarbons to the oxidizing compound. When the oxidation of organic compounds is complete, the end products are carbon dioxide and water; however, incomplete oxidation may yield smaller organic compounds. Common oxidants include high concentrations of hydrogen peroxide, hydroxyl radicals (produced by Fenton's Reagent), permanganate, ozone, persulfate, and molecular oxygen, or combinations of these.

The end products of complete oxidation are natural materials. Since the entire reaction takes place in-situ, minimal wastes are generated from the treatment process.

In-situ solidification (ISS) can be combined with ISCO as part of the mechanical mixing process to re-solidify the soil matrix and decrease the matrix permeability post remedy. The following are some advantages and disadvantages of ISCO:

Advantages	**Disadvantages**
With thorough mixing there is complete destruction of contaminants of concern. In the process, there is a release of sorbed contaminant from organic material and so more contaminant mass can be made available in the aqueous phase for reaction.	Unique health and safety issues exist for the chemicals (e.g., safe storage, site security, safe usage) that must be considered.
Potentially a relatively quick time frame to reach Site-specific clean up goals.	Chemical oxidation is relatively non-specific to the contaminants of concern, so metals and organic material present will oxidize. Depending on the other naturally occurring oxidant demands in the soils, large amounts of oxidant may be needed.
Relatively low costs per unit of contaminant mass treated (avoids the cost of excavation, transport, dewatering, shoring, backfill).	Effectiveness is directly related to ability to have oxidants come in direct contact with contaminants. Therefore, an effective method for injection/delivery is required (e.g., soil mixing, jet grouting).
Effective over a wide range of contaminant concentrations and over a wide range of pH in the subsurface.	Regulatory concerns may exist associated with injecting chemicals into the subsurface. EPA injection approval required.
	The chemicals could potentially react with metal utilities (force main) and the sheet pile wall.

The current data set would need to be augmented with the following data collection to further evaluate this specific remedy:

1. Horizontal and vertical grid pattern sampling to further characterize the soils (see Section 3.0 for sampling information).

2. Geotechnical data including grain size and moisture content of strata above the underlying confining clay.

3. Up to two bench treatability studies (with a control) and total organic carbon. Likely reagents to be evaluated include sodium persulfate and modified Frenton's reagent. The studies will evaluate the effectiveness of the reagents and determine the total oxidant demand.

3.0 Scope of Work

The objective of this scope of work is to refine the magnitude and extent of contamination in the Subject Area to aid in the evaluation of remedial options and provide characterization data for soil treatment and/or disposal. The subtasks below describe the procedures to be completed in support of this objective.

3.1 General Field Activities

General field activities include Site meetings, mobilization, health and safety planning, utility locating, installing soil borings, implementing a community air monitoring plan (CAMP), sampling and analytical testing, decontaminating equipment, handling of investigation wastes, and surveying. Subcontractors will be used for locating utilities, drilling, laboratory analyses, and surveying.

Field investigation activities will be conducted in accordance with this SAP and the existing site-specific Health and Safety Plan (HASP), Quality Assurance Project Plan (QAPP), and Generic Site Investigation Procedures (GSIP). Field investigation activities will be supervised and documented by a qualified AECOM geologist.

The sampling methods and equipment selected will limit both the need for decontamination and the volume of waste material to be generated. Decontamination procedures specific to each of the field activities as well as handling of investigation wastes are described in the GSIP.

3.1.1 Mobilization

Prior to mobilization, the Underground Facilities Protection Organization (UFPO) will be contacted to clear exploration locations. Utility clearance requires three working days by UFPO. A private utility locator will also be subcontracted to clear the Subject Area. Also, AECOM will review available utility and foundation drawings and coordinate with the plant facility staff.

Prior to mobilization, AECOM will secure a New York State Department of Transportation (NYSDOT) permit (PERM-33) for access and installation of borings within the NYSDOT right-of-way (northeastern end of the Subject Area).

3.2 Field Investigation Activities

The investigation activities described in this SAP include field procedures compliant with NYSDEC's DER-10 "Technical Guidance for Site Investigation and Remediation", dated May 2010. Field activities will be documented in a dedicated, bound log book and on standard field data forms specific to the investigation phase.

3.2.1 Soil Sampling

During the sampling activities, soils will be sampled from up to 65 locations as described below and illustrated on **Figure 2**. Actual locations may be adjusted slightly based on field conditions encountered such as the locations of utilities and accessibility. Cross sections showing the topography and stratigraphic units in the vicinity of the TR-3 North Wall are provided in **Appendix A**.

1. Field personnel will primarily utilize a track-mounted drilling rig with direct push technology for sample collection and soil characterization (including lithology characterization). Soil

lithology characterization will be described using New York State Department of Transportation *Soil Description Procedure* or Unified Soil Classification System. The slope in areas located along the bank of Sanders Creek will prevent use of a track-mounted drilling rig at some locations. In these instances, an alternative method will be required (e.g., tripod, jackhammer, manual augering, etc.).

2. Boring locations will be established along a grid pattern of approximately 20 ft in the west-east direction and 10 ft in the north-south direction (spacing subject to field conditions, see **Figure 2**). The sample locations will be in the center of each grid.

3. At each location, one soil boring will be advanced to the underlying confining clay layer (estimated to be less than 20 ft below ground surface [bgs]). Soil cores will be collected continuously using a macro-core (or equivalent) sampler in each boring. Soil lithology will be recorded by an AECOM field geologist.

4. Upon retrieval, soil cores will be opened and then screened with a photoionization detector (PID) equipped with a 10.6 electron volt (eV) lamp and characterized for contaminants by visual and/or olfactory observations. Field observations will be recorded in a dedicated, bound log book.

