ATTACHMENT 5:

PROPOSED WORK PLAN AND FEE SCHEDULE (TO BE SUBMITTED SEPARATELY)

ATTACHMENT 5

WORK PLAN FOR A
SITE INVESTIGATION/REMEDIAL ALTERNATIVES REPORT
ROADWAY RIGHT-OF-WAY PROPERTY
EAST ROME BUSINESS PARK
ROME, NEW YORK

Prepared For:

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1.0 INTRODUCTION

1.1 Purpose of the Site Investigation/Remedial Alternatives Report (SI/RAR)

The City of Rome, NY, is proposing to facilitate the development of the East Rome Business Park on property which had been used since the late 1800s for a variety of industrial purposes. The City has investigated the environmental conditions of the 17-acre core area of the business park site under the Voluntary Cleanup Program (VCP) pursuant to an order from the New York State Department of Environmental Conservation (NYSDEC). The property has been found to contain residual materials and their constituents in soils and groundwater in excess of New York guidance concentrations.

The City is planning to prepare a Site Investigation/Remedial Alternatives Report (SI/RAR) of one parcel of the business park, the right-of-way for a new street, in order to apply for New York financial assistance provided under Title 5 of the Clean Water/Clean Air Bond Act of 1996. Pursuant to a joint development agreement (JDA) with the current owner of the property, Charles Gaetano, the City will take title to two parcels of the right-of-way site for a new public street on or before May 6, 1997. This document refers to these parcels as the Roadway Right-of-Way Property.

Construction by the City of the northern end of roadway must begin in October 1997 to support the redevelopment of a northern end parcel of the site at that time. The site owner, Mr. Gaetano, has the intent to enter into a voluntary agreement with the NYSDEC to remediate this parcel, the Pecoraro Site, in conjunction with its redevelopment on the same schedule. It is therefore imperative that the schedule for this SI/RAR provides for issuance of a record of decision (ROD) by the NYSDEC on the northern end of the roadway in October 1997. A ROD for the southern end of the roadway will follow.

The SI/RAR is to be prepared for the approximately 2.77 acres Roadway Right-of-Way Property in the central portion of the East Rome Business Park. The new roadway will provide access to new subdivisions within the park and will run from the intersection of Railroad Street and Fifth Avenue to the intersection of Mill and East Whitesboro Streets. Figure 1-1 shows the entire 200 acres of the East Rome Business Park. Figure 1-2 is a site map showing the boundaries of the Roadway Right-of-Way Property, including the Mill Street Parcel and the Core Area Parcel.

The overall purpose of the SI/RAR is to complete the characterization of this property, building on the existing database, and to prepare an analysis of several remedial alternatives which address existing or potential impacts found in the investigation. The conduct of the SI/RAR will be in accordance with the requirements of the NYSDEC published guidelines for the performance of SI/RARs in the "Municipal Assistance Brownfield Program Procedures Handbook."

This work plan presents the approach, procedures and methods that will be used to complete the SI/RAR of the Roadway Right-of-Way Property.

1.2 Organization of the Work Plan

The main body of the work plan is a scoping document which evaluates existing data; sets the remedial goals; determines the data quality objectives necessary to achieve those goals; and outlines the general tasks to be completed. Section 1.0 presents the context of the project in the development of the site, and outlines the organization and presentation of the work plan. Section 2.0 presents the history and description of the site, details the physical and geological setting, and summarizes past environmental studies conducted at the site. Section 3.0 presents a conceptual model of site conditions based on remediation scenarios applicable to the site and the rationale for addressing existing data gaps. Section 4.0 identifies data gaps and data quality objectives necessary to complete the SI/RAR.

Section 5.0 of the work plan describes the various tasks which are to be conducted in the performance of the SI/RAR, and provides a schedule for the completion of the investigation. Also included in Section 5.0 are discussions of project management, task deliverables and the project schedule. Section 6.0 provides a description of additional documents to be provided to supplement this Work Plan, and Section 7.0 is a list of references and documents which provide background on the site. Tables and figures necessary to illustrate the proposed activities follow Section 7.0 in the order referenced in the report. The supplemental documents include the Field Sampling Plan (FSP), a detailed description of the investigations to be conducted in the field; the Quality Assurance/Quality Control Plan (QA/QC); the Health and Safety Plan (HASP); and the Community Participation Plan (CP).

2.0 SITE BACKGROUND

2.1 Site Description and History

The study area for this investigation is a parcel of land which has been defined by the City of Rome as the Roadway Right-of-Way Property, a parcel of land in the western portion of the "Central Core" of a 200-acre industrial redevelopment area known as the East Rome Business park (Figure 2-1). The "Central Core" site is generally bounded by Railroad Street to the north, the New York State Barge Canal to the south and by industrial and commercial properties to the east and west. The property has been owned by Mr. Charles A. Gaetano since 1975, and is listed by the City of Rome as tax map parcel 242.020-0001-018.

In order to provide access to the new subdivision within the East Rome Business Park the City of Rome has proposed to build an access road from the intersection of Railroad Street and Fifth Avenue at the north side of the site to the intersection of Mill Street and East Whitesboro Street at the south. The right-of-way for this road passes through the former locations of General Cable buildings 1, 2, 3, 22, 9 (the boiler house), 13, 11, 38, and the adjacent Mosca Moving Company garage. Future connecting roads to the east and west to access additional areas within the Business park are planned to intersect this road south of the boiler house. Redevelopment of this parcel will consist of installation of a full set of modern underground utilities, construction of the commercial access road, and construction and landscaping of a pedestrian sidewalk to connect the commercial/residential neighborhood along East Dominick Street with the City of Rome marina park at the former barge canal terminal.

The history of the "Central Core" site is described in the report titled "Phase I Environmental Site Assessment, City of Rome Industrial Redevelopment Area, Rome, New York" (RETEC, 1995). The site was first developed in the late 1800s when the Rome Tube Company began construction of a casting and pickling facility. In 1904, the Electric Wire Works (later the Rome Wire Company) began construction on the northwest portion of the site. The Rome Wire Company, and its successor, General Cable, operated the facility from 1920 to 1972. During that period, a wide-range of metal working activities were conducted including machining, stamping and drawing, plating, pickling, and coating with rubber, asbestos, and paints (RETEC, 1995). General Cable ceased operations at the site in 1972 and, with minor exceptions, the site has been unused since then. At present, the site contains abandoned buildings and open areas, most of which are covered with concrete pavement. Demolition to grade of several of the former General Cable buildings at the northern end of the site has been completed by Mr. Gaetano. Figure 2-2 is a current site map providing the location of buildings and other features of the site. Figure 2-3 is an expanded site plan showing the Roadway Right-of-Way site along with the sampling locations described in later sections of this report.

2.2 Previous Investigations

A number of investigations have been previously performed at the site and in the "Central Core" of the East Rome Business park. This section describes the available documents on the history and conditions of the area, and presents their significant findings.

NYSDEC Spill File #8402290

In 1984 a spill was recorded with NYSDEC for the Revere Copper and Brass facility, located to the north and upgradient of the site. According to the spill file, oil was released into the storm sewer system which allowed it to be conveyed to the central core property. A manhole, located to the south of former Building 38, acted as an oil-water separator and was the location of clean-up efforts by NYSDEC.

NYSDEC Spill File #9006535

A PCB removal action occurred at the central core site in 1991. Environmental Products and Services, Inc., under contract with Mr. Gaetano, completed the removal of several transformers and capacitors containing PCB oils. Mr. Gaetano reported that this equipment was removed from the basement of former General Cable Building 50. The PCB materials were disposed of in a licensed facility. The record shows that the spill file has been closed.

Plumley Engineering P.C.

A Phase I environmental site assessment was completed for the site and its wider setting by Plumley Engineering P.C. on behalf of a potential private developer. The 1992 document "Draft Phase I Environmental Site Assessment of the former Rome Manufacturing Division of Revere Copper and Brass, Inc., and the former General Cable Corporation in the City of Rome, New York" noted a number of environmental concerns on the property. These included the presence or reported presence of underground storage tanks, stained floors and ground surfaces throughout the complex, 55-gallon drums containing liquids and piles of demolition debris. The locations of several underground storage tanks, located from historical Sanborn maps, could not be verified in the field.

Huntingdon/Empire Soils Investigations, Inc.

A number of investigations were performed by Empire Soils Investigations, Inc. in the southern area of the site, adjacent to the Barge Canal. The investigations were conducted to obtain engineering data in support of the construction of a proposed independent power generating facility. A Phase I, Phase II, a contaminant source investigation, and a geotechnical investigation and design were performed between 1990 and 1993 (Empire, 1990; Empire, 1991; Empire, 1993). The subsurface investigations found that chlorinated volatile organic compounds were present in the groundwater at concentrations exceeding New York groundwater standards. In addition, one soil sample from a site of eight samples obtained from borings at the site exceeded the TCLP limit for lead (100 mg/L as compared to the limit of 5 mg/L). It was believed that this TCLP lead result was either an erroneous laboratory result, or was due to inclusion of metal in the fill at that location. Testing of an additional soil sample from the same boring found that TCLP lead was below the method detection limit. Analysis of soil samples across this area south of the rod mill by Empire Soils found total lead concentrations ranging from non-detect up to a maximum of 553 mg/Kg. Empire performed a soil gas survey over the proposed plant site. The results of the survey indicated that volatile organic compounds were detected in two of 32 samples collected. Toluene and xylene were found at one location in concentrations of 63.6 and 76.4 $\mu g/m^3$, respectively and toluene was found at the detection limit of $\mu g/m^3$ at a second location. The proposed power plant was not constructed due to financial and contractual considerations.

Remediation Technologies, Inc. 1995

RETEC was contracted through the Saratoga Associates by the City of Rome and the Rome Industrial Development Corporation (RIDC) to provide environmental consulting and investigation services in support of the creation and development of the East Rome Business Park. As part of this work, RETEC prepared an environmental overview of the entire 200-acre redevelopment area which included both a review of the hydrogeologic setting and the industrial history of the area (RETEC, 1995). This report contained a review of the history of the central core site and summarized the information from the previous investigations discussed above.

Remediation Technologies, Inc. 1996

A limited Phase II investigation was performed by RETEC in support of the proposed Canterbury expansion project. The investigation was comprised of a series of test pits where surface soil, subsurface soil and groundwater samples were collected and analyzed. Samples were also obtained of sediment located in a tunnel which houses utilities in that area, connecting Building 38 and the Canterbury building to the former General Cable boiler house (Building 9). The results of the investigation were presented in a report to the Saratoga Associates (RETEC, 1996a). The findings were that concentrations of metals in soil in the study area were within typical background concentrations with the exception of copper. No organic compounds were found in groundwater samples taken from the excavations for the test pits. A 2,000 gallon gasoline UST was located between Building 38 and Building 11, which was found to have released an unknown quantity of petroleum product to the surrounding soils.

In 1996, RETEC prepared a work plan for conducting a site-wide investigation of the central core site in order to provide the environmental data needed to plan the redevelopment of the site (RETEC, 1996b). The field work was performed in December 1996, and consisted of three surface soil samples; 22 soil borings; collection of 20 groundwater samples from temporary well points in the soil borings; soil gas sampling; shallow monitor well installation (four wells) and sampling; ambient air sampling from selected buildings; and a survey and sampling of subsurface structures and utilities. The major findings of the 1996 RETEC investigation are summarized below:

- The northern area of the proposed right-of-way, from Railroad Street to the boiler house, is characterized by elevated metals in both the soil and in the utility tunnel system. Low levels of PAHs were found in the soil in borings SB-12 (each compound at less than 2 ppb), and in the groundwater at boring SB-13 (each compound less than 16 ppb). No other organic compounds were found in this area.

- The soil and groundwater near the boiler house were found to be impacted by antimony. The direction of groundwater flow, from the northwest at this location, points to an off-site source for this groundwater impact.

- Free petroleum, identified as the "heavy end" of number 2 fuel oil or as number 6 fuel oil was found in one of the tunnels joining the south side of the boiler house. Spots of oil were also observed floating on the surface of the water filling the substructure of the boiler house. The underground storage tank located adjacent to the boiler house should also be removed. Due to the association of impacted water with asbestos containing materials in the boiler house, it is likely that remediation for petroleum and for asbestos would occur during the same remedial program. No hydrocarbons were detected in the well (MW-15) or soil borings from this area, indicating that the contents of the contained structures have not impacted the surrounding soil and water.

- The utility tunnel extending from the courtyard area south of the boiler house to the Canterbury building contains hydrocarbon and PCB-impacted sediments, though at lower concentrations than in the proposed Canterbury expansion area. No evidence of impact to the surrounding soil and groundwater by the contents of the tunnel was detected.

A Phase II investigation was performed on the Mosca Garage on Mill Street by RETEC in 1997. This building has been used for maintenance of trucks used by the Mosca Brothers Moving and Storage Company. The investigation found the following:

- A 1,000 gallon underground fuel oil tank is located along the northern wall of the building. This tank has impacted the surrounding soil and groundwater. The extent of impact to the north and west were defined by a test pit investigation, but the downgradient direction (under the garage) has not been defined.

- Parts cleaning solvents were observed to be in use in the building, along with other automotive chemical products. Drums of spent solvent were observed to be present at the site.

- The garage floor drains were traced to the storm sewer in Mill Street, however two breaks were observed in the underground line which has impacted the surrounding soil.

2.3 Physical Setting

2.3.1 General Geology

The East Rome Business Park is located in the western Mohawk River valley of the Hudson-Mohawk Lowlands physiographic province of New York State. The lowland is formed by the

Appalachian Plateau to the south, and by the Adirondack Region to the north. The site is situated in the river valley and floodplain of the Mohawk River, and as such, is characterized by low relief with elevations across the site varying by less than ten feet. The regional drainage pattern in the vicinity of the site has been modified by the diversion of the Mohawk River and the construction of the Barge Canal, which is located to the south of the site.

The Business Park is underlain by a sequence of unconsolidated sediment layers, having a total thickness of approximately 100 feet, which fills a shale and siltstone bedrock valley. This material is a combination of glacial outwash sediments and post-glacial alluvial sediments which have filled a trough of the Mohawk River (Casey and Reynolds, 1989). The sediments from top to bottom, are composed of industrial fill, alluvial deposits, lacustrine sand and a basal till emplaced on the bedrock (RETEC, 1995). Soil boring logs from previous site investigations show that a silt-clay unit is also present at approximately 50-60 feet below the ground surface (Atlantic, 1993; Empire Soils, 1991). Surface water and groundwater at the site flows generally to the south to the Barge Canal (Empire Soils, 1993).

Two shallow stratigraphic units have been identified at the site. The uppermost consists of fill which varies in composition, but is generally a gray clayey silt containing varying amounts of angular and rounded rock fragments, brick fragments, cinders and slag fragments, wood, glass, and other debris.

Underlying the fill material is a heterogeneous mixture of fluvial sediments which is comprised of discontinuous beds of near-shore sediments, primarily clayey silt, silty sand, and gravel.

2.3.2 Hydrogeology

Detailed information regarding the site hydrogeology was obtained during the soil boring and monitoring well investigation. The depth to water was defined by four new monitoring wells and four of the existing wells. Depth to water measurements were also taken at all the temporary well points installed in the soil borings. In general, the soil boring measurements confirmed the potentiometric measurements obtained from the wells; however, the soil boring data were not used in the interpretation of water table conditions. A complete round of depth-to-water measurements was collected prior to groundwater sampling on December 20, 1996. Similar results were obtained during a second round of measurements collected on January 15, 1997. The results of the December 20, 1996 measurements have been used to map the potentiometric surface of the water table (Figure 2-4). The arrows shown at right angles to the groundwater contours represent the inferred direction of the groundwater flow at that location.

The water table can be found in the fluvial soils beneath the fill unit. The depth-to-water below the ground surface is approximately six feet in the center of the Right-of-Way area, but may be as deep as 16 feet in other parts of the "Central Core". The surface of the water table slopes towards the canal at all locations within the site. This direction of flow to the south was determined by RETEC, and by previous site studies conducted by Empire Soils (Empire, 1993), and the United States Geologic Survey (Reynolds, 1990). Based on water table maps from RETEC (1997), the average horizontal gradient across the site was calculated to be 0.0065 feet/foot. Two pairs of monitoring wells in the area south of the Roadway show an upward gradient from the deeper wells to the shallow portion of the aquifer.

2.3.3 Physical Features

The proposed City Roadway Right-of-Way Property is shown in Figure 2-3. Active utilities are found at both the north (Railroad Street) and west (Mill Street) ends of the roadway area. At the north end, active gas and water mains and sanitary and storm sewers are present in the Railroad Street right-of-way. In the western end of the roadway, active utilities include gas and water lines which were located on the Mosca Brothers Moving and Storage Garage grounds in the Mill Street right-of-way.

One active sanitary sewer line crosses the roadway in the northern portion of the area. RETEC was unable to determine the condition of the sewer system due to the presence of debris in the manhole (U22-1). According to historical drawings, the sanitary sewer flows from the direction of the former Rome Manufacturing Company Building (Rossi Building) to the current building occupied by Serway to the east.

Active storm sewers in the roadway right-of-way are found in two areas. At the southern end of Building 38, the storm sewer system collects surface run-off into a shallow system of storm drains around Building 38 and then discharges water into a deeper (12 feet deep) system of drains. The deeper system also collects water from the north (Canterbury Printing property) and discharges via a 20-inch line which runs beneath Building 11 and then to the canal.

An active storm sewer system was found in the central area of the roadway around the boiler house (Building 9). This system consists of two branches which meet in a manhole at the north end of Building 53 and then flow to the canal. A 24-inch line collects water from the north (Nash Metal Works site) and west (Canterbury property) at sampling point U9-1, and flows to the east to Building 53.

The second branch in this area is found along the east side of the boiler house where a 24 inch storm sewer system line carries water to the manhole at the end of Building 53. This branch collects water from the northern area of the roadway including the area of the Rossi Building and Building 39.

The Roadway area includes the boiler house (Building 9). The foundation of this building was found to be acting as a sump which collects surface water from the utility tunnel to the west. No outlet for this water could be located in the field or on the historic site plans.

As described above, a main subsurface feature in the roadway area is the southern utility tunnel system in the area of the boiler house. There may, however, be features associated with subsurface conditions beneath the floor of Buildings 11 and 13. Building 13 is constructed with a gap between the floor and the ground surface, with sumps and utility lines located beneath the floor elevation. Similarly, the floor of the south-central portion of Building 11 was found to be constructed above the ground surface, with support systems and structures located in the hollow space below the floor. The northern portion of Building 11 does not have access points to inspect the subsurface, and from the building construction it appears that it may have a different foundation and subfloor structure from the south end.

Three electrical utility vault access manholes were investigated in the roadway area. Two of the vaults were located in Building 11 (U11-7 and U11-8). A third electrical vault was located outside of the north end of Building 11. All three of the utility vaults were filled with standing water in 1997 (RETEC).

3.0 CONCEPTUAL SITE MODEL AND REMEDIATION SCENARIOS

The site has been investigated previously; however, additional data are required to fulfill the requirements of an SI/RAR. An initial evaluation of the existing data has been conducted, from which a conceptual site model has been developed to assist in the preparation of this work plan rationale. The conceptual model identifies chemicals of concern, potential receptors, and migration pathways for the chemicals of concern.

3.1 Conceptual Site Model

The preliminary site assessment and Phase II investigation of the Roadway Right-of-Way Property and surrounding area identified the past uses of the site and likely chemicals-of-concern [RETEC, 1995]. This earlier work provided a substantial amount of information about the overall site which serves as a basis for this conceptual model. Table 3-1 lists the likely chemicals of concern (COC) for the site is based on the findings from the Phase II investigation.

The evaluation of conditions at the Roadway Right-of-Way Property will include these COCs, whether they are in the soil, groundwater, utility system, or building structures. Due to the current and intended use of the property, soil gas will not be evaluated for impacts to receptors (i.e., its effect on the open air above the roadway will be negligible). Soil gas will be investigated, however, as a means of identifying sources of soil contamination, should they exist on the property.

3.1.1 Potential Media of Interest

Section 2 of this work plan provided an overview of the site setting and historical site uses. The previous investigations have found that both soil and groundwater in the Roadway Right-of-Way Property have been impacted by residuals of industrial site use. Additionally, impacts have been found in the subsurface infrastructure at the site, including the storm sewer system, the utility tunnel system, and the basement of the boiler house.

3.1.2 Potential Human Receptors and Associated Exposure Pathways

The human receptors considered potentially relevant at the roadway site include: construction workers, utility workers, and nearby residents This section contains a discussion of the rationale used for selecting each of these potential receptor groups and their associated exposure pathways.

Construction workers are the individuals that will be involved in the construction of the roadway and of new buildings on the adjacent property. It is expected that they will come into contact with surface soils and have little contact with subsurface soils. The exposure pathways considered most applicable and plausible for construction workers are: incidental soil ingestion and inhalation of volatiles and particulates that may be released or generated during construction activities.

Utility workers are those individuals that will be involved in the installation and/or maintenance of the utility lines that service the new or renovated buildings on the site. It is anticipated that their exposure will be primarily to subsurface soils or fill and bedding materials in utility trenches. The exposure pathways considered most applicable and plausible for this receptor group include: incidental ingestion of subsurface soils and inhalation of volatiles and particulates released or generated during their work activities.

Nearby residents (i.e., those living along East Dominick Street and near Mill Street) were selected as potential receptors since they may be exposed to either volatile or dust emissions during the construction activities. The exposure pathways considered most applicable for nearby residents include: inhalation of volatilized constituents and particulates released or generated during construction activities. It should be noted that visitors to nearby recreational facilities (i.e., parks) could also be exposed to volatilized constituents or fugitive dust released during construction activities. However, their exposures would be occasional (when they visit the park) and for relatively short periods of time (e.g., two to four hours) so that their overall exposures would be less than the exposures to nearby residents, therefore, their exposure will be lower than that of nearby residents.

Future commercial occupants and visitors were not selected as potential receptor groups with respect to the Roadway Right-of-Way Property. Remediation scenarios for the site will include capping (i.e., the roadway) of site contaminants, thus, direct exposure to constituents in existing surface soil will not occur. Based on existing VOC data, it is unlikely that there will be any volatilization to outdoor air in any significant concentrations over the roadway or migration elsewhere.

3.1.3 Potential Ecological Receptors and Associated Exposure Pathways

The Roadway Right-of-Way Property is and will be fully developed, therefore there are no on-site ecological receptors (i.e., terrestrial flora and fauna) to be evaluated. Likewise, all of the neighboring properties are developed and have no ecological receptors.

Potential risks to ecological receptors in the Barge Canal to the south would be from groundwater discharging or stormwater runoff to the Canal. There is no direct surface water overland runoff from the site to the Canal; storm water is collected by an existing storm sewer system which drains to the Canal at three outfall points. This system, combined with the coverage of the site by buildings and pavement, generally prevents storm water from contacting soil at the site.

The existing stormwater collection and drainage system is to be abandoned during site reconstruction so that the present isolation of storm water from the soil and therefore from potential constituents in soil is maintained, thus preventing future impacts to storm water and subsequent impact on ecological receptors. However, the stormwater system has been found to contain within it sediments and sludge with elevated concentrations of metals and PCBs. This material in the stormwater system has the current potential to migrate to the Canal through the pipes. This current pathway will be addressed in the SI/RAR.

In particular, the impact for an existing storm sewer to be used during an interim construction period will be considered in detail. The new sewer system will be started at the north end of the site and proceed to Mill Street. Until it reaches Mill Street, existing sewers will be used. These existing sewers will be tested to evaluate their role in, if any, contaminant migration, and then cleaned prior to reuse.

The other potential migration pathway associated with the sewers and conduits is their bedding material which was typically a granular fill underneath the pipes. These have not been investigated and represent a data gap to be addressed in this project.

In summary, the migration pathways to be addressed include groundwater, storm sewer conduits and the bedding of sewers and utility lines and tunnels. The evaluation of off-site migration or runoff of contaminants will be made at the downgradient side of the Roadway Right-of-Way Property.

3.2 Remediation Scenarios

The Remedial Alternative Assessment (RAA) for the site will address several options for preventing or eliminating exposure to human health and the environment due to contact with chemicals or migration of chemicals from the Roadway Right-of-Way site. The baseline remediation scenario for this assessment is remediation to levels specified in TAGM 4046. Other remediation scenarios will address breaking the exposure pathways or blocking migration pathways.

The remediation scenarios considered in the RAR will include the following elements:

Soil:

- removal of soil exceeding TAGM 4046 levels
- removal of soil excavated during construction of roadway and utilities exceeding TAGM 4046 and capping
- capping of soils
- removal of source materials ("hot spots")

Groundwater:

- remediation of groundwater exceeding TAGM 4046 levels
- contaminant source removal
- in situ treatment
- removal and ex situ treatment
- removal and/or blockage of preferential flow pathways (e.g. utility line bedding)

Surface Structures (Sewers, Basements, Tunnels):

- cleaning of source materials
- blocking of conduit

4.0 WORK PLAN RATIONALE

4.1 Data Gaps

The proposed SI/RAR is designed to collect the data necessary to perform a site investigation and subsequently perform an analysis of remedial options appropriate for the end use of the Rome site. The SI/RAR is also designed to be consistent with all applicable law, specifically the requirements of New York State Environmental Conservation law.

The data for the Roadway property, both existing and new data, taken as a whole, must be able to answer the following questions at the conclusion of this investigation:

1) Are there hazardous substances on the site which exceed NYSDEC soil and water cleanup standards? If so, what are their concentrations and distribution?

A Remedial Assessment Report must be prepared at the finish of the investigation to address all of the contaminants on the site. Sufficient data must be collected to be able to assess the risk to receptors, and to evaluate all of the remedial alternatives.

2) If hazardous substances are present, is the source of the substances on-site? Are the contaminants migrating from the property?

The potential for off-site migration must be established in order for the State to provide the city with an indemnification. Once indemnified, the State will be liable for all off-site impacts which have their source on the site.

3) Are the hazardous substances migrating onto the site from an outside source?

If contaminants are impacting the site from an upgradient source, it is important to document this fact so that appropriate measures may be taken against the PRPs to eliminate the problem, to establish liability for past impacts, and to include management of the problem in the site redevelopment plans (e.g., construction of new storm sewers).

Based on the previous investigations at the property the potential environmental concerns have been well defined. This work plan therefore addresses the specific data needs to complete the site characterization under the state Superfund guidelines, and to provide the full suite of data necessary to evaluate all remedial alternatives in a Superfund decision-making format. The sections below identify the elements necessary to this investigation, and the rational for the investigation techniques.

4.1.1 TCE in Groundwater

Data Objective: To determine whether this chemical and its related breakdown compounds are present on the property. If it is present, to determine whether it has its source on the property.

As discussed in Section 2, the trichloroethene and its associated breakdown compounds are present at the water table in an area at the south side of the former General Cable site. The full lateral and subsurface distribution of the groundwater impact has not been defined; however, the work performed to date on the 17-acre core of the General Cable complex has not located an on-site source. Visual inspection of the facilities, sampling and analysis of vadose zone soils, soil gas and groundwater at the water table have been performed, yet gaps remain in the data. In order to satisfy the above data objective, it is necessary to create a conceptual model of the currently defined site conditions. At present, there are two potential conceptual models:

Model 1: The TCE observed at the south end of the former General Cable site has its origin north of the Roadway Right-of-Way, and is the result of lateral migration at some depth below the water table, with upwelling of groundwater near the canal transporting dissolved phase TCE to the upper reaches of the aquifer. In this model there is a plume from a source at the northwest that has bypassed the water table sampling points (both water table wells and temporary well points). This model is supported by the lack of TCE in the soil or shallow groundwater, by the direction of groundwater flow from northwest to southeast across this portion of the site, and by the observation of an upward hydraulic gradient in the area where TCE is observed, as measured by comparing the water table wells with wells screened deeper in the aquifer.

Model 2: The TCE is only found in the area already mapped, either because it was actually spilled there, or because that is the point where deep groundwater impacted by TCE upwells from a deep reservoir of contamination. In this model there is no lateral plume or identifiable surface source of the TCE, either because it never existed, or because the spill event was sufficiently long ago that the core of the plume has migrated to a stable position near the axis of the fill in the Mohawk River valley. In this model the tail end of the plume may be present under the Roadway Right-of-Way Property, but the concentration of TCE will decrease in the direction of its origin, not increase as might be expected in Model 1. If the groundwater is found to be impacted at a confining layer below the water table aquifer it can be presumed that the contamination is present due to lateral migration from an area outside the property, and therefore the source is outside the subject area of this investigation.

Investigation Approach:

The investigation of TCE will take a stepped approach so that new field results can be used to focus the investigation as they are received.

Step 1: Advancement of direct push borings ("Geoprobe") along the expected axis of the plume to the suspected clay confining layer 50 to 60 feet below the ground surface (if present) to determine if TCE is present, and if so, to define its bounds across the Roadway Right-of-Way property (Figure 4-1). Direct push groundwater samples will be collected and analyzed to screen for TCE. The depth of the direct push will be limited by the soils encountered and may not reach 50-60 feet.

Step 2: In the property, install a well to the confining layer so that groundwater may be sampled at the interface of the upper aquifer and the confining layer. The well would be targeted for the plume center based on the results of Step 1.

Step 3: In the property, install a deep well to the top of the bedrock to determine whether TCE is present in the lower aquifer in either dissolved or free-phase form (DNAPL). If TCE is present in the upper aquifer this well will be double-cased to prevent the vertical migration of contaminants.

