REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

REMEDIAL INVESTIGATION REPORT APPENDICES - VOLUME NO. 2

Bedford Village Wells
Shopping Arcade Site
Westchester County, New York

prepared for the
New York State Department of Environmental Conservation

by
DVIRKA AND BARTILUCCI
CONSULTING ENGINEERS
SYOSSET, NEW YORK

JUNE 1989

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
BEDFORD VILLAGE WELLS
SHOPPING ARCADE SITE
WESTCHESTER COUNTY, NEW YORK

REMEDIAL INVESTIGATION REPORT

APPENDICES
VOLUME NO. 2

Prepared For

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

By

DVIRKA AND BARTILUCCI
CONSULTING ENGINEERS
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VOLUME NO. 2 – APPENDICES

APPENDIX A

AERIAL PHOTOGRAPH/TOPOGRAPHIC MAP

APPENDIX B

HAZARDOUS SUBSTANCE LIST AND TARGET COMPOUND LIST PARAMETERS

Hazardous Substance List (HSL) and
Contract Required Detection Limits (CRDL)**

		CAS Number	Detection Limits* Low Water[a] µg/L	Low Soil/Sediment[b] µg/Kg
1.	Chloromethane	74-87-3	10	10
2.	Bromomethane	74-83-9	10	10
3.	Vinyl chloride	75-01-4	10	10
4.	Chloroethane	75-00-3	10	10
5.	Methylene chloride	75-09-2	5	5
6.	Acetone	67-64-1	10	10
7.	Carbon Disulfide	75-15-0	5	5
8.	1,1-Dichloroethene	75-35-4	5	5
9.	1,1-Dichloroethane	75-35-3	5	5
10.	trans-1,2-Dichloroethene	156-60-5	5	5
11.	Chloroform	67-66-3	5	5
12.	1,2-Dichloroethane	107-06-2	5	5
13.	2-Butanone	78-93-3	10	10
14.	1,1,1-Trichloroethane	71-55-6	5	5
15.	Carbon tetrachloride	56-23-5	5	5
16.	Vinyl acetate	108-05-4	10	10
17.	Bromodichloromethane	75-27-4	5	5
18.	1,1,2,2-Tetrachloroethane	79-34-5	5	5
19.	1,2-Dichloropropane	78-87-5	5	5
20.	trans-1,3-Dichloropropene	10061-02-6	5	5
21.	Trichloroethene	79-01-6	5	5
22.	Dibromochloromethane	124-48-1	5	5
23.	1,1,2-Trichloroethane	79-00-5	5	5
24.	Benzene	71-43-2	5	5
25.	cis-1,3-Dichloropropene	10061-01-5	5	5
26.	2-Chloroethyl vinyl ether	110-75-8	10	10
27.	Bromoform	75-25-2	5	5
28.	2-Hexanone	591-78-6	10	10
29.	4-Methyl-2-pentanone	108-10-1	10	10
30.	Tetrachloroethene	127-18-4	5	5
31.	Toluene	108-88-3	5	5
32.	Chlorobenzene	108-90-7	5	5
33.	Ethyl Benzene	100-41-4	5	5
34.	Styrene	100-42-5	5	5
35.	Total Xylenes		5	5

[a]Medium Water Contract Required Detection Limits (CRDL) for Volatile HSL Compounds are 100 times the individual Low Water CRDL.

[b]Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Volatile HSL Compounds are 100 times the individual Low Soil/Sediment CRDL.

HSL - Base/Neutral/Acid Extractables

		CAS Number	Detection Limits* Low Water[c] µg/L	Low Soil/Sediment[d] µg/Kg
36.	Phenol	108-95-2	10	330
37.	bis(2-Chloroethyl) ether	111-44-4	10	330
38.	2-Chlorophenol	95-57-8	10	330
39.	1,3-Dichlorobenzene	541-73-1	10	330
40.	1,4-Dichlorobenzene	106-46-7	10	330
41.	Benzyl alcohol	100-51-6	10	330
42.	1,2-Dichlorobenzene	95-50-1	10	330
43.	2-Methylphenol	95-48-7	10	330
44.	bis(2-Chloroisopropyl) ether	39638-32-9	10	330
45.	4-Methylphenol	106-44-5	10	330
46.	N-Nitroso-dipropylamine	621-64-7	10	330
47.	Hexachloroethane	67-72-1	10	330
48.	Nitrobenzene	98-95-3	10	330
49.	Isophorone	78-59-1	10	330
50.	2-Nitrophenol	88-75-5	10	330
51.	2,4-Dimethylphenol	105-67-9	10	330
52.	Benzoic acid	65-85-0	50	1600
53.	bis(2-Chloroethoxy) methane	111-91-1	10	330
54.	2,4-Dichlorophenol	120-83-2	10	330
55.	1,2,4-Trichlorobenzene	120-82-1	10	330
56.	Naphthalene	91-20-3	10	330
57.	4-Chloroaniline	106-47-8	10	330
58.	Hexachlorobutadiene	87-68-3	10	330
59.	4-Chloro-3-methylphenol (p-chloro-m-cresol)	59-50-7	10	330
60.	2-Methylnaphthalene	91-57-6	10	330
61.	Hexachlorocyclopentadiene	77-47-4	10	330
62.	2,4,6-Trichlorophenol	88-06-2	10	330
63.	2,4,5-Trichlorophenol	95-95-4	50	1600
64.	2-Chloronaphthalene	91-58-7	10	330
65.	2-Nitroaniline	88-74-4	50	1600
66.	Dimethyl phthalate	131-11-3	10	330
67.	Acenaphthylene	208-96-8	10	330
68.	3-Nitroaniline	99-09-2	50	1600
69.	Acenaphthene	83-32-9	10	330
70.	2,4-Dinitrophenol	51-28-5	50	1600
71.	4-Nitrophenol	100-02-7	50	1600
72.	Dibenzofuran	132-64-9	10	330

HSL - Base/Neutral/Acid Extractables (con't.)

		CAS Number	Detection Limits* Low Water[c] µg/L	Low Soil/Sediment[d] µg/Kg
73.	2,4-Dinitrotoluene	121-14-2	10	330
74.	2,6-Dinitrotoluene	606-20-2	10	330
75.	Diethylphthalate	84-66-2	10	330
76.	4-Chlorophenyl phenyl ether	7005-72-3	10	330
77.	Fluorene	86-73-7	10	330
78.	4-Nitroaniline	100-01-6	50	1600
79.	4,6-Dinitro-2-methylphenol	534-52-1	50	1600
80.	N-nitroso-diphenylamine	86-30-6	10	330
81.	4-Bromophenyl phenyl ether	101-55-3	10	330
82.	Hexachlorobenzene	118-74-1	10	330
83.	Pentachlorophenol	87-86-5	50	1600
84.	Phenanthrene	85-01-8	10	330
85.	Anthracene	120-12-7	10	330
86.	Di-n-butyl phthalate	84-74-2	10	330
87.	Fluoranthene	206-44-0	10	330
88.	Pyrene	129-00-0	10	330
89.	Butyl benzyl phthalate	85-68-7	10	330
90.	3,3'-Dichlorobenzidine	91-94-1	20	660
91.	Benzo(a)anthracene	56-55-3	10	330
92.	bis(2-ethylhexyl)phthalate	117-81-7	10	330
93.	Chrysene	218-01-9	10	330
94.	Di-n-octyl phthalate	117-84-0	10	330
95.	Benzo(b)fluoranthene	205-99-2	10	330
96.	Benzo(k)fluoranthene	207-88-9	10	330
97.	Benzo(a)pyrene	50-32-8	10	330
98.	Indeno(1,2,3-cd)pyrene	193-39-5	10	330
99.	Dibenz(a,h)anthracene	53-70-3	10	330
100.	Benzo(g,h,i)perylene	191-24-2	10	330

[c] Medium Water Contract Required Detection Limits (CRDL) for Semi-Volatile HSL Compounds are 100 times the individual Low Water CRDL.

[d] Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Semi-Volatile HSL Compounds are 60 times the individual Low Soil/Sediment CRDL.

HSL - Pesticides/PCBs

		CAS Number	Detection Limits* Low Water[e] µg/L	Low Soil/Sediment[f] µg/Kg
101.	alpha-BHC	319-84-6	0.05	8.0
102.	beta-BHC	319-85-7	0.05	8.0
103.	delta-BHC	319-86-8	0.05	8.0
104.	gamma-BHC (Lindane)	58-89-9	0.05	8.0
105.	Heptachlor	76-44-8	0.05	8.0
106.	Aldrin	309-00-2	0.05	8.0
107.	Heptachlor epoxide	1024-57-3	0.05	8.0
108.	Endosulfan I	959-98-8	0.05	8.0
109.	Dieldrin	60-57-1	0.10	16.
110.	4,4'-DDE	72-55-9	0.10	16.
111.	Endrin	72-20-8	0.10	16.
112.	Endosulfan II	33213-65-9	0.10	16.
113.	4,4'-DDD	72-54-8	0.10	16.
114.	Endosulfan sulfate	1031-07-8	0.10	16.
115.	4,4'-DDT	50-29-3	0.10	16.
116.	Endrin ketone	53494-70-5	0.10	16.
117.	Methoxychlor	72-43-5	0.5	80.
118.	Chlordane	57-74-9	0.5	80.
119.	Toxaphene	8001-35-2	1.0	160.
120.	AROCLOR-1016	12674-11-2	0.5	80.
121.	AROCLOR-1221	11104-28-2	0.5	80.
122.	AROCLOR-1232	11141-16-5	0.5	80.
123.	AROCLOR-1242	53469-21-9	0.5	80.
124.	AROCLOR-1248	12672-29-6	0.5	80.
125.	AROCLOR-1254	11097-69-1	1.0	160.
126.	AROCLOR-1260	11096-82-5	1.0	160.

[e] Medium Water Contract Required Detection Limits (CRDL) for Pesticide HSL Compounds are 100 times the individual Low Water CRDL.

[f] Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Pesticide HSL compounds are 15 times the individual Low Soil/Sediment CRDL.

*Detection Limits listed for soil/sediment are based on wet weight. The detection limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, as required by the protocol, will be higher.

**Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be achievable.

HSL - Inorganic Parameters

Elements Determined by Inductively Coupled Plasma Emission or Atomic Absorption Spectroscopy

Parameter	Contract Required Detection Level[1] [2] (µg/L)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	5
Magnesium	5000
Manganese	15
Mercury	0.2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20

HSL - Inorganic Parameter

(continued)

Parameter	Contract Required Detection Level[1,2] (µg/L)
Cyanide	10

1: Any analytical method specified in SOW Exhibit D may be utilized as long as the documented instrument or method detection limits meet the Contract Required Detection Level (CRDL) requirements. Higher detection levels may only be used in the following circumstance:

If the sample concentration exceeds two times the detection limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the contract required detection level. This is illustrated in the example below:

For lead:
Method in use = ICP
Instrument Detection Limit (IDL) = 40
Sample concentration = 85
Contract Required Detection Level (CRDL) = 5

The value of 85 may be reported even though instrument detection limit is greater than required detection level. The instrument or method detection limit must be documented as described in Exhibit E.

2: These CRDL are the instrument detection limits obtained in pure water that must be met using the procedure in Exhibit E. The detection limits for samples may be considerably higher depending on the sample matrix.

SECTION I
CLP ORGANICS
Superfund Target Compound List (TCL) and
Contract Required Quantitation Limits (CRQL)*

	Volatiles	CAS Number	Quantitation Limits** Low Water µg/L	Low Soil/Sediment[a] µg/Kg
1.	Chloromethane	74-87-3	10	10
2.	Bromomethane	74-83-9	10	10
3.	Vinyl chloride	75-01-4	10	10
4.	Chloroethane	75-00-3	10	10
5.	Methylene chloride	75-09-2	5	5
6.	Acetone	67-64-1	10	10
7.	Carbon Disulfide	75-15-0	5	5
8.	1,1-Dichloroethylene	75-35-4	5	5
9.	1,1-Dichloroethane	75-35-3	5	5
10.	1,2-Dichloroethylene(total)	540-59-0	5	5
11.	Chloroform	67-66-3	5	5
12.	1,2-Dichloroethane	107-06-2	5	5
13.	2-Butanone	78-93-3	10	10
14.	1,1,1-Trichloroethane	71-55-6	5	5
15.	Carbon tetrachloride	56-23-5	5	5
16.	Vinyl acetate	108-05-4	10	10
17.	Bromodichloromethane	75-27-4	5	5
18.	1,1,2,2-Tetrachloroethane	79-34-5	5	5
19.	1,2-Dichloropropane	78-87-5	5	5
20.	cis-1,3-Dichloropropene	10061-01-5	5	5
21.	Trichloroethene	79-01-6	5	5
22.	Dibromochloromethane	124-48-1	5	5
23.	1,1,2-Trichloroethane	79-00-5	5	5
24.	Benzene	71-43-2	5	5
25.	trans-1,3-Dichloropropene	10061-02-6	5	5
26.	Bromoform	75-25-2	5	5
27.	2-Hexanone	591-78-6	10	10
28.	4-Methyl-2-pentanone	108-10-1	10	10
29.	Tetrachloroethylene	127-18-4	5	5
30.	Toluene	108-88-3	5	5
31.	Chlorobenzene	108-90-7	5	5
32.	Ethyl Benzene	100-41-4	5	5
33.	Styrene	100-42-5	5	5
34.	Total Xylenes	1330-20-7	5	5

[a]Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Volatile TCL Compounds are 100 times the individual Low Soil/Sediment CRQL.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation Limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, as required by the protocol, will be higher.

Superfund Target Compound List (TCL) and
Contract Required Quantitation Limits (CRQL)*

	Semivolatiles	CAS Number	Quantitation Limits** Low Water µg/L	Low Soil/Sediment[b] µg/Kg
35.	Phenol	108-95-2	10	330
36.	bis(2-Chloroethyl) ether	111-44-4	10	330
37.	2-Chlorophenol	95-57-8	10	330
38.	1,3-Dichlorobenzene	541-73-1	10	330
39.	1,4-Dichlorobenzene	106-46-7	10	330
40.	Benzyl alcohol	100-51-6	10	330
41.	1,2-Dichlorobenzene	95-50-1	10	330
42.	2-Methylphenol	95-48-7	10	330
43.	bis(2-Chloroisopropyl) ether	108-60-1	10	330
44.	4-Methylphenol	106-44-5	10	330
45.	N-Nitroso-dipropylamine	621-64-7	10	330
46.	Hexachloroethane	67-72-1	10	330
47.	Nitrobenzene	98-95-3	10	330
48.	Isophorone	78-59-1	10	330
49.	2-Nitrophenol	88-75-5	10	330
50.	2,4-Dimethylphenol	105-67-9	10	330
51.	Benzoic acid	65-85-0	50	1600
52.	bis(2-Chloroethoxy) methane	111-91-1	10	330
53.	2,4-Dichlorophenol	120-83-2	10	330
54.	1,2,4-Trichlorobenzene	120-82-1	10	330
55.	Naphthalene	91-20-3	10	330
56.	4-Chloroaniline	106-47-8	10	330
57.	Hexachlorobutadiene	87-68-3	10	330
58.	4-Chloro-3-methylphenol (p-chloro-m-cresol)	59-50-7	10	330
59.	2-Methylnaphthalene	91-57-6	10	330
60.	Hexachlorocyclopentadiene	77-47-4	10	330
61.	2,4,6-Trichlorophenol	88-06-2	10	330
62.	2,4,5-Trichlorophenol	95-95-4	50	1600
63.	2-Chloronaphthalene	91-58-7	10	330
64.	2-Nitroaniline	88-74-4	50	1600
65.	Dimethyl phthalate	131-11-3	10	330
66.	Acenaphthylene	208-96-8	10	330
67.	2,6-Dinitrotoluene	606-20-2	10	330
68.	3-Nitroaniline	99-09-2	50	1600
69.	Acenaphthene	83-32-9	10	330
70.	2,4-Dinitrophenol	51-28-5	50	1600
71.	4-Nitrophenol	100-02-7	50	1600
72.	Dibenzofuran	132-64-9	10	330

Superfund Target Compound List (TCL) and
Contract Required Quantitation Limits (CRQL)*

	Semivolatiles (cont.)	CAS Number	Quantitation Limits** Low Water µg/L	Low Soil/Sediment[b] µg/Kg
73.	2,4-Dinitrotoluene	121-14-2	10	330
74.	Diethylphthalate	84-66-2	10	330
75.	4-Chlorophenyl phenyl ether	7005-72-3	10	330
76.	Fluorene	86-73-7	10	330
77.	4-Nitroaniline	100-01-6	50	1600
78.	4,6-Dinitro-2-methylphenol	534-52-1	50	1600
79.	N-nitrosodiphenylamine	86-30-6	10	330
80.	4-Bromophenyl phenyl ether	101-55-3	10	330
81.	Hexachlorobenzene	118-74-1	10	330
82.	Pentachlorophenol	87-86-5	50	1600
83.	Phenanthrene	85-01-8	10	330
84.	Anthracene	120-12-7	10	330
85.	Di-n-butyl phthalate	84-74-2	10	330
86.	Fluoranthene	206-44-0	10	330
87.	Pyrene	129-00-0	10	330
88.	Butyl benzyl phthalate	85-68-7	10	330
89.	3,3'-Dichlorobenzidine	91-94-1	20	660
90.	Benz(a)anthracene	56-55-3	10	330
91.	Chrysene	218-01-9	10	330
92.	bis(2-ethylhexyl)phthalate	117-81-7	10	330
93.	Di-n-octyl phthalate	117-84-0	10	330
94.	Benzo(b)fluoranthene	205-99-2	10	330
95.	Benzo(k)fluoranthene	207-08-9	10	330
96.	Benzo(a)pyrene	50-32-8	10	330
97.	Indeno(1,2,3-cd)pyrene	193-39-5	10	330
98.	Dibenz(a,h)anthracene	53-70-3	10	330
99.	Benzo(g,h,i)perylene	191-24-2	10	330

[b] Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Semi-Volatile HSL Compounds are 60 times the individual Low Soil/Sediment CRDL.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

Superfund Target Compound List (TCL) and
Contract Required Quantitation Limits (CRQL)*

	Pesticides/PCBs	CAS Number	Quantitation Limits** Low Water µg/L	Low Soil/Sediment[c] µg/Kg
100.	alpha-BHC	319-84-6	0.05	8.0
101.	beta-BHC	319-85-7	0.05	8.0
102.	delta-BHC	319-86-8	0.05	8.0
103.	gamma-BHC (Lindane)	58-89-9	0.05	8.0
104.	Heptachlor	76-44-8	0.05	8.0
105.	Aldrin	309-00-2	0.05	8.0
106.	Heptachlor epoxide	1024-57-3	0.05	8.0
107.	Endosulfan I	959-98-8	0.05	8.0
108.	Dieldrin	60-57-1	0.10	16.
109.	4,4'-DDE	72-55-9	0.10	16.
110.	Endrin	72-20-8	0.10	16.
111.	Endosulfan II	33213-65-9	0.10	16.
112.	4,4'-DDD	72-54-8	0.10	16.
113.	Endosulfan sulfate	1031-07-8	0.10	16.
114.	4,4'-DDT	50-29-3	0.10	16.
115.	Endrin ketone	53494-70-5	0.10	16.
116.	Methoxychlor	72-43-5	0.5	80.
117.	alpha-Chlordane	5103-71-9	0.5	80.
118.	gamma-Chlordane	5103-74-2	0.5	80.
119.	Toxaphene	8001-35-2	1.0	160.
120.	AROCLOR-1016	12674-11-2	0.5	80.
121.	AROCLOR-1221	11104-28-2	0.5	80.
122.	AROCLOR-1232	11141-16-5	0.5	80.
123.	AROCLOR-1242	53469-21-9	0.5	80.
124.	AROCLOR-1248	12672-29-6	0.5	80.
125.	AROCLOR-1254	11097-69-1	1.0	160.
126.	AROCLOR-1260	11096-82-5	1.0	160.

[c] Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Pesticide HSL compounds are 15 times the individual Low Soil/Sediment CRDL.

*Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

**Quantitation Limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, as required by the protocol, will be higher.

SECTION II

CLP INORGANICS

Superfund Target Compound List (TCL) and
Contract Required Quantitation Limit

	Parameter	Contract Required Quantitation Level[1] [2] (µg/L)
1.	Aluminum	200
2.	Antimony	60
3.	Arsenic	10
4.	Barium	200
5.	Beryllium	5
6.	Cadmium	5
7.	Calcium	5000
8.	Chromium	10
9.	Cobalt	50
10.	Copper	25
11.	Iron	100
12.	Lead	5
13.	Magnesium	5000
14.	Manganese	15
15.	Mercury	0.2
16.	Nickel	40
17.	Potassium	5000
18.	Selenium	5
19.	Silver	10
20.	Sodium	5000
21.	Thallium	10
22.	Vanadium	50
23.	Zinc	20
24.	Cyanide	10

1: Any analytical method specified in Exhibit D, CLP-Inorganics may be utilized as long as the documented instrument or method detection limits meet the Contract Required Quantitation Level (CRQL) requirements. Higher quantitation levels may only be used in the following circumstance:

If the sample concentration exceeds two times the quantitation limit of the instrument or method in use, the value may be reported even though the instrument or method detection limit may not equal the contract required quantitation level. This is illustrated in the example below:

For lead:
Method in use = ICP
Instrument Detection Limit (IDL) = 40
Sample concentration = 85
Contract Required Quantitation Level (CRQL) = 5

The value of 85 may be reported even though instrument detection limit is greater than Contract Required Quantitation Limit. The instrument or method detection limit must be documented as described in Exhibit E.

2: These CRQL are the instrument detection limits obtained in pure water that must be met using the procedure in Exhibit E. The quantitation limits for samples may be considerably higher depending on the sample matrix.

APPENDIX C

SEISMIC REFRACTION INVESTIGATION

SEISMIC REFRACTION INVESTIGATION

BEDFORD VILLAGE, NEW YORK

FOR

DVIRKA & BARTILUCCI
SYOSSET, NEW YORK

DELTA
GEOPHYSICAL SERVICES

October 13, 1987

Dvirka & Bartilucci
6800 Jericho Turnpike
Syosset, New York 11791

DELTA
GEOPHYSICAL SERVICES
A GEONICS COMPANY

REPORT: Seismic Refraction Investigation
Bedford Village, New York

Dear Mr. Walka:

It is our pleasure to submit our final report for the seismic refraction survey performed around Bedford Village. Bedford Village is located in Westchester County, New York. Many of the seismic stations were located along roads, and on private lawns.

GENERAL GEOPHYSICAL METHODOLOGY

We used the seismic refraction method to evaluate the subsurface conditions. Data were collected at twenty seven seismic stations. Data interpretation allowed us to determine depth to water and depth to rock.

The seismic refraction method uses a shock wave induced by a sledge hammer. As the shock wave propagates though the earth, it is affected by the materials through which it passes. The resultant wave is recorded at geophones placed on the surface at selected distances from the wave source.

The refraction method utilizes the amount of time it takes the resultant wave to travel to each geophone. Analysis of the data (travel times and distances) provides seismic wave velocities of the subsurface, and depth to interfaces with differing seismic wave velocities.

Geologic conditions yielding higher seismic wave velocities within a range include increased amounts of water, clay, cobbles, and rock fragments, greater compaction or lower degree of weathering.

GEOPHYSICAL SURVEY

We used an EG&G Geometrics 12-channel exploration seismograph

(ES-1225) to collect data at 27 stations (12 at the Arcade Building Site and 15 at the Hunting Ridge Mall Site). The seismic stations used a 180'-200' geophone cable spread length. The offset between geophone cable and sledge hammer source ranged from 5'-105'.

We calculated seismic velocities and depths to seismic velocity interfaces from the data collected at each seismic station. The calculated seismic velocity ranges were interpreted to represent the following subsurface materials:

1) Glacial Till - 800 to 1,400 ft/sec
2) Moist Glacial Till - 2,100 to 7,000 ft/sec
3) Rock - 15,000 to 20,000 ft/sec

The interpretation of the seismic data is presented on two maps and in a table of results. Map 1 (Appendix) shows the seismic station location and number, depth below ground surface to water, and the velocity of the water bearing layer. The velocity is indicated by a number (small size) above the depth value. By multiplying this number by 1,000, you can determine the actual velocity value.

Map 2 (Appendix) shows shows the seismic station location and number, depth below ground surface to rock, and the velocity of the rock. The displayed velocity value also needs to be multiplied by 1,000 to determine the actual velocity value.