5. Samples will be collected for laboratory analysis from each boring as follows:

    1. Interval #1: Above the water table – up to 32 locations (i.e., a subset of the total number of boring locations since previous investigations have shown limited impacts above the water table). Sample collection based on visual or olfactory evidence, and/or elevated PID readings or at the mid-point of the unsaturated interval.

    2. Interval #2: Just below the water table at all locations.

    3. Interval #3 and #4: Two additional soil samples will be collected at approximately 5 ft descending intervals from interval #2 (just below the water table) to just above the underlying confining clay layer.

    4. Interval #5: Approximately 6 inches into the underlying confining clay layer - up to 32 locations (i.e., half of the borings). Locations to be based on visual or olfactory evidence, and/or elevated PID readings from the material directly above the underlying confining clay layer. The sample collection depth (estimated to be 6 inches) into the underlying confining clay layer will be based on no evidence of impacts from visual or olfactory evidence and/or background PID readings.

    Soil samples will be collected as outlined above with additional sample collection based on visual or olfactory evidence, and/or elevated PID readings, if observed outside of the prescribed intervals.

    As shown in Table 1, sample analysis is to include Site-specific VOC list and PCBs. If field observations identify petroleum oil-related contaminants, then semi-VOCs will also be analyzed at those locations.

    Samples will be collected with a Terra Core® sampler, logged on a chain-of-custody and stored on ice prior to overnight shipment for laboratory analysis.

Additional soil volume and groundwater sample will be collected and submitted to In-Situ Oxidative Technologies, Inc. (ISOTEC) to perform two bench scale treatability tests as well as up to six total organic carbon analyses.

Geotechnical data including grain size and moisture content of strata above the underlying confining clay will be collected at six locations below the water table.

6. Further refinement of the western extent of contamination will include multiple step-out borings to the west of the currently-defined remediation boundary (i.e., west of TR-3-SB-07) and step-out borings to the west in the four cardinal directions around TR3-SB-10.

7. Further refinement of the eastern extent of contamination will include multiple step-out borings to the east of the currently defined remediation boundary (i.e., east of TR3-SB-01 and TR3-SB-11).

Table 1 contains analytical quantities and methods.

Following completion, each boring will be backfilled to grade with remaining soil removed from the boring and bentonite.

To the extent allowed by existing physical conditions at the Site, sample collection efforts will adhere to the specific methods presented in this SAP. If alternative sampling locations or procedures are implemented in response to Site-specific constraints, each will be selected on the basis of meeting data objectives.

3.2.2 Community Air Monitoring Plan

Monitoring of VOCs and dust particulates will be conducted upwind and at the downwind perimeter of the active work area during intrusive subsurface activities.

VOCs

If the ambient air concentration of total organic vapors at the downwind perimeter of the work area exceeds 5 part per million (ppm) above background for the 15-minute average, work activities will be temporarily suspended and monitoring continued. If the total organic vapor levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided the total organic vapor level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure (whichever is less) is below 5 ppm over background. If the total organic vapor level is above 10 ppm at the perimeter of the work area, activities will be shut down and appropriate actions taken to mitigate the organic vapor source.

Particulates

Particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. Each particulate monitor will be calibrated daily with a filtered air sample. Each air monitoring instrument will be continuously downloaded and saved electronically to a dedicated computer.

The New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP) specified action level of 0.10 milligrams per cubic meter (mg/m^3) above background for PM-10 will be used to determine whether modifications to given processes are required. If the downwind measurement of PM-10 is greater than 0.10 mg/m^3 above the upwind background level, or if dust is observed leaving the project area, dust suppression techniques (e.g., misting surfaces with water) will be implemented to reduce the generation of fugitive dust. Furthermore, if the action level of 0.15 mg/m^3 (above background) is exceeded, work activities will be ceased and site work activities will be re-evaluated.

3.2.3 Decontamination Procedures

Sampling equipment will be decontaminated following procedures presented in the GSIP. Solvents will not be used in decontamination.

3.2.4 Investigation Waste Management

Personal protective equipment (e.g., latex gloves) and disposable sampling equipment will be placed in plastic garbage bags for disposal as solid waste. Soils with the presence of free phase liquids or staining and excess soils that could not be returned to the borehole will be drummed and stored on-Site pending analyses for appropriate disposal. Liquids used for decontamination will be drummed and stored on-Site pending analyses for appropriate disposal.

3.3 Environmental Analytical Testing Program

The number and types of environmental samples to be collected is summarized in **Table 1**. The samples collected will be submitted for analytical testing according to United States Environmental Protection Agency (USEPA) SW-846 methods with an equivalent Category B deliverable package and data validation. **Table 2** contains a summary of the types and sizes of sample bottles, as well as the minimum sample volume required, preservation methods, and holding times for each analyte.

3.4 Survey

Each soil boring location will be surveyed upon the completion of the fieldwork by a NYS- licensed land surveyor. Horizontal measurements will be made relative to the North American Datum 83 Central (NAD 83 Central). Vertical measurements of the ground surface elevation will be made relative to the North American Vertical Datum 88 (NAD 88). Monitoring point measurements and top of casing measurements will be accurate to within 0.01 foot. Horizontal measurements and ground surface elevations will be accurate to within 0.1 foot. The survey will include pertinent site features, as applicable.

4.0 Quality Assurance/Quality Control

A QAPP has been prepared under separate cover in support of activities performed pursuant to the Corrective Action Order to ensure the accuracy and precision of Site characterization and data interpretation activities. The QAPP specifies the Data Quality Objectives (DQOs) for the project, and identifies the principal organizations involved in verifying achievement of data collection goals. Data collected and analyzed in conformance with the DQO process described in the QAPP will be used in assessing the overall level of uncertainty associated with decisions related to this Site. The QAPP has been prepared in accordance with USEPA's Requirements for Quality Assurance Project Plans for Environmental Data Operations; the USEPA Region II Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Manual, and NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).

