Albany Community Development Agency

City of Albany • 200 Henry Johnson Boulevard • Albany, NY 12210

Interim Remedial Action Work Plan

Henry Johnson Boulevard Properties
Albany, New York

NYSDEC ERP Project #E401049

May 2011

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4279009

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1. Introduction

The City of Albany, New York (City) received a grant under the 1996 Clean Water/Clean Air Bond Act Environmental Restoration Program (ERP) to conduct a Remedial Investigation/Alternatives Analysis (RI/AA) for the Henry Johnson Boulevard (HJB) Properties (site) in Albany, New York, consisting of five parcels with historic uses including vehicle maintenance and fueling. Soil and groundwater samples collected from the site contained volatile organic compounds (VOCs) at concentrations greater than the corresponding New York State Department of Environmental Conservation (NYSDEC) Standards from historical releases associated with degreasing operations. The RI/AA Report was submitted to the New York State Department of Environmental Conservation (NYSDEC) in August 2009 (Malcolm Pirnie, 2009). A Record of Decision (ROD) for the site was issued in March 2010. The ROD requires focused in-situ chemical oxidation of groundwater, site-wide institutional controls in the form of an environmental easement, development of a Site Management Plan, periodic certification of institutional and engineering controls, and long-term monitoring. Due to the previous removal of chlorinated solvent-impacted soil during a soil removal action (SRA) remaining remedial actions at the site will focus on residual groundwater contamination, largely in the vicinity of SRA 2 at 124 HJB. This Interim Remedial Work Plan has been prepared to address the chlorinated solvents present in the groundwater at the site. This Work Plan presents the objectives and scope of the remedial actions that will be performed at the site and the manner in which they will be achieved. The Site Management Plan, which will summarize the scope of the additional mitigation and monitoring requirements of the ROD, will be submitted to the NYSDEC following implementation of the chemical oxidation remedial action.

2. Site Description and Background

2.1. Site Location and Description

The site includes five properties along Henry Johnson Boulevard (HJB) (historically Northern Boulevard), in the City of Albany, New York. Figure 1 shows the location of the site and Figure 2 identifies the properties included within the site. The assessment area consists of five non-contiguous parcels along the southeastern side of HJB between Clinton Avenue and First Street. One property fronts on Clinton Avenue and four properties front on HJB. The property at 339 Clinton Avenue is the only property on the site with a structure. The building at 339 Clinton Avenue is a three story brick structure with a basement. The ground surface at 124, 126, and 130 HJB is covered with grass. The ground surface at 132 HJB is covered with either gravel, gravely sand with limited grassy vegetation, or deteriorated asphalt and concrete. The only trees present on the site are located at southern extent of 132 HJB.

2.2. Geology/Hydrogeology

As bedrock was not encountered during the RI investigation at depths within 28 feet of the ground surface, the Hudson-Mohawk Sheet of the Geologic Map of New York was reviewed to determine the underlying bedrock at the site (Fisher et al., 1970). Normanskill shale, with minor mudstone and sandstone is present beneath the site and a majority of the surrounding area.

The Hudson-Mohawk Sheet of the Surficial Geologic Map of New York (Caldwell et al., 1987) was used to identify characteristics of the surface geology at the site. Lacustrine sand deposits were identified in the area underlying the site. Based on the subsurface evaluation conducted during the RI, overburden materials generally consisted of fill material overlying cohesive brown and gray clay.

Topography at the site varies from approximately 200 feet above mean sea level (amsl) at the northeastern end of the site to approximately 180 feet amsl at the southwestern end of the site. The depth to groundwater at the site during the RI ranged from 4 to 10 feet below ground surface (bgs). A potentiometric contour map is shown on Figure 3. As shown on Figure 3, the direction of groundwater flow is generally toward the south and southwest, which follows the topographic gradient of the site.

2.3. Site History

Historical records for the site and surrounding areas indicate that it was developed prior to 1892. The properties have historically been residential or commercial.

The property that fronts on Clinton Avenue has apparently remained unchanged or a new building was built in the footprint of a previous building. The property at 124 HJB was historically a service station. The locations of buildings at 124, 126, 128, and 130 HJB appeared to be relatively consistent through 1995; however, no buildings were present on these properties at the time of the RI or the preceding Phase II ESA investigation in 2004 (Malcolm Pirnie, 2005). The property at 132 HJB (formally consisting of properties 132, 134, 136A, and 136B HJB, respectively) were vacant at the time of the investigation. Historically, four separate commercial and residential buildings were on these properties, adjacent to HJB as late as 1908. By 1934 these buildings had been demolished and a single building was located in the center of the combined properties. This facility was identified as a service station. The service station building was listed on the property as late as 1995 but was not present at the time of the RI.

