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**Water Monitoring, Assessment &
Protection Division**

May 3, 2002

Lori Murtaugh
SCDHEC Bureau of Water
Groundwater Quality Section
2600 Bull Street
Columbia, SC 29201-1708

Re: Corrective Action Plan to Address Impacted Soil
Norfolk Southern Railway Company
Wayne Street Site
Columbia, South Carolina
SCDHEC Site ID No. A-40-AA-16941
NS Project No. SA97023001
MM&A Project No. NS1186-01

Dear Ms. Murtaugh:

Enclosed is the Corrective Action Plan for addressing impacted soil at the above referenced site. If you have any questions, feel free to contact me any time at (919) 786-1414.

Respectfully Submitted,

MARSHALL MILLER & ASSOCIATES, INC.

Larry George, P.G.
Technical Director/Senior Scientist

Enclosure

cc: NS1186-01 File/Reports
Paul DuPuy, Norfolk Southern
Lorraine Pearsall, CPF Associates, Inc.
Van Baker, Southern Region Industrial Realty

(A25)

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CORRECTIVE ACTION PLAN

**Norfolk Southern Railway Company
Wayne Street Site
Columbia, South Carolina**

May 3, 2002

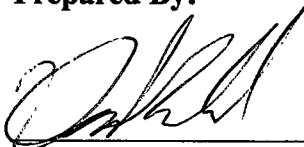
Prepared For:

**Norfolk Southern Railway Company
Environmental Protection Department
110 Franklin Road SE
Roanoke, Virginia 24042-0013**

Prepared By:

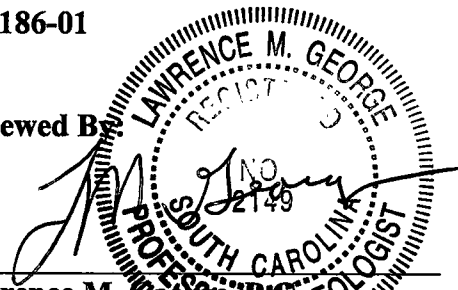
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MM&A Project No. NS1186-01**

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1.0 INTRODUCTION

This Corrective Action Plan (CAP) for soil at the Wayne Street Site in Columbia, South Carolina is submitted for review and comment to the South Carolina Department of Health and Environmental Control (SCDHEC) on behalf of the Norfolk Southern Railway Company (NSRC).

A groundwater monitoring program has been in progress at the site based upon the lead levels detected at MW-11. The results of the monitoring program will be provided in a separate report in the near future as requested by SCDHEC, and groundwater results are not discussed or provided in this soil CAP.

The Plan is focused on soil corrective action in combination with the development of the property, and the preliminary plans for this development are discussed in this report. The City of Columbia, the University of South Carolina, and NSRC have been working together for many years in an effort to revitalize the general area in which the Wayne Street property is located. The Wayne Street property is part of a 200 million dollar revitalization effort extending from the historic Gervais Street redevelopment, known as "The Vista." Significant new community projects in this vicinity include a sports arena, a planned convention center directly adjacent to the Wayne Street property, the Strom Thurmond Wellness Center, and fraternity and sorority housing for the University of South Carolina. All of these projects indicate a need for additional parking in this area. The Wayne Street site will provide this parking, and the plan to develop this property into a surface parking lot is discussed in this report as an important part of the CAP.

The report is divided into the following sections:

- **Section 2: Site Characterization.** This section provides a discussion of the location, history, geology of the site, the soil investigations performed on the property, and an evaluation of exposure potential.
- **Section 3: Proposed Corrective Action.** This section provides a discussion of the proposed plan that involves soil excavation, stabilization, and disposal, additional

investigation in areas remaining uncovered, and the placement of deed restrictions on the property.

- Section 4: Summary of Approach. This section provides a bulleted summary of the approach, together with a tentative schedule and costs.

2.0 SITE CHARACTERIZATION

2.1 SITE LOCATION

The Wayne Street Site is located at 1000 Wayne Street, Columbia, Richland County, South Carolina and occupies approximately 3.65 acres. The site is owned and operated by Norfolk Southern Railway Company. The site is bounded by the Ben Arnold Company to the north and east, rail lines to the east, Pendleton Street to the south, and Wayne Street to the west. The location of the site is depicted on an excerpt of the Columbia, S.C., United States Geological Survey (USGS) 7.5-minute series topographic quadrangle map (Figure 1). Figure 2 illustrates the layout of the property.

2.2 SITE HISTORY

A number of relevant confirmed and probable past land uses of the property were summarized in earlier documents, with most of the historic information being originally reported in the *Phase I Environmental Site Evaluation and Asbestos Survey* (Westinghouse Environmental and Geotechnical Services, Inc., June 28, 1991). According to these reports, a tax map from 1927 indicates that a building owned by Palmetto Fertilizer Company was located at the eastern portion of the Wayne Street Site. Several smaller structures and a rail line were also reported as being present. Based on the review of six aerial photos taken in 1938, 1943, 1951, 1955, 1966, and 1981 (housed at the University of South Carolina Thomas Cooper Library) conducted during the Phase I investigation, the building indicated on the 1927 map is not present in the photos. The photos from 1938 and 1943 show one building at the south corner of the site near the intersection of Wayne and Pendleton Streets. The 1951 and 1955 photos show a second smaller building adjacent to the first one at this corner of the site. The 1966 and 1981 photos indicate the presence of debris. The 1981 photo indicates that some junk cars were present. The site

currently is partially vegetated with wooded areas along the eastern portion of the site near the rail lines and along the southern portion of the site near Pendleton Street. A thin screen of trees also exists along the western boundary line adjacent to Wayne Street. The remaining areas of the site contain a mixture of vegetated and non-vegetated areas. Portions of the site contain small bits of broken glass and metal debris, most of which appears to be automotive-related.

A concrete pad approximately 48 feet by 100 feet is present in the southwestern portion of the site. This pad is at the location of the second smaller building noted on the aerial photos from 1951 to 1981. One structure currently exists along the eastern end of the site adjacent to the rail lines. The building is approximately 30 feet by 30 feet and in poor condition. This building was visible in a number of aerial photos.

2.3 SITE GEOLOGY

Regionally, the Wayne Street Site is situated within the Upper Coastal Plain physiographic province near the boundary of the Piedmont province. The Upper coastal Plain province consists of sediments deposited in fluvial (river), estuarine (tidal), and near-shore (marine) depositional environments. The Upper Coastal Plain sediments, which were deposited over Piedmont based rocks, consists of quartz sand, interlayered with varying amounts of kaolinitic clay. The Piedmont province consists of weathered and unweathered crystalline igneous and metamorphic rocks. The Piedmont basement rocks in the site area are composed of massive intrusive rock complexes.

