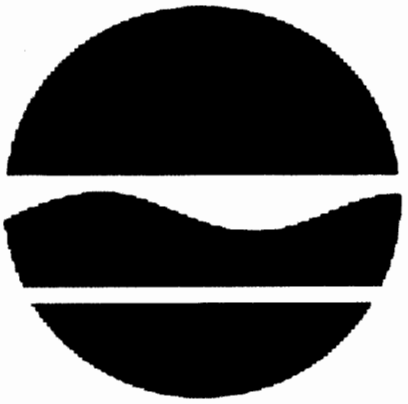
Monitoring Plan
Armonk Private Wells
Westchester County
NYSDEC Site # 3-60-005



625 Broadway
Albany, NY 12233-7013
518-402-9812

Date: December 6, 2004

Monitoring Plan Checklist

Site Name and Number: Armonk Private Wells Site # 3-60-005 **Date:** December 6,2004

_____ 1) **Cover sheet**
   a) Site name
   b) Site number
   c) Site County
   d) NYSDEC address
   e) Date
   f) DEC Logo centered on the page

_____ 2) **Section 1.0 Site Summary**
   a) A section for background information, which can be found in the DER Site Remediation Tracking System, or in the ROD or other Decision document.
   b) A site assessment, which includes information such as the last site visit, the accuracy of labeling of the wells, if uniform locks are installed, and the condition of the wells, as recorded on the LTMP summary sheets by Region. (Excel files stored in V:\bureau files\bureau d-b\workplan\OM&M workplan\workplan summaries\by region #.xls
   c) The remedy of the site, including the type of remedy and if it is a monitoring-only remedy. This can be found in the ROD or other Decision document for the site.
   d) Project Management information such as lab services used, current work assignments, and DEC PM, which can be obtained from the PM. (PM recorded on the LTMP Summary Sheets by Region. (Excel files stored in V:\bureau files\bureau d-b\workplan\OM&M workplan\workplan summaries\by region #.xls)

_____ 3) **Section 2.0 Sampling and Analysis Requirements**
This information can be found on the LTMP Summary Sheets by Region (Excel files stored in V:\bureau files\bureau d-b\workplan\OM&M workplan\workplan summaries\by region #.xls)
   a) Monitoring frequency and/or sampling months
   b) Number of wells
   c) Contaminants-of-Concern (CoC's)
   d) Test methods and detection limits
   e) Frequency of monitoring reports
   f) Historic monitoring results - Table on page 2-1 (If there are historic groundwater standards, include them in the table. Make one column for the old standard and one column for the new standard. Talk to the PM and note which standard the site has to comply with.)

_____ 4) **Section 3.0 Maps and Plans**
   a) Site Location Plan, from the Registry
   b) Site survey of the location of the wells, from Monitoring reports
   c) Site Plan, from Monitoring reports

_____ 5) **Section 4.0 Monitoring Well Data**
   a) Well boring logs, from Will Welling or from Monitoring reports
   b) Well G.P.S Coordinates, from Will Welling

_____ 6) **Section 5.0 Health and Safety Plan**
These pages are Red in hard copy, but must be white when scanned into a .pdf file
a) Emergency Planning sheet, from Tom Koch's files
b) Hospital Location Map, from existing Plan or from Tom Koch's files

_____ 7) **Section 6.0 Historic Monitoring Reports**
a) Any lab report data that you can dig up, from site files or contact the PM

_____ 8) **Section 7.0 Historic GW Contour Maps**
a) geological cross-sections, from monitoring reports or other site documents
b) groundwater contour maps, from Monitoring reports or other site documents

_____ 9) **Section 8.0 Treatment System Diagrams**
a) Any plans illustrating the treatment system, from site documents or the PM.

_____ 10) **Evaluate Plan**: Compare plan to ROD or other Decision document and/or discuss with Project Manager for the site.
a) Monitoring frequency
b) Detection Limit
c) Contaminants monitored
d) Complete Recommendations for Future Work (Wordperfect file found in V:\bureau files\Bureau d-b\monitoring plan\recommendations for future work.wpd.) Based on document review, PM discussions, etc.

_____ 11) **Plan Formatting:**
a) date, path and filename, and page numbers in the footer of the document
b) Table of Contents

_____ 12) **Information storage:**
a) Compare the list of contaminants and remedies to the database to check for accuracy, and enter or edit any data as necessary. (Any changes to the database regarding CoC's or remedies must be approved by Jim Harrington.)
b) Store files on V:\bureau files\bureau d-b\monitoring plan, burn a CD to include all files associated with the monitoring plan (including; this site checklist, the monitoring plan, and recommendations for future work), and e-mail the files to Marcia with a path and filename to put on EDOCS. The secretaries will set up the EDOCS folder with Sue Wither. (See the February 23, 2004 memo for guidance regarding EDOCS file-naming conventions at V:\bureau files\bureau d-b\files\filing & admin efficiency\edocs cheatsheet.pdf) Once files are stored in EDOCS, delete files from V-drive.
c) Update the spreadsheet at V:\Bureau Files\Bureau D-B\Work Plan\OM&M Work Plan\Workplan Summaries\by region #.xls. This file will store all of the information that was used to develop the monitoring plan. Also refer to V:\bureau files\bureau d-b\workplan\om&m workplan\workplan summaries\site checklist.xls for an additional checklist that can be used in the production of a monitoring plan.

Recommendations for Future Work

Site Name and Number: Armonk Private Wells Site # 3-60-005 **Date:** 12/6/04

Project Management:

The Project Manager for this site is Carl Hoffman. He can be contacted at 518-402-9812. There is currently a Work Assignment with Earthtech. Any samples will be sent to Earthtech labs for analysis.

Site Conditions (locks, fences, mowing):

According to the project manager, uniform locks have been installed and the site is in good shape.

Well Conditions (labeling, etc.):

According to the project manager, all of the wells at the site are in good shape.

Monitoring Frequency, Detection Limit, Contaminants Monitored:

According to the monitoring data, sampling is being conducted quarterly for contaminants-of-concern using a detection limit of 0.5 ppb. This detection limit is set to a good level. Monitoring needs to continually be completed quarterly until the department approves a lower frequency of monitoring.

H:\LTM Plans\Armonk Private Wells\Recommendations for future work.wpd

Table of Contents

1.0 Site Summary

Background Information

The Armonk Private Wells site is located in the central business district of the hamlet of Armonk, Town of North Castle, Westchester County. The site is approximately 34 acres in size and is bounded by the Wampus River to the east. The site is bounded by Bedford Road to the south, Route 128 to the west and the northern end of the A&P Shopping Center to the north. The area is comprised of approximately 55 private homes and small businesses. Contaminants-of-Concern (COC's) include VOC's such as PCE, TCE, and DCE. These contaminants have been traced back to one former and two existing dry cleaning establishments.

Remedy

The COC's are present in two media that require remedial action. The first is the Vadose Zone. This is the zone that includes soil above the water table. The second media that requires remedial action is the groundwater. According to the Record of Decision (ROD), remedial action of the Vadose Zone includes the removal of liquid waste and sludge from the septic tank and off-site treatment of these wastes, removal of the septic tank and the off-site disposal of septic tank materials, soil gas collection by vacuum extraction, on-site treatment of extracted gases using carbon adsorption, soil gas monitoring, and land use restrictions upon completion of remediation. Remedial action of the groundwater includes pump and treat, on-site treatment using carbon adsorption, discharge of treated water to the Wampus River, groundwater monitoring, and restrictions on well use and new well drilling upon completion of remediation.

2.0 Monitoring Requirements and Results

Groundwater Monitoring Requirements

To monitor the site's groundwater, 25 monitoring wells were drilled, (see Section 4), and these wells should currently be monitored annually for the contaminants-of-concern (COC's), for two years, then potentially less frequently, as approved by DEC. According to Carl Hoffman, the influent sampling will be completed monthly and the wells will be sampled annually. It is possible that the Department will change to 5/4 sampling in the future if the results deem it necessary. To date, samples have been analyzed by the DER laboratory for the COC's in the table below. The site is scheduled to be sampled in 2005.

Table 1. Armonk Private Wells
Quarterly Groundwater Monitoring Requirements

Monitoring Well	Contaminants-of-Concern	Water Quality Criteria (ppb)	Detection Limit (ppb)
All Wells	Tetrachloroethene (PCE)	5 ppb	0.5 ppb
Aw #1 through Aw #15	Trichloroethene (TCE)	5 ppb	0.5 ppb
	Methyl-t-butyl ether	10 ppb	0.5 ppb
	cis-1,2-dichloroethene (DCE)	5 ppb	0.5 ppb

1-NYSDEC. Division of Water Technical and Operational Guidance Series (1,1,1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. 1998

Groundwater Monitoring Results

The data show that contaminants-of-concern are present in the monitoring wells below the minimum groundwater standards. The table below illustrates the downward trend of groundwater contamination based on results from 11/1998, 7/2000, and 7/2002. The results have been achieved as a result of soil removal and groundwater treatment. In all cases, the standards appear to be achieved. The data from these years was used because it represented a good trend over 4 years and because it is the latest data. It also appears that at this point, a detection limit of 0.5 ppb should continue to be used.

Table 2- Groundwater Monitoring Data Summary for Armonk Private Wells				
Contaminant of Concern	Groundwater Standard	Monitoring Date		
		11-21-98	7-31-00	7-1-02
Tetrachloroethene (PCE)	5 ppb	**0.5 ppb (J)**	**0.5 ppb (J)**	**1 ppb**
Trichloroethene (TCE)	5 ppb	**0.5 ppb (J)**	**0.5 ppb (J)**	**1 ppb**
Methyl-t-butyl ether	10 ppb	**N /A**	19 ppb	**1 ppb**
cis-1,2-dichloroethene (DCE)	5 ppb	**0.5 ppb (J)**	**0.5 ppb (J)**	**4 ppb**

* See Quality Assurance Key on the following page.

** Data has been collected quarterly but only 1 monitoring event per year was tabulated to show long-term trends.

Bold = Groundwater contaminant levels are below the groundwater standard.

Shaded = Groundwater contaminant levels show a decreasing trend.

Quality Assurance Key:

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is re-analyzed at a higher dilution factor, as in the "E" flag above, the "DL" suffix is appended to the sample number on the Form I for the diluted sample, and all concentration values reported on that Form I are flagged with the "D" flag. This flag alerts data users that any discrepancies between the concentrations reported may be due to dilution of the sample or extract.

J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero. For example, if the sample quantitation limit is 10 µg/L, but a concentration of 3 µg/L is calculated, report it as 3J. The sample quantitation limit must be adjusted for dilution as discussed for the U flag.

U - Indicates compound was analyzed for but not detected. This is with the detection limit set at the groundwater standard for the contaminant. The sample quantitation limit must be corrected for dilution and for percent moisture. For example, 10 U for phenol in water if the sample final volume is the Protocol-specified final volume. If a 1 to 10 dilution of extract is necessary, The reported limit is 100 U.

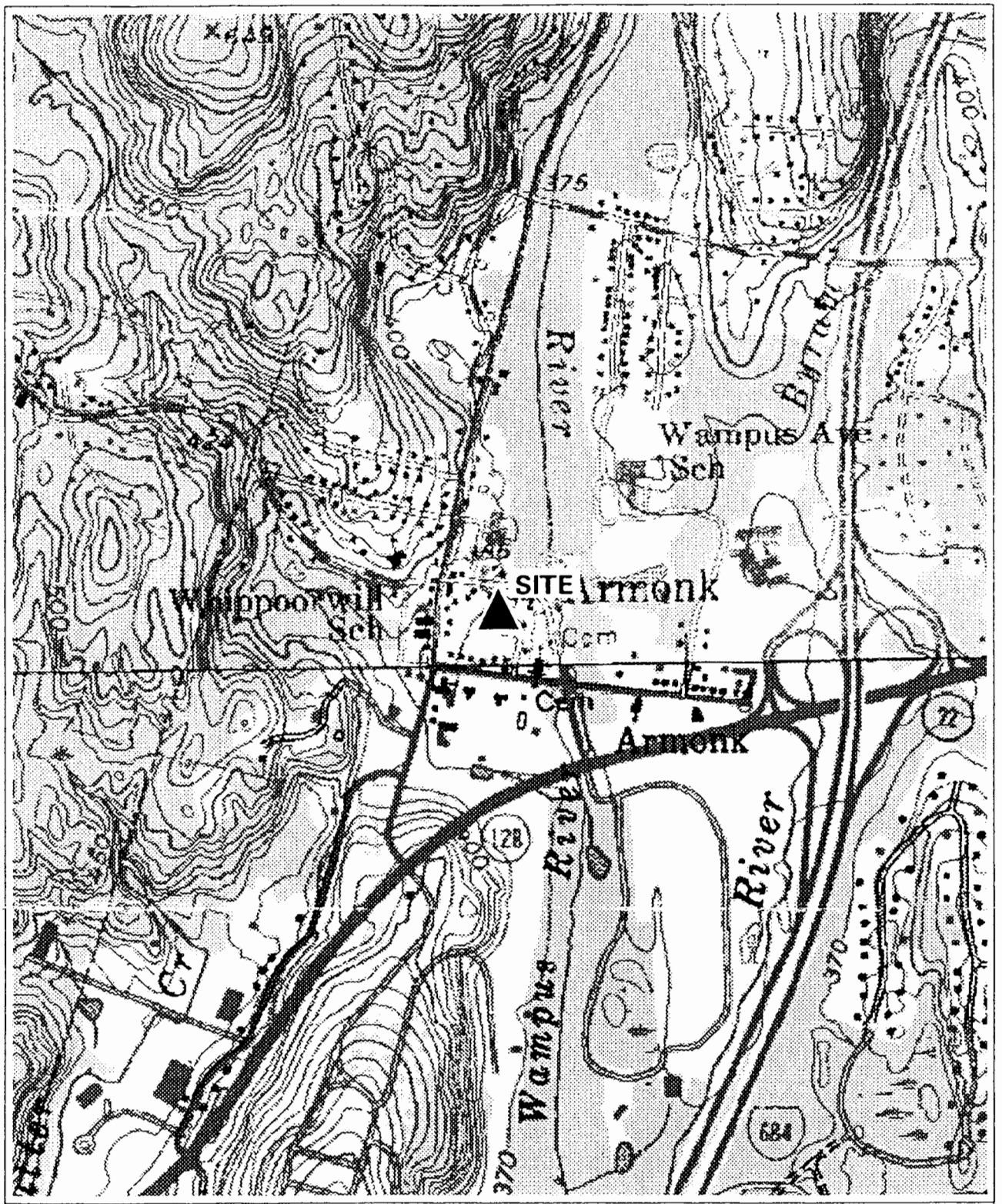
Discharge Monitoring Requirements

The discharge rate may not exceed the effective or design treatment system capacity. Only site-generated wastewater is authorized for treatment and discharge. Monitoring will continue to be completed on a monthly basis.

Discharge Monitoring Results

Currently, discharge monitoring, sampling, and analysis results have indicated that the treatment system is successful in reducing the level of COC's in the groundwater. Also, the levels of contaminants in the groundwater are below the discharge criteria set forth by the City.

Section 3.0 - Site and Wells: Maps and Plans



Site Location Map

360005 Armonk Private Wells

Map source: USGS 1:24,000-scale topographic quadrangles

N

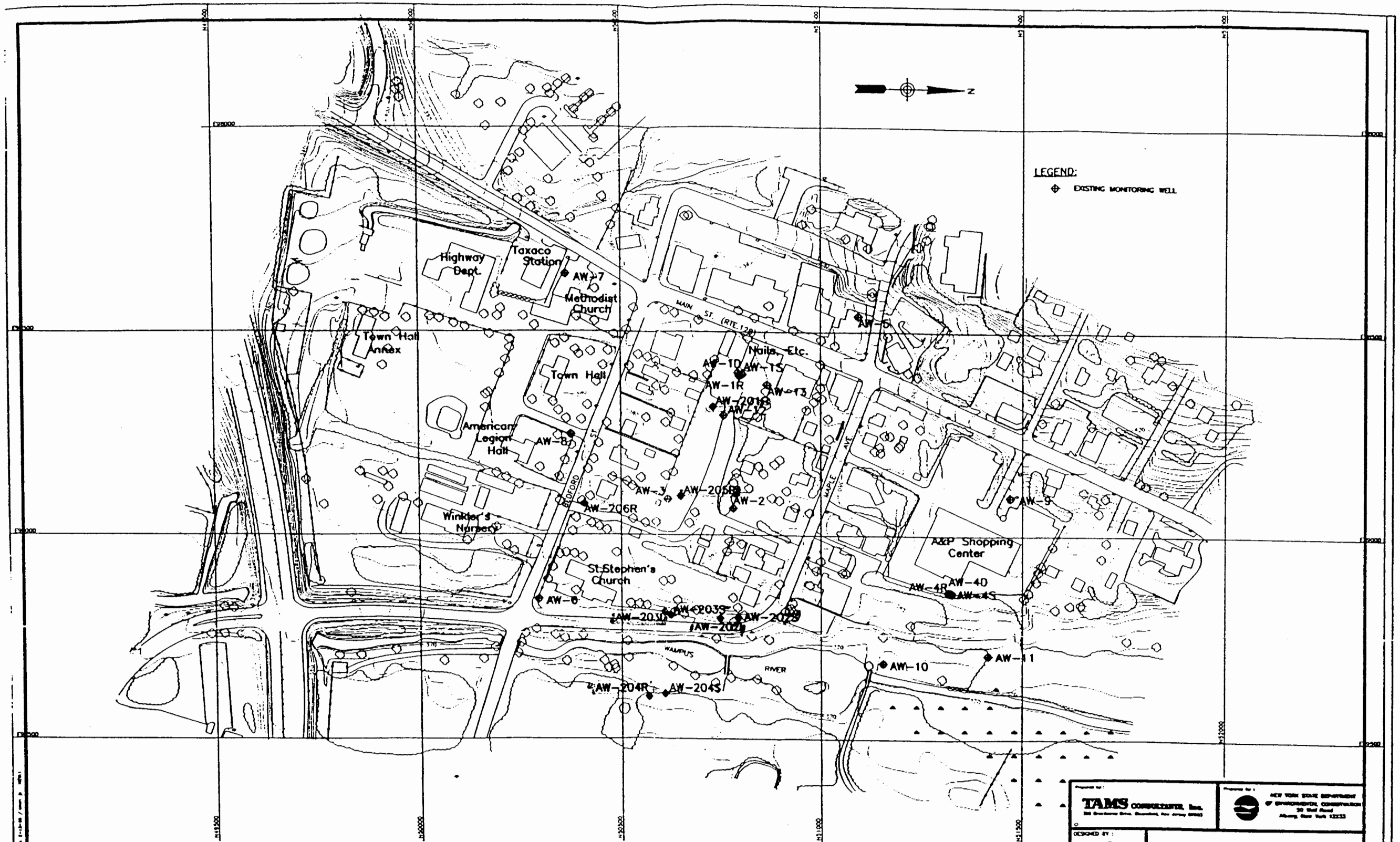
0 250 500 750 1000

FEET

Scale 1:12,000

April 1, 2000

County: Westchester



NOTES:

1. THIS MAP WAS ELECTRONICALLY SCANNED FROM A TOPOGRAPHIC BASE MAP PREPARED BY VEP ASSOCIATES, INC. THE TOPOGRAPHIC BASE MAP WAS PREPARED BY PHOTOGRAPHIC TECHNIQUES. THE AERIAL PHOTOGRAPHY WAS DONE BY KEYSTONE AERIAL SURVEY, INC. IN MARCH 1986.
2. THE HORIZONTAL GRID IS ASSUMED.
3. ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL USING THE NATIONAL GEODETIC VERTICAL DATUM (NGVD, 1929).
4. NEWLY INSTALLED MONITORING WELLS WERE SURVEYED BY YEC, INC. ON MAY 7, 1994.
5. WELLS AW-205R AND AW208R WERE LOCATED USING OFFSET AND DISTANCE.

