Task 210 - Subsurface Site Investigation
Vacant Land
Branford North Rail Station
Branford, Connecticut
State Project #310-0007A
Assignment No. 403-3551

Submitted to:
Connecticut Department of Transportation

July 16, 2008

TETRA TECH RIZZO

July 16, 2008

Mr. Gregory Dorosh
Principal Engineer
Environmental Compliance Section
Bureau of Engineering and Highway Operations
Connecticut Department of Transportation
Newington, CT 06131-7546

Attention: Mr. Chris Bonsignore/ Ms. Denise Young

Re: Task 210 - Subsurface Site Investigation
Vacant Land
Branford North Rail Station
Branford, Connecticut
Project No. 310-0007A
Assignment No. 403-3551

Dear Mr. Dorosh:

Tetra Tech Rizzo, Inc. (Tetra Tech) is pleased to submit this report summarizing the conduct and findings of the Task 210 - Subsurface Site Investigation conducted on a vacant parcel located on the south side of the railroad track and west of the existing parking lot for the Branford North Rail Station in Branford, Connecticut. This report was prepared to evaluate the parcel for evidence of contamination of the soil or groundwater due to former and current site activities.

This investigation included advancement of soil borings and collection and analysis of groundwater and soil. The results and recommendations are presented in the attached report. We appreciate the opportunity to provide these services to you. Please contact us if you have any questions concerning this report.

Very truly yours,

Adam L. Stannard	David P. Brassard, PE, LEP	John E. Adams, LEP, LSP
Geologist II	Project Manager	Senior Vice President

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1.0 Introduction

This Task 210 Subsurface Site Investigation study was conducted on a vacant parcel of land approximately 3.15 acres which is located on the south side of the railroad track and west of the existing parking lot for the Branford North Rail Station in Branford, Connecticut (Site). Connecticut Department of Transportation (CTDOT) is considering acquisition of this site to construct a parking lot to add additional parking spaces for commuters utilizing the railroad.

The object of this study was to investigate the parcel for evidence of potential contamination of the soil and/or groundwater with oil or hazardous materials as defined by CGS Section 22a-134 and to assess the applicability of CGS Section 22a-134 to 134(d), as amended (Connecticut Transfer Act). This study was conducted by the following Tetra Tech Rizzo (Tetra Tech) personnel: David P. Brassard, PE, LEP and Adam L. Stannard at the request of the Connecticut Department of Transportation (CTDOT). This investigation was conducted on April 18, 2008.

Analytical data collected during the investigation will be compared to the criteria prescribed in the Connecticut Remediation Standard Regulations (Regulations of the Connecticut State Agencies Sections 22a-133k-1 through 3 and 22a-133q-1) (RSR). A Site location map is presented as **Figure 1**.

Abbreviations used in this report are as follows:

µg/kg	micrograms per kilogram (equivalent to parts per billion)
µg/L	micrograms per liter (equivalent to parts per billion)
CT DEP	Connecticut Department of Environmental Protection
CT DOT	Connecticut Department of Transportation
DEC	Direct Exposure Criteria
ETPH	extractable total petroleum hydrocarbons
GWPC	Groundwater Protection Criteria
mg/kg	milligrams per kilogram (equivalent to parts per million)
mg/L	milligrams per liter (equivalent to parts per million)
pH	potential of hydrogen
PID	photoionization detector
PMC	Pollutant Mobility Criteria
PVC	polyvinyl chloride

with the transaction.

2.0 Summary of Previous Environmental Site Assessments

Storch Associates had prepared a Task I and Task II site assessment for CTDOT on the Site. The assessments concluded that much of the site was initially swampland fed by an unnamed brook. Aerial photographs dating back to 1952 show the site as an undeveloped parcel. Site walks conducted during the assessments indicated the presence of construction and demolition debris. Also noted were exposed buried tanks, drums, concrete and brick rubble, and large pieces of slag located in several areas. Based on aerial photographs dating back to the 1960's, indications that fill was being place on the site exists.

A report entitled "A *Preliminary Environmental Investigation on Vacant Land of Bran Park Associates in Branford, Connecticut"* prepared by Storch Associates was reviewed by Tetra Tech. There was no date on the report but figures would indicate that the work was done in the fall of 1993.