The seismic field data sheets are also located in the Appendix.

The data collected at seismic station H11 may be inaccurate due to the presence of a nearby cesspool. The seismic data collected at H13 is of better quality. The seismic station H13 was performed away from manmade structures and interference.

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If there are any questions concerning this report, please contact us. It was a pleasure to have worked with you on this project.

Very truly yours,
Delta Geophysical Services

Michael Menkus
Geophysical Engineer

DELTA

SEISMIC REFRACTION INTERPRETATION

STATION NUMBER	DEPTH (FT)	VELOCITY (FT/SEC)	INTERPRETED MATERIAL
SHOPPING ARCADE SITE			
A1	0 - 7	1100	TILL
	7 - 31	3250	MOIST TILL
	BELOW 31	20000	ROCK
A2	0 - 10	1100	TILL
	10 - 38	3500	MOIST TILL
	BELOW 38	20000	ROCK
A3	0 - 8	1100	TILL
	8 - 42	5000	MOIST TILL
	BELOW 42	20000	ROCK
A4	0 - 9	1100	TILL
	9 - ?	4500	MOIST TILL
	Depth to rock is greater than 69 feet		
A5	0 - 12	1200	TILL
	12 - 41	6000	MOIST TILL
	BELOW 41	20000	ROCK
A6	0 - 10	1200	TILL
	10 - 80	5500	MOIST TILL
	BELOW 80	20000	ROCK
A7	0 - 7	1350	TILL
	7 - 70	4500	MOIST TILL
	BELOW 70	15000	ROCK
A8	0 - 8	1100	TILL
	8 - 69	4750	MOIST TILL
	BELOW 69	20000	ROCK
A9	0 - 12	1100	TILL
	12 - 57	7000	MOIST TILL
	BELOW 57	20000	ROCK
A10	0 - 11	1000	TILL
	11 - 56	4000	MOIST TILL
	BELOW 56	20000	ROCK
A11	0 - 12	1100	TILL
	12 - 79	4600	MOIST TILL
	BELOW 79	17000	ROCK

A12	0 - 15	1250	TILL
	15 - ?	8000	MOIST TILL
	Depth of rock is greater than 71 feet		

HUNTING RIDGE MALL SITE

H1	0 - 8	1150	TILL
	8 - ?	7000	WEATHERED ROCK
H2	0 - 5	1100	TILL
	5 - 15	3100	MOIST TILL
	BELOW 15	20000	ROCK
H3	0 - ?	1100	TILL
	Depth to rock is greater than 13 feet		
H4	0 - 9	1100	TILL
	9 - 61	3000	MOIST TILL
	BELOW 61	20000	ROCK
H5	0 - 12	1150	TILL
	12 - 70	2100	MOIST TILL
	BELOW 70	20000	ROCK
H6	0 - 16	900	TILL
	16 - 56	5000	MOIST TILL
	BELOW 56	20000	ROCK
H7	0 - 8	1050	TILL
	8 - ?	4250	MOIST TILL
	Depth to rock is greater than 81 feet		
H8	0 - 20	1150	TILL
	20 - 85	4750	MOIST TILL
	BELOW 85	20000	ROCK
H9	0 - 16	1200	TILL
	16 - 70	6000	MOIST TILL
	BELOW 70	20000	ROCK
H10	0 - 23	1200	TILL
	23 - 90	5050	MOIST TILL
	BELOW 90	17000	ROCK
H11	0 - 12	800	TILL
	12 - 66	4000	MOIST TILL
	BELOW 66	20000	ROCK
	Subsurface interferences may be present (see report)		
H12	0 - 4	1225	TILL
	4 - 91	4500	MOIST TILL
	BELOW 91	17000	ROCK

H13	0 - 26	1200	TILL
	26 - ?	5900	MOIST TILL
	Depth to rock is greater than 87 feet		
H14	0 - 18	1100	TILL
	18 - 80	4500	MOIST TILL
	BELOW 80	15000	ROCK
H15	0 - 10	1150	TILL
	10 - 53	4250	MOIST TILL
	BELOW 53	20000	ROCK

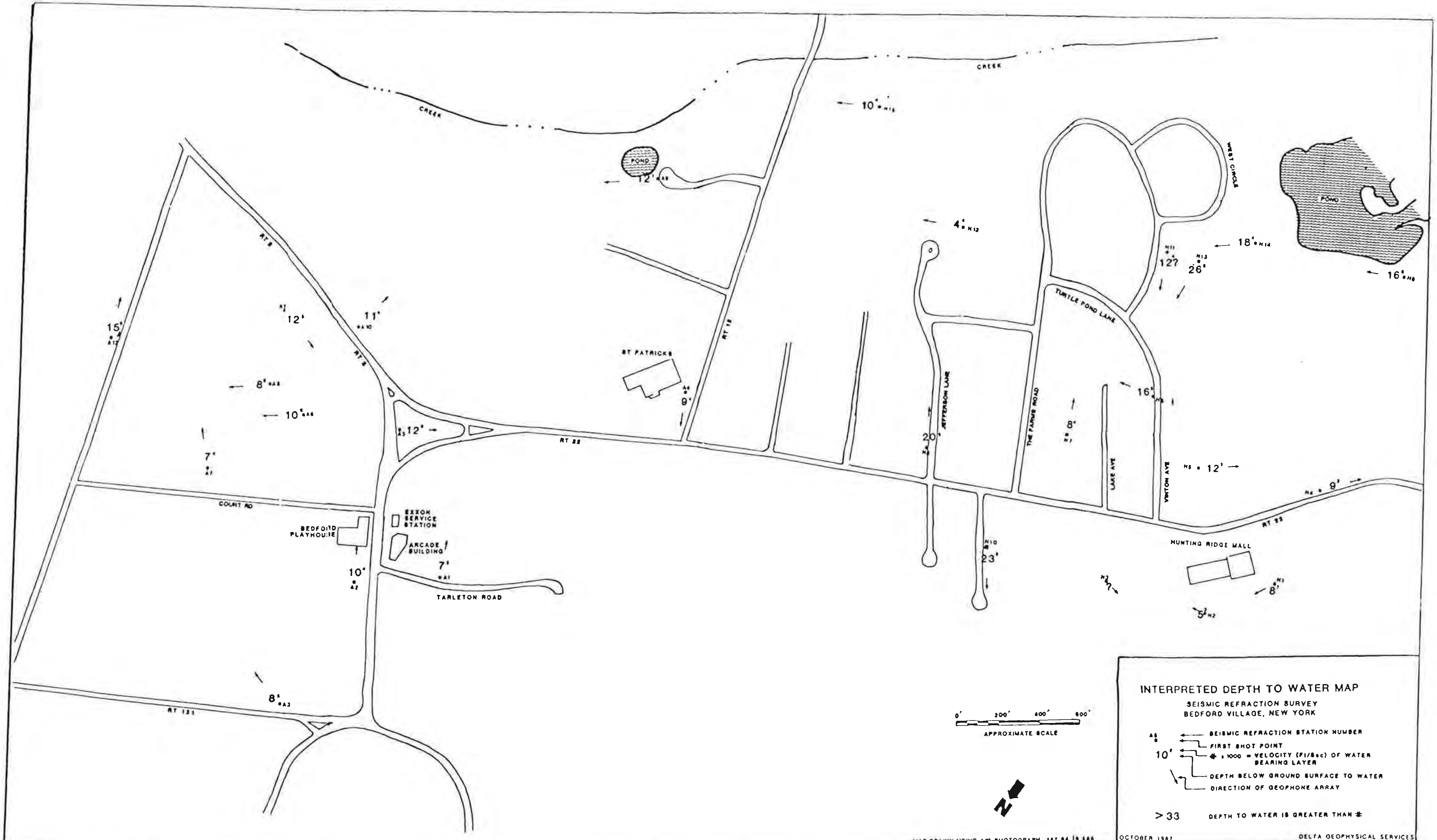

INTERPRETED DEPTH TO WATER MAP
SEISMIC REFRACTION SURVEY
BEDFORD VILLAGE, NEW YORK
SEISMIC REFRACTION STATION NUMBER
FIRST SHOT POINT
✱ x 1000 = VELOCITY (Ft/Sec) OF WATER BEARING LAYER
DEPTH BELOW GROUND SURFACE TO WATER
DIRECTION OF GEOPHONE ARRAY
>33
DEPTH TO WATER IS GREATER THAN ✱
OCTOBER 1987
DELTA GEOPHYSICAL SERVICES
MAP DRAWN USING AIR PHOTOGRAPH
APPROXIMATE SCALE
0'
200'
400'
600'
N
CREEK
POND
RT 22
RT 121
COURT RD
TARLETON ROAD
BEDFORD PLAYHOUSE
EXXON SERVICE STATION
ARCADE BUILDING
ST PATRICKS
JEFFERSON LANE
THE FARMS ROAD
LAKE AVE
VINTON AVE
TURTLE POND LANE
WEST CIRCLE
HUNTING RIDGE MALL

FIGURE NO. 4-1

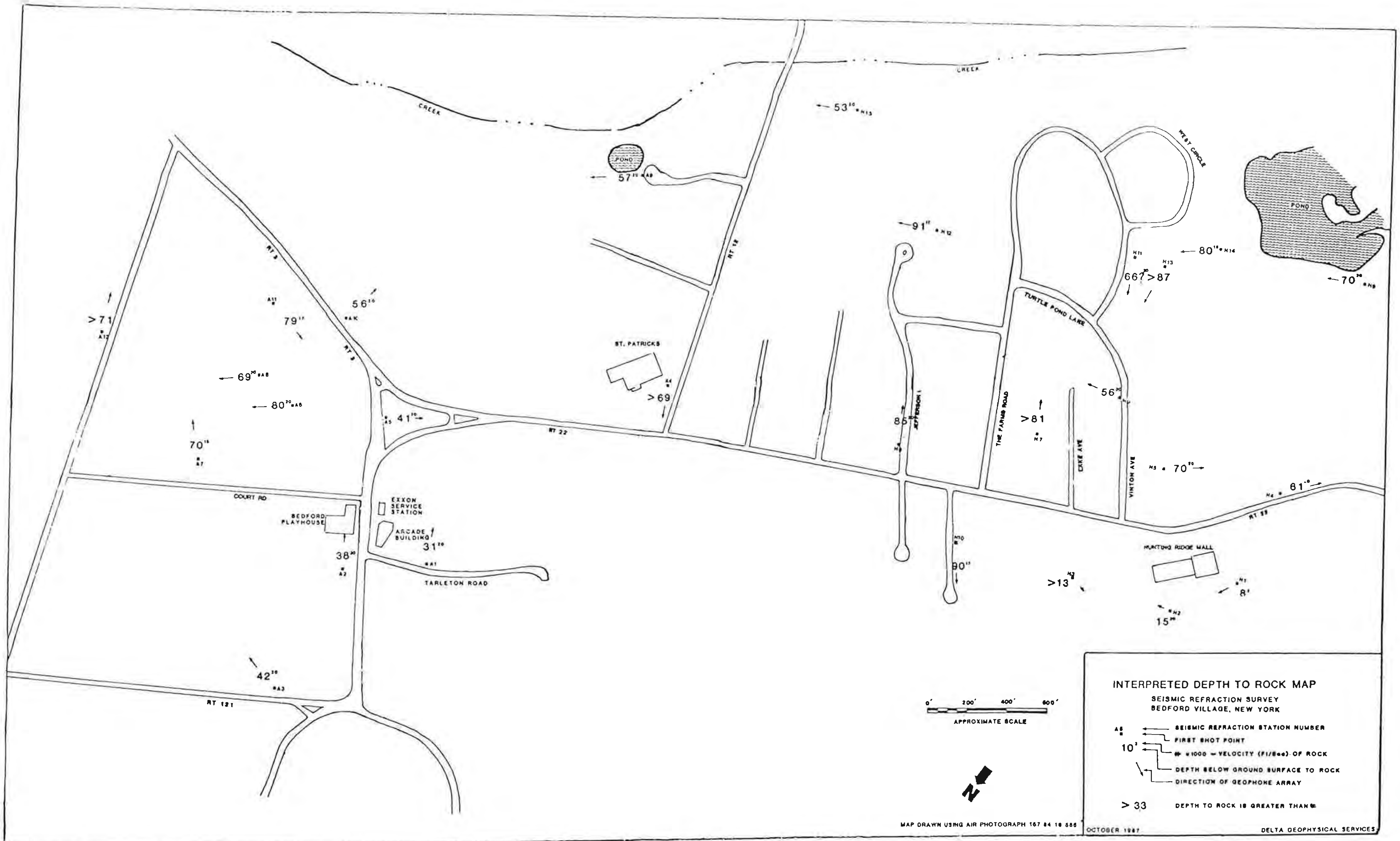
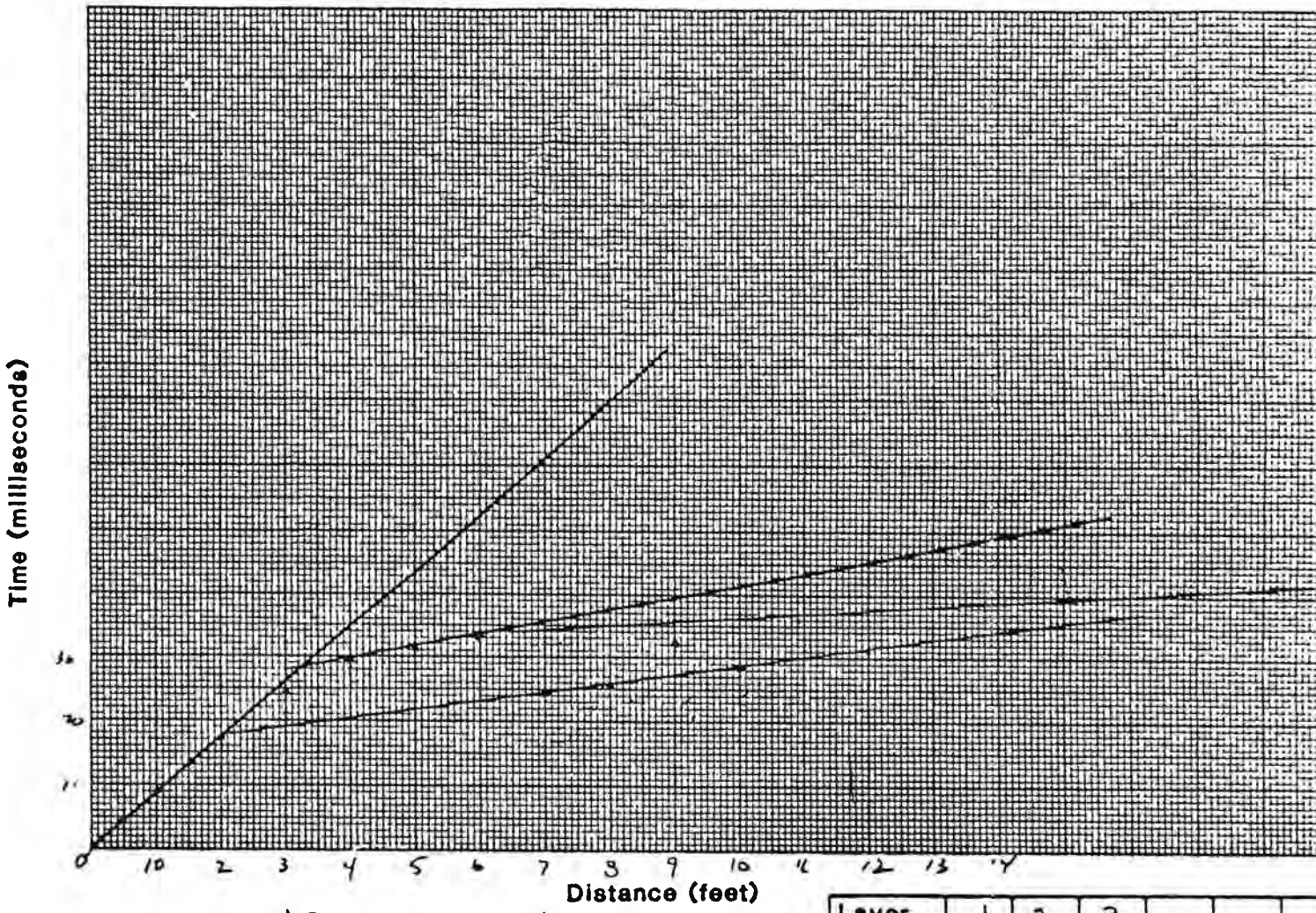

INTERPRETED DEPTH TO ROCK MAP
SEISMIC REFRACTION SURVEY
BEDFORD VILLAGE, NEW YORK
SEISMIC REFRACTION STATION NUMBER
FIRST SHOT POINT
x1000 – VELOCITY (Ft/Sec) OF ROCK
DEPTH BELOW GROUND SURFACE TO ROCK
DIRECTION OF GEOPHONE ARRAY
> 33
DEPTH TO ROCK IS GREATER THAN
OCTOBER 1987
DELTA GEOPHYSICAL SERVICES
MAP DRAWN USING AIR PHOTOGRAPH 167 84 16 586
0' 200' 400' 600'
APPROXIMATE SCALE
N
CREEK
POND
WEST CIRCLE
TURTLE POND LANE
ST. PATRICKS
RT 22
RT 121
COURT RD
TARLETON ROAD
BEDFORD PLAYHOUSE
EXXON SERVICE STATION
ARCADE BUILDING
THE FARMS ROAD
LAKE AVE
VINTON AVE
JEFFERSON
HUNTING RIDGE MALL

FIGURE NO. 4-2

Seismic Refraction Worksheet

DATA

x	ms	x	ms
0			
5	4.7		
10	9.6		
15	13.7		
20	17.2		
30	24.5		
40	29.2		
50	31.2		
60	33.0		
70	24.5		
80	25.7		
90	32.5		
100	28.7		



Project: Bedford (D&B) **Date:** 9/20

Line Description: Hunting Ridge Mall
Station 1

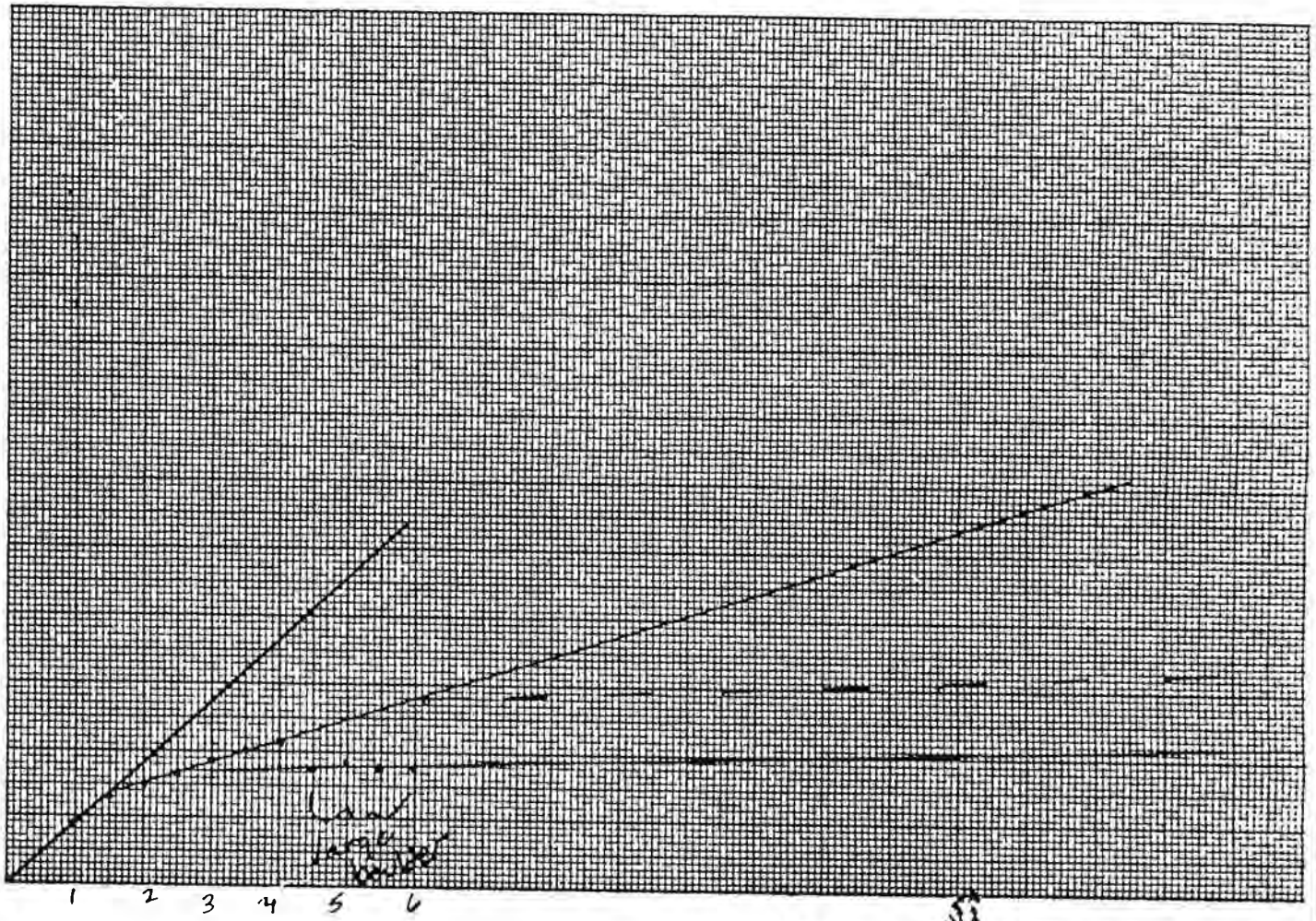
Layer	1	2	3			
Velocity	1150	3000	20000	?		
X_c	32	>65				
Depth	12.8	>35				

Layer	1	2	3			
Velocity	1150	7000				
X_c	20					
Depth	8.5	?				