Prepared for: NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, 50 Wolf Road, Albany, New York 12233

Prepared by: TAMS CONSULTANTS, Inc., 300 Kinderkamack Road, Oradell, New Jersey 07649

DESIGNED BY: MT	ARMONK PRIVATE WELL SITE
DRAWN BY: PM	ARMONK, NEW YORK
CHECKED BY: DFS	SITE FEATURES MAP
SUBMITTED BY: MT	DATE: FEBRUARY, 1995 · SCALE: AS SHOWN · FIGURE NO.: 1-2

Section 4.0 - Monitoring Well Data

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-1S
SHEET 1 OF 2
FILE No. R5757.30

CONTRACTOR R&R International, Inc.
DRILLER J. Bucksar
GZA ENGINEER C. Cuviello/R. Lapert

BORING LOCATION See Location Plan
SURFACE ELEV. 381.21 DATUM NGVD
DATE: START 8/19/87 COMPLETE 8/19/87

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4 1/4" I.D. Hollow Stem Augers
SAMPLING METHOD Split Spoon (2.5" ID & 1-3/8" ID)
ROCK DRILLING None

REMARKS Soil sample collected using a 1 3/8 inch I.D. or 2 1/2" ID by 24" long split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 5 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 19.0' BOTTOM OF HOLE ELEVATION 362.2

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
						0			Flush mount locking road box	
0									Concrete surface seal	
								No samples collected from 0 to 13' For soil classification in this area, refer to boring log AW-1D		
5									Cement/Bentonite grout mixture	
									2 inch I.D. stainless steel (type 316) riser	
10									Bentonite pellet seal	
									No. 4 QROK sand	
	31 15 16 11	S-1	13-15	31	60			Dense, brown, fine to coarse SAND, some Silt, trace Gravel, wet		
15	6 6	S-2	15-16	NA	100				2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)	1, 2,
	6 7	S-3	16-17	NA	100					3

REMARKS:
1. Water observed on split spoon.
2. Layer of varved fine sand and silt from 16.8-17.0' and 17.6-18.0'.
3. Collected composite sample S-2 to S-5 for priority pollutant organics and inorganic analysis using a 2 1/2 inch I.D. split spoon.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-1S
SHEET 2 OF 2
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
	7 8	S-4	17-18	NA	100			Grades to: . . . fine SAND, some Silt		2.
	8 10	S-5	18-19	NA	100			Gray, fine SAND and Clayey SILT, overall slight plasticity, wet		
20								BOTTOM OF HOLE 19.0 ft.		
25										

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-1D
SHEET 1 OF 2
FILE No. R5757.30

CONTRACTOR R&R International, Inc.
DRILLER J. Bucksar
GZA ENGINEER C. Cuviello/R. Laport

BORING LOCATION See Location Plan
SURFACE ELEV. 381.22 DATUM NGVD
DATE: START 8/18/87 COMPLETE 8/19/87

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4 1/4" I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8" I.D. Split Spoon
ROCK DRILLING None

REMARKS Soil samples collected using a 1 3/8" I.D. by 24" long split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 12 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 27.5' BOTTOM OF HOLE ELEVATION 353.7

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
									Flush mount locking road box	
0	13					0			Concrete surface seal	
	13	S-1	0-2	17	50			Medium dense, brown, fine to coarse SAND, some Silt, trace fine Gravel, damp		
	4									
	4									
	9									
	6	S-2	2-4	15	45					
	9									
	11									
	10									
5	7	S-3	4-6	13	35					
	6									
	7									
	10									
	13	S-4	6-8	27	50					
	14									
	13									
	9									
	14	S-5	8-10	26	65				Cement/Bentonite grout mixture	
	12									
10	12									
	6									
	7	S-6	10-12	13	75			Grades to: . . . little Silt, wet		
	6									
	7									
	7									
	6	S-7	12-14	13	75			Grades to: . . . fine to medium SAND.	2 inch I.D. Stainless steel (type 316) riser	
	7									
	10									
	3									
15	4	S-8	14-16	8	75			Grades to: . . . loose		
	4									
	3									
	4	S-9	16-18	4	45			Grades to: . . . very loose		
	2									

REMARKS: 1. Water observed on split spoon.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-1D
SHEET 2 OF 2
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
	2 4	S-9	16-18	4	45					
	3 15 15 41	S-10	18-20	30	50			Very stiff to hard gray, Clayey SILT, little fine-medium Sand, overall slight plasticity, wet		Bentonite pellet seal
20	11 12 16 11	S-11	20-22	28	85			Dense, gray-black, GRAVEL and fine to coarse SAND, little Silt, wet		No. 4 QROK Sand
										2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)
25	29 35 26 44	S-12	25-27	61	100			. . . Very dense, fine to coarse SAND, some Gravel.		Bentonite pellet seal
								BOTTOM OF HOLE 27.5 ft. Auger Refusal 27.5 ft.		
30										

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-1R
SHEET 1 OF 3
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Bucksar/J. Rockford
GZA ENGINEER C. Cuviello

BORING LOCATION See location plan
SURFACE ELEV. 381.13 DATUM NGVD
DATE: START 12/14/87 COMPLETE 1/10/88

DRILLING METHODS

TYPE OF DRILL RIG Davey Kent 5/CME 75
CASING 6-1/4" I.D. Hollow Stem Augers
SAMPLING METHOD 1-3/8" I.D. Split Spoon
ROCK DRILLING NX Size Rock Core

REMARKS Soil samples collected using a 1-3/8" I.D. split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY

DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 2 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 2
OVERBURDEN THICKNESS 25.5'
AMOUNT OF ROCK DRILLED 32.2'
TOTAL DEPTH OF HOLE 57.7'
TOP OF ROCK ELEVATION 355.6
BOTTOM OF HOLE ELEVATION 323.4

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
0						0		No samples taken between 0 and 17' For soil classification in this area, refer to boring log AW-1D	Flush mount locking road box Concrete surface seal Cement/bentonite grout mixture 4" I.D. PVC pipe 2" I.D. PVC pipe	
5										
10										
15										

REMARKS:

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-1R
SHEET 2 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
	100/4	S-1	17-17.4	NA	0						
	4										
	4							Stiff, gray, SILT, little fine Sand, wet			
	6	S-2	18.0-20.0	10	65						
20	15										
25								Top of Rock at 25.5'			
								Auger refusal at 25.5'			
		C-1	25.5-27.5	55	60			LA,SO,S			
								Black hornblende-quartz gneiss, moderately hard, moderately weathered, medium grained, thin bedded, moderately fractured		1	
30		C-2	29.5-31.7	83	100			H,SO,M			
								H,C,S			
								H,C,M		2	
								H,SO,M			
								H,O,MV			
		C-3	32.5-36.5	82.5	100			LA,SO,M			
								HA,O,M			
								HA,C,M			
35								LA,SO,MV			
								LA,SO,M			
								LA,O,V			
		C-4	36.5-40.0	85.7	100			H,C,S			
								H,C,S			
								H,C,SM			
								H,SO,S			
								H,SO,S			
40								H,SO,SM			
								H,SO,M			
								H,O,M			
								H,C,SM			
								H,O,MV			
		C-5	40.0-48.5	68	98			Zone of fractured rock (41.2' to 41.5')			
								H,SO,MV			
								H,C,S			
								HA,SO,M			

INSTALLATION LOG: Cement/bentonite grout mixture; Bentonite pellet seal; Bottom of 4" PVC casing at 31.0'; No. 4 QROK Sand

STRATIGRAPHIC LOG: Cement/bentonite grout mixture; Bentonite pellet seal; Bottom of 4" PVC casing at 31.0'; No. 4 QROK Sand

REMARKS:
1. Rapid advancement of core barrel from 27.5' - 29.5'
2. Rapid advancement of core barrel from 31.7' - 32.5'

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-1R
SHEET 3 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
								HA,O,V		4	
								H,C,S			
								Zone of fractured rock (43.9' to 44.3')			
								H,O,M			
		C-5	40.0-48.5	68	91			H,SO,S			
45								H,SO,SM			
											2" I.D. PVC riser
								LA,O,V			
								LA,SO,M			
50								HA,SO,M			
								HA,C,SM			
								HA,SO,SM			
								HA,SO,S			
		C-6	48.5-57.7	65	100			HA,SO,S			
								HA,C,SM			
								Zone of fractured rock (53.2' to 53.8')			2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)
								LA,SO,MV			
								H,SO,M			
								H,O,V			
55								HA,SO,M			
								Zone of fractured rock (55.1' to 55.8')			
								H,O,MV			
								HA,C,M			
								HA,SO,V			
								HA,SO,MV			
								HA,SO,MV		3	
								BOTTOM OF HOLE 57.7 ft.			
60											

REMARKS:
3. Discoloration of rock at fracture

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-2
SHEET 1 OF 4
FILE No. R5757.30

CONTRACTOR R&R International, Inc.
DRILLER J. Bucksar
GZA ENGINEER C. Cuviello

BORING LOCATION See Location Plan
SURFACE ELEV. 380.61 DATUM NGVD
DATE: START 8/20/87 COMPLETE 8/21/87

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4 1/4" I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8" I.D. Split Spoon
ROCK DRILLING None

REMARKS Soil samples collected using a 1 3/8" I.D. by 24" long split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 23 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 70.0' BOTTOM OF HOLE ELEVATION 310.6

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
										Locking steel protective casing
0	3					0				
	3	S-1	0-2	8	50			Loose, brown, fine to coarse SAND, little Silt, little Gravel, damp		Concrete surface seal
	5									
	5									
	6									
	7	S-2	2-4	17	30			Grades to: . . . Medium dense		
	10									
	14									
	9									
5	9	S-3	4-6	20	40					Cement/bentonite grout mixture
	11									
	11									
	7									
	10	S-4	6-8	21	50					
	11									
	13									
	11									
	10	S-5	8-10	21	60			Grades to: . . . trace Silt		
	11									
10	9									
	8									
	9	S-6	10-12	16	50			Grades to: . . . moist		2 inch I.D. stainless steel screen
	7									
	7									1
	7									
	3	S-7	12-14	6	50			Grades to: . . . Loose, wet		
	3									
	2									
	7									
15	3	S-8	14-16	5	45					
	2									
	2									
	9	S-9	16-18	9	50					
	7									

REMARKS: 1. Water observed on split spoon.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-2
SHEET 2 OF 4
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
	2	S-9	16-18	9	50			Grades to: . . . trace Gravel		
	3									
	3									
	4	S-10	18-20	8	95					
	4									
20	5									
	25									
	9	S-11	20-22	15	90			Grades to: . . . Medium dense, little Gravel		
	6									
	3									
	1									
	1	S-12	22-24	3	50			Grades to: . . . very loose, fine to coarse SAND, little Silt, no Gravel		
	2									
	2									
	1									Cement/Bontonite grout mixture
25	WOH	S-13	24-26	0	80					
	WOH									
	1									
	1									
	1	S-14	26-28	2	75			Grades to: . . . Gray		
	1									
	1									
	2									
	2	S-15	28-30	8	100			Grades to: . . . Loose		
	6									2 inch I.D. stainless steel screen
30	3									
	WOH							Very loose, gray, fine SAND and SILT, wet		
	WOH	S-16	30-32	0	90					
	WOH									
	WOH									
	WOH									
	WOH	S-17	32-34	0	100					
	WOH									
	WOH									
35										
	WOR									Bentonite pellet seal
	WOR	S-18	35-37	0	0			No recovery		
	WOR									
	WOR									
										No. 4 QROK Sand
										2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)
40										
	2									
	1	S-19	40-42	0	90					
	WOH							Very loose, gray-brown, fine to coarse SAND, trace fine Gravel, trace Silt, wet		
	WOH									
	1	S-20	42-44	5	75			Grades to: . . . Loose		
	2									

REMARKS: WOH = Weight Of Hammer
WOR = Weight Of Rods

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-2
SHEET 3 OF 4
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
	3									
	6									
	7									
45	9	S-21	44-46	20	100			. . . Medium Dense, fine to medium SAND, trace Silt, no Gravel		
	11									
	13									
50										2.
	WOH									
	WOH	S-22	50-52	2	75			. . . Very loose, gray		
	2									
	2									
55										3.
60	1									
	2	S-23	60-62	3	95					
	1									
	2									
65										

Bentonite pellet seal

Soil backfill

REMARKS:

2. "Running" sands filled about 20' of casing while attempting to collect sample S-22. Casing was cleaned out using a tricone roller bit. Sample was then collected.
3. No split spoon sample was collected from 55 to 57, due to high hydrostatic pressure.

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-2
SHEET 4 OF 4
FILE No. R5757.30

DEPTH (FT.)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
70										4.
								BOTTOM OF HOLE 70.0 ft.		
75										

REMARKS: 4. After augering to 70', an attempt was made to remove the rods and auger plug from the hole; however, "running" sands resultedin lodging the plug inside the augers. Also, while attempting to rotate the augers, while the plug was lodged, the auger extension broke. Further drilling and sampling was abandoned.

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigation
Armonk, New York

BORING No. AW-3
SHEET 1 OF 3
FILE No. R5757.30

CONTRACTOR R&R International, Inc.
DRILLER J. Bucksar
GZA ENGINEER C. Cuviello

BORING LOCATION See Location Plan
SURFACE ELEV. 378.67 DATUM NGVD
DATE: START 8/13/87 COMPLETE 8/13/87

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4 1/4" I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8" I.D. Split Spoon
ROCK DRILLING None

REMARKS Soil sample collected using a 1 3/8" I.D. by 24" long split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 16 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 62.0' BOTTOM OF HOLE ELEVATION 316.7

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
										Locking steel protective casing
0	3					0				
	3	S-1	0-2	7	0			No recovery		Concrete surface seal
	4									
	2									
	1									
	1	S-2	2-4	3	0			No recovery		
	2									
	2									
	5									
5	8	S-3	4-6	18	75			Medium dense, brown, fine to coarse SAND, some Gravel, trace Silt, moist		
	10									
	12									
	11									
	15	S-4	6-8	27	50					Cement/Bentonite grout mixture
	12									
	14									
	13									
	9	S-5	8-10	17	70					
	8									
10	8									
	9									
	10	S-6	10-12	13	75					
	3									
	4									
15										
	2									
	1	S-7	15-17	4	80			. . . Very loose, trace Gravel, wet		1
	3									
	4									

REMARKS: 1. Water observed on split spoon.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES. TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-3
SHEET 2 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
20	WOH									2 inch I.D. stainless steel (type 316) riser
	WOH	S-8	20-22	2	45			. . . little Silt		
	2									
	2									Bentonite pellet seal
25	1									No. 4 QROK Sand
	1	S-9	25-27	2	70			. . . trace Silt		
	1									2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)
	1									
30	2									
	1	S-10	30-32	3	45					
	2									
	2									Bentonite pellet seal
35	2									
	1	S-11	35-37	4	50			. . . gray, little Silt		
	3									
	3									
40	WOH									Soil backfill
	2	S-12	40-42	5	45			Loose, gray fine to coarse SAND and SILT, trace Gravel, wet		
	3									
	4									

REMARKS: WOH = Weight of Hammer.