The investigation included the following:

- Excavation and sampling of twelve test pits,
- a seismic refraction survey,
- advancement of thirteen soil borings with seven completed as groundwater monitoring wells,
- collection of soil samples from borings and groundwater samples from wells,
- twelve surficial grab samples, and
- a drum sample and a soil sample beneath a rusted drum.

Locations of the sampling points where taken form the figure in the report and transposed onto **Figure 2** of this report. Locations are approximate. A summary of the soil and groundwater analysis is presented below.

Results of soil samples from test pits indicated RSR exceedances of TPH and PCBs in select areas of the site. VOCs, RCRA 8 metals and RCRA 8 TCLP metals were noted but below applicable standards.

Three soil samples were collected from soil borings during the investigation. Results of soil samples indicated elevated levels of TPH and leachable lead. The TCLP lead concentration was above the RCRA threshold for hazardous.

3.2.1 Volatilization Criteria

The VC was established to ensure that diffusion and volatilization of volatile organic compounds (VOCs) dissolved within the groundwater do not pose an unacceptable risk to human health through inhalation. Presently, the VC applies only to groundwater within 15 feet of surface grade or a building (although a proposed revision to the RSRs would change this to 30 feet of surface grade or a building and lower current default values). To evaluate the potential risk posed by dissolved VOCs in groundwater, both residential and industrial/commercial exposure scenarios and respective criteria are provided. All sites must meet the residential VC unless residential use is prohibited through recording of an ELUR.

3.2.2 Surface Water Protection Criteria

As required by the regulation, groundwater plumes which discharges to a surface water body are in compliance if substance concentrations are equal to or less than the SWPC.

4.0 Scope of Investigation

Site activities were conducted in April of 2008. The proposed scope of activities for the investigation included the following:

- Advancement of soil borings within the proposed areas of construction.
- Installation of temporary one-inch monitoring wells within the proposed areas of construction.
- Collection and submission of soil and groundwater samples collected from the borings and monitoring wells.

Data will be used to understand the environmental condition of the Site and the environmental issues with future construction at the Site.

4.1 Pre-Drilling Activities

The following activities were completed prior to initiating intrusive investigation activities on the Site.

4.2 Location of Subsurface Utilities

Call Before You Dig (CBYD), the utility marking service, was contacted on April 15, 2008, to locate underground utilities. Utilities contacted by CBYD include AT&T, Town of Branford, CT Light and Power, Southern CT Gas, MCI, SBC, Comcast, and Regional Water Authority. The CBYD number is 20081601495.

RCRA 8 metals. Select samples were also analyzed for individual SPLP metals. Soil sampling results are presented in **Section 4.7.**

4.6 Groundwater Sampling

On April 18, 2008, Tetra Tech collected groundwater samples from the three (3) newly installed temporary 1-inch groundwater monitoring wells (RSB-1, RSB-4, RSB-6). On the day of sampling, groundwater samples were collected from the wells with a peristaltic pump that is used for low flow sampling to reduce sediment volume and volatilization.

Groundwater samples were analyzed for VOCs by EPA Method 8260, SVOCs by EPA Method 8270, PCBs and Pesticides, RCRA 8 Metals, and CT ETPH. Groundwater analysis results are presented in **Section 4.9**.

4.7 Results of Soil Sampling Analyses

Fifteen soil samples were collected for analysis during the investigation. Samples were selected based primarily on the depth location and PID readings.

Copies of the Laboratory Certificates of Analysis and Chain of Custody are included in **Appendix C. Table 1** summarizes laboratory analysis results for soil samples. The results are summarized below:

Volatile Organic Compounds (VOCs)

Fifteen soil samples were submitted for VOC analysis. VOCs were not detected above the applicable RSR criteria in any of the soil samples. VOCs that were detected above the laboratory's reportable detection limits include: benzene, n-butylbenzene, 4-isopropyltoluene, naphthalene, toluene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene. One or more of these compounds were detected in RSB-3 (4-5.5'), RSB-4 (4-8'), RSB-6 (4-8'), and RSB-10 (4-8').

Extractable Total Petroleum Hydrocarbons (ETPH)

Fifteen soil samples were submitted for ETPH analysis. ETPH were detected above the laboratory detection limits in all but one (RSB-6 (0-4')) of the fifteen samples collected. ETPH were detected above the Res DEC in RSB-8 (4-8') at 754 mg/kg. ETPH were detected above the I/C DEC and GB PMC in RSB-9 (0-4') at 7,030 mg/kg.