4.1 Scope of the QAPP

The QAPP was prepared to provide QA guidelines to be implemented during the SAP activities. This document may be modified for subsequent phases of investigative work, as necessary. The QAPP provides:

- A means to communicate to the persons executing the various activities exactly what is to be done, by whom, and when.
- A culmination to the planning process that ensures that the program includes provisions for obtaining quality data (e.g., suitable methods of field operations).
- A historical record that documents the investigation in terms of the methods used, calibration standards and frequencies planned, and auditing planned.
- A document that can be used by the Project Manager and QA Officer to assess if the activities planned are being implemented and their importance for accomplishing the goal of quality data.
- A plan to document and track project data and results.
- Detailed descriptions of the data documentation materials and procedures, project files, and tabular and graphical reports.

The QAPP is primarily concerned with the quality assurance and quality control aspects of the procedures involved in the collection, preservation, packaging, and transportation of samples, field testing, record keeping, data management, chain-of-custody procedures, laboratory analyses, and other necessary matters to assure that the investigation activities, once completed, will yield data whose integrity can be verified.

4.2 Objectives for Measurement Data

DQOs for measurement data in terms of sensitivity and the PARCC parameters (precision, accuracy, representativeness, comparability, and completeness) are established so that the data collected are sufficient and of adequate quality for their intended use. Data collected and analyzed in conformance with the DQO process described in the QAPP will be used in assessing the uncertainty associated with decisions related to this Site.

4.3 Data Usability Evaluation

Data evaluation/validation will be performed by a qualified AECOM data validator using the most current methods and quality control criteria from the USEPA's Contract Laboratory Program (CLP) National Functional Guidelines for Organic Data Review, and CLP National Functional Guidelines for Inorganic Data Review. The data review guidance will be used only to the extent that it is applicable to the SW-846 methods; SW-846 methodologies will be followed primarily and given preference over CLP when differences occur. In addition, results of blanks, surrogate spikes, matrix spike/matrix spike duplicates, and laboratory control samples will be reviewed/evaluated by the data validator. All sample analytical data for each sample matrix will be evaluated. The data validator will also evaluate the overall completeness of the data package. Completeness checks will be administered on all data to determine whether deliverables specified in the QAPP are present. The data validator will determine whether all required items are present and request copies of missing deliverables. The data validation results will be presented in a Data Usability Summary Report (DUSR).

5.0 Reporting & Schedule

Upon receipt of the laboratory analytical reports and Electronic Data Deliverables, the data will be uploaded into the project database. The database and laboratory hardcopy reports will be forwarded to the data validator who will insert the appropriate qualifiers into the data tables and prepare a DUSR. The validated data will then be entered into the database. AECOM will then prepare the Sampling and Analysis Report.

5.1 Reporting

The Sampling and Analysis Report will include the following information and documentation, consistent with the NYSDEC's DER-10 Technical Guidance for Site Investigation and Remediation (May 2010).

- Introduction, Site history, summary, and description.
- A description of the field procedures and methods used.
- The data obtained during sampling and analysis that may include field measurements and geochemical data.
- Conclusions regarding the refined magnitude and extent of contamination in the Subject Area.
- Findings of the bench scale treatability tests.
- Re-evaluation of remedial options (as necessary) and a review of the data with regard to soil disposal management.
- Supporting documents for the sampling analysis report that may include boring logs, laboratory analytical reports, etc.

The DUSR and tabulated, validated data will be appended to the Sampling and Analysis Report.

5.2 Schedule

Within 30 days of notice to proceed by UTC, AECOM will begin implementation of the SAP activities. AECOM will prepare the Sampling and Analysis Report within 30 days of receipt of the laboratory data and bench scale treatability tests results generated by the SAP activities.

Tables

Table 1
Sampling and Analysis Plan Laboratory Analyses
UTC/Carrier TR3 North Wall Area

MATRIX/ANALYSIS	Analytical Method	Field Sample Quantity	Matrix Spike (MS) or LCS	MS Duplicate or Matrix Duplicate	Field Duplicate	Equipment/ Field Blank	Trip Blank
Soil Boring Samples							
Volatile Organics	SW-846 8260C	260	13	13	26	26	1 per cooler
Polychlorinated Biphenyls	SW-846 8082A	260	13	13	26	26	-
Semivolatile Organics	SW-846 8270D	Based on field observations - Assume 12	-	-	-	-	-
Moisture Content	ASTM D2216	6	-	-	-	-	-
Grain Size	ASTM D422	6	-	-	-	-	-
Total Oganic Carbon	Lloyd Kahn	6	-	-	-	-	-
Soil Volume for Bench Scale Treatability Tests	-	2	-	-	-	-	-
Groundwater Samples							
Companion Groundwater Samples for the Bench Scale Treatability	-	2	-	-	-	-	-