Step 4: With the lateral and vertical extent of TCE defined on the Roadway Right-of-Way Property, install an additional well in the down gradient and the up gradient direction along the axis of the TCE plume at the same level as the shallowest impacted aquifer. The piezometric data from these wells will be used to establish a direction of groundwater flow in the impacted aquifer, and the chemical concentration data from the wells will help to establish the location of greatest TCE impact.

Note that unless this investigation finds a previously unknown source of TCE in the vadose zone or associated with the water table aquifer, the discovery of TCE in any of the wells described above should show that the origin of TCE is off-site.

The previous investigations at the site did not locate a source of TCE on the 17-acre central core property. The Mosca Garage property and the portion of the Canterbury property to be conveyed to the city should be evaluated to determine if they are the source or provide information on the source. Soil gas samples will be obtained from the Mosca Garage and Canterbury property which have been incorporated into the right of way, and from the former General Cable property on the west side of Mill Street which is to be used for the realignment of East Whitesboro Street (Figure 4-2). The soil gas samples will be analyzed for solvents and petroleum hydrocarbons. Additional areas within the Right-of-Way will also be investigated by soil gas sampling if they are suspected of being the origin of the TCE. Note that if the groundwater investigation successfully locates the TCE source, then the soil gas survey may not be necessary.

4.1.2 Migration Pathways in the Utility System Bedding Materials and Subsurface Structures

Data Objective: To determine whether contaminated groundwater is migrating along the bedding material outside of utility lines or subsurface structures.

The Phase II investigation of the General Cable core area found that the storm sewer and utility tunnel system at the site contained sediments with PCB 1260 and metals which exceeded TAGM 4046 concentrations. Low concentrations (generally less than 1 ppm) of PCBs were found in the water samples obtained from these systems, therefore the potential exists for PCBs and metals to migrate to the Barge Canal through the piping and tunnels. If breaks or leaks exist in these systems, or if the systems are installed below the water table the bedding material or fill on the outside of the structures may act as a preferential flow pathway for groundwater, "short circuiting" the natural flow through the native soil or man-made fill.

The systems at the site of concern are those which could act as a source of groundwater or surface water contaminants (the storm sewer system and utility tunnels), or those which might be installed at or below the water table and thus may provide a groundwater flow conduit (the sanitary sewer system).

Each structure which is suspected to be at a depth close to or below the water table will be investigated at its upgradient location on the Roadway Right-of-Way Property to assess whether contaminated groundwater is being conducted through the bedding materials. A test pit will be advanced along side each line to expose the piping or tunnel, the associated fill or bedding material, and the groundwater. The elevation of all of the structures on the property will be compared to the water table elevation to determine which features should be abandoned in a manner which prevents migration of groundwater along the structures. If groundwater is observed in the bedding material, a sample will be obtained for analysis of organic constituents.

Deep storm sewer lines and subsurface structures which may act as conduits for groundwater leaving the site will also be investigated by test pits. Based on the historical utility maps for the site there are at least two deep storm sewer lines which should be evaluated.

4.1.3 Fill Soil

Data Objective: To obtain an accurate definition of the thickness and composition of the fill soils across the Roadway Right-of-Way Property.

All previous investigations at the former General Cable site have shown that the uppermost soil unit is composed of a fill soil. The Phase II investigation found that fill soils are present at all locations, with a thickness ranging from 2 to 13 feet. In some locations this soil is visually similar to or indistinguishable from the underlaying natural soil. In most locations, however, the fill soil contains anthropogenic artifacts. Chemically, this soil is distinguished by certain elevated metals concentrations, especially for copper, nickel, zinc, and lead.

In order to evaluate the feasibility of remediation this soil to levels recommended by TAGM 4046, it is necessary to map its physical distribution and chemical composition. The methods and costs to remediate areas which exceed the soil cleanup standards will then be evaluated in the Remedial Alternatives Report. Soil borings for the mapping and sampling of fill soils are shown on Figure 2-3. Soils will be sampled for total constituent concentrations. Where necessary, EPTOX testing will also be performed to determine whether materials are classified as hazardous waste.

Surface soil samples will also be obtained in the vicinity of Building 39a where electrical distribution equipment may have resulted in the release of PCBs.

Since capping by a city roadway is one likely alternative for the site, engineering soil data must be obtained as part of this investigation in order to assess whether the soils are suitable for this alternative. If the fill is unsound from a geotechnical standpoint it may have to be removed even if capping were a suitable remedial approach. Data must also be obtained to map the elevation of the ground surface beneath buildings with floors which are not constructed on-grades.

4.1.4 Antimony in Soil and Groundwater

Data Objective: To establish whether antimony in soil is a source of groundwater contamination.

The Phase II investigation found that the only element (outside of petroleum products) which appeared both above TAGM 4046 in soil and above groundwater standards was antimony. Antimony concentrations in soil varied across the site from less than 3.3 mg/Kg (detection limit) to 77.7 mg/Kg. The highest concentration was found in a sample obtained from a soil boring one foot below the ground surface adjacent to the boiler house at the center of the Roadway Right-of-Way. For comparison, a background surface soil sample obtained adjacent to East Dominick Street was measured to contain antimony at 16 mg/kg. Groundwater obtained from Well MW-15 at the boiler house location contained 0.065 mg/L. Down gradient of this location groundwater was also found to exceed the groundwater standard of 0.003 mg/L. This implies that the source and impact of antimony is limited to a band extending across the center of the site in alignment with the groundwater flow direction. Preliminary information from the adjacent portion of the Nash Metalware property where wastes have been deposited shows that antimony is also present in the soil at a concentration of at least 71 mg/Kg.

The soil borings to be performed to characterize the fill soils will also serve to further define the extent of antimony in the vicinity of the boiler house. One monitoring well will be installed on the upgradient side of the site to monitor the impact of groundwater from the Nash waste disposal area (Figure 2-3. To monitor impacted groundwater leaving the site, an additional well will be installed downgradient of the boiler house near Building 53.

4.1.5 Contents of Subsurface Structures

Data Objective: To perform a predemolition asbestos survey of the subsurface structures.

The Phase II investigation of the 17-acre East Rome Business Park core area surveyed the contents of the subsurface tunnels and utility system beneath the site. It found that the utility tunnels in the southern portion of the site have been impacted by petroleum products, PCB 1260, and metals, and that tunnels in the northern portion of the site contain soil and debris which has infiltrated the structures from the surface of the site. This information is generally sufficient to characterize the problems with these structures; however, asbestos in these subsurface structures must be evaluated so that it can be managed safely during the removal of other contaminants.

It was observed that piping clad with potentially asbestos containing material was present in the utility tunnels. Remedial plans for the tunnels and storm sewer system include cleaning out the contents or removal of the structures as they are replaced or abandoned. It will be necessary to also manage the asbestos in the tunnels during this remediation and abandonment, therefore it is necessary to complete a predemolition asbestos survey. It is also believed that asbestos clad piping and other structures are present in the flooded boiler house basement. The boiler house basement will need to be cleaned at the same time as the utility tunnels, therefore the predemolition survey of the boiler house must also be conducted prior to the assessment of remedial alternatives and NYSDOL asbestos rules included as part of the SCGs for this portion of the site.

4.1.6 Influent Utility Lines

Data Objective: To define the potential for influent utility lines and structures to convey contaminants to the Roadway Right-of-Way.

The General Cable complex, at its peak, included the Canterbury Printing and the George Rossi buildings, which are located up gradient of the Roadway Right-of-Way property. The utility system for the complex therefore cross-cuts the existing property boundaries, and stormwater from these buildings is being conveyed to the right-of-way. It is also shown on historical site maps that a 24-inch storm sewer line enters the right-of-way property from the Nash Metalworks property. It is possible that metals, PCBs, and hydrocarbons may be found in these lines up gradient of the Roadway Right-of-Way Property; therefore, any plan to remediate the existing storm sewers and reroute storm water must take into account the impact of continuing migration of contaminants towards the area from the northwest. Sampling of accumulated soil, sludge, and water in the influent lines must be performed at the closest up gradient access point for each line (Figure 4-3). The evaluation of whether the bedding materials for these structures is acting as groundwater migration pathways will be included in the task described in Section 4.1.2 above.

4.1.7 Investigation of Southern Site Parcels

Data Objective: To investigate the condition of pertinent parcels at the southern end of the site for roadway development.

In order to complete the site investigation, two small parcels of property must be further addressed or addressed for the first time. These parcels are 1) a portion of the 1.1 acre parcel of land owned by Charles A. Gaetano bounded by Mill Street to the east, and East Whitesboro Street to the south and 2) the garage property used by Mosca Brothers Moving and Storage, located the east side of the intersection of East Whitesboro and Mill Street. Both of these parcels of land were once owned by General Cable and are germaine to the environmental condition of the Roadway Right-of-Way Property. The Mill Street parcel is a component the Roadway Right-of-Way Property for which title will be purchased by the City on or before May 6, 1997. Although title for the other parcel will not be held by the City by the date of the State Assistance Contract for investigation, they must be addressed because of their influence on the roadway site.

The Mosca garage has been previously sampled. Soil conditions at this property should be similar to those on the adjacent right-of-way property. The parcel located on the west side of Mill Street has not been sampled. It is currently paved and used a parking area. There are no records that any structures ever existed on the parcel, or that there are any environmental problems associated with the property (RETEC, 1995). The historical records do indicate that mill races were formerly present between Mill Street and the Mohawk River and that an industrial railroad spur ran along Mill Street in the same area as this property, therefore it is possible that such an abandoned structure could be present on the subject parcel. If so, such a structure could act as a sink or conduit for contaminants in the subsurface.

4.1.8 Reuse of Utility Lines

Data Objective: To determine the suitability and remedial needs for temporary reuse of existing storm sewers.

The construction of the roadway in two phases will require the reuse of existing storm sewer lines within the former General Cable complex on a temporary basis. In order to ensure that this does not result in further impacts to off-site receptors, specifically the Barge Canal, the lines to be reused must be investigated. Issues to be included will be the definition of inputs to the lines, contaminant contents, determination of clean-out needs, and off-site routing. The current plan for redevelopment of the northern portion of the site will require a set of lines shown on Figure 4-4 to be investigated and remediated so that the temporary sewer connections can be made.

4.2 Data Quality Objectives

The conceptual model presented in Section 3 identified several data objectives required to complete the characterization of the site and needed to support decisions concerning the appropriate remedial response activities. The data quality objectives (DQOs) are qualitative and quantitative statements to ensure that data of known and appropriate quality are obtained during sampling and analysis activities.

The DQOs for this project will be as follows:

- DQO Level 1- Field screening for health and safety monitoring and for field screening subsurface soil samples and utility lines for organic vapors.

- DQO Level 2 - Soil gas survey and groundwater screening

- DQO Level 3- Engineering data, and analysis of water and sludge samples associated with the interior and exterior of utility lines and subsurface structures.

- DQO Level 4 - Analysis of soil and water samples from soil borings, monitoring wells and test pit soil samples.

A detailed description of the quality assurance/quality control procedures to be implemented will be provided in the QA/QC Plan for the project. Adherence to such procedures are consistent with the NCP and NYSDEC protocols.

5.0 SCOPE OF WORK

5.1 Overview of Project

This section presents the scope of work necessary to complete the Site Investigation/Remedial Alternatives Report (SI/RAR) for the Roadway Right-of-Way for the East Rome Business Park, Rome, New York. A total of nine general tasks will be used to complete the project. The first five tasks, Field Sampling (01), Sample Analysis and Validation (02), Data Evaluation (03), Assessment of Impacts to Human Health and the Environment, and Site Investigation (SI) Reporting (04) are related to site characterization discussed in Section 5.2. The next three tasks, Remedial Alternative Development/Screening (05), Detailed Analysis of Remedial Alternatives (06), and Remedial Alternatives Report (RAR) (07) are for developing and evaluating the specific remedial alternatives selected for the site and are discussed in Section 5.3. Project Management (09) is the last task. Project Management is discussed in Section 5.4 along with the project deliverables and the schedule.

In order to initiate construction of the northern end of the roadway in mid-October, it is necessary for the NYSDEC to issue a record-of-decision (ROD) around October 15, 1997. To facilitate the issuance of this ROD, the site has been divided into two operable units:

- Operable Unit (OU) North - This is the portion of the Roadway Right-of-Way Property beginning at Railroad Street and continuing to the end of the George Rossi Building just before the Boiler House (Figure 1-2).

- Operable Unit (OU) South - This is the portion of the Roadway Right-of-Way Property beginning at the southern boundary of OU-North and continuing to the southern end of the property across Mill Street (Figure 1-2).

This separation into OU-North and OU-South was made because the environmental issues on OU-North are less complex than on OU-South, and as such, a faster schedule for the SI/RAR and subsequent work can be maintained to support a ROD for OU-North on October 15. With an OU-North ROD issued, construction can take place this fall concurrent with the redevelopment of the Pecoraro Site which needs new utility systems and the roadway to proceed.

Redevelopment of OU-South a area is on a slower time schedule and as such, the ROD for it can be issued later in the year.

The schedule given splits the conduct of the project into OU-North and OU-South following initiation of field work and results in two separate RODS, one for OU-North on October 15 and one for OU-South on December 3. The planned duration of this project to result in RODs for both OU-North and OU-South is a period of 32 weeks beginning May 1 and ending February 3 , 1998. Table 5-1 is a general schedule outlining the milestones of the project. A more detailed schedule will be provided in the FSP to be issued as a supplemental document. This Work Plan will be submitted on or around May 1 and the documents necessary to supplement it (Section 6.0) will be submitted May 9. The schedule calls for two weeks NYSDEC review with approval of the Work Plan supplemental documents on May 23.

Field work on both operable units will begin May 27. It is at this point that the project divides into the two operable units. OU-North is anticipated to be less complex so that field work will be complete within a week (i.e., June 5). The SI/RAR for OU-North will be submitted to NYSDEC on July 1. Allowing 30 days for NYSDEC to prepare a Proposed Remedial Action Plan (PRAP) and 45 days for public comment results in the NYSDEC initiating preparation of a ROD for OU-North on September 15. With 30 day preparation time, the ROD can be issued on October 15 to permit roadway construction to proceed.

With regard to OU-South, due to its complexities (e.g., boiler house, tunnels, etc.), it is anticipated that the field work will take longer, being complete on June 27 with submission of an SI/RAR for OU-South on August 15. Procedures similar to OU-North from that point in time plus some contingency time results in a ROD for OU-South on February 3, 1998, thereby completing this project.

5.2 Site Investigation Tasks

5.2.1 Property Line and Feature Survey (Including Utilities)

Project Area Survey

The roadway property cuts through the former General Cable complex, and includes portions of four separate real estate parcels. The first step in characterizing the entire right-of-way is to survey and mark in the field the boundaries of the property. This layout of the site will be performed by a New York State licenced surveying company. The property lines will be establish by permanent markers and will be clearly identified for later site workers with lines painted on the ground, survey flagging, and stakes.

The survey crew will then update the existing survey map of the site to show all features on the right-of-way and adjoining properties of significance, including but not limited to buildings, sumps, pits, subsurface utility openings, tunnels, and tanks. The invert elevations of all subsurface structures will also be measured, and the locations of subsurface lines and tunnels mapped. These features will be identified in the field with the aid of the environmental consultant.

Drum and surface contaminant survey

All drums and other containers, both containing product and empty, will be inventoried at the site. Each drum or container found will be labeled with a unique identification number, and its condition, contents, and location noted. If the contents of a drum cannot be identified then a sample will be obtained for analysis. The results of the survey will be tabulated, and a map prepared to show the locations of all drums. Areas of surface contamination, such as staining and discoloration, will also be noted during the drum inspection and the locations shown on the survey map of the site. Surface contaminants and contaminated building materials will also be sampled to determine how demolition debris should be handled.

Site Investigation Layout

The proposed sampling locations will be marked in the field and the elevation and location surveyed. Any deviations from the marked locations due to access or safety concerns will be noted and the offset from the marked location measured.

Background Investigation

To help focus on potential problem areas within the study area, an attempt will be made to interview former General Cable workers. Where possible, the former works will be interviewed at the site so that former site operations can be discussed in detail. Where necessary, the field investigation will be adjusted to reflect new information.

Asbestos Pre-Demolition Survey

An integral part of the remediation of the tunnels and basement of the boiler house will be the management of asbestos. Additional asbestos management will also be required if the remaining aboveground structures (the boiler house, Building 11/13, and Building 53) must be demolished to remediate the site and to construct the roadway.

The asbestos survey will be performed in compliance with NYSDOL regulations. The location and condition of all ACMs will be identified on the site map, and options for its management discussed in the Remedial Assessment Report.

5.2.2 Field Sampling

The details of the field investigation, including the detailed description of each sampling point, the analytical needs, and the investigation techniques, will be described in the Field Sampling and Analysis Plan (FSAP). Based on the data needs described in Section 4, the investigation of this site requires the use of a suite of investigation techniques. Each investigation method can serve more then one purpose, thus maximizing the data obtained and mininizing the costs. Listed below are the techniques for this project along with the types of data to be obtained by each:

- Test Pits
  - Utility line inspection
  - Soil sampling

- Soil Borings - Direct Push
  - Soil Gas
  - Soil Sampling
  - Groundwater Screening

- Soil Borings - Auger
  - Soil Sampling
  - Monitoring Well Installation
  - Geotechnical Analysis

- Grab Samples
    - Subsurface Utility Lines
    - Surface Soil Samples

The methods to be used for employing each of these techniques at the site will be detailed in the FSAP. Each sampling point will be identified along with the justification for its selection and list of analysis to be performed.

5.2.3 Sample Analysis

Chemical Analysis

Samples obtained from the field under investigation tasks described above will be analyzed by NYSDEC ASP protocols by a NYSDOH-certified laboratory. Analytical methods for the chemicals of concern listed in Table 3-1 will be USEPA and NYSDEC approved methods. The methods and their appropriate QA/QC protocols will be discussed in the Field Sampling Plan (FSP). QA/QC procedures to be followed by the laboratory will be those specified by the ASP and by the project-specific QA/QC Plan. The laboratory will prepare a full documentation of the analysis (Level B deliverables) for data review.

Physical Analysis

Physical analysis of soil samples will be required to evaluate the engineering properties of the soils beneath the proposed roadway. Testing will include:

- Grain-size analysis
- Atterberg limits
- Proctor (standard)
- Unconfined compression

5.2.4 Data Evaluation

The data package prepared by the laboratory will be reviewed by a NYSDEC-certified chemist. The data validator will review the results and data package to determine whether the data meet the data quality objective (DQOs), will prepare a Data Usability Summary Report (DUSR) per NYSDEC guidelines. The results of the review will be summarized in a report for submittal to the laboratory and to the project manager. The laboratory will then address any data deficiencies. If the deficiencies cannot be resolved the project manager will review the issues with NYSDEC and address whether resampling is required.

5.2.5 Assessment of Potential Impacts to Human Health and the Environment

The existing site conditions, present and anticipated site use, and compilation of all new and existing data will be reviewed to assess the potential impacts of site conditions on human health and the environment. As discussed in Section 3.1 above, the specific receptors to be addressed, at a minimum, include onsite construction workers, utility workers, neighbors and visitors, and ecological receptors at the Barge Canal. The assessment will examine the sources and pathways for environmental impact.

5.2.6 Site Investigation Report

Following completion of the first four SI tasks, the data will be compiled and evaluated against the Data Quality Objectives. The investigation and results will then be detailed and presented in a draft comprehensive Site Investigation Report. The report will follow the guidelines and format suggested in the NYSDEC Municipal Assistance Brownfield Program Procedures Handbook. Table 5-2 presents the general format of the report.

5.3 Remedial Alternatives Report (RAR)

This section presents the three tasks for completing the RAR. Based on the results of the site characterization, SI Tasks, several integrated remedial strategies will be developed for the Roadway Right-of-Way Property. According to the DEC requirements, the integrated RAR will include both onsite and offsite remedial alternatives. In addition, a no action alternative will be considered for a baseline comparison. The three categories of remedial alternatives to be considered are institutional controls, as well as ex situ and in situ response actions.

To develop the integrated remedial strategies, individual technologies will be selected to address specific site substances of concern. Technologies will be chosen considering alternatives for treatment, disposal, minimization, recycling, or destruction of the site substances. Technologies will be selected based on the results of the site characterization and the projected future use of the Roadway Right-of-Way.

Individual technologies will then be combined to develop several sets of integrated site remedial alternatives that are protective of both human health and the environment.

5.3.1 Remedial Alternative Development/Screening

This task can begin shortly after completion of the site investigation. SI data will be used to develop and screen alternatives.

Potential remedial action alternatives that may be used to clean up the site will be developed by:

- identifying potential general response actions;
- evaluating general response actions for effectiveness, reliability, implementability and cost; and
- assembling suitable general response actions into alternative remedial actions.

The general response actions include institutional controls, ex situ and in situ remediation of affected soil and groundwater. The specific general response actions must be initially defined during the development of the alternatives. Preliminary estimates of the areas and/or volume of each impacted medium will be made to which the general response actions might be applied.

5.3.2 Detailed Analysis of Remedial Alternatives

Following initial screening of the remedial alternatives, a detailed evaluation of alternatives will be conducted on the selected alternatives. The evaluation will follow 6 NYCRR 375-1.10, Remedy Selection requirements. For the detailed evaluation, each remedial alternative will be refined and then reevaluated based on a more detailed set of specifications that are protective of human health and the environment and also take into consideration the future use of the property. The following evaluation criteria will be used to address the technical and policy considerations that are important for selecting among the remedial alternatives:

- Overall protection of human health and the environment
    - exposure to human health and the environment after the remediation
    - magnitude of residual public health risks after the remediation
    - magnitude of residual environmental risks after the remediation

- Compliance with Remedial Goals

- Short-term effectiveness
  - protection of community during remedial actions
  - environmental impacts

- Long-term effectiveness and permanence
  - lifetime of remedial actions
  - magnitude of residual risks
  - adequacy and reliability of controls

- Reduction of toxicity, mobility and volume
  - volume of hazardous waste reduced.
  - reduction in mobility of hazardous waste.
  - irreversibility of the destruction or treatment.

- Feasibility
  - suitability to site conditions.
  - consideration of implementability.
  - availability of services and materials.
  - consideration of cost-effectiveness.

- Community acceptance

The remedial alternatives will be analyzed against the first six criteria and then compared against one another to determine the most cost effective, protective remedy. The seventh criteria will be evaluated by the department once the public comment period has concluded.

Based on this detailed analysis, a preferred alternative will be recommended for implementation at the Roadway Right-of-Way Property.

5.3.3 Remedial Alternatives Report (RAR)

The information and rationale used to formulate and evaluate site remedial alternatives as part of the RAR will be summarized and presented in a report. The report will include a tabular summary of the initial screening of each remedial alternative, an assessment of the effectiveness, cost, acceptability of each alternative, and the results of the detailed evaluation of the remedial alternatives remaining following the initial screening. The detailed evaluation will include a more thorough description of each remaining alternative as well as the rationale for the selection of the preferred alternative. The detailed evaluation will address each criterion specified by the DEC. A summary of the Remedial Goals and whether they will be attained by specific alternatives will be presented in the RAR. Table 5-3 presents the general format of the report.

This RAR will be prepared for DEC review. The DEC will prepare a Proposed Remedial Action Plan (PRAP) which summarizes the proposed remedy for the property based on the findings in the SI/RA Report.

5.4 Project Management

The project management task includes the identifying the resources necessary to initiate the project, maintain project quality control and assurance, and to maintain the SI/RAR schedule. The project is divided into ten tasks. Detailed subtasks will be developed once the work plan has been approved. The project task structure follows the New York Municipal Assistance Brownfield Program Procedures Handbook. Project deliverables will include the Field Sampling Plan (FSP), Quality Assurance/Quality Control (QA/QC), Health and Safety Plan (HASP), and Citizen Participation (CP) Plan and an SI/RAR for both OU-North and OU-South.

5.5 Project Budget

A budget for these tasks has been prepared and presented as Table 5-4. This budget is based on the scopes of work as described in this work plan. The total amount is $196,342.

6.0 WORK PLAN SUPPLEMENTS

In a letter of April 28, 1997, the NYSDEC defined the application content of this work plan to the investigation scope of work In that letter, NYSDEC identified certain additional documents to be provided following the submission of this work plan to supplement and complete it. These documents are scheduled to be submitted on May 9.

6.1 Field Sampling Plan (FSP)

This is a detailed plan specifying the field work to be performed in completing this SI/RAR. It includes locations of sample points, methods of collection and other field procedures necessary to collect the data generally described in this work plan.

6.2 Health and Safety Plan (HASP)

This is a detailed plan specifying the procedures that will be followed to assure that the field work is performed in a safe manner.

6.3 QA/QC Plan

This is a detailed plan specifying how data collected during the project will be determined to be useable with respect to QA/QC and DQO requirements defined in the FSP and this work plan.

6.4 Citizen Participation Plan (CPP)

This is a plan describing how the project will provide outreach to the community regarding the project and identify appropriate Citizen participation activities. This plan will be in accordance with guidance provided by NYSDEC.

6.5 Detailed Project Budget

The general budget provided separately will be broken down in terms of the task specific activities including field work, analytical, equipment, and similar costs. The budget will follow the detailed task structure identified in this work plan and the FSP.