2.4. Previous Investigations

2.4.1. Phase I and II ESAs

Phase I and II Environmental Site Assessments (ESAs) were conducted at the site as part of a USEPA Brownfields Assessment Demonstration Pilot Program grant (Malcolm Pirnie, 2003; Malcolm Pirnie, 2005). Based on field observations made during the Phase II site investigation and the analytical results for samples collected from the site, petroleum compounds were present in the subsurface soil and groundwater in the vicinity of the former vehicle maintenance and refueling facility at 132 HJB. Soil samples collected in this area contained several volatile organic compounds (VOCs) at concentrations greater than the corresponding NYSDEC Technical and Administrative Guidance Memorandum (TAGM) Cleanup Objectives. One groundwater sample contained methyl tert-butyl ether (MTBE), a common gasoline additive, at a concentration greater than the corresponding NYSDEC Glass GA Standard.

Based on field observations and analytical data, chlorinated solvents were present in the subsurface soil and groundwater in the vicinity of the former building foundation at 124 HJB, located in the southwest portion of the site. Soil and groundwater samples collected from this area contained several VOCs at concentrations greater than the corresponding NYSDEC Standards. Potential sources for these VOCs include degreasing operations and underground storage tanks (USTs).

Chromium, mercury, and lead were the Resource Conservation and Recovery Act (RCRA)-listed metals that were most frequently detected at elevated concentrations. Chromium concentrations were generally consistent across the site and likely represent site background conditions. Several soil samples contained mercury at concentrations that exceeded the NYSDEC TAGM Cleanup Objective. Lead was detected at concentrations greater than 500 micrograms per kilogram (µg/kg) in several soil samples collected during the site investigation. Groundwater in the vicinity of the former vehicle maintenance and refueling facility contained lead at a concentration greater than the NYSDEC Standard. Groundwater in the vicinity of the former building foundation at 124 HJB contained several metals at concentrations greater than the corresponding NYSDEC Class GA Standards.

2.4.2. Remedial Investigation

None of the soil samples collected from the site contained concentrations of VOCs or SVOCs greater than the 6NYCRR Part 375 Commercial Soil Cleanup Objectives (CSCOs).   Lead was detected in one surface soil sample and arsenic was detected in only one subsurface soil sample at concentrations above the applicable 6NYCRR Part 375 SCOs. Although polychlorinated biphenyls (PCBs) were detected in one surface soil sample at a concentration greater that the 6NYCRR Part 375 SCOs, the sample was collected from a location that was within the subsequent SRA excavation limits.

Several groundwater samples contained concentrations of VOCs greater than NYSDEC Class GA Standards. The samples collected from the groundwater monitoring wells in the SRA excavation (MW-4/MW-4R) contained the greatest concentration of VOCs. However, the VOC concentrations in these samples decreased by an order of magnitude in the groundwater sampling event following the completion of the SRA. Groundwater samples collected from 132 HJB (MW-1 and MW-2R) contained methyl tertiary butyl ether (MTBE) at concentrations greater than the NYSDEC Class GA Standard. The groundwater sample from MW-3 contained isopropylbenzene at a concentration that exceeded the NYSDEC Class GA Standard during the April 2006 sampling event. The concentrations of this compound in subsequent samples from this location (July and October 2006) were less than the NYSDEC Class GA Standard.

All of the groundwater samples analyzed for metals (some monitoring locations did not contain a sufficient sample volume to analyze for metals) contained concentrations of metals greater than the NYSDEC Class GA Standards. Metals exceedances were reported in on- and off-site wells sampled during the RI. Iron, magnesium, and manganese were among the most common groundwater metals exceedances and are likely due to naturally occurring soil constituents. Sodium exceeded the NYSDEC Class GA Standard in all of the groundwater samples collected during the RI. The prevalence of this element, coupled with the presence of chloride detections in all of the groundwater samples, is likely due to deicing agents. Selenium was also detected in several groundwater monitoring wells at concentrations greater than the applicable NYSDEC Class GA Standard.

All of the soil vapor and ambient air samples collected during the RI contained VOCs. Chlorinated VOCs were detected in soil vapor samples collected within and immediately up-gradient of the SRA excavation area at concentrations that were significantly greater than other soil vapor or ambient air samples collected during the RI. While the New York State Department of Health (NYSDOH) does not regulate these compounds in soil vapor, they are evaluated in conjunction with the concentrations of chemicals of concern found in other environmental media related to the site. Analytical results for off-site air and soil vapor samples collected from 335 Clinton Avenue showed relatively low concentrations of several VOCs that were generally consistent with ambient air and background levels. Based on review of these data, there does not appear to be a vapor intrusion risk at this address.

2.4.3. Soil Removal Action

The 124 HJB property was identified as containing tetrachloroethene (PCE)-impacted soil. Based on the RI evaluations, an SRA was conducted at the property in which approximately 363 tons of PCE-impacted soil was removed from an area approximately 21 foot by 30 foot area excavated to a depth of approximately four feet bgs with all soil transported to the City of Albany Landfill for disposal in accordance with applicable federal, state, and local regulations. The remains of concrete foundations (approximately 20 tons) removed from the excavation were recycled. Sheeting was then installed around the perimeter of the excavation area to a depth of approximately 20 feet bgs to protect adjacent structures. Following the installation of the sheeting, soil was removed to a depth of approximately 12 feet bgs, based on historical site groundwater levels and the maximum depth of PCE-impacted soil, as indicated in previous soil borings. Following confirmation sampling, the excavation was then backfilled with approximately two-feet of washed stone (approximately 2-inch diameter) to provide a highly permeable layer for further remedial measures, if needed. The remainder of the excavation was backfilled, graded, and compacted with riverbank sand and gravel. None of the confirmation samples collected from the SRA excavation area contained VOCs at concentrations greater than Protection of Groundwater SCOs. The concentrations of PCE in sidewall and bottom confirmation samples contained PCE at concentrations less than the respective Protection of Groundwater SCO of 1.3 mg/kg. Based on the results of the SRA, field observations made during the investigation, and the analytical results for investigation and confirmation samples, the main source of contamination at the site has been removed.