Notes:
LCS = Laboratory Control Sample

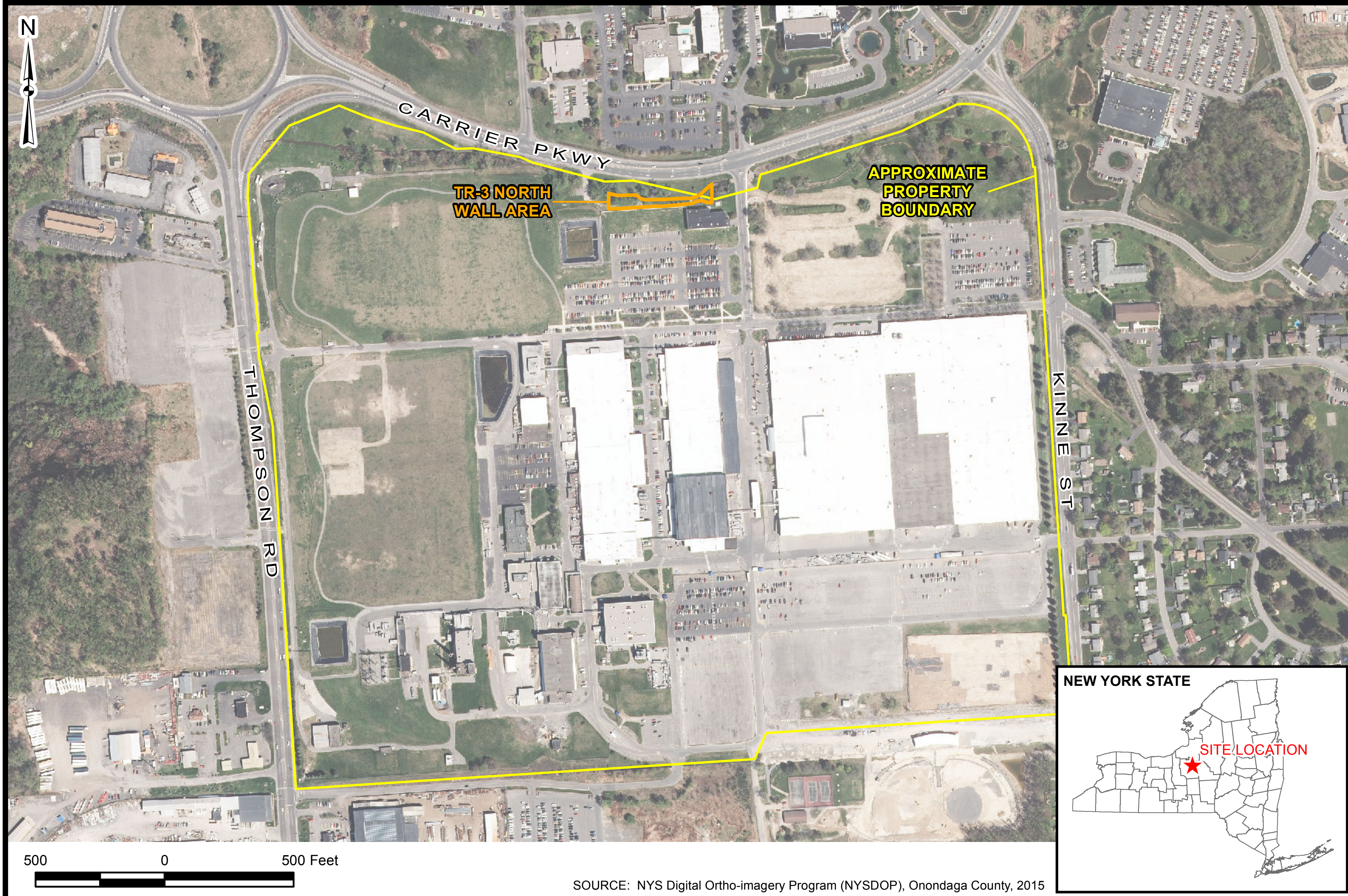
Table 2
Sample Bottle, Volume, Preservation, and Holding Time Summary
UTC/Carrier TR3 North Wall Area

MATRIX/ANALYSIS	Sample Prep Method (1)	Analytical Method (1)	Sample Bottles		Preservation	Holding Time	
			Material	Size		Extraction	Analysis
Soil Samples							
Volatile Organics	SW-846 5035A	SW-846 8260C	TerraCore	5 or 25 grams	None	NA	48 hours
Semivolatile Organics	SW-846 3540C/3541/3545A	SW-846 8270D	Glass	8 oz	None	14 days	40 days from extraction
Polychlorinated Biphenyls	SW-846 3540C/3541/3545A	SW-846 8082A	Glass	5 or 25 grams	None	14 days	40 days from extraction
Moisture Content	-	ASTM D2216	Glass/Plastic	100 grams	Container must be tightly sealed	NA	NA
Grain Size	-	ASTM D422	Glass/Plastic	115 grams	None	NA	NA
Total Oganic Carbon	-	Lloyd Kahn	Glass	5 grams	cool 4C	NA	14 days
Soil Volume for Bench Scale Treatability Tests	-	-	Plastic Bags / Buckets	25 pounds in plastic bags / 5 gallon bucket	None	-	-
Groundwater Samples							
Volatile Organics	SW-846 5030B	SW-846 8260C	Glass	40 mL VOA vial w/ septa	HCl to pH<2	NA	14 days

Notes:
(1) SW-846: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. USEPA SW-846. Complete through Update IV, March 2009.
NA - Not applicable

Figures

J:\Projects\60310231_UTCAOCGRI\MISC\GIS\Maps\TR3\SITE LOCATION (REV2).mxd 4/26/2018