7.0 REFERENCES AND BACKGROUND DOCUMENTS

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TABLES

TABLE 3-1
CHEMICALS-OF-CONCERN

- VOCs
  - Benzene
  - Toluene
  - Ethylbenzene
  - Xylenes
  - Tetrachloroethane
  - Trichloroethene
  - Trans-1,2-Dichloroethylene
- PAHs
  - Naphthalene
  - Acenaphthene
  - Acenaphthylene
  - Fluorene
  - Phenanthrene
  - Anthracene
  - Fluoranthene
  - Pyrene
  - Benz(a)anthracene
  - Chrysene
  - Benzo(b)fluoranthene
  - Benzo(k)fluorantheneBenzo(a)pyrene
  - Indeno(1,2,3-cd)pyrene
  - Dibenz(a,h)anthracene
  - Benzo(g,h,i)perylene
- PCBs
  - Aroclor 1016
  - Aroclor 1221
  - Aroclor 1232
  - Aroclor 1242
  - Aroclor 1248
  - Aroclor 1254
  - Aroclor 1260
- Metals
  - Antimony
  - Arsenic
  - Beryllium
  - Chromium (III)
  - Chromium (VI)
  - Copper
  - Lead
  - Nickel
  - Zinc
- Asbestos

TABLE 5-1
PROJECT GENERAL SCHEDULE

DATE	EVENT
05/01/97	Submission of Work Plan
05/09/97	Submission of Work Plan Supplemental Documents
05/23/97	NYSDEC Approval of Work Plan Supplemental Documents
05/27/97	Initiation of Field Work on Both OU-North and OU-South
06/05/97	Completion of Field Work on OU-North
06/27/97	Completion of Field Work on OU-South
07/01/97	Submission of SI/RAR on OU-North
08/01/97	NYSDEC Issuance of PRAP for OU-North, Initiation of 45-day Public Comment Period
08/15/97	Submission of SI/RAR for OU-South
09/15/97	End of Public Comment Period on OU-North
09/18/97	NYSDEC Issuance of PRAP for OU-South, Initiation of 45-day Public Comment Period
10/15/97	NYSDEC Issuance of Record of Decision (ROD) for OU-North, Initiation of Utility System and Roadway Construction
11/03/97	End of Public Comment Period on OU-South
02/03/98	NYSDEC Issuance of Record of Decision (ROD) for OU-South

TABLE 5-2
GENERAL SI REPORT FORMAT

Executive Summary

1. Introduction
   1.1 Purpose of Report
   1.2 Site Background
   1.3 Report Organization

2. Study Area Investigation
   2.1 Includes Field Activities Associated with Site Characterization
   2.2 Technical Correspondence Documenting Field Activities

3. Physical Characteristics of the Study Area
   3.1 Results of Field Activities

4.0 Nature and Extent of Contamination
   4.1 Results of Site Characterization

5.0 Contaminant Fate and Transport
   5.1 Potential Routes of Migration
   5.2 Contaminant Persistence
   5.3 Contaminant Migration

6.0 Baseline Risk Assessment
   6.1 Public Health Evaluation
   6.2 Environmental Assessment

7.0 Summary and Conclusions
   7.1 Summary
   7.2 Conclusions

Appendices
A Technical Correspondence on Field Activities
B Analytical Data and QA/QC Evaluation Results
C Risk Assessment Methods

TABLE 5-3
GENERAL RA REPORT FORMAT

Executive Summary

4. Introduction
   1.1 Purpose and Organization of Report
   1.2 Background Information (Summarized from SI Report)

5. Identification and Development of Alternatives
   2.1 Introduction
   2.2 Remedial Action Objectives
   2.3 General Response Actions
   2.4 Development of Alternatives

6. Detailed Analysis of Alternatives
   3.1 Introduction
   3.2 Individual Analysis of Alternatives
   3.3 Comparative Analysis

Bibliography
Appendices

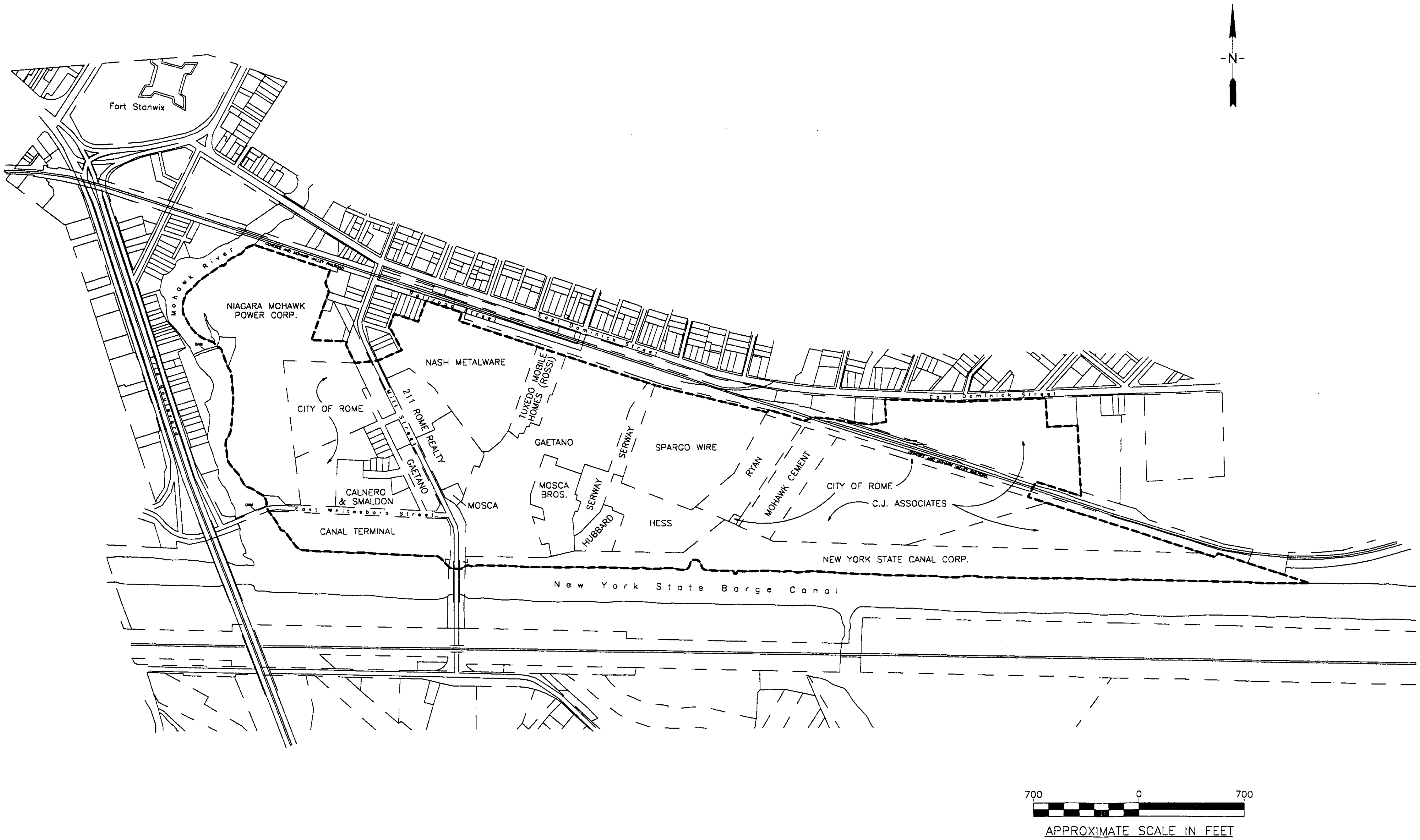
TABLE 5-4
PROJECT BUDGET

Activity	Budget
Work Plan Finalization	$ 7,400
HASP & QA/QC, FSP, CP Plans	6,500
Field Investigations	
4.1.1 TCE in Groundwater (8 Geoprobes, 6 wells, 24 soil gas)	
Personnel and Expenses	8,678
Drillers and Subcontractors	18,969
Analytical	11,390
4.1.2 Utility System Investigation (10 test pits)	
Personnel and Expenses	1,552
Drillers and Subcontractors	1,792
Analytical	N/A
4.1.3 Fill Investigation (8 soil borings and analysis; includes 2 borings In antimony area)	
Personnel and Expenses	1,552
Drillers and Subcontractors	2,985
Analytical	7,006
4.1.4 Antimony Investigation (2 wells)	
Personnel and Expenses	776
Drillers and Subcontractors	1,925
Analytical	486
4.1.5 Subsurface Structure Controls (Asbestos) (Inspection and Sampling)	
Personnel and Expenses	2,320
Analytical	715
4.1.6 Sewer Investigation (Inspection and Sampling)	
Personnel and Expenses	2,704
Analytical	10,861

TABLE 5-4 (Cont'd)
PROJECT BUDGET

4.1.7 Southern Parcel Investigation (2 borings, 1 well, 7 soil gas)	
Personnel and Expenses	2,328
Drillers and Subcontractors	2,960
Analytical	1,270
4.1.X Miscellaneous (site survey, existing well sampling and analysis, water level measurements, drum sampling, TCLP tests (4), waste tests (2), surface soil sample test (2))	
Personnel and Expenses	8,860
Drillers and Subcontractors	4,400
Analytical	22,513
Data Validation	6,300
SI Reports (OU-North and OU-South)	20,000
RAR Reports (OU-North and OU-South)	15,000
Project Detailed Budget Preparation	1,100
Project Management	21,000
Citizen Participation Meetings	3,000
TOTAL	**$196,342**

FIGURES



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		1	EAP	4/30/97	INITIAL ISSUE				

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FIGURE 1-1
SITE LOCATION MAP

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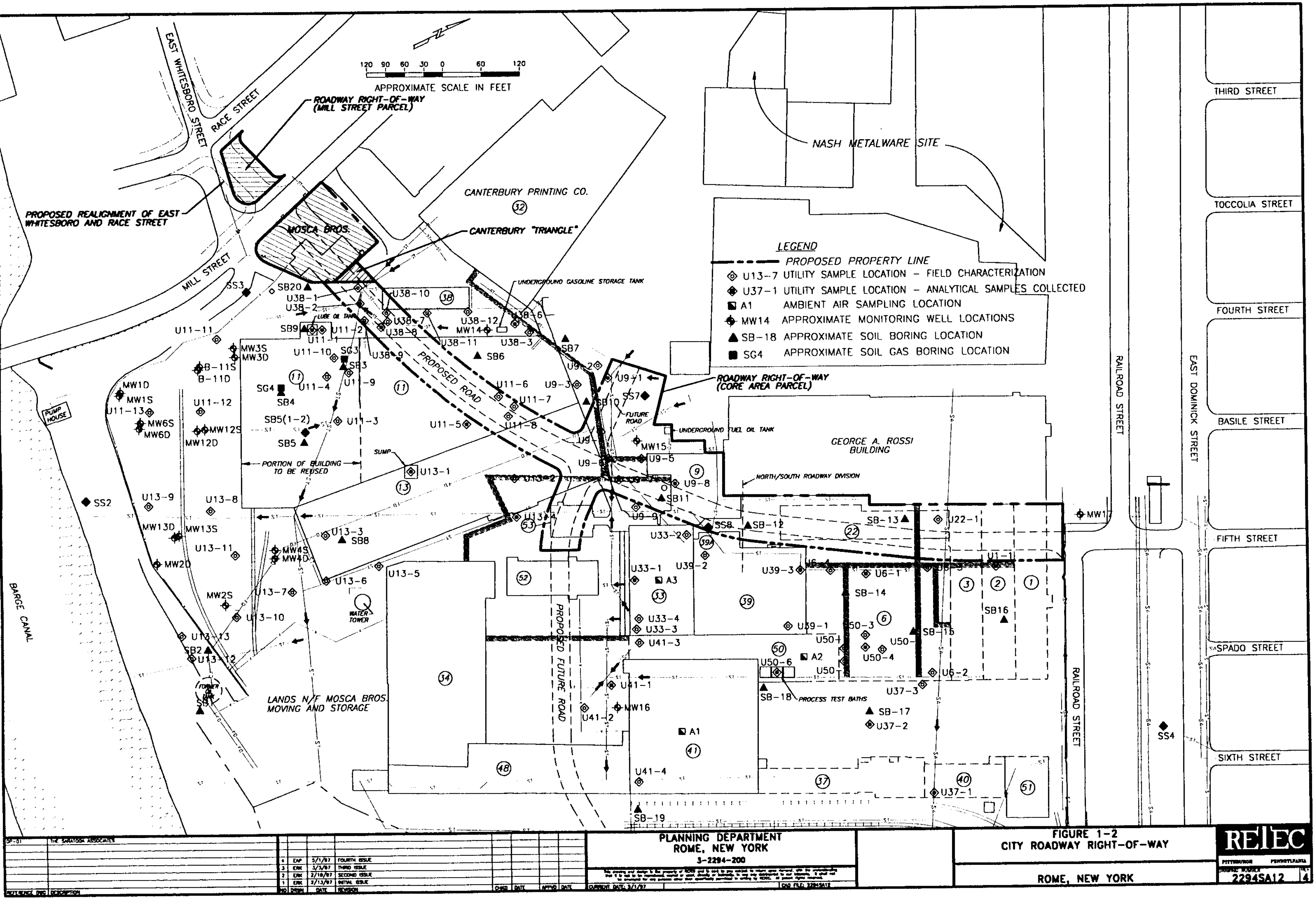
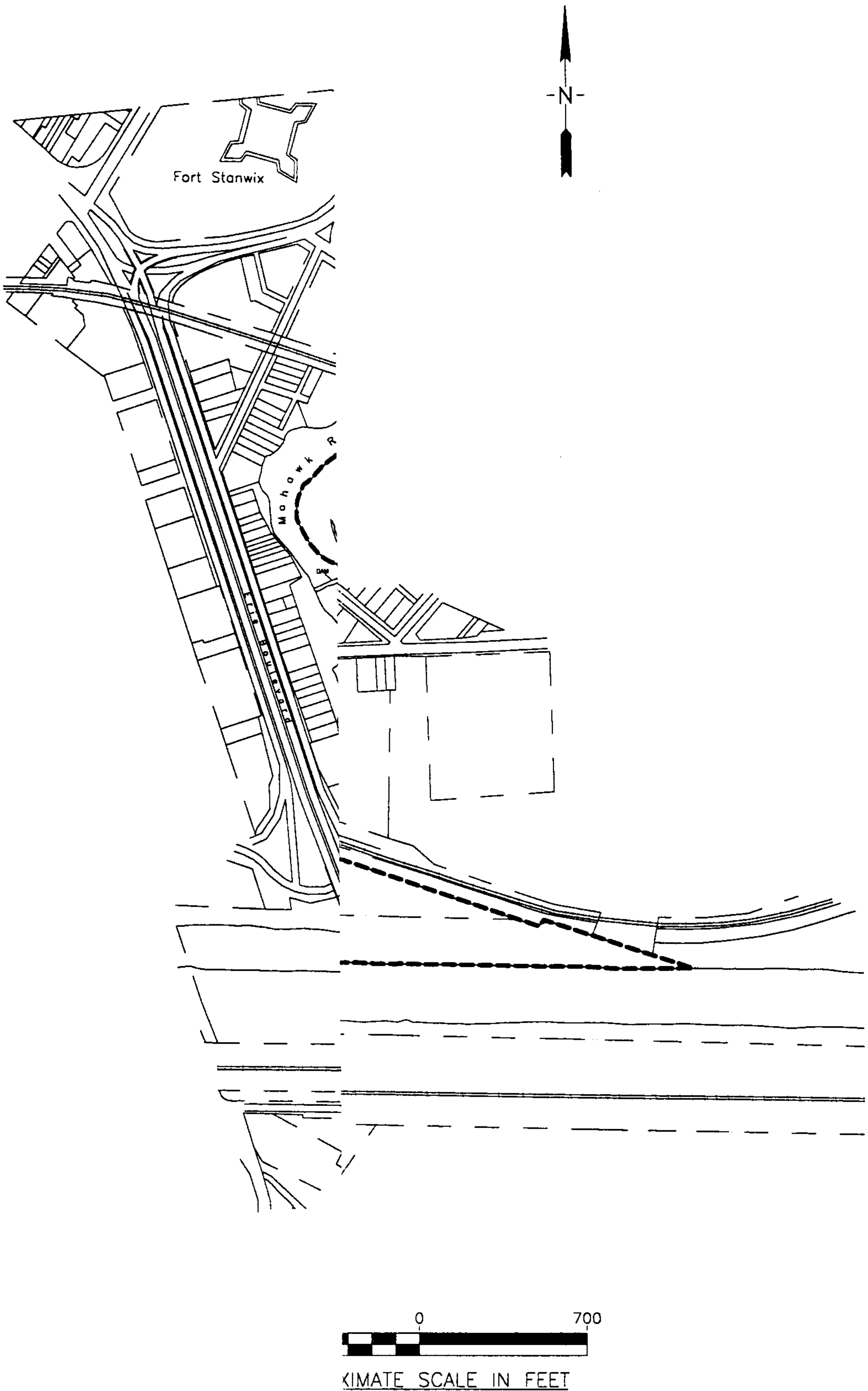


LEGEND
PROPOSED PROPERTY LINE
U13-7 UTILITY SAMPLE LOCATION - FIELD CHARACTERIZATION
U37-1 UTILITY SAMPLE LOCATION - ANALYTICAL SAMPLES COLLECTED
A1 AMBIENT AIR SAMPLING LOCATION
MW14 APPROXIMATE MONITORING WELL LOCATIONS
SB-18 APPROXIMATE SOIL BORING LOCATION
SG4 APPROXIMATE SOIL GAS BORING LOCATION
APPROXIMATE SCALE IN FEET
120 90 60 30 0 60 120
THIRD STREET
TOCCOLIA STREET
FOURTH STREET
BASILE STREET
FIFTH STREET
SPADO STREET
SIXTH STREET
EAST DOMINICK STREET
RAILROAD STREET
EAST WHITESBORO STREET
RACE STREET
MILL STREET
BARGE CANAL
NASH METALWARE SITE
CANTERBURY PRINTING CO.
CANTERBURY "TRIANGLE"
MOSCA BROS.
ROADWAY RIGHT-OF-WAY (MILL STREET PARCEL)
ROADWAY RIGHT-OF-WAY (CORE AREA PARCEL)
PROPOSED REALIGNMENT OF EAST WHITESBORO AND RACE STREET
GEORGE A. ROSSI BUILDING
NORTH/SOUTH ROADWAY DIVISION
UNDERGROUND FUEL OIL TANK
UNDERGROUND GASOLINE STORAGE TANK
LUBE OIL TANK
PROPOSED ROAD
PROPOSED FUTURE ROAD
FUTURE ROAD
PORTION OF BUILDING TO BE REUSED
SUMP
WATER TOWER
PUMP HOUSE
PROCESS TEST BATHS
LANDS N/F MOSCA BROS. MOVING AND STORAGE
PLANNING DEPARTMENT
ROME, NEW YORK
3-2294-200
FIGURE 1-2
CITY ROADWAY RIGHT-OF-WAY
ROME, NEW YORK
RETEC
2294SA12
4



REFERENCE DWG | DESCRIPTION

FIGURE 2-1
SITE PLAN SHOWING
EAST ROME BUSINESS PARK

ROME, NEW YORK

RETEC
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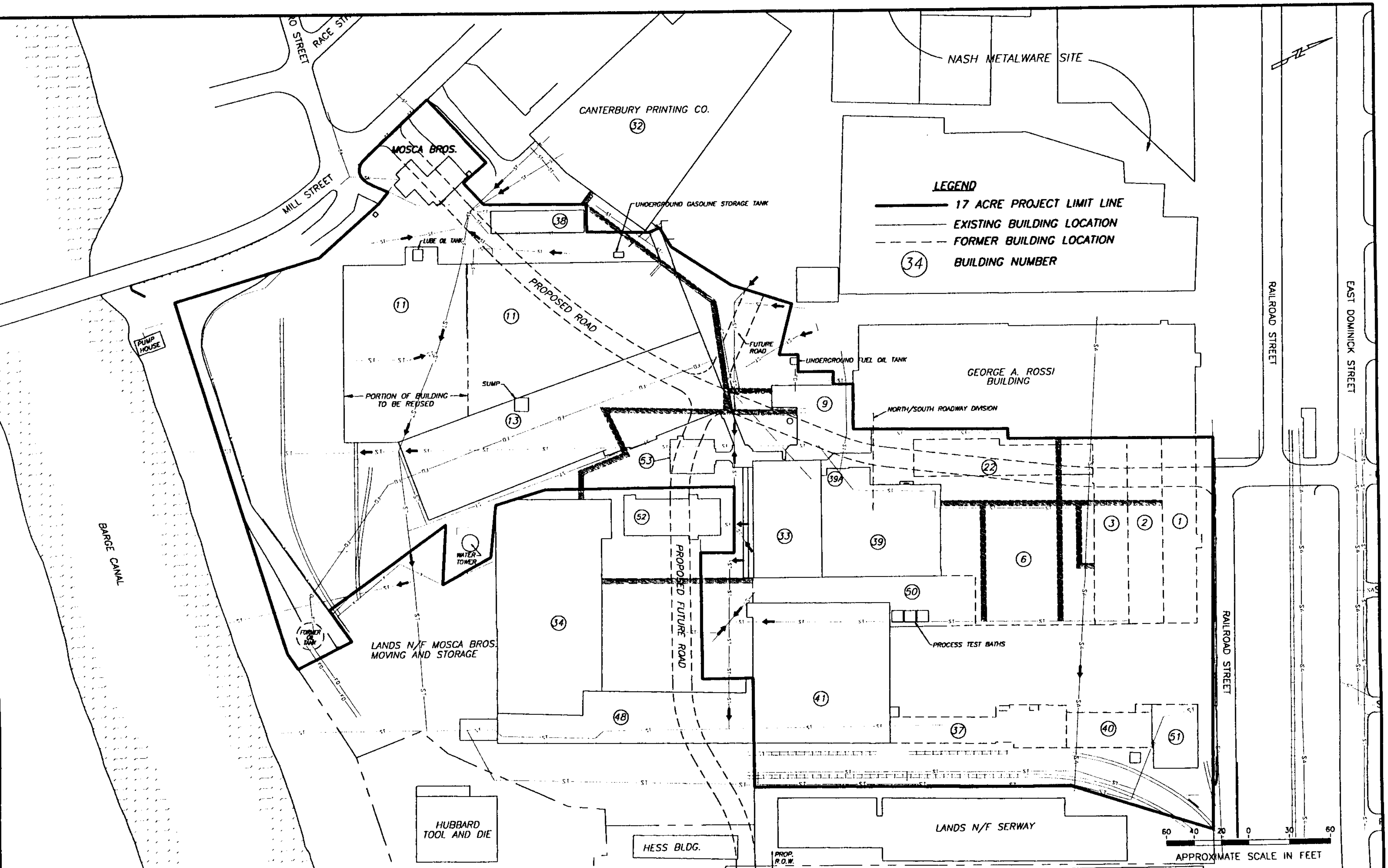
REV 1



PLANNING DEPARTMENT ROME, NEW YORK 3-2294-200	FIGURE 2-2 CURRENT SITE LAYOUT ROME, NEW YORK	RETEC PITTSBURGH PENNSYLVANIA 2294SA17 REV 3

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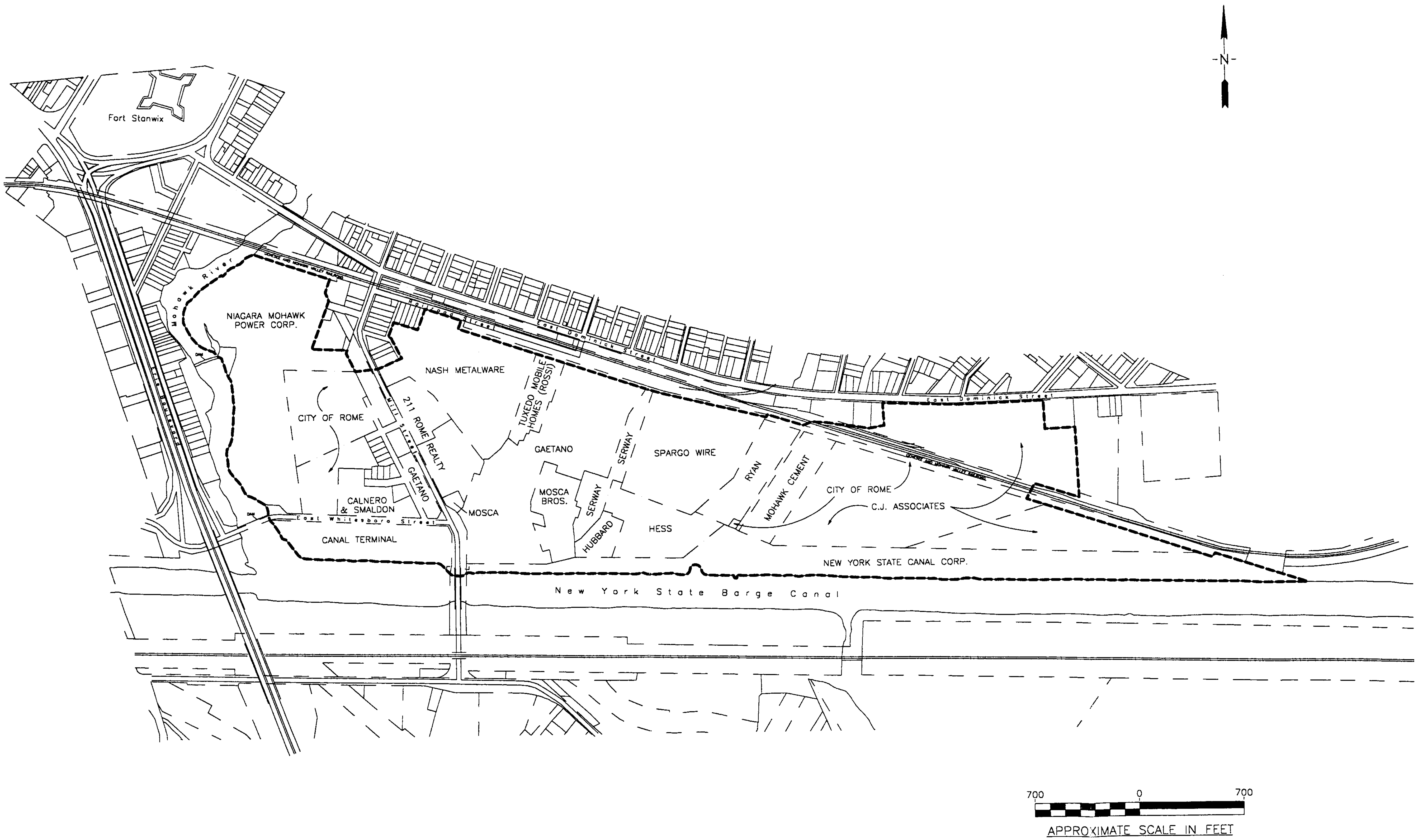

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FIGURE 2-1
SITE PLAN SHOWING
EAST ROME BUSINESS PARK

ROME, NEW YORK

RETEC
PITTSBURGH PENNSYLVANIA
DRAWING NUMBER 2294SA28 REV 1

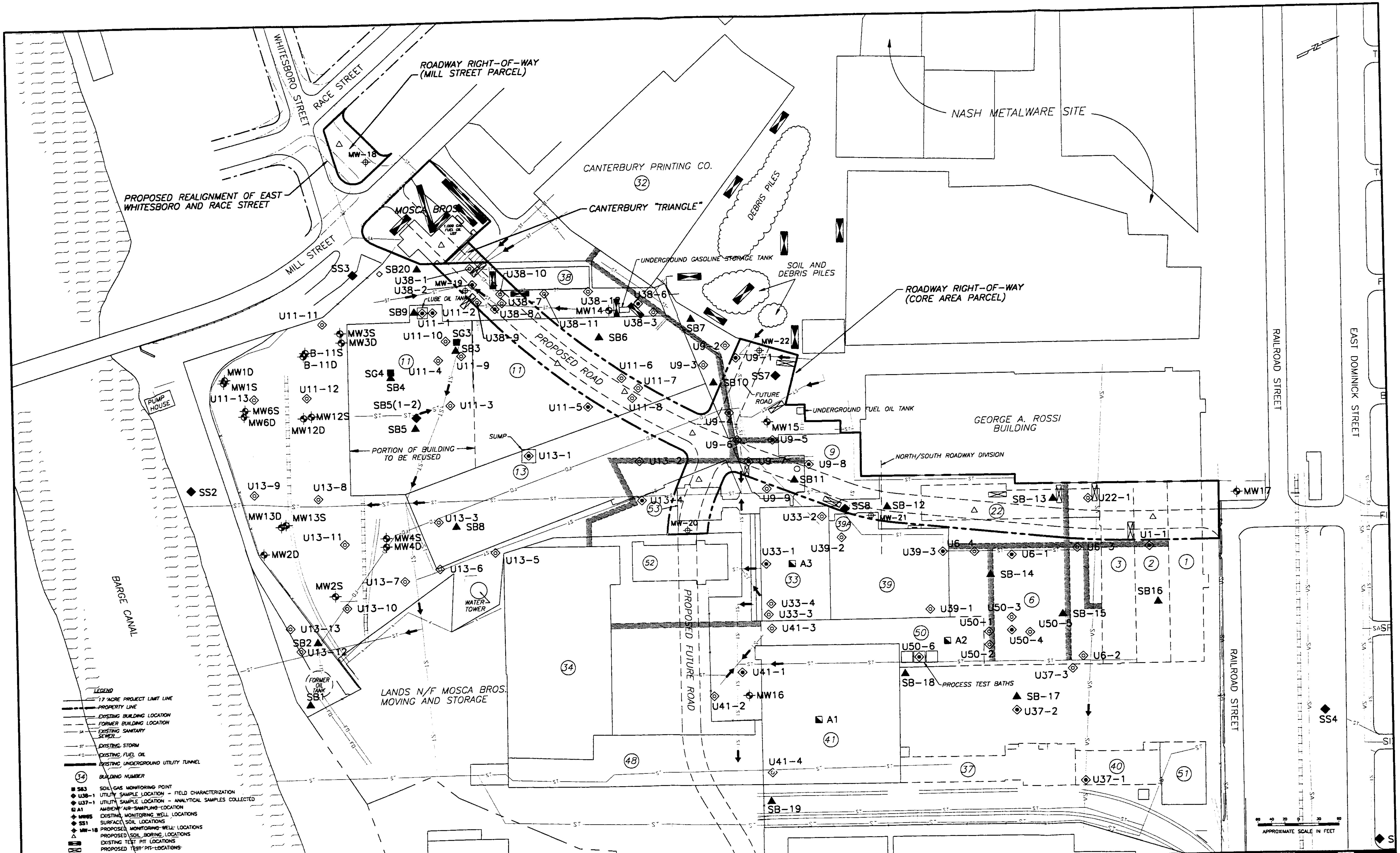

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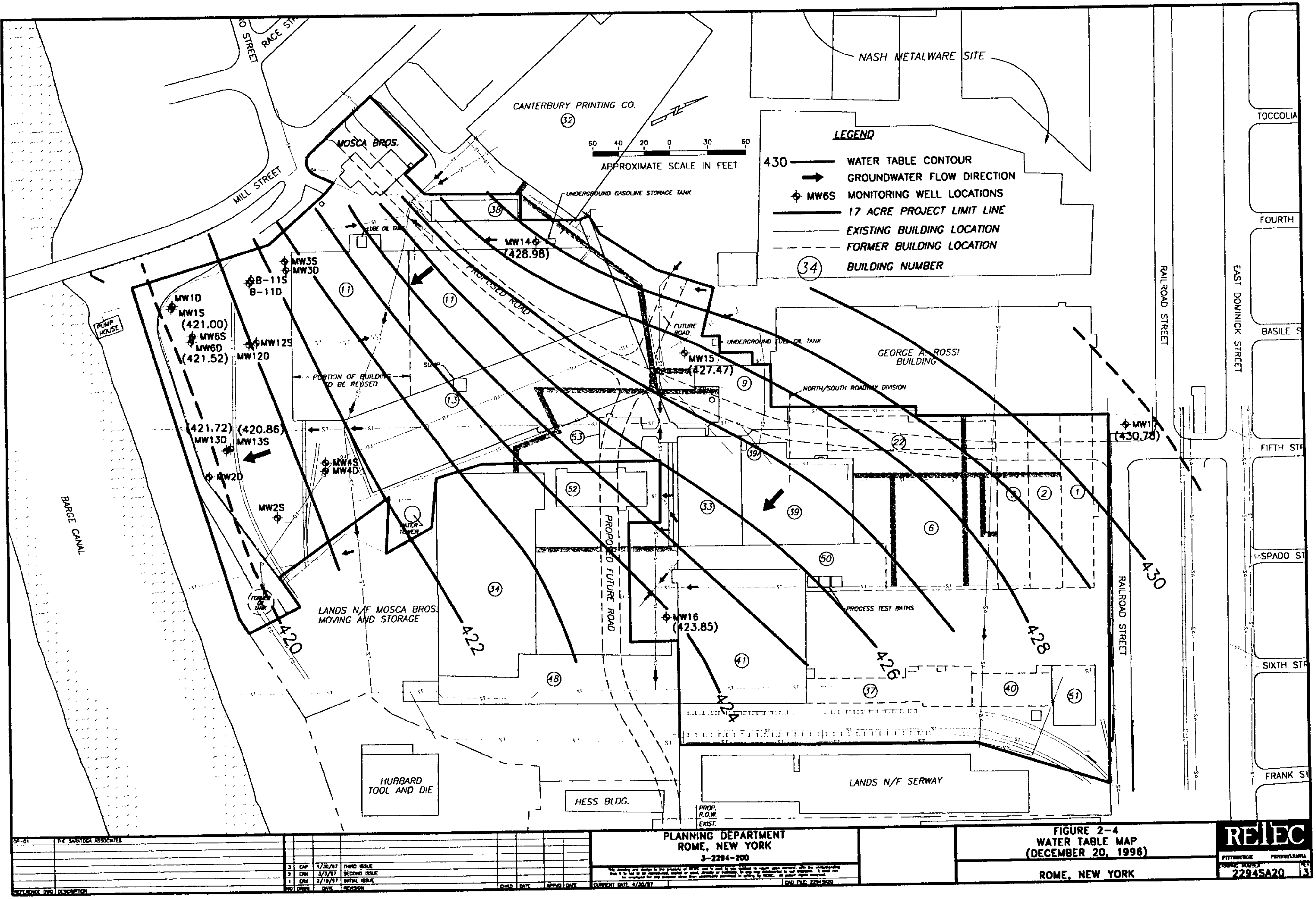
FIGURE 2-3
SITE PLAN ROADWAY RIGHT-OF-WAY
EAST ROME BUSINESS PARK
ROME, NEW YORK