Poly-Aromatic Hydrocarbons (PAHs)

Fifteen soil samples were submitted for PAH analysis. PAH concentrations were detected above the laboratory's detection limit in only the soil sample from RSB-2 (0-4'). The concentration was below the applicable RSR criteria.

laboratory's reportable detection limits in both RSB-1 and RSB-6 but below the applicable RSRs.

Total RCRA 8 Metals

Three groundwater samples were submitted for analysis of the RCRA eight metals. Lead was found in exceedance of the SWPC in RSB-1 (1.52 mg/l), RSB-4 (2.65 mg/l), and RSB-6 (2.27 mg/l). Metals that were detected above the laboratory's reportable detection limits include: barium, chromium, and lead.

Pesticides

Three groundwater samples were submitted for pesticides analysis. Pesticides were not detected above the laboratory's detection limits in any of the samples.

Polychlorinated Biphenyls (PCBs)

Three groundwater samples were submitted for PCB analysis. PCBs were not detected above the laboratory's reportable detection limits in any of the samples.

5.0 Conclusions

This Task 210 – Subsurface Site Investigation was conducted on April 18, 2008. All Site activities were conducted in accordance with the CT DEP's RSRs.

Based on the analytical data collected during this site investigation and from previous investigations, soils exist on site that exceed either the GB PMC or Res DEC or both in select areas of the site.

Groundwater samples collected indicated a SWPC exceedance for lead. Groundwater samples from previous investigations indicated elevated levels of cyanide, oil and grease, and metals. Antimony, chromium, iron, lead, arsenic, and zinc concentrations exceeded the drinking water standard that were established when those groundwater samples were collected. The metals could be attributed to suspended solids in the groundwater samples collected since the groundwater samples were analyzed as unfiltered.

During site visits, excessive amounts of debris were noted buried or lying around on site. Debris present included construction and demolition material. Also noted were exposed buried tanks, drums, concrete and brick rubble, car parts, tires, and large pieces of slag in several areas. Several mounds of soil which appeared to have been dumped onto the site were noted with debris extending out from the pile. Based on the debris on site and in accordance with the Connecticut Department of Environmental Protect regulations, the site is defined as a solid waste disposal area. A solid waste disposal area is defined as any location including a landfill or other land disposal site used for the disposal of more than 10 cubic yards of solid waste.

Table 1
Laboratory Analysis for Soil
Branford Rail Station
Branford, Connecticut

Sample Location	Res DEC	I/C DEC	GB PMC	RSB-1 (0-4')	RSB-1 (4-8')	RSB-2 (0-4')	RSB-3 (4-5.5')	RSB-4 (4-8')	RSB-5 (4-8')	RSB-6 (0-4')
Laboratory I.D.				SA77513-01	SA77513-02	SA77513-03	SA77513-04	SA77513-05	SA77513-06	SA77513-07
Sample Date				18-Apr-08 08:45	18-Apr-08 08:55	18-Apr-08 09:30	18-Apr-08 10:00	18-Apr-08 10:30	18-Apr-08 11:00	18-Apr-08 12:15
Volatile Organic Compounds (µg/kg)										
Benzene (BZ)	21,000	200,000	200	<5.4	<6.4	<5.5	<57.2	123	<7.3	<5.6
n-Butylbenzene	500,000	1,000,000	14,000	<5.4	<6.4	<5.5	79.6	<66.2	<7.3	<5.6
4-Isopropyltoluene (p-cymene)	500,000	1,000,000	41,800	<5.4	<6.4	<5.5	69.3	<66.2	<7.3	<5.6
Naphthalene	1,000,000	2,500,000	56,000	<5.4	<6.4	<5.5	208	<66.2	<7.3	<5.6
Toluene (TL)	500,000	1,000,000	67,000	<5.4	<6.4	<5.5	<57.2	92.6	<7.3	<5.6
1,2,4-Trimethylbenzene	500,000	1,000,000	70,000	<5.4	<6.4	<5.5	275	<66.2	<7.3	<5.6
1,3,5-Trimethylbenzene	500,000	1,000,000	70,000	<5.4	<6.4	<5.5	254	<66.2	<7.3	<5.6
SemiVolatile Organics (µg/kg)										
Chrysene	84,000	780,000	1,000	<358	<386	364	<391	<405	<422	<368
Fluoranthene	1,000,000	2,500,000	56,000	<358	<386	680	<391	<405	<422	<368
Pyrene	1,000,000	2,500,000	40,000	<358	<386	590	<391	<405	<422	<368
Inorganic Substances (mg/kg)										
Arsenic (As)	10	10	NE	2.50	2.91	6.97	<1.49	2.66	1.93	3.85
Barium (Ba)	4,700	140,000	NE	34.7	32.1	96.9	13.2	15.8	34.6	119
Cadmium (Cd)	34	1,000	NE	0.628	0.874	8.51	<0.497	0.602	<0.626	0.924
Chromium, total (Cr)	NE	NE	NE	34.8	47.0	47.0	7.75	33.7	19.5	40.2
Lead (Pb)	400	1,000	NE	40.2	43.1	184	11.8	15.7	18.2	30.6
Mercury (Hg)	20	610	NE	<0.0329	<0.0332	0.388	<0.0353	<0.0326	<0.0381	<0.0313
Selenium (Se)	340	10,000	NE	<1.54	1.79	3.04	<1.49	<1.64	<1.88	1.94
SPLP Metals by EPA 1312 & 6000/7000 Series Methods (mg/l)										
Lead (Pb)	NE	NE	0.15	NA	NA	0.0623	NA	NA	NA	NA
Pesticides by EPA Method 8081A (µg/kg)										
4,4'-DDT (p,p')	1,800	17,000	NE	<11.1	<12.0	16.1	<11.6	<11.4	<12.8	<10.8
Poly-Chlorinated Biphenyls (PCBs) by EPA Method 8082 (µg/kg)										
PCB 1260	1,000	10,000	NE	26.6	<23.9	35.0	<23.2	<22.9	<25.7	<21.7
TPH (ETPH Method) (mg/kg)	500	2,500	2,500	182	112	225	146	112	129	246