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-3
SHEET 3 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
45	WOH 5 6 7	S-13	45-47	11	100			. . . Medium dense		
50	WOH WOH WOH WOH	S-14	50-52	0	100			. . . Very loose	Soil backfill	
55	WOH WOH WOH WOH	S-15	55-57	0	100			Same as previous sample (S-14)		
60	3 WOH WOH 1	S-16	60-62	0	90			Same as previous sample (S-14)		
								BOTTOM OF HOLE 62.0 ft.		
65										

REMARKS:

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-4S
SHEET 1 OF 3
FILE No. R5757.30

CONTRACTOR R&R International, Inc.
DRILLER J. Bucksar
GZA ENGINEER C. Cuviello

BORING LOCATION See Location Plan
SURFACE ELEV. 383.56 DATUM NGVD
DATE: START 8/7/87 COMPLETE 8/10/87

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4 1/4" I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8" I.D. Split Spoon
ROCK DRILLING None

REMARKS Soil sample collected using a 1 3/8" I.D. by 24" long split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL --
OVERBURDEN SAMPLES: DISTURBED 17 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 65.9' BOTTOM OF HOLE ELEVATION 317.66

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
									Flush mount locking road box	
0	4					0		Loose, brown, fine to coarse SAND, little Silt, trace Gravel, moist.	Concrete surface seal	
	4	S-1	0-2	8	50					
	4									
	4									
	3									
	4	S-2	2-4	9	50			Loose, tan, fine to coarse SAND and GRAVEL, some Silt, damp		
	5									
	4									
	6							Grades to: . . . Dense		
5	15	S-3	4-6	32	60					
	17									
	12									
	10									
	9	S-4	6-8	18	60			Grades to: . . . Medium dense	Cement/bentonite grout mixture	
	9									
	12									
	8							Very dense, brown, fine to coarse SAND, some Silt, little Gravel, moist		
	25	S-5	8-9.2	N/A	80					
	50/.2									
10										
	11									
	16	S-6	10-12	39	75			Grades to: . . . Dense	2 inch I.D. stainless steel (type 316) riser	
	23									
	22									
15										
	5									
	4	S-7	15-17	9	65			. . . Loose, little Silt, trace fine Gravel, wet.		1
	5									
	5									

REMARKS: 1. Water observed on split spoon.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES. TRANSITIONS MAY BE GRADUAL

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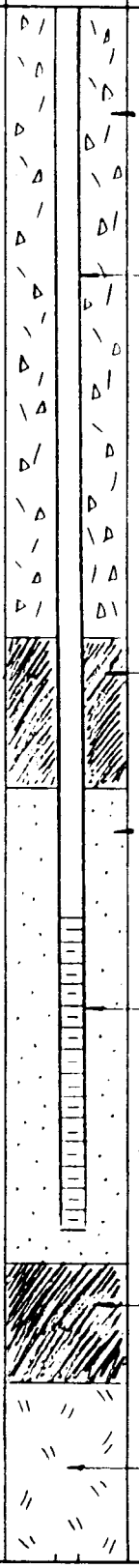
-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-4S
SHEET 2 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	REMARKS
20	WOH								
	1	S-8	20-22	5	70			. . . No Gravel	
	4								
	6								
25	4								
	7	S-9	25-27	14	65			. . . Medium dense, trace Gravel, trace Silt	
	7								
	13								
30	6								
	9	S-10	30-32	20	50				
	11								
	13								
35	11								
	11	S-11	35-37	26	75				
	15								
	22								
40	3								
	6	S-12	40-42	14	100			. . . Gray fine to coarse Sand	
	8								
	10								

INSTALLATION LOG



REMARKS: WOH = Weight of Hammer

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-4S
SHEET 3 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
45	WOH 3 3 3	S-13	45-47	6	100			. . . Loose		
								Gray SILT, some fine to medium Sand, wet.		
50	4 4 7 12	S-14	50-52	11	100			. . . Medium Dense		
55	WOH WOH WOH WOH	S-15	55-57	0	100			. . . Very loose, little fine to medium Sand	Soil backfill	
60	42 15 31 24	S-16	60-62	46	100			. . . Hard Dense, gray, fine to coarse SAND and GRAVEL, some Clayey Silt, overall slight plasticity, wet		
65	100/.2	S-17	65-65.2	N/A	100			BOTTOM OF HOLE 65.9 ft. Auger Refusal 65.9 ft.		

REMARKS:

WOH = Weight of Hammer

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-BORING LOG-

PROJECT Armonk Well Site
Armonk, New York

BORING No. AW-4D
SHEET 1 OF 3
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER G. Klawinski

BORING LOCATION See location plan
SURFACE ELEV. 383.5 DATUM NGVD
DATE: START 12/5/87 COMPLETE 12/10/87

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4 1/4 inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8" I.D. Split Spoon
ROCK DRILLING none

REMARKS Soil samples collected using 1 3/8 inch I.D. split spoon driven by a 140 pound hammer falling 30 inches per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL --
OVERBURDEN SAMPLES: DISTURBED 6 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0
TOP OF ROCK ELEVATION --
TOTAL DEPTH OF HOLE 68.0 ft.
BOTTOM OF HOLE ELEVATION 315.5

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
									Flush Mount Locking Road Box	
0	2					0		Black, fine to medium SAND and SILT with intermixed organics (roots, leaves) moist	Concrete Surface Seal	
	4	S-1	0-2	7	50					
	3							Loose, brown, fine to coarse SAND little Silt, trace Gravel, moist		
	4									
	5							Loose, tan, fine to coarse SAND and GRAVEL, some Silt, damp		1
	4	S-2	2-4	6	25					
	2									
	9									
5										
	7							Medium dense, brown, fine to coarse SAND, some Silt, little Gravel, moist	Cement/bentonite grout mixture	
	11	S-3	7-9	23	75					
	12									
	16								2 inch I.D. PVC riser	
10										
										2
	11							. . . trace fine Gravel, wet		3
15	5	S-4	14-16	12	60					
	7									
	6									

REMARKS:
1. Rock fragment and wood fragment lodged in split spoon.
2. Augering difficult, potential presence of cobbles between 10.5 and 11.5 feet.
3. Water observed on split spoon.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES. TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-4D
SHEET 2 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
20	1 1 1 4	S-5	19-21	2	55			. . . Very loose, fine to medium SAND, no Gravel		4
25										
30										
35									Cement/bentonite grout mixture	
40										

REMARKS: 4. The hole remained open to 19' after 68 feet of of Hollow Stem Auger were removed following the first attempt to install monitoring well.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-4D
SHEET 3 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
45									2-inch I.D. PVC riser	
50									Cement/Bentonite grout mixture	
55									Bentonite pellet seal	
60									#4 QROK Sand	
	6								2-inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)	
	10	S-6	63-65	35	35			Dense, gray, fine to coarse SAND, some Silt, trace Gravel, wet		
65	25									
	21								Soil backfill	
								Auger refusal at 68.0 ft. BOTTOM OF HOLE AT 68.0 FT.		5

REMARKS:

5. Augering became difficult at 67.5 feet; possible presence of weathered rock.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-4R
SHEET 1 OF 4
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER C. Cuviello

BORING LOCATION See location map
SURFACE ELEV. 383.57 DATUM NGVD
DATE: START 1/10/88 COMPLETE 1/22/88

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4-inch I.D. Flush Joint Casing
SAMPLING METHOD 1 3/8-inch I.D. split spoon
ROCK DRILLING NX rock core

REMARKS Soil samples taken using a 1 3/8 inch I.D. split spoon driven by a 140 pound hammer falling 30 inches per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL --
OVERBURDEN SAMPLES: DISTURBED 3 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 2
OVERBURDEN THICKNESS 64.1
AMOUNT OF ROCK DRILLED 25.3
TOTAL DEPTH OF HOLE 89.4
TOP OF ROCK ELEVATION 319.5
BOTTOM OF HOLE ELEVATION 294.5

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
0						0		No soil samples taken from 0 to 36 feet. For soil classification in this area, area, refer to boring log AW-4S.		1 Flush mount locking gate box 1 Concrete surface seal 2 3
5										
10										
15										

REMARKS:
1. 6 1/4-inch I.D. Hollow Stem Augers were used to start the hole from 0.0 - 30.0 feet.
2. Groundwater encountered 10.8 feet on 1/19/88.
3. Difficult augering from 15.0 - 17.0 feet.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES. TRANSITIONS MAY BE GRADUAL

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-4R
SHEET 2 OF 4
FILE No. R5757.30

DEPTH (FT.)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
20										
25										2 inch I.D. PVC riser
30										Cement/bentonite grout mixture
35										
	7 11 9 13	S-1	36-38	20	50			Medium dense, brown, fine to coarse SAND, wet		
	9 7 8 7	S-2	38-40	15	50			Medium dense, gray, fine to coarse SAND, trace Silt, wet		
40										

REMARKS:

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-4R
SHEET 3 OF 4
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
45										
	8							Medium dense, gray, SILT, some fine to medium Sand, wet		
	8	S-3	46-48	17	90					
	9									
	10									
50								No soil samples taken from 48 to 64.1 feet For soil classification in this area refer to boring log AW-4S		Cement/Bentonite grout mixture
55										
60										
								Top of Rock at 64.1 feet Auger refusal at 64.1 feet		Bentonite pellet seal
65		C-1	64.1 - 72.4	80	100			LA, SO, SM Gray-black, quartz-hornblende gneiss, moderately hard, slightly weathered, medium grained, thin bedded, moderately fractured HA, SO, M HA, SO, M Zone of fractured rock (65.8' to 66.2') HA, O, M LA, SO, M HA, SO, S HA, SO, MV		

REMARKS:

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-4R
SHEET 4 OF 4
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
70								HA, C, S HA, SO, M H, O, M			
								HA, O, V HA, O, V T, O, V			
		C-2	72.4 - 79.4	26	73			LA, O, V		4	
								HA, O, V			
								Zone of fractured rock (72.9' to 74.4')			2 inch I.D. PVC riser
75								HA, O, MV			
								Quartz vein LA, O, SM H, O, SM H, SO, SM LA, O, M			No. 4 QROK Sand
								HA, O, SM LA, O, SM HA, O, SM LA, O, SM LA, O, M		5	
80		C-3	79.4 - 89.4	33	83			H, O, SM H, O, SM H, O, SM H, O, SM HA, O, M LA, O, M LA, O, M HA, O, M Zone of fractured rock (82.0' to 82.5') H, O, SM H, O, SM H, O, SM			2 inch I.D. stainless steel (type 316) wire wound screen
85								H, O, SM Zone of fractured rock (84.5' to 84.8') HA, O, SM LA, O, SM LA, O, M LA, SO, M H, O, M H, O, M LA, O, M LA, O, M LA, O, M LA, O, M H, O, M LA, O, M			
90								BOTTOM OF HOLE AT 89.4 FT.		6	
95											

REMARKS:
4. Completed NX rock coring to depth of 72.4 feet on 1/19/88.
5. Completed NX rock coring to depth of 79.4 on 1/20/88.
6. Completed NX rock coring to depth of 89.4 on 1/21/88.

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-5
SHEET 1 OF 2
FILE No. R5757.30

CONTRACTOR R&R International, Inc.
DRILLER J. Bucksar
GZA ENGINEER C. Cuviello

BORING LOCATION See Location Plan
SURFACE ELEV. 387.83 DATUM NGVD
DATE: START 8/4/87 COMPLETE 8/6/87

DRILLING METHODS

TYPE OF DRILL RIG CME-75
CASING 4 1/4" I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8" I.D. Split Spoon
ROCK DRILLING NX Size Rock Core

REMARKS Soil samples collected using a 1 3/8" I.D. by 24" long split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY

DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 6 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 1
OVERBURDEN THICKNESS 10.2'
AMOUNT OF ROCK DRILLED 15.0'
TOTAL DEPTH OF HOLE 25.2'
TOP OF ROCK ELEVATION 377.6
BOTTOM OF HOLE ELEVATION 362.6

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
0						0				Locking steel protective casing
	7									
	12	S-1	0-2	23	65			Medium dense, brown, fine to coarse SAND, trace Gravel, occasional rock fragments, damp		Concrete surface seal
	11									
	7									
	5									
	6	S-2	2-4	15	90			Grades to: . . . some Silt		
	9									
	11									
	5									
	32	S-3	4-5.4	N/A	70			Grades to: . . . Very dense		Cement/Bentonite grout mixture
5	50/.4									
	19									
	17	S-4	6-8	61	75			Grades to: . . . little Silt, little Gravel		
	44									
	50									
	50/.45	S-5	8-8.45	N/A	100			Description - see Note 1. below		1.
										Bentonite pellet seal
10	100/.2	S-6	10-10.2	N/A	0			No recovery Auger refusal at 10.2 ft. TOP OF ROCK @ 10.2 ft.		
								H,SO,MV HA,SO,S Black hornblende-quartz gneiss, moderately hard, slightly weathered, fine grained, thin bedded, moderately fractured HA,SO,S LA,SO,S 0.1' Crushed Rock (presumed to be a result of coring operation)		2
		C-1	10.2-12.8	69	100			Fractured Rock Zone (13,5' to 13.7')		2 inch I.D. stainless steel (type 316) riser
								Fractured Rock Zone (14.1' to 14.4')		
15		C-2	12.8-18.8	50	97			HA,SO,M		
								Fractured Rock Zone (15.8' to 17.2')		

REMARKS: 1. Sub-angular Gneiss rock fragment approximately 1 inch in diameter lodged in split spoon sampler.
2. Water observed on split spoon.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-5
SHEET 2 OF 2
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
								HA,O,V		No. 4 QROK Sand
								HA,SO,M LA,O,V		
20		C-3	18.8-22.2	12	98			Fractured Rock Zone (19.7' to 20.2') HA,SO,M Fractured Rock Zone (21.1' to 21.7'		2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)
								Crushed Rock (presumed result of coring operation) HA,SO,M HA,O,M HA,O,V HA,SO,S		
		C-4	22.2-25.2	48	97			HA,SO,M HA,O,S HA,O,V		
25								BOTTOM OF HOLE 25.2 ft.		
30										

REMARKS:

BORING No. AW-5

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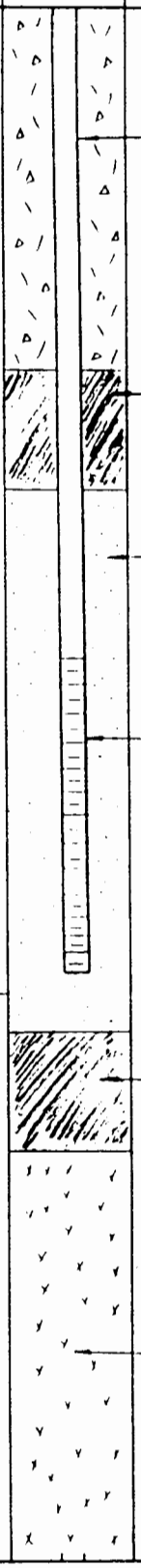
-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-6
SHEET 2 OF 5
FILE No. R5757.30

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION
20	WOH WOH 3 2	S-8	20-22	3	100			. . . very loose, fine to coarse SAND, trace Silt.
25	WOH WOH 4 4	S-9	25-27	4	25			
30	8 5 7 10	S-10	30-32	12	60			. . . Medium dense, little Silt.
35	10 12 8 7	S-11	35-37	20	50			Medium dense, gray, fine to medium SAND, some Silt, wet
40	2 4 4 3	S-12	40-42	8	50			. . . Loose

INSTALLATION LOG



REMARKS

REMARKS:
WOH = Weight of Hammer

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-6
SHEET 4 OF 5
FILE No. R5757.30

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
70	3									
	1	S-18	70-72	2	100					
	1									
	3									
75	WOH									
	WOH	S-19	75-77	0	100					
	WOH									
	WOH									
80	WOH									
	WOH	S-20	80-82	4	100					
	4									
	3									
85	WOH							. . . and SILT		Soil backfill
	WOH	S-21	85-87	0	75					
	WOH									
	WOH									
90	WOH									
	WOH	S-22	90-92	0	95					
	WOH									
	8									
95										

REMARKS: WOH = Weight of Hammer

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-6
SHEET 5 OF 5
FILE No. R5757.30

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
	WOH							Very soft, gray, Clayey SILT, little fine Sand, overall slight plasticity, wet		
	WOH	S-23	95-97	0	70					
	WOH									
	5									
100									Soil backfill	
	WOH									
	WOH	S-24	100-102	0	80					
	WOH									
	6									
								BOTTOM OF HOLE 102.0 ft.		
105										

REMARKS: WOH = Weight of Hammer

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-7A
SHEET 1 OF 2
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER C. Cuviello

BORING LOCATION See location map
SURFACE ELEV. 378.10 DATUM NGVD
DATE: START 12/17/87 COMPLETE 12/18/87

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4 1/4-inch I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8-inch split spoon
ROCK DRILLING None

REMARKS Soil samples taken with 1 3/8-inch I.D. split spoon driven by a 140 pound hammer falling 30 inches per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL 0
OVERBURDEN SAMPLES: DISTURBED 4 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 20.0' BOTTOM OF HOLE ELEVATION 358.1

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0						0					
	11									1	
	12	S-1	1.5 - 3.5	26	50			Medium dense, brown, fine to coarse SAND, little Gravel, trace Silt, damp			Concrete surface seal
	14										Cement/bentonite grout mixture
	12										
5	22							. . .Moist			
	14	S-2	5-7	25	50						
	11										
	12										
										2	
10	3							. . .Very loose, trace Gravel, wet			
	2	S-3	10-12	4	60						
	2										
	4										
										3	
15	16							. . .Medium dense			
	15	S-4	15-17	25	80						
	10										
	11										

REMARKS:
1. AW-7A was advanced to 20.0 feet and grouted to ground surface on 12/18/87. Soil conditions and the time constraints caused the rescheduling of monitoring well installation at AW-7B.
2. Water observed on solit spoon.
3. Auger spoil appeared stained with petroleum deposits.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-7A
SHEET 2 OF 2
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
									Cement/bentonite grout mixture		
20								BOTTOM OF HOLE 20.0 FT.			