Seismic Refraction Worksheet

DATA

x	ms	x	ms
0			
5	4.2		
10	9.0		
15	13.2		
20	15.0		
25	16.5		
30	18.5		
35	20.2		
40	21.5?		
45	17.2		
50	18.7		
55	17.5		
60	18.0		



Project: D & B **Date:** 9/21

Line Description: Seismic Station 2

Layer	1	2	3			
Velocity	1100	3100	20000			
X_c	15	260				
Depth	5.2	29.8				

Layer	1	2	3			
Velocity	1100	3100	20000			
X_c	15	25				
Depth	5.2	14.8				

DELTA GEOPHYSICAL

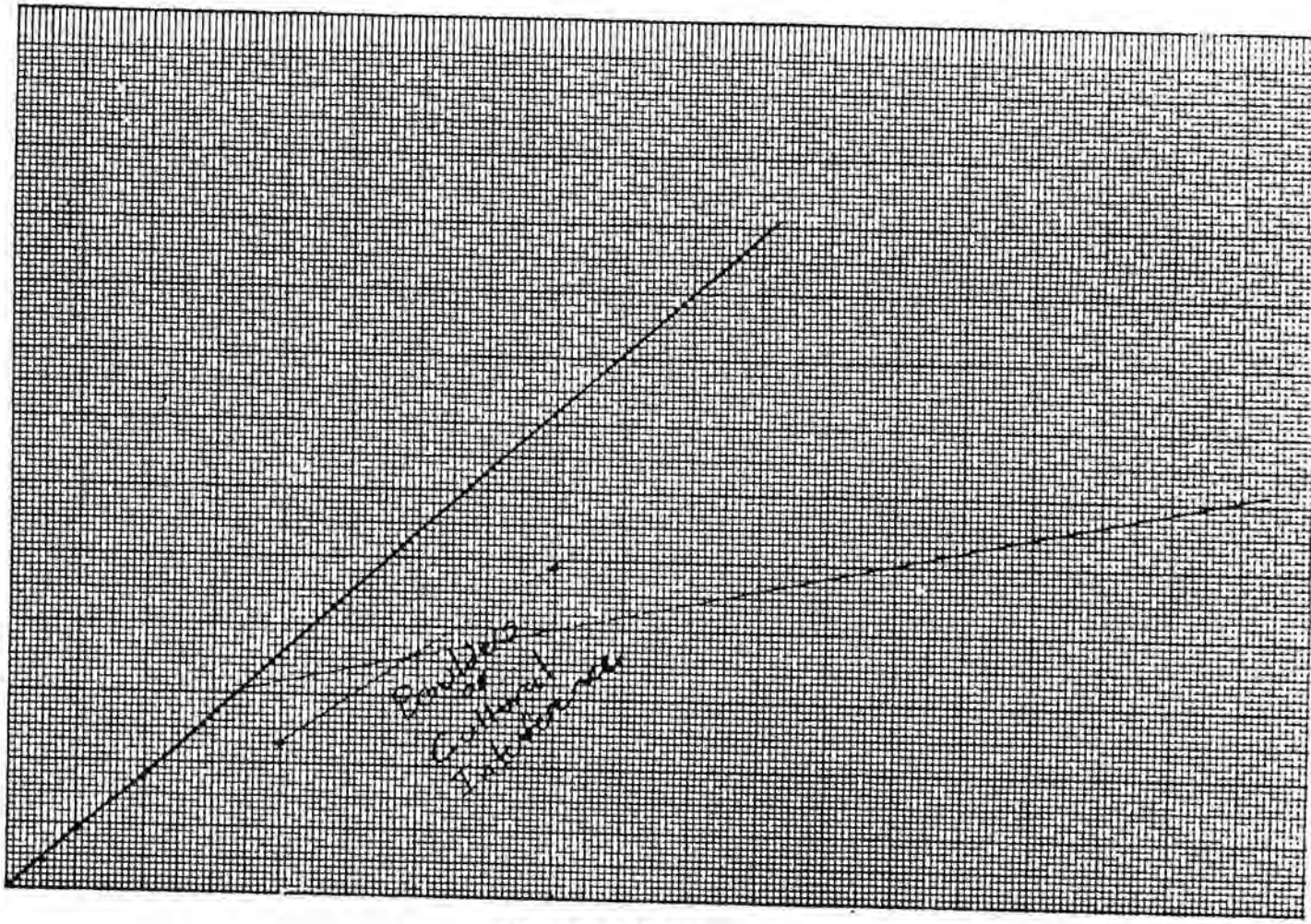
Seismic Refraction Worksheet

DATA

x	ms	x	ms
0			
5	4.2		
10	9.0		
15	14.0		
20	18.0		
40	23.2		
60	36.0		
80	49.0		
100	NR		
120	NR		
140	NR		
160	NR		
180	NR		

Noisy from Crane

Time (milliseconds)



Distance (feet)

Project: Heating Ridge Well Site **Date:** 9/21/87

Line Description: # 3

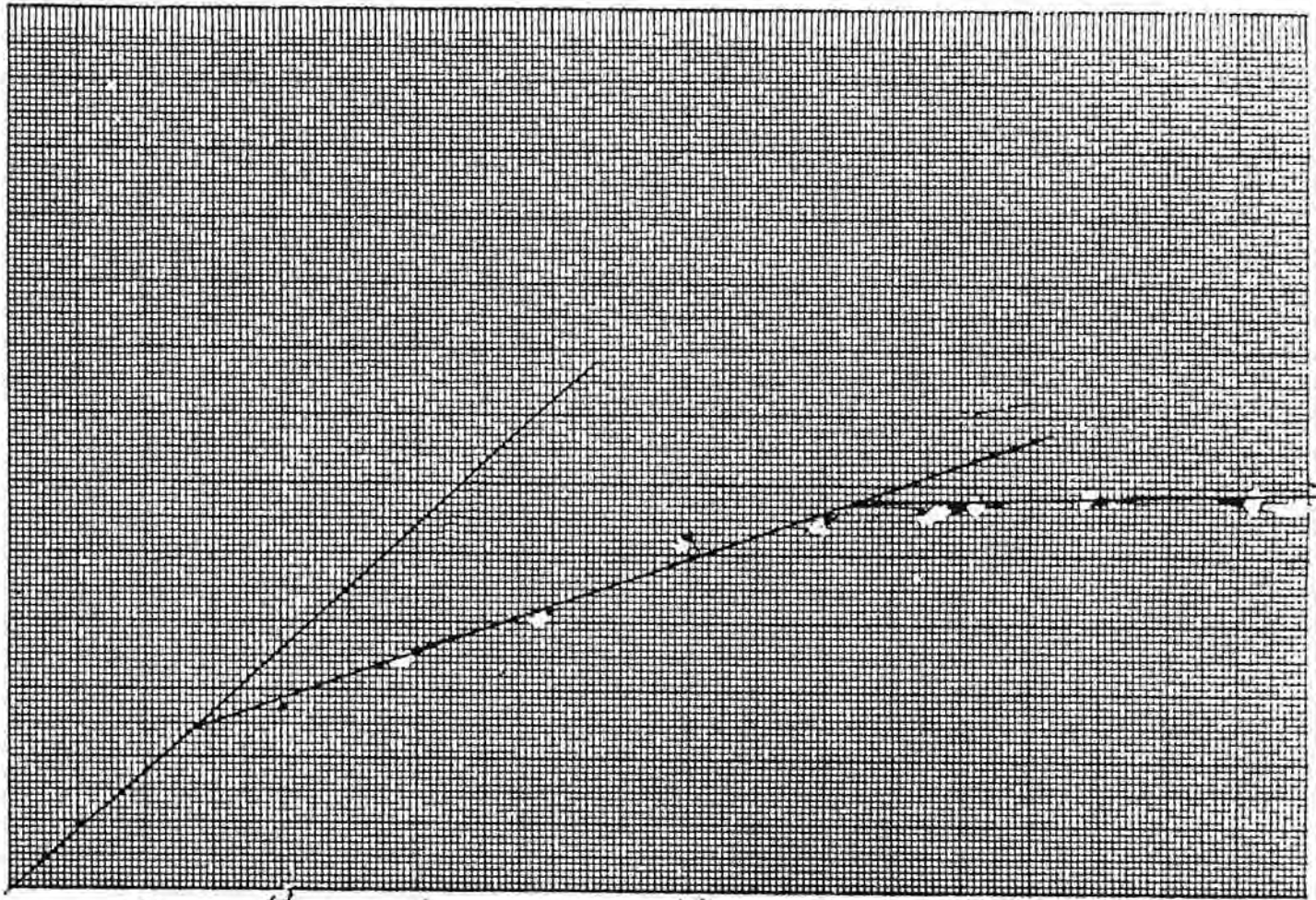
Layer	1	2				
Velocity	1100	4500				
X_c	>34					
Depth	>13.3					
Layer						
Velocity						
X_c						
Depth						

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

DATA

x	ms	x	ms
0			
5	4.7		
10	9.5		
20	18.0		
40	27.0		
60	35.7		
80	41.7		
100	53.0		
120	55		
140	57.0		
160	58.2		
180	58.2		
200	62.2		



12 14

Project: 8 D&B Bedford **Date:** 9/23

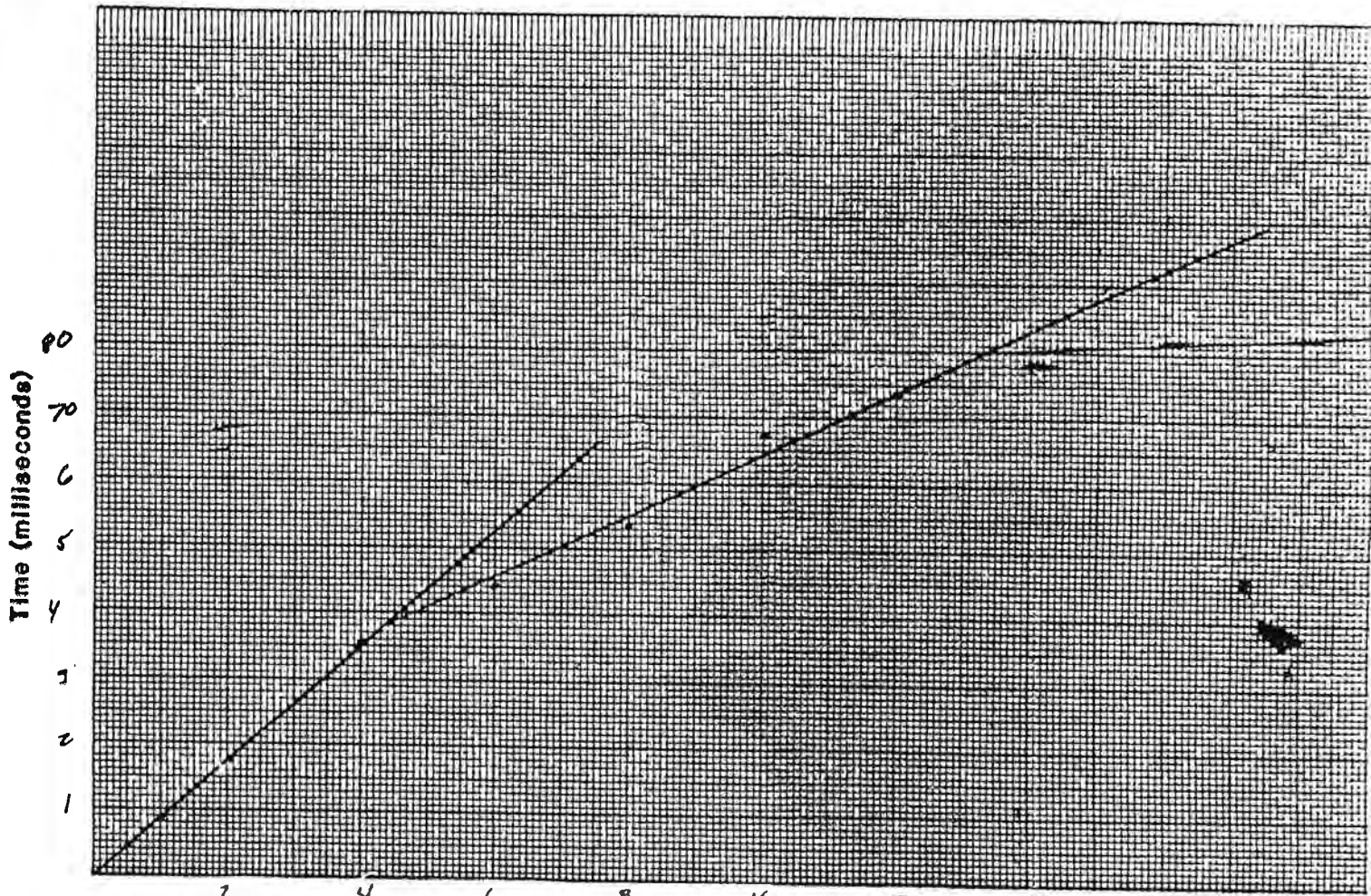
Line Description: H4

Layer	1	2	3			
Velocity	1100	3000	20000			
X_c	27	125				
Depth	9.2	61.1				
Layer						
Velocity						
X_c						
Depth						

Seismic Refraction Worksheet

DATA

x	ms	x	ms
0			
5	4.5		
10	8.7		
20	17.5		
40	35.5		
60	44.2		
80	53.7		
100	67.7		
120	73.3		
140	77.7		
160	81.7		
180	87.2		
200	840		



Project: D&B **Date:** 7/23

Line Description: H5

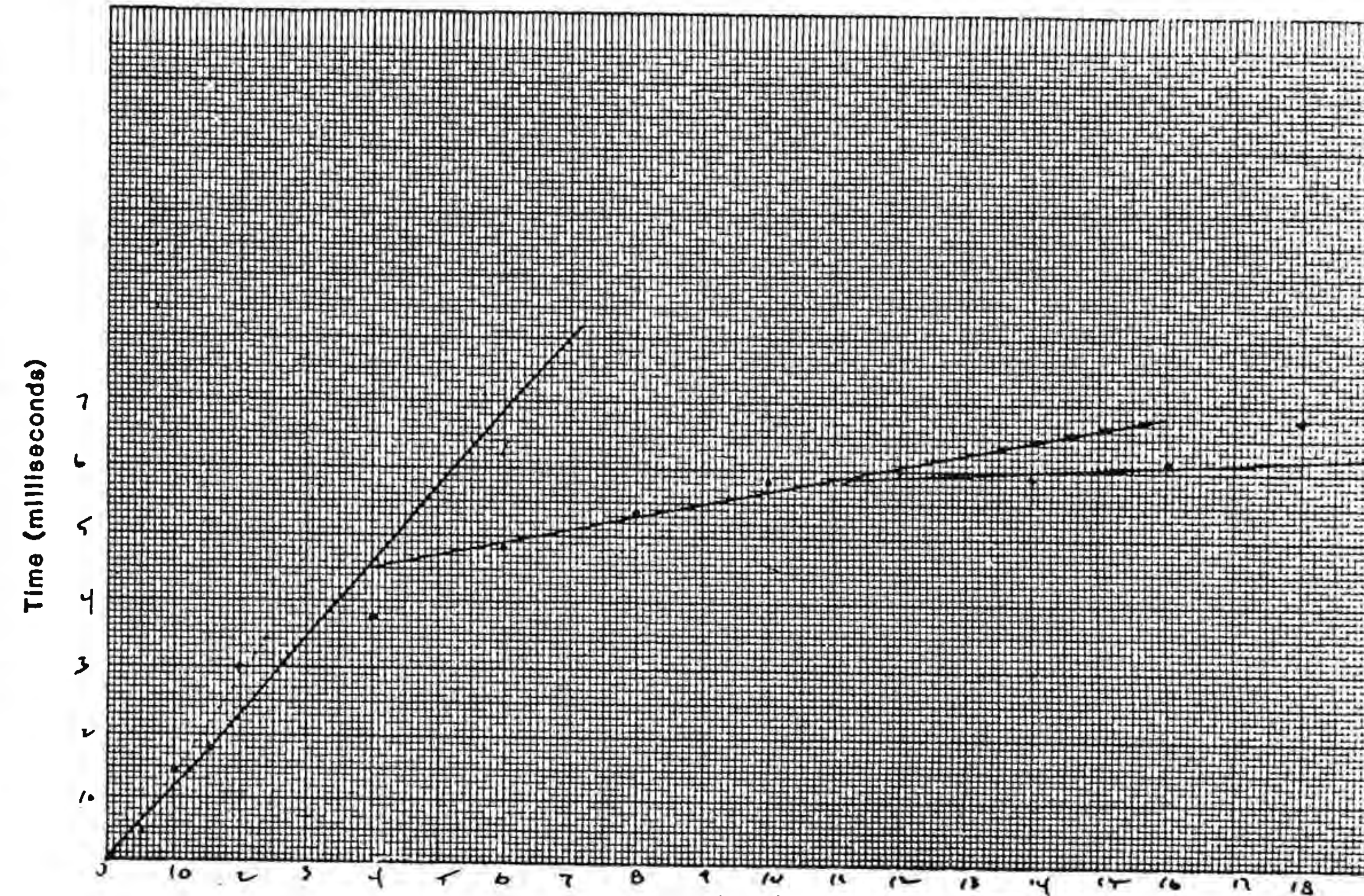
Drove Jeep in Woods

Layer	1	2	3			
Velocity	1150	2100	2000			
X_c	44	134	—			
Depth	11.9	69.8				
Layer						
Velocity						
X_c						
Depth						

Seismic Refraction Worksheet

DATA

x	ms	x	ms
0			
5	4.25		
10	14.25		
15	18.0		
20	30.0		
40	37.5		
60	48.0		
90	53.75		
110	58.0		
120	60.0		
140	59.0		
160	61.75		
180	69.0		



Project: HRM **Date:** 9/21/07

Line Description: #6 RgtR way

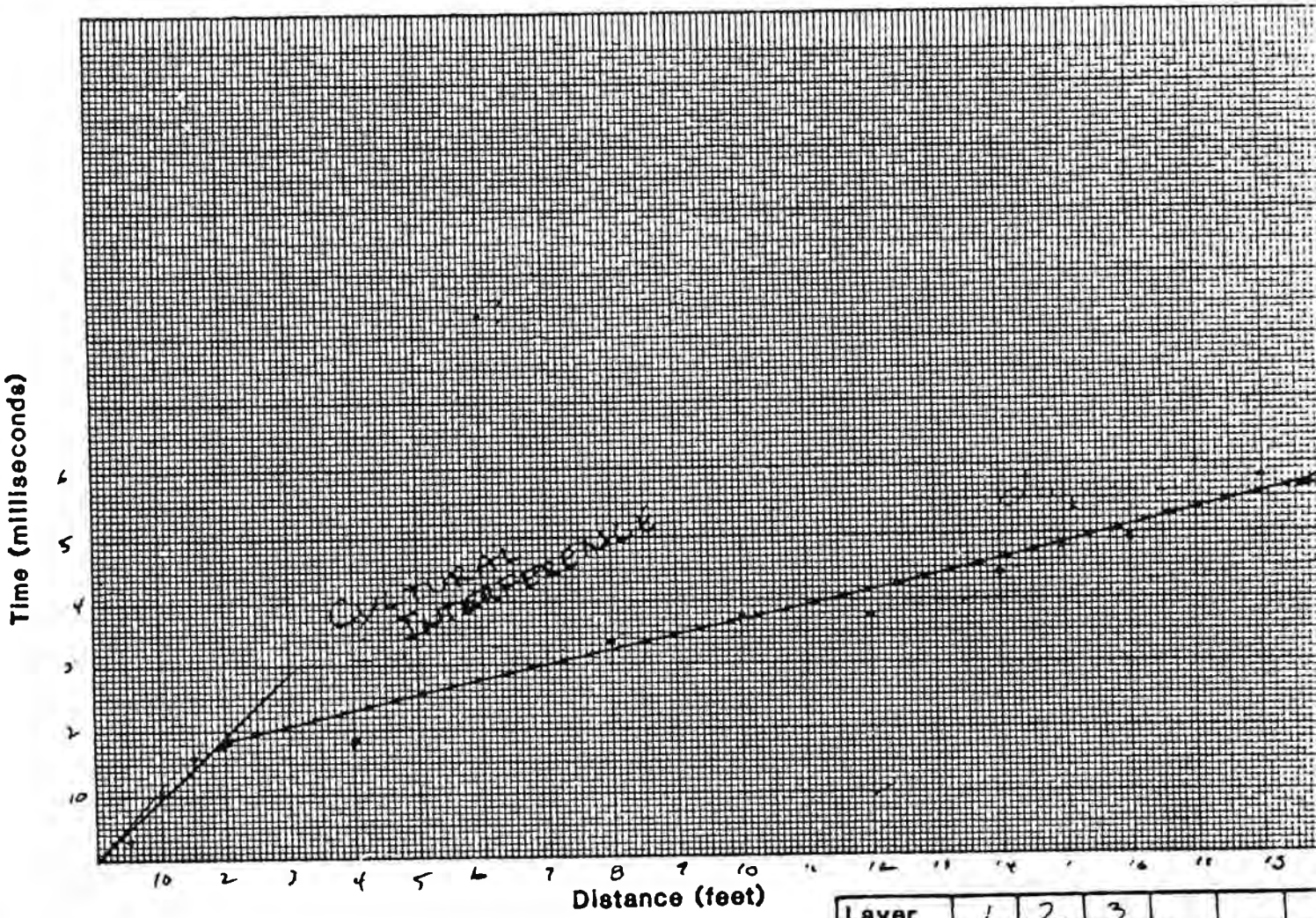
∇ -10-15'

Layer	1	2	3			
Velocity	900	5000	20000			
X_c	39	110				
Depth	16.3	55.6				
Layer						
Velocity						
X_c						
Depth						

Seismic Refraction Worksheet

DATA

x	ms	x	ms
0			
5	3.0		
10	10.0		
15	16.25		
20	17.50		
40	18.75		
60	83.75	?	
80	33.75		
100	37.5		
120	37.5		
140	44.25		
160	49.25	?	
190	58.0		



Project: Hunters Rdg Mall **Date:** 9/21/87

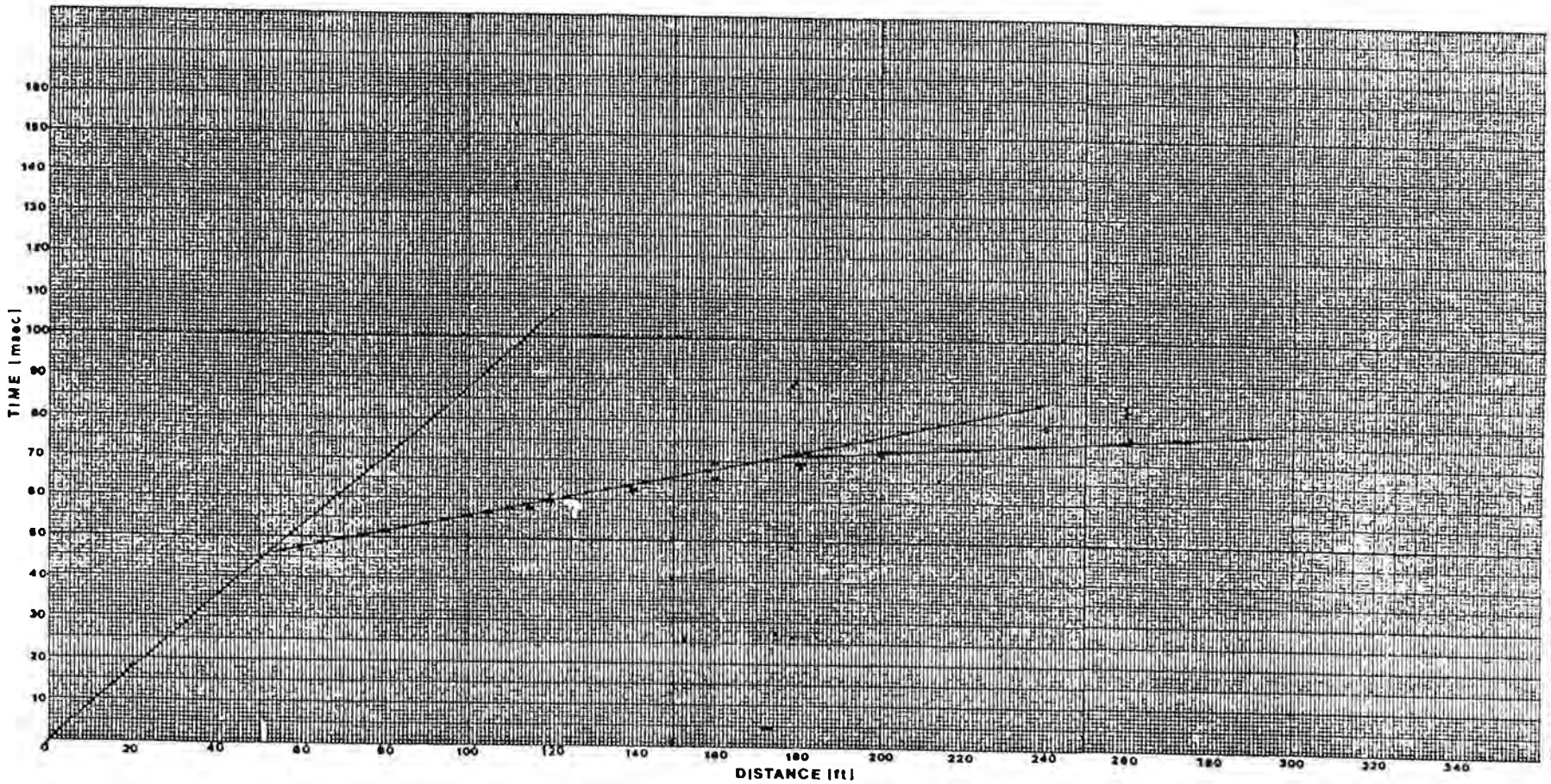
Line Description: #7

Layer	1	2	3			
Velocity	1050	4250	20000			
X_c	20	>186				
Depth	7.8	80.8				
Layer						
Velocity						
X_c						
Depth						

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

Project: D&B Date: 7/22



#1 x	ms	#2 x	m
0	X	0	X
5	5.0	105	56
10	7.2	110	[illegible]
15	11.5	115	[illegible]
20	18.0	120	59
40	35.5	140	67
60	46.7	160	[illegible]
80	51.5	180	87
100	55.7	200	72
120	61.2	220	[illegible]
140	62.7	240	[illegible]
160	69.7	260	92
180	72.0	280	[illegible]