3. Interim Remedial Action Implementation

As discussed in Section 2, chlorinated VOCs, primarily PCE, are present in groundwater at the site above applicable New York State Standards. The objective of the remedial program is to reduce the concentration of hazardous constituents in groundwater at the site to NYSDEC Class GA Standards and thereby reduce the risk of vapor intrusion into future buildings at the site and adjacent buildings. Because the area of impacted groundwater is relatively small and provisions for future in-situ chemical oxidation were considered and implemented during the SRA (the installation of two feet of gravel), site conditions are already conducive to full-scale implementation and it is therefore recommended that a full-scale pilot study be conducted after which design parameters including injection frequency and period of performance will be finalized.

A NYSDOH Environmental Laboratory Approval Program (ELAP) and NYSDEC Analytical Services Protocol (ASP)-approved analytical laboratory will analyze all samples collected during the remedial action. ASP Category B data packages will be produced for each sample. All sample collection, handling activities, and QA/QC sampling will be conducted in accordance with the approved Quality Assurance Project Plan (QAPP) for the site (Malcolm Pirnie, 2006).

3.1. Pre-Injection Activities

3.1.1. Well Installation

One four-inch diameter Schedule 80 PVC injection well (IW-1) will be installed near the northern corner of the SRA footprint as shown in Figure 4 using 6.25-inch inner diameter (ID) hollow-stem augers to a depth of approximately 12 feet bgs. The well will be constructed using up to 3 feet of 0.05-inch continuous slot PVC well screen and designed so that the well screen straddles the two feet of washed stone that was placed in the bottom of the SRA excavation. The top of the well casing will be fitted with a coupling to facilitate connection of injection piping.

To augment the existing monitoring well network, one additional two-inch diameter Schedule 40 PVC monitoring well (MW-22) will be installed immediately down-gradient of the SRA footprint as shown in Figure 4 using 4.25-inch inner diameter (ID) hollow-stem augers to a depth of approximately 15 feet bgs. The well will be constructed using up to 10 feet of 0.01-inch slot PVC well screen.

A clean, appropriately sized, filter pack will be installed around the screened interval of each well as the augers are slowly removed. The filter pack will extend approximately two feet above the screened interval. A minimum two-foot thick layer of bentonite pellets will be placed above the filter pack by slowly dropping the pellets along the side of the monitoring well casing. If the bentonite pellets are emplaced above the water table, they will be hydrated with potable water. The augers will then be removed as the remainder of the annulus is tremie grouted to the surface with a cement-bentonite grout to within two feet of the ground surface. Each well will be completed at the surface with a steel flush-mounted cover and concrete pad. Upon completion, each well will be developed in accordance with the QAPP to remove sediment from the well and filter sand pack. Additional details for monitoring well installation using hollow-stem auger methods are included in the QAPP.

3.1.2. Baseline Groundwater Sampling

Groundwater samples will be collected from the injection well and each of the monitoring wells in the vicinity of the injection area (MW-4R, MW-10, MW-11R, MW-12, MW-13, and MW-14) shown in Figure 4. Prior to groundwater purging and sampling the water level in each monitoring well will be measured and recorded. Groundwater sampling will be conducted in accordance with the USEPA Low-Flow/Low-Purge Sampling Protocol (USEPA, 1998). To the extent practicable, groundwater purging rates will be low enough to prevent significant drawdown of the groundwater level in the well. Water levels will be monitored during sampling to ensure that excessive draw down is not occurring. Detailed sampling procedures are included in the QAPP. Each groundwater sample will be analyzed for the following parameters:

- Target Compound List (TCL) VOCs by USEPA Method 8260B;
- Target Analyte List (TAL) Metals by USEPA Methods 6010C and 7470A; and
- Chloride by USEPA Method 325.3.

To evaluate geochemical characteristics of the groundwater, and to evaluate the effectiveness of well purging, temperature, pH, oxidation-reduction potential, specific conductivity, turbidity, and dissolved oxygen will be measured during purging and immediately prior to groundwater sampling.

3.1.3. Baseline Soil Vapor Sampling

3.1.3.1. Soil Vapor Sampling

Air samples from each of the existing soil vapor monitoring points in the vicinity of the injection area (SV-4, SV-5, SV-7, SV-9R, SV-10, and SV-11) will be collected using six liter summa canisters. The canisters will be batch certified clean (in accordance with EPA Method TO-15) and under a vacuum pressure of no more than -25 inches of mercury (in Hg). Flow controllers will be set for a two-hour collection period. Upon completion of sampling, each canister will be checked for final vacuum pressure and shipped to the laboratory for analysis of VOCs using USEPA Method TO-15. Procedures to be used during soil gas sample collection are detailed in the QAPP.