RETEC — PITTSBURGH, PENNSYLVANIA
DRAWING NUMBER 2294SA27 REV 1


LEGEND
430 WATER TABLE CONTOUR
GROUNDWATER FLOW DIRECTION
MW6S MONITORING WELL LOCATIONS
17 ACRE PROJECT LIMIT LINE
EXISTING BUILDING LOCATION
FORMER BUILDING LOCATION
34 BUILDING NUMBER
60 40 20 0 30 60
APPROXIMATE SCALE IN FEET
NASH METALWARE SITE
CANTERBURY PRINTING CO.
MOSCA BROS.
MILL STREET
RACE ST
BARGE CANAL
PUMP HOUSE
UNDERGROUND GASOLINE STORAGE TANK
LUBE OIL TANK
PROPOSED ROAD
FUTURE ROAD
UNDERGROUND OIL TANK
GEORGE A. ROSSI BUILDING
NORTH/SOUTH ROADWAY DIVISION
PORTION OF BUILDING TO BE REUSED
SUMP
WATER TOWER
PROPOSED FUTURE ROAD
PROCESS TEST BATHS
LANDS N/F MOSCA BROS. MOVING AND STORAGE
HUBBARD TOOL AND DIE
HESS BLDG.
LANDS N/F SERWAY
PROP. R.O.W.
EXIST.
RAILROAD STREET
EAST DOMINICK STREET
TOCCOLIA
FOURTH
BASILE ST
FIFTH ST
SPADO ST
SIXTH ST
FRANK ST
MW1D
MW1S
(421.00)
MW6S
MW6D
(421.52)
B-11S
B-11D
MW3S
MW3D
MW12S
MW12D
(421.72)
(420.86)
MW13D
MW13S
MW2D
MW4S
MW4D
MW2S
MW14
(428.98)
MW15
(427.47)
MW16
(423.85)
MW17
(430.78)
420
422
424
426
428
430
PLANNING DEPARTMENT
ROME, NEW YORK
3-2294-200
FIGURE 2-4
WATER TABLE MAP
(DECEMBER 20, 1996)
ROME, NEW YORK
REIEC
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3 EAP 4/30/97 THIRD ISSUE
2 ERK 3/3/97 SECOND ISSUE
1 ERK 2/19/97 INITIAL ISSUE
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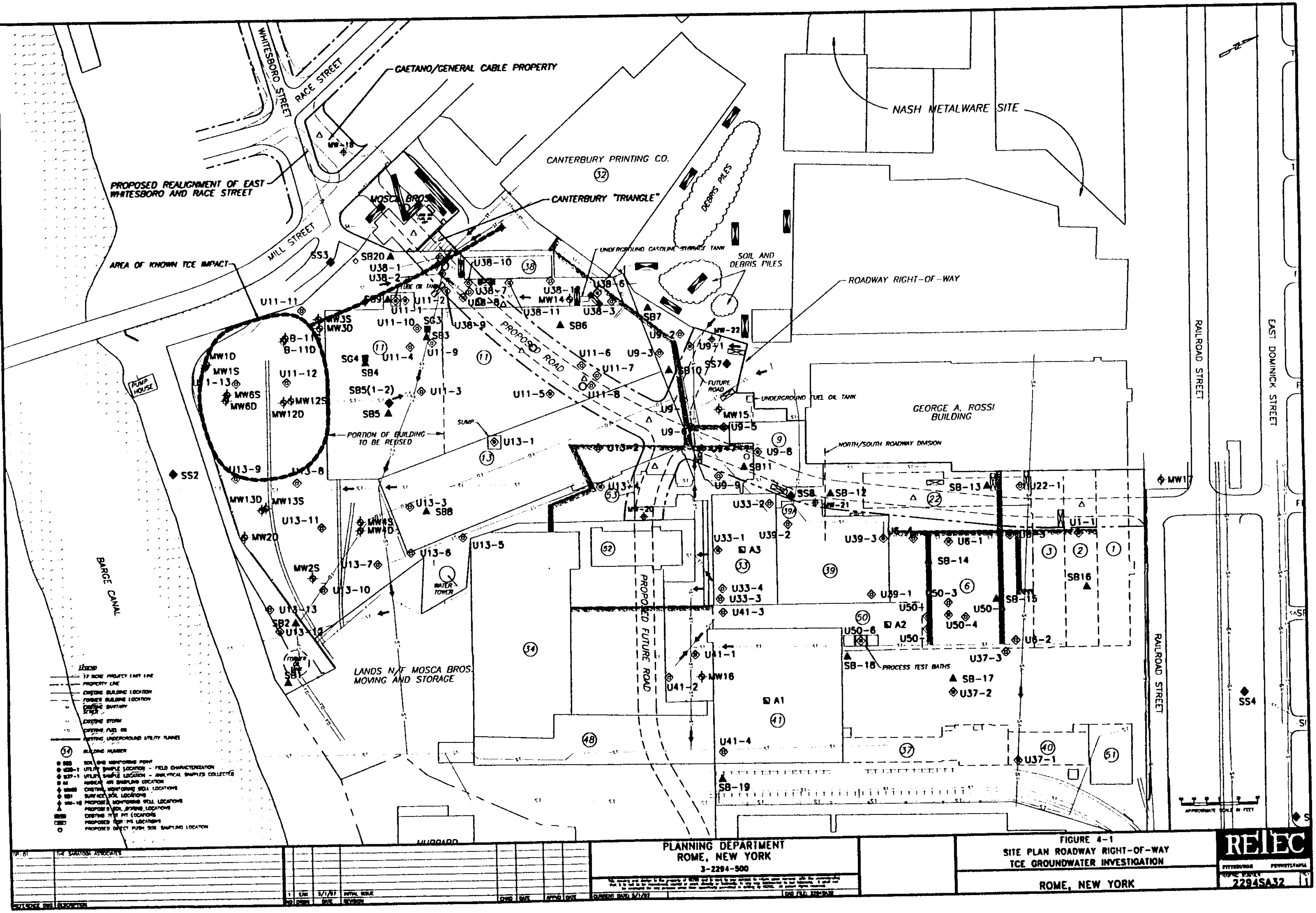

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FIGURE 4-1
SITE PLAN ROADWAY RIGHT-OF-WAY
TCE GROUNDWATER INVESTIGATION

ROME, NEW YORK

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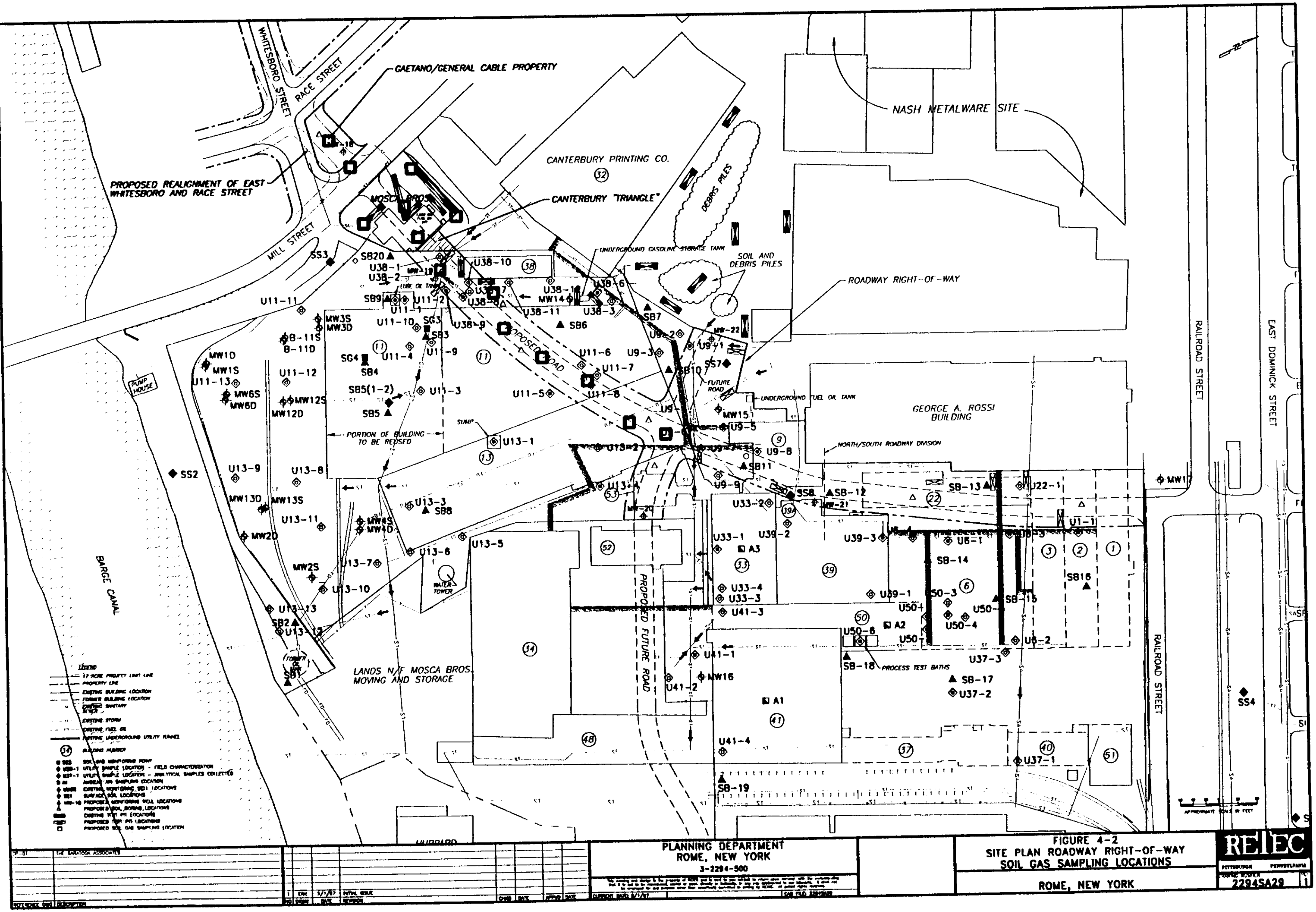

EAST DOMINICK STREET
RAILROAD STREET
NASH METALWARE SITE
GAETANO/GENERAL CABLE PROPERTY
CANTERBURY PRINTING CO.
CANTERBURY "TRIANGLE"
PROPOSED REALIGNMENT OF EAST WHITESBORO AND RACE STREET
WHITESBORO STREET
RACE STREET
MILL STREET
DEBRIS PILES
SOIL AND DEBRIS PILES
UNDERGROUND GASOLINE STORAGE TANK
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GEORGE A. ROSSI BUILDING
UNDERGROUND FUEL OIL TANK
NORTH/SOUTH ROADWAY DIVISION
PORTION OF BUILDING TO BE REUSED
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LANDS N/F MOSCA BROS. MOVING AND STORAGE
WATER TOWER
PUMP HOUSE
BARGE CANAL
PROCESS TEST BATHS
HUBBARD
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FIGURE 4-2
SITE PLAN ROADWAY RIGHT-OF-WAY
SOIL GAS SAMPLING LOCATIONS
ROME, NEW YORK
REIIEC
2294SA29

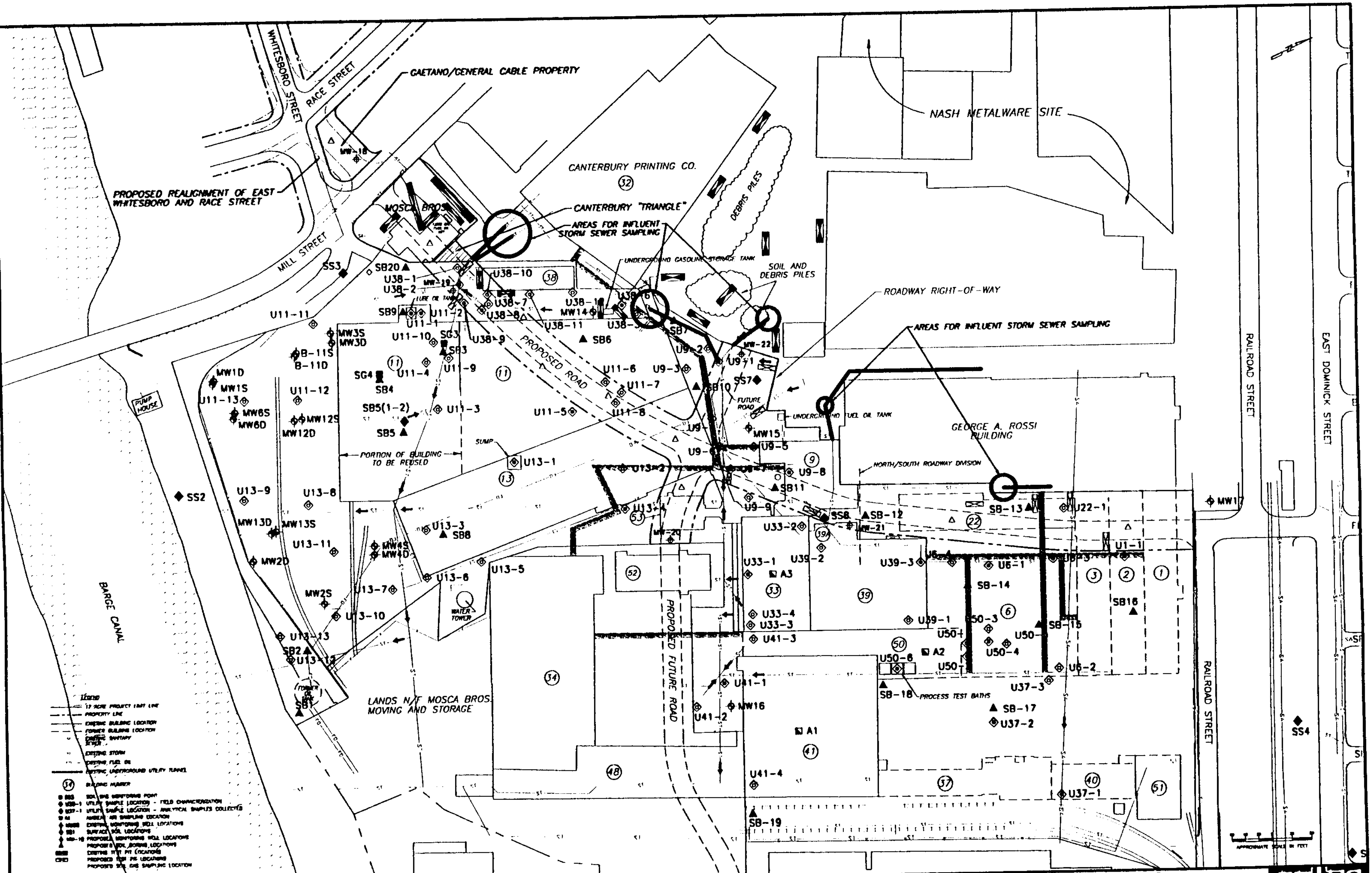

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FIGURE 4-3
SITE PLAN ROADWAY RIGHT-OF-WAY
TARGET AREAS FOR INFLUENT STORM SEWER SAMPLING

ROME, NEW YORK

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2294SA30

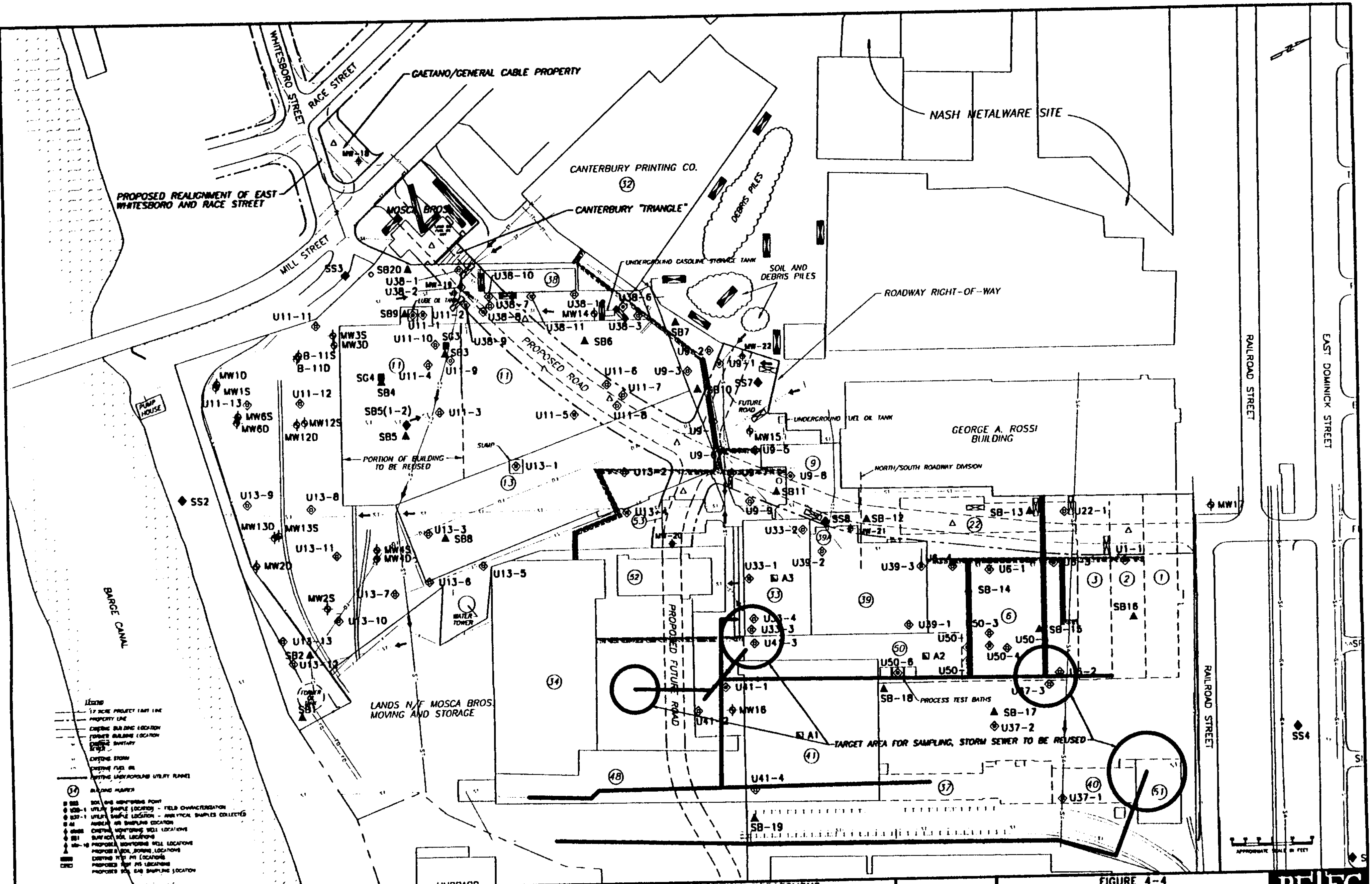

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FIGURE 4-4
SITE PLAN ROADWAY RIGHT-OF-WAY
STORM SEWER TO BE REUSED - TARGET AREA FOR SAMPLING

ROME, NEW YORK

RE|TEC
2294SA31

FIELD SAMPLING AND ANALYSIS PLAN
ROADWAY RIGHT-OF-WAY
ROME, NEW YORK

Prepared For:

DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT
City Hall
Rome, NY 13340

Prepared By:

REMEDIATION TECHNOLOGIES, INC.
1001 West Seneca Street, Suite 204
Ithaca, NY 14850

RETEC Project No.: 3-2294-510

Subcontractor To:

THE SARATOGA ASSOCIATES
443 Broadway
Saratoga Springs, NY 12866

MAY 1997

FIELD SAMPLING AND ANALYSIS PLAN
ROADWAY RIGHT-OF WAY
ROME, NEW YORK

Prepared For:

DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT
City Hall
Rome, NY 13340

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Subcontractor To:

THE SARATOGA ASSOCIATES
443 Broadway
Saratoga Springs, NY 12866

Prepared By: ______________________

Reviewed By: ______________________

MAY 1997

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LIST OF FIGURES

1.0 INTRODUCTION

1.1 Statement of Purpose

This document presents the Field Sampling and Analysis Plan (FSAP) for the investigation of the areas comprising the City of Rome's industrial access roadway right-of-way (site) in the East Rome Business Park in the City of Rome, Oneida County, New York. This FSAP has been prepared in conjunction with the Work Plan, Quality Assurance Project Plan, Citizen Participation Plan, and Health and Safety Plan that have been completed for the site investigation and assessment of remedial alternatives.

The roadway is located between East Dominick Street and the New York State (NYS) Barge Canal in east Rome. All of the property comprising the roadway right-of-way was at one time owned by the General Cable Corporation. The site, shown in Figure 1-1, is composed of several parcels. The largest parcel is a portion of the 17-acre General Cable site owned by Mr. Charles Gaetano listed by the City of Rome as tax map parcel 242.020-0001-018. Additional parcels which are to be investigated include the Mosca Garage property, a portion of the Canterbury Printing property, and a portion of former General Cable property at the northwest corner of Mill Street and East Whitesboro Street.

The purpose of this FSAP is to detail the activities being conducted during the site investigation (SI) phase of the City of Rome's Brownfield Restoration Project which is being conducted under the 1996 Clean Water/Clean Air Bond Act. The SI will evaluate the areas of possible impacts at the site, the extent of impact, and provide data to determine the possible need for remediation on various parcels within the site in the context of development for use as an access road for commercial development of the surrounding properties. Soil and groundwater data will also be generated for use in the preliminary evaluation of potential remedial technologies and for design of the roadway. The elements of the FSAP are:

- the identification of the specific areas that are to be investigated, the possible impacted media within each specified area, and the media to be investigated;
- the specific details of each media to be sampled in the areas specified, how the samples are to be collected, and the determination of the samples to be analyzed.

This FSAP was prepared in accordance with generally accepted professional practices, consistent with the New York State Department of Environmental Conservations's (NYSDEC) draft *Municipal Assistance Brownfield Program Procedures Handbook* and with the standard procedures of NYSDEC's Division of Hazardous Waste Remediation.

The FSAP is intended for the exclusive use of the City of Rome and for submission to the New York State Department of Environmental Conservation. This FSAP is not meant to represent a legal opinion. No other warranty, express or implied, is made.

1.2 FSAP Focus

The focus of this FSAP is to detail the methods to be used to collect the information needed to assess potential impacted areas of the site. This assessment will be used in the evaluation of the need for remedial action, if applicable. The site redevelopment activities are expected to involve the demolition or rehabilitation of existing buildings, and the construction of a new road. This activity could lead to the disturbance of soil at the site. The following groups of people could theoretically be exposed directly to soil or, indirectly, to vapors or dust emitted from the soil:

- construction workers;
- utility workers;
- nearby residents; and
- future commercial/occupants and visitors.

Soil, soil gas, and groundwater will be sampled to assess the impact of potential sources of contamination associated with former manufacturing operations both on and off the site, and to assess whether contaminants are migrating from the site. Samples will also be collected to determine the composition of potential asbestos containing materials (ACMs) so that asbestos management can be included in the evaluation of demolition and remediation plans.

Based on a review of past site activities and data collected in previous investigations, the following list of potential chemicals-of-interest has been developed:

- petroleum compounds (benzene, toluene, ethylbenzene and xylenes or BTEX and polycyclic aromatic hydrocarbons or PAHs);
- chlorinated solvents (TCE);
- polychlorinated biphenyls (PCBs);
- metals (arsenic, chromium, copper, lead, mercury, nickel, zinc);
- asbestos

1.3 Site Background

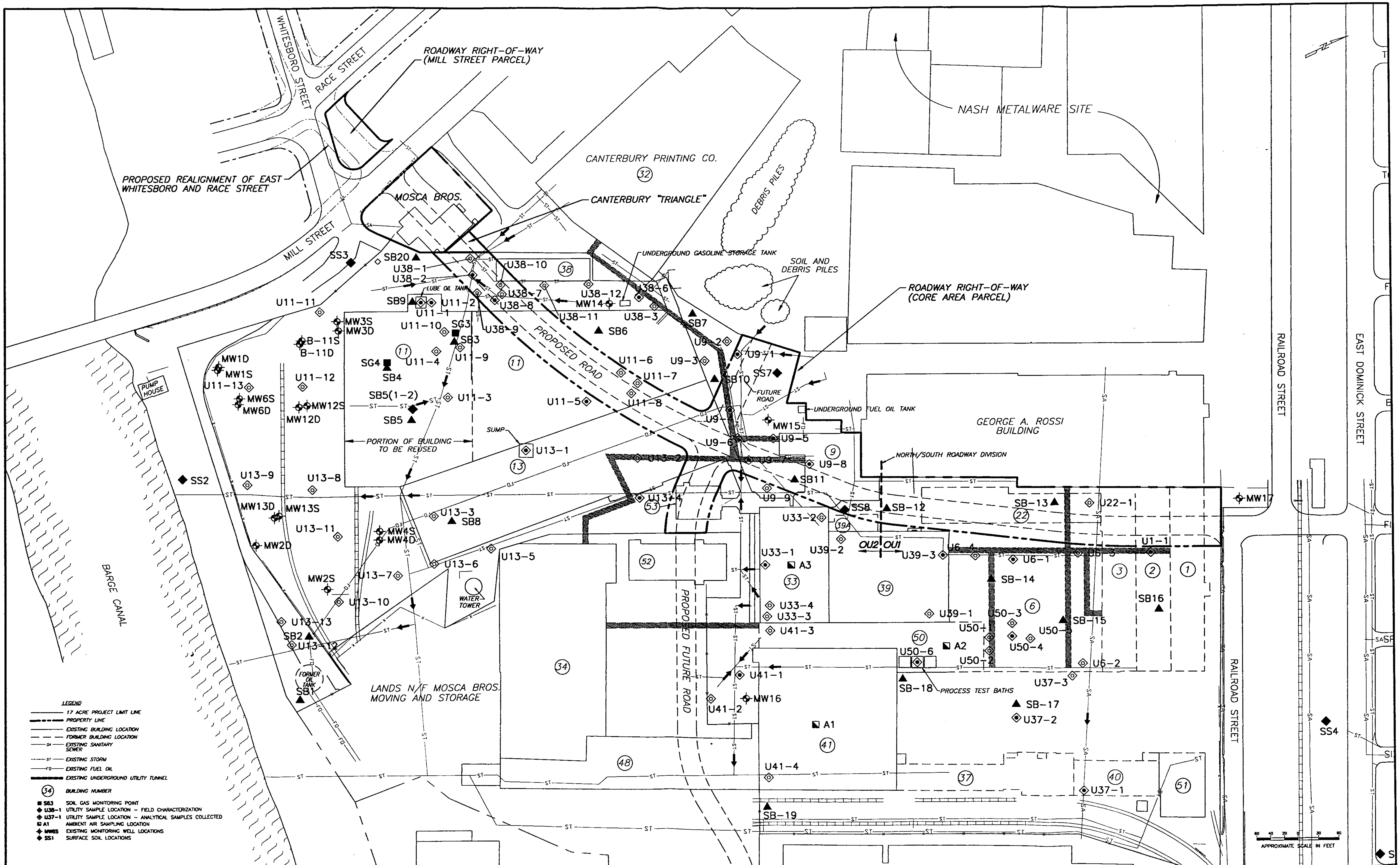
The study area for this investigation is a parcel of land which has been defined by the City of Rome as the Roadway Right-of-Way Property, a parcel of land in the western portion of the "Central Core" of a 200-acre industrial redevelopment area known as the East Rome Business park (Figure 2-1). The "Central Core" site is generally bounded by Railroad Street to the north, the New York State Barge Canal to the south and by industrial and commercial properties to the east and west.

In order to provide access to the new subdivision within the East Rome Business Park, the City of Rome has proposed to build an access road from the intersection of Railroad Street and Fifth Avenue at the north side of the site to the intersection of Mill Street and East Whitesboro Street at the south. The right-of-way for this road passes through the former locations of General Cable buildings 1, 2, 3, 22, 9 (the boiler house), 13, 11, 38, and the adjacent Mosca Moving Company garage. Future connecting roads to the east and west to access additional areas within the Business park are planned to intersect this road south of the boiler house. Redevelopment of this parcel will consist of installation of a full set of modern underground utilities, construction of the commercial access road, and construction and landscaping of a pedestrian sidewalk to connect the commercial/residential neighborhood along East Dominick Street with the City of Rome marina park at the former barge canal terminal.