#1

Layer	1	2	3			
Velocity	1150	4750	28000			
X_c	52	175				
Depth	20.3	84.9				

#2

Layer						
Velocity						
X_c						
Depth						

Line Description: in front of House Jeff Lane

50 ft
7 ms

STATION NUMBER

48

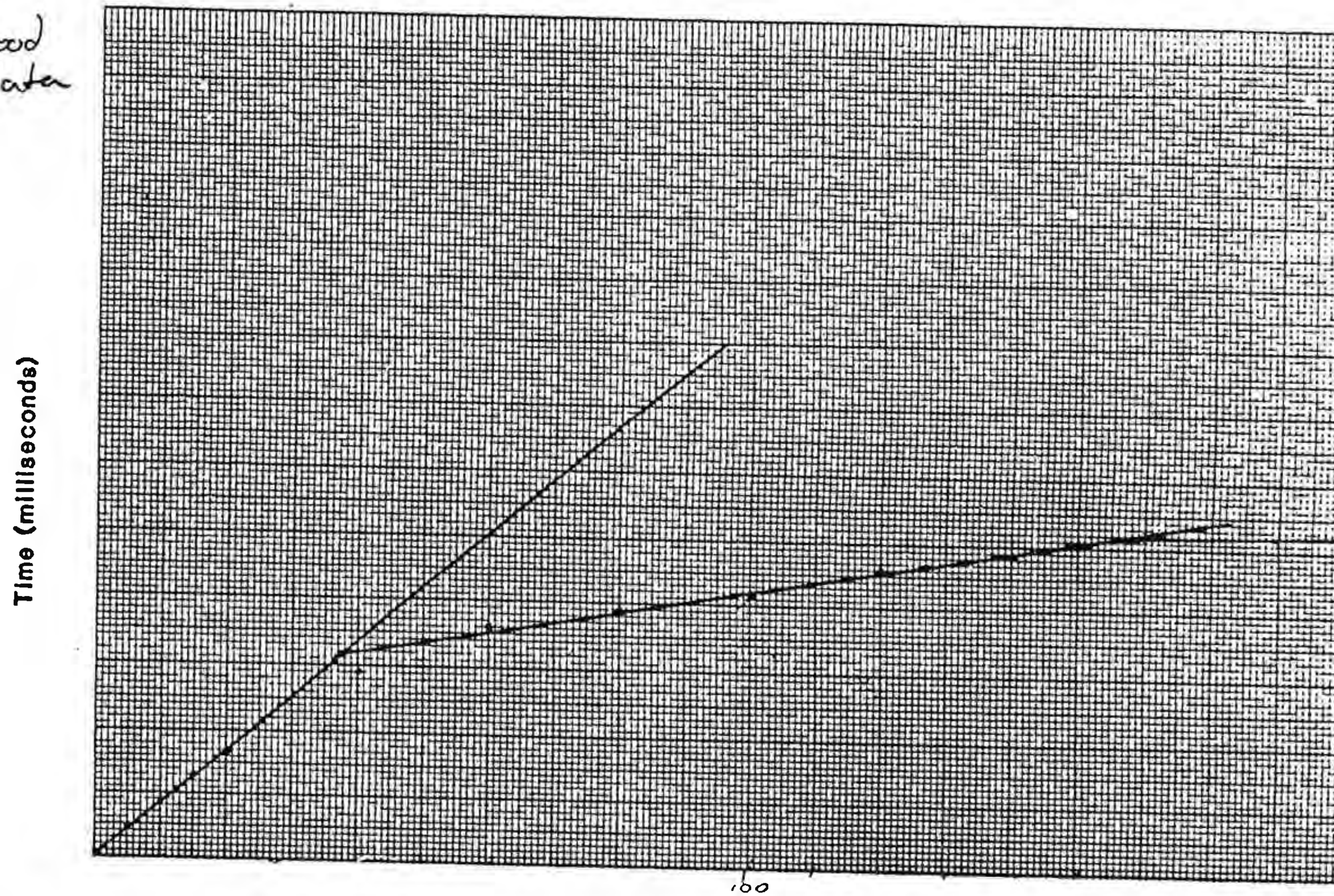
1

Seismic Refraction Worksheet

DATA

x	ms	x	ms
0			
5	4.5		
10	9.0		
15	13.2		
20	16.7		
40	28.7		
60	35.5		
80	39.0		
100	41.5		
120	45.7		
140	48.5		
160	52.2		
180	51.7		

good data



Project: DVP Bedford **Date:** 7/23

Line Description: H 9
Line along ridge, Sand pit 12' drop

Layer						
Velocity	1200	6000	12000			
X_c	38	158				
Depth	15.5	70.4				

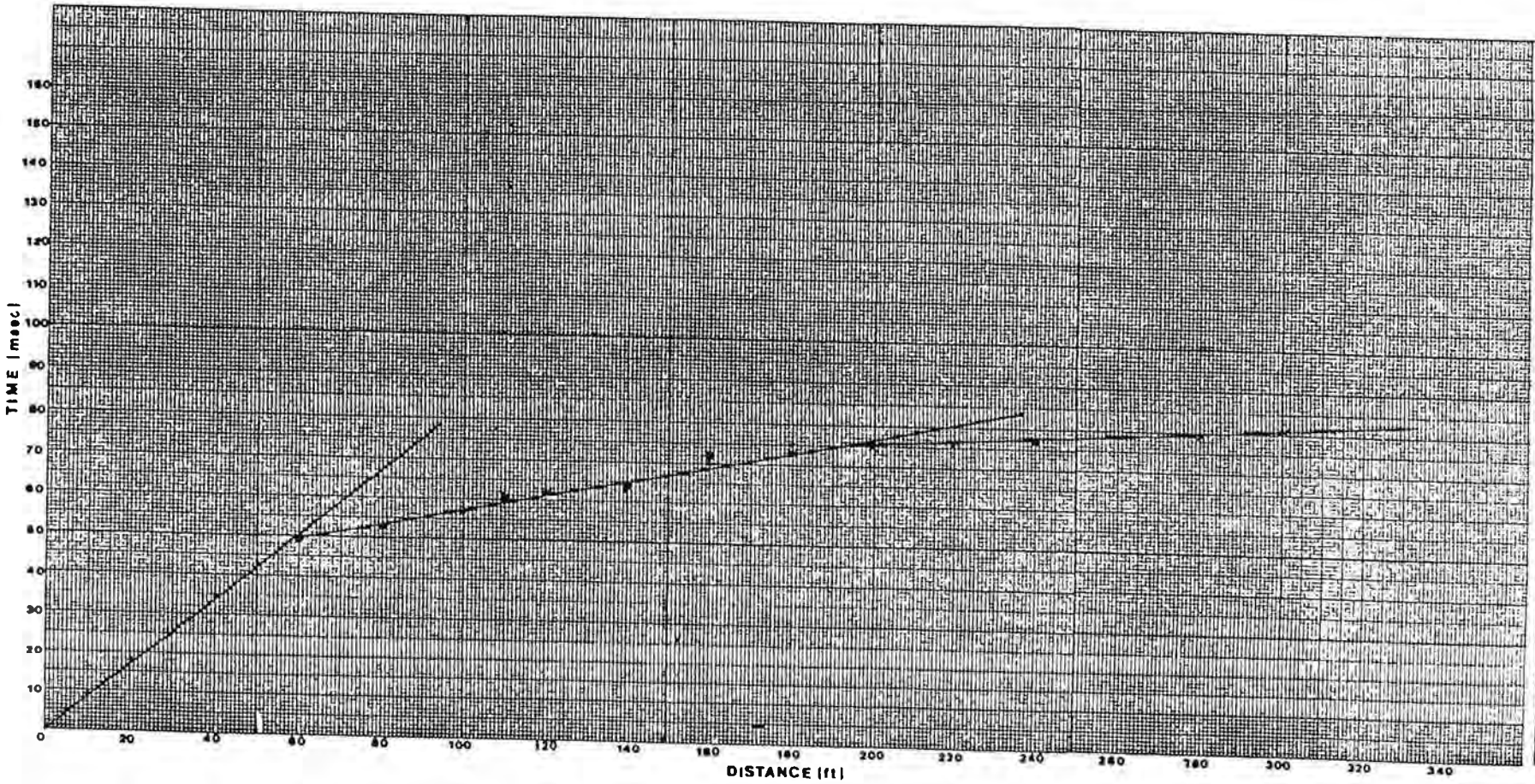
Layer						
Velocity						
X_c						
Depth						

DELTA GEOPHYSICAL

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

Project: D&B Date: 9/23



#1 x	#1 ms	#2 x	#2 ms
0			
5	4.7	105	
10	9.2	110	
20	18.2	120	
40	34.5	140	
60	48.7	160	
80	53.7	180	
100	56.5	200	
120	62.0	220	
140	64.5	240	
160	70.2	260	
180	75	280	
200	76	300	

#1

Layer	1	2	3			
Velocity	1200	5050	17,000			
X_c	59	195				
Depth	23.2	90.3				

#2

Layer						
Velocity						
X_c						
Depth						

Line Description: _____

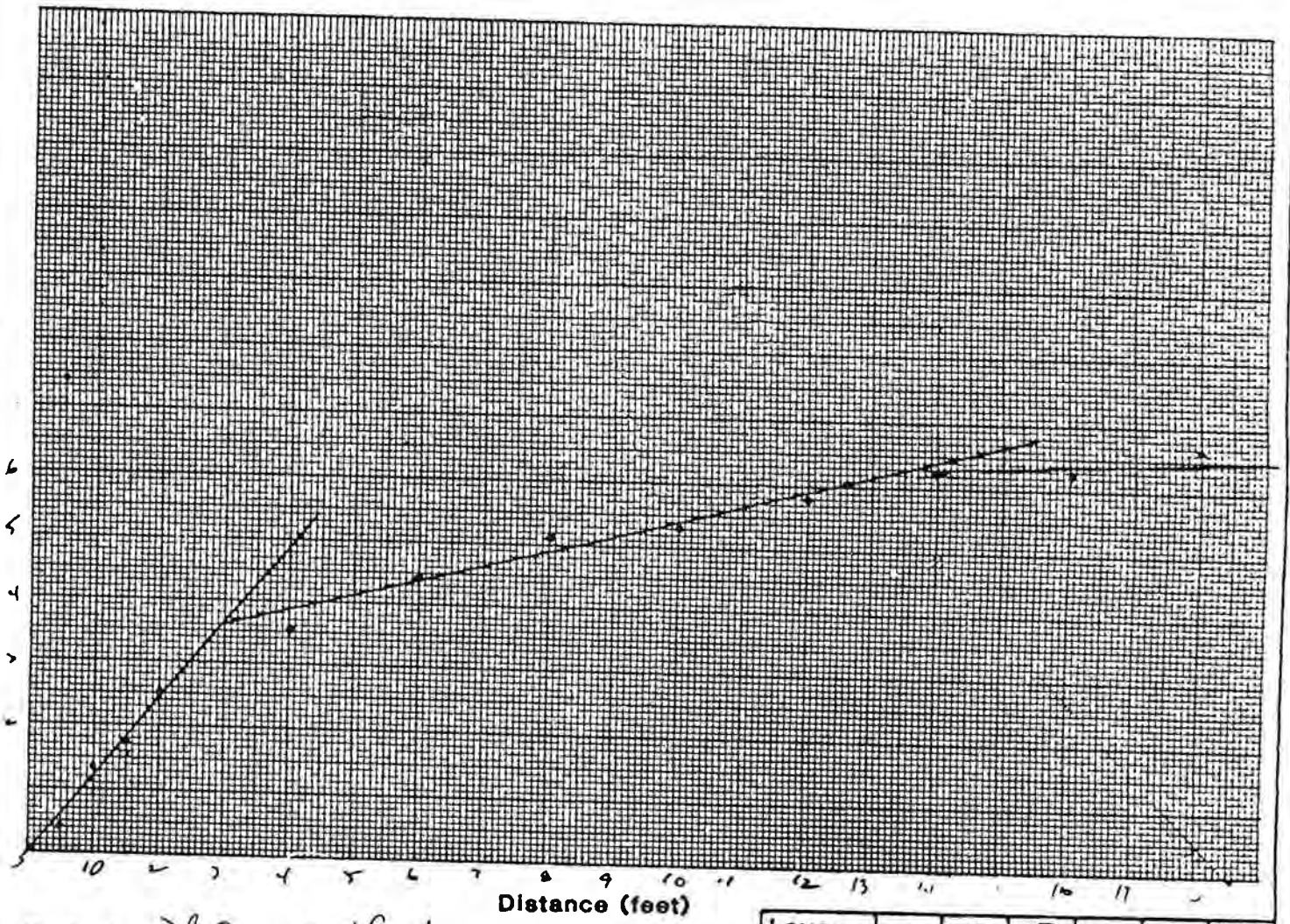
STATION NUMBER

H10

Seismic Refraction Worksheet

DATA

x	ms	x	ms	
0				
5	4.25	180	4.25	5
10	17.75	160	31.75	25
15	17.5	140	49.25	45
20	25	120	60.0	65
30	35.5	100	80.0	85
60	44.25	80	96.25	105
80	51.25	60	109.25	125
100	53.0	40	118.0	65.5 145
120	59.0	20	68.75	165
140	62.5	15	69.25	
160	62.5	10	70.5	175
180	66.75	5	71.75	180



Project: D&B Bedford Date: 9/21

Line Description: (II)

For Graph of reverse see other page

Layer	1	2	3			
Velocity	800	4000	2000			
X_c	30	138				
Depth	12.3	66.1				
Layer						
Velocity						
X_c						
Depth						

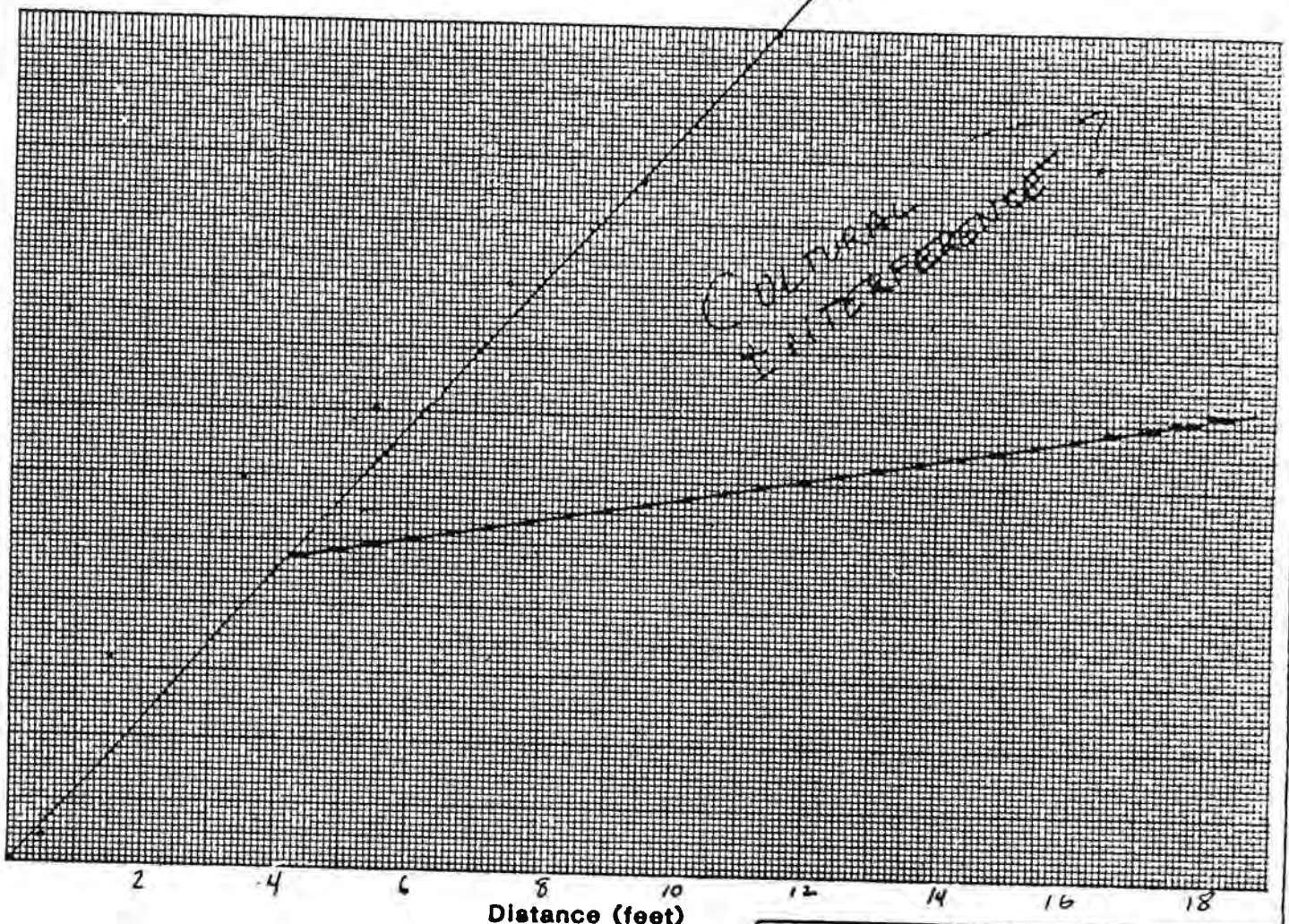
DELTA GEOPHYSICAL

Seismic Refraction Worksheet

DATA

x	ms	x	ms	
		180	4.25	5
		160	31.75	25
		140	49.25	45
		120	60.0	65
		100	80.0	85
		80	96.25	105
		60	109.25	125
		40	118	145
		20	68.75	165
		15	69.25	170
		10	70.5	175
		5	71.75	180

Time (milliseconds)



Project: D&B **Date:** 9/21

Line Description: Reverse of Line 11

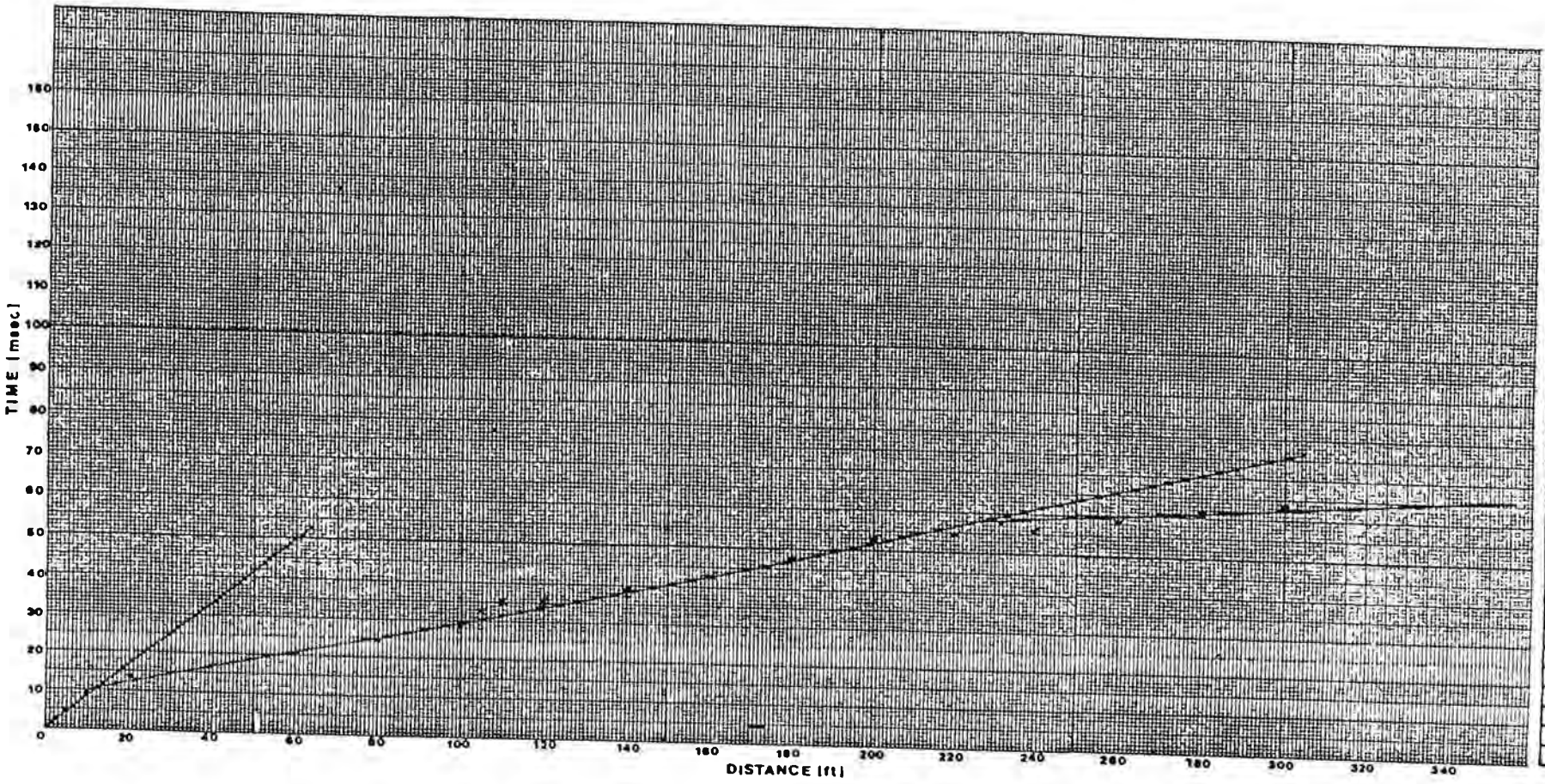
Layer	1	2	3			
Velocity	900	5750				
X_c	48	>175				
Depth	20.5	>81.5				
Layer						
Velocity						
X_c						
Depth						

DELTA GEOPHYSICAL

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

Project: D & B Date: 5/23



Good data

#1 x	#1 ms	#2 x	#2 ms
0			
5	4.3	105	
10	9.0	110	
20	12.5	120	
40	16.7	140	
60	20.5	160	
80	24.2	180	
100	29.0	200	
120	34.2	220	
140	37.2	240	
160	40.7	260	
180	47.0	280	
200	52.5	300	

#1

Layer						
Velocity	1225	4500	7000			
X_c	12	228				
Depth	4.5	90.6				

#2

Layer						
Velocity						
X_c						
Depth						

Line Description: Bedford Park

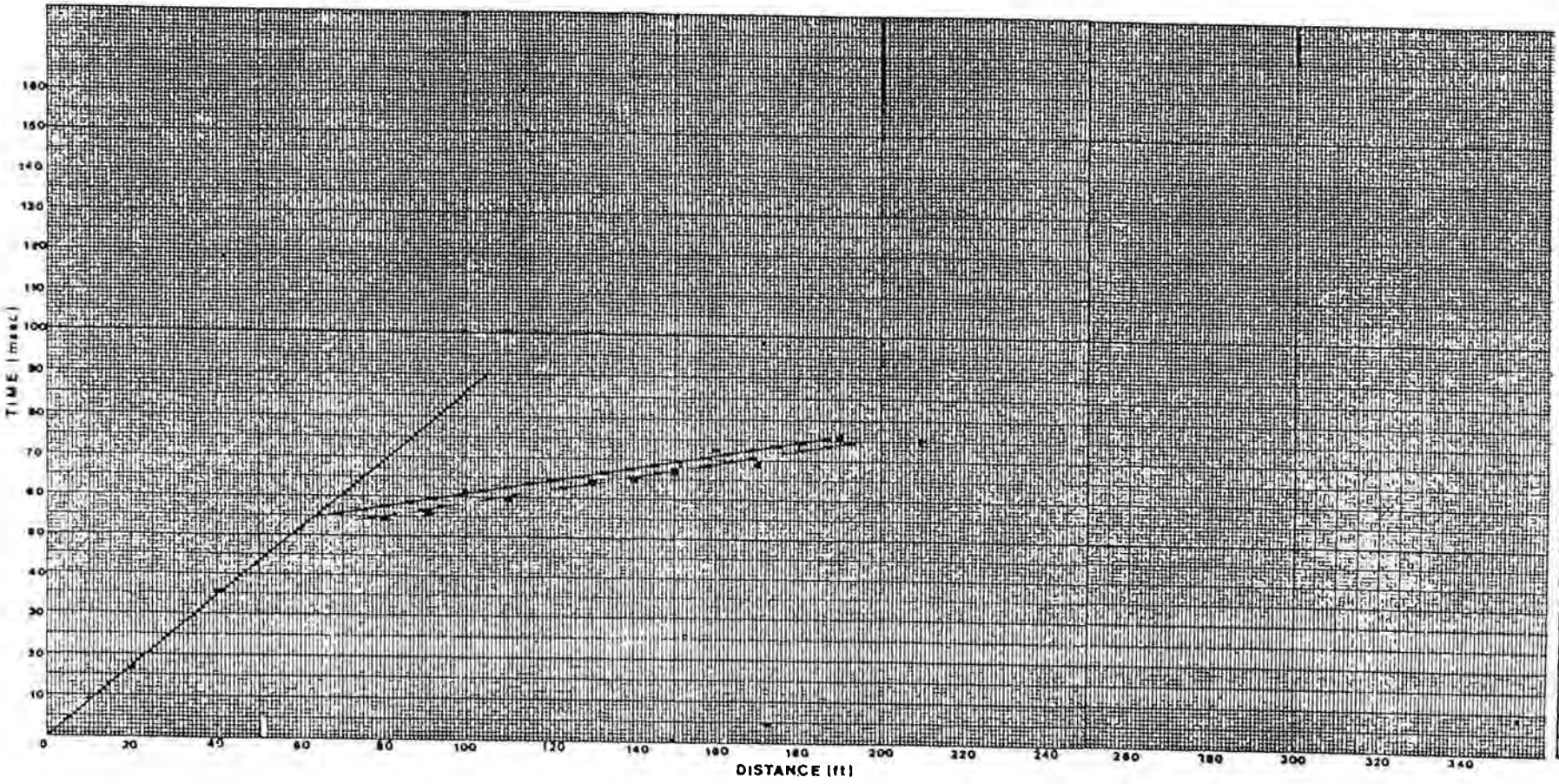
STATION NUMBER

lt #12

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

Project: D & B Date: 9/23



#1 x	#1 ms	#2 x	#2 ms
5	4.7	75	
10	9.0	80	54.2
20	16.2	90	55.5
40	35.2	110	59.8
60	51.7	130	64.2
80	57.2	150	66.7
100	61.2	170	69.2
120	64.0	190	76.2
140	69.7	210	75.0
160	72.5	230	NR
180	74.2	250	NR
200	NR	270	NR