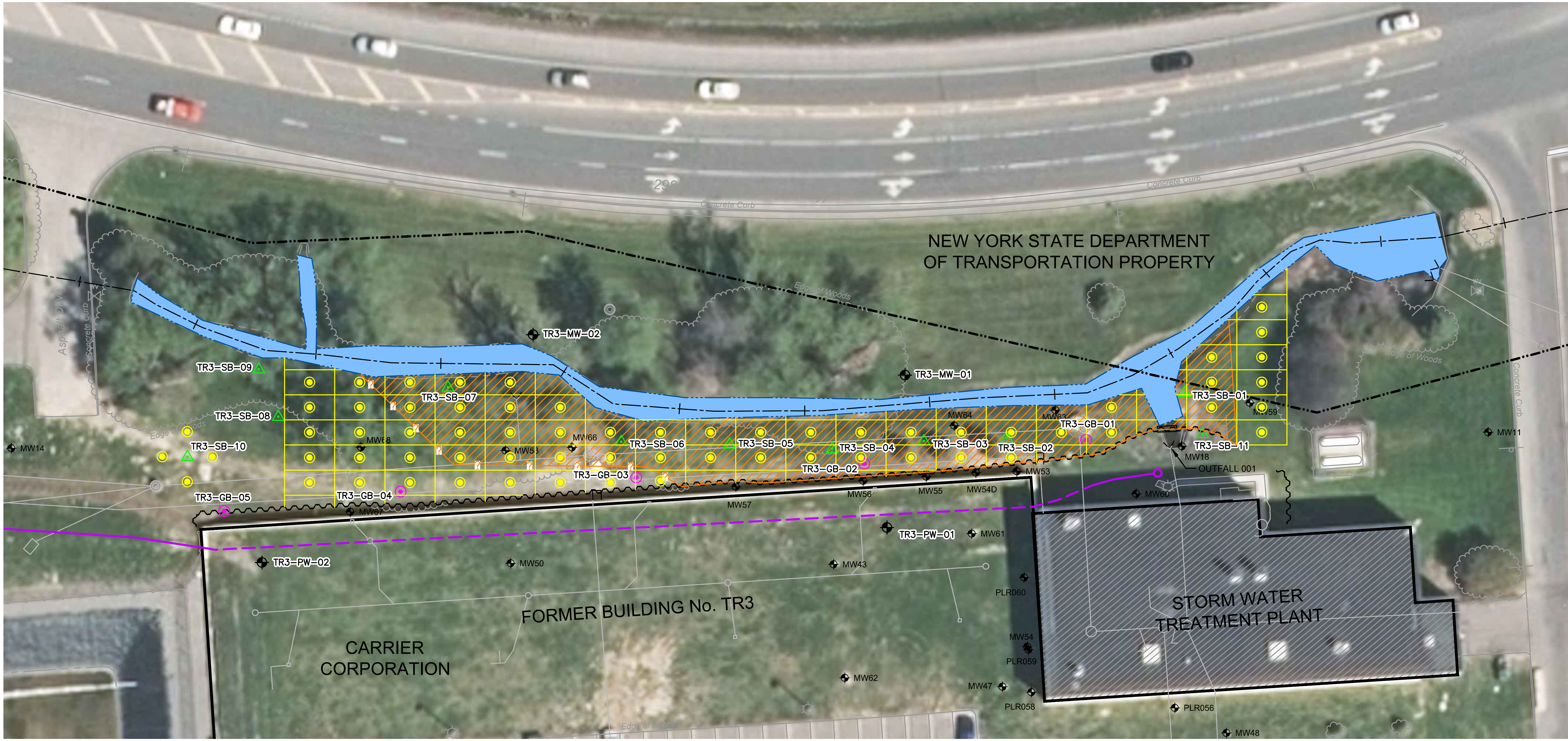


SOURCE: NYS Digital Ortho-imagery Program (NYSDOP), Onondaga County, 2015

AECOM

TR-3 NORTH WALL
SITE LOCATION
UTC/CARRIER SITE

FIGURE 1



LEGEND

	EDGE OF WOODS		FIRE HYDRANT
	EDGE OF WATER		MANHOLE
	EDGE OF GRAVEL		UTILITY POLE
	GUIDE RAIL		GUY WIRE
49+00	CENTERLINE OF CREEK ALIGNMENT		LIGHT POLE
	CHAIN LINK FENCE		TREE
GV	GAS VALVE		
WV	WATER VALVE		SIGN

- APPROXIMATE LIMITS OF SANDERS CREEK
- APPROXIMATE PROPERTY BOUNDARY - FROM TAX MAPPING
- TR-3 PROPOSED AREA OF REMEDIATION BASED ON PRE DESIGN INVESTIGATION REPORT (2016)
- HORIZONTAL WELL (SLOTTED PIPE)
- HORIZONTAL WELL (SOLID PIPE)
- SHEET PILE WALL
- GEOTECH BORING
- MONITORING WELL
- SOIL BORING
- PROPOSED SOIL BORINGS
- GRID PATTERN APPROXIMATELY 20 FEET IN THE WEST-EAST DIRECTION AND 10 FEET IN THE NORTH-SOUTH DIRECTION

0' 20' 40' 80'

MAPPING REFERENCE: MAPPING INFORMATION SHOWN FROM AN AERIAL SURVEY PERFORMED BY THEW ASSOC., NOVEMBER 2013.

TR-3 NORTH WALL
PROPOSED SOIL INVESTIGATION
UTC/CARRIER SITE

AECOM

FIGURE 2

Appendix A

Reference Figures from Previous Investigations

Figure 7
Summary of Detected Analytes in Soil
Former Building TR-3 North Wall Investigation
Carrier Corporation Thompson Road Facility
Syracuse, New York

Monitoring Well

PLR Parking Area

Notes:
- All units shown are in µg/kg (micrograms per kilogram) except Diesel and Oil Range Organics which are in mg/kg (milligrams per kilogram).
- Values in RED indicate an exceedance of the NYDEC-DER 6 NYCRR SCO criteria