On a site-specific level, a hydrogeologic cross-section has been constructed using data obtained from the subsurface test borings. Cross-section C-C' (**Figure 3**) traverses the Wayne Street Site from north to south along the western edge of the site (from MW-10, through MW-11 and to MW-13). The cross-section illustrates the stratigraphy of the sediments beneath the site to a maximum depth of 52 feet below land surface. Based on the site-specific data, the stratigraphy beneath the Wayne Street Site has been divided into four units consisting of fill material, coastal plain sediments referred to as Unit I and II and Saprolite. These units present at the Wayne Street property are described in the chart below based upon investigations conducted by Earth Tech:

Fill	Fill was not present across the entire site, however where it existed it appeared to be shallow, ranging approximately from 1 to 2 feet in depth. The fill sediments were composed primarily of sand with minor amounts of inorganic debris. Some of the soil samples collected from the fill zone contained coal and debris.
Unit I	Composed primarily of red-to-brown-to-gray clayey sands. Sediments resembling Unit I were found at variable depths at the property ranging from 2 feet to 16 feet. Unit I sediments were not saturated.
Unit II	Consisted primarily of red to brown, coarse-grained, moderately sorted sand. Unit II sediments were encountered at variable depths ranging from land surface to 22 feet. Unit II sediments were not saturated.
Saprolite	Generally encountered at depths greater than 20 feet, although it was observed at a depth of 10 feet in one well boring location (MW-11). The saprolite was tan to green, granitic, and soft to firm. The saprolite was saturated, even though water was not observed in the samples.

2.4 SOIL INVESTIGATION

Earth Tech conducted surface and subsurface soil investigations at the property. The surface soil investigations were conducted in April and July of 1998. Results of the sampling event were presented to SCDHEC during a meeting on August 19, 1998 and in the *Continued Soil and Groundwater Quality Assessment Work Plan* (Earth Tech, 1998 – Final document is dated February 1999). Subsurface soil data were collected in 1999 as part of their on-going groundwater investigation, and these data were submitted to SCDHEC in the *Continued Hydrogeologic Assessment* (Earth Tech, 1999). The Earth Tech investigations form the basis of the CAP and are discussed below.

2.4.1. Surface Soil

In April of 1998, Earth Tech performed unbiased soil sampling in a grid pattern at the Wayne Street Site to delineate the extent of metals in surface soils. The property was divided into a 100-ft by 100-ft grid system with the base line of the grid being the western property line along

Wayne Street.¹ The 100-ft grid squares thus consisted of four 50 ft quadrants (Figure 4).

Fifteen composite soil samples (A-1 through G-3) were collected from the fifteen 100-ft grid square locations and analyzed for RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Each composite soil sample within the 100-ft grid square consisted of four sub-samples, one from the center of each of the 50-ft quadrants comprising the 100-ft grid square. These fifteen soil samples were collected from a depth interval of 0-1 ft. Two additional composite soil samples (E-1-2 and F-3-2) were collected in the same manner from the four quadrants of the E-1 and F-3 grid squares in July 1998. These samples were collected from the 1-2 ft depth and also analyzed for RCRA metals. Samples were not collected from those areas of the site covered with heavy vegetation. The analytical results of the surface soil samples are presented in **Table 1**.

Lead and arsenic were the two RCRA metals that exceeded EPA Region IX industrial soil Preliminary Remediation Goals (PRGs), which are used by SCDEHC. The industrial soil PRG for lead is 1,000 mg/kg, and the PRG for arsenic is 2.7 mg/kg. The distribution of lead and arsenic in the Wayne Street Site surface soils is shown in **Figure 4**.

The composite sampling results indicate that most of the lead in surface soil (12 of the 15 grid squares) exceeds the industrial soil PRG. Lead concentrations from the 0-1 ft samples ranged from 219 mg/kg to 25,440 mg/kg. The average lead concentration in surface soil across the 15 grid locations is 5,500 mg/kg. Unusually high levels of lead in comparison to the remainder of the site were detected at grid location E-1. Soil in this grid location contained lead concentrations of 25,550 mg/kg at 0-1 ft and 9,497 mg/kg at a depth of 1-2 feet. However, results from subsurface sampling, discussed below, provide an indication that the lead concentrations observed in surface soil decrease sharply with depth. Although groundwater results are not provided in this report, it is relevant to note that the monitoring well located in the E-1 grid location, MW-11, was the only well with lead concentrations in groundwater above the

¹ The rows and columns were labeled with numbers and letters, respectively. Rows were labeled with numbers 1-4 originating with the row along the base line at Wayne Street. Columns were labeled with letters A through G originating with the northern-most column.

action level.

Arsenic in surface soil ranged from 7.3 mg/kg to 130.2 mg/kg. The average arsenic concentration in the 0-1 ft soil samples across the 15 grid locations is 42.6 mg/kg. Arsenic concentrations in soil are not correlated with lead. Although arsenic exceeds the Region IX PRG at all grid locations, background concentrations of arsenic (particularly in surface soil in urbanized areas) are generally higher than the industrial PRG and other screening levels. No background data are available for the site.

2.4.2 Subsurface Soil

In December 1998, Earth Tech collected a total of fourteen subsurface soil samples from well borings MW-10 through MW-13 to determine lead concentrations in subsurface soils above the water table. The samples were collected at five-foot intervals using split-spoon samplers. The subsurface soil samples were analyzed for lead by USEPA Method 3050/6010B, and the results are summarized in **Table 2**. Each sample was also tested for the presence of organic vapors via a photoionization detector (PID) and these PID data are provided in **Table 3**.

None of the lead concentrations in subsurface soil exceeded the Region IX industrial soil PRG for lead of 1,000 mg/kg. Lead concentrations ranged from 1.5 mg/kg to 340 mg/kg, and thus were very low in comparison to surface soil results. The data collected from monitoring well borings indicate that lead concentrations decrease rapidly with depth. This is of particular interest at grid location E-1, which contained the highest surficial soil lead concentrations as previously discussed. Soil samples from well boring MW-11 within the E-1 grid location show that lead concentrations ranged from 2.5 mg/kg to 340 mg/kg.

The PID results were relatively low, ranging from 3 to 60 ppm. While no definitive statement can be made about these results, it is reasonable to assume that any potential impacts associated with organic chemicals are relatively minor when compared with the magnitude and extent of the inorganic impacts at the site.

2.5 EXPOSURE POTENTIAL

The site as it currently exists is undeveloped and covered with scrub vegetation and automotive debris such as metal parts and broken glass. SCDHEC related that in past years, signs of habitation by homeless people were observed at the adjacent Lincoln Street property and that this might be a concern for the Wayne Street property as well. Conversations with NSRC staff who have been involved in the development of the site indicate that the area has become very developed over the past two years, and the likelihood of usage by homeless people has greatly diminished. However, the construction of a paved parking lot over most of the Wayne Street site in combination with the other measures of the CAP will eliminate this concern.

OSHA-trained remedial workers, utilizing an approved health and safety plan, will implement the proposed correction action. Dust emissions will be controlled during excavation and stabilization.

After construction of the parking lot, direct contact with any remaining impacted soil will be eliminated. Also, the utilities for the parking lot will be routed above ground. Surface soil in areas outside of the asphalt cover will be sampled to ensure that residual lead and arsenic concentrations in these areas are acceptable. Finally, deed restrictions will be implemented to control the land use of the property.

3.0 PROPOSED CORRECTIVE ACTION

The goal of this Corrective Action Plan is to outline the optimum approach for mitigating the impacted soil at the site while returning the site to a beneficial use. The plan outlines a method of addressing the site that is protective of human health and the environment. Specifically, the proposed plan has several advantages: (1) the site will be constructed into a parking lot, providing a beneficial re-use for citizens of Columbia; (2) exposure pathways for incidental contact with site soils can be eliminated; (3) the installation of an impermeable cover will reduce infiltration, thereby eliminating the source for potential future groundwater impact; and (4) deed restrictions will ensure that the land use remains acceptable.