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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-BORING LOG-

PROJECT: Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-7B
SHEET 1 OF 2
FILE No. R5757.30

CONTRACTOR: R&R International
DRILLER: J. Rockford
GZA ENGINEER: C. Cuviello

BORING LOCATION: See location plan
SURFACE ELEV. 378.10 DATUM NGVD
DATE: START 2/23/88 COMPLETE 2/24/88

DRILLING METHODS
TYPE OF DRILL RIG: CME-75
CASING: 4-inch I.D. Flush Joint Casing
SAMPLING METHOD: 1 3/8" I.D. Split Spoon
ROCK DRILLING: None

REMARKS: Soil samples taken with 1 3/8 inch I.D. split spoon driven by a 140 pound hammer falling 30 inches per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 6 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES NA
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED NA TOP OF ROCK ELEVATION --
TOTAL DEPTH OF HOLE 40.5 BOTTOM OF HOLE ELEVATION 337.6

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
									Flush mount locking gate box	
0						0		No soil samples taken from 0-13 ft. For soil calssification in this area, refer to boring log AW-7A	Concrete surface seal	
5										1
									Cement/bentonite grout mixture	
10									2 inch I.D. PVC riser	
	2 2 2 2	S-1	13.0 - 15.0	4	50			Loose, brown, fine to coarse SAND, trace fine Gravel, trace Silt, wet		

REMARKS:

1. Water level measured inside 4-inch flush joint casing with electronic water level indicator on 2/23/88.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-7B
SHEET 2 OF 2
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
20	2 2 2 2	S-2	20.0-22.0	4	60					PVC Riser 2 inch I.D.
25	4 2 3 2	S-3	25.0-27.0	5	70					
30	2 2 3 2	S-4	30.0-32.0	5	70					Bentonite Pellet Seal No. 4 QROCK Sand
35	3 3 4 4	S-5	35.0-37.0	7	40					2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)
40	8 50/0	S-6	40-40.5	NA	100			...Little Gravel Auger Refusal at 40.5 ft. BOTTOM OF HOLE AT 40.5 FT.		

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-8
SHEET 1 OF 3
FILE No. R5757.30

CONTRACTOR R&R International, Inc.
DRILLER J. Bucksar
GZA ENGINEER C. Cuviello

BORING LOCATION See Location Plan
SURFACE ELEV. 378.86 DATUM NGVD
DATE: START 8/14/87 COMPLETE 8/14/87

DRILLING METHODS

TYPE OF DRILL RIG CME-75
CASING 4 1/4" I.D. Hollow Stem Augers
SAMPLING METHOD 1 3/8" I.D. Split Spoon
ROCK DRILLING None

REMARKS Soil sample collected using a 1 3/8" I.D. by 24" long split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY

DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 19 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 47.0' BOTTOM OF HOLE ELEVATION 331.9

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
										Locking steel protective casing
0	1					0		Loose, red-brown, fine to coarse SAND, trace Silt, trace Gravel, damp		Concrete surface seal
	2	S-1	0-2	6	55					
	4									
	2									
	2							Grades to: . . . Loose to very loose		
	2	S-2	2-4	4	45					
	2									
	6									
	14							Grades to: . . . Dense		
5	30	S-3	4-6	44	50					
	14									
	9									
	13							Grades to: . . . Medium dense		
	11	S-4	6-8	21	85					Cement/Bentonite grout mixture
	10									
	9									
	13							Grades to: . . . little Gravel, moist		
	11	S-5	8-10	21	5					
	10									
10	8									
	6							Grades to: . . . wet		1.
	7	S-6	10-12	13	70					
	6									
	4									2 inch I.D. stainless steel (type 316) riser
	2									
	3	S-7	12-14	7	85			Grades to: . . . Loose, trace Gravel		
	4									
	3									
	3									
15	1	S-8	14-16	2	75			Grades to: . . . Very loose		
	1									
	2									Bentonite pellet seal
	3	S-9	16-18	5	90			Grades to: . . . Loose, no Gravel		
	2									

REMARKS: 1. Water boserved on split spoon.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES. TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-8
SHEET 2 OF 3
FILE No. R5757.30

DEPTH (FT.)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
	3 1	S-9	16-18	5	90					
	2 2 2 2	S-10	18-20	4	90			Grades to: . . . very loose, little Silt		
20	1 1 2 1	S-11	20-22	3	75			Grades to: . . . trace Silt	2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)	
	1 1 2 1	S-12	22-24	3	75					
25	2 1 1 2	S-13	24-26	2	60			Very loose, gray, fine to coarse SAND, some Silt, wet		
	1 2 2 4	S-14	26-28	4	100				No. 4 QROK Sand	
	WOH WOH WOH WOH	S-15	28-30	0	75			Grades to: . . . fine SAND and SILT		
30	WOH WOH WOH 1	S-16	30-32	0	100				Bentonite pellet seal	
35	3 2 1 3	S-17	35-37	3	100				Soil backfill	
40	WOH WOH 4 4	S-18	40-42	4	100			. . . SILT, some fine Sand		

REMARKS: WOH = Weight of Hammer

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-8
SHEET 3 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
15	WOH								Soil backfill	
	WOH	S-19	45-47	0	100					
	WOH									
	WOH									
								BOTTOM OF HOLE 47.0 ft.		
50										

REMARKS:
WOH - Weight of Hammer

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigation
Armonk, New York

BORING No. AW-9A
SHEET 1 OF 2
FILE No. R5757

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER P. Mulheren

BORING LOCATION See location plan
SURFACE ELEV. 388.07 DATUM NGVD
DATE: START 2/10/88 COMPLETE 2/11/88

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4 1/4-inch I.D. HSA/4-inch I.D. FJC
SAMPLING METHOD 1 3/8 I.D. Split Spoon
ROCK DRILLING None

REMARKS Soil samples taken with 1 3/8 inch I.D. split spoon driven by a 140 pound hammer falling 30 inches per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 8 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 27.1 BOTTOM OF HOLE ELEVATION 361.0

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
0	2	S-1	0-2	9	75	0		Loose, brown, fine to coarse SAND, little Gravel, trace Silt, damp		1 Topsoil
	3									Concrete surface seal
	6									
	10									
	17	S-2	4-6	52	50			. . .Very dense, fine SAND, no Gravel, moist		Cement/Bentonite grout mixture
5	25									2
	27									
	12									
	36	S-3	9-11	41	50			. . .Dense, fine to coarse SAND		3
10	22									
	19									
	20									
	9	S-4	14-16	24	75			. . .Medium dense		
15	13									
	11									
	13									

REMARKS:
1. Metal weight on end of measuring tape fell into borehole to depth of approximately 25 feet. AW-9A was grouted to ground surface and monitoring well was installed in AW-9B.
2. 1-inch diameter rock fragment lodged in end of split spoon sampler.

HSA = Hollow Stem Augers FJC = Flush Joint Casing

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES. TRANSITIONS MAY BE GRADUAL

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigation
Armonk, New York

BORING No. AW-9A
SHEET 2 OF 2
FILE No. R5757.30

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
										3
20	5 5 5 5	S-5	19-21	10	33			Loose to medium dense, brown, SILT, some fine to coarse Sand, wet	Cement/bentonite grout mixture	
25	21 10 14 16	S-6	24-26	24	50			. . . Some Silt, little fine Gravel		4
	50 50/1"	S-7	26.5-27.1	NA	30			Auger Refusal at 27.1 ft. BOTTOM OF HOLE AT 27.1 FT.		
30										

REMARKS:
3. Water observed on split spoon.
4. Weathered rock fragments in samples taken between 24 and 26 ft.

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-9B
SHEET 1 OF 2
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER P. Mulheren

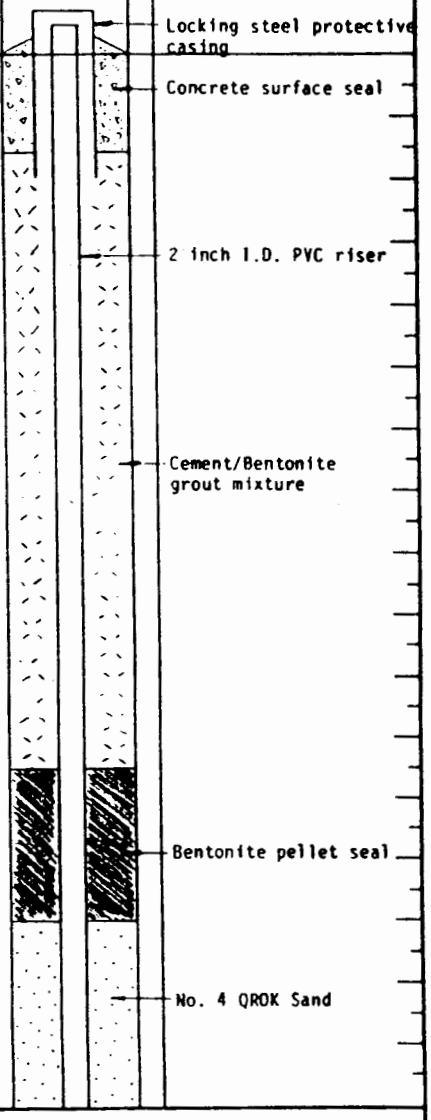
BORING LOCATION See location plan
SURFACE ELEV. 388.07 DATUM NGVD
DATE: START 2/10/88 COMPLETE 2/11/88

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4-1/4" I.D. HSA/4" I.D. FJC
SAMPLING METHOD 1-3/8" I.D. Split Spoon
ROCK DRILLING None

REMARKS No soil samples taken.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 0 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 22.5 BOTTOM OF HOLE ELEVATION 365.6

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0						0		No soil samples taken. For soil classification in this area, refer to boring log AW-9A.			
5											
10											
15											



REMARKS: HSA = Hollow Stem Auger
FJC = Flush Joint Casing

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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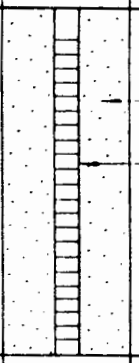
-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-9B
SHEET 2 OF 2
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
20											No. 4 QROK Sand 2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)
25								BOTTOM OF HOLE AT 22.5 ft.			

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT: Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-10
SHEET 1 OF 5
FILE No. R5757

CONTRACTOR: R&R International
DRILLER: J. Rockford
GZA ENGINEER: C. Cuviello

BORING LOCATION: See location map
SURFACE ELEV. 369.95 DATUM: NGVD
DATE: START 2/17/88 COMPLETE 2/22/88

DRILLING METHODS
TYPE OF DRILL RIG: CME-75
CASING: 4-inch I.D. Flush Joint Casing
SAMPLING METHOD: Split Spoon (2 1/2 inch I.D. and (1 3/8 inch I.D.)
ROCK DRILLING: None

REMARKS: Soil samples collected using a 1 3/8 inch or 2 1/2 inch I.D. split spoon driven by a 140 pound hammer falling 30 inches per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 22 UNDISTURBED ---
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0
TOTAL DEPTH OF HOLE 112.0 ft.
TOP OF ROCK ELEVATION --
BOTTOM OF HOLE ELEVATION 358.0

358.0 GFZ 6/21/02

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
0						0				Locking steel protective casing
	5 2 2 5	S-1	0.0 - 2.0	4	75			Very loose, brown, fine to coarse SAND, little Silt, trace Gravel, moist with occasional root fibers and grass (TOPSOIL)		Concrete surface seal 1
5	1 1 WOH 1	S-2	5.0 - 7.0	1	5			Wet		2
10	WOH -- -- --	S-3	10.0 - 12.0	0	50			Very loose, black, fine to coarse SAND, some Silt, wet; with intermixed organics (wood, roots) (PEAT)		Cement/bentonite grout mixture
15	WOH -- -- --	S-4	15.0 - 17.0	N/A	20					2

REMARKS:
1. Water observed on split spoon.
2. Two attempts were made to collect sample using 1 3/8 inch split spoon. Sample was collected on third attempt using 2 1/2 inch I.D. split spoon.
WOH = Weight of Hammer

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-10
SHEET 2 OF 5
FILE No. R5757

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
20	WOH -- -- --	S-5	20.0 - 22.0	NA	100					2
25	WOH -- -- --	S-6	25.0 - 27.0	0	100			Very loose, gray-brown SILT, wet		
30	WOH WOH 3 6	S-7	30.0 - 32.0	3	100			Trace fine to coarse Sand		3
	21 10 7 13	S-8	32.5 - 34.5	17	20			Medium dense, brown, fine to coarse SAND and GRAVEL, trace Silt, wet		2
35										
	10 12 9 11	S-9	37.5 - 39.5	21	50					
40										

REMARKS:
2. See Page 1
3. Sand was layered throughout sample.

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-10
SHEET 3 OF 5
FILE No. R5757

DEPTH (FT.)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
45	45 17 18 8	S-10	43.0 - 45.0	35	30			Dense, brown, angular fine to coarse GRAVEL, some fine to coarse Sand, trace Silt, wet		
50	34 22 12 8	S-11	48.0 - 50.0	34	35					
55	32 7 6 4	S-12	53.0 - 55.0	13	40			. . .Medium dense		4
60	13 7 13 17	S-13	58.0 - 60.0	20	45					
65	24 20 12 15	S-14	63.0 - 65.0	32	45			. . .Dense		
	66 14	S-15	68.0- 70.0	30	45					2

REMARKS:
2. See page 1.
4. Rock fragment was lodged in split spoon sampler. Recovered sample was comprised of gravel.

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigation
Armonk, New York

BORING No. AW-10
SHEET 4 OF 5
FILE No. R5757

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
70	16 9	S-15	68.0-	30	45					
	19 16 11 13	S-16	73.0- 75.0	27	50			. . .Medium dense		
75									PVC Riser 2 inch I.D.	5
	47 17 17 17	S-17	78.0- 80.0	34	40			Medium dense, brown, fine to coarse SAND and GRAVEL, trace Silt, wet		2
80										
	72 12 11 12	S-18	83.0- 85.0	N/A	40			. . .GRAVEL, trace coarse Sand		6
85									Cement/bentonite grout mixture	
	24 18 18 20	S-19	88.0- 90.0	N/A	80			. . .fine to coarse SAND and GRAVEL		6
90										
	24 22 14 17	S-20	93.0- 95.0	N/A	40			. . .GRAVEL, trace coarse Sand		6
95									Bentonite pellet seal	

REMARKS:

2. See page 1.
5. Stratification line approximated based upon change in auger advancement.
6. Sample collected with 2 1/2 inch I.D. split spoon

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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigation
Armonk, New York

BORING No. AW-10
SHEET 5 OF 5
FILE No. R5757

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
95										
	31									
	23	S-21	98.0-	40	50					4
	17									
00	17									
105										
110	69									
	53	S-22	110 - 112	N/A	40					
	33									
	20									
								BOTTOM OF HOLE 112.0 FT.		7

No. 4 OROCK Sand

2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)

Soil backfill

REMARKS: 6. See page 4.
7. Driller could not advance casing due to running sands and coarse gravel. Auger refusal was not encountered.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-11A
SHEET 1 OF 2
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER P. Mulheren

BORING LOCATION See location plan
SURFACE ELEV. 372.24 DATUM NGVD
DATE START 2/2/88 COMPLETE 2/3/88

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4-1/4" I.D. Hollow Stem Augers/4" I.D. FJC
SAMPLING METHOD 1-3/8" I.D. Split Spoon
ROCK DRILLING NX Rock Core

REMARKS Soil samples taken using a 1-3/8" I.D. split spoon driven by a 140 pound hammer falling 30 inches per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 6 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 2.5' boulder TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 30.0' BOTTOM OF HOLE ELEVATION 342.2

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
0	2 4 9 14	S-1	0.0-2.0	13	75	0		Medium dense, dark brown, fine to coarse SAND, little Silt, trace Gravel, moist		1 TOPSOIL Concrete surface seal
										Cement/bentonite grout mixture
5	22 5 8 10	S-2	5.0-7.0	13	50			Medium dense, brown, GRAVEL and fine to coarse SAND, trace Silt, wet		2
10	20 39 37 22	S-3	10.0-12.0	76	75			Very dense, gray-brown, fine to coarse SAND, little Silt, trace fine Gravel, moist		
15	13 20 25 26	S-4	15.0-17.0	45	70			. . . Dense		

REMARKS:
1. Refusal encountered at approximately 23 feet due to boulder. Rig was moved 15 feet and monitoring well was installed in AW-11B.
2. Water observed on split spoon.
FJC = Flush Joint Casing

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES. TRANSITIONS MAY BE GRADUAL

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-11A
SHEET 2 OF 2
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
20	5 9 13 17	S-5	20.0-22.0	22	75			. . . Medium dense, little fine Gravel, trace Silt, wet		3
25		C-1	24.5-27.0	N/A	N/A			Boulder (Granite)	Cement/bentonite grout mixture	
	15 17 15 13	S-6	28.0-30.0	32	75			Dense, gray-brown, fine to coarse SAND and GRAVEL, trace Silt, wet		
30								BOTTOM OF HOLE AT 30.0 ft.		

REMARKS:

3. Auger refusal encountered at 23'. Cored through boulder with NX rock core barrel to 27'. Switched to 4" I.D. FJC. Attempted to spin casing through boulder. Casing advanced approximately 4" into boulder but would not go further. Boring was grouted to ground surface.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-11B
SHEET 1 OF 3
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER P. Mulheren

BORING LOCATION See location plan
SURFACE ELEV. 372.24 DATUM NGVD
DATE: START 2/3/88 COMPLETE 2/9/88

DRILLING METHODS

TYPE OF DRILL RIG CME-75
CASING 4" I.D. Flush Joint Casing
SAMPLING METHOD 1-3/8" I.D. Split Spoon
ROCK DRILLING NX Rock Core

REMARKS Soil samples taken using a 1-3/8" I.D. split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY

DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 6 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 1
OVERBURDEN THICKNESS 54.3'
AMOUNT OF ROCK DRILLED 10.7' TOP OF ROCK ELEVATION 317.9
TOTAL DEPTH OF HOLE 65' BOTTOM OF HOLE ELEVATION 307.2

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
0						0		No samples taken between 0 and 33.5' For soil classification in this area, refer to boring log AW-11A		1	Locking steel protective casing Concrete surface seal 2 inch I.D. PVC riser Cement/bentonite grout mixture
5											
10											
15											

REMARKS:
1. Water observed in borehole.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-11B
SHEET 2 OF 3
FILE No. R5757.30

DEPTH (FT.)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
20									2 inch I.D. PVC riser		
25									Cement/bentonite grout mixture		
30											
	13 17	S-7A	33.5-34.5	37	50			Brown, GRAVEL, little fine to coarse Sand, trace Silt, wet			
35	20 27	S-7B	34.5-35.5					Brown, fine SAND, little Silt, wet			
	7 10										
40	11 10	S-8	38.5-40.5	21	50			. . . Medium dense			

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-11B
SHEET 3 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS	STRATIGRAPHIC LOG
	6 50/4"	S-9	43.5-44.4	N/A	100			. . . trace Silt		2	2" I.D. PVC riser
45											Bentonite pellet seal
											No. 4 QROK sand
50	8 1 1 3	S-10	49.0-51.0	2	50			. . . Very loose, fine to coarse SAND, some fine Gravel			2" I.D. stainless steel(type 316) wire wound screen (No. 20 slot)
	50/3"	S-11	54-54.3	N/A	0			Auger refusal and top of bedrock at 54.3'		3	
55								Gray-black quartz-hornblende gneiss, moderately hard, slightly weathered, medium-grained, thin bedded, moderately weathered		3	
60											Bentonite pellet seal
		C-1	61.0-65.0	20	90			HA, SO, S Fractured rock zone (61.8-62.4') HA, SO, S LA, SO, M LA, SO, SM LA, SO, SM LA, SO, M LA, SO, SM LA, SO, SM			
65								Zone of fractured rock (64.5-65.0') BOTTOM OF HOLE AT 65.0 ft.			