0 80 160 Feet

REQUESTED BY: S. Goodnight

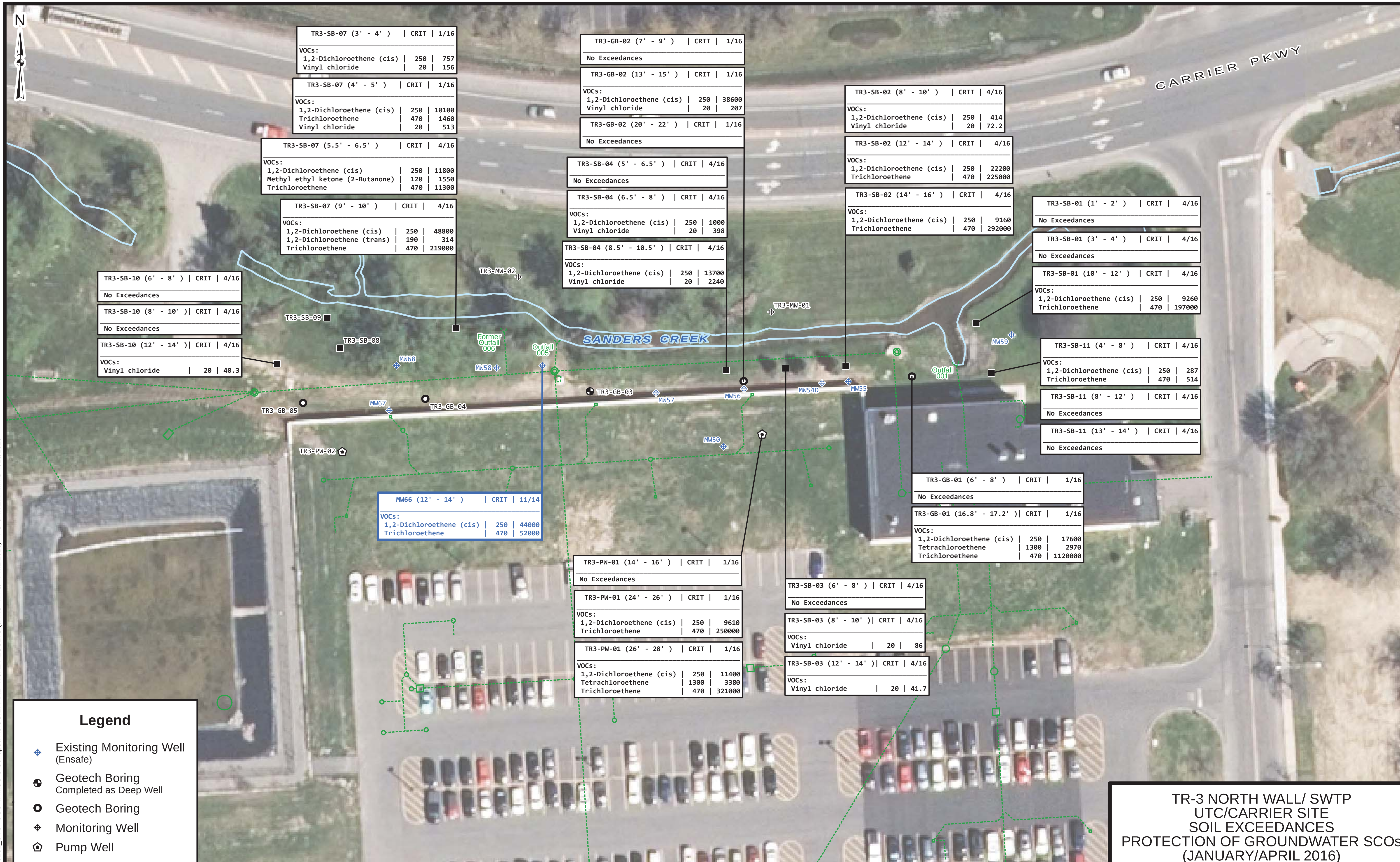
DRAWN BY: M. Senne

DATE: 2/6/2015

PROJECT NO: 0888815827

ENSAFE
1-800-588-7962
WWW.ENSAFE.COM

X:\UTC\Syracuse\Carrier Campus\Projects\TR-1_PLR_Investigation_Oct_2013\PLR\Fig_7_SO_Detects_Carrier_Syracuse_Base_Map_Rev_MS.mxd



CRITERIA: 6 NYCRR Part 375.6, Remedial Program Soil Cleanup Objectives, Effective 12/14/06. Restricted Use. Protection of Groundwater, including CP-51 Table 1, Effective 12/2/10.
NOTES: Units shown in µg/kg; Acetone exceedances were excluded from the figure, as explained in the report. MW54D and MW68 analyzed for PCBs, ORO, & DRO only.
VOC samples from Ensafe borings were collected from above the water table only.
SOURCE: NYS Digital Ortho-imagery Program (NYSDOP), Onondaga County, 2015