3.1.3.2. Tracer Gas Testing

A tracer gas test will be performed in accordance with NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, 2006) to confirm the integrity of the bentonite seals at each soil vapor probe to minimize the entrainment of ambient air into the soil vapor samples. Helium will be used as the tracer gas since it is non-toxic, non-reactive, and provides a sensitive response that can be monitored using a portable helium detector. Tracer gas testing will be performed at all proposed soil vapor sampling locations. A small plastic container will be placed over the sampling point, filled with helium, and measured using a helium detector to ensure 100 percent concentration of helium in the enclosure. A syringe will be used to purge the sampling tube into a Tedlar® bag which will be tested using the helium detector and a PID. If high concentrations (greater than 10 percent) of tracer gas are observed in the Tedlar® bag, the probe seal will be enhanced to reduce the infiltration of air. Once the probe seal's integrity is confirmed, the 6-liter sampling canister with a vacuum gauge and flow controller will be connected to the sample tubing and the point sampled in accordance with Section 3.1.3.1 and the QAPP.

3.1.3.3. Ambient Air Sampling

One ambient air sample will be collected at the site, to both evaluate the potential on-site exposures resulting from chlorinated VOCs in soil and groundwater in the vicinity of the site, and to establish background values for local ambient air quality. Sample collection will be performed concurrently with the collection of soil vapor samples in accordance with the QAPP.

3.1.4. Investigation Derived Waste

Investigation derived wastes will be handled in accordance with the NYSDEC Proposed Decision TAGM Disposal of Contaminated Groundwater Generated During Site Investigations and the Final TAGM – Disposal of Drill Cuttings. Soil and/or groundwater will be contained in U.N.-approved 55-gallon drums. The drums will be properly labeled with their contents, and staged on-site until they can be properly disposed off-site in accordance with federal, state, and local regulations.

3.1.5. Survey

Upon completion of the pre-injection field activities, the location of the new monitoring and injection wells will be surveyed to the nearest 0.1-foot and horizontally referenced to the same datum used to create the site base map. Well measurement point elevations for top of casing and ground surface will be surveyed to the nearest 0.01-foot vertically to allow for evaluation of local groundwater flow patterns.

3.2. Sodium Permanganate Injection

Following the baseline sampling, a full-scale pilot test will be conducted consisting of one injection of sodium permanganate ($NaMnO_4$) into the new injection well IW-1 (Figure 5). Between approximately 1,700 and 3,400 gallons of 4% $NaMnO_4$ (between approximately 50% and 100% of the gravel backfill pore volume) will be delivered to the subsurface. Due to the high hydraulic conductivity of the SRA backfill it is anticipated that $NaMnO_4$ will be delivered by gravity feed and that pressurized injection will not be necessary. The exact volume of the injection will be dependent upon the observed displacement of groundwater from the gravel pore space. Water levels in monitoring wells in the vicinity and immediately down-gradient of the injection well (MW-11R, MW-4R, MW-10, and MW-22) will be monitored during the injection. If water levels in these wells rise to within two feet of ground surface, injection activities will be halted until water levels recede. If water levels do not recede, the injection activities will be stopped. Additionally, the basement of 339 Clinton Ave, which has a dirt floor, is vacant and owned by the City and therefore can be monitored for permanganate intrusion in conjunction with groundwater levels. If permanganate is found in the basement, injection activities will be stopped and the permanganate will be neutralized with either sodium thiosulfate or an equal parts mixture of hydrogen peroxide, vinegar, and water. The rear portion of 337 Clinton Ave. (immediately adjacent to the SRA area) is not believed to have a basement, although the front of this building could have a basement.

Based on the volume of affected groundwater and concentration of VOCs, the proposed injection would deliver more than sufficient permanganate to breakdown the VOCs at the site. Assuming adequate pore volume displacement, the permanganate is projected to slowly diffuse into the surrounding silt and clay. The persistence of permanganate in the subsurface, compared to other chemical oxidants, permits this approach. Due to the limited spatial extent of PCE-impacted groundwater, it is possible that the pilot test injection could deliver enough $NaMnO_4$ to treat the affected area. The need for subsequent injections will be evaluated after the pilot test. During injection, $NaMnO_4$ distribution will be monitored in the nearby monitoring wells (MW-4R, MW-11R, MW-12, MW-13, MW-14, and the new monitoring well MW-22). Groundwater samples will be collected by lowering a bailer into each monitoring well. The concentration of $NaMnO_4$ in water can be estimated by observing the color (pink to purple) and comparing this color to standard solutions in glass vials (Figure 6). Permanganate concentrations may be visually estimated between the range of approximately 1 milligram per liter (mg/L) and 100 mg/L. Permanganate concentrations lower than 1 mg/L have no purple color and those higher than 100 mg/L have a uniform deep purple color. Additionally, based on the observed $NaMnO_4$ distribution, spectrophotometric methods will be used to analytically measure aqueous concentrations of permanganate.