REMARKS:
2. Rock fragment lodged in split spoon.
3. 3-7/8" tricone roller bit advanced from 54.3 to 61'.
4. NX rock core collected from 61 to 65' to confirm bedrock.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-12
SHEET 1 OF 3
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER P. Mulheren

BORING LOCATION See location plan
SURFACE ELEV. 380.67 DATUM NGVD
DATE: START 1/22/88 COMPLETE 1/25/88

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4-1/4" I.D. Hollow Stem Augers
SAMPLING METHOD 1-3/8" I.D. Split Spoon
ROCK DRILLING None

REMARKS Soil samples collected using a 1-3/8" I.D. split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 9 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0
TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 45
BOTTOM OF HOLE ELEVATION 335.7

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
									Locking steel protective casing	
0	8					0				
	4	S-1	0-2	10	65			Medium dense, brown, fine to coarse SAND, little fine Gravel, trace Silt, damp	Concrete surface seal	
	6									
	6									
5	10									
	14	S-2	5-7	24	50			. . . trace fine Gravel		
	10									
	16									
10	10								Cement/bentonite grout mixture	
	19	S-3	10-12	33	65			. . . Dense, brown, fine to medium SAND, little Silt, moist		
	14									
	14								2 inch I.D. PVC riser	
15	7									
	4	S-4	15-17	9	100			. . . Loose, wet, occasional roots		
	5									
	6									

REMARKS:

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-12
SHEET 2 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION
20	4 5 9 6	S-5	20-22	14	65			. . . Medium dense, fine to coarse SAND, trace Silt, wet
25	3 2 7 7	S-6	25-27	9	100			. . . Loose, fine to medium SAND
30	1 1 3 2	S-7	30-32	4	75			
35	4 5 10 9	S-8	35-37	15	100			. . . Medium dense
40	16 18 14 15	S-9	40-42	32	75			Dense, gray, fine to coarse SAND, some fine Gravel, trace clayey Silt, wet

INSTALLATION LOG

REMARKS

1
Cement/bentonite grout mixture
2" I.D. PVC riser
Bentonite pellet seal
No. 4 QROK sand
2" I.D. stainless steel (type 316) wire wound screen (No. 20 slot)
2

REMARKS:
1. Water observed on split spoon.
2. Fine SAND and Clayey SILT lense encountered from 41.9 to 42.0'.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
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-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-12
SHEET 3 OF 3
FILE No. R5757.30

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
45								Auger refusal at 44.5' BOTTOM OF HOLE AT 44.5'		

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-13
SHEET 1 OF 2
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER P. Mulheren

BORING LOCATION See location plan
SURFACE ELEV. 381.89 DATUM NGVD
DATE: START 1/26/88 COMPLETE 1/26/88

DRILLING METHODS
TYPE OF DRILL RIG CME-75
CASING 4-1/4" I.D. Hollow Stem Augers
SAMPLING METHOD 1-3/8" I.D. Split Spoon
ROCK DRILLING None

REMARKS Soil samples collected using a 1-3/8" I.D. split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY
DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 7 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 26.5 BOTTOM OF HOLE ELEVATION 355.4

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
0	8					0		Asphalt	Flush mount locking gate box	
	4	S-1	0-2	10	65			Medium dense, brown, fine to coarse SAND, some Silt, trace fine Gravel, damp	Concrete surface seal	
	6									
	6									
5	9	S-2	5-7	18	50			. . . Moist		
	9									
	9									
	11								Cement/Bentonite grout mixture	
10	7									
	8	S-3	10-12	18	100			. . . Fine to medium SAND, little Silt		
	10									
	9								2 inch I.D. PVC riser	
15	5									
	6	S-4	15-17	14	75			. . . Fine SAND		
	8									
	10									

REMARKS: 1.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES. TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-13
SHEET 2 OF 2
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
20	15									
	18	S-5	20-22	39	100			. . . Dense, some Silt, wet		
	21									
	15									
25	50/3"	S-6	25-25.2	NA	100			Gray, fine to medium SAND, little Clayey Silt, wet		
								Auger refusal at 26.5 ft BOTTOM OF HOLE AT 26.5 FT.		
30										

Bentonite pellet seal

No. 4 QROK Sand

2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-14
SHEET 1 OF 3
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER P. Mulheren

BORING LOCATION See location plan
SURFACE ELEV. 378.08 DATUM NGVD
DATE: START 1/27/88 COMPLETE 2/1/88

DRILLING METHODS

TYPE OF DRILL RIG CME-75
CASING 4-1/4" I.D. Hollow Stem Augers/4" I.D. FJC
SAMPLING METHOD 1-3/8" I.D. Split Spoon
ROCK DRILLING None

REMARKS Soil samples taken using a 1-3/8" I.D. split spoon driven by a 140 pound hammer falling 30" per blow.

DRILLING SUMMARY

DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ---
OVERBURDEN SAMPLES: DISTURBED 14 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS ---
AMOUNT OF ROCK DRILLED 0 TOP OF ROCK ELEVATION ---
TOTAL DEPTH OF HOLE 68.0' BOTTOM OF HOLE ELEVATION 310.1

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
									Locking steel protective casing	
0	8					0				
	9	S-1	0-2	22	50			Medium dense, brown, fine to coarse SAND, little Silt, trace fine Gravel, moist, rock fragment in tip of spoon	Concrete Surface Seal	1
	13									
	10									
5	26	S-2	5-7	56	100			. . . Very dense	Cement/bentonite grout mixture	
	27									
	29									
	33									
10	12	S-3	10-12	17	100			. . . Medium dense, wet		2
	9'									
	8									
	8									
15	4	S-4	15-17	10	75				2 inch I.D. PVC riser	
	5									
	5									
	6									

REMARKS:
1. 4-1/4" I.D. HSA used from 0 to 30'. Switched to 4" I.D. flush joint casing due to "running" sands.
2. Water observed on split spoon.

FJC = Flush Joint Casing

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK TYPES, TRANSITIONS MAY BE GRADUAL.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-14
SHEET 2 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
20	5 5 6 5	S-5	20-22	11	100			. . . Fine to medium SAND, trace Silt, no Gravel		
25	2 4 4 7	S-6	25-27	8	100			. . . Loose		
30	8 1 1 5	S-7	29-31	2	50			. . . Very loose, fine SAND, little Silt		
35	13 7 9 8	S-8	34-36	16	100			. . . Medium dense, fine to coarse SAND, trace Silt		
40	8 5 5 7	S-9	39-41	10	100			. . . Fine to medium SAND		

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-14
SHEET 3 OF 3
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
45	8 5 7 8	S-10	44-46	12	50					
50	12 16 18 14	S-11	49-51	34	100			. . . Dense, fine to coarse SAND	Cement/Bentonite grout mixture	
55	4 6 4 7	S-12	54-56	10	75			. . . Medium dense, fine to medium SAND	2 inch I.D. PVC riser	
60	8 10 14 12	S-13	59-61	24	100				Bentonite pellet seal No. 4 QROK Sand	
65	11 15 17 21	S-14	64-66	32	100			. . . Dense, fine to coarse SAND, some Silt	2 inch I.D. stainless steel (type 316) wire wound screen (No. 20 slot)	
								Roller bit refusal and bottom of hole at 68.0 ft.		

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-15A
SHEET 2 OF 5
FILE No. R5757.30

DEPTH (FT)	BLOWS PER 0.5 FT	SAMPLE NUMBER	SAMPLE DEPTH (FT)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
20	5 3 4 4	S-5	20.0-22.0	N/A	5					2
25	7 4 4 2	S-6	25.0-27.0	8	50			Loose, gray-brown, fine to coarse SAND, trace Silt, wet	Cement/bentonite grout mixture	
30	4 2 4 5	S-7	30.0-32.0	6	50			. . . trace Gravel		
35	16 10 9 11	S-8	35.0-37.0	19	50			. . . medium dense		3
40	7 12 6 10	S-9	40.0-42.0	N/A	50					2

REMARKS:
2. Made two attempts to collect sample with 2 1/2 inch I.D. split spoon sampler.
3. Made two attempts to collect sample with 1-3/8" I.D. split spoon sampler.

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-15A
SHEET 4 OF 5
FILE No. R5757.30

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
70	7 11 12 10	S-15	70.0-72.0	23	60				Cement/bentonite grout mixture	
75	12 13 12 15	S-16	75.0-77.0	25	55					
80	8 10 14 13	S-17	80.0-82.0	24	55					
85	7 14 11 10	S-18	85.0-87.0	25	60					
90	13 18 21 21	S-19	90.0-92.0	39	100			. . . Dense		
95										

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-15B
SHEET 1 OF 6
FILE No. R5757.30

CONTRACTOR R&R International
DRILLER J. Rockford
GZA ENGINEER C. Cuviello

BORING LOCATION See location map
SURFACE ELEV. 380.3 DATUM NGVD
DATE: START 3/3/88 COMPLETE 3/31/88

DRILLING METHODS

TYPE OF DRILL RIG CME-75
CASING 4 inch I.D. Flush Joint Casing
SAMPLING METHOD None
ROCK DRILLING None

REMARKS No soil samples collected.

DRILLING SUMMARY

DIRECTION OF HOLE: VERTICAL ☒ INCLINED ☐ DEGREES FROM VERTICAL ____
OVERBURDEN SAMPLES: DISTURBED 0 UNDISTURBED 0
ROCK CORE: NUMBER OF BOXES 0
OVERBURDEN THICKNESS --
AMOUNT OF ROCK DRILLED 0
TOP OF ROCK ELEVATION --
TOTAL DEPTH OF HOLE 127.0'
BOTTOM OF HOLE ELEVATION 253.3

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
0						0		No soil samples taken. For soil classification in this area, refer to boring log AW-15A		Topsoil Concrete surface seal Cement/Bentonite grout mixture
5										
10										
15										

REMARKS:

1. Boring AW-15B was placed about 4 ft. east of boring AW-15A.

NOTE: THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL AND ROCK

GZA

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-15B
SHEET 3 OF 6
FILE No. R5757

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
45										
50									Cement/bentonite grout mixture	
55										
60										
65										

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-15B
SHEET 4 OF 6
FILE No. R5757

DEPTH (FT.)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR ROD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
70										
75										
80									Cement/bentonite grout mixture	
85										
90										
95										

REMARKS:

GOLDBERG-ZOINO ASSOCIATES OF N.Y., P.C.
GEOTECHNICAL-GEOHYDROLOGICAL CONSULTANTS

-BORING LOG-

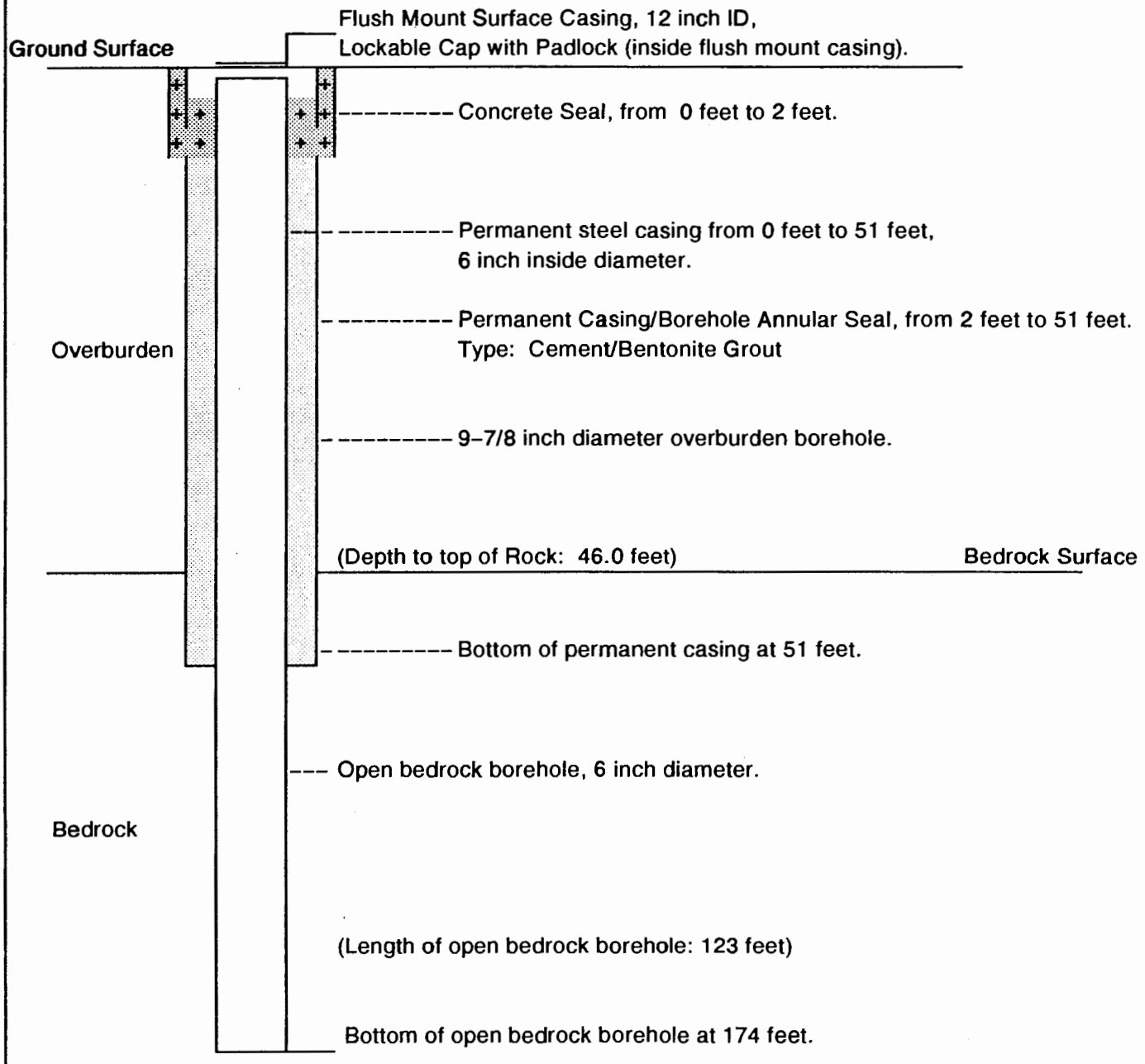
PROJECT Armonk Well Site
Remedial Investigations
Armonk, New York

BORING No. AW-15B
SHEET 5 OF 6
FILE No. R5757

DEPTH (FT)	BLOWS PER 0.5 FT.	SAMPLE NUMBER	SAMPLE DEPTH (FT.)	N-VALUE OR RQD (%)	% RECOVERY	DEPTH (FT.)	LEGEND	SAMPLE DESCRIPTION	INSTALLATION LOG	REMARKS
100									Cement/bentonite grout mixture	
105										2
110										
115										
120										

REMARKS: 2. 4-inch Flush Joint Casing (FJC) was broken by driller at 105 feet. NYSDEC/TAMS directed GZA to have driller grout boring to ground surface. Approximately 15 feet of FJC remained in borehole.