The history of the "Central Core" site is described in the report titled "Phase I Environmental Site Assessment, City of Rome Industrial Redevelopment Area, Rome, New York" (RETEC, 1995). The site was first developed in the late 1800s when the Rome Tube Company began construction of a casting and pickling facility. In 1904, the Electric Wire Works (later the Rome Wire Company) began construction on the northwest portion of the site. The Rome Wire Company, and its successor, General Cable, operated the facility from 1920 to 1972. During that period, a wide range of metal working activities were conducted including machining, stamping and drawing, plating, pickling, and coating with rubber, asbestos, and paints (RETEC, 1995). General Cable ceased operations at the site in 1972 and, with minor exceptions, the site has been unused since then. At present, the site contains abandoned buildings and open areas, most of which are covered with concrete pavement. Demolition to grade of several of the former General Cable buildings at the northern end of the site has been completed by Mr. Gaetano.

A number of investigations have been previously performed at the site and in the "Central Core" of the East Rome Business Park. A series of investigations performed by Empire Soils Investigations, Inc. in the southern area of the 17-acre site (Empire, 1990; Empire, 1991; Empire, 1993). The subsurface investigations found that chlorinated volatile organic compounds were present in the groundwater at concentrations exceeding New York groundwater standards. In addition, one soil sample from a site of eight samples obtained from borings at the site exceeded the TCLP limit for lead (100 mg/L as compared to the limit of 5 mg/L).

A limited Phase II investigation was performed by RETEC in support of the proposed expansion of the Canterbury Printing site onto a small portion of the 17-acre Gaetano site. The



PLANNING DEPARTMENT
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3-2294-500

FIGURE 1-1
SITE PLAN ROADWAY RIGHT-OF-WAY
EAST ROME BUSINESS PARK
ROME, NEW YORK

RETEC PITTSBURGH PENNSYLVANIA
DRAWING NUMBER 2294SA42 REV 1

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CURRENT DATE: 5/13/97 CAD FILE: 2294SA42

investigation was comprised of a series of test pits where surface soil, subsurface soil and groundwater samples were collected and analyzed. Samples were also obtained of sediment located in a tunnel which houses utilities in that area, connecting Building 38 and the Canterbury building to the former General Cable boiler house (Building 9). The results of the investigation were presented in a report to the Saratoga Associates (RETEC, 1996a). The findings were that concentrations of metals in soil in the study area were within typical background concentrations with the exception of copper. No organic compounds were found in groundwater samples taken from the excavations for the test pits. A 2,000 gallon gasoline UST was located between Building 38 and Building 11, which was found to have released an unknown quantity of petroleum product to the surrounding soils.

In 1996, RETEC conducted a site-wide investigation of the central core site in order to provide the environmental data needed to advance redevelopment plans (RETEC, 1996b). The field work was performed in December 1996, and consisted of three surface soil samples; 22 soil borings; collection of 20 groundwater samples from temporary well points in the soil borings; soil gas sampling; shallow monitor well installation (four wells) and sampling; ambient air sampling from selected buildings; and a survey and sampling of subsurface structures and utilities. The major findings of the 1996 RETEC investigation are summarized below:

- The northern area of the proposed right-of-way, from Railroad Street to the boiler house, is characterized by elevated metals in both the soil and in the utility tunnel system. Low levels of PAHs were found in the soil in borings SB-12 (each compound at less than 2 ppb), and in the groundwater at boring SB-13 (each compound less than 16 ppb). No other organic compounds were found in this area.

- The soil and groundwater near the boiler house were found to be impacted by antimony. The direction of groundwater flow, from the northwest at this location, points to an off-site source for this groundwater impact.

- Free petroleum, identified as the "heavy end" of number 2 fuel oil or as number 6 fuel oil was found in one of the tunnels joining the south side of the boiler house. Spots of oil were also observed floating on the surface of the water filling the substructure of the boiler house. The underground storage tank located adjacent to the boiler house should also be removed. Due to the association of impacted water with asbestos containing materials in the boiler house, it is likely that remediation for petroleum and for asbestos would occur during the same remedial program. No hydrocarbons were detected in the well (MW-15) or soil borings from this area, indicating that the contents of the contained structures have not impacted the surrounding soil and water.

- The utility tunnel extending from the courtyard area south of the boiler house to the Canterbury building contains hydrocarbon and PCB-impacted sediments, though at lower concentrations than in the proposed Canterbury expansion area. No evidence of impact to the surrounding soil and groundwater by the contents of the tunnel was detected.

A Phase II investigation was performed on the Mosca Garage on Mill Street by RETEC in 1997. This building has been used for maintenance of trucks used by the Mosca Brothers Moving and Storage Company. The investigation found the following:

- A 1,000 gallon underground fuel oil tank is located along the northern wall of the building. This tank has impacted the surrounding soil and groundwater. The extent of impact to the north and west were defined by a test pit investigation, but the downgradient direction (under the garage) has not been defined.

- Parts cleaning solvents were observed to be in use in the building, along with other automotive chemical products. Drums of spent solvent were observed to be present at the site.

- The garage floor drains were traced to the storm sewer in Mill Street. However, two breaks were observed in the underground line which has impacted the surrounding soil.

The results of all of the previous work have been used in the preparation of the FSAP for this next phase of the site investigation.

1.4 Overview of The FSAP

The remainder of this FSAP is divided into five additional sections. Section 2 outlines the approach used to characterize potential media and chemicals-of-interest at the seven specific areas of investigation.

Section 3 presents the specifics of the site investigation procedures. This section presents the sampling methods and protocols.

Section 4 outlines the analytical program being followed during the investigation.

Section 5 is a summary of how the results of the site investigation will be presented in the final report. The final report will include the results of the investigation, an evaluation of the results of the investigation, identification of additional data needs, and recommendations for remedial actions to allow the safe redevelopment and reoccupation of the site.

Section 6 is a list of references that were used when preparing this report.

2.0 AREAS OF INVESTIGATION

This section details the specific field activities planned to conduct the investigation. The elements of the investigation were described in the Work Plan and have been subdivided by technical focus areas for simplicity of presentation. Note also that the investigation is also subdivided geographically into the northern and southern roadway areas, defined as Operable Units 1 and 2, respectively. The purpose of this division was to accommodate the redevelopment schedule for the 17-acre former General Cable site, with the northern roadway development leading that of the southern portion. The site investigation will begin with the northern roadway property, and then continue during the same mobilization into the southern roadway.

Section 2 presents the rationale and focus of each technical work element of the site investigation. Note that this scope of work builds upon the recently completed Phase II investigation of the entire 17-acre central core area of the East Rome Business Park. To aid in summarizing the data in the remedial investigation reports and feasibility assessments, the numbering system previously established for well, boring, soil gas locations at the roadway site is continued. The locations of the previous sampling points are shown on Figures 1-1 and 2-7.

2.1 TCE Investigation

The data objective of the TCE investigation is to determine whether this chemical and its related breakdown compounds are present on the property. If TCE is present, the goal is to determine whether it has its source on the property. The TCE investigation shall take a stepped approach so that new field results can be used to focus the investigation as they are received.

2.1.1 TCE Soil Gas Investigation

As part of the TCE source investigation, soil gas samples will be obtained from direct push borings. The following samples will be collected, as shown on Figure 2-1:

- Five samples at the Mosca Garage and Canterbury property which have been incorporated into the site

- Two samples at the former General Cable property on the west side of Mill Street which falls within the roadway project area; and

- Seven samples on the former General Cable property along the road right-of-way between the Mosca Garage and the boiler house.

The samples will be obtained at approximately six feet below the ground surface via direct push borings. The soil gas samples will be analyzed within 48-hours of receipt by the laboratory so that the results of the soil gas survey can be used to adjust the focus of the TCE groundwater investigation described below.

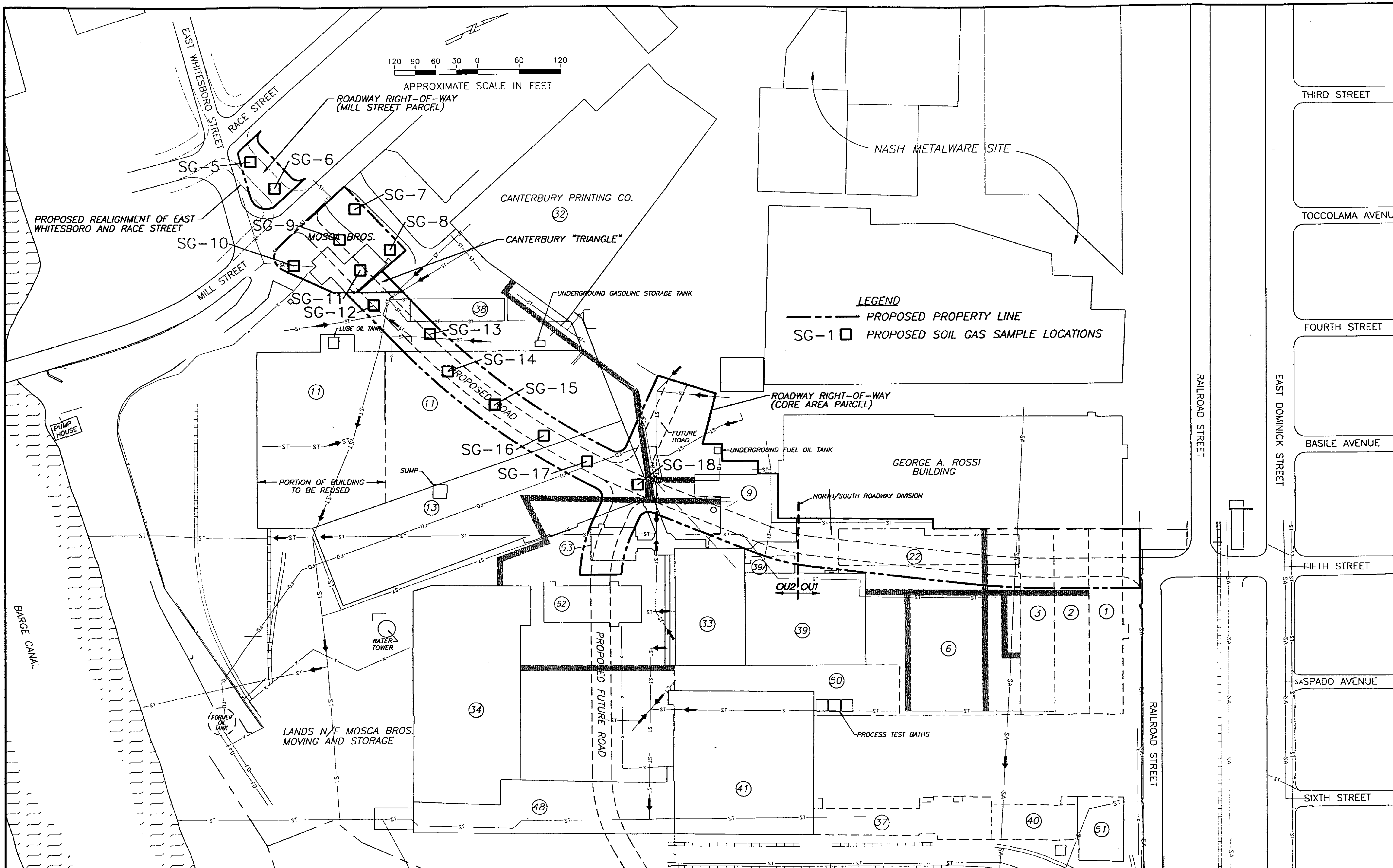

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FIGURE 2-1
SOIL GAS SURVEY

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2.1.2 TCE Groundwater Investigation

As part of the TCE groundwater investigation, advancement of direct push borings along the expected axis of the plume to the suspected clay confining layer 50 to 60 feet below the ground surface will be conducted to determine if TCE is present, and if so, to define its bounds across the site. Direct push groundwater samples will be collected and analyzed to screen for TCE. Based on the field screening results, four groundwater monitoring wells will be installed. The proposed locations of the borings and wells are shown on Figure 2-2. To meet the objectives of the TCE investigation, the following steps will be followed and samples collected:

Step 1: Direct push borings will be advanced along the southern portion of the roadway across the axis of the expected TCE plume to define its lateral boundaries. The borings will be advanced to a suspected clay confining layer (if present) 50 to 60 feet below the ground surface. The shallow portion of the direct push borings may be advanced by drilling with hollow stem augers in order to combine sampling points with borings for the soil investigation, and to extend the range of the direct push technique. If site conditions result in refusal before reaching the confining layer, the borings may be advanced by other drilling techniques.

A total of seven borings will be advanced at the locations shown on Figure 2-2. In each boring, groundwater will be sampled at an intermediate level below the water table (approximately 30 feet below the ground surface) and at the top of the confining layer (50 to 60 feet below the ground surface). Groundwater samples from this phase of the investigation will be delivered by courier to a laboratory for overnight screening analysis for chlorinated solvents so that adjustments to the boring program may be made in the field.

Step 2: A groundwater monitoring well will be installed at the center of the axis of the plume on the roadway right-of-way to the top of the confining layer. The well will be developed, surveyed, and sampled for overnight analysis for TCE.

Step 3: A deep well will be installed adjacent to the upper aquifer monitoring well to the top of bedrock in the lower aquifer. If the upper aquifer is impacted by TCE (or other contaminants) the deep well will be double-cased to minimize the potential for vertical migration of contaminants.

Step 4: With the lateral and vertical extent of TCE defined, additional wells will be installed in the upper impacted aquifer in the upgradient and downgradient directions along the axis of the TCE plume.

Following installation and development of the wells, the locations and reference elevations will be surveyed for the preparation of groundwater maps. The new wells will be sampled along with the downgradient wells between the Building 11 and the Barge Canal.

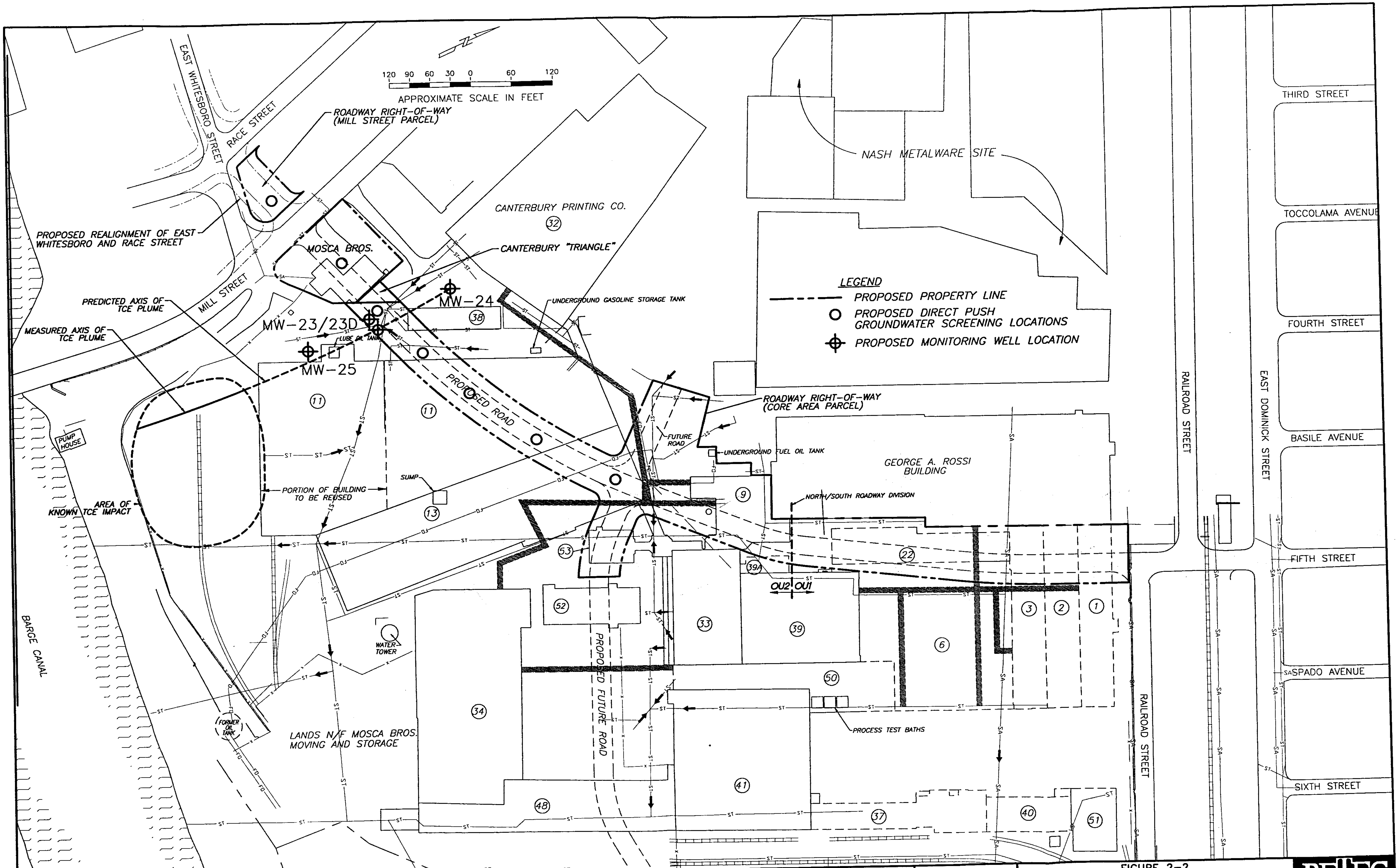

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FIGURE 2-2
TCE GROUNDWATER INVESTIGATION
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2.2 Utility Bedding Materials and Subsurface Structures

The data objective in this area is to determine whether contaminated groundwater is migrating along the bedding material outside of utility lines or subsurface structures. The locations of target lines and structures are shown on Figure 2-3. If it can be verified in the field that a line or structure is above the water table, then no further investigation will be performed. If it is suspected that a line or structure is near the seasonal high groundwater level, or if its depth cannot be determined, then the feature will be exposed by advancing a test pit. If groundwater is found at or above the level of the line or structure, it will be sampled for site chemicals of interest (COIs). To assess the impact of on-site migration of groundwater all lines investigated in this manner will be exposed at the upgradient location where they enter the roadway right-of-way. Deep lines which exit the right-of-way at the downgradient side of the site will also be exposed and sampled to assess the off-site migration of groundwater.

An additional goal of this phase of the investigation will be to assess the condition of utility lines which are to be reused on an interim basis during construction of the northern portion of the roadway and during redevelopment of the northern eight acres of the 17-acre General Cable site. Based on the current plans for the roadway and for the commercial reuse of Building 41, several existing storm sewer lines must be maintained. The potential for these lines to act as groundwater contaminant migration routes must be investigated at the upgradient and downgradient locations. The locations to be investigated are shown on Figure 2-3.

Up to 12 test pits will be advanced based on the current understanding of subsurface utilities and structures at the site. A log will be kept describing each test pit, including soil classification, depth to groundwater (if encountered), and field observations of contaminants (visual, odor, PID). Where water is encountered, a sample will be obtained and analyzed for the site organic contaminant list.

2.3 Fill Soil

The objective for this task is to obtain an accurate definition of the thickness and composition of the fill soils across the site property. The thickness of the fill will be noted in all boring and test pit logs advanced at the site. At the locations shown on Figure 2-4 soil borings will be advanced to the base of the fill soils, and composite soil samples will be obtained to determine the average concentration of site contaminants.

The geotechnical characteristics of the soil must also be evaluated in order to determine the suitability of the fill soil for construction of the roadway. Field characterization of the soil will be by standard penetration testing (SPT) according to ASTM Method D1586 to obtain field density measurements of the soil, and by soil classification according to ASTM Method D2487 (the Unified Soil Classification System). All borings for geotechnical parameters will be advanced to 20 feet below the ground surface.

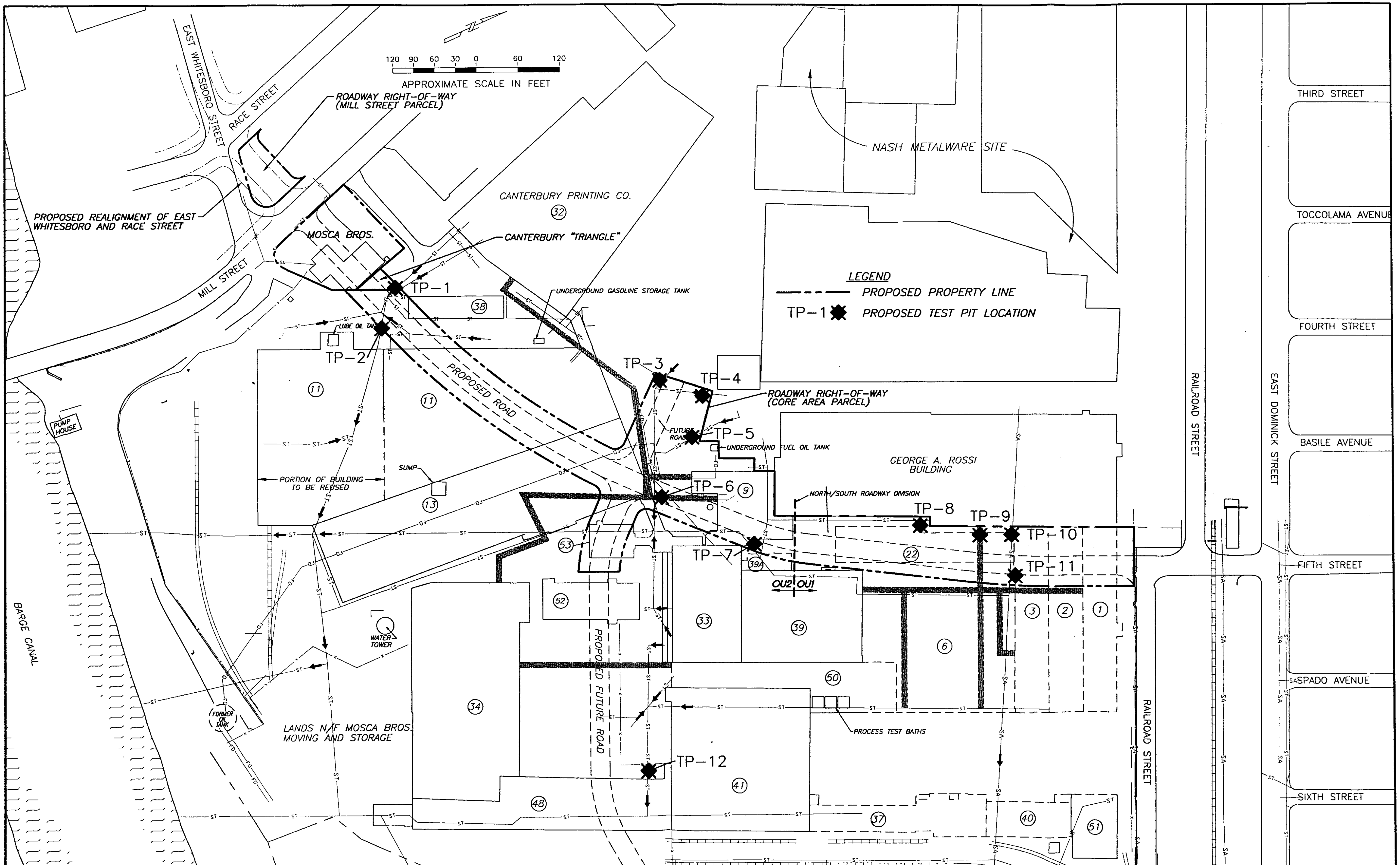

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FIGURE 2-3
UTILITY LINE BEDDING AND TUNNEL SURVEY

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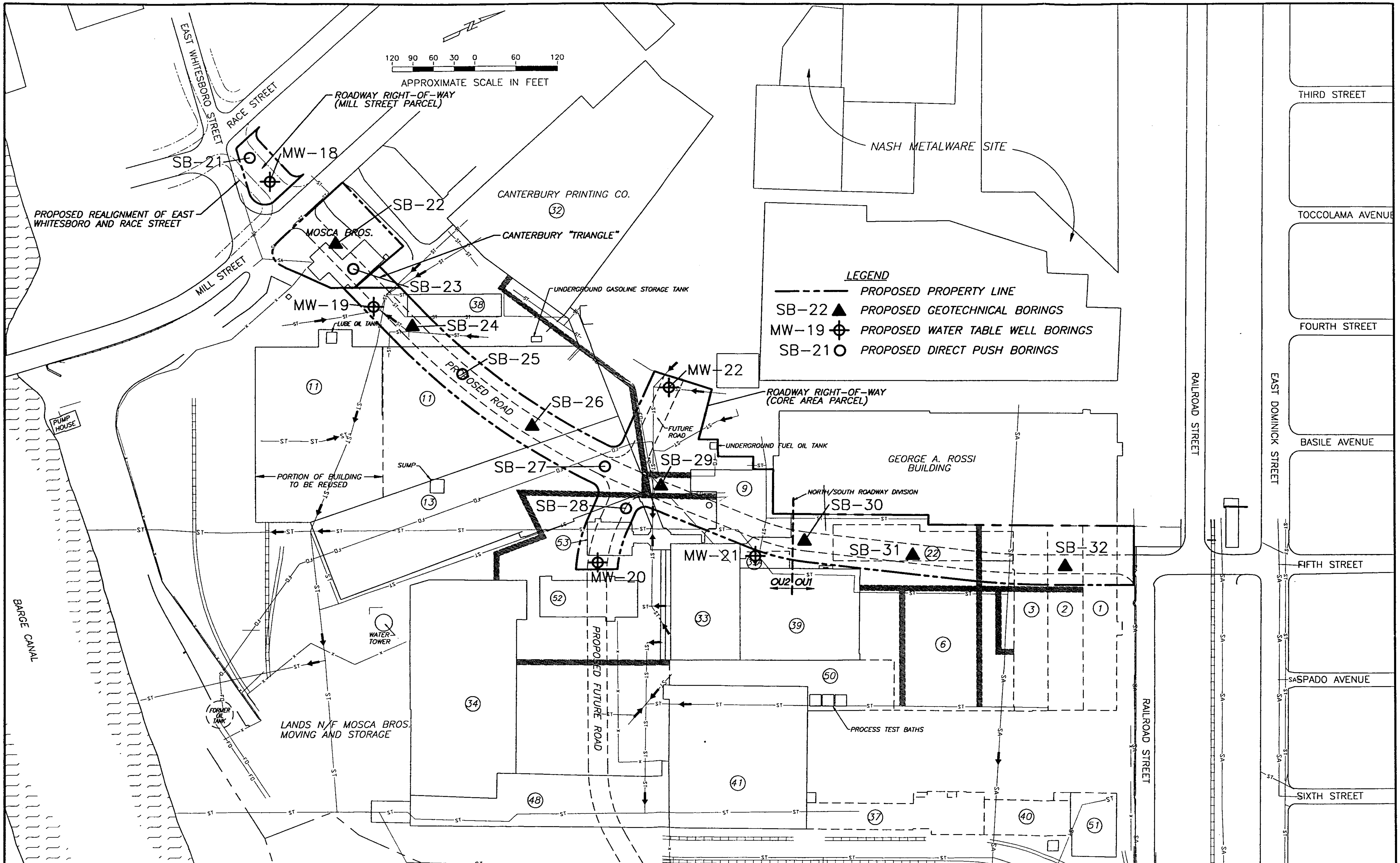

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FIGURE 2-4
SOIL BORING LOCATIONS

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2.4 Antimony in Soil and Groundwater

A specific goal of the soil investigation in the area of the boiler house will be to establish whether antimony in soil is a source of elevated antimony concentrations measured in groundwater at monitoring wells MW-15. Antimony will be analyzed for in all soil samples from the site; four soil borings and four test pits are scheduled to be advanced specifically in the area where elevated antimony concentrations have been measured.

To monitor groundwater concentrations of antimony (and all other COIs) in this area two additional water table aquifer monitoring wells will be installed (wells MW-20 and MW-22, as shown on Figure 2-5). Well MW-22 will be installed in the upgradient direction towards the waste disposal area which has been identified on the Nash Metalware site. Well MW-20 will be installed downgradient of this area where groundwater is predicted to flow from the roadway property.

2.5 PCBs

Two areas at the site will be investigated specifically for suspected PCB impacts:

- Area south of Building 38 where PCBs were found during the Phase II investigation at high concentrations in the utility line sediments; and

- Building 39a, a former electrical equipment and transformer location which has been recently made accessible to investigation.

A water table monitoring well will be installed at each location (MW-19 and MW-21, respectively). Additional observations and sampling will be performed in the area of the utility lines at these locations as part of the scope of work described in Section 2.2 above (see also Figure 2-3).

2.6 Asbestos Survey

The objective of this task will be to perform a predemolition asbestos survey of above and below ground structures according to New York State Department of Labor (NYSDOL) regulations. Sampling will be performed by licensed asbestos sampling personnel, with laboratory analysis by approved NYSDOH procedures. The results of the survey will be used to prepare asbestos abatement plans for the above ground structures within the roadway right-of-way, and to identify subsurface structures containing asbestos. Note that preliminary indications are that some of the tunnels within the site contain asbestos and soil or sludge containing petroleum hydrocarbons, PCBs, and elevated metals concentrations. Sufficient field data will be obtained so that where asbestos is found with other site contaminants the remedial plans can address both NYSDEC and NYSDOL regulations.