NSRC, the City of Columbia, and the University of South Carolina are working together to revitalize the Wayne Street property. There are significant development pressures to expand parking areas in the downtown section of the city. Also, there is currently no area downtown large enough to stage tractor-trailers which will be used in delivering and producing events at the newly proposed Convention Center adjacent to the property. The lot to be built as part of this Corrective Action will be constructed to serve as many vehicles as possible, maximizing its use and function for downtown users, but will be constructed with enough structural integrity to support fully loaded eighteen wheelers. **Figure 5** depicts a preliminary layout of the parking structure.

3.1 OVERVIEW OF REMEDIAL PLAN

The proposed method of remediation for this site is a combination of excavation, stabilization, and remediation techniques. This alternative involves the excavation and removal of the surficial soils (down to a depth of six to eight inches below grade), followed by the subsequent asphalt capping of the remaining soil in-place.

The proposed correction action plan involves the:

- Removal of surface soil across the parking area;
- Removal of soil down to 3 feet in grid location E-1;
- Stabilization of excavated soil, sampling and disposal at a permitted facility;
- Additional sampling in areas not covered by the parking lot;
- Construction of an asphalt parking lot; and
- Placement of deed restrictions on the property.

3.1.1 Removal of Surface Soil

When constructing a parking lot, the top six to eight inches of fill and/or soil are generally unsuitable for use in the subgrade and are usually graded off. Workers with the appropriate OSHA training will remove the top six to eight inches of soil from the area of the site to be covered by the parking lot. It is anticipated that the highest concentrations of lead and arsenic in surface soil will be contained in this soil excavation, and dust control measures will be

implemented during excavation. Following the removal of the soil, the remedial workers will install a layer of stone base as cover over the remaining soils. The six to eight inch base will be compacted and prepared for the placement of an asphalt cover by construction workers.

3.1.2 Additional Soil Removal at Grid Location E-1

The two highest concentrations of lead in soil were observed in grid location E-1. Based upon subsurface soil data collected by Earth Tech, these lead concentrations dramatically decrease at a depth of 3 ft. Therefore, the entire 100 ft x 100 ft grid will be excavated to a depth of three ft and filled with a stone base.

3.1.3 Stabilization and Disposal of Excavated Soil

The excavated soil will be staged, stabilized and sampled for disposal at an appropriate permitted facility. As the first phase in the process, soil excavated from the site will be transferred into lined roll-offs. As the material is deposited into the roll-off, it will be stabilized by adding a phosphate rinse or other liquid stabilizing agent and mechanically mixed using a trackhoe or similar mixing device. Following stabilization, a sample from each roll-off will be tested for leachable lead using TCLP analysis. If the levels exceed the TCLP limit (5.0 mg/L), then the soil will be re-stabilized. Once the analytical results indicate that the leachable lead concentration is below the TCLP limit, then the soil will be disposed of off-site at an industrial landfill. Additionally, as a health and safety precaution, when the concentration of dust in the air is measured at one half of the OSHA PEL (or 2.5 mg/m³), then work will be suspended until the situation is mitigated (i.e., the concentration of dust in the air falls below the established action level). This will prevent potential worker and bystander exposure.

3.1.4 Sampling in Areas not Covered by the Parking Lot

While most of the Wayne Street property will be covered with a parking lot, there will remain scattered areas on the hillside to the northeast and east of the property that have not been sampled. Additionally, grid locations A1 and C2 will not be covered by the parking lot. These grid locations will be resampled to determine the need for soil removal or cover.

Following the same sampling approach as described in previous investigations (i.e., dividing the sampling areas into 50 ft quadrants), a sample will be collected from each quadrant of the grid location. The collected samples from two adjacent quadrants will be homogenized into one composite sample. This sample will then be analyzed for lead and arsenic. Any areas with impacts above the appropriate regulatory action level will be either excavated and removed from the site, or will be covered with a cover of soil and vegetation in consultation with SCDHEC. It may be necessary to define a site-specific remediation level for arsenic depending upon the outcome of this sampling effort.

3.1.5 Construction of the Parking Lot

Once the soil is removed and remedial workers install the sub-base, the site will be ready for construction of the parking lot. With the subgrade compacted and the base course of stone in place, the asphalt pavement can be placed at the site. Following the appropriate AASHTO and SCDDOT requirements, as well as City of Columbia regulations, the site will be constructed into an asphalt pad on grade surface parking lot. The proposed capacity will be approximately 437 vehicles. All utilities required for the parking lot (i.e., area lights) will be routed above ground.

3.1.6 Deed Restrictions

Although NSRC will maintain ownership and control of the property, deed restrictions limiting development to acceptable non-residential uses will be implemented.

4.0 SUMMARY OF APPROACH

In order to achieve the treatment goals of this Corrective Action Plan, the following summarizes the proposed approach for addressing soil at the site.

- Grade and pave approximately 121,000 square feet (2.78 acres) of area on the corner of Wayne and Pendleton Streets. The area will be prepared by removing approximately six to eight inches of surficial soils (all of which are assumed to be impacted with lead levels above 1,000 mg/kg).

- Additionally, during the previous sampling events, an area (approximately 10,000 square feet) had lead levels above 25,000 mg/kg. This area will be excavated to a depth of three feet below grade and the removed soil will be disposed of off-site (a total of approximately 4,475 tons disposed of off-site).
- Areas along the hillside on the northeast and east of the site as well as former grid locations that remain uncovered need to be evaluated for potential impacts. Following past sampling procedures, this area will be evaluated and any impacted areas will either be removed or covered as appropriate.
- A parking lot that will cover approximately 75% of the property with a parking capacity of approximately 437 vehicles will be constructed at the site.
- Deed restrictions will be implemented to control land use.

4.1 TENTATIVE SCHEDULE OF EVENTS

Submittal of CAP to SCDHEC.....	April 2002
Completion of CAP Review	July 2002
Prepare Remedial Design.....	August 2002 – February 2003
Construction of Parking Lot	To begin by last quarter 2002

4.2 TOTAL PROJECT COST ESTIMATE

A summary of the costs and assumptions surrounding the costs are included in **Table 4**.