TAMS CONSULTANTS, Inc.	WELL LOG	Well No. AW-201R		
Project: Armonk Private Wells	Location: Armonk, NY	Page 10 of 10		
Project No.: 5651-133	Contractor: American Auger and Ditching	Water Levels		
Surface Elevation: 380.66	Driller: R. Baye	Date	Time	Depth
Top of Casing Elevation: 380.70	Well Permit Number: n/a	5/4/94	10:08	10.50'
		11/1/94	17:02	10.29'
Datum: NGVD	Date of Completion: 5/11/94			

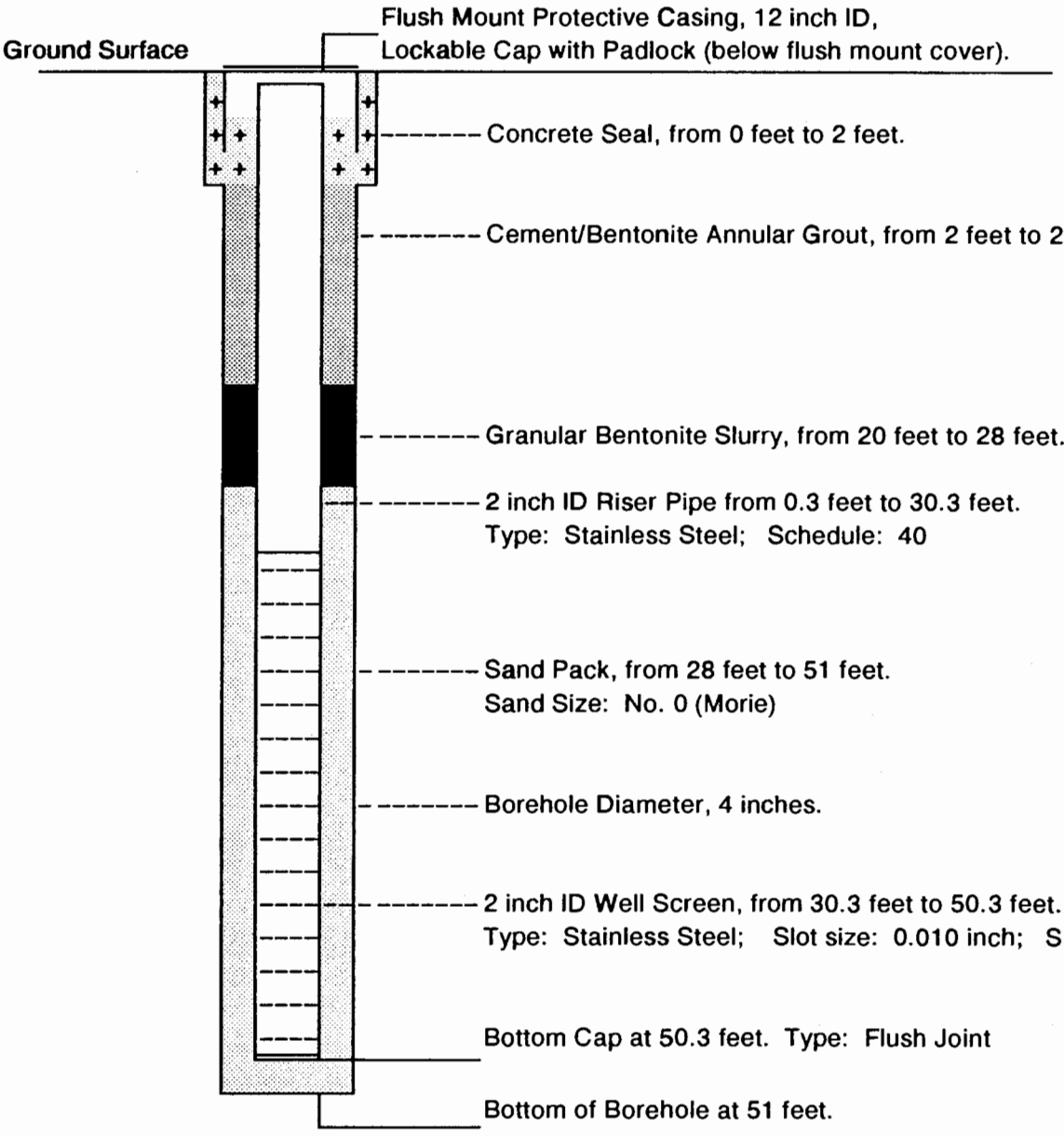


Note: All measurements referenced to feet below grade.

(NOT TO SCALE)

TAMS CONSULTANTS, Inc. WELL LOG Well No. AW-202S

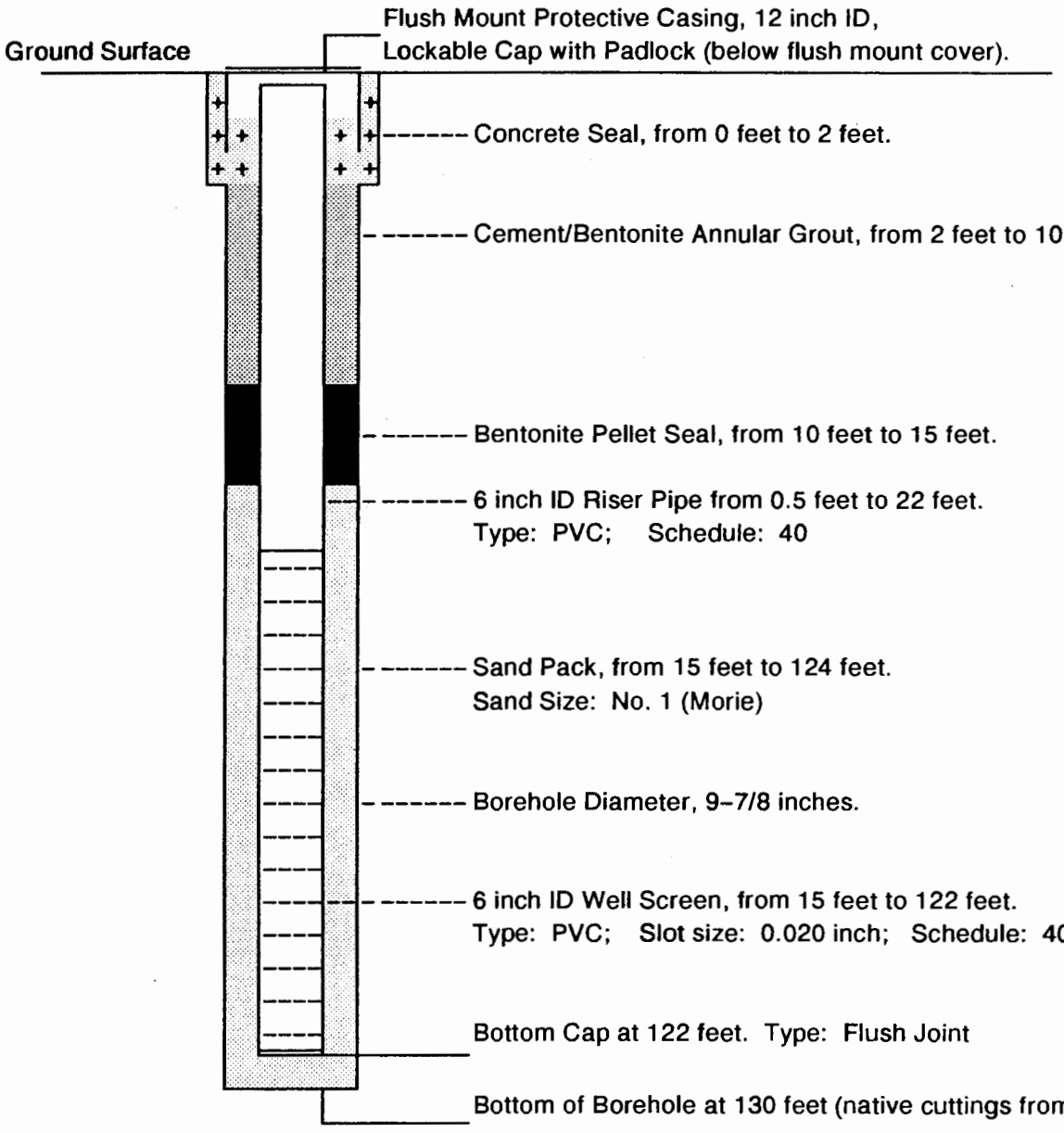
Project: Armonk Private Wells	Location: Armonk, NY	Page 4 of 4		
Project No.: 5651-133	Contractor: American Auger and Ditching	Water Levels		
Surface Elevation: 375.26	Driller: L. Penrod	Date	Time	Depth
Top of Riser Elevation: 374.75	Well Permit Number: n/a	5/4/94	15:45	4.29'
		11/1/94	18:40	4.86'
Datum: NGVD	Date of Completion: 5/3/94			



Note: All measurements referenced to feet below grade.

(NOT TO SCALE)

TAMS CONSULTANTS, Inc.	WELL LOG	Well No. AW-202I		
Project: Armonk Private Wells	Location: Armonk, NY	Page 8 of 8		
Project No.: 5651-133	Contractor: American Auger and Ditching	Water Levels		
Surface Elevation: 375.55	Driller: L. Penrod	Date	Time	Depth
Top of Riser Elevation: 374.97	Well Permit Number: n/a	5/11/94	11:44	10.10'
		11/1/94	18:38	5.20'
Datum: NGVD	Date of Completion: 5/11/94			

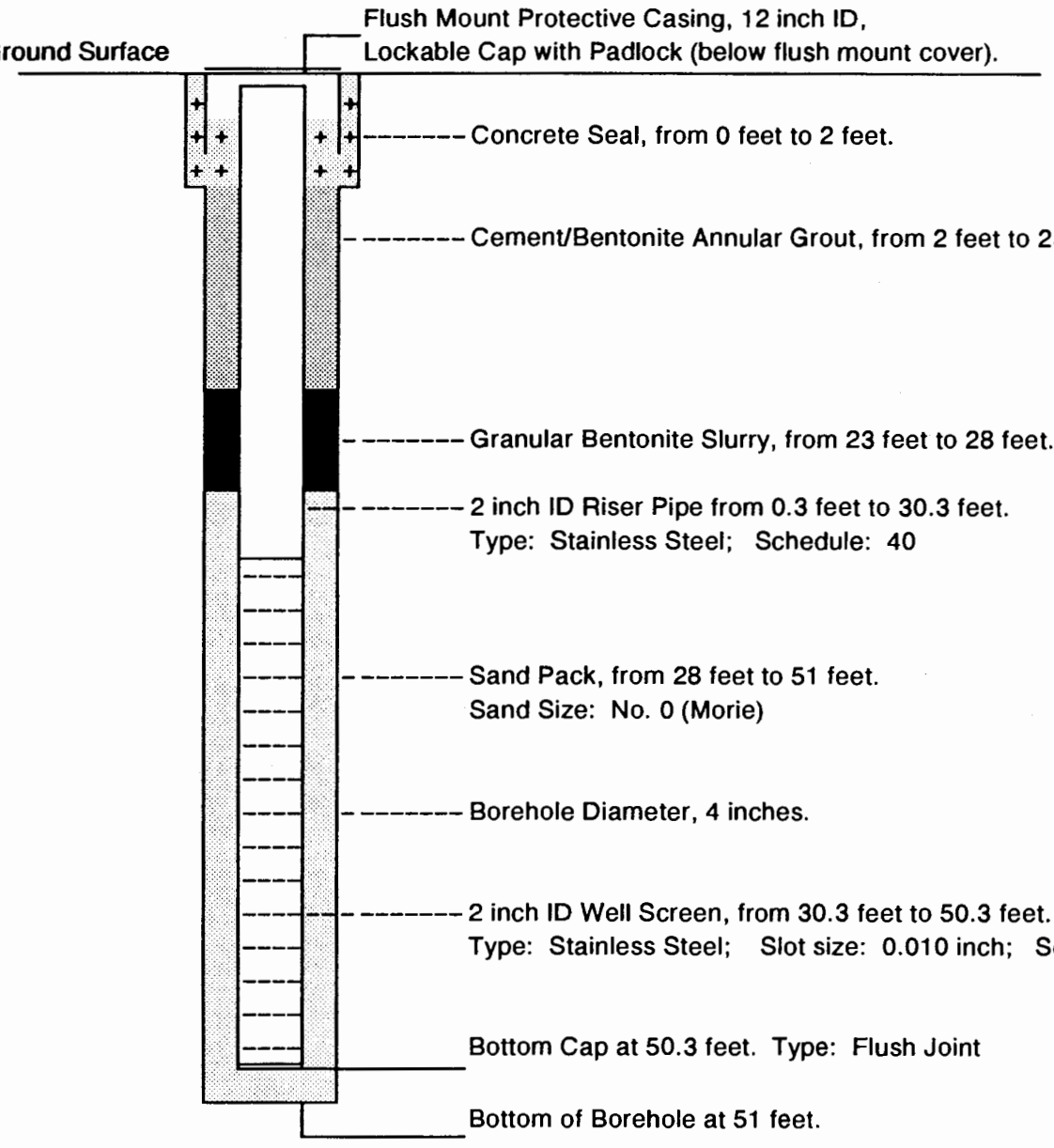


Note: All measurements referenced to feet below grade.

(NOT TO SCALE)

TAMS CONSULTANTS, Inc. WELL LOG Well No. AW-203S

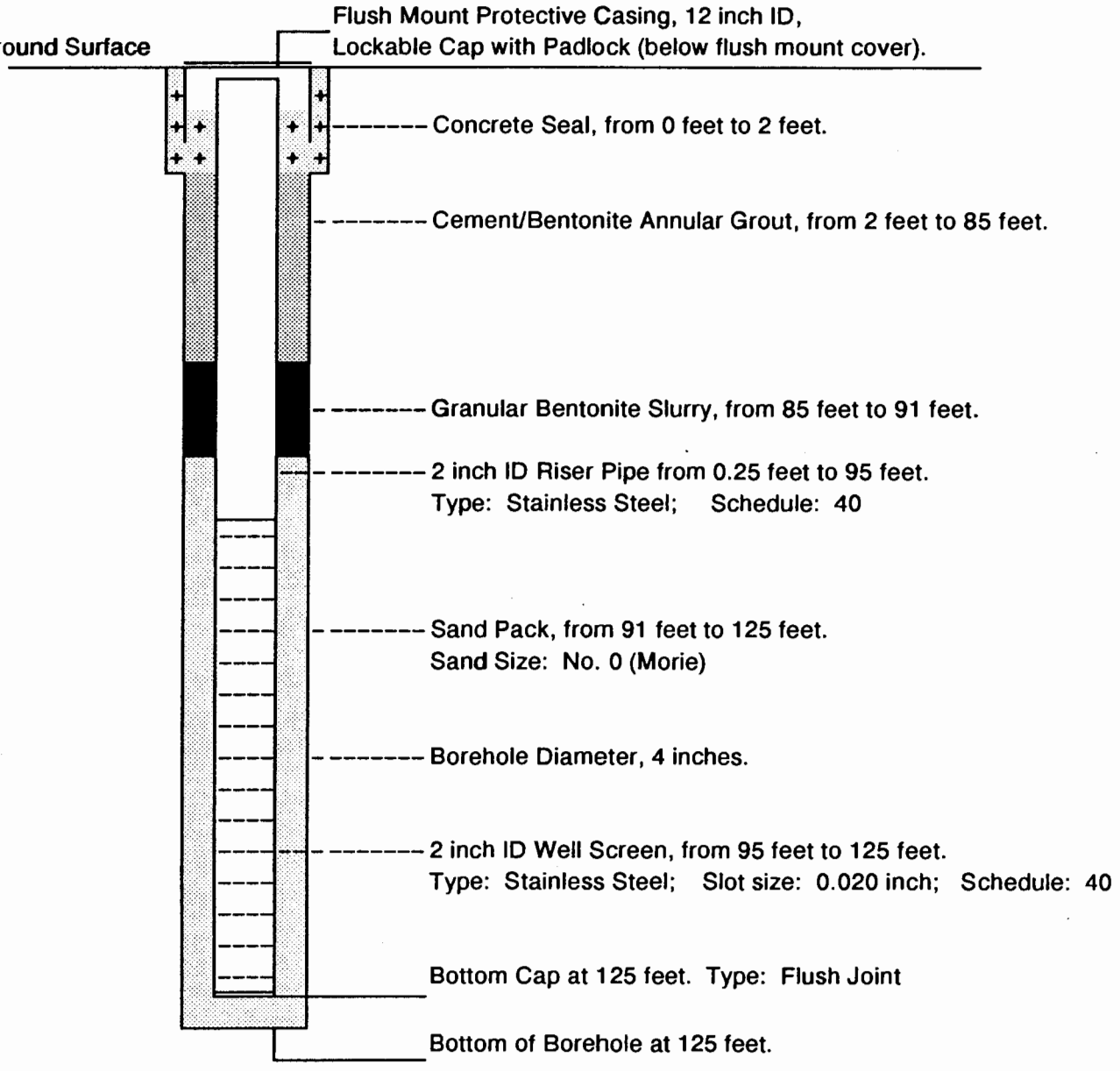
Project: Armonk Private Wells	Location: Armonk, NY	Page 4 of 4		
Project No.: 5651-133	Contractor: American Auger and Ditching	Water Levels		
Surface Elevation: 373.42	Driller: L. Penrod	Date	Time	Depth
Top of Riser Elevation: 372.94	Well Permit Number: n/a	5/10/94	08:40	2.75'
		11/1/94	18:33	3.20'
Datum: NGVD	Date of Completion: 4/27/94			



Note: All measurements referenced to feet below grade.

(NOT TO SCALE)

TAMS CONSULTANTS, Inc.	WELL LOG	Well No. AW-203I		
Project: Armonk Private Wells	Location: Armonk, NY	Page 8 of 8		
Project No.: 5651-133	Contractor: American Auger and Ditching	Water Levels		
Surface Elevation: 373.77	Driller: JOHN PITZTRUCK	Date	Time	Depth
Top of Riser Elevation: 373.50	Well Permit Number: n/a	5/10/94	10:50	3.10'
		11/1/94	18:36	4.12'
Datum: NGVD	Date of Completion: 5/4/94			

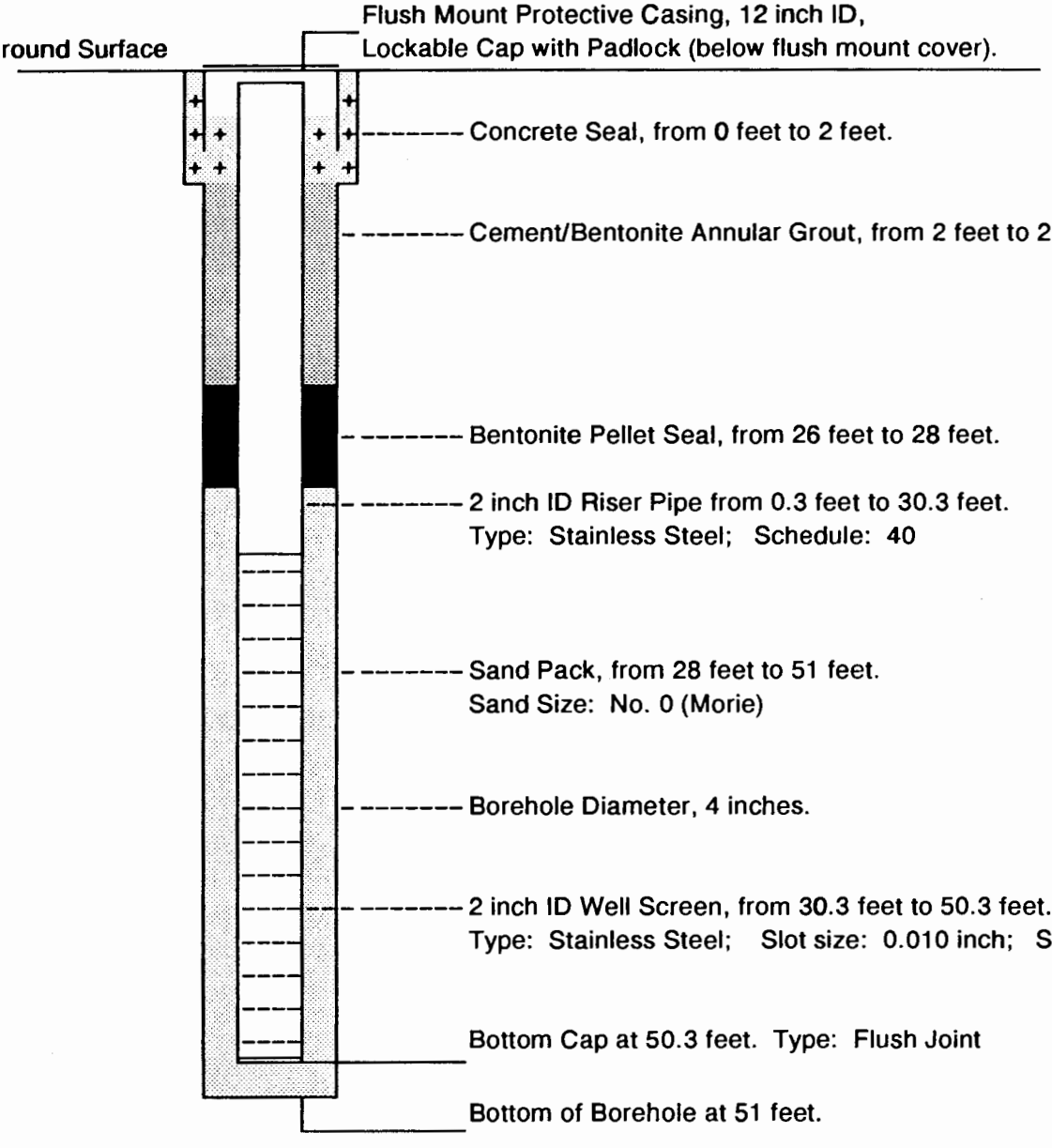


Note: All measurements referenced to feet below grade.