3.3. Post-Injection/Rebound Monitoring

It is anticipated that after the end of the injection phase, $NaMnO_4$ concentrations will gradually diminish and VOC concentrations may gradually rise due to back diffusion from the lower permeability native clay material. Due to the large difference in hydraulic conductivities between the gravel backfill into which the $NaMnO_4$ will be injected and the native clay material, it is anticipated that maximum $NaMnO_4$ distribution could significantly lag the injection. Therefore, following the injection, $NaMnO_4$ distribution monitoring, as described in Section 3.2, will be conducted weekly for a period of two months or until the maximum spatial extent of $NaMnO_4$ is observed with subsequent $NaMnO_4$ dissipation. The frequency of $NaMnO_4$ distribution monitoring may be adjusted based on the observed rate of $NaMnO_4$ dissipation. When $NaMnO_4$ concentrations decrease to approximately 5 mg/L (i.e., the visible range of $NaMnO_4$ detection), a round of post-injection sampling will be conducted in accordance with Section 3.1.2.

4. Reporting

The results of the pre-injection sampling, injection event details, $NaMnO_4$ distribution monitoring, and post-injection sampling will be summarized in a Construction Completion Report to the NYSDEC upon the receipt of validated analytical results from the post-injection sampling. The report will also include an evaluation of injection effectiveness and recommendations for additional injection events, if necessary. The report will include the following:

- Discussion of field activities.
- Presentation of analytical results for all media sampled.
- Quality assurance/quality control evaluation of the analytical data including the results of the data usability summary report.
- Comparison of analytical results to NYSDEC standards and guidance values.
- Conclusions and recommendations drawn from the interpretation of the data.
- Supporting data, including analytical data packages, field log forms, and monitoring well construction diagrams.

5. Schedule

The anticipated project milestones for the Remedial Action are provided in the following project milestone schedule:

Project Milestone	**Day(s)**
Notice to Proceed	0
Subcontractor Procurement and Scheduling	1 – 30
Pre-Injection Field Work	31-50
Injection Phase Field Work	51-60
Post-Injection Field Work	61-120
Reporting	121-180

6. References

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Malcolm Pirnie, Inc., 2006, Quality Assurance Project Plan, Henry Johnson Boulevard Properties, Albany, New York.

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Albany Community Development Agency
Interim Remedial Action Work Plan
Henry Johnson Blvd. Properties

Figures

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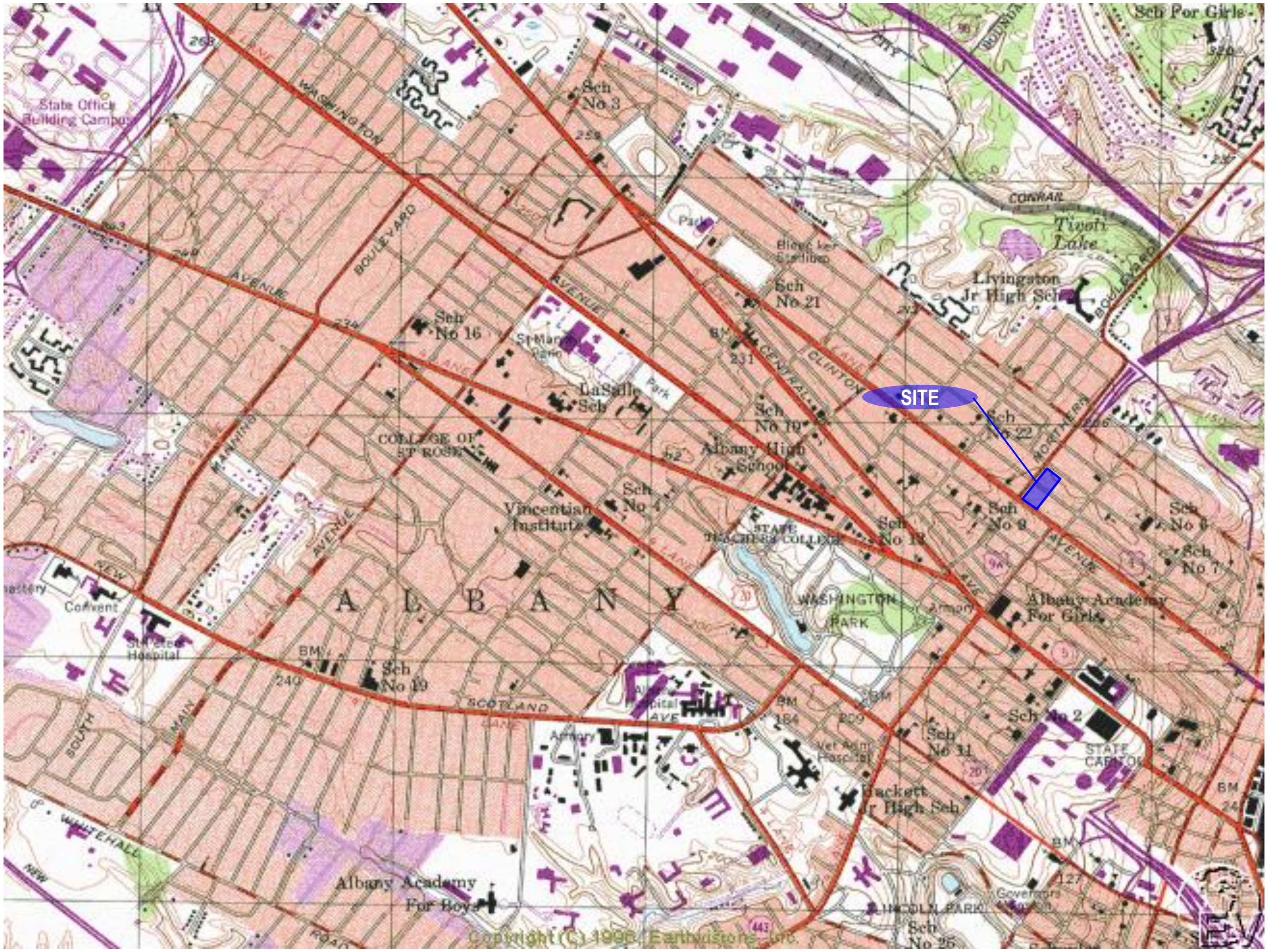