TABLES

TABLE 1

**SUMMARY OF SURFACE SOIL DATA
NORFOLK SOUTHERN RAILWAY COMPANY
WAYNE STREET SITE
COLUMBIA, SOUTH CAROLINA
MM&A PROJECT NO. NS1186-01**

Sample ID	Date Collected	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)
A-1	04/08/98	57.3	99.3	5.5	37.4	221.1	0.19	0.26	0.09
B-1	04/08/98	77.1	1686.5	9.3	39	1136	0.89	0.39	0.54
C-1	04/09/98	55.9	1849	36.1	106.9	5184	3.82	0.4	2.4
C-2	04/09/98	130.2	106.7	4.5	20.5	219.2	0.2	0.34	<0.05
D-1	04/09/98	44	1385.9	50	99.7	7387.2	7.41	0.37	1.4
D-2	04/09/98	32.6	156.5	13.7	25.8	949	0.1	0.26	0.25
E-1	04/10/98	35.1	865.9	34.7	69.5	25440	2.88	0.34	1.7
E-2	04/10/98	40.5	677	35	80.4	4640	4.26	0.59	0.96
E-3	04/10/98	28.1	700.2	33.5	52.8	4882.8	0.77	0.43	0.71
F-1	04/13/98	8.1	46	3.95	14.3	5170	0.27	<0.50	0.16
F-2	04/13/98	7.3	1660.8	33.5	60.4	3998	1.11	<0.50	0.47
F-3	04/13/98	34.5	1474.2	47.6	92.7	8764	1.1	<0.50	3.2
G-1	04/13/98	12.9	157.3	10	29.9	5440	0.56	<0.50	0.34
G-2	04/13/98	37.6	797.1	27	53.8	7550	1.2	<0.50	0.86
G-3	04/14/98	38.5	1098	45.8	91.2	8195	3.25	<0.50	1.05
E-1-2	07/07/98	9.5	103.2	24.5	39.7	9497.3	1.09	<0.15	0.83
F-3-2	07/07/98	12.8	362.9	17.2	58.1	1196.6	1.08	<0.15	0.3
USEPA Region IX									
Preliminary Remediation Goals									
Industrial Soil		2.7	100,000	810	450	1,000	610	10,000	10,000

Notes: **Bold** values indicate exceedance of USEPA soil screening criteria
Data obtained from *Continued Soil and Groundwater Quality Assessment Work Plan*, Earth Tech, Inc., Feb. 1999



TABLE 2

**SUMMARY OF SUBSURFACE SOIL DATA
 NORFOLK SOUTHERN RAILWAY COMPANY
 WAYNE STREET SITE
 COLUMBIA, SOUTH CAROLINA
 MM&A PROJECT NO. NS1186-01**

Sample ID	Date Collected	Depth (ft)	Lead mg/Kg
MW-10-5	12/14/98	3 - 5	22
MW-10-10	12/14/98	8 - 10	19
MW-10-15	12/14/98	13 - 15	4.7
MW-10-20	12/14/98	18 - 20	1.5
MW-11-3	12/16/98	1 - 3	300
MW-11-8	12/16/98	6 - 8	340
MW-11-13	12/16/98	11 - 13	3.9
MW-11-18	12/16/98	16 - 18	2.5
MW-12-5	12/16/98	3 - 5	37
MW-12-10	12/16/98	8 - 10	5.4
MW-12-15	12/16/98	13 - 15	4.4
MW-13-5	12/17/98	3 - 5	260
MW-13-10	12/17/98	8 - 10	4.6
MW-13-15	12/17/98	13 - 15	6.8

Note: Data obtained from *Continued Hydrogeologic Assessment*, Earth Tech, Inc., 5/5/99

TABLE 3

**PHOTOIONIZATION DETECTOR READINGS
NORFOLK SOUTHERN RAILWAY COMPANY
WAYNE STREET SITE
COLUMBIA, SOUTH CAROLINA
MM&A PROJECT NO. NS1186-01**

Depth Interval (feet)	PID Reading (ppm)			
	MW-10	MW-11	MW-12	MW-13
1 to 3	-	28	-	-
3 to 5	35	-	30	18
6 to 8	-	35	-	-
8 to 10	45	-	10	10
11 to 13	-	55	-	-
13 to 15	50	-	15	12
16 to 18	-	30	-	-
18 to 20	40	-	5	10
21 to 23	-	45	-	-
23 to 25	60	-	5	10
26 to 28	-	35	-	-
28 to 30	35	-	3	8
31 to 33	-	30	-	-
33 to 35	25	-	-	-

All results reported in Parts per Million

(-) indicates depth of measurement does not apply

Data obtained from *Continued Hydrogeologic Assessment*, Earth Tech, Inc., 5/5/99

TABLE 4

**PRELIMINARY REMEDIAL COSTS
NORFOLK SOUTHERN RAILWAY COMPANY
WAYNE STREET SITE
COLUMBIA, SOUTH CAROLINA
MM&A PROJECT NO. NS1186-01**

Combination of Limited Excavation and Construction of an Impermeable Cap

Grade and pave approximately 121,000 square feet (2.78 acres) of area on the corner of Wayne and Pendleton Streets. The area will be prepared by removing approximately six inches of surficial soils (all of which are assumed to be impacted with lead levels above 1,000 ppm). Additionally, during the previous sampling events, an area (approximately 10,000 square feet) had lead levels above 25,000 ppm. This area will be excavated to a depth of three feet below grade and the removed soil will be disposed of off-site (a total of approximately 4,475 tons disposed of off-site). The resulting parking capacity will be approximately 437 vehicles.

Environmental Implications: All of the impacted soil at the site would be addressed through removal (and off-site disposal) or capping (with the installation of the parking lot). The work exposure would be approximately three months (from the beginning of grading to the completion of the preparation work).

	Unit Rate	Units	Total Rate
Construction Superintendent	\$45 /hour x	480 hour	\$21,600
Laborer	\$30 /hour x	2,880 hour	\$86,400
Dozer	\$750 /month x	3 month	\$2,250
Trackhoe	\$1,350 /month x	3 month	\$4,050
Roller	\$900 /month x	1.5 month	\$1,350
Impacted Soil Trans. and Disposal Costs	\$150 /ton x	4,472 ton	\$670,833
Backfill	\$35 /ton x	5,042 ton	\$176,458
Soil and Erosion Control Measures	\$5 /foot x	850 feet	\$4,250
Compaction Testing	\$35 /test x	200 test	\$7,000
Miscellaneous Costs and Contingencies	\$12,690 /unit x	1 unit	\$12,690
		Subtotal	\$986,882

Assumptions:

- Excavation depth = 6"
- Surface area of lead impacted soil = 2.78 acres
- 100' x 100' grid with lead levels >25,000ppm would be excavated to a depth of 3'
- Total volume which would require removal and off-site disposal = 4,475 tons (3,000 cubic yards)
- All material will require stabilization prior to transporting it off-site for disposal
- Waste to be treated on-site to be rendered non-hazardous without a special permit
- Disposal costs are approximately \$75/ton (as non-hazardous waste)
- Backfill costs (including transportation) are \$35/ton
- Transportation costs are estimated to be approximately \$75/ton
- Some additional data for delineating the extent of impact may be required
- A foremen and a six person crew (including equipment operators) will work 40 hr weeks for twelve weeks to complete the site preparation work.

FIGURES

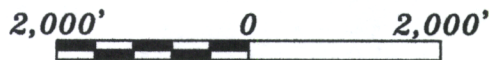


**NORFOLK SOUTHERN RAILWAY COMPANY
WAYNE STREET SITE
COLUMBIA, SC**

Prepared by:



NS1186 vic.dwg 05/02
USGS 7.5' COLUMBIA, SC - 1972



SCALE 1:24,000

VICINITY MAP

FIGURE 1



ALLEN BROTHERS MILLING
(ADLUH FLOUR MILL)

CONCRETE BLOCK BLDG

SILLO

10" STEEL PIPE

WATER VALVE

"H" FRAME P.P. # 328820

"H" FRAME P.P. # 328819

F.H.