#1

Layer						
Velocity	1200	5900	20000			
Xc	63	2180				
Depth	25.6	286.3				

#2

Layer						
Velocity						
Xc						
Depth						

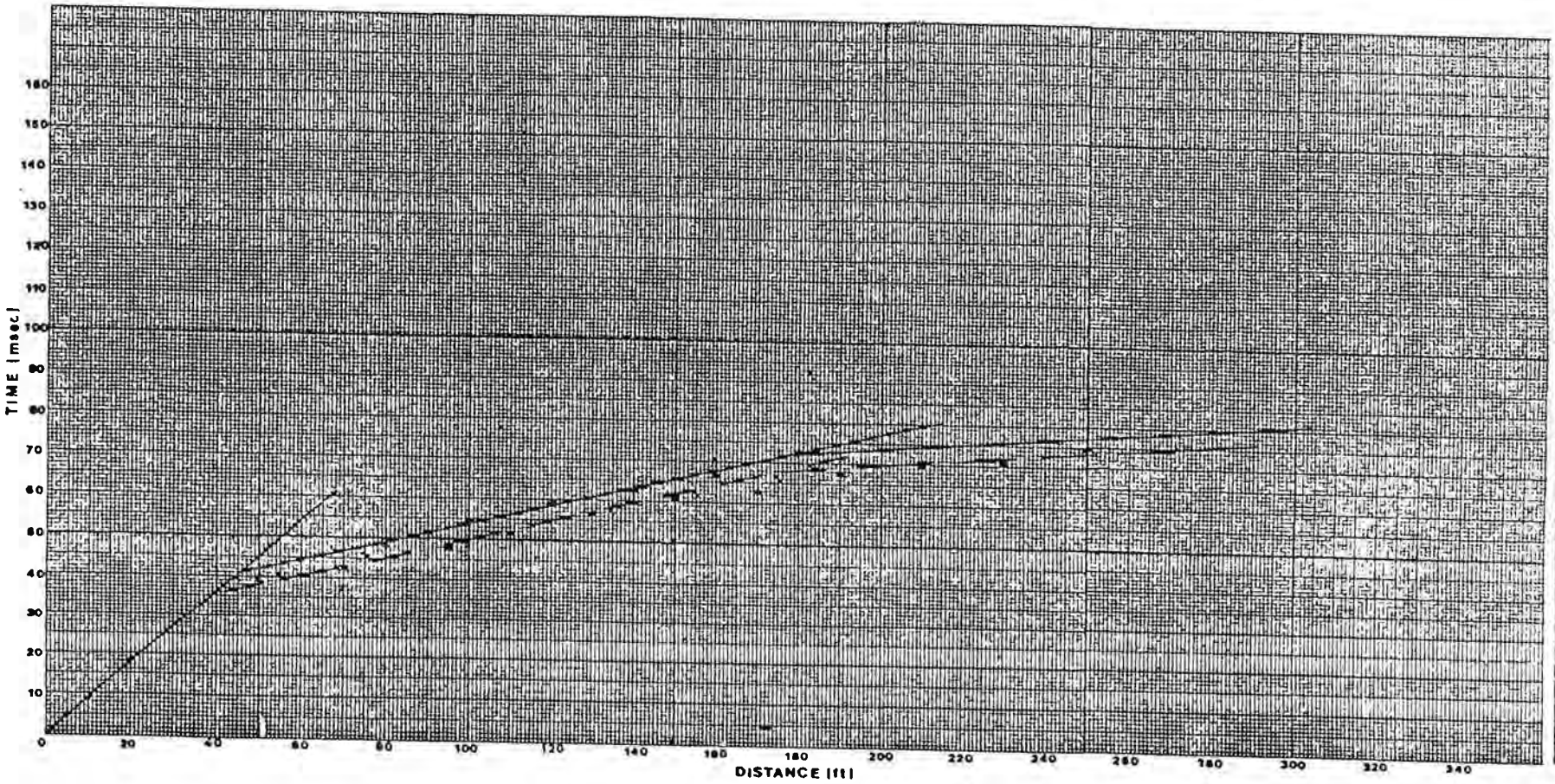
Line Description: Redo in Backyard of 11 Special 1 mm

STATION NUMBER: H13

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

Project: _____ Date: _____



x	#1 ms	s	#2 ms
0			
5	4.2	40	
10	8.7	45	35
20	16.2	55	41
40	34.0	75	46
60	44.0	95	
80	48.0	115	
100	54.5	135	52
120	59.2	155	61
140	62.5	175	66
160	66.5	195	69
180	72.0	205	
200	76	225	71.5
		50	38
		70	42
		90	47
		110	50
		130	54
		150	61
		170	69
		190	69
		210	69
		230	71
		250	74
		270	74.5

#1

Layer	1	2	3			
Velocity	1100	4500	15000			
X_c	45	180				
Depth	17.5	80.0				

#2

Layer						
Velocity						
X_c						
Depth						

Line Description: _____

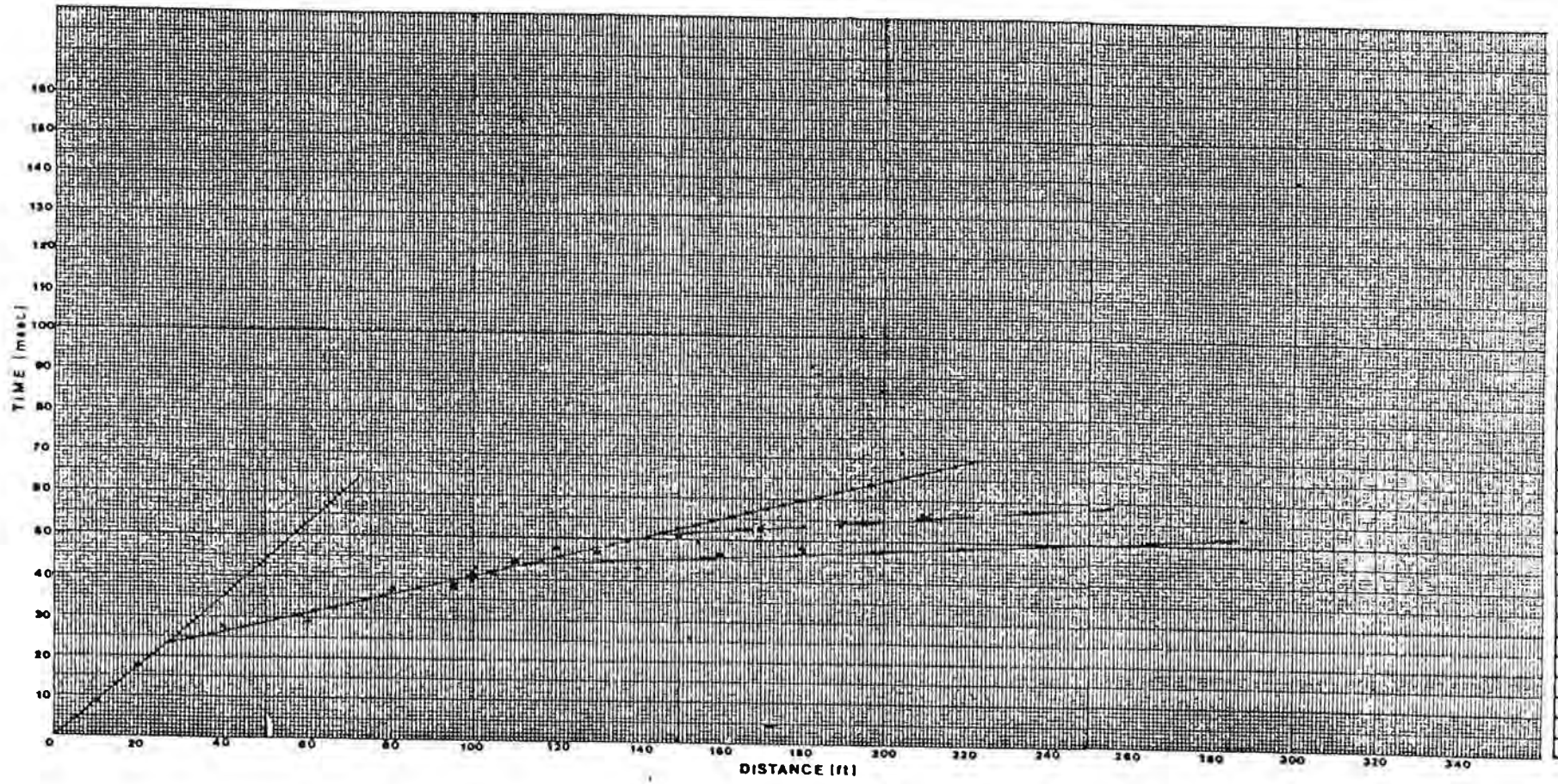
STATION NUMBER

H/4

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

Project: D & B Date: 9/4z



#1 x	#1 ms	#2 x	#2 ms
0			
5	4.3	95	42
10	8.7	100	41
15	13.0	105	41
20	17.5	110	44
40	27.2	130	46
60	29.0	150	50
80	36.7	170	51
100	40.2	190	
120	47.5	210	55
140	45	230	
160	46.5	250	
180	48	270	

#1

Layer	1	2	3			
Velocity	1150	4750	20000			
X_c	26	112				
Depth	9.8	53.0				

#2

Layer	1	2	3			
Velocity	1150	4250				
X_c	26	145				
Depth	9.8	46.3				

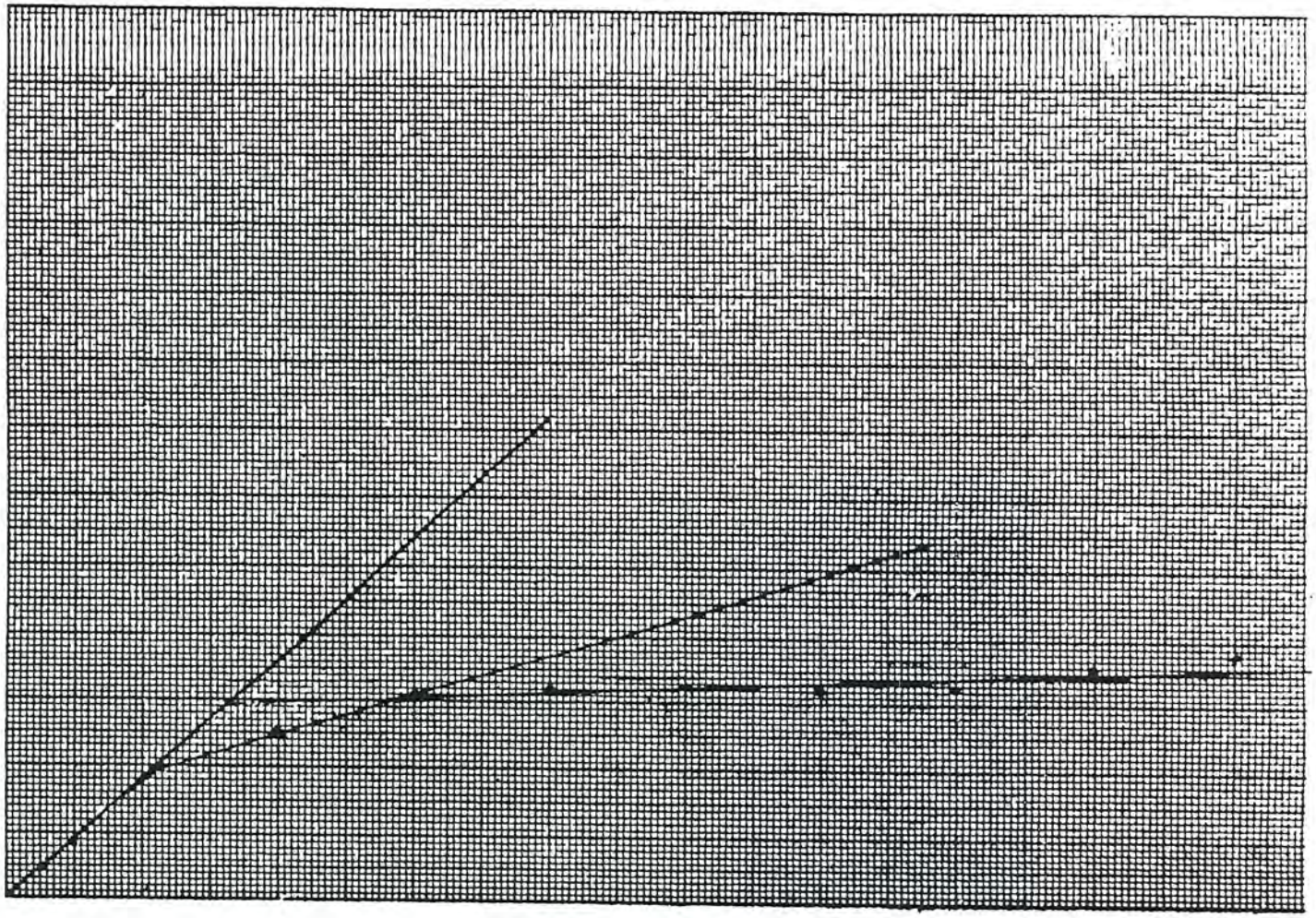
Line Description: 50' Sewer Pipe River

STATION NUMBER: H15

Seismic Refraction Worksheet

DATA

x	ms	x	ms
0			
5	5.0		
10	9.0		
20	18.0		
40	25.2		
60	31.0		
90	32.5		
100	32.7		
120	32.0		
140	32.5		
160	35.7		
180	38.0		



Project: D & B Bedford **Date:** 9/22

Line Description: (AD) on hillside

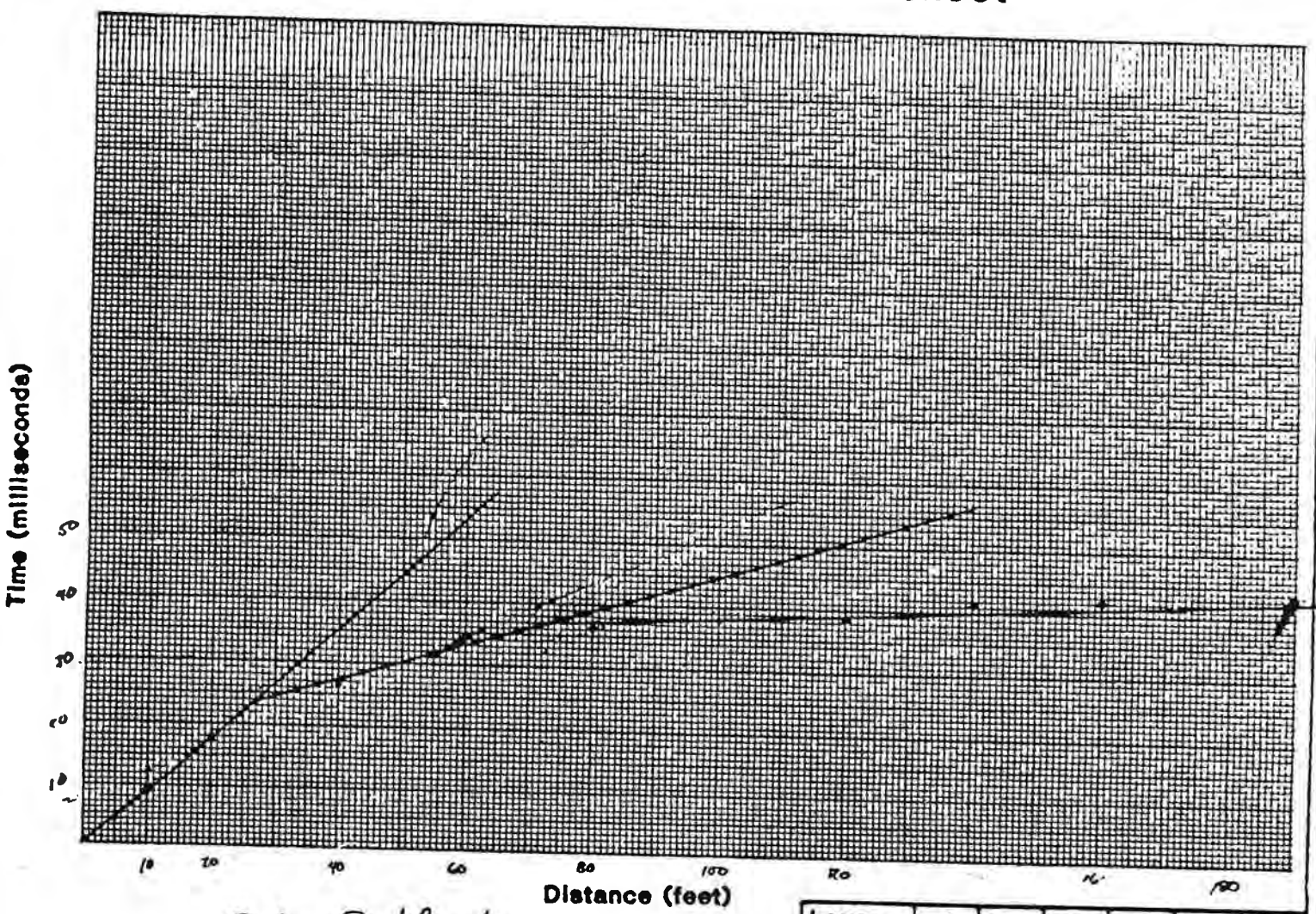
Layer	1	2	3			
Velocity	1100	3250	20000			
X_c	21	60				
Depth	7.4	31.4				
Layer						
Velocity						
X_c						
Depth						

Seismic Refraction Worksheet

DATA

x	ms	x	ms
5	4.2		
10	9.0		
20	17.5		
40	26.7		
60	34.2		
80	36.0		
100	38.2		
120	38.7		
140	41.0		
160	42.0		
180	NR		
190	43.5		

12.2



Project: D+B Bedford Date: 7/22

Line Description: A-2 by mt school

Layer	1	2	3			
Velocity	1100	3500	20000			
X_c	27	73				
Depth	9.8	38.4				
Layer						
Velocity						
X_c						
Depth						

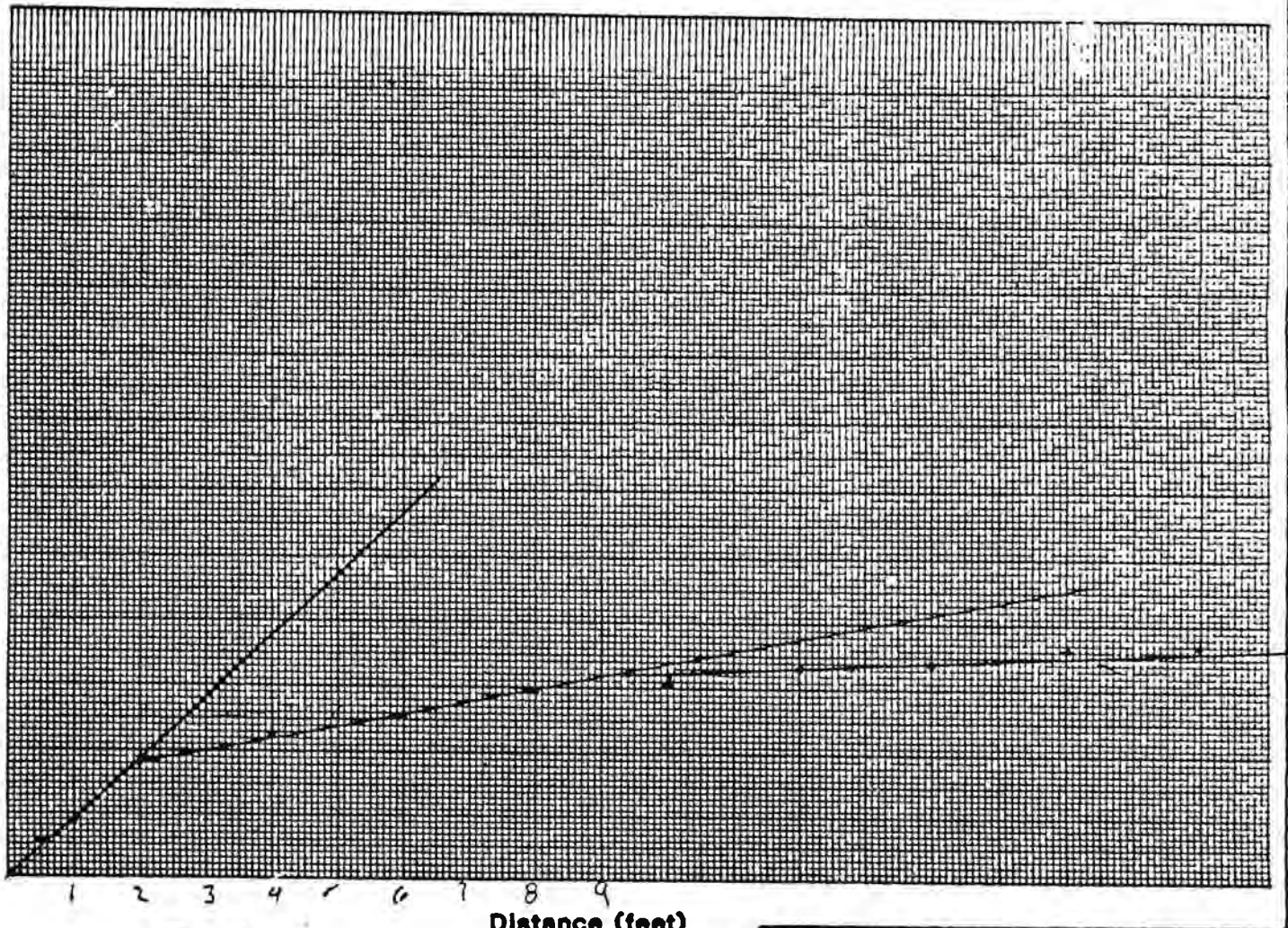
DELTA GEOPHYSICAL

Clinton, NJ

Seismic Refraction Worksheet

DATA

x	ms	x	ms
5	5.1		
10	9.0		
20	18.0		
40	22.7		
60	26.2		
80	29.5		
100	30.5		
120	33.0		
140	34.0		
160	35.7		
180	36.7		
200	37.0		