SOURCE: 7.5 MINUTE TOPOGRAPHIC MAP
ALBANY QUADRANGE, NEW YORK
UNITED STATES GEOLOGIC SURVEY 1980.

SCALE IN FEET

0 1000 2000 4000

F:PROJECT\4279009\FILE\HJ WORKPLAN\FIGS 2-1 and 3-1.PPT

MALCOLM PIRNIE

HENRY JOHNSON BOULEVARD PROPERTIES
ALBANY, NEW YORK

SITE LOCATION

FIGURE 1

LEGEND

Henry Johnson Boulevard Properties

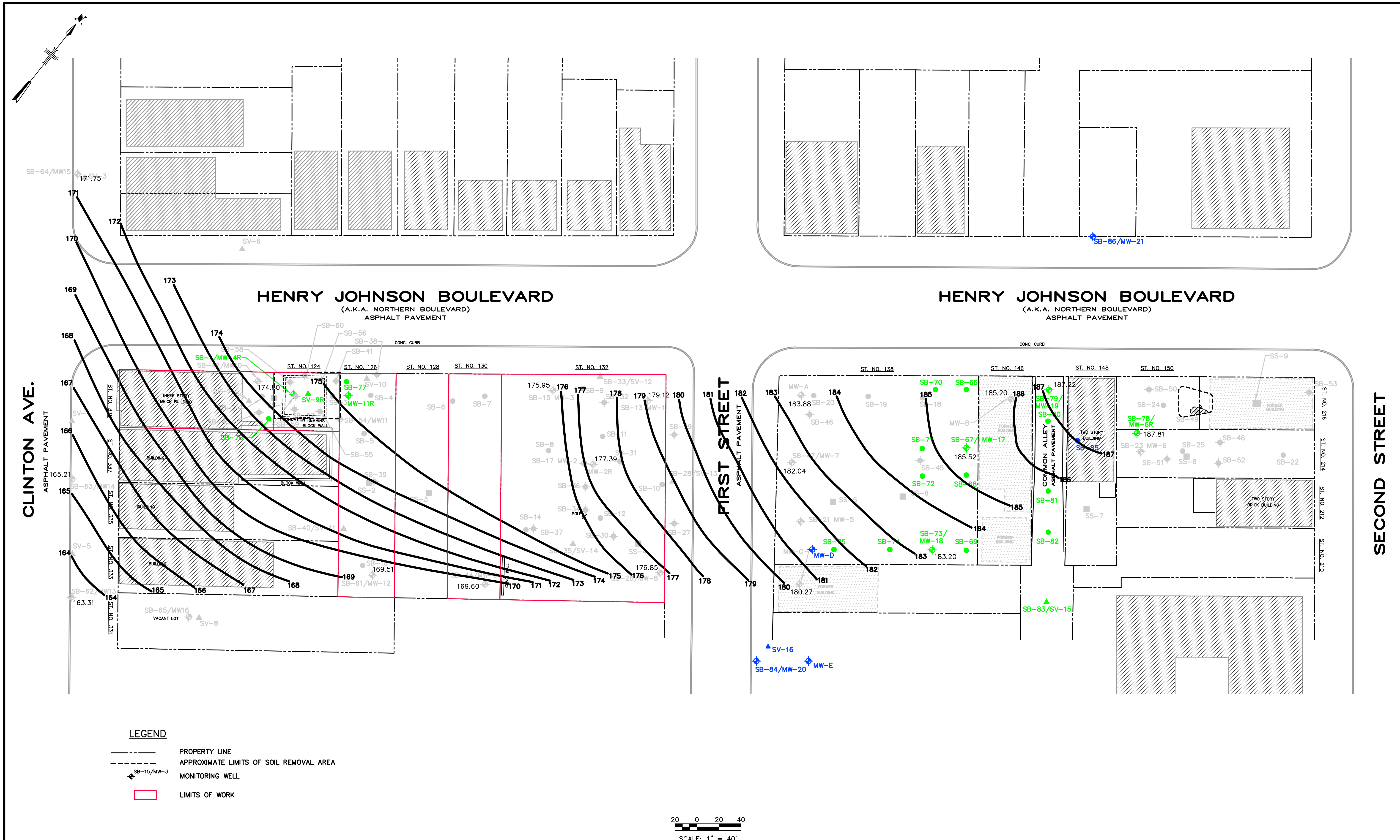
F:\PROJECT\4279009\FILE\HJ WORK PLAN\FIG 2-1.PPT