P.P. # 260

12" RCP

BRICK ROAD

6" CITY OF COLUMBIA WATER LINE

CONC. DOCK

BLDG

CONC. DOCK

SOUTHERN REALTY DEV. CORP.
(BEN ARNOLD COMPANY)

CONCRETE BLOCK OFFICE & WHSE

MULT MH

GATE

R VALVE

WAYNE STREET

6" CITY OF COLUMBIA WATER LINE

WAYNE STREET SITE

MW-10

MW-11

MW-12

MW-13

PENDLETON STREET

CENTERLINE OF RAILROAD SPUR

CONC. SLAB

18" CMP

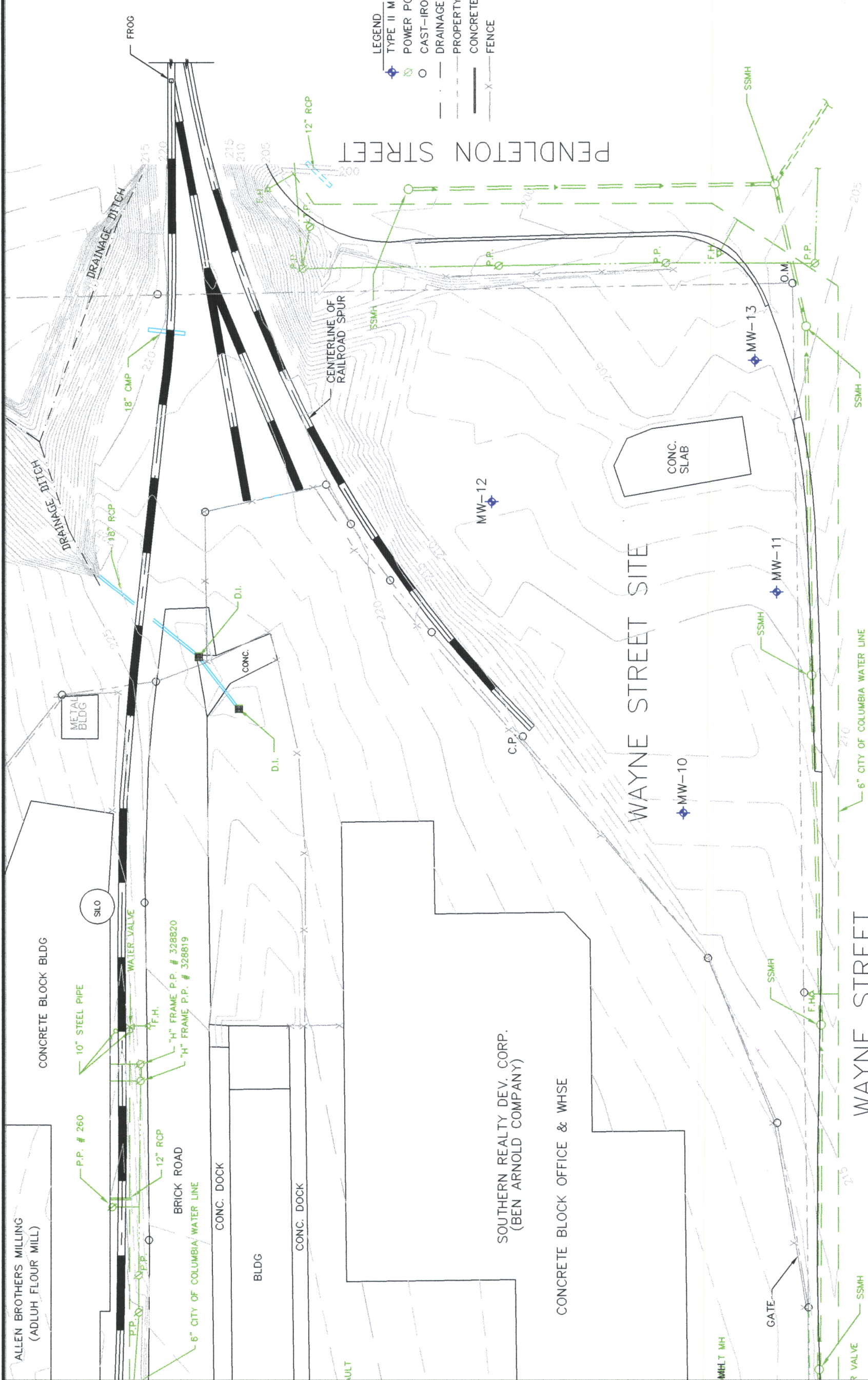
18" RCP

12" RCP

12" RCP

FROG

- LEGEND
- TYPE II MONITORING WELL
 - POWER POLE
 - CAST-IRON PINS
 - DRAINAGE DITCH
 - PROPERTY LINE
 - CONCRETE WALLS
 - FENCE



MAP ORIGINALLY DRAWN BY EARTH TECH

FIGURE NUMBER

2

NORFOLK SOUTHERN RAILWAY COMPANY
WAYNE STREET SITE
COLUMBIA, SOUTH CAROLINA

SITE MAP

DESIGNED:	EARTH TECH
DRAWN:	AMS
CHECKED:	DES
DATE:	04/02
SCALE:	1" = 80'
PROJECT NO.:	NS1186
FILE NO.:	NS1186a.dwg

Prepared By: **MARSHALL MILLER ASSOCIATES**

Marshall Miller and Associates
Geology, Environmental Sciences & Engineering, Geophysics

Richmond, VA • Charleston, WV • Harrisburg, PA
Bluffton, VA • Lexington, KY • Raleigh, NC