Project: Dob **Date:** 1/22

Line Description: A-3

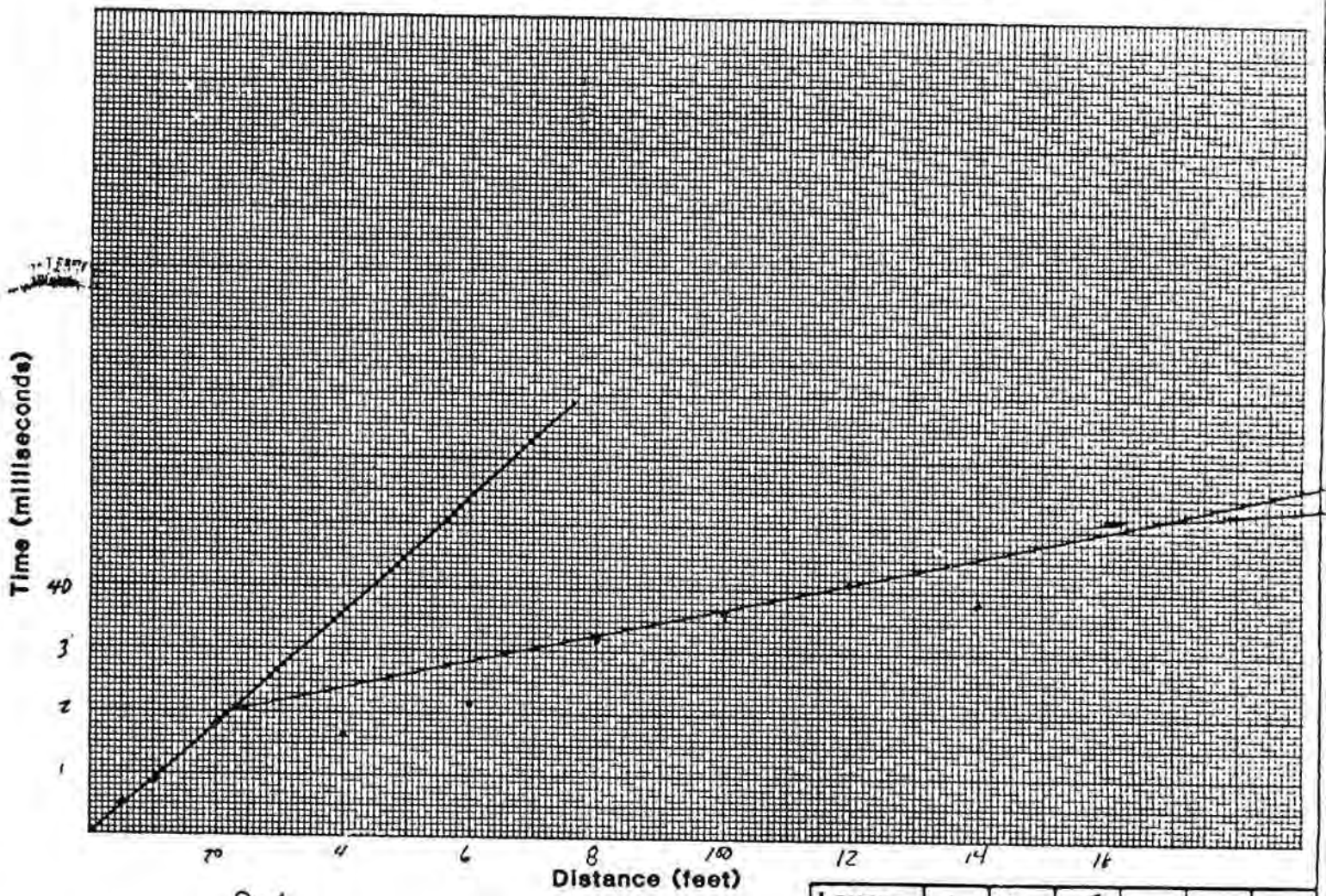
Layer	1	2	3			
Velocity	1100	5000	20000			
X_c	20	92				
Depth	8.0	42.0				
Layer						
Velocity						
X_c						
Depth						

DELTA GEOPHYSICAL Clinton, NJ GEONICS

Seismic Refraction Worksheet

DATA

x	ms	x	ms
5	5.0		
10	8.75		
20	18.0		
40	16.25		
60	21.75		
80	31.75		
100	36.25		
120	41.75		
140	50.0		
160	51.75		
180			
200			



Project: D+B **Date:** 9/22

Line Description: St Pats along Greenwich Rd

A 4

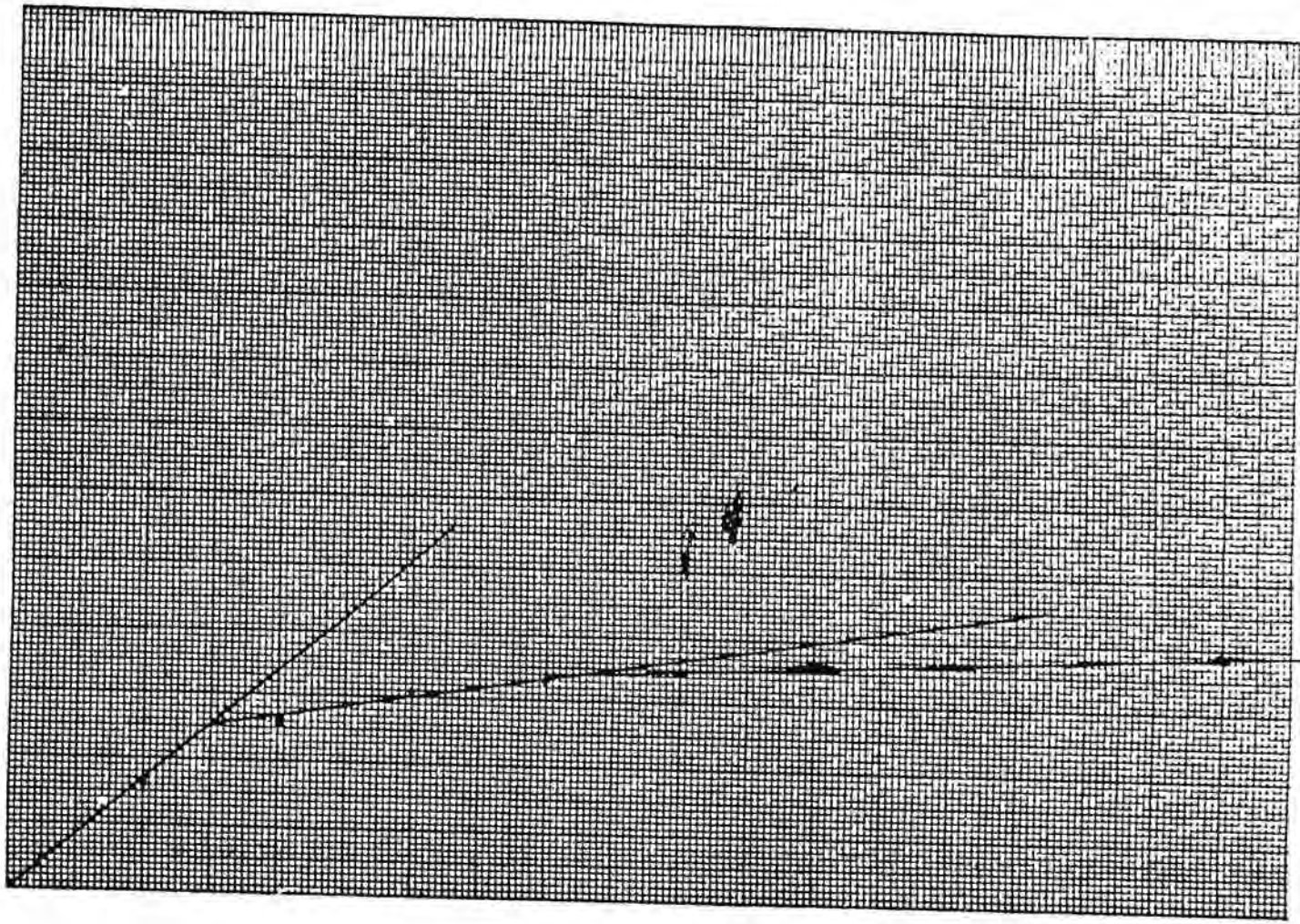
Layer	1	2	3?			
Velocity	1100	4500	15000			
X_c	23	>168				
Depth	9.0	>68.8				
Layer						
Velocity						
X_c						
Depth						

Seismic Refraction Worksheet

good data

DATA

x	ms	x	ms
5	4.5		
10	9.0		
22.2 20	16.5		
40	26.5		
60	30.7		
80	33.0		
100	34.5		
120	35.7		
140	36.5		
160	37.7		
180	38.7		



Project: D & B Date: 9-22

Line Description: City Village Green
Arcade #5

A5

Layer	1	2	3			
Velocity	1200	6000	20000			
X_c	30	86				
Depth	12.3	41.4				
Layer						
Velocity						
X_c						
Depth						

DELTA GEOPHYSICAL

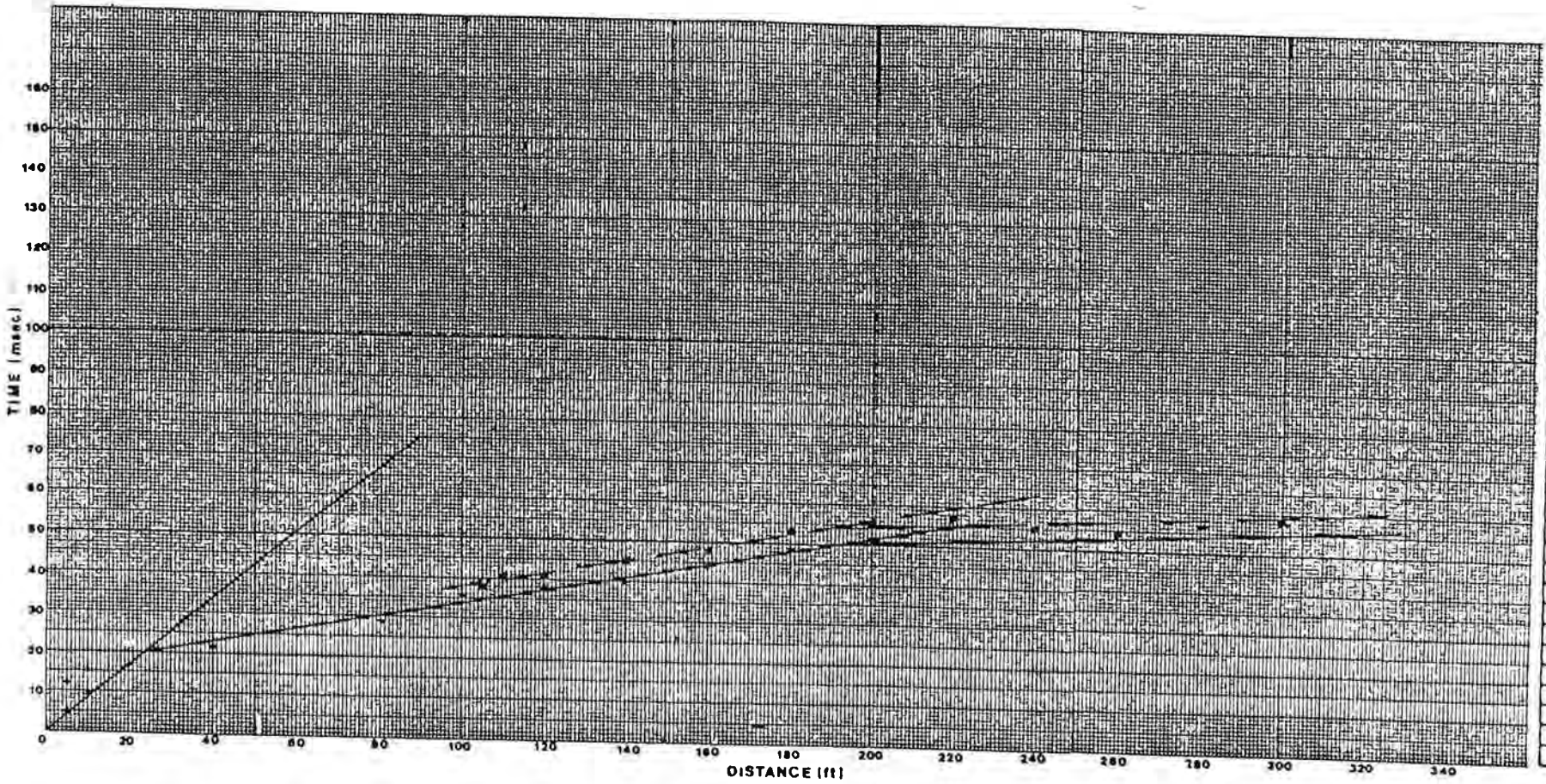
Clinton, NJ

GEONICS

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

Project: D & B Date: 9/25



#1 x	#1 ms	#2 x	#2 ms
5	5.2/3	105	45
10	9.2/6	110	40
20	16.5	120	40.7
40	21.5	140	45 :
60	24.2	160	47.7
80	28.7	180	51.1
100	35.7	200	55.7
120	37.7	220	52.1
140	39.2	240	55[illegible]
160	44.2	260	54.5
180	48.5	280	56.5
200	51.7	300	55
↑ CREEK			

#1

Layer	1	2	3			
Velocity	1200	5500	7000			
$\bar{x}_c$	24	192				
Depth	9.6	90.1				

#2

Layer						
Velocity						
$\bar{x}_c$						
Depth						

Line Description: Behind Nursery School Fire Dept

STATION NUMBER
A6

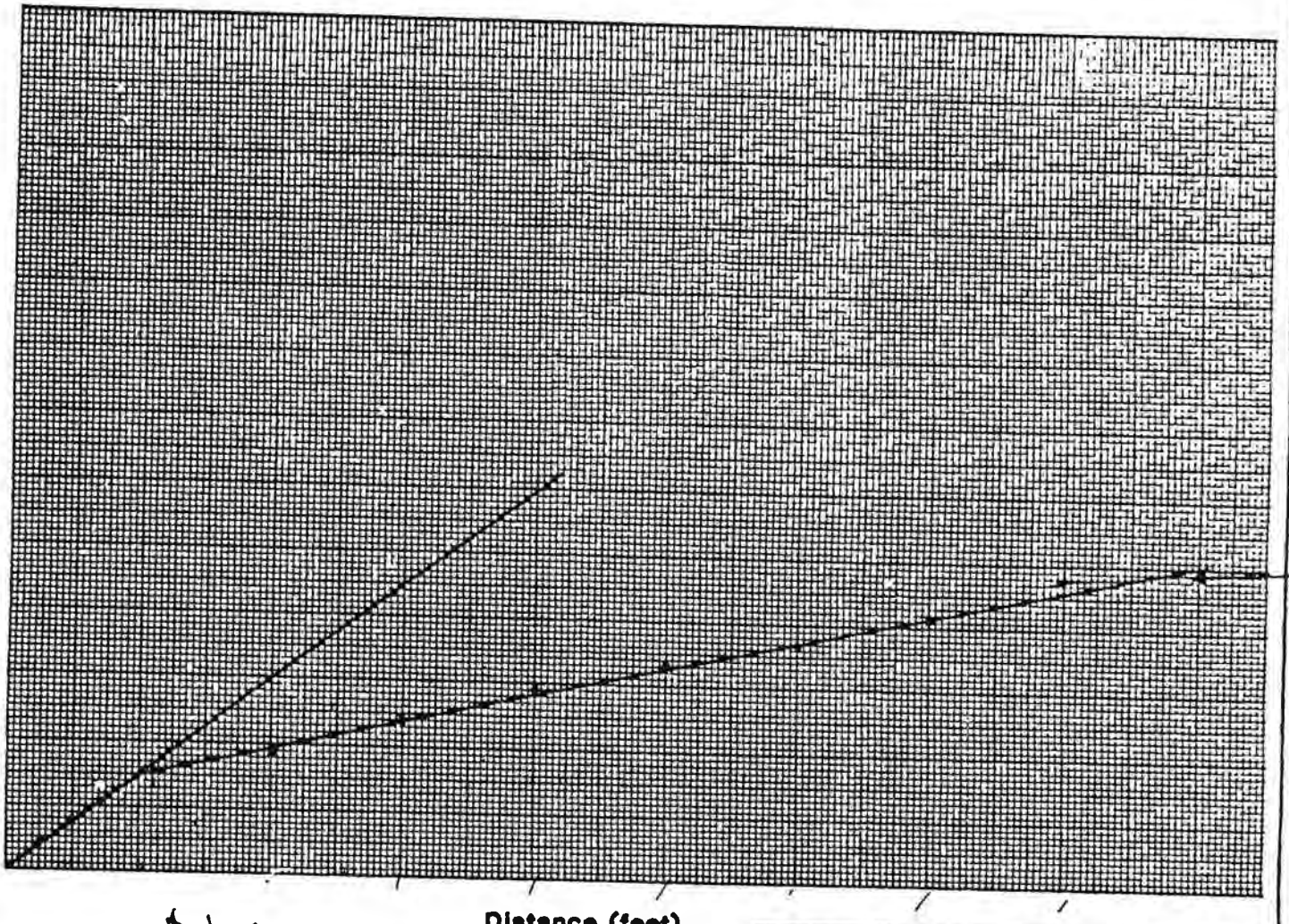
Seismic Refraction Worksheet

DATA

x	ms	x	ms
5	4.0		
10	8.2		
20	15.0		
40	18.7		
60	23.7		
80	29.0		
100	33.0		
120	36.5		
140	41.0		
160	47.7		
180	49		
200	50.2		

12.5

Rock?



Project: D&B

Date: 9/22

Line Description: A7

Layer						
Velocity						
X_c						
Depth						
Layer	1	2	3			
Velocity	1350	4600	15000			
X_c	20	176				
Depth	7.3	70.4				

DELTA GEOPHYSICAL

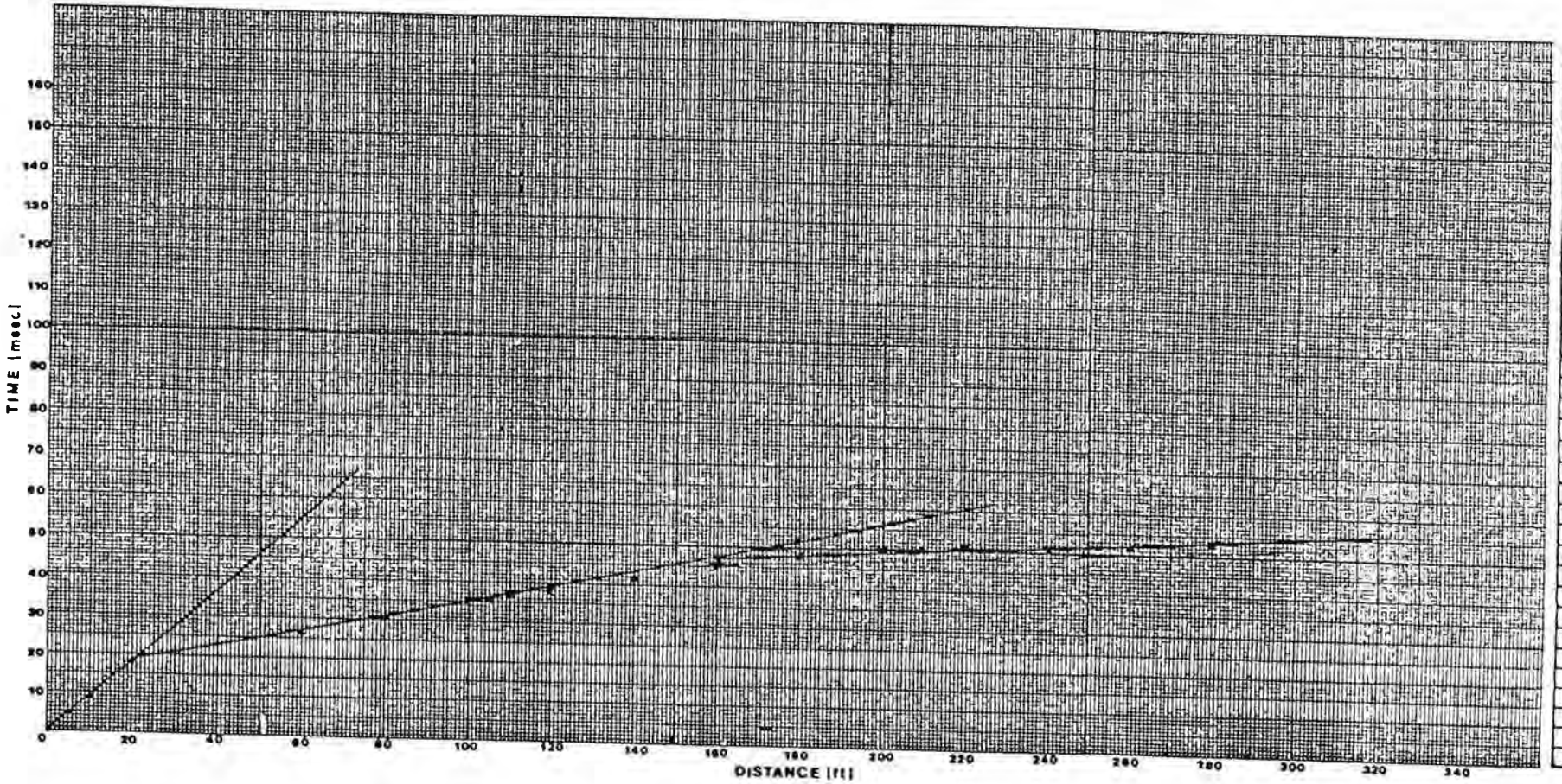
Clinton, NJ

GEONICS

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

Project: DLB Date: 9/22



#1 x	ms	#2 x	ms
5	4.5	105	[illegible]
10	8.5	110	[illegible]
20	18.0	120	[illegible]
40	22.2	140	[illegible]
60	26.7	160	[illegible]
80	30.2	180	[illegible]
100	35.0	200	[illegible]
120	39.0	220	[illegible]
140	42.0	240	[illegible]
160	46.0	260	[illegible]
180	52.0	280	[illegible]
200	58.7	300	[illegible]

Good Data

#1							
Layer							
Velocity	1100	4750	7800				
X_c	21	159					
Depth	13.3	69.0					

#2							
Layer							
Velocity							
X_c							
Depth							

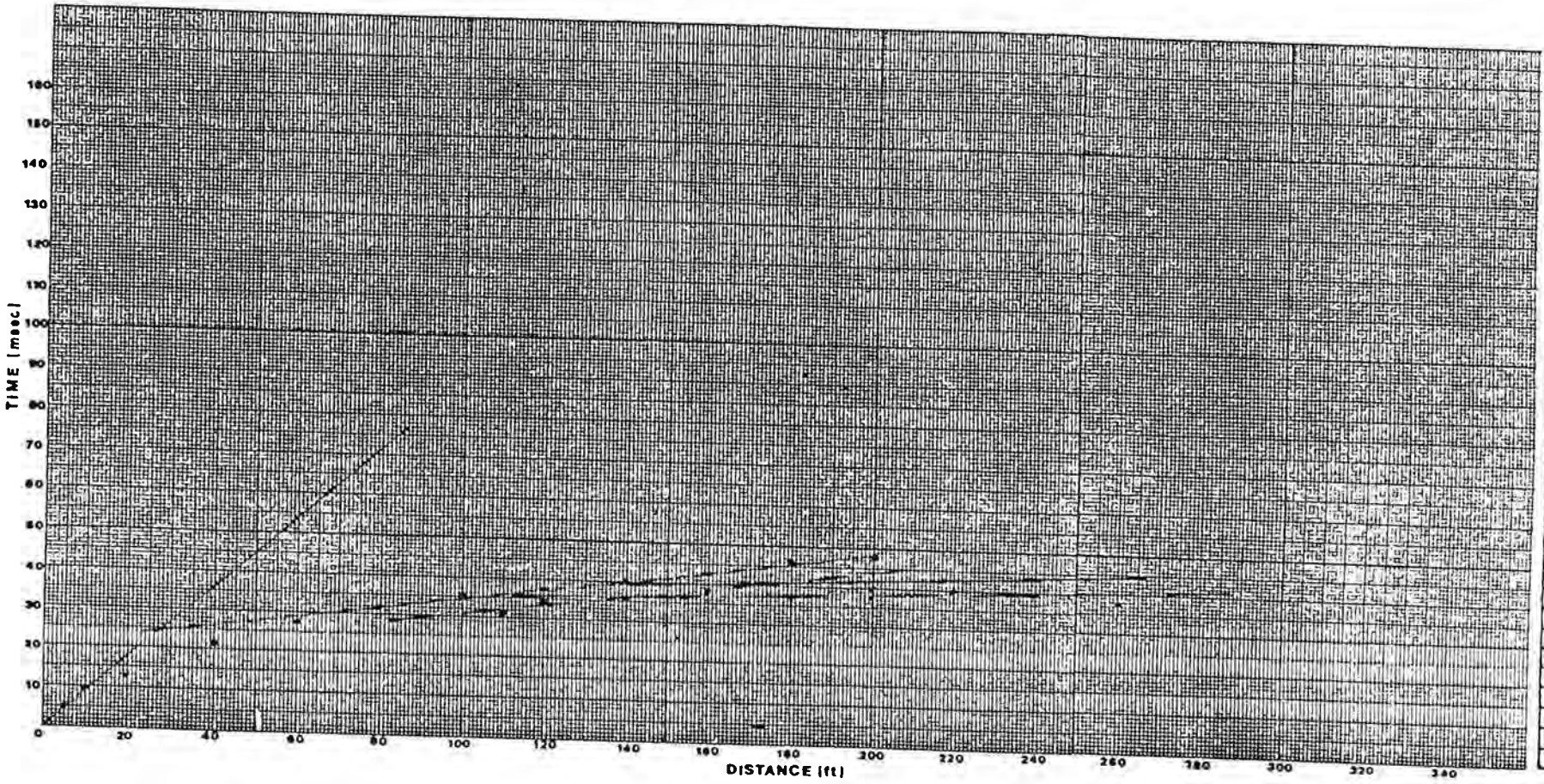
Line Description: Special Field

STATION NUMBER: A8

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

Project: Bedford Date: 9/23



#1 x	#1 ms	#2 x	#2 ms
0			
5	5.2	105	31
10	9.5	110	31
20	12.7	120	34
40	21.0	140	35
60	27.5	160	38
80	32.0	180	3?
100	35.2	200	40
120	37.7	220	4?
140	40.0	240	39
160	42.7	260	37
180	46.2	?	40
200	47.7	?	43