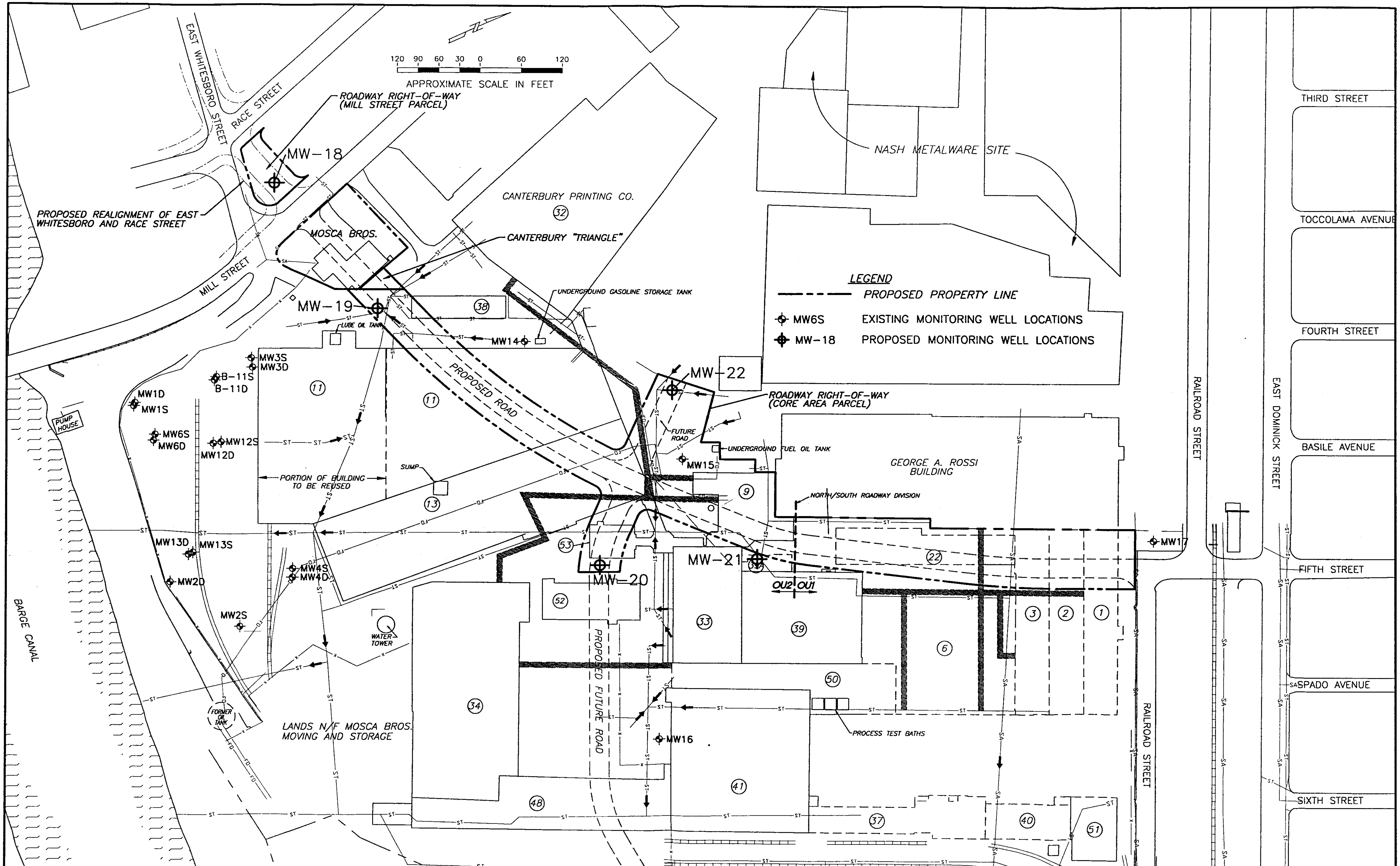

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FIGURE 2–5
WATER TABLE MONITORING WELL LOCATIONS

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Building 38 and the Mosca Garage have been previously surveyed for asbestos. Buildings to be surveyed in this investigation include Building 9 (the boiler house), 11, 13, and 53 (Figure 2-6).

2.7 Utility Lines

An important element of the field investigation will be to assess the contents of utility lines and structures capable of conveying contaminants to and from the roadway right-of-way. This information is needed to assess the potential for impacts on the roadway, and for assessing the impact of the roadway on downgradient receptors. An additional data objective of this work element is to assess the contents of storm sewer lines which will be reused on an interim basis during the initial stage of roadway construction and redevelopment of the northern eight acres of the 17-acre General Cable site. Note that lines to be abandoned will not be sampled as they will be cleaned prior to abandonment or removed. Lines to be reused will be sampled at locations which would be representative of storm water capture and discharge zones.

The target storm sewer lines and tunnels and the target sampling locations are identified on Figure 2-7. The actual sampling locations will depend on the availability of access points. In all cases the closest access point to where the line enters or exits the right-of-way will be sampled. Both water and accumulated soil or sludge will be sampled and analyzed for site COIs.

2.8 Southern Parcels (Mosca Garage, East Whitesboro Realignment)

The data objective in this area is to investigate the condition of parcels at the southern end of the site roadway project area which were not included in the previously conducted Phase II investigation of the 17-acre General Cable site. (Note that a limited Phase II investigation has been performed of the Mosca Garage property, and that the results of that investigation have been used to help prepare this Sampling Plan.)

Work elements described above which will be used to investigate these parcels include:

- soil gas samples from seven direct push borings (Figure 2-1);
- soil samples from four soil borings (Figure 2-4); and
- groundwater samples from one water table monitoring well, MW-18 (Figure 2-5).

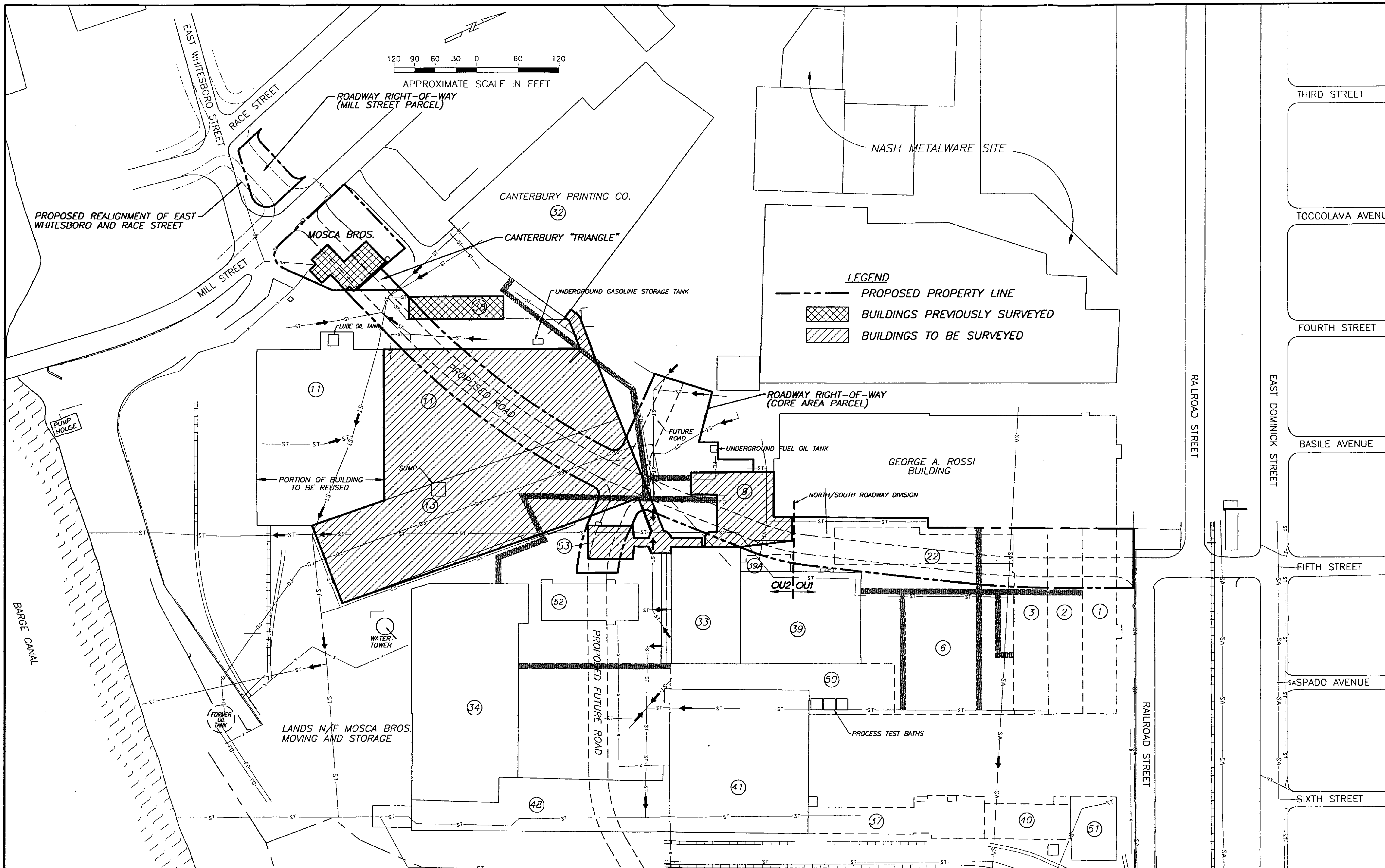

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FIGURE 2-6
ASBESTOS SURVEY

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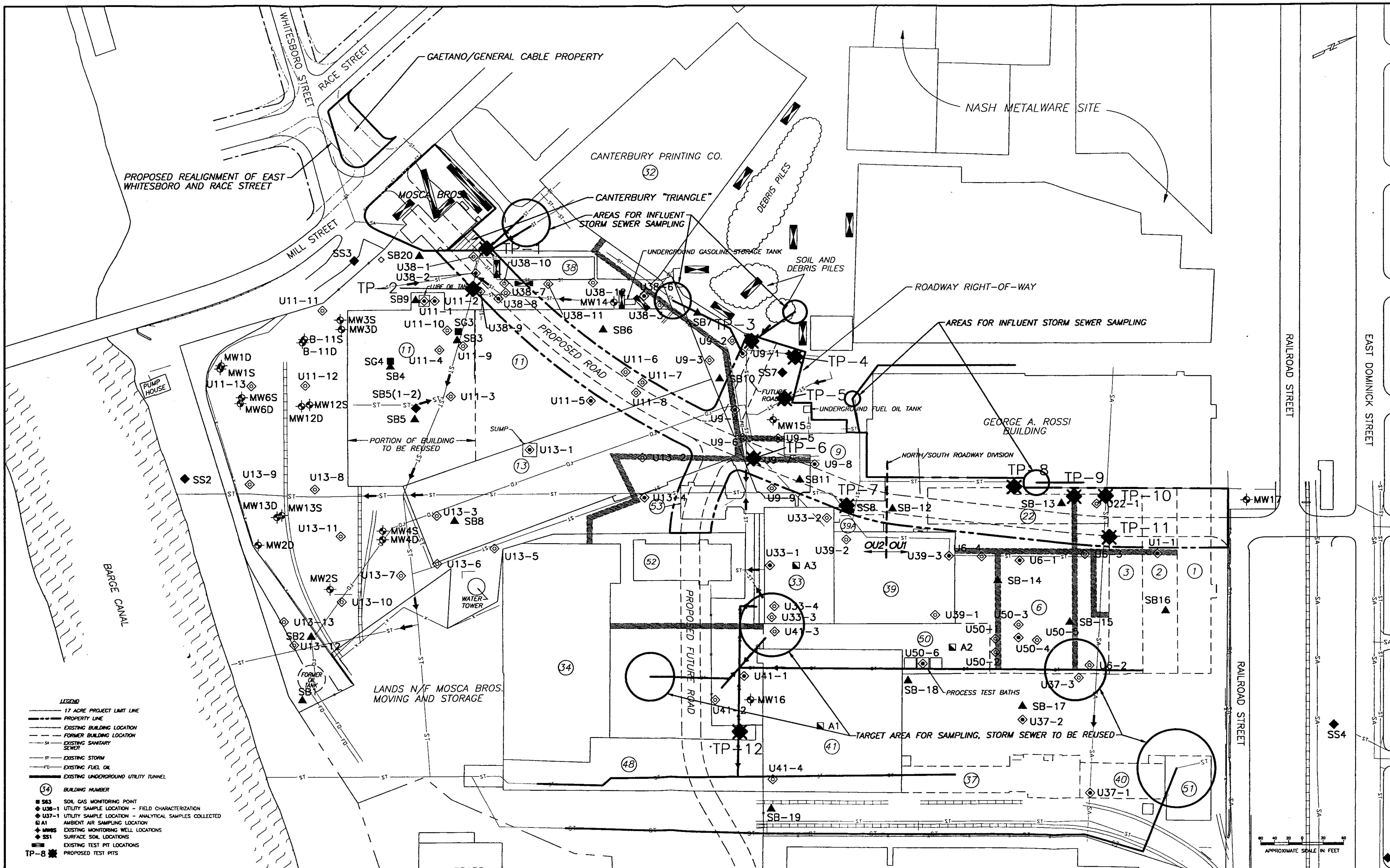

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FIGURE 2-7
STORM SEWER SAMPLE
TARGET LOCATIONS

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2.9 Surface Materials

Miscellaneous materials found at the surface of the site will require characterization for disposal. This will include drums and other containers containing chemical products, and contaminated building materials such as oil-soaked flooring. These materials will be cataloged, sampled, and analyzed in this investigation.

The testing required will depend on the suspected contaminant and the impacted matrix. Where the contents of drums cannot be indentified from the labeling the contents will be sampled for product identification. TCLP tests may also be performed in order to determine whether the material must be managed as hazardous waste, solid waste, or clean demolition debris.

2.10 Hazardous Waste Screening

Selected samples of the most impacted materials found at the site will be subjected to TCLP testing to determine the extent of hazardous waste distribution at the site. The decision on which materials to test will be made in the field by the field geologist and NYSDEC supervisor based on field testing and field observations. Material which may be sampled include surface soil, subsurface soil, utility line sediments or sludge, and impacted building materials.

3.0 SITE INVESTIGATION PROCEDURES

This section describes the procedures that will be followed during the field sampling program. The program includes the following operations:

- surveying and investigation layout;
- underground utility clearance;
- soil borings and monitoring well installations;
- surface and subsurface soil collection;
- groundwater measurement and collection;
- soil gas sampling;
- asbestos sampling;
- mapping and sampling of subsurface structures;
- cataloging and sampling of drums and other containers; and
- sampling of potentially contaminated building materials.

The soil boring program and groundwater survey are closely integrated in that groundwater samples will be collected after the soil sampling equipment has been advanced to the final depth within each borehole. At several locations soil gas samples will also be collected from the borings. Although a soil, soil gas, and groundwater sample may be obtained from a single boring, for the purposes of this FSAP each program is discussed separately. The following sections provide descriptions of the procedures which will be used to complete each separate operation.

3.1 Site Background Investigation

Prior to the initiation of field work former workers at the General Cable plant will be located and interviewed in order to gain information on the former industrial practices employed at the site. A record of each interview will be prepared and included as an attachment to the site investigation report. The site investigation work plan will be modified where necessary if the interview process identifies additional target areas.

3.2 Surveying and Site Layout

At the start of fieldwork the boundaries of the roadway property will be marked by a New York State licensed surveyor. The property lines will be clearly established in the field by survey markers, tape, paint, flagging, stakes, or other appropriate means. The surveyors will work with the environmental consultant and NYSDEC representative to locate and mark boring and sampling locations in the field.

The surveyors will update the site plan as necessary to locate all buildings and relevant site features, including the locations of utility lines, tunnels, sumps, and other subsurface structures. The surface and invert elevations of all subsurface structures will be measured during this stage of work. The survey of the site will form the base map on which the results of the investigation will be plotted.

3.3 Underground Utility Clearance

Prior to the start of any field work, the proposed sample locations will be established by a stake or painted markings at the location of each sampling point. The Underground Facilities Protective Organization (UFPO, 1-800-962-7962) will be contacted to arrange for the location and marking of all underground utilities in the vicinity of the proposed borings. UFPO will be notified at least two full business days prior to the commencement of any subsurface work to ensure compliance with excavation regulations. If necessary, a private utility locating service will be used to locate private underground utilities which will not be located by the UFPO subscribing utilities.

Borings will be relocated if there is risk of drilling activities damaging any underground or overhead utilities. Many of the structures at the site are of questionable integrity, therefore boring locations will be relocated if conditions at a mapped sampling point do not allow for the safe conduct of the work. The field geologist will record the results of the utility clearance, and will measure the offset from the designated location when borings or samples must be relocated.

3.4 Soil Sampling

Soil samples will be obtained from all borings in the upper fill soil unit at the site. Composite samples of the fill soil will be obtained from:

- Five direct push soil borings;
- Seven geotechnical auger soil borings (one for every 200 feet of roadway); and
- Five auger soil borings for water table well installations.

The sample locations included as part of this investigation were chosen by taking into account the following information:

- previous investigation results;
- site inspections and historical maps identifying former process areas and materials; and
- proposed redevelopment locations and activities.

The sampling locations shown in Figures 2-1 through 2-7 may be adjusted based on the final site investigation layout in the field, site access, and the location of underground and overhead utilities. Some boring and sampling locations may be combined if, for example, borings for TCE evaluation are adjacent to those for the roadway design.

3.5 Groundwater Evaluation and Sampling

The elevation of the water table will be measured at all 17 existing wells and at the nine new monitoring wells which will be installed under this FSAP (Figures 2-2 and 2-5). The proposed well locations were selected to define the water table gradient across the site, to assess water quality in the fill soils, and to track the location of solvent-impacted subsurface groundwater. The five new water table wells, along with at least six of the existing water table wells will be sampled during this investigation for organics and metals.

The new water table monitoring wells will be constructed of 2-inch diameter PVC well materials in soil borings advanced by 4 1/4-inch I.D. hollow stem augers. The well screens will be ten feet long, and extend from approximately three feet above to seven feet below the water table at the time of installation. The screens will have a 0.01-inch slot size and will be installed with a Morie #3Q sandpack, or equivalent. A two-foot thick bentonite pellet seal will be installed above the sandpack, and the remainder of the borehole annulus filled with bentonite cement. The well casing will extend above the ground surface and be secured by a locking steel guard pipe or will be terminated in a flush-mounted casing installed in the pavement. Each well will be developed following installation by surging and pumping to 50 NTU. The locations and reference elevations of the monitoring wells will be surveyed so that a water table map of the site can be created.

Deeper wells for TCE evaluation will be constructed in the same manner unless they are installed through a contaminated zone in the aquifer or through a confining layer. It is anticipated that the well proposed for installation to the top of bedrock will pass through a confining layer at 50 to 60 feet or pass through a TCE-impacted zone in the aquifer, or both. This well will be constructed through an upper casing installed into the confining layer so that the vertical migration of groundwater is prevented.

3.6 Sample Designation

This section describes the sample designations that will be used in this investigation:

- Groundwater Samples. Groundwater samples obtained from monitoring wells will be designated by the well number (e.g. MW-2S). Groundwater samples obtained at the water table in the direct push borings will be designated by GW- followed by the boring number.

- Subsurface Soil Samples. These samples will be designated by SB- and the sequential number of the sample location. For example SB-7 would be a sample collected from soil boring number seven.

- Soil Gas Survey Samples. Soil gas samples will be numbered by the location of the boring and the depth interval from which it was collected. For example SG-18 (6-7) would be a sample collected from the location of soil boring 18 from a depth interval of six to seven feet below ground surface.

- Surface Soil Samples for PCBs. These samples will be designated by PCB- and the sequential number of the sample location.

- Test Pit Samples. Groundwater samples will be designated by TPW- followed by the location and approximate depth interval from which it was taken. For example, TPW-1 (5-6) would represent a sample collected from Test Pit No.1 from a depth interval of 5 to 6 feet below ground surface.

- Asbestos Samples. Asbestos samples will be designated by ASB- followed by the building number from which it was taken. For example, ASB-41 will represent the asbestos sample from Building 41.

- Subsurface Influent Utility Samples. A composite of accumulated soil, water or sludge samples obtained from sewers will be designated by SC- followed by the sample number.

3.7 Sample Collection Procedures

This section describes the methods used to collect soil and groundwater samples and the sample handling and documentation procedures required to ensure the integrity of the samples before shipment to the analytical laboratory. All field sampling operations will be directed by the project field geologist. The geologist will be responsible for work certification, preparation of the daily field logs, sampling logs, decontamination of equipment and adherence to the site-specific health and safety plan (HASP). All field sampling documentation will be reviewed by the project quality assurance officer to ensure compliance with the FSAP and data quality objectives. The quality assurance officer will also supervise the laboratory data review and validation process. The qualifications for the data validator and quality assurance officer will be submitted to NYSDEC for approval prior to the commencement of the investigation.

3.7.1 Subsurface Soil Investigation and Sampling Procedures

To obtain an accurate definition of the thickness and composition of the fill soils along the roadway right-of-way 17 soil borings will be installed using hollow stem auger (HSA) and direct-push ("Geoprobe") boring methods. Analysis of the samples will be to determine the average concentrations of site contaminants, engineering properties of the fill soils, and to determine whether the most impacted soils at the surface or subsurface of the site fail the tests for hazardous characteristics.

Prior to starting the subsurface soil boring program, groundwater elevation measurements will be collected from the existing site monitoring wells. This data set will be used to determine the approximate elevation of groundwater in the study area. If water is encountered while advancing the soil borings, the information will be used to distinguish between groundwater and the occurrence of any perched water conditions. Water level measurements will be obtained in accordance with RETEC SOP-231 (Appendix A).

Hollow Stem Auger Borings

Soil borings will be completed for environmental and engineering soil sampling using hollow stem auger techniques. A 4¼ ID auger and 2-inch OD, 2-foot long split spoon sampler will be used to advance each borehole and collect the appropriate soil samples. Using 4¼ augers will provide sufficient annular space that could accommodate a 2-inch monitoring well, if installed. When a soil sample is collected it will be extracted and sampled according to the following procedures:

- the split spoon sampler will be opened in a manner that minimizes disturbance to the sample;

- representative samples of soil from the depth interval will be immediately placed into laboratory provided containers, specific for VOC analysis;

- the samples will then be described by the field geologist using the American Society for Testing and Materials (ASTM) Standards and the Unified Soil Classification System (USCS);

- the soil samples will then be subdivided into 1-foot intervals;

- one half of the soil from each 1-foot interval will be placed into jars and screened for organic vapors using a photoionization detector equipped with a 10.2 eV bulb (SOP-310, Appendix A);

- following completion of the boring, the field geologist will create a composite soil sample for analytical testing. This sample will be placed in laboratory supplied containers for VOCs + TICs, SVOCs + TICs, PCBs, and metals analysis. If impacted soil strata are found in the boring one or more samples of the discrete interval may also be collected for analysis. The selection of additional sampling intervals and the analytical parameters will be made by the field geologist and/or the NYSDEC field supervisor.

Direct Push Borings

Direct push soil borings will be advanced to sample the fill soils within the roadway right-of-way, and to obtain groundwater samples to locate the TCE at the site.

Five borings will be advanced to sample the fill soils. A 2-inch outside diameter, 4-foot long sampling tube (Macro-Core) will be advanced from the ground surface to below the base of the fill soil in each borehole. Where necessary, drilling or coring will be performed at the ground surface through asphalt, concrete, or dense fill in order to provide access for the sampling tube. Each sampling tube will be equipped with a 4-foot long clear plastic (PETG) liner. The sample tube will be driven in four-foot increments to the correct depth within the borehole, extracted and sampled according to the following procedures.

- the soil sampling tube liners will be cut open in a manner that minimizes disturbance to the sample;

- representative samples of soil from the depth interval will be immediately placed into laboratory provided containers, specific for VOC analysis;

- the samples will then be described by the field geologist using the American Society for Testing and Materials (ASTM) Standards and the Unified Soil Classification System (USCS);

- the soil sampling tubes will then be subdivided into 1-foot intervals;

- one half of the soil from each 1-foot interval will be placed into jars and screened for organic vapors using a photoionization detector equipped with a 10.2 eV bulb (SOP-310, Appendix A);

- following completion of the boring, the field geologist will create a composite soil sample for analytical testing. The soil will be placed in laboratory supplied containers for PCBs, PAH, and metals analysis.

If refusal of the direct-push probing tool is encountered, the borehole will be relocated in the immediate vicinity of the proposed location. If repeated refusal occurs, the soil boring will be completed by drilling using hollow stem auger techniques.

Seven direct push borings will be completed for TCE screening. Groundwater samples will be obtained at approximately 30 and 50 feet below the ground surface across the expected axis of the plume to the suspected clay confining layer 50 to 60 feet below the ground surface. At the appropriate sampling depth a screened water intake will be advanced and allowed to accumulate the water sample. The depth to groundwater below the ground surface will be measured. The sample will then be pumped directly into the laboratory provided containers. The groundwater samples collected from these locations will be analyzed for TCE and related compounds on a rush basis so that the results can be used to determine the placement of additional borings (if necessary) and monitoring wells. Additional details on the techniques for measurement and sampling of groundwater are discussed below.

The depth of the direct push borings may be limited by the soils encountered and may not reach the approximated completion depth of 50 to 60 feet. The depth range of the direct push borings may be increased by advancing the bore hole with hollow stem drilling methods in the upper or lower soil intervals.

Test Pits

Twelve test pits will be completed along side deep storm sewer lines and utility tunnels that could act as conduits for groundwater migration. Each structure that is suspected to be at a depth that is close to or below the water table will be investigated at its upgradient location on the site property to assess whether contaminated groundwater is being conducted through the bedding materials. Deep storm sewer lines which exit the site will also be investigated to assess the potential for off-site transport of contaminants. The groundwater collected from the test pit locations will be analyzed for VOCs, SVOCs, and PCBs.

The test pits will be advanced with a backhoe or excavator. Where necessary the pavement will be broken with a jackhammer or similar tool. If groundwater is encountered at or above the utility line a grab sample will be obtained from the excavator bucket; site workers will not be allowed to enter excavations over four feet deep. Note that if the utility line is approximately one foot or more below the water table it will not be possible to expose the line for inspection.

3.7.2 Groundwater Sampling Procedures

Groundwater samples will be obtained from monitoring wells, soil borings, and test pits during this investigation. This section describes the appropriate sampling procedures for obtaining samples from monitoring wells and soil borings.

Monitoring Wells

Monitoring wells will be installed and sampled at shallow, intermediate, and deep levels in the unconsolidated soils beneath the roadway right-of-way. Water table wells are for assessment of groundwater impacts from suspected sources of PCBs (MW-19, MW-21), metals (MW-20, MW-22), and for investigation of previously unsampled areas (MW-18). Intermediate depth wells (approximately 50 feet below the ground surface) and a deep well installed to the top of bedrock (MW-23D) will be installed for the investigation of TCE in groundwater.

As described in Section 2.2, the investigation of TCE will take a stepped approach so that the field results can be used to focus the investigation as they are received. Based on the TCE screening results, the following monitoring wells will be installed: one intermediate monitoring well to the confining layer so that the groundwater may be sampled at the interface of the upper aquifer and the confining layer; and one deep monitoring well to the top of bedrock to determine whether TCE is present in the lower aquifer in either the dissolved or free-phase form (DNAPL). If TCE is present in the upper aquifer, the deep well will be double cased to prevent the vertical migration of contaminants, and two additional intermediate depth wells will be installed to monitor the shallowest impacted aquifer. One of the two intermediate depth wells will be installed downgradient and the other will be installed upgradient along the axis of the TCE plume.

Groundwater samples will be collected from the water table wells for analysis of VOCs + TICs, SVOCs + TICs, PCBs, and metals. Samples from intermediate and deep wells will be sampled for chlorinated solvent VOCs only unless field conditions indicate the potential that other contaminants may be present. Prior to purging and sampling of the monitoring wells, a static water level measurement will be taken from the top of the PVC well casing. (Note: water levels will be measured in all site wells). The measurement will be made using an electric water level indicator to a precision of 0.01 ft. The water level meter probe will be decontaminated prior to, and following each use in accordance with NYSDEC protocols. Water level measurements in all wells will be collected within a few hours of each other to accurately determine the overall groundwater flow direction. The results of the water level measurements will be summarized into a water table map. Water levels obtained from wells screened below the water table will be used to prepare a map of the piezometric surface.

A minimum of three well volumes of water will be purged from each well to ensure that a fresh sample of groundwater is obtained during sample collection. Purging will be completed using a peristaltic pump or appropriate equivalent pump, equipped with dedicated Tygon tubing for each well, to eliminate any potential cross-contamination. The intake for the tubing will be located as close as possible to the top of the water column during purging and lowered as necessary to purge the entire contents of the well. During purging, the field measurements for pH, specific conductance, temperature and turbidity will be monitored for stabilization to ensure that fresh formation water is sampled.

Following completion of the purging, a final measurement of the field parameters will be recorded and samples of groundwater will be collected immediately by pumping into laboratory supplied bottles. If the well is purged dry, samples will be collected as soon as the well recovers sufficiently and no longer than 24 hours following purging. The samples for laboratory analysis will be collected in the order of decreasing volatility of the parameters. Metals samples will be unfiltered, therefore unless the monitoring wells can be developed to less than 50 NTU the metals samples will be obtained after allowing the turbidity in the wells to settle (but not more than 24 hours after purging). If well development or quiescent sampling cannot produce a sample with less than 50 NTU alternate metals sampling approaches will be discussed with the NYSDEC project manager. All relevant sampling information and any observations about the sampling procedures will be recorded in the field log book. The sample bottles will be field preserved as necessary, placed in a cooler with icepacks, and delivered to the laboratory daily following standard chain-of-custody procedures. Supporting information is also presented in RETEC SOP 230 (Appendix A).