MALCOLM PIRNIE

HENRY JOHNSON BOULEVARD PROPERTIES
ALBANY, NEW YORK

ASSESSMENT PROPERTIES

FIGURE 2



MALCOLM PIRNIE

REVISIONS			
NO.	BY	DATE	REMARKS

DES JLF
DWN JLF
CKD

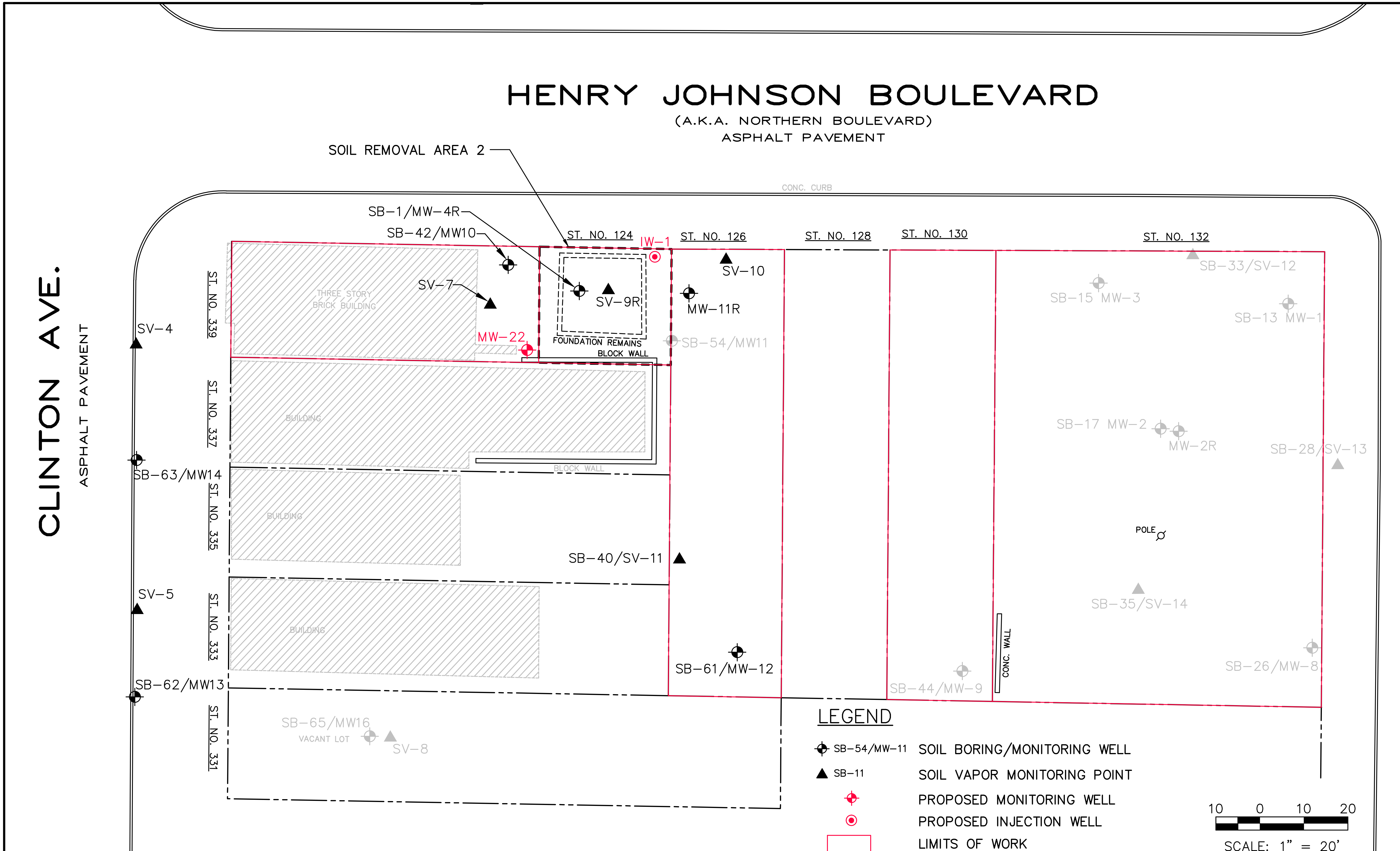
CITY OF ALBANY
ALBANY, NEW YORK
HENRY JOHNSON BOULEVARD ERP

POTENTIOMETRIC MAP (AUGUST 22, 2007)