(NOT TO SCALE)

TAMS CONSULTANTS, Inc. WELL LOG Well No. AW-204S

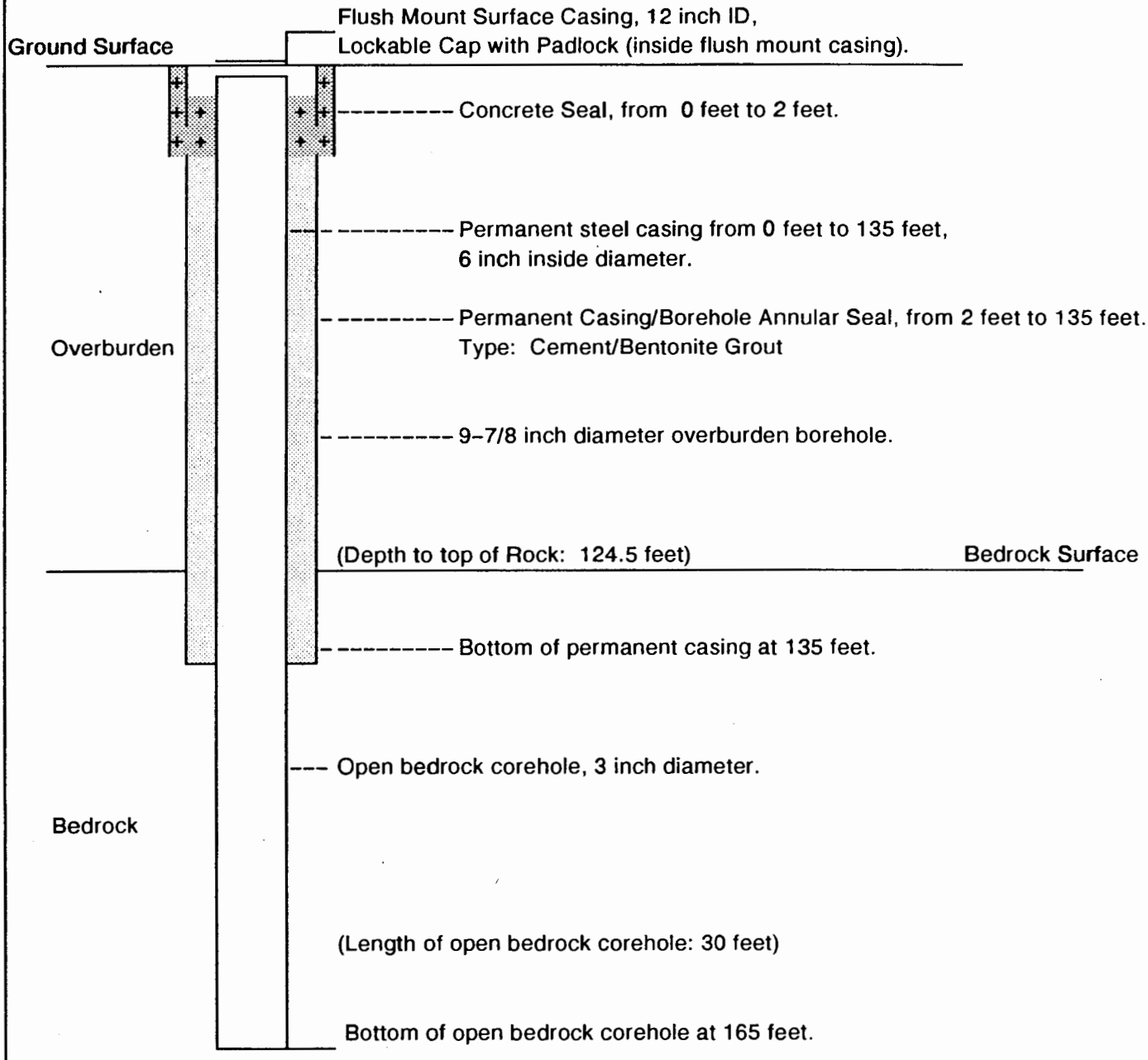
Project: Armonk Private Wells	Location: Armonk, NY	Page 4 of 4		
Project No.: 5651-133	Contractor: American Auger and Ditching	Water Levels		
Surface Elevation: 371.51	Driller: L. Penrod	Date	Time	Depth
Top of Riser Elevation: 371.19	Well Permit Number: n/a	5/3/94	14:05	0.75'
		11/1/94	18:42	1.37'
Datum: NGVD	Date of Completion: 4/29/94			



Note: All measurements referenced to feet below grade.

(NOT TO SCALE)

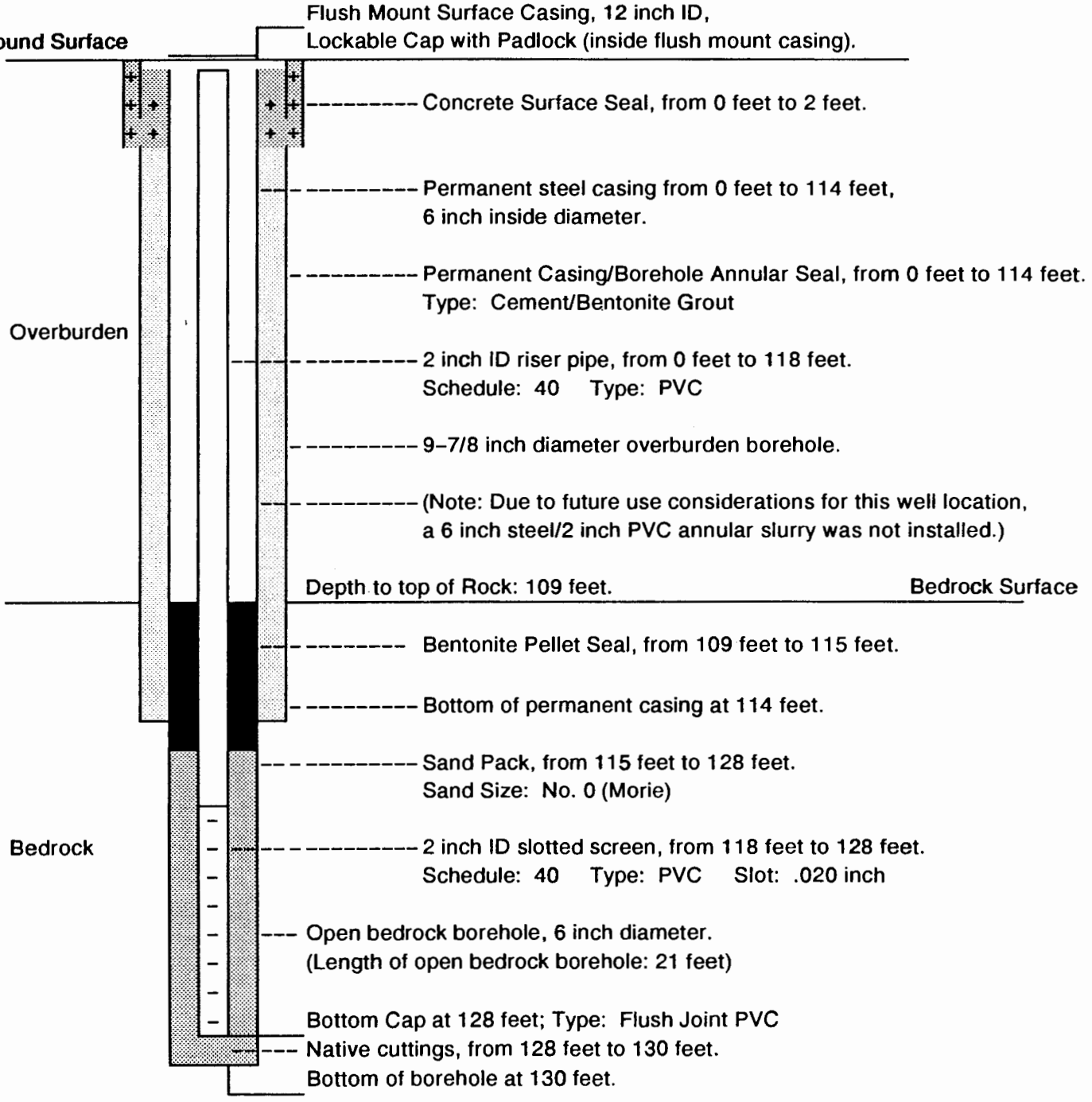
TAMS CONSULTANTS, Inc.	WELL LOG	Well No. AW-204R
Project: Armonk Private Wells	Location: Armonk, NY	Page 8 of 8
Project No.: 5651-133	Contractor: American Auger and Ditching	Water Levels
Surface Elevation: 372.52	Driller: ROCKY BAYE	Date / Time / Depth
Top of Casing Elevation: 372.08	Well Permit Number: n/a	5/12/94 7:47 1.22' 11/1/94 18:43 2.83'
Datum: NVGD	Date of Completion: 5/11/94	



Note: All measurements referenced to feet below grade.

(NOT TO SCALE)

TAMS CONSULTANTS, Inc.	WELL LOG	Well No. AW-205R		
Project: Armonk Private Wells	Location: Armonk, NY	Page 8 of 8		
Project No.: 5651-133	Contractor: American Auger and Ditching	Water Levels		
Surface Elevation: not avail.	Driller: R. Baye	Date	Time	Depth
Top of Casing Elevation: not avail.	Well Permit No.: n/a	9/22/94	15:45	9.0'
		11/1/94	18:24	9.54'
Datum: NGVD	Date of Completion: 9/22/94			



Note: All measurements referenced to feet below grade.

(NOT TO SCALE)

Section 5.0 - Health and Safety Plan

SITE SAFETY PLAN

T&A Code 1669

Sample ID Nos. __ __ __ __ __ - __ __ __ __ - __ __ __ __ - [01-__]

Site Name: Armonk Private Wells
Site Address: Vicinity of Maple Avenue/Main Street
North Castle
County: Westchester Region: 3

Registry Status: ☐ existing site Site ID No.: 360005
☐ "P" site "P" Site ID No.: _____
☐ not listed
☐ "Brownfields" site Site ID No.: _____

Regional contact: Ram Pergadia Phone No.: 845-256-3146

Plan prepared by: Wayne Bayer Wayne Bayer Date: 6/17/02
Approved by:
- Section Representative: _____ Date: _____
- Section Chief: Dennis Farrar Date: 6/18/02

Proposed date of sampling/investigation: 6/18/02

BACKGROUND INFORMATION

Information sources for background review:

- ☒ Routine O&M Sampling - Last sampled on: ?
- ☒ Phase I/Phase II Investigation: Date: _____
- ☐ Preliminary Site Assessment: Date: _____
- ☐ EPA/NUS Investigation Report: Date: _____
- ☒ RI/FS Reports: Date: _____
- ☒ Registry/File Review
- ☐ Other Reports/Studies: Date: _____ Type: _____

Site Status:

☐ Active ☒ Inactive ☐ Abandoned ☐ Unknown

Are there any unusual features on the site that may be of concern?

☐ Yes [describe below] ☒ No

_____

_____

_____

_____

Brief site history and description:

See Registry Page Information attached

Wastes of concern:

Tetrachloroethylene (PCE)

Waste characteristics:

☐ Corrosive ☐ Reactive ☐ Toxic
☐ Ignitable ☐ Volatile ☐ Unknown

Overall hazard levels anticipated on-site:

☐ High ☐ Moderate ☒ Low ☐ None ☐ Unknown

Slip/trip hazards:

☒ Yes ☐ No Describe: Just routine

Overall hazard assessment:

Low - Back Injury Preventive Action for Lifting Pumps and Generators will be emphasized.

ON-SITE ACTIVITIES

Has this site been sampled and/or investigated before?	☒ Yes ☐ No
Has the site perimeter been identified?	☒ Yes ☐ No ☐ Unknown
Is the site fenced?	☐ Yes ☒ No ☐ Unknown
Is a site map/sketch available?	☒ Yes ☐ No [if yes, attach]
Have areas of contamination been identified?	☒ Yes ☐ No
Will air quality monitoring be done on-site?	☐ Yes ☒ No
Is sampling planned at this site?	☒ Yes ☐ No

If yes:

	Parameters to be analyzed for
☐ soil/sediment	
☐ surface water	
☒ groundwater	VOCs
☐ waste product	

List the proposed on-site activities:

1. tailgate HASP Briefing
2. unload sampling equipment (i.e., generators, pumps, etc.)
3. take well and purge wells
4. sample (after recovery) where appropriate
5. decon and ice samples
6. leave site and return to base and dropping off or mailing samples

Will respiratory protection be required? ☐ Yes ☒ No

Level of respiratory protection anticipated.

- Level B [SCBA or supplied airline] ☐
- Level C [Air purifying respirator] ☐
- Level D [No external respiratory protection] ☒

Are Modifications to respiratory protection anticipated? ☐ Yes ☒ No

Describe: _____

Air quality monitoring equipment to be used (describe)

- ☐ Photo ionization detector: _____
- ☐ Flame ionization detector: _____
- ☐ Explosimeter/O2 meter: _____
- ☐ Other equipment: _____

List of personnel anticipated to be on-site

	Name	Representing [DEC, DOH, etc.]/phone no.
1.	Wayne Bayer	518-402-9553
2.	Burt Pine	518-402-9553
3.	George Momberger	518-402-9552
4.	Jim Schreyer	845-256-3146
5.	Saiban Endra Mahamouth	
6.		
7.		
8.		
9.		
10.		

Emergency Planning

Is 911 Emergency service available for the County that the site is located in? ☒ Yes ☐ No

Hospital: Northern Westchester Hospital
400 E. Main St., Mt. Kisco, NY Phone No. (914) 666-1200

Ambulance: 911
Phone No. ( )

Police: 911
Phone No. ( )

Other Emergency:
Phone No. ( )

DEC, DOH, County and/or Municipal Contacts

Name	Phone Number
• Ram Pergadia	(845) 256-3146
• Dennis Farrar	(518) 402-9553
• Jerry Rider	(518) 402-9552
•	( )

Hospital Route Information

- Attach a map that shows the site location and a nearby hospital. Highlite the best route to the hospital.