I/C DEC = Industrial/Commercial Direct Exposure Criteria
RES DEC = Residential Direct Exposure Criteria
GB PMC = Pollutant Mobility Criteria for a GB groundwater designation
< = Concentration less than the laboratory detection limits
mg/kg = milligrams/kilogram or parts per million
µg/kg= micrograms/kilogram or parts per billion
mg/l = milligrams/liter or parts per million
SPLP = Synthetic Precipitation Leaching Procedure
NE = None Established
NA = Not Analyzed
ETPH = Extractable Total Petroleum Hydrocarbons

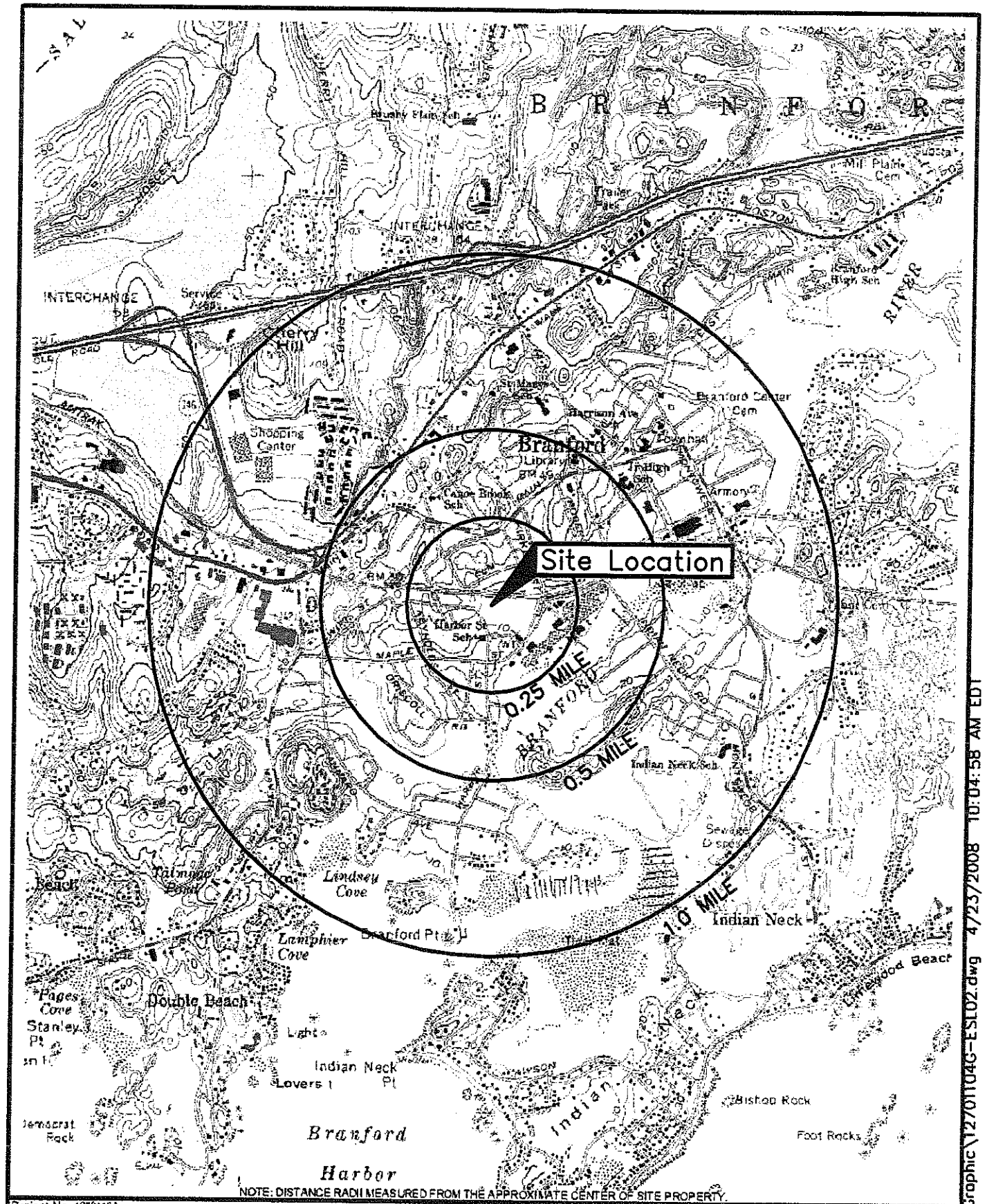
Notes:

1. Compounds shown when detected in at least one sample
2. Bold concentrations indicate exceedances of the applicable RSR criteria

Table 2
Laboratory Analysis for Groundwater
Branford Rail Station
Branford, Connecticut

Sample Location Laboratory I.D. Sample Date	SWPC	Res VC	I/C VC	RSB-1 SA77513-16 18-Apr-08 10:45	RSB-4 SA77513-17 18-Apr-08 12:15	RSB-6 SA77513-18 18-Apr-08 12:45
Volatile Organic Compounds (µg/l)	All analytes non-detect			ND	ND	ND
SemiVolatile Organics (µg/l)						
1-Methylnaphthalene	NE	NE	NE	0.225	<0.050	0.449
2-Methylnaphthalene	NE	NE	NE	<0.050	<0.050	0.258
Naphthalene	NE	NE	NE	0.088	<0.050	0.202
Phenanthrene	0.077	NE	NE	<0.050	<0.050	**0.135**
Inorganic Substances (mg/l)						
Barium (Ba)	NE	NE	NE	0.701	0.792	1.48
Chromium, total (Cr)	NE	NE	NE	0.373	0.316	0.289
Lead(Pb)	0.013	NE	NE	**1.52**	**2.65**	**2.27**
Pesticides (µg/l)	All analytes non-detect			ND	ND	ND
PCB's (EPA Method 8082) (µg/l)	All analytes non-detect			ND	ND	ND
TPH (ETPH Method) (mg/l)	NE	NE	NE	<0.2	<0.2	<0.2

Abbreviations and Symbols
SWPC=Surface Water Protection Criteria
Res VC=Residential Volatilization Criteria
I/C VC=Industrial/Commercial Volatilization Criteria
< = Concentration less than the laboratory detection limits
NE = Not established
mg/L=milligrams per liter µg/l=micrograms per liter
PCBs = Polychlorinated Biphenyls
Notes:
1.**Bold** concentrations indicate exceedances of the applicable RSR criteria



NOTE: DISTANCE RADII MEASURED FROM THE APPROXIMATE CENTER OF SITE PROPERTY.

Project No. 12701104

TETRA TECH RIZZO

0 2,000 Feet

Information obtained from USGS Map of Branford, CT Dated 1967, Photorevised 1984

CTDOT - Branford Rail Station
Commuter Parking Lot
Maple & Harbor Streets, Branford, CT

Figure 1

Site Locus Plan

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