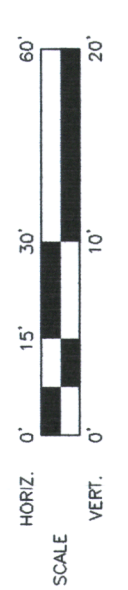
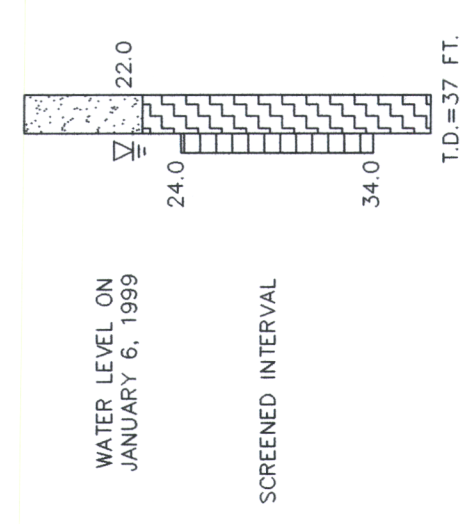
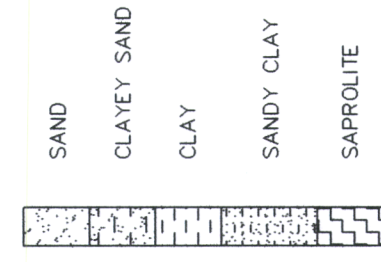
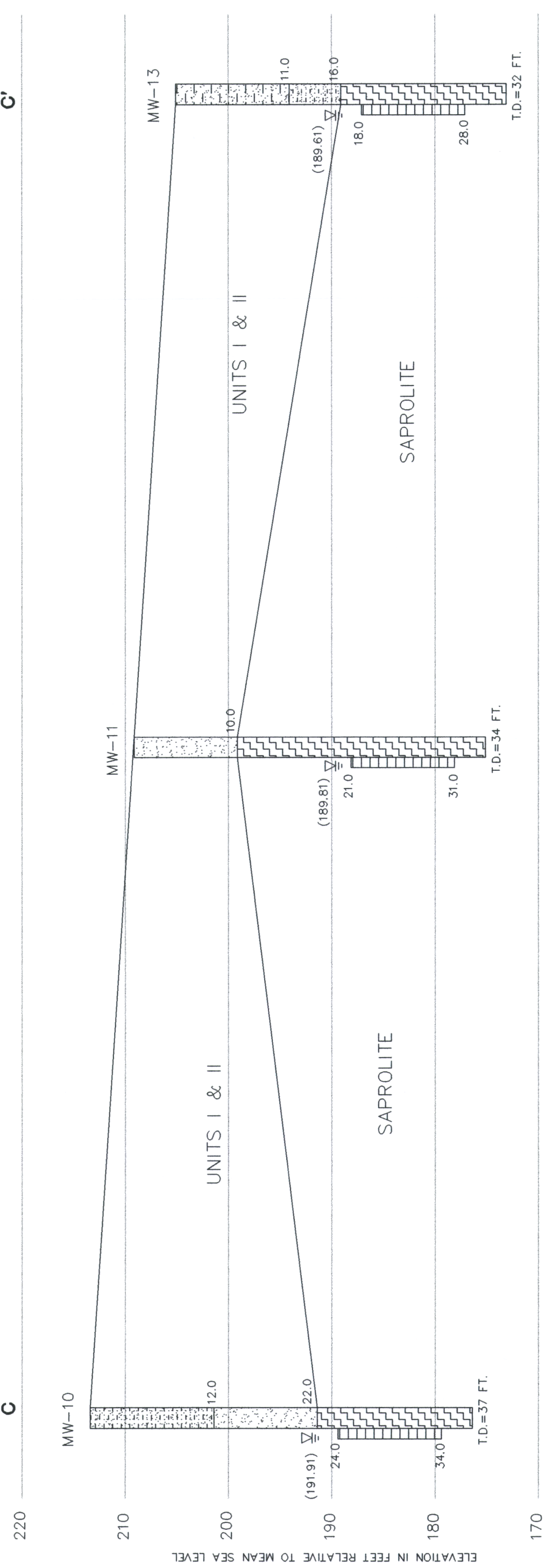
No.	Date	Revision

DESIGNED:	EARTH TECH
DRAWN:	AMS
CHECKED:	DES
DATE:	04/02
SCALE:	AS SHOWN
PROJECT NO.:	NS1186-01
FILE NO.:	CROSS.dwg

NORFOLK SOUTHERN RAILWAY COMPANY
 WAYNE STREET SITE
 COLUMBIA, SOUTH CAROLINA
 CROSS SECTION C-C'

C'

C



ALLEN BROTHERS MILLING
(ADLUH FLOUR MILL)

CONCRETE BLOCK BLDG

BRICK ROAD

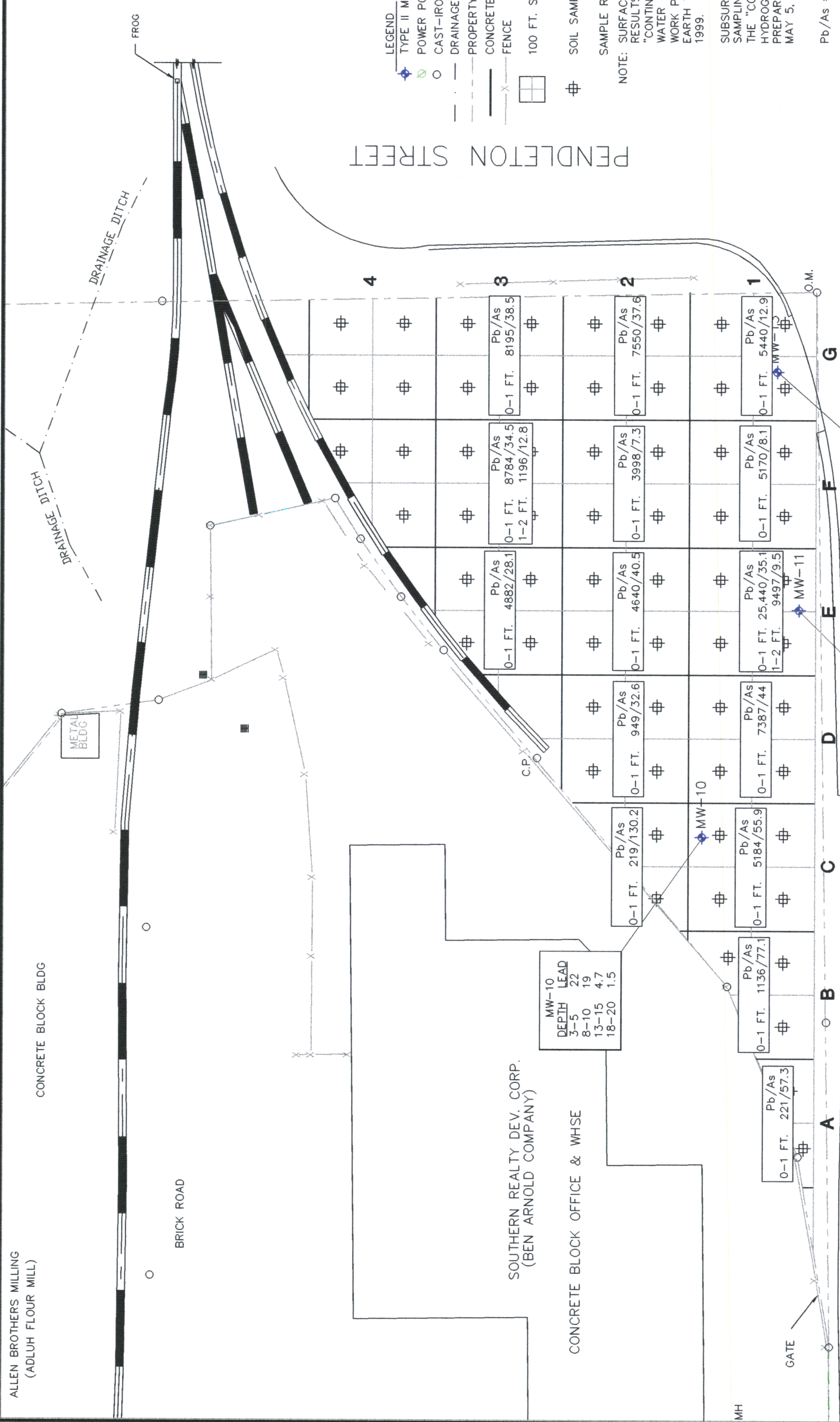
METAL BLDG

SOUTHERN REALTY DEV. CORP.
(BEN ARNOLD COMPANY)

CONCRETE BLOCK OFFICE & WHSE

WAYNE STREET

PENDLETON STREET



- LEGEND**
- TYPE II MONITORING WELL
 - POWER POLE
 - CAST-IRON PINS
 - DRAINAGE DITCH
 - - - PROPERTY LINE
 - CONCRETE WALLS
 - - - FENCE
 - 100 FT. SAMPLE SQUARE
 - ⊕ SOIL SAMPLE LOCATIONS

NOTE: SAMPLE RESULTS ARE IN mg/kg
RESULTS ARE FROM THE
"CONTINUED SOIL AND GROUND
WATER QUALITY ASSESSMENT
WORK PLAN" PREPARED BY
EARTH TECH, INC. IN FEBRUARY
1999.