SCALE: 1"=40'

FIGURE 3

CAD REF. NO. 4279009



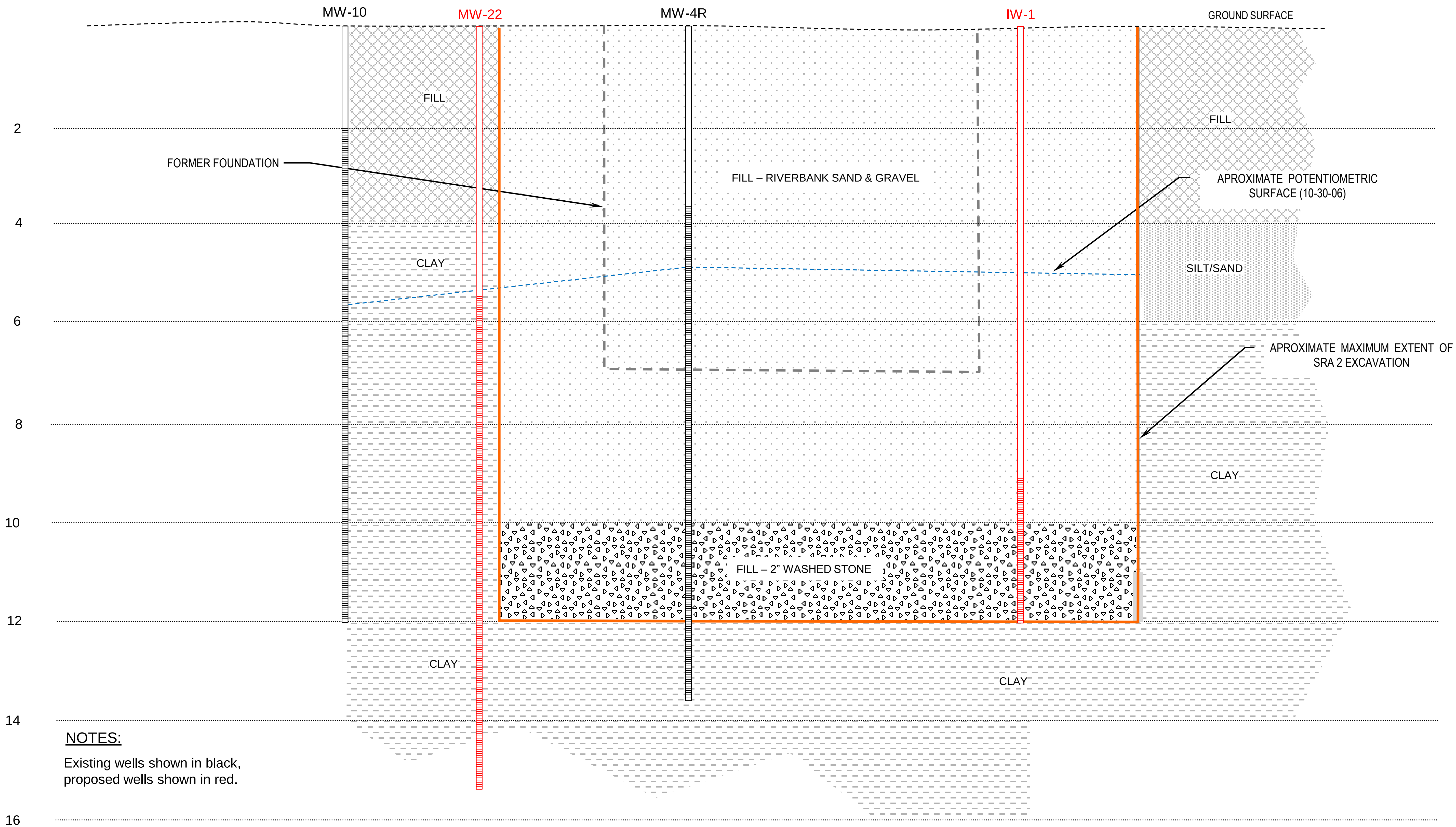
MALCOLM PIRNIE

CITY OF ALBANY
ALBANY, NEW YORK
HENRY JOHNSON BOULEVARD ERP

SAMPLING LOCATIONS

SCALE: AS SHOWN

MALCOLM PIRNIE, INC.
APRIL 2011
FIGURE 4



NOTES:

Existing wells shown in black, proposed wells shown in red.

APPROXIMATE SCALE
HORIZONTAL: 1 INCH = 5 FEET
VERTICAL: 1 INCH = 2 FEET

MALCOLM PIRNIE	HENRY JOHNSON BOULEVARD ERP CITY OF ALBANY, NY	**124 HJB – PROPOSED WELL LOCATIONS & EXCAVATION BACKFILL SUMMARY**	 **FIGURE 5**

F:\PROJECT\4279009\FILE\FIGURE1(11x17)ppt.

MALCOLM PIRNIE

ACDA
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PERMANGANATE COLOR
VARIATION WITH CONCENTRATION

FIGURE 6