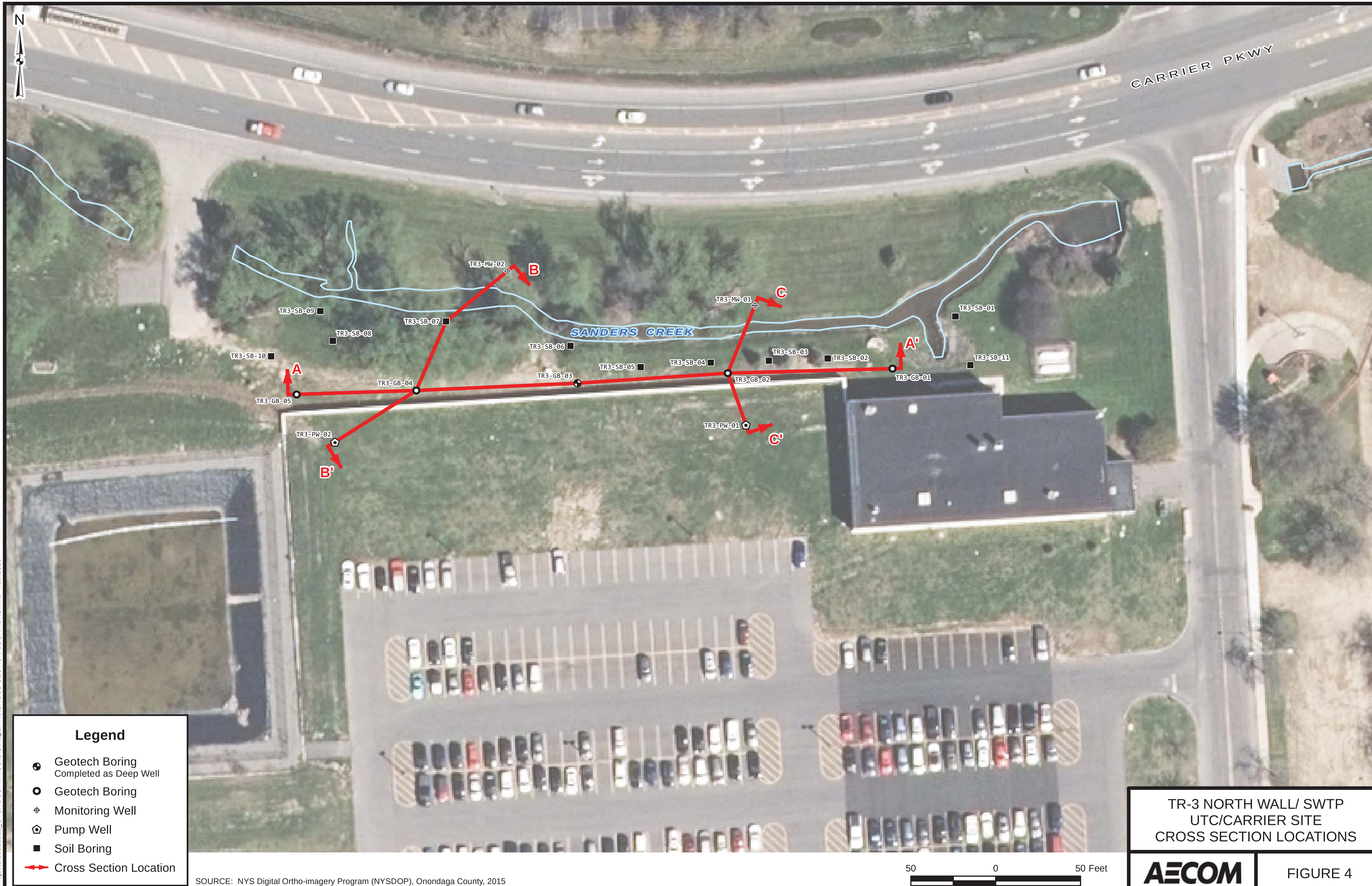
TR-3 NORTH WALL/ SWTP
UTC/CARRIER SITE
SOIL EXCEEDANCES
PROTECTION OF GROUNDWATER SCOs
(JANUARY/APRIL 2016)

AECOM

FIGURE 6

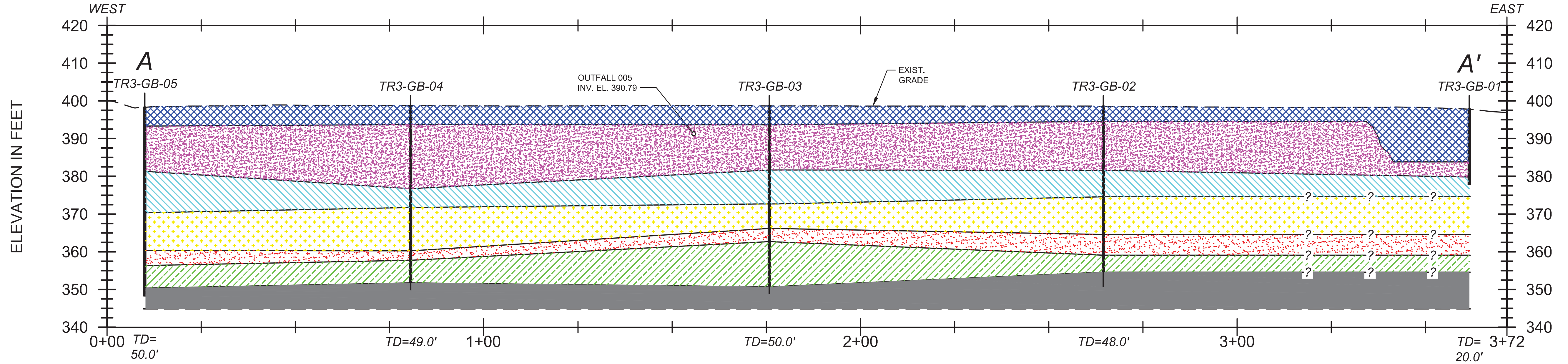
J:\Projects\60310231_UTCAOCGRI\MISC\GIS\Maps\TR3\SOIL ANALYTICAL RESULTS (JANUARY & APRIL 2016) - PG CRITERIA.mxd 7/19/2016