SUBSURFACE (MONITORING WELL)
SAMPLING RESULTS ARE FROM
THE "CONTINUED
HYDROGEOLOGIC ASSESSMENT"
PREPARED BY EARTH TECH. ON
MAY 5, 1999.

Pb/As = LEAD/ARSENIC
CONCENTRATIONS



MAP ORIGINALLY DRAWN BY EARTH TECH

FIGURE NUMBER
4

NORFOLK SOUTHERN RAILWAY COMPANY
WAYNE STREET SITE
COLUMBIA, SOUTH CAROLINA
DISTRIBUTION OF
LEAD AND ARSENIC IN SOILS

DESIGNED: EARTH TECH
DRAWN: AMS
CHECKED: DES
DATE: 04/02
SCALE: 1" = 80'
PROJECT NO.: NS1186
FILE NO.: NS1186a.dwg

Prepared By: **MARSHALL MILLER ASSOCIATES**
Marshall Miller and Associates
Geology, Environmental Sciences & Engineering, Geophysics
Richmond, VA · Charleston, WV · Raleigh, NC
Bluffton, VA · Lexington, KY · Harrisburg, PA

ALLEN BROTHERS MILLING
(ADLUH FLOUR MILL)

CONCRETE BLOCK BLDG

BRICK ROAD

METAL BLDG

SOUTHERN REALTY DEV. CORP.
(BEN ARNOLD COMPANY)

CONCRETE BLOCK OFFICE & WHSE

WAYNE STREET

PENDLETON STREET

TOTAL PARKING SPACES = 437

20' DRIVING AISLE

GATE

MH

- LEGEND
- POWER POLE
 - CAST-IRON PINS
 - DRAINAGE DITCH
 - - - PROPERTY LINE
 - CONCRETE WALLS
 - X - FENCE

NOTE: PARKING CONFIGURATION IS
PRELIMINARY AND ASSUMES AN
8 FT WIDE BY 17.5 FT LONG
PARKING SPACE WITH A
MINIMUM 20 FT DRIVING AISLE.



MAP ORIGINALLY DRAWN BY EARTH TECH

FIGURE NUMBER
5

NORFOLK SOUTHERN RAILWAY COMPANY
WAYNE STREET SITE
COLUMBIA, SOUTH CAROLINA
PARKING LOT OPTION

DESIGNED:	EARTH TECH
DRAWN:	AMS
CHECKED:	DES
DATE:	04/02
SCALE:	1" = 80'
PROJECT NO.:	NS1186
FILE NO.:	NS1186.dwg

Prepared By: MARSHALL MILLER ASSOCIATES
 Marshall Miller and Associates
 Geology, Environmental Sciences & Engineering, Geophysics
 Richmond, VA • Charleston, WV • Raleigh, NC
 Durham, VA • Lexington, KY •



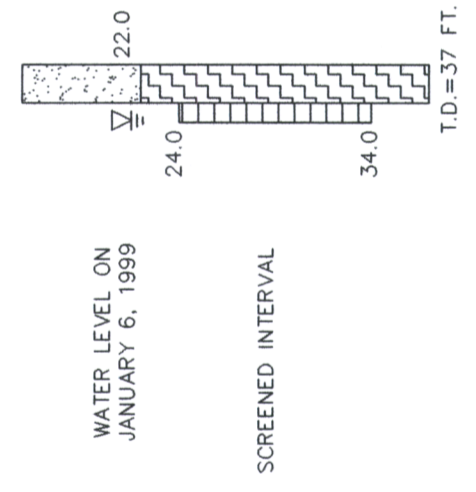
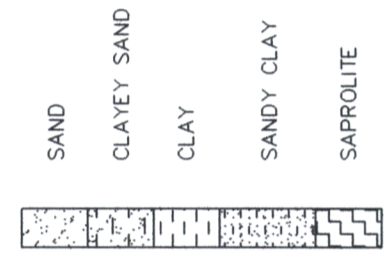
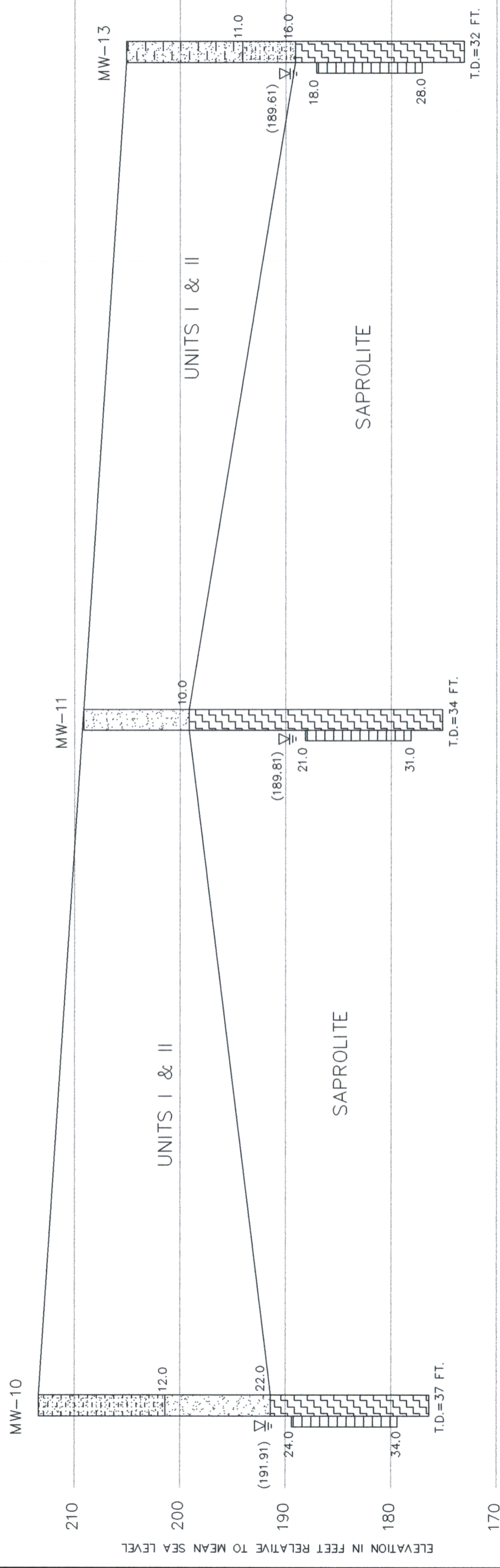
No.	Date	Revision

DESIGNED:	EARTH TECH
DRAWN:	AMS
CHECKED:	DES
DATE:	04/02
SCALE:	AS SHOWN
PROJECT NO.:	NS1186-01
FILE NO.:	CROSS.dwg

NORFOLK SOUTHERN RAILWAY COMPANY
WAYNE STREET SITE
COLUMBIA, SOUTH CAROLINA
CROSS SECTION C-C'

C'

C



ALLEN BROTHERS MILLING
(ADLUH FLOUR MILL)