Soil Borings

The groundwater sampling procedures used for sampling groundwater from direct push borings will generally follow those used for monitoring wells. It is expected that the ability to control turbidity will be less than in installed wells, therefore it may not be possible to obtain metals samples from all boring locations

3.7.3 Soil Gas Samples

Soil gas samples will be obtained from direct push borings located on the Mosca Garage and Canterbury property which have been incorporated into the site, and from the former General Cable property on the west side of Mill Street which is to be used for the realignment of East Whitesboro Street. Additional soil gas samples will be collected from direct push borings installed along the proposed roadway within Buildings 11 and 13. The soil gas samples will be analyzed for volatile organic compounds (halogenated solvents and BTEX).

In order to obtain the soil gas samples the probe rods and an expendable drive point head will be advanced to six feet below the ground surface. The drive point head will be coupled to an adapter to allow soil gas vapors to flow up the polyethylene tubing in response to an applied vacuum. This system will ensure that the vapor sample will originate at the target sample depth. The sampling train will be purged, and the soil vapor sample collected in a Tedlar bag. Each bag sample will be placed in a cooler with icepacks and sent under chain of custody procedures to the laboratory for analysis. Further details on soil gas procedures are provided in SOP-751, Collection and Analysis of Soil Gas Samples (Appendix A).

3.7.4 Subsurface Structures

Subsurface structures are present at many locations within the study area. These structures range from sumps and pits associated with specific manufacturing equipment to tunnels large enough for people to walk through which served as major conduits for utility lines. The locations of the major structures are identified on historical site plans. The locations of minor and process-related structures are not consistently mapped. During the Phase II investigation most of the locations of these subsurface structures were mapped, and the environmental conditions determined by a combination of field and laboratory measurements.

For any additional structures found during this investigation the following field observations will be made:

- total interior depth
- depth of water, sediment, or sludge
- direction and estimated flow rate of water (if applicable)
- odors and PID measurements in the headspace of the structure
- sheens, odors, and headspace PID measurements associated with the water and sediment

The presence of potential asbestos containing materials will be noted; however, this material will be sampled as part of the predemolition asbestos survey by cerified asbestos personnel.

In locations where analytical samples are called for, sediment, water, and sludge will be analyzed for volatiles, semi-volatiles, PCBs, and metals by the methods cited in Section 4. At present the number of structures and access points are unknown; therefore, for budgeting purposes, we have assumed that 20 analytical samples will be obtained from the site during this portion of the investigation. The subsurface utility structures are considered under OSHA standards to be "confined spaces", therefore all sampling of these structures will be performed from the surface through manways and other access points.

Manways associated with the storm sewer system will be identified in the field, their covers removed, and observations made of the field conditions listed above. Sewer lines and tunnels entering the upgradient side of the site will be inspected to find the closest access point to the roadway right-of-way so that upgradient samples can be obtained to asses the potential for contaminant migration onto the roadway property. In locations where the manways and storm sewer lines are to be replaced, abandoned, or resused the sediments will be analyzed for volatiles, semi-volatiles, PCBs, and metals.

3.7.5 Drums and Surface Materials

Drum sampling will be performed by following the procedures specified in Section 8 of the site Health and Safety Plan. Surface materials and impacted building materials such as wood and concrete flooring will be sampled by removing loose materials or scraping representative portions of the surface of the material. The analyses of these materials will be determined in the field by the field geologist and/or NYSDEC field supervisor based on the observed or suspected contaminants and on the sample matrix.

3.7.6 Borehole Abandonment

Following collection of the soil gas sample, all down hole equipment will be retracted to the surface. The borehole (approximately 1 to 1½- inch diameter) will be allowed to collapse naturally. If any visible portion of the hole fails to collapse, a Portland cement and bentonite slurry will be used to backfill the open borehole. All larger boreholes, such as those produced by hollow stem auger drilling, will be abandoned by filling with bentonite slurry. The slurry mix ratio will consist of, at a minimum, 94 pounds of Portland cement to three to five pounds of bentonite powder to 6.5 gallons of potable water. A Portland cement concrete surface seal will be installed above any slurry at boring locations which were advanced through concrete or asphalt pavement.

3.7.7 Decontamination

All down hole or sampling equipment will be decontaminated between borings to minimize the potential for cross-contamination. Decontamination will be accomplished by steam cleaning, hot-water power washing, or by use of the following sequence:

- brushing gross contamination from the equipment;
- tap water rinse;
- an Alconox (detergent) wash;
- rinse with tap water;
- rinse with a laboratory grade methanol followed by a rinse of laboratory grade hexane; and
- final rinse with de-ionized, demonstrated analyte-free water.

Protocol for decontamination are further described in SOP-120 (Appendix A).

3.8 Waste Management

Several types of waste requiring proper management will be generated during the field work. The wastes, and their management are summarized as follows:

- Any drill cuttings and soil samples not sent to the laboratory will be returned to the borehole prior to borehole abandonment or disposed of at the ground surface near the boring or well locations, per NYSDEC TAGM 4032;

- Development water from the new monitoring wells will be discharged to the ground surface as close as is practical to the well sites. The discharge locations will be such that the water infiltrates the soil and does not run off or enter the storm sewer system;

- Personal protective equipment (PPE) and direct push sampling tube liners will be double-bagged and disposed of by landfilling;

- Plastic sheeting used during decontamination procedures will be double-bagged and disposed of by landfilling; and

- Water generated during decontamination procedures (i.e. steam cleaning downhole drilling and sampling equipment) will be discharged to the ground such that it infiltrates the soil and does not run off. If water appears contaminated, it will be contained and properly labeled and tested for future disposal.

Metals

- Antimony
- Arsenic
- Beryllium
- Chromium (III)
- Chromium (VI)
- Copper
- Lead
- Mercury
- Nickel
- Zinc

Asbestos

Laboratory testing of site soils will also be performed for geotechnical characteristics:

- Grain size
- Atterburg limits
- Standard proctor test
- Unconfined compressive strength

These analyses are being performed to evaluate the engineering properties of the soils beneath the proposed roadway. In addition, they will help evaluate the thickness of the fill soils across the property.

4.1 Sample Handling and Analysis

Following sample collection, each sample jar will be labeled with the following information: designation, collection depth, time and date of collection, and a list of laboratory analyses to be performed. The sample will be then prepared for sample shipment by wrapping in bubble wrap, placement in plastic zip-lock bags, and placed into coolers with ice packs. The samples will be in the possession of the sampler or in a secured area until shipment to the laboratory. Shipment will be by overnight delivery service such as Federal Express. Samples for TCE screening analysis will be delivered the same day by courier to a laboratory for rush analysis.

4.2 Laboratory Analysis

The chemical analysis will be performed by an NYSDOH ASP-certified laboratory. A summary of the samples to be collected as part of this investigation is presented in Table 4-2. A summary of the laboratory analyses for each sample is presented in Table 4-3, along with a summary of the samples which will be collected for quality control purposes. Analytical methods for the analytes are given in Table 4-4. Samples will be analyzed within the ASP-specified holding times (see Table 4-5).

Table 4-2
Sampling Summary

Sample Designation	Analytes	Sample Depth/Matrix	Rationale
Direct Push Borings			
DP-01-30	TCE Screen	groundwater @ 30' bgs	define the TCE bounds across the Roadway
DP-01-50	TCE Screen	groundwater @ 50' bgs	define the TCE bounds across the Roadway
DP-02-30	TCE Screen	groundwater @ 30' bgs	define the TCE bounds across the Roadway
DP-02-50	TCE Screen	groundwater @ 50' bgs	define the TCE bounds across the Roadway
DP-03-30	TCE Screen	groundwater @ 30' bgs	define the TCE bounds across the Roadway
DP-03-50	TCE Screen	groundwater @ 50' bgs	define the TCE bounds across the Roadway
DP-04-30	TCE Screen	groundwater @ 30' bgs	define the TCE bounds across the Roadway
DP-04-50	TCE Screen	groundwater @ 50' bgs	define the TCE bounds across the Roadway
DP-05-30	TCE Screen	groundwater @ 30' bgs	define the TCE bounds across the Roadway
DP-05-50	TCE Screen	groundwater @ 50' bgs	define the TCE bounds across the Roadway
DP-06-30	TCE Screen	groundwater @ 30' bgs	define the TCE bounds across the Roadway
DP-06-50	TCE Screen	groundwater @ 50' bgs	define the TCE bounds across the Roadway
DP-07-30	TCE Screen	groundwater @ 30' bgs	define the TCE bounds across the Roadway
DP-07-50	TCE Screen	groundwater @ 50' bgs	define the TCE bounds across the Roadway
DP-08-30	TCE Screen	groundwater @ 30' bgs	define the TCE bounds across the Roadway
DP-08-50	TCE Screen	groundwater @ 50' bgs	define the TCE bounds across the Roadway
Monitoring Wells			
MW-23	chlorinated VOCs	groundwater @ 50' bgs	center of plume based on direct push results
MW-23D	chlorinated VOCs	groundwater @ 100' bgs	determine if TCE is present in lower aquifer
MW-25	chlorinated VOCs	groundwater @ 50' bgs	monitor downgradient of TCE plume
MW-24	chlorinated VOCs	groundwater @ 50' bgs	monitor upgradient of TCE plume
MW-20	VOC, SVOC, metals, PCB	shallow groundwater	monitor groundwater impact from the Nash waste disposal area
MW-22	VOC, SVOC, metals, PCB	shallow groundwater	monitor groundwater leaving the site, downgradient of boiler house near Bldg 53
MW-18	VOC, SVOC, metals, PCB	shallow groundwater	monitor groundwater on parcels at the southern end of the site
MW-19	VOC, SVOC, metals, PCB	shallow groundwater	monitor groundwater quality in area of PCB impacted utilities
MW-21	VOC, SVOC, metals, PCB	shallow groundwater	monitor groundwater beneath electrical substation and equipment

Sample Designation	Analytes	Sample Depth/Matrix	Rationale
Soil Gas			
SG-5	VOCs	soil gas @ 6 feet bgs	VOC screening and TCE source investigation: East Whitesboro realignment area
SG-6	VOCs	soil gas @ 6 feet bgs	VOC screening and TCE source investigation: East Whitesboro realignment area
SG-7	VOCs	soil gas @ 6 feet bgs	VOC screening and TCE source investigation: Mosca Garage
SG-8	VOCs	soil gas @ 6 feet bgs	VOC screening and TCE source investigation: Mosca Garage
SG-9	VOCs	soil gas @ 6 feet bgs	VOC screening and TCE source investigation: Mosca Garage
SG-10	VOCs	soil gas @ 6 feet bgs	VOC screening and TCE source investigation: Mosca Garage
SG-11	VOCs	soil gas @ 6 feet bgs	VOC screening and TCE source investigation: Mosca Garage
SG-12	VOCs	soil gas @ 6 feet bgs	TCE source investigation: metals reclaiming area
SG-13	VOCs	soil gas @ 6 feet bgs	TCE source investigation: metals reclaiming area
SG-14	VOCs	soil gas @ 6 feet bgs	TCE source investigation: rod mill building
SG-15	VOCs	soil gas @ 6 feet bgs	TCE source investigation: rod mill building
SG-16	VOCs	soil gas @ 6 feet bgs	TCE source investigation: rod mill building
SG-17	VOCs	soil gas @ 6 feet bgs	TCE source investigation: Building 13
SG-18	VOCs	soil gas @ 6 feet bgs	TCE source investigation: Building 13
Test Pits			
TP-1	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility lines onto site
TP-2	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line off of the site
TP-3	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line onto the site
TP-4	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line onto the site
TP-5	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line onto the site
TP-6	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line off of the site

Sample Designation	Analytes	Sample Depth/Matrix	Rationale
TP-7	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line off of the site
TP-8	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line onto the site
TP-9	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line onto the site
TP-10	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line onto the site
TP-11	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line off of the site
TP-12	VOC, SVOC, PCB	groundwater in bedding material	groundwater migration outside of utility line off of the site (assessment for line reuse)
Soil Borings			
SB-21 direct push	VOC, SVOC, metals (soil), PCB	composite of fill soil, shallow groundwater	soil and groundwater beneath East Whitesboro realignment area
SB-22 auger	VOC, SVOC, metals, PCB, geotechnical	composite of fill soil	soil on Mosca Garage property beneath proposed roadway
SB-23 direct push	VOC, SVOC, metals (soil), PCB	composite of fill soil, shallow groundwater	soil and groundwater under Mosca Garage building beneath proposed roadway
SB-24 auger	VOC, SVOC, metals, PCB, geotechnical	composite of fill soil	soil beneath proposed roadway
SB-25 direct push	VOC, SVOC, metals (soil), PCB	composite of fill soil, shallow groundwater	soil and groundwater under rod mill beneath proposed roadway
SB-26 auger	VOC, SVOC, metals, PCB, geotechnical	composite of fill soil	soil under rod mill beneath proposed roadway
SB-27 direct push	VOC, SVOC, metals (soil), PCB	compsite of fill soil, shallow groundwater	soil under Building 13 beneath proposed roadway
SB-28 direct push	VOC, SVOC, metals (soil), PCB	compsite of fill soil, shallow groundwater	soil in antomony target area, proposed eastern road spur
SB-29 auger	VOC, SVOC, metals, PCB, geotechnical	composite of fill soil	antimony target area, soil beneath proposed roadway
SB-30 auger	VOC, SVOC, metals, PCB, geotechnical	composite of fill soil	soil beneath proposed roadway
SB-31 auger	VOC, SVOC, metals, PCB, geotechnical	composite of fill soil	soil beneath proposed roadway

Sample Designation	Analytes	Sample Depth/Matrix	Rationale
SB-32 auger	VOC, SVOC, metals, PCB	composite of fill soil	soil beneath proposed roadway
Asbestos			
Building 9 (boiler house)	suspected asbestos containing materials (ACMs)	building materials, insulation, water in flooded basement	predemolition asbestos survey, assessment of asbestos in stormwater
Building 11 (rod mill, north portion)	suspected ACMs	building materials and insulation	predemolition asbestos survey
Building 13	suspected ACMs	building materials and insulation	predemolition asbestos survey
Building 53	suspected ACMs	building materials and insulation	predemolition asbestos survey
Tunnels	suspected ACMs	pipe insulation	asbestos to be managed with other COIs in utility tunnels
Sewers			
SW-01 through SW-	VOC, SVOC, metals, PCB	soil, sludge, and water	investigate potential for influent utility lines and structures to convey contaminants on or off the site
Field QC samples			
trip blanks	VOC	NA	one blank per cooler shipment
equipment blanks	VOC and PAH	NA	one blank per each sampling equipment set
field duplicates	VOC, PAH, metals	NA	one duplicate soil and water sample per 20 samples of each matrix

Table 4-3
Analytical Program Summary

Sample Designation	Sample Matrix	Sample Number Designation	Sample Depth (bgs)	TCE screen	VOC	SVOC	TCE Soil Gas	Site Target Metals	PCBs
Direct Push	Groundwater	DP-#-depth	30 & 50 feet	x					
Monitoring Wells	Groundwater	MW-#	Screened interval		x	x		x	x
Soil Gas	soil gas	SG-#	6 feet		x		x		
Test Pits	groundwater	TP-#	water table		x	x			x
Soil Borings	soil	SB-#	composite of fill soils; most impacted layers		x	x		x	x
Asbestos	building materials, pipe insulation, water in boiler house basement	AB-#	buildings and subsurface tunnels						
Sewers	soil, sludge,water	SW-#	influent lines and offsite discharge		x	x		x	x

* Note: Site Target Metals include: antimony, arsenic, beryllium, chromium (III), chromium (VI), copper, lead, mercury, nickel, zinc

Table 4-5
Sample Containerization

Analysis	Bottle Type	Preservation	Holding Time
Aqueous Samples			
Volatile Organics	3 - 40 ml glass vials	HCl to pH <2 - cool to 4°C	7 days
Semivolatile Organics (including PCBs)	2 - 1000 ml amber glass	cool to 4°C	5 days to extraction
TAL Metals	1 - 1000 ml plastic	HNO_3 to pH<2	26 days (Hg) 6 months (others)
Soil			
Volatile Organics	wide-mouth glass w/Teflon cap	cool to 4°C	7 days
Semivolatile Organics (including PCBs)	wide-mouth glass w/Teflon cap	cool to 4°C	5 days to extraction
TAL Metals	w/Teflon cap	cool to 4° C	26 days (Hg) 6 months (others)
Geotechnical Test	5 gallon bucket	none	N/A
Soil Gas			
Volatile Organics	Tedlar bags	cool to 4° C	5 days

4.3 Quality Assurance Objectives

The overall quality assurance objective is to develop and implement procedures for field sampling, chain-of-custody and laboratory analysis that will provide results which are legally defensible. To meet these goals Data Quality Objectives (DQOs) have been established for the investigation. DQOs are qualitative and quantitative statements which specify the quality of data required to support specific remedial response decisions on regulatory actions. The DQOs focus on the identification of the end use of the data to be collected and to the degree of certainty with respect to the precision, accuracy, reproducibility, completeness and comparability necessary to satisfy the intended end use. The DQOs for field and laboratory work for this effort are summarized in Section 4.4 below.

4.4 Data Quality Levels

There are five analytical levels of data quality which may be used to accomplish these site objectives. They are typically designated as follows:

- Level I - field screening or analysis using portable instruments, calibrated to non-compound specific standards;
- Level II - field analysis using portable instruments, calibrated to specific compounds;
- Level III - non-Contract Laboratory Program (ASP-CLP) laboratory methods;
- Level IV - ASP-CLP Routine Analytical Services methods; and
- Level V - non-standard analytical methods.

To meet the specific objectives of this project, Levels I, III and IV data quality objectives will be utilized. No Level II or Level V procedures are planned for this project.

4.4.1 Field Screening Methods - Level I

Level I screening will be performed for health and safety purposes according to procedures given in the site specific health and safety plan (Appendix C to the workplan). The tests are classified as field screening evaluations, even though the results are not typically used as part of any site characterization.

4.4.2 Level III - non-Contract Laboratory Programs (CLP) Laboratory Methods

Level III data is planned for assessing the extent of TCE and related compounds in water samples from direct push borings ("Geoprobe") along the expected axis of the plume. Analysis will be performed according to EPA method 8240. Results for TCE will be available within 48 hours of sample collection. Level III data will also be provided for the soil gas surveys, geotechnical testing, hazardous waste classification, and asbestos surveys. As with the TCE screening, the results from the soil gas survey will be used to focus the investigation to the most appropriate areas. The geotechnical testing is being performed to evaluate the engineering properties of the soils beneath the proposed roadway. Data generated during the hazardous waste classification and asbestos surveys will be used to determine the proper disposition of site materials.

4.4.3 Level IV CLP Methodologies

All other laboratory data will be according to CLP protocols described in the New York State Analytical Services Program (ASP). This level of data quality will ensure the generation of legally, and technically defensible data for project use.

4.5 Data Validation

NYSDEC recommends two levels of data review. The basic review is a data usability summary report (DUSR). Current NYSDEC policy is to require this level of review on most sites. Full data validation is called for at sites where the data will be used in litigation, or where problems are expected with data quality (such as where matrix interference is significant). The laboratory deliverables are the same in both cases, and a DUSR can be upgraded to full validation at a later time if necessary. For this investigation a full data validation will be performed.

4.5.1 Full Data Validation

Full data validation will be performed by an approved data validator using the standard USEPA Inorganics Regional Data Assessment and Organics Regional Data Assessment forms. The objective of the review will be to summarize the overall deficiencies in the data which will require further attention. The forms will also contain any applicable supplementary documentation identifying any specific problems.

The data validator will inform RETEC's project manager of the data quality and limitations and assist the project manager in working with the laboratory to correct any identified deficiencies. The laboratory may then re-run the analyses depending on the extent of the deficiencies and their importance to meeting the project objectives. The results of the validation will then be compiled into tables which will present the following information:

- sample date and time;
- sample matrix;
- analytes for which positive results were obtained;
- any analytes identified in trip or field blanks;
- concentration units for detected analytes;
- data qualifiers listed by the analyst; and
- data qualifiers provided by the data validator

4.5.2 Field Measurement Data

Validation of data obtained from field measurements will be performed by the Field Manager. Validity of all data will be determined by checking calibration procedures utilized in the field, and by comparing the data to previous measurements obtained at the specific site. Large variations (greater than 10%) will be examined in association with changes in local media conditions and general trends. Variations in data which cannot be explained will be assigned a lower level of validity and will be used for limited purposes. The Field Manager will summarize the data obtained from field measurements and will include this information in the field activities documentation report which will be submitted to the Project Manager for review.

4.6 Chain-of-Custody Procedures

To establish the documentation necessary to trace the sample possession from the time of sample collection, a chain-of-custody record will be filled out for each sample. The record will contain the following information:

- sampling site identification;
- sampling date and time;
- identification of sample collector;
- sample identification;
- sample description (type and quantity);
- analysis to be performed;
- signatures of persons involved in the chain of possession; and
- date and times of possession.

4.7 Field Logbooks and Documentation

Field logbooks will provide an accurate history of all aspects of sample collection and handling. Field logbooks will be bound field survey books that will contain a daily log of project specific information including:

- a description of field analytical equipment,
- calibration data for field sampling equipment,
- results of field physical measurements,

- calculations for field sampling; and
- sample description including field duplicate locations.

5.0 APPLICATION OF RESULTS TO SITE DEVELOPMENT

5.1 Reporting of Results

Due to the need for early remedial action and development of the northern portion of the roadway, the report of findings and remedial action alternatives will be divided into two separate documents. The SI report on the northern roadway right of way (Operable Unit 1) will be prepared first, with the SI report for the southern portion of the right-of-way (Operable Unit 2) following by approximately 45 days.

The final report for each Operable Unit (OU) of the investigation will include:

- descriptions of field and analytical investigation methods used;
- field measurements and observations;
- boring and well construction logs;
- water table maps and geologic interpretations;
- analytical results and a comparison to Data Quality Objectives;
- a comparison of soil conditions to NYSDEC TAGM 4046 and TSCA (for PCBs);
- a comparison of groundwater conditions to NYSDEC Standards and Guidance values;
- an evaluation of chemical concentrations and exposure pathways for human and ecological receptors under current and proposed site conditions.

The SI report for each OU will follow the guidelines and format suggested in the NYSDEC Brownfield Procedures Handbook.

6.0 REFERENCES

Empire Soils Investigations, 1990, *Environmental Site Assessment, Mill Street, Rome, New York,* August 1990, Atlantic Energy Systems, Inc.

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APPENDIX A

RETEC STANDARD OPERATING PROCEDURES

SOP 120: DECONTAMINATION

1.0 Purpose and Applicability

This SOP describes the methods to be used for the decontamination of all field equipment which becomes potentially contaminated during a sample collection task. The equipment may include split spoons, bailers, trowels, shovels, hand augers or any other type of equipment used during field activities.

Decontamination is performed as a quality assurance measure and a safety precaution. It prevents cross contamination between samples and also helps to maintain a clean working environment.

Decontamination is achieved mainly by rinsing with liquids which include: soap and or detergent solutions, tap water, distilled water and methanol. Equipment may be allowed to air dry after being cleaned or may be wiped dry with chemical free cloths or paper towels if immediate re-use is needed.

At most project sites, decontamination will be accomplished between each sample collection point. Waste products produced by the decontamination procedures such as waste liquids, solids, rags, gloves, etc. will be collected and disposed of properly based on the nature of contamination. Specific details for the handling of the decontamination wastes will be addressed in the project plans.

2.0 Responsibilities

It is the responsibility of the field sampling coordinator to assure that the proper decontamination procedures are followed and that all waste materials produced by decontamination are properly managed. It is the responsibility of the project safety officer to draft and enforce safety measures which provide the best protection for all persons involved directly with sampling and or decontamination.

It is the responsibility of any subcontractors (i.e., drilling contractors) to follow the proper, designated decon-tamination procedures that are stated in their contracts and outlined in the Project Health and Safety Plan. It is the responsibility of all personnel involved with sample collection or decontamination to maintain a clean working environment and to ensure that any contaminants are not negligently introduced to the environment.

3.0 Supporting Materials

- Cleaning liquids and dispensers: soap and or detergent solutions, tap water, distilled water, methanol,
- Personal safety gear as defined in the Project Health and Safety Plan,
- Chemical free paper towels,
- Disposable gloves,
- Waste storage containers: drums, boxes, plastic bags,
- Cleaning containers: plastic and/or galvanized steel pans and buckets,
- Cleaning brushes, and
- Aluminum foil

4.0 Methods/Procedures

The extent of known contamination will determine the degree of decontamination required. If the extent of contamination cannot be readily determined, cleaning should be done according to the assumption that the equipment is highly contaminated.

The standard procedures listed below can be considered the procedure for full field decontamination. If different or more elaborate procedures are required for a specific project, they will be spelled out in the project plans. Such variations in decontamination may include following all, just part, or an expanded scope of the decontamination procedure stated herein.

- Remove gross contamination from the equipment by brushing and then rinsing with tap water.
- Wash with soap or detergent solution.
- Rinse with tap water.
- Rinse with methanol.
- Rinse with distilled water.
- Repeat entire procedure or any parts of the procedure as necessary.

5.0 Quality Assurance/Quality Control

To assess the adequacy of decontamination procedures, field blanks are collected for aqueous samples and replicates are collected for soil samples. The specific number of blanks and replicates will be defined in the project sampling plan. In general, for water samples, one field blank will be collected per sampling event and per sampling equipment.

6.0 Documentation

Field notes will be kept describing the procedure used to collect the field blanks. The field notes will be kept in the project files.

SOP 210: SOIL SAMPLING AND SUBSURFACE EXPLORATION

1.0 Purpose and Applicability

This SOP describes the methods used in obtaining soil samples for physical testing, stratigraphic correlations, and chemical analysis. Soil samples are obtained in conjunction with test pit excavations, soil borings, and monitoring well installation programs. These procedures provide direct information as to the physical makeup of the surface and subsurface environment. This SOP will discuss sampling of the surface material with hand tools and sampling of the subsurface material by augers and split spoons, and within test pits.

2.0 Responsibilities

The project geologist/engineer will be responsible for the proper use and maintenance of all types of equipment used for obtaining surface and test pit samples. The geologist/engineer will determine the location, total depth and overall size of each surface sample collection point and test pit, and the location and depth of all subsurface borings.

It is the responsibility of contractors to provide the necessary materials for obtaining subsurface samples in borings and for the decontamination of these materials. Construction of test pits, split spoon sampling, and subsurface augering will be conducted by the contractor.

It shall be the responsibility of the project geologist/engineer to observe all activities pertaining to soil sampling and subsurface investigations to ensure that all the standard procedures are followed properly, and to record all pertinent data, including unified soil system classification, on a field log or field book. The collection, handling, and storage of all samples will be the responsibility of the geologist/engineer.

3.0 Supporting Materials

In addition to materials provided by a contractor, the geologist/engineer will provide:

- Sample bottles/containers and labels,
- Boring and test pit logs,
- Field notebook,
- Chain of custody forms,
- Depth measurement device,
- Stakes and fluorescent flagging tape,
- Decontamination solutions,
- Camera for photographing sections, and
- Sample cutting/extracting equipment: knives, trowels, shovels, hand auger.

4.0 Methods

Specific sampling equipment and methodology will be dictated by the characteristics of the soil to be sampled, the type of soil samples required and by the analytical procedures to be employed. Soil samples obtained at the surface may be collected using a shovel, trowel or hand auger. A hand auger can be used to extract shallow soil samples up to 10 feet below the surface. Sampling to obtain uniform coverage within a specified area will often require the use of an area grid. These considerations will be followed based upon specific project requirements.

The sampling depth interval in borings is typically one sample per every five feet with additional samples taken at the discretion of the project geologist/engineer when significant textural or odor changes are encountered. Deviations in the standard operating procedure will be covered in the project specific operating procedures.

Most subsurface explorations by ReTeC will be on privately owned land and often an industrial facility. Prior to commencing subsurface exploration ReTeC will work with the facility manager to locate any subsurface utilities or structures. If no data are available, utilities (electric, water, sewer, etc.) who may have equipment or transmission lines buried in the vicinity will be notified. Many regions have organizations which represent all utilities for these notification purposes. Allow enough time after notification (typically three working days) for the utilities to respond and provide locations of any equipment which may be buried on site.

4.1 General Applications

General locations for test pits and sampling locations may be documented by survey or by using topographic maps and/or plans. A preliminary log of the test pit, or boring shall be prepared in the field by the geologist or engineer. A sketch of the test pit may be necessary to depict the strata encountered.

Sampling locations shall be mapped by the geologist or engineer. Before measuring the depth to the groundwater, if encountered, the geologist or engineer will allow sufficient time for stabilization of the groundwater table. All information shall be recorded in a log book. The data shall be transferred at a later date to profiles or logs at a scale to be determined by the geologist or engineer.

4.2 Surface Sampling

Prior to surface sampling, remove all surface materials that are not to be included such as rocks, twigs, leaves. For sample collection within the upper two to three feet use a shovel or trowel. A hang auger may be used to depths of up to 10 feet. When using the hand auger, auger the hole to the required depth, then slowly remove the auger and collect the soil sample from the auger flight at the point corresponding to the required depth. A tube sampler can be attached to the auger rods after augering to the desired depth, inserted into the open borehole, and then advanced into the deposits at the base of the boring. If sampling is in sandy or non-cohesive soil, a shovel may be necessary to collect samples.

4.3 Test Pit Excavation and Sampling

The test pits shall be excavated in compliance with applicable safety regulations. Walls should be cut as near vertical as possible to facilitate stratigraphic logging. The size and depth of test pit shall be recorded in the Test Pit Log shown in Figure 1.