DRAFT



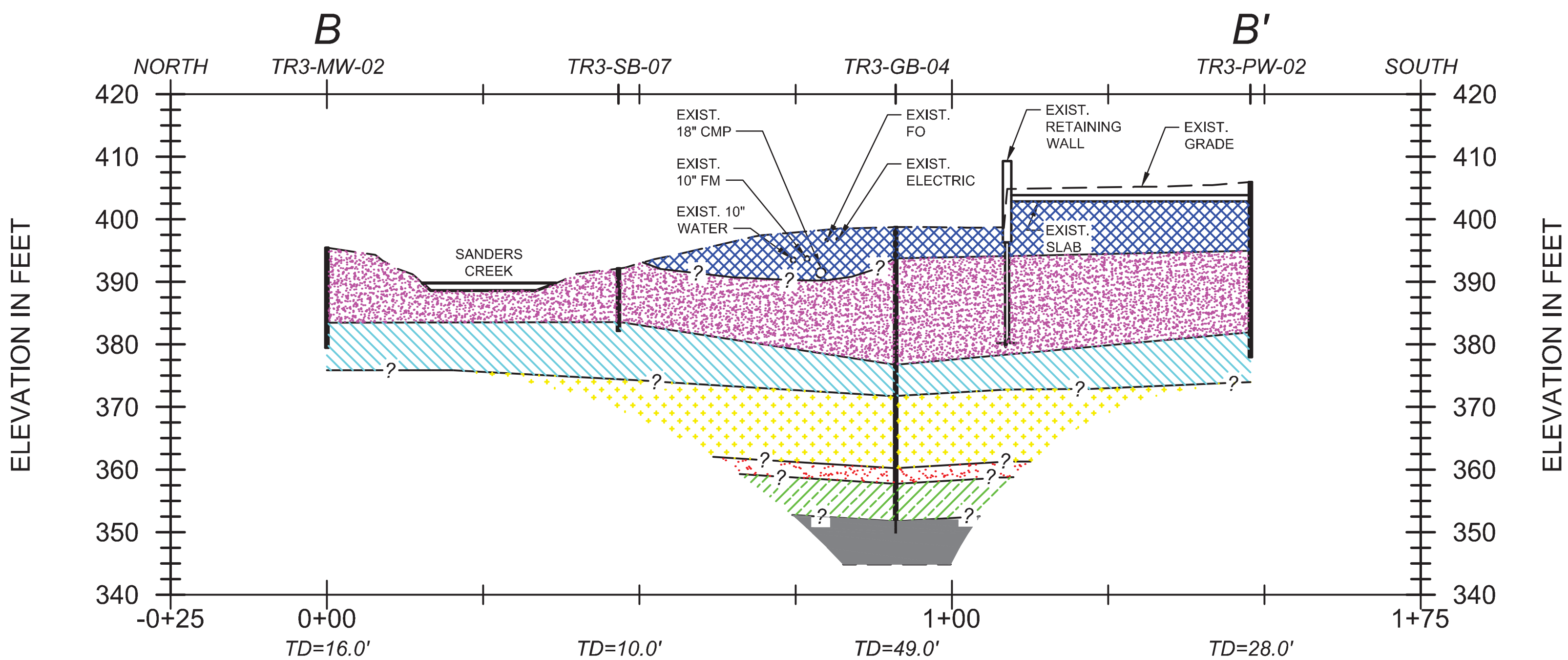
J:\Projects\60310231_UTCAOCGRI\MISC\GIS\Maps\TR3\CROSS SECTION LOCATIONS.mxd 7/19/2016

DRAFT



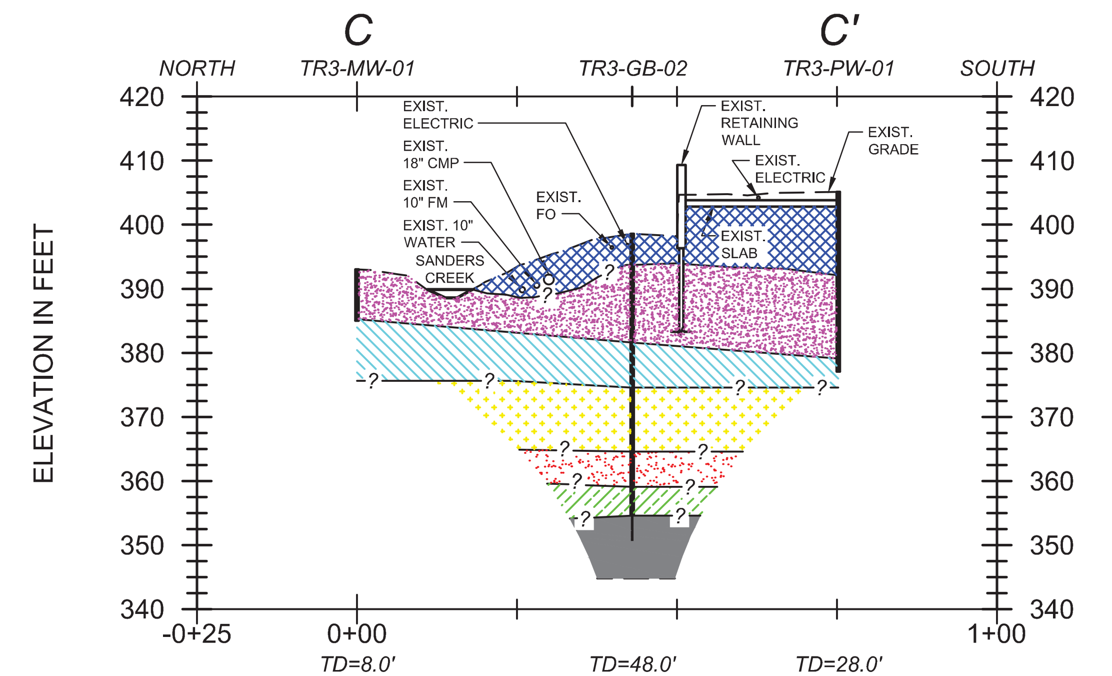
SECTION A-A'

SCALE: 1" = 30'-0"



SECTION B-B'

SCALE: 1" = 30'-0"



SECTION C-C'

SCALE: 1" = 30'-0"

LEGEND:

- FILL
- INTERLAYERED SILTY CLAY, CLAYEY SILT SOME SILTY SAND LAYERS
- GRAY CLAY
- CLAYEY SILT
- F-M SAND
- CLAYEY SILT w/OCCASIONAL SILTY CLAY AND SILTY SAND LAYERS
- SHALE BEDROCK

NOTE:

1. UTILITY LOCATIONS ARE APPROXIMATE.

30' 0 30'

SCALE IN FEET

TR-3 NORTH WALL/SWTP
UTC/CARRIER SITE
CROSS-SECTIONS A-A', B-B', & C-C'

AECOM

FIGURE 5