CONCRETE BLOCK BLDG

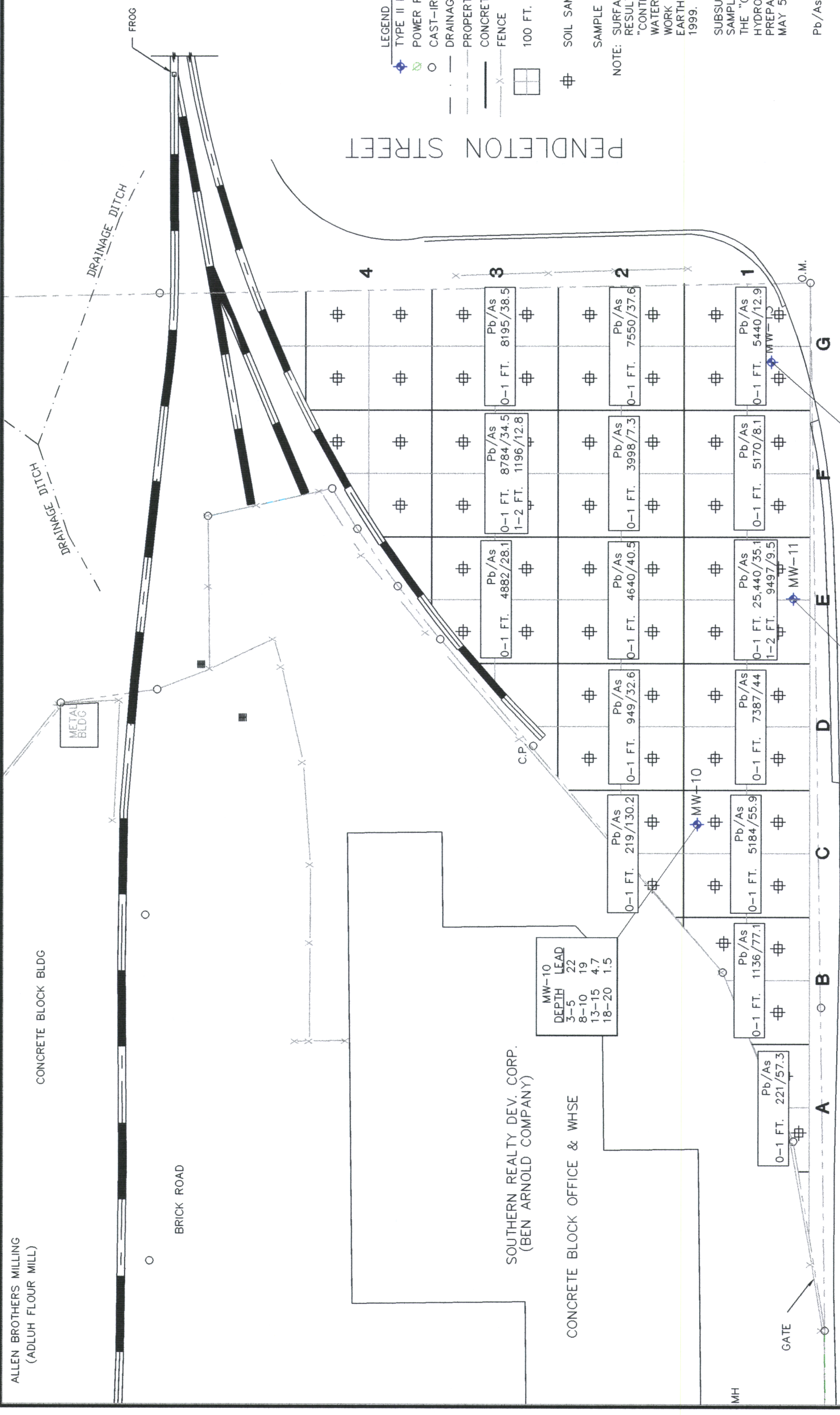
BRICK ROAD

SOUTHERN REALTY DEV. CORP.
(BEN ARNOLD COMPANY)

CONCRETE BLOCK OFFICE & WHSE

WAYNE STREET

PENDLETON STREET

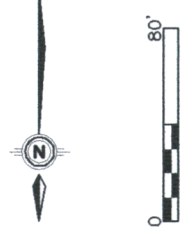


- LEGEND**
- ◆ TYPE II MONITORING WELL
 - POWER POLE
 - CAST-IRON PINS
 - - - DRAINAGE DITCH
 - - - PROPERTY LINE
 - - - CONCRETE WALLS
 - - - FENCE
 - 100 FT. SAMPLE SQUARE
 - ⊕ SOIL SAMPLE LOCATIONS

NOTE: SAMPLE RESULTS ARE IN mg/kg
SURFACE (GRID) SAMPLING RESULTS ARE FROM THE "CONTINUED SOIL AND GROUND WATER QUALITY ASSESSMENT WORK PLAN" PREPARED BY EARTH TECH, INC. IN FEBRUARY 1999.

SUBSURFACE (MONITORING WELL) SAMPLING RESULTS ARE FROM THE "CONTINUED HYDROGEOLOGIC ASSESSMENT" PREPARED BY EARTH TECH. ON MAY 5, 1999.

Pb/As = LEAD/ARSENIC CONCENTRATIONS



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Marshall Miller and Associates
Richmond, VA • Charleston, WV • Harrisburg, PA
Bluefield, VA • Lexington, KY • Raleigh, NC

No.	Date	Revision

DESIGNED: EARTH TECH
DRAWN: AMS
CHECKED: DES
DATE: 04/02
SCALE: 1" = 80'
PROJECT NO.: NS1186
FILE NO.: NS1186a.dwg

NORFOLK SOUTHERN RAILWAY COMPANY
WAYNE STREET SITE
COLUMBIA, SOUTH CAROLINA
DISTRIBUTION OF
LEAD AND ARSENIC IN SOILS

ALLEN BROTHERS MILLING
(ADLUH FLOUR MILL)

CONCRETE BLOCK BLDG

BRICK ROAD

SOUTHERN REALTY DEV. CORP.
(BEN ARNOLD COMPANY)

CONCRETE BLOCK OFFICE & WHSE

WAYNE STREET

PENDLETON STREET

TOTAL PARKING SPACES = 437

GATE

MH

- LEGEND
- POWER POLE
 - CAST-IRON PINS
 - DRAINAGE DITCH
 - PROPERTY LINE
 - CONCRETE WALLS
 - X- FENCE

NOTE: PARKING CONFIGURATION IS
PRELIMINARY AND ASSUMES AN
8 FT WIDE BY 17.5 FT LONG
PARKING SPACE WITH A
MINIMUM 20 FT DRIVING AISLE.



MAP ORIGINALLY DRAWN BY EARTH TECH

FIGURE NUMBER
5

NORFOLK SOUTHERN RAILWAY COMPANY
WAYNE STREET SITE
COLUMBIA, SOUTH CAROLINA
PARKING LOT OPTION

DESIGNED:	EARTH TECH
DRAWN:	AMS
CHECKED:	DES
DATE:	04/02
SCALE:	1" = 80'
PROJECT NO.:	NS1186
FILE NO.:	NS1186a.dwg

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Blacksburg, VA · Lexington, KY · Raleigh, NC