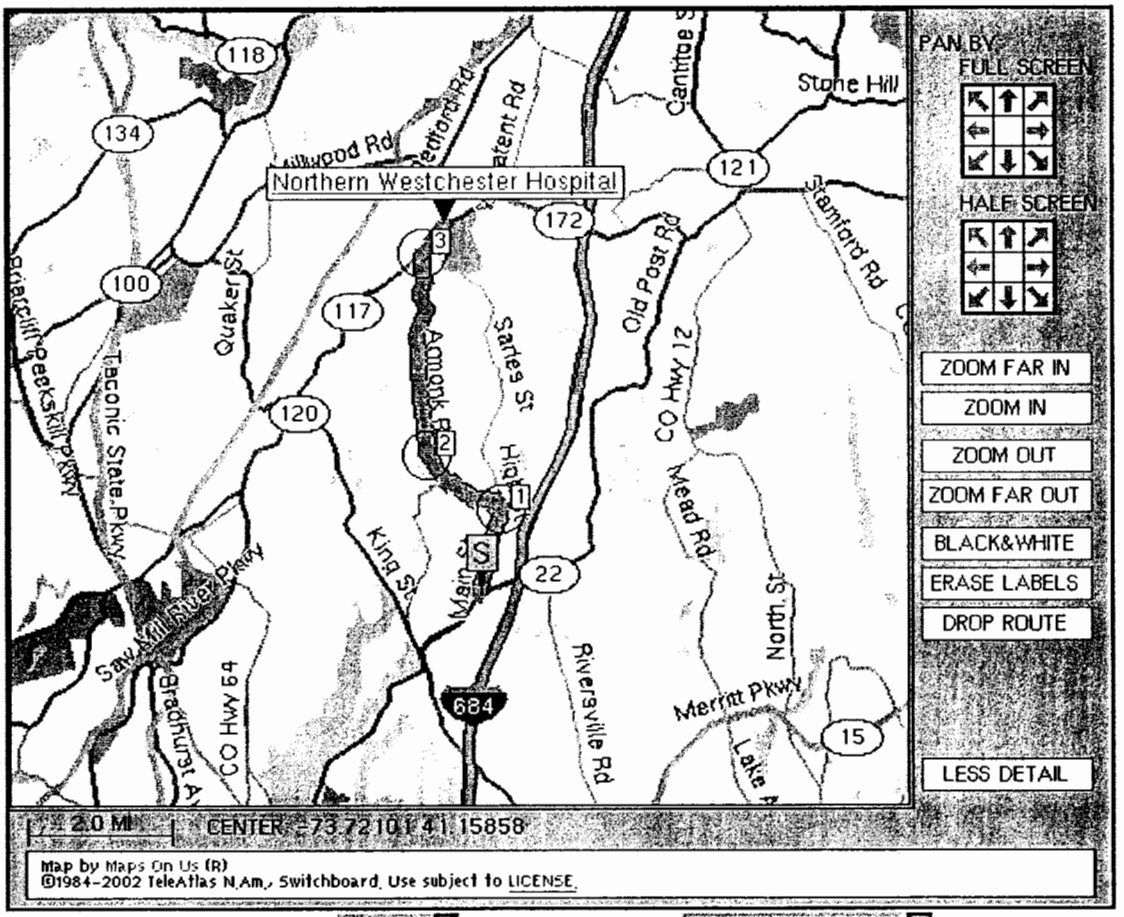
  Optional written directions:

  Attached

Route Summary

Start:	**Start Point (Main St, Armonk, NY)**
End:	**Northern Westchester Hospital**, 914-666-1200, 400 E Main St, Mt Kisco, NY 10549-3417
Totals:	`6.0 miles, 11 minutes, 3 turns` (Fastest Route)

Plan Return Route Plan Another Route Delete Route
Jump to Turn-by-Turn Directions Redraw Map to Show Full Route
Hide Large Map



Scale (mi/in): 2.0 Map-Clicking will: Zoom In

REDRAW MAP | WHAT'S NEARBY? Explain Map Operations

Problems printing? Get a Printable Map.

Turn-by-Turn Directions

For a detailed map of a turn, click on the turn number.

To see the route in a non-tabular format, click here.

	Go	And Then ...	Total Miles	Replace this column with detailed maps for all turns
Start		Head NORTH on MAIN ST [HWY 128], From **Start Point (Main St, Armonk, NY)**	0.0	
1	1.3 mi	CONTINUE onto ARMONK MOUNT KISCO RD [HWY 128]	1.3	
2	1.4 mi	FOLLOW as road goes into ARMONK RD [HWY 128]	2.6	
3	2.9 mi	BEAR RIGHT onto E MAIN ST [HWY 117]	5.5	
End	0.5 mi	**Northern Westchester Hospital**, 914-666-1200, 400 E Main St, Mt Kisco, NY 10549-3417	6.0	

WARNING: Use these directions at your own risk. Switchboard Incorporated is not responsible for their accuracy or for any losses resulting from their use. **Obey all traffic regulations.**

User Manual Sections: [Routes In General] [Turn-by-Turn Directions] [Caveats]

Site Name:	**Armonk Private Wells**			**Site Code:**	**360005**
Class Code:	**2**	Region: **3**	County: **Westchester**	EPA Id:	**NYD980780696**
Address:	**Vicinity of Maple Ave. Main St. & Bedford**		City: **North Castle**	Zip:	
Latitude:	**41 7' 34"**	Longitude:	**73 42' 46"**		
Site Type:	**Dump**		Estimated Size: **10** Acres		

Site Owner / Operator Information:
Current Owner(s) Name: ***** Multiple Site Owners *****
Current Owner(s) Address:
Owner(s) during disposal: ***** Multiple Site Owners *****
Operator(s) during disposal:
Stated Operator(s) Address:
Hazardous Waste Disposal Period: From **pre 1979** To **unknown**

1669

Site Description:
This site consists of private or non-community water supply wells contaminated by volatile organic chemicals, particularly tetrachloroethylene (PCE). Approximately 17 wells are affected in the 50 some parcels that are split by Maple Avenue. Phase I and II investigations have been completed. EPA has conducted a study justifying the need for a municipal water supply and has installed a community water supply and treatment facility for the affected area. A State funded RI/FS that was completed in 1990 identified the septic systems of one former and two existing dry cleaning establishments as being the sources of primary contamination found at the site. One of the septic tanks was removed under an Interim Remedial Measure (IRM). Benzene, toluene and xylenes were also found in the groundwater. The pump and treat system began operation in 1998 and is continuing under the O&M plan. The section of the site north of Maple Avenue has been remediated with no further action required. The southern section has an active pump and treat system operated by a DEC consultant. Ground water contamination levels have decreased in three extraction wells. Problems with extraction well EW-1, located in the area of highest GW contaminating have limited the removal of gw from this area. A petition for reclassification to a 4 by a potential developer is under consideration if deed restriction issues can be resolved.

Confirmed Hazardous Waste Disposal:
Tetrachloroethylene (PCE) (F002)

Quantity:
unknown

Analytical Data Available for: **Groundwater**
Applicable Standards Exceeded in: **Groundwater Drinking Water Surface Water**
Geotechnical Information:
Soil/Rock Type: **Silt, sand, gravel and clay.**
Depth to Groundwater: **Range: 10 to 15 feet.**

Legal Action: Type: Status:
Remedial Action: **In Design Complete** Nature of action: **Groundwater pump & treat system.**

Assessment of Environmental Problems:
Results of analyses of groundwater samples collected from certain wells show contravention of groundwater standards for the organic compound tetrachloroethylene.

Assessment of Health Problems:
The primary route of exposure at the site was the use of contaminated groundwater for both commercial and residential water supplies. Drinking water at sixty-eight homes was sampled between 1979 and 1987. Eight affected residences were originally supplied with bottled water or granular activated carbon filter units to remove the volatile organic compound contamination. A community drinking water supply system was installed to provide water to the affected homes. Volatile contaminants were detected at high levels in soil gas around several buildings. However, in 1989, indoor air was sampled in basements and no volatile organic compounds were detected. Contaminated groundwater has apparently reached the nearby Wampus River. The low levels of contaminants in the stream dissipate very quickly and are not expected to create adverse impacts. A groundwater pump and treat system installed in 1998 is reducing the level of contaminants in the groundwater.

Section 6.0 - Treatment System Diagrams / Cross Sections

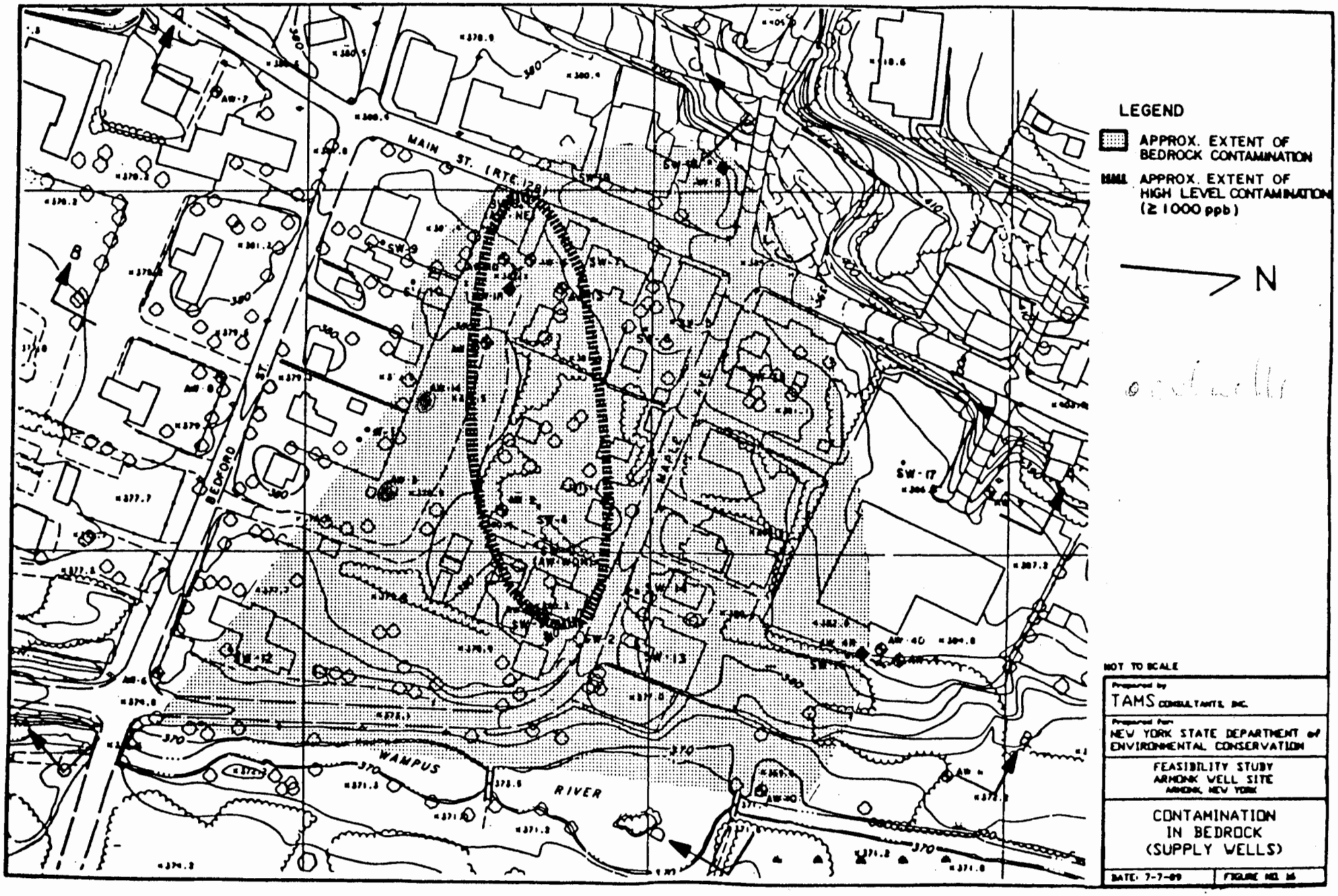


FIGURE 3 - APPROXIMATE EXTENT OF BEDROCK CONTAMINATION

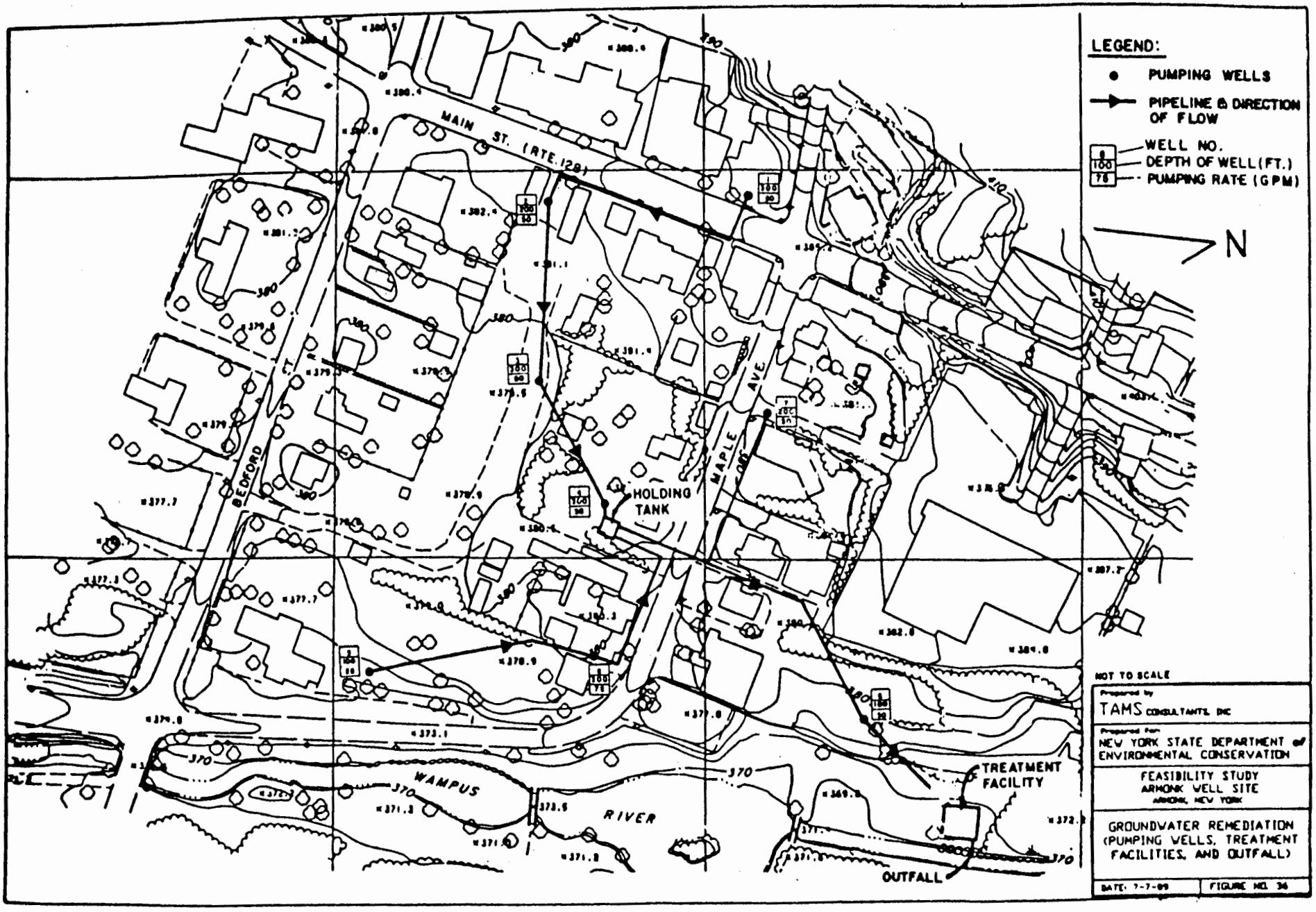
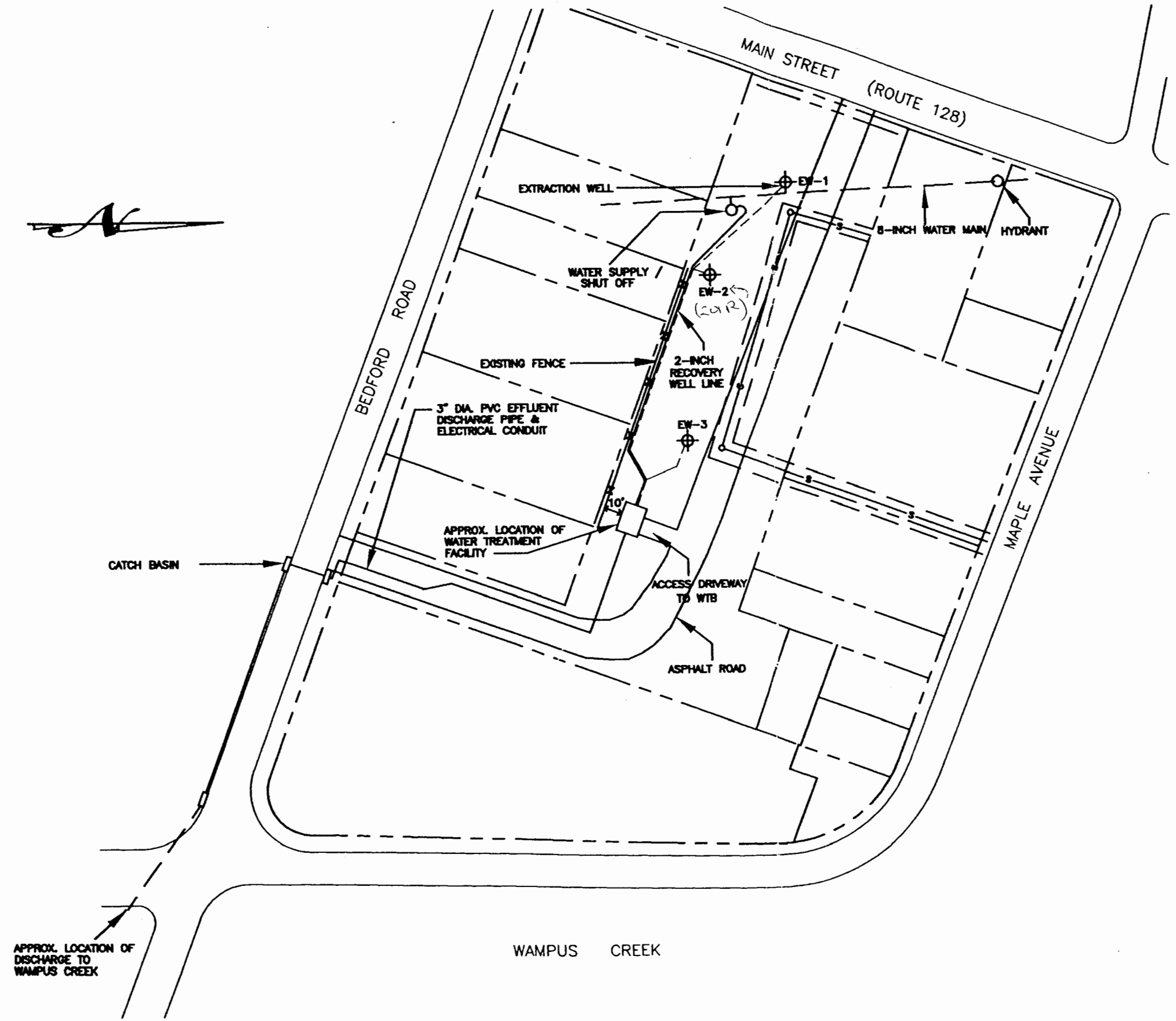


FIGURE 7 - ASSUMED GROUNDWATER REMEDIATON PUMPING SCHEME



0 100 FT 200

APPROX. SCALE: 1" = 100'

REVISED BY: BM REVISION DATE: OCTOBER 1, 1998	FIGURE: 1

NYSDEC – ARMONK

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