Photographs of specific geologic features may be required for documentation purposes. A scale or an item providing a size perspective should be placed in each photograph. The frame number and picture location shall also be documented in the field log book.

The test pit shall be inspected to ensure that all the appropriate and/or required data and samples have been collected. All test pits will be backfilled to original grade and compacted.

4.4 Subsurface Sampling

Borings are typically advanced by two methods, rotary drilling and augering. The casing shall be of the flush joint or flush couple type and of sufficient size to allow for soil sampling, coring, and/or well installation. All casing sections shall be straight and free of any obstructions. Hollow stem augers or solid flight augers with casing may be used according to specific project requirements. Rotary drilling may be used in dense formations to advance to the required sample depth where a split spoon sampler or a coring device will be used to obtain the sample. Recirculated water shall not be used when casing is being driven unless specified in project specific plans and/or directed and properly documented by the geologist/ engineer. If recirculated water is used all loose material within the casing shall be removed by washing to the required sampling depth using a minimum amount of water. Care should be taken to limit recirculation of the wash water to those times when the water supply is extremely limited or unavailable.

Subsurface soil samples shall be obtained using a split-tube type sampler (split spoon). Split spoons come in a variety of sizes with the most standard having a 2-inch OD, a 1 3/8-inch ID and a 24-inch long barrel with an 18-inch sample capacity. Split spoons shall be equipped with a check valve at the top and a flap valve or basket type retainer at the

Project ______ Site ______ TEST PIT ______ Sh ____ of ____
Date ______ Location ______ Ground Elevation ______
Total Depth ______ Contractor ______
Equipment Used ______ Logged by ______
Remarks ______

Elev. Feet	Depth Feet	Sample		Soil & Rock Description & Comments
		Type & No.	Depth Range	

Test Pit Plan

North

Groundwater		
Date	Time (Hours After Completion)	Depth (Feet)

bottom. Samples shall be obtained using the standard penetration test (SPT), which allows for determination of resistance within the deposits. The number of hammer blows shall be recorded on the boring log.

The split spoon sampler shall be immediately opened upon removal from the casing. If the soil will be sampled for volatile organic analyses the soil sample must be collected as soon as practicable after the split-spoon is opened to minimize the loss of volatiles. The sample jar will then be transferred into a cooler containing ice.If the recovery is inadequate, further attempts shall be made until the amount of material is of a sufficient quantity as necessary for the required sample size. The sampler shall be decontaminated between attempts, in accordance with SOP 120 to prevent cross contamination.

In the event that gravels or other material prevents penetration by the split spoon, samples will be collected from the auger flights. Slowly remove the auger and collect the sample at the point corresponding to the required depth.

4.5 Sample Handling

Specific procedures pertaining to the handling and shipment of samples shall be followed according to SOP 110. Sample containers (jars or bags) shall be labelled with the following information:

- Client/project name,
- Test pit,boring, or sampling point number,
- Sample number/identification,
- Horizontal/vertical location, and
- Date of collection.

These data shall be similarly recorded on to the sample log sheets and field log book.

Larger, bulk samples shall be placed in cloth bags with plastic liners. Sample bags shall be marked with the information listed above.

5.0 Documentation

- Test pit or boring log,
- Sample log sheets,
- Field log book,
- Chain of custody forms, and
- Shipping receipts

All documentation shall be placed in the project files and retained following completion of the project.

SOP 230: GROUNDWATER SAMPLING

1.0 Purpose and Applicability

This SOP is concerned with the collection of valid and representative samples from groundwater monitoring wells.

2.0 Responsibilities

The field sampling coordinator will have the responsibility to oversee and ensure that all groundwater sampling is performed in accordance with the project specific sampling program and this SOP. In addition, the field sampling coordinator must ensure that all field workers are fully apprised of this SOP.

3.0 Supporting Materials

The list below identifies the types of equipment which may be used for a range of groundwater sampling applications. From this list, a project specific equipment list will be selected based upon project objectives, the depth to ground water, purge volumes, analytical parameters and well construction. The types of sampling equipment are as follows:

3.1 Purging/Sample Collection

- Bailers and bailer cord,
- Centrifugal pump,
- Bladder pump, and
- Peristaltic pump.

3.2 Sample Preparation/Field Measurement

- pH meter,
- Specific conductance meter,
- Filtration apparatus, and
- Water level measurement equipment.

3.3 General

- Project specific sampling program,
- Distilled water dispenser bottle,
- Methanol dispenser bottle,
- Personal protection equipment as specified in the Project Health and Safety Plan,
- Field data sheets and log book,
- Preservation solutions,
- Sample containers,
- Buckets and intermediate containers,
- Coolers,
- Water filters, and
- Chemical free paper towels.

4.0 Water Level Measurement

After unlocking and/or opening a monitoring well, the first task will be to obtain a water level measurement. Water level measurements will be made using an electronic or mechanical device.

The measuring point location for the well should be clearly marked on the outermost casing or identified in previous sample collection records. If no measuring point can be determined, a measuring point should be established. Typically the top of the protective or outermost well casing will be used as the measuring point. The measuring point location should be described on the Groundwater Sample Collection Record (see Figure 1).

To obtain a water level measurement lower a decontaminated mechanical or an electronic sounding unit into the monitoring well until the audible sound of the unit is detected or indicates water contact. At this time the precise measurement should be determined by repeatedly raising and lowering the tape or cable to converge on the exact measurement. The water level measurement should be entered on the Groundwater Sample Collection Record. The water level measurement device shall be decontaminated immediately after use.

5.0 Purging and Sample Collection Procedures

5.1 Introduction

Purging must be performed for all groundwater monitoring wells prior to sample collection. Depending on the stability of pH and conductivity readings, three or more volumes of groundwater present in a well shall be withdrawn prior to sample collection. The volume of water present in each well shall be computed using the two measurable values, length of water column and monitoring well inside diameter.

Three general methods are used for well purging. Well purging may be achieved using bailers, surface pumps, or down well submersible pumps. In all cases pH and or specific conductance will be monitored during purging. Field parameter values will be entered on the Groundwater Sample Collection Record along with the corresponding purge volume. The following sections explain the procedures to be used to purge and collect samples from monitoring wells.

5.2 Bailing

Obtain a clean decontaminated bailer and a spool of poly- propylene rope or equivalent bailer cord. Using the rope at the end of the spool tie a bowline knot or

REMEDIATION TECHNOLOGIES, INC.
Groundwater Sampling Form

PROJECT ______________________________ **WELL NO.** ______________________________
PROJECT NO. __________________________ **SAMPLERS** ______________________________

1. WELL CONDITION CHECKLIST

a. Bump posts ____________ Pro. casing/lock ____________ Surface pad ____________
b. Well visibility (paint) ______________________________
c. Well label ______________________________

2. WATER LEVEL MEASUREMENT

DATE ______________ TIME ______________
WEATHER CONDITIONS ______________________________

a. Location of measuring point ______________________________
b. Depth of water table from measuring point ______________________________
c. Height of measuring point above ground surface ______________________________
d. Total depth of well below measuring point ______________________________
e. Length of water column (line 2d-2b) ______________________________

3. WELL PURGING

DATE ______________ TIME ______________
WEATHER CONDITIONS ______________________________

a. Purge method ______________________________
b. Required purge volume at 3 well volumes ______________________________

Pumping Duration/Vol Rmvd	pH	Cond.	T(C)	Appearance

4. SAMPLE COLLECTION

DATE ______________ TIME ______________
WEATHER CONDITIONS ______________________________

a. Collection Method ______________________________
b. Meter Calibration: Date Model
   pH Meter ______________________________
   Conductivity Meter ______________________________
c. Sample Information pH __________ Cond. __________ T(C) __________

Analysis	Containers	Sample Prep./Preservation

d. Chain of Custody Form ______________ COC Tape ______________
e. Shipping Container ______________________________

5. COMMENTS: ______________________________

equivalent through the bailer loop. Test the knot for adequacy by creating tension between the line and the bailer. Tie again if needed.

Lower the bailer to the bottom of the monitoring well and remove an additional five feet of cord from the spool. Cut the cord at the spool and secure the rope to the well head or the wrist of the person who shall perform the bailing.

Raise the bailer by grasping a section of cord using each hand alternately. This bailer lift method is used so that the bailer cord will not come into contact with the ground or other potentially contaminated surfaces.

Samples collected by bailing will be poured directly into sample containers from bailers which are full of fresh groundwater. Fill VOA vial first. During sample collection, bailers will not be allowed to contact the sample containers.

5.3 Pumping

Groundwater withdrawal using pumps is commonly performed with centrifugal, peristaltic, submersible or bladder pumps. Peristaltic and centrifugal pumps are limited to conditions where groundwater need only be raised through approximately 20 to 25 feet of vertical distance. Submersible or bladder pumps can be used when groundwater is greater than 25 feet below grade. Specific methods for pumps will be discussed in the project specific sampling plan. Pumping for collection of samples to be analyzed for volatile organics will only be with bladder pumps.

6.0 Sample Preparation and Filtration

Prior to transport or shipment, groundwater samples may require preparation and or preservation. Field preparation may entail filtration, or preservation in the form of chemical additives or temperature control.

Specific preservation techniques are described in the EPA document, Handbook for Sampling and Sample Preservation of Water and Wastewater (EPA-600/4-82-029). The EPA manual will be consulted during the planning stage of the project. Project specific sampling plans shall be assembled using the approved procedures obtained from the EPA manual.

Groundwater samples collected for dissolved metals analyses will be filtered prior to being placed in sample containers. Groundwater filtration will be performed using a peristaltic pump and a 0.45 micron water filter. For most dissolved metal analyses, pH adjustment of the sample is also required and shall be performed after filtration.

7.0 Documentation

A number of different documents will be completed and maintained as a part of groundwater sampling. The documents will provide a summary of the sample collection procedures and conditions, shipment method, the analyses requested and the custody history. The list of documents is:

- Field log book,
- Groundwater sample collection record,
- Sample labels,
- Chain of custody, and
- Shipping receipts.

8.0 References

EPA, Handbook for Sampling and Sample Preservation of Water and Wastewater, EPA-600/4-82-029, September 1982.

SOP 231: WATER LEVEL MEASUREMENT

1.0 Purpose and Applicability

This SOP is concerned with the measurement of water levels in groundwater monitoring wells. Water level measurements are fundamental to groundwater and solute transport studies. Some of the major uses of water level data are to indicate the directions of groundwater flow and areas of recharge and discharge, to evaluate the effects of manmade and natural stresses on the groundwater system, to define the hydraulic characteristics of aquifers, and to evaluate stream-aquifer relations. Measurements of the static water level are also needed to estimated the amount of water to be purged from a well prior to sample collection.

2.0 Responsibilities

The field sampling coordinator will have the responsibility to oversee and ensure that all procedures are performed in accordance with the project specific program and this SOP. In addition, the field sampling coordinator must ensure that all field workers are fully apprised of this SOP.

3.0 Supporting Materials

The list below identifies the types of equipment which may be used for measurement of groundwater levels. From this list, a project specific equipment list will be selected based upon project objectives, observed or probable well contamination and well construction. The types of water level measurement equipment are as follows:

- Water level and/or product level measuring device,
- Distilled water dispenser bottle,
- Hexane dispenser bottle,

- Personal protection equipment as specified in the Project Health and Safety Plan,
- Field data sheets and log book,
- Chemical free paper towels.

4.0 <u>Procedures Before Measuring Water Levels</u>

Upon arrival at the monitoring well, the condition of the surface seal and well protector should be examined for any evidence of frost heaving, cracking, or vandalism. All observations should be recorded in the field logbook. The area around the well should be cleared of weeds and other materials prior to beginning measurement of the static water level. A drop cloth or other material should be placed on the ground around the well, particularly if the ground is disturbed or potentially contaminated. This will save time and work of cleaning equipment or tubing should they fall on the ground during preparation or operation. The well protector should then be unlocked and the cap removed from the top of the well.

4.1 Measuring Point Location

The measuring point location for the well should be clearly marked on the outermost casing or identified in previous sample collection records. If no measuring point can be determined, a measuring point should be established. Typically the top of the protective or outermost well casing will be used as the measuring point. The measuring point location should be described in the field notebook. Monitoring well measurements for total depth and water level should be consistently measured from one reference point so that these data can be used for assessing trends in the groundwater.

4.2 Safety Considerations

The air in the well head shall be sampled for organic vapors using either a photoionization analyzer or an organic vapor analyzer, and the results recorded in the field logbook. This serves as the first indication of the presence of a lighter than water contaminant. If the potential for fire or explosion exists, additional personal monitoring shall be conducted.

If the well is suspected of being contaminated, or has a history of contamination, the static water level measurements should be made while wearing appropriate protective gear.

5.0 Water Level Measurement

Water level measurements will be made using an electronic or mechanical device. Several methods for water level measurement are described below. The specific method used will be defined in the Groundwater Sampling Plan.

5.1 Graduated Steel Tape

The graduated steel tape method is considered an accurate method for measuring the water level in nonflowing wells. Steel surveying tapes in lengths of 100, 200, 300, 500, and 1,000 feet are commonly used. A black tape is better than a chromium-plated tape. The tapes are mounted on hand-cranked reels up to 500-ft lengths; for greater depth a motor-driven tape drive is usually required. A slender weight is attached to the ring at the end of the tape to insure plumpness and to permit some feel for obstructions.

The lower few feet of tape is chalked by pulling the tape across a piece of blue carpenter's chalk. The wet chalk mark identifies the portion of the tape that was submerged. Lower the graduated steel-tape from the measuring point at the top of the well until a short length of the tape is submerged. The weight and tape should be lowered into the water slowly to prevent splashing. Submergence of the weight and tape may temporarily cause a water-level rise in wells or piezometers having very small diameters. This effect can be significant if the well is in materials of very low hydraulic conductivity. Under dry surface conditions, it may be desirable to pull the tape from the well by hand, being careful not to allow it to become kinked, and reading the water mark before rewinding the tape onto the reel. In this way, the water mark on the chalked part of the tape is rapidly brought to the surface before the wetted part of the tape dries. In cold regions, rapid withdrawal of the tape from the well is necessary before the wet part freezes and becomes difficult to read. Read the tape at the measuring point, and then read the water mark on the tape. The difference between these two readings is the depth to water below the measuring point.

Errors resulting from the effects of thermal expansion of tapes and of stretch due to the suspended weight of the tape and plumb weight can become significant at high temperatures and for measured depths in excess of 1,000 feet.

The observer should make two measurements. If two measurements of static water level made within a few minutes do not agree within 0.01 or 0.02 foot in observation wells having depth to water of less than a couple hundred feet, continue to measure until the reason for the lack of agreement is determined or until the results are shown to be reliable. Where water is dripping into the hole or covering its wall, it may be impossible to get a good water mark on the chalked tape.

5.2 Electrical Methods

Many types of electrical instruments are available for water level measurement; most operate on the principle that a circuit is completed when two electrodes are immersed in water. Electrodes are generally contained in a weighted probe that keeps the tape taut while providing some shielding of the electrodes against false indications as the probe is being lowered into the hole. Before lowering the probe in the well, the circuitry can be checked by dipping the probe in water and observing the indicator (a light, sound, and/or meter).

To obtain a water level measurement slowly lower the decontaminated probe into the monitoring well until the indicator (light, sound, and/or meter) shows water contact. At this time the precise measurement should be determined by repeatedly raising and lowering the tape or cable to converge on the exact measurement.

In wells having a layer of product floating on the water, the electric tape will not respond to the oil surface and , thus, the fluid level determined will be different than would be determined by a steel tape. The difference depends on how much product is floating on the water. Dual media tapes may be used in these instance to measure both product and water levels using the same measuring device.

The water level/product level measurement should be entered in the field logbook. The water level measurement device shall be decontaminated immediately after use following the procedures described in SOP 120: Decontamination.

5.3 Air Line

The air line method is especially useful in pumped wells where water turbulence may preclude using more precise methods. A small diameter air-type tube of known length is installed from the surface to a depth below the lowest water level expected. Compressed air is used to purge the water from the tube. The pressure, in pounds per square inch (psi), needed to purge the water from the air line multiplied by 2.31 (feet of water for one psi) equals the length in feet of submerged airline. The depth to water below the center of the pressure gage can be easily calculated by subtracting the length of air line below the water surface from the total length of air line (assuming the air line is essentially straight).

Accuracy depends on the precision to which the pressure can be read. The accuracy of an air line or pressure gage measurement depends primarily on the accuracy and condition of the gage but is normally within one foot of the true level as determined by means of a steel-tape measurement. The air lines themselves, however, have been known to become clogged with mineral deposits or bacterial growth or to develop leaks and consequently yield false information. A series of air line measurements should be checked periodically by the use of a steel tape or an electric water-level indicator.

The air line and any connections to it must be airtight throughout its entire length. A long-term increase in air line pressure may indicate gradual clogging of the air line. A relatively sudden decrease in air line pressure may indicate a leak or break in the air line. Air line pressures that never go above a constant low value may indicate that the water level has dropped below the outlet orifice of the air line. To minimize the effect of turbulence, the lower end of the air line should be at least five feet above or below the pump intake. Corrections should be made for fluid temperatures much different from 20°C and for vertical differences in air density in the well column for cases where the depth to water is very large.

6.0 Procedures for Immiscible Fluids

At those facilities where monitoring to determine the presence or extent of immiscible contaminants is required, the sampler will need to use special procedures for the measurement of fluid levels. The procedures required will depend on whether light immiscibles that form lenses floating on top of the water table or dense immiscibles that sink through the aquifer and form lenses over lower permeability layers are present.

In the case of light immiscibles, measurements of immiscible fluid and water level usually cannot normally be accomplished by using normal techniques. For example, a chalked steel tape measurement will only indicate the depth to the immiscible fluid (not the depth to water) and a conventional electric water level probe will not generally respond to nonconducting immiscible fluids. Similar problems are found with other techniques.

To circumvent these problems, the use of special techniques and equipment can be specified. These techniques have been specially developed to measure fluid levels in wells containing immiscible fluids, particularly petroleum products. One method is similar to the chalked steel tape method. The difference is the use of a special paste or gel rather than ordinary carpenters chalk. Such indicator pastes, when applied to the end of the steel tape and submerged in the well, will show the top of the oil as a wet line and the top of the water as a distinct color change. Another method, similar to the electric tape method, uses a dual purpose probe and indicator system. The probe can detect the presence of any fluid (through the wetting effect) and can also detect fluids that conduct electricity. Thus, if a well is contaminated with low density, nonconducting immiscible fluids such as gasoline, the probe will first detect the surface of the gasoline, but it will not register electrical conduction. However, when the probe is lowered deeper to contact water, electrical conduction will be detected.

7.0 Measurement of Total Depth

During water level measurement, the total depth of the well may also be measured. This measurement gives an indication of possible sediment buildup within the well that may significantly reduce the screened depth. The same methods used for measuring water levels (e.g. steel tape or electrical probes) may be used to measure the total well depth. The most convenient time to measure the total well depth is immediately following measurement of the water level and prior to removing the measurement device completely from the well. The measurement device (steel tape or electrical probe) is lowered down the well until the measurement tape becomes slack indicating the weighted end of the tape or probe has reached the bottom of the well. The total depth of shall be recorded in the field logbook.

8.0 Documentation

Data entry will be made on a groundwater sample collection record as a part of water level measurement. Additional comments, observations, or details will be entered in the field log book. These documents will provide a summary of the water level measurement procedures and conditions.

SOP 310: JAR HEADSPACE SCREENING

1.0 Purpose and Applicability

This SOP describes the basic techniques for using a jar headspace analysis to screen for volatile organics from contaminated soils using a portable Photoionization Detector (PID) or Flame Ionization Detector (FID).

2.0 Responsibilities

The field geologist/engineer has the responsibility to oversee and ensure that samples are screened in accordance with this SOP and the project work plan.

3.0 Supporting Materials

The field geologist engineer will provide the following:

- 16 oz. soil or "mason" type jars;
- aluminum foil;
- PID/FID instrument; and,
- field notebook.

4.0 Methods/Procedures

Half-fill one clean glass jar with the sample to be analyzed. Quickly cover each open top with one to two sheets of clean aluminum foil and subsequently apply screw caps to tightly seal the jars. Allow headspace development for at least ten minutes. Vigorously shake jars for 15 seconds, both at the beginning and end of the headspace development period. Where ambient temperatures are below 32°F (0 C), headspace development should be within a heated vehicle or building.

Subsequent to headspace development, remove screw lid/expose foil seal. Quickly puncture foil seal with instrument sampling probe, to a point about one-half of the headspace depth. Exercise care to avoid uptake of water droplets or soil particulates. As an alternative, use a syringe to withdraw a headspace sample with subsequent injection to instrument probe or septum-fitted inlet is acceptable contingent upon verification of methodology accuracy using a test gas standard. Following probe insertion through foil seal and/or sample injection to probe, record highest meter response as the jar headspace concentration. Using foil seal/probe insertion method, maximum response should occur between two and five seconds. Erratic meter response may occur at high organic vapor concentrations or conditions of elevated headspace moisture, in which case headspace data should be discounted.

5.0 Quality Assurance/Quality Control

QA/QC will include the collection of duplicate samples. Data generated between the duplicates should be consistent to plus or minus twenty percent. Also, the PID/FID instrument shall be checked/adjusted no less than once every ten analyses.

6.0 Documentation

All data generated (results and duplicate comparisons) will be recorded in the field notebook. Any deviation from the outlined procedure will also be noted.

SOP 751: SOIL GAS MEASUREMENTS USING THE PreSIT℠ METHOD

1.0 PURPOSE AND APPLICABILITY

This SOP describes the methods to be used for measurement of volatile chemical concentrations in soil gas samples using the PreSIT℠ Method of Remediation Technologies, Inc. Chemical concentrations are measured *in situ* using gas detector tubes with results read directly in the field. The investigative program can be changed in the field in response to the results. The data quality objective of this method is to delineate source areas of contamination via chemical concentrations in soil gas in a timely and cost-effective manner. Appendix A is a general brochure on the method with a picture of some of the equipment. Appendix B discusses the chemical rationale of this approach for locating source areas. Appendix C provides a general discission on Dräger tubes.

2.0 RESPONSIBILITIES

The project geologist/scientist will be responsible for ensuring the proper use and maintenance of all equipment used in making the measurements. The geologist/scientist will determine the location and depths of measurement points. The field crew will be responsible to provide, operate, and maintain the equipment and to make the soil gas measurements. The geologist/scientist will be responsible to observe all activities pertaining to the measurements and to ensure that all standard procedures are properly followed.

The geologist/scientist will be responsible to record all pertinent field data including, but not limited to, the following:

- client/project name,
- measurement point name/number,
- date of measurement,
- geologist/scientist's name,
- field crew names,
- location of measurement; map, and

- lithologic description.

All data will be recorded on field logs (Figure 2-1). In addition to the above, the following information specific to each measurement will be recorded by the geologist/scientist or field crew leader:

- depth,
- sample location/number,
- soil type,
- color and stain,
- odor,
- other indication of potential contamination, and
- gas detector tube measurements.

3.0 SUPPORTING MATERIALS

In addition to materials and equipment provided by the field crew, the geologist/scientist will provide:

- chain-of-custody documents,
- sample bottles/containers and labels,
- field notebook,
- stakes and fluorescent flagging tape,
- camera for photographing sections, and
- spatulas for obtaining samples.

4.0 METHODS

4.1 Field Methods

Soil gas concentrations indicative of source areas should be expected to be in the ppm range, typically between 10 ppm and several hundred ppm. Substance-specific gas detector tubes are designed to operate in this range. They allow an on time evaluation and delineation of source areas in a cost-effective manner.

*PreSIT*SM requires a borehole of 1 to 1.5 inches in diameter. The borehole is formed by driving a slotted rod, approximately one inch in diameter, containing a slot of approximately 0.375 inch width and 0.25 inch depth. As the rod is extracted, a soil sample is retrieved in the slot. This soil sample can be collected at boring locations for characterization and analysis. The soil sample is removed by scrapping the slot with a screwdriver, afterwhich it is placed in a four ounce glass sample jar. Soil samples for laboratory VOC analysis are placed into 20 ml vials with zero headspace.

Between borings, the drilling rod is scrapped of residual soil, washed in soap and water, and rinsed in succession with tap water and deionized water. This procedure is designed to prevent cross-contamination of boreholes with the drilling equipment.

A probe containing a gas detector tube in the tip is inserted into that hole. Using a small, hand-operated bellows pump, a defined volume of gas (typically 200 to 500 ml, depending on the type of tube used and the indicating range desired) from the bottom of the hole is drawn through the detector tube. The tube contains a reagent that changes color in the presence of a specific chemical. The length of the color band in the tube indicates the concentration of the chemical vapor. The immediate display enables the field crew to adapt the measuring and sampling program in terms of locations and depth levels to the actual contamination pattern.

Detector tubes manufactured by Drägerwerk AG Lübeck (Germany) are used. Appendix C contains a general discussion about the principals of these detector tubes along with a list of available tubes. These were taken from the 1989 Dräger Detector Tube Handbook.

It has to be considered that gas detector tubes show different degrees of cross-sensitivity. They do not only indicate the substance they are designed and calibrated for, but also some other compounds of similar chemistry. Accordingly, the results are only semi-quantitative. The manufacturer gives a standard deviation of 10% to 15% if only a single substance is involved.

To allow a more accurate qualitative and quantitative assessment of the compounds and concentrations present at a pre-screened location, soil gas samples are subsequently taken from selected points. Using the same boreholes as for the detector tube measurements, a probe containing a disposable, gas-tight 5 mL-syringe in the tip is lowered down the hole. The annulus is sealed at the surface with a cone, and the hollow probe is purged with a hand pump, extracting 1,000 to 2,000 mL of air depending on the sampling depth and thus the volume contained in the probe tubing. Using a pulling device, which is connected to the piston of the syringe, the latter is filled with soil gas. After collecting the sample, it is transferred into a 2 mL glass pipette through its narrow open end by means of a needle which extends to the bottom of the presealed pipette. The sampling vial is then sealed immediately with a torch. Since no leaking septum is involved, the holding time for such samples is up to several months, provided they are stored in a dark place. All samples are stored in a cooler after collection.

After each measuring or sampling event, the probe tips are purged with pressurized air to ensure the removal of volatile compounds potentially adsorbed to those parts of the equipment enclosing either the detector tube or the syringe. The same procedure applies to the drilling rods. After measuring at a significantly contaminated location, the probe tips are previously cleaned with petroleum ether.

4.2 Soil Gas Monitoring Probes

When it is desired to provide for a more precise analysis of the soil gas or monitor soil gas over time, permanent soil gas monitoring probes can be installed. Figure 4-1 is a schematic diagram of a typical soil gas monitoring probe as specified by Remediation Technologies, Inc. The probe is a length of 0.25 inch diameter, aluminum tubing placed in a borehole of approximately 1.5 inches diameter with the bottom three inches of the tube slotted. The bottom 12 inches of the annulus space is filled with a sand pack. The rest of the annulus from there to the surface is filled with a bentonite-clay mixture. The top of the tube is protected with a two-inch PVC pipe and screw-on cap in a concrete apron. This probe accesses the soil gas at the desired depth. Immediately after installation of the probe, 2.5 liters of soil gas is withdrawn with a bellows hand pump to flush out air trapped during installation. This volume represents approximately three time the volume of the tube and sand pack pore space for a 12 foot length of tube and 12 inch send pack. This volume should be adjusted accordingly for different lengths. The borehole for the probe is formed as described in Section 4.1.

Twenty-four or more hours after installation, the probe can be sampled for subsequent laboratory analysis. Prior to collecting a soil gas sample from the probe, a volume of at least 0.4 liters of soil gas will be withdrawn with either a bellows hand pump or a calibrated, electric gas pump to purge the aluminum tube. This volume represents approximately three tube-volumes for a 12 foot length of tube. This volume should be adjusted accordingly for a different tube lengths.

After purging the probe soil gas samples can be collected by two methods: adsorptive tubes, glass bulbs, or Tedlar bags. Soil gas constituents can be captured on adsorptive media (e.g., charcoal tubes) by connecting the adsorptive tube to the aluminum tube and then withdrawing an appropriate volume of soil gas from the monitoring probe directly through the adsorptive tube. A hand bellows pump or calibrated, electric pump is used for the withdrawal. The volume withdrawn should be determined at the time based on the requirements of the adsorptive tube and the desired analytical detection limits.

Instead of the adsorptive tubes, the soil gas can be withdrawn through a 125 milliter (ml) glass bulb equipped with gas tight teflon valves on both ends and a septum. At least three to five bulb volumes should be withdrawn through the bulb before the valves are closed to collect a sampled in order to purge the initial contents of the bulb. The septum provides access via syringes to the soil gas samples for subsequent instrumental analysis (e.g., gas chromatography or gas chromatography/mass spectrometry).

Finally, the gas sample can be withdrawn into a Tedler bag using suitable apparatus for subsequent instrumental analysis.

Following these sampling methods, the soil gas samples should be preserved, shipped, and analyzed in accordance with the specific requirements (e.g., holding times) for the analysis being performed.

5.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Sampling and analysis are performed using appropriate QA/QC procedures to assure data validity. Sample collection activities are recorded on a field log describing details of sampling (e.g., location, date, time, volume, method, etc.). Chain-of-custody forms are prepared and shipped with the samples. A duplicate sample is collected with every tenth soil gas sample. A trip blank is collected at the beginning and end of each soil gas sampling episode. These blanks are collected by collecting an appropriate volume of ambient air at a suitable background location at or near the site. Where smaller numbers of samples are collected, duplicates, and blanks should be specified appropriate for the number of samples.