#1

Layer	1	2	3			
Velocity	1100	7000	20000			
X_c	27	139				
Depth	11.5	57.4				

#2

Layer						
Velocity						
X_c						
Depth						

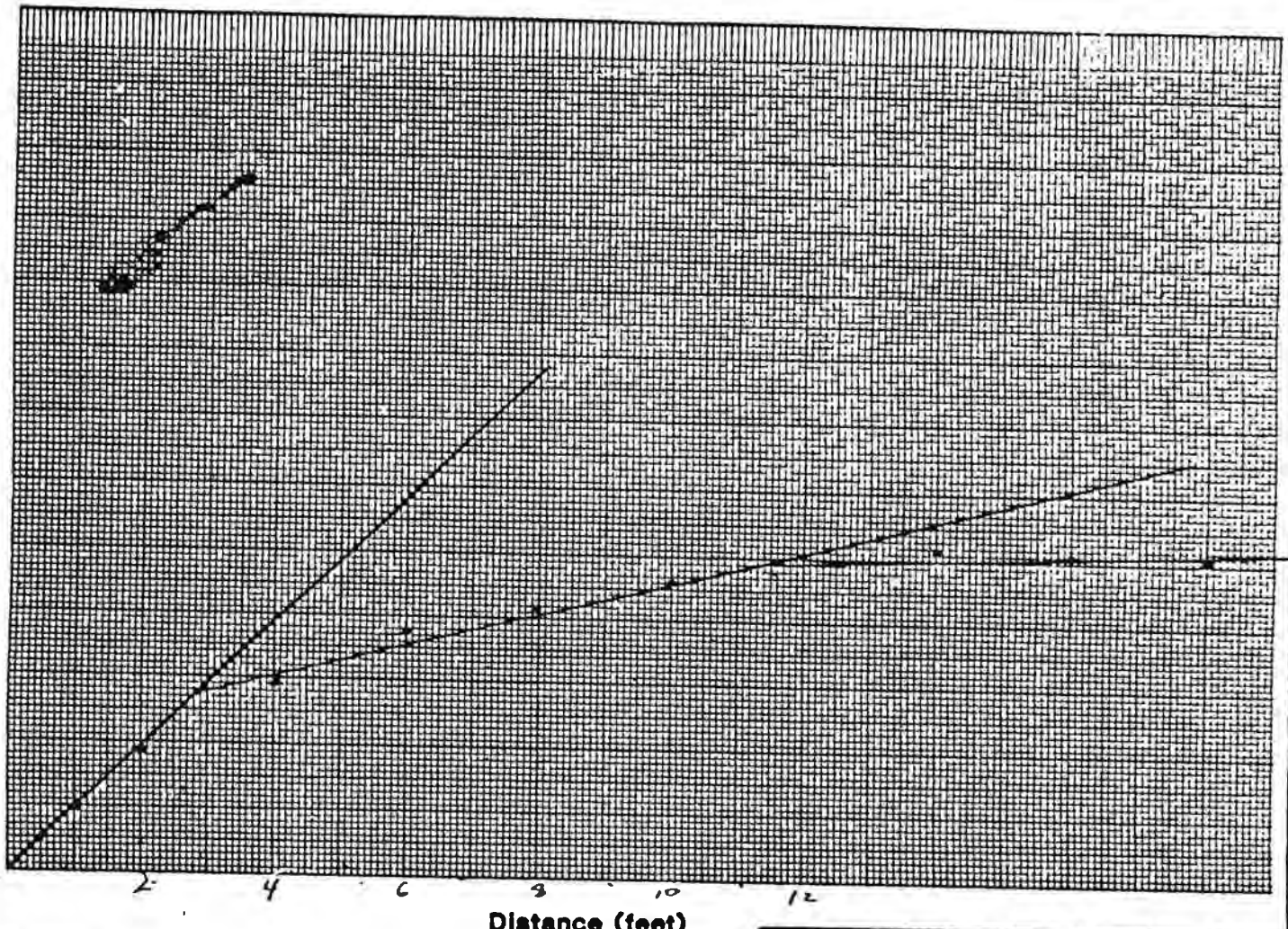
Line Description: Spruce Pond Lane

STATION NUMBER: A#9

Seismic Refraction Worksheet

DATA

x	ms	x	ms
0	4.7		
5	9.2		
10	18.5		
20	29.0		
40	37.5		
60	41.5		
80	46.0		
100	50.2		
120	57.7		
140	58.2		
160	59.8		
180	59.5		
200	▼		



Project: D&B **Date:** 7/22

Line Description: large Colonial house
last Shot of day

A10

Layer	1	2	3			
Velocity	1000	4000	20000			
X_c	28	115				
Depth	10.8	55.6				
Layer						
Velocity						
X_c						
Depth						

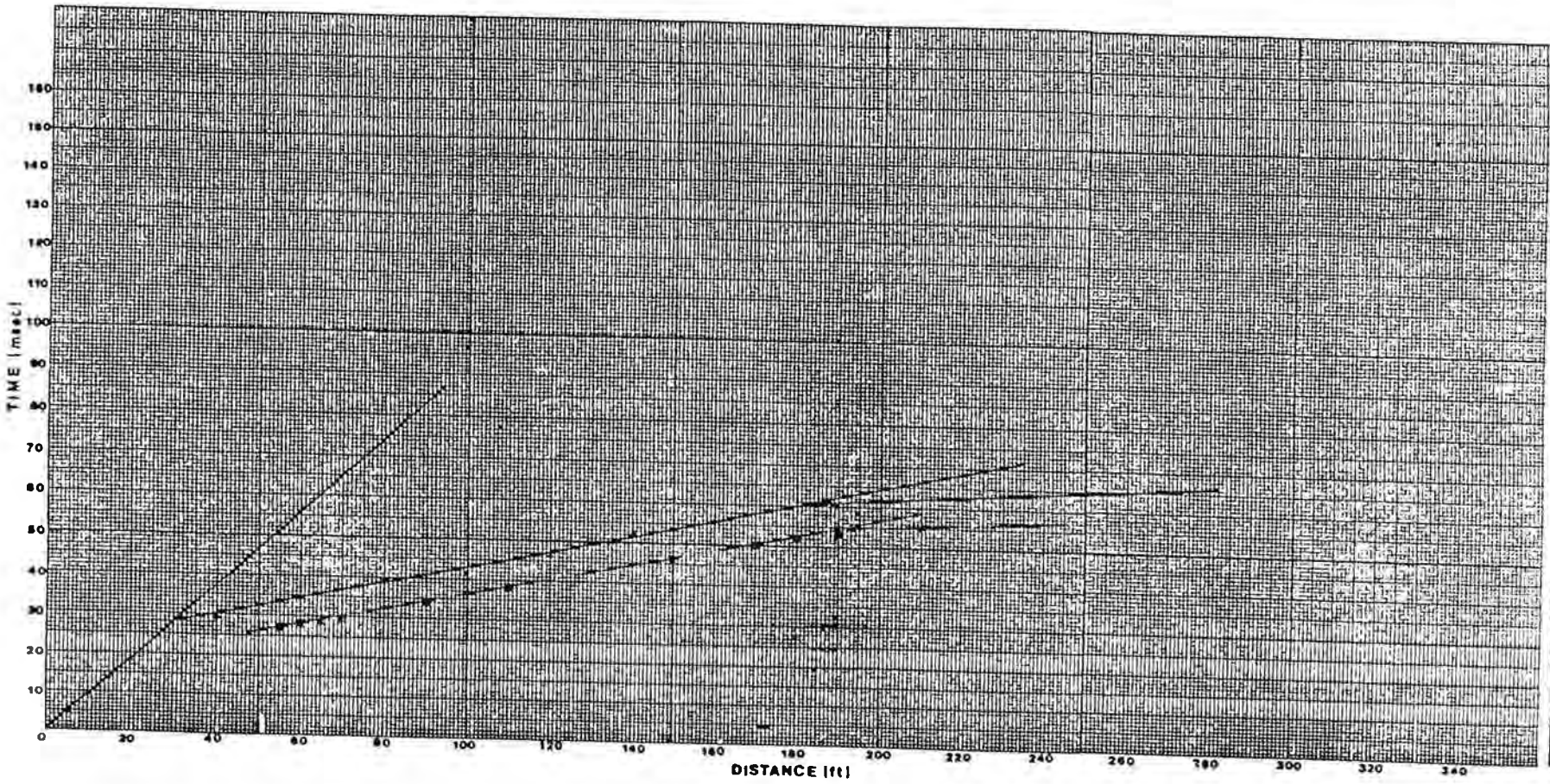
DELTA GEOPHYSICAL Clinton, NJ GEONICS

DELTA GEOPHYSICAL

Seismic Refraction Worksheet

Project: D & C

Date: 9/13



#1 x	#1 ms	#2 x	#2 ms
0	↗	0	↗
5	4.7	55	23
10	9.2	60	24
15	13.5	65	28
20	18.0	70	34
40	29.0	90	50
60	41.5	110	39
80	39.2	130	41
100	41.7	150	46
120	46.2	170	44
140	52	190	52
160	NR	210	54
180	52.0	230	58

#1

Layer	1	2	3			
Velocity	1100	4600	17000			
X_c	31	185				
Depth	12.2	79.0				

#2

Layer							
Velocity							
X_c							
Depth							

Line Description: All
Pools
2 PESS near Building Foundation

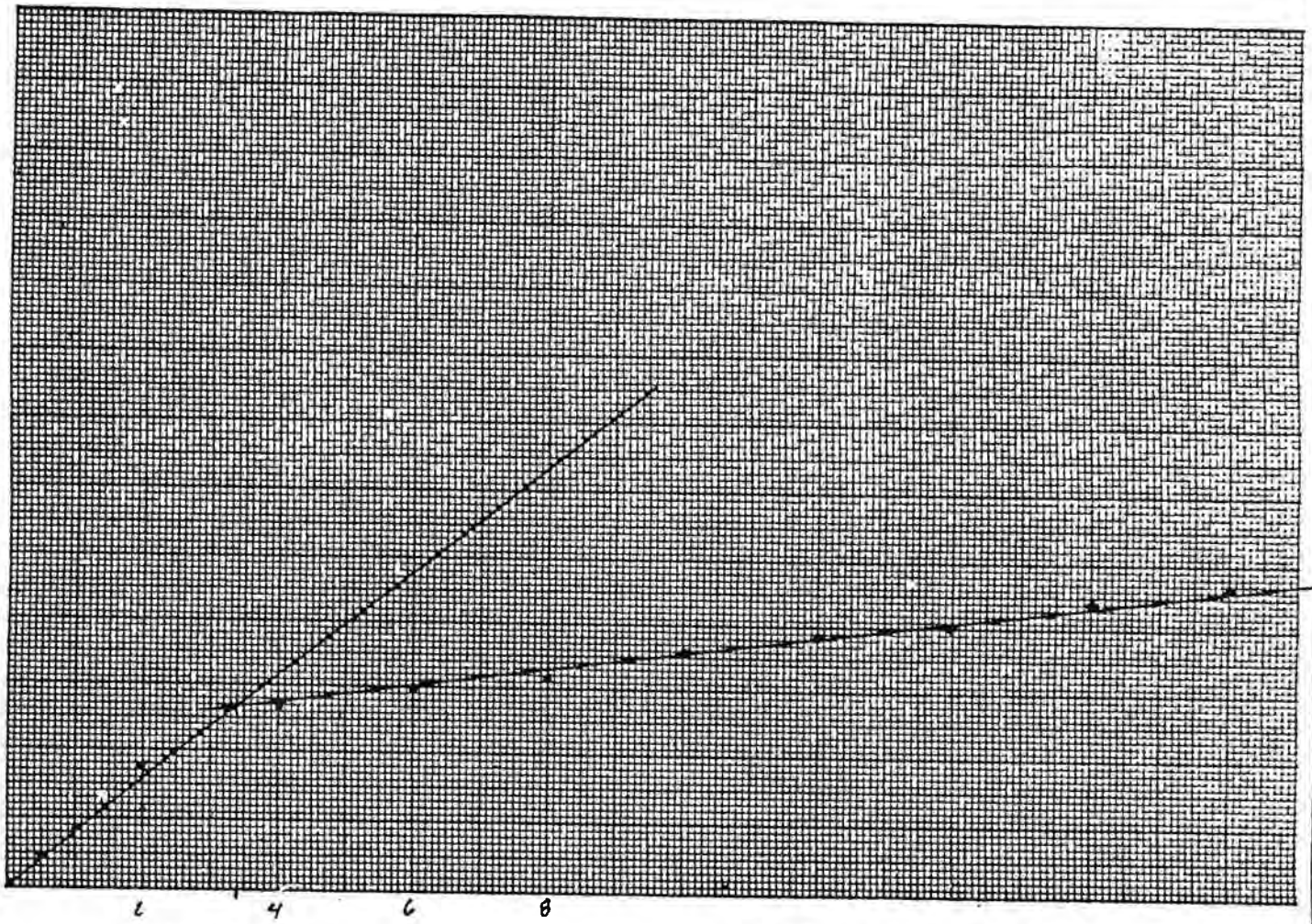
STATION NUMBER
All

Seismic Refraction Worksheet

DATA

x	ms	x	ms
5	4.5		
10	8.2		
20	11.0	77.7	
40	26.7		
60	29.7		
80	31.7		
100	36.2		
120	38.2		
140	40.0		
160	44.2		
180	46.0		
200	47.7		

Time (milliseconds)



Distance (feet)

Project: DOT **Date:** 9/22

Line Description: A-12

Layer	1	2				
Velocity	1250	6000				
X_c	34	180				
Depth	14.5	70.5				
Layer						
Velocity						
X_c						
Depth						

DELTA GEOPHYSICAL Clinton, NJ GEONICS

APPENDIX D

MONITORING WELL BORING LOGS

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-038
OWNER Shopping Arcade

Bedford Village Wells
Shopping Arcade

WELL / BORING Nº MW-1-D
SHEET 1 OF 3
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD 4" Hollow Stem Auger
DATE STARTED 11-3-87 DATE COMPLETED 11-7-87

BOREHOLE COMPLETION DEPTH 43'6"
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA / HNU / HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0								Brown Grey Silt And Gneiss Cobbles		
1										
2										
3										
4										
5										
6			1	5-7'	11"	11"	16-50/5"		1	ppm OVA
7										
8								(Damp) 8'6"		
9										
10										
11										
12										
13										
14								Gneiss, Banded (Black And White) Very Hard, Fine-Coarse Grained, Fresh, Massive High Biotite Content Trace K-Feldspar		
15			WEATHERED FRACTURE							
16										
17			Core Run # 1	13.5' - 23.5'	10'	9'10"				
18										
19										
20										

REMARKS: 4" PVC Casing Set @ 13'6"

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-038
OWNER Shopping Arcade

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-1-D
SHEET 2 OF 3
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD Hollow Stem Auger
DATE STARTED 11-3-87 DATE COMPLETED 11-7-87

BOREHOLE COMPLETION DEPTH 43'6"
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS /6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20										
21										
22			Core Run # 1	13.5 - 23.5'	10'	9'8"				
23			WEATHERED FRACTURE							
24										
25										
26										
27								GNEISS Banded (Black And White) Very Hard, Fine-Coarse Grained, Fresh, Massive, High Biotite Content Including Large (2CM)- K-Feldspar Crystals		
28			Core Run # 2	23.5 - 33.5'	FRACTURE					
29	WEATHERED									
30					10'	10'				
31										
32										
33										
34										
35										
36										
37			Core Run # 3							
38										
39										
40										

REMARKS: Next Morning After 2nd Core Run 5' of Water In Boring.
After Bailing Boring Recharges 2" per 30 Minutes.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-038
OWNER Shopping Arcade

Bedford Village Wells
Shopping Arcade

WELL / BORING Nº MW-1-D
SHEET 3 OF 3
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD Hollow Stem Auger
DATE STARTED 11-3-87 DATE COMPLETED 11-7-87

BOREHOLE COMPLETION DEPTH 43'6"
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA / HNU / HEADSPACE READING (ppm)	STRATUM DESCRIPTION
40										
41			Core Run # 3	FRACTURED				GNEISS Banded (Black And White) Very Hard, Fine-Coarse Grained, Fresh, Massive High Biotite Content Including Large (2CM) K-Feldspar Crystals		
42				WEATHERED						
43										
44								End Boring @ 43'6"		
45										
46										
47										
48										
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59										
60										

REMARKS: Boring Recharges -.85' In 5 Minutes.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT N° 842-038
OWNER Exxon

Bedford Village Wells
Shopping Arcade

WELL/BORING N° MW-2-M
SHEET 1 OF 2
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD Hollow Stem Auger
DATE STARTED 11-5-87 DATE COMPLETED 12-12-87

BOREHOLE COMPLETION DEPTH 34'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE N°	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0								Grey Fine Sand And Clayey Silt		
1										
2										
3										
4										
5										
6			1	5-7'	24"	20"	4-12-16-12	(Damp)	> 1000 ppm OVA 340 ppm TIP	
7										
8								(Petroleum Smell)		
9										
10										
11			2	10-12'	24"	20"	10-12-14-24	11'0"	50 ppm OVA 8 ppm TIP	
12								Brown Clayey Silt Trace Fine Gravel		
13								(Damp) 13'6"		
14										
15										
16			3	15-17'	24"	22"	15-23-24-29	Brown Very Fine Sand, Some Silt, Trace Fine Gravel	80 ppm OVA 11 ppm TIP	
17										
18										
19								(Damp)		
20										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartlucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wells

Shopping Arcade

PROJECT N° 842-03B

OWNER Exxon

WELL/BORING N° MW-2-M

SHEET 2 OF 2

BY R J T DATE

CHK'D DATE

DRILLING CONTRACTOR R & R International

DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski

DRILL RIG Kent DK-5 DRILLING METHOD Hollow Stem Auger

DATE STARTED 11-5-87 DATE COMPLETED 12-12-87

BOREHOLE COMPLETION DEPTH 34'

INITIAL HOLE DIA.

GROUND SURFACE EL.

FINISHED TOP EL.

MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE N°	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS /6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20										
21			4	20-22'	24"	21"	17-20-26-29	Brown Very Fine Sand, Some Silt, Trace Fine Gravel (Damp)	16 ppm OVA 4 ppm TIP	
22										
23								23'0"		
24										
25								Fractured Gneiss		
26										
27										
28								Competent Gneiss		
29										
30										
31										
32								End Boring @ 34'		
33								34'-28' Bentonite		
34								28'-10.5' Sand		
35								10.5'-9.5 Bentonite Balls		
36								9.5'-G.S. Grout		
37								26.5'-10.5' #6 Stainless Steel Screen		
38								10.5'-G.S. 2" I.D. PVC Riser		
39										
40										

REMARKS: Water at 21'

STATIC WATER LEVEL DATE

LEVEL DATE

LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wells
Shopping Arcade

PROJECT Nº 842-038
OWNER Shopping Arcade

WELL/BORING Nº MW-3-M
SHEET 1 OF 2
BY R J T. DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent Dk-5 DRILLING METHOD 4" Hollow Stem Auger
DATE STARTED 11-9-87 DATE COMPLETED 11-10-87

BOREHOLE COMPLETION DEPTH 21'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0								Brown Fine Sand And Silt, Little Cobbles		
1										
2										
3										
4										
5										
6			1	5-7'	15"	14"	20-20-50/3"		1	ppm OVA
7										
8								(Damp) 8'6"		
9										
10										
11			2	10-12'	24"	10"	5-11-14-12	Brown Clayey Silt, Some Fine Sand, Little Fine-Coarse Gravel	< 1	ppm OVA
12										
13								(Damp) 13'6"		
14										
15								Brown Fine Sand And Silt, Little Fine-Coarse Gravel		
16			3	15-17'	24"	10"	35-31-31-29		1	ppm OVA
17										
18								(Damp) 18'6"		
19										
20								Brown Fine-Medium Sand, Little Silt, Little Fine-Coarse Gravel (Moist-Wet)		

REMARKS: Water at 16'

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wells

Shopping Arcade

PROJECT N° 842-038

OWNER Shopping Arcade

WELL/BORING N° MW-3-M

SHEET 2 OF 2

BY R J T DATE

CHK'D DATE

DRILLING CONTRACTOR R & R International

DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski

DRILL RIG Kent DK-5 DRILLING METHOD 4" Hollow Stem Auger

DATE STARTED 11-9-87 DATE COMPLETED 11-10-87

BOREHOLE COMPLETION DEPTH 21'

INITIAL HOLE DIA.

GROUND SURFACE EL.

FINISHED TOP EL.

MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE N°	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20										
21			4	20-22'	22"	14"	19-22-50-50/4"	Brown Fine-Medium Sand, Little Silt, Little Fine-Coarse Gravel (Moist-Wet)	< 1	ppm OVA
22								Competent Gneiss		
23								End Boring @ 21'		
24								#6 Stainless Steel Screen 20'7"-9'7"		
25								PVC Riser 9'7"-(+)8"		
26								Sand 20'8"-6'6"		
27								Bentonite Balls 6'6"-3'6"		
28								Cement 3'6"-G.S.		
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										

REMARKS:

STATIC WATER LEVEL DATE

LEVEL DATE

LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-038
OWNER Dylman

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-4-S
SHEET 1 OF 2
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD 4" Hollow Stem Auger
DATE STARTED 11-11-87 DATE COMPLETED 11-24-87

BOREHOLE COMPLETION DEPTH 31'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0								Yellow-Brown Fine Sand Trace Silt		
1										
2										
3										
4										
5										
6			1	5-7'	24"	24"	10-17-25-30		< 1	ppm OVA
7								(Moist) 8'6"		
8										
9								Light Brown Clayey Silt Trace Very Fine Sand		
10										
11			2	10-12'	24"	24"	2-2-4-11		< 1	ppm OVA
12										
13								(Wet) 13'6"		
14										
15								Light Brown Fine-Medium Sand Trace Fine-Medium Gravel, Trace Silt		
16			3	15-17'	24"	24"	8-4-6-10		3	ppm OVA
17										
18								(Wet) 18'6"		
19										
20								Light Brown Fine-Coarse Sand Trace Fine-Medium Gravel, Trace Silt (Wet)		

REMARKS: Water at 5'

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wells

Shopping Arcade

PROJECT Nº 842-038

OWNER Dulman

WELL/BORING Nº MW-4-S

SHEET 2 OF 2

BY R J T DATE

CHK'D DATE

DRILLING CONTRACTOR R & R International

DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski

DRILL RIG Kent DK-5 DRILLING METHOD 4" Hollow Stem Auger

DATE STARTED 11-11-87 DATE COMPLETED 11-24-87

BOREHOLE COMPLETION DEPTH

INITIAL HOLE DIA.

GROUND SURFACE EL.

FINISHED TOP EL.

MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20								Light Brown Fine-Coarse Sand		
21			4	20-22'	24"	24"	5-6-8-10	Trace Fine-Medium Gravel, Trace Silt	1	ppm OVA
22										
23								(Wet) 23'6"		
24										
25								Light Brown Fine Sand		
26			5	25-27'	24"	10"	3-5-10-11	Little Silt	< 1	ppm OVA
27										
28								(Wet) 28'6"		
29										
30								Brown Fine Sand		
31			6	30-32'	24"	6"	7-9-50/3"	Little Silt (Boulders) (Wet)	< 1	ppm OVA
32								End Boring @ 31'		
33								Competent Gneiss		
34								22.0-5.0' #6 Stainless Steel Screen 22.0-3.5' Sand 3.5-2.0' Bentonite Balls 2.0-G.S. Cement 5.0-G.S. 2" PVC Riser		
35										
36										
37										
38										
39										
40										

REMARKS:

STATIC WATER LEVEL DATE

LEVEL DATE

LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT N° 842-038
OWNER Dulman

Bedford Village Wells
Shopping Arcade

WELL/BORING N° MW-4-D
SHEET 1 OF 3
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Dan Drusky ENGINEER/GEOLOGIST Tworkowski
DRILL RIG CME 75 DRILLING METHOD 2" Core
DATE STARTED 11-24-87 DATE COMPLETED 12-12-87

BOREHOLE COMPLETION DEPTH 73'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE N°	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
30								Brown Fine Sand, Little Silt		
31										
32										
33								(Wet) 33'0"		
34								Weathered Gneiss 34'0"		
35										
36										
37										
38										
39										
40								Gneiss		
41						FRACTURE		Black & White Banded, Hard, Very Slightly Weathered, Fine-Coarse Crystals, Broken, w/ Biotite, And K-Feldspar Crystals		
42			Core Run # 1	39-46'			Rec ft. 6'9" Rec % 96% RQD 35%			
43										
44										
45						FRACTURE				
46										
47			Core Run # 2	46-55'6"			Rec ft 10'0" Rec % 100% RQD 95%	Gneiss		
48								Black & White Banded, Hard, Fresh, Fine-Coarse Crystals, Massive, w/ Biotite		
49										
50										

REMARKS: 4" PVC Set @ 39'
0-30' See MW-4-S Log.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wells

Shopping Arcade

PROJECT Nº 842-038

OWNER Dulman

WELL / BORING Nº MW-4-D

SHEET 2 OF 3

BY R J T DATE

CHK'D DATE

DRILLING CONTRACTOR R & R International

DRILLER Dan Drusky ENGINEER/GEOLOGIST Tworkowski

DRILL RIG CME 75 DRILLING METHOD 2" Core

DATE STARTED 11-24-87 DATE COMPLETED 12-12-87

BOREHOLE COMPLETION DEPTH 73'

INITIAL HOLE DIA.

GROUND SURFACE EL.

FINISHED TOP EL.

MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA / HNU / HEADSPACE READING (ppm)	STRATUM DESCRIPTION
50			Core Run # 2	46'-56'			Rec (ft) Rec (%) RQD 10'0" 100% 95%			
51										
52										
53										
54										
55										
56										
57			Core Run # 3	56'- 66'			Rec (ft) Rec (%) RQD 9'10" 98% 97%	Gneiss Black & White Banded Hard, Fresh, Fine-Coarse Crystals, Massive w/ Biotite, Calcite		
58										
59										
60										
61										
62										
63										
64										
65										
66										
67			Core Run # 4	66'- 73'			Rec (ft) Rec (%) RQD 7'0" 100% 95%			
68										
69										
70										

REMARKS:

STATIC WATER LEVEL DATE

LEVEL DATE

LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-038
OWNER Dulman

Bedford Village Wells
Shopping Arcade

WELL / BORING Nº BW-4-D
SHEET 3 OF 3
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Rochford ENGINEER/GEOLOGIST Tworkowski
DRILL RIG CME-75 DRILLING METHOD 2" Core
DATE STARTED 11-24-87 DATE COMPLETED 12-12-87

BOREHOLE COMPLETION DEPTH 73'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA / HNU / HEADSPACE READING (ppm)	STRATUM DESCRIPTION
70			Core # 4	66'-73'			RQD Rec ft Rec% 95%	Gneiss		
71							7'0" 100%	Black & White Banded, Hard, Fresh, Fine-Coarse Crystals, Massive w/ Biotite, Calcite Crystals		
72										
73				Weathered Fracture				End Boring @ 73'		

REMARKS: Encounter Abundant Recharge at End of 4th Core Run.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT N° 842-038
OWNER Bedford Presbyter an

Bedford Village Wells
Shopping Arcade

WELL/BORING N° MW-5-S
SHEET 1 OF 2
BY R J T DATE 10-28-87
CHK'D _____ DATE _____

DRILLING CONTRACTOR RAR International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD Hollow Stem Auger
DATE STARTED 10-28-87 DATE COMPLETED 10-28-87

BOREHOLE COMPLETION DEPTH 23'
INITIAL HOLE DIA. _____
GROUND SURFACE EL. _____
FINISHED TOP EL. _____
MEASUREMENT POINT _____

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE N°	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS /6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0								Brown Clayey Silt With Roots		
1										
2										
3										
4										
5										
6			1	5-7	24"	8"	8-4-4-13		9 ppm OVA < 1 ppm TIP	
7								(Moist)		
8								8'6"		
9										
10										
11			2	10-12	24"	10"	3-8-10-11	Grey-Green Very Fine Sand Some Silt	35 ppm OVA < 1 ppm TIP	
12										
13								(Moist)		
14								13'6"		
15										
16			3	15-17'	24"	14"	5-7-9-9	Grey Clayey Silt	2 ppm OVA < 1 ppm TIP	
17										
18										
19										
20								(Wet)		

REMARKS: Water At 10'

STATIC WATER LEVEL _____ DATE _____
LEVEL _____ DATE _____
LEVEL _____ DATE _____

Dvirka and Bartlucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-038
OWNER Bedford Presbyterian
Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-5-S
SHEET 2 OF 2
BY RJT DATE 10-28-87
CHK'D ____ DATE ____

DRILLING CONTRACTOR R&R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD Hollow Stem Auger
DATE STARTED 10-28-87 DATE COMPLETED 10-28-87

BOREHOLE COMPLETION DEPTH 23'
INITIAL HOLE DIA. ____
GROUND SURFACE EL. ____
FINISHED TOP EL. ____
MEASUREMENT POINT ____

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS /6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20										
21			4	20-22'	24"	16"	3-8-7-10	Grey Clayey Silt	≤1 ppm OVA < 1 ppm TIP	
22								(WET)		
23								End Boring @ 23'		
24										
25										
26										
27										
28										
29										
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										

Sand 22'-3.5'
Bentonite Balls 3.5'-2.0'
Cement 2.0'-G.S.
2" Stainless Steel Screen 22'-5' #6 Slot
2" PVC Riser 5'-(+)2'

REMARKS:

STATIC WATER LEVEL ____ DATE ____
LEVEL ____ DATE ____
LEVEL ____ DATE ____

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wells
Shopping Arcade

PROJECT N° 842-038
OWNER Presbyterian Church

WELL/BORING N° MW-5-D
SHEET 1 OF 5
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jacoby ENGINEER/GEOLOGIST Tworkowski
DRILL RIG CME-750 DRILLING METHOD 4" Hollow Stem Auger
DATE STARTED 12-3-87 DATE COMPLETED 12-9-87

BOREHOLE COMPLETION DEPTH 116'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE N°	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20										
21				20-22'	24"	16"	3-8-7-10	Grey Clayey Silt	< 1 < 1	ppm OVA ppm TIP
22										
23										
24										
25										
26										
27								(Wet) 27'6"		
28										
29										
30										
31										
32								Brown Fine Sand, Little Silt, Little Fine-Medium Gravel		
33										
34			1	33-35'	24"	6"	11-17-16-12		< 1	ppm OVA
35										
36										
37										
38								(Moist-Wet) 37'6"		
39								Grey-Brown Very Fine Sand, Some Silt, Little Fine-Coarse Gravel		
40								(Moist-Wet)		

REMARKS: For Log 0-20' See MW-5-S.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wells

Shopping Arcade

PROJECT N° B42-038

OWNER Presbyterian Church

WELL / BORING N° MW-5-D

SHEET 2 OF 5

BY R J T DATE

CHK'D DATE

DRILLING CONTRACTOR R & R International

DRILLER Jacoby ENGINEER/GEOLOGIST Tworkowski

DRILL RIG CME-750 DRILLING METHOD 4" Hollow Stem Auger

DATE STARTED 12-3-87 DATE COMPLETED 12-9-87

BOREHOLE COMPLETION DEPTH 116'

INITIAL HOLE DIA.

GROUND SURFACE EL.

FINISHED TOP EL.

MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE N°	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS /6"	SAMPLE DESCRIPTION	OVA / HNU / HEADSPACE READING (ppm)	STRATUM DESCRIPTION
40										
41			2	40-42'	17"	12"	31-42-50/5"	Grey Brown Very Fine Sand, Some Silt, Little Fine-Coarse Gravel	< 1	ppm OVA
42										
43								(Moist-Wet) 43'6"		
44										
45								Grey Very Fine Sand, Little Silt, Trace Fine-Medium Gravel		
46			3	45-47'	11"	8"	18-50/5"		< 1	ppm OVA
47										
48								(Moist-Wet) 48'6"		
49										
50										
51			4	50-52'	9"	7"	17-50/3"	Grey Fine-Coarse Sand, Trace Silt		
52										
53								(Moist-Wet) 53'6"		
54										
55										
56			5	55-57'	11"	9"	18-50/5"	Grey Fine Sand, Trace Silt		
57										
58										
59										
60								(Moist-Wet)		

REMARKS:

STATIC WATER LEVEL DATE

LEVEL DATE

LEVEL DATE

Dvirka and Bartlucci CONSULTING ENGINEERS

PROJECT

PROJECT N° 842-038
OWNER Dulman

Bedford Village Wells
Shopping Arcade

WELL / BORING N° MW-5-D
SHEET 3 OF 5
BY J. Day DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Rick Jacoby ENGINEER/GEOLOGIST J. Day
DRILL RIG CME 750 DRILLING METHOD 4" Hollow Stem Auger
DATE STARTED 12-3-87 DATE COMPLETED 12-9-87

BOREHOLE COMPLETION DEPTH 116'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE N°	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA / HNU / HEADSPACE READING (ppm)	STRATUM DESCRIPTION
60								Grey Fine Sand, Trace Silt		
61								(Moist-Wet) 61'0"		
62										
63										
64										
65										
66			6	65-67'	21"	18"	21-28-45-50/3"	Yellow -Brown Saprolite	< 1 ppm OVA	
67										
68										
69										
70										
71								71'0"		
72										
73								Fractured Gneiss		
74										
75										
76			7	75-77'		15"	26-19-50/3"	76'0"	< 1 ppm OVA	
77								Competent Gneiss		
78										
79										
80										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-038
OWNER Dulman

Bedford Village Wells
Shopping Arcade

WELL / BORING Nº MW-5-D
SHEET 4 OF 5
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD 2" Core
DATE STARTED 12-3-87 DATE COMPLETED 12-9-87

BOREHOLE COMPLETION DEPTH 116'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA / HNU / HEADSPACE READING (ppm)	STRATUM DESCRIPTION
80								Competent Gneiss		
81										
82										
83										
84										
85										
86								86'0"		
87		Weathered Fracture	Core Run # 1	Weathered						
88				Fracture						
89										
90										
91				86' - 96'						
92				Very Severe Weathered				Gneiss White & Black Banded, Hard, Fine-Coarse Grained, Slightly Weathered, Massive Carbonaceous, w/Chloride		
93										
94										
95										
96										
97			Core Run # 2	96' - 101' Completely Weathered						
98										
99										
100				Completely Weathered						

REMARKS: Set 4" PVC at 83'0".

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci Consulting Engineers

PROJECT

PROJECT N° 842-038
OWNER Dulman

Bedford Village Wells
Shopping Arcade

WELL / BORING N° MW-5-D
SHEET 5 OF 5
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD 2" Core
DATE STARTED 12-3-87 DATE COMPLETED 12-9-87

BOREHOLE COMPLETION DEPTH 116'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE N°	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA / HNU / HEADSPACE READING (ppm)	STRATUM DESCRIPTION
99										
100			Run # 2	96'- 101'	Completely Weathered			Gneiss White & Black Banded, Hard, Fine-Coarse Grained, Slightly Weathered, Massive Carbonaceous w/ Chlorite. 100'6"		
101										
102										
103								Marble White, Hard, Fine-Medium Grained, Fresh, Massive w/ Chlorite		
104										
105			Run # 3	101'- 106'						
106										
107										
108										
109			Weathered Fracture							
110			Weathered Fracture							
111			Moderate Severe Weathered							
112								Marble White, Hard, Coarse Grained, Slightly Weathered, Slightly Broken, w/ Phlogopite		
113										
114			Run # 4	106'- 116'						
115			Weathered Fracture							
116								End Boring @ 116'		
117										
118										
119										
120										

REMARKS: Abundant Recharge Encountered in 4th Run.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Phillips

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-6-M
SHEET 1 OF 2
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 4½" Hollow Stem Auger
DATE STARTED 4-26-88 DATE COMPLETED 4-26-88

BOREHOLE COMPLETION DEPTH 37'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS /6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0								Grey-Brown Silt, Trace Clay		
1										
2										
3										
4										
5										
6										
7										
8								(Damp) 8'6"		
9								Brown Clayey Silt, Brown Fine Sand (2" Lenses)		
10										
11										
12										
13										
14										
15										
16										
17										
18								(Wet) 18'6"		
19										
20										

REMARKS:

Water at 19 feet.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wells
Shopping Arcade

PROJECT Nº B42-038
OWNER Phillips

WELL/BORING Nº MW-6-M
SHEET 2 OF 2
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 4¼" Hollow Stem Auger
DATE STARTED 4-26-88 DATE COMPLETED 4-26-88

BOREHOLE COMPLETION DEPTH 37'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20–30								Brown Fine Sand, Little Clayey Silt (2" Lenses)		
								(Wet) 23'6"		
								Brown Fine Sand, Trace Silt		
31			1	30-32'	24"	24"	11-9-6-7		2.5	ppm OVA
32–35								(Wet) 33'6"		
								Grey Silty Clay, Some Angular Rock Fragments (1") (Very Weathered Gneiss)		
36			2	35-37'	24"	18"	4-3-5-7		10	ppm OVA
37–40								End of Boring @ 37'		

2" I.D. Stainless Steel Screen (.006 Slot) 34'-23'

2" I.D. PVC Schedule 40 Riser 23'-(+)2'

Sand 34'-20'6"

Bentonite Balls 20'6"-16'

Grout 16'-G.S.

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Phillips

Beford Village Wells
Shopping Arcade

WELL/BORING Nº MW-6-B
SHEET 1 OF 5
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 6¼" Hollow Stem Auger
DATE STARTED 4-24-88 DATE COMPLETED 5-3-88

BOREHOLE COMPLETION DEPTH 87.3'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0								GREY-BROWN SILT, Trace Clay		
1										
2										
3										
4										
5										
6			1	5-7'	24"	20"	10-14-11-12		< 1	ppm OVA
7										
8										
9								(Damp) 8'6"		
10								BROWN-CLAYEY SILT, w/ Lenses of Brown Fine Sand		
11			2	10-12'	24"	24"	5-6-7-9		2	ppm OVA
12										
13										
14										
15										
16			3	15-17'	24"	24"	5-5-6-15		< 1	ppm OVA
17										
18										
19								(Wet) 18'6"		
20										

REMARKS: WATER AT 19'.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wellls
Shopping Arcade

PROJECT Nº 842-03B
OWNER Phillips

WELL/BORING Nº MW-6-B
SHEET 2 OF 5
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 6¼" Hollow Stem Auger
DATE STARTED 4-24-88 DATE COMPLETED 5-3-88

BOREHOLE COMPLETION DEPTH 87.3'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA / HNU / HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20								BROWN FINE SAND, Little Clayey Silt (2" Lenses)		
21			4	20-22'	24"		6-6-9-10		< 1	ppm OVA
22										
23										
24								(Wet) 23'6"		
25								BROWN FINE SAND, Trace Silt		
26			5	25-27'	24"	14"	3-5-7-6		10-15	ppm OVA
27										
28										
29										
30										
31			6	30-32'	24"	24"	5-5-7-8		8	ppm OVA
32										
33										
34								(Wet) 33'6"		
35								GREY SILTY CLAY, Some Angular Rock Fragments (1") (Very Weathered Gneiss)		
36			7	35-37'	24"	20"	4-3-5-7		< 1	ppm OVA
37										
38										
39								(Wet) 38'6"		
40								BROWN CLAYEY SILT, Some Angular Rock Fragments (Very Weathered Gneiss)		

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Phillips

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-6-B
SHEET 3 OF 5
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 6¼" Hollow Stem Auger
DATE STARTED 4-24-88 DATE COMPLETED 5-3-88

BOREHOLE COMPLETION DEPTH 87.3'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
40								BROWN CLAYEY SILT, Some Angular Rock Fragments (Very Weathered Gneiss)		
41			8	40-42'	24"	24"	54-39-35-27		< 1	ppm OVA
42										
43										
44								(Wet) 43'6"		
45								WEATHERED GNEISS		
46			9	45-47'	10"	10"	35-75/4"		< 1	ppm OVA
47										
48										
49										
50										
51			10	50-52'	24"		75/.15"		< 1	ppm OVA
52								(Wet) 51'6"		
53								GNEISS		
54								Banded (Black and White) Hard, Fine-Coarse Grained, Moderately Severe Weathering, Garnet as Trace Mineral, Boudinage Present		
55										
56										
57										
58			CORE RUN #1	57-61'			REC(ft) 3'5" REC(%) 85% RQD 54%		Water	Bearing Fracture
59									Water	Bearing Fracture
60										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-038
OWNER Phillips

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-6-B
SHEET 4 OF 5
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 2" Core
DATE STARTED 4-24-88 DATE COMPLETED 5-3-88

BOREHOLE COMPLETION DEPTH 87.3'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
60			CORE RUN #1	57-61'		REC(ft) 3'5" REC(%) 85% RQD 54%		GNEISS Banded (Black and White) Hard, Fine-Coarse Grained, Moderately Severe Weathering, Garnet As A Trace Mineral, Boudinage Present	Water	Bearing
61										
62										Fractures
63										
64										
65			CORE RUN #2	61-70'		REC(ft) 8'2" REC(%) 91% RQD 59%				Fracture
66										Fracture
67										Fracture
68										
69										
70										
71										Fracture
72			CORE RUN #3	70-77'		REC(ft) 6'3" REC(%) 89% RQD 88%				
73										
74										Fracture
75										
76										
77										
78			CORE RUN #4	77-84.5'		REC(ft) 6'0" REC(%) 80% RQD 71%				Fracture
79										
80										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Phillips
Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-6-B
SHEET 5 OF 5
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 2" Core
DATE STARTED 4-24-88 DATE COMPLETED 5-3-88

BOREHOLE COMPLETION DEPTH 87.3'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm.)	STRATUM DESCRIPTION
80			CORE RUN #4	77-84.5'			RQD 71%	GNEISS		
81							REC(%) 80%	Banded (Black and White), Hard, Fine-Coarse Grained, Moderately Severe Weathering, Garnet As A Trace Mineral, Boudinage Present		Water Bearing
82										Fractures
83							REC(ft) 6'0"			Fracture
84										
85			CORE RUN #5	84.5-87.3'			RQD 65%			Water Bearing
86										Fractures
87							REC(%) 100%	END OF BORING AT 87.3'		
88							REC(ft) 2'8"			
89										
90										
91										
92										
93										
94										
95										
96										
97										
98										
99										
100										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Henry

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-7-B
SHEET 1 OF 6
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Dave O'Neill ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD 6" Hollow Stem Auger
DATE STARTED 8-23-88 DATE COMPLETED 8-29-88

BOREHOLE COMPLETION DEPTH 105'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0								LIGHT BROWN SILT		
1								Trace Fine Sand		
2										
3										
4										
5			1	3.5-5.5'	20"	20"	4-7-13.50/2"	(Damp) 5'0"		
6										
7										
8										
9								DARK GREY GNEISS		
10								Fresh, Massive, Very Hard, Fine-Coarse Grained w/ Some Biotite.		
11							RQD 58%			
12										
13			Core Run #1	8.5'-18.5'						
14							Rec(%) 75%			
15										
16										
17										
18							Rec(ft.) 7'6"			
19			Core Run #2					(Damp) 19'10"		
20								PINKISH WHITE QUARTZ FELDSPAR VEIN		

REMARKS: 4" PVC set at 8.5'.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wells
Shopping Arcade

PROJECT Nº 842-038
OWNER Henry

WELL/BORING Nº MW-7-B
SHEET 2 OF 6
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Dave O'Neill ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD 2" NX Core
DATE STARTED 8-23-88 DATE COMPLETED 8-29-88

BOREHOLE COMPLETION DEPTH 105'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20							RQD 80%	PINKISH WHITE QUARTZ FELDSPAR VEIN, Fresh, Massive, Fine-Coarse Grained, Very Hard		
21								21'8"		
22								DARK GREY GNEISS		
23								22'10" MODERATELY WEATHERED DARK GREY GNEISS 23'4"		
24			Core Run # 2	18.5'-28.5'			Rec(%) 100%			
25										
26										
27										
28							Rec(ft.) 10'0"			
29							RQD 67%	DARK GREY GNEISS Fresh, Massive, Very Hard, Fine-Coarse Grained, w/ Some Biotite.		VERTICAL JOINTING MODERATELY WEATHERED
30										
31										
32										
33			Core Run # 3	28.5'-38.5'			Rec(%) 100%			
34										
35										
36										
37										
38							Rec(ft.) 10'0"			
39			#4							Weathered Fracture
40										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-01B
OWNER Henry

Bedfrod Village Wells
Shopping Arcade

WELL/BORING Nº MW-7-R
SHEET 3 OF 6
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Dave O'Neill ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD 2" NX Core
DATE STARTED 8-23-88 DATE COMPLETED 8-29-88

BOREHOLE COMPLETION DEPTH 105'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
40							RQD 88%			
41										Weathered Fracture
42										
43										
44			Core Run #4	38.5'-48.5'			Rec(%) 95%			
45										
46										Vertical Jointing
47								DARK GREY GNEISS Fresh, Massive, Very Hard, Fine-Coarse Grained w/ Some Biotite And Large (2-5 cm) K-Feldspar Crystals		
48							Rec(ft.) 9'6"			
49										
50							RQD 91%			
51										
52										
53										
54			Core Run #5	48.5'-58.5'			Rec(%) 98%			
55										
56										
57										
58							Rec(ft.) 9'9"			
59										
60			#6							

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Henry
Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-7-B
SHEET 4 OF 6
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Dave O'Neill ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent Dk-5 DRILLING METHOD 2" NX Core .
DATE STARTED 8-23-88 DATE COMPLETED 8-29-88

BOREHOLE COMPLETION DEPTH 105'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
60			Core Run #6	58.5'-64.5'			ROD 78%			
61										
62							Rec(%) 96%			
63										
64							Rec(ft.) 5'9"			
65										
66				ROLLER			NO			
67				BIT			SAMPLE			
68								DARK GREY GNEISS		
69								Fresh, Massive, Very Hard, Fine-Coarse Grained w/ Some Biotite		Weathered
70										
71							ROD 99%			
72										
73			Core Run #7	68'0"-78'0"						Weathered Fracture
74							Rec(%) 100%			
75										
76										
77							Rec(ft.) 10'0"			
78										
79			#8							
80										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Henry
Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-7-B
SHEET 5 OF 6
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & B International
DRILLER Dave O'Neill ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD 2" NX Core
DATE STARTED 8-23-88 DATE COMPLETED 8-29-88

BOREHOLE COMPLETION DEPTH 105'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS /6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
80							RQD 96%			
81										
82										
83			Core Run # 8	78'0"-88'0"						
84							Rec(%) 100%			
85										
86										
87							Rec(ft.) 10'0"			Weathered Jointing
88								DARK GREY GNEISS Fresh, Massive, Very Hard, Fine-Coarse Grained w/ Some Biotite		
89										Fracture
90							RQD 98%			
91										
92										
93			Core Run # 9	88'0"-98'0"						
94							Rec(%) 99%			
95										
96										
97							Rec(ft.) 9'11"			
98										
99			#10							
100										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Henry
Bedford Village Wells
Shopping Arcade

WELL / BORING Nº MW-7-B
SHEET 6 OF 6
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Dave O'Neill ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD 2" NX Core
DATE STARTED 8-23-88 DATE COMPLETED 8-29-88

BOREHOLE COMPLETION DEPTH 105'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA / HNU / HEADSPACE READING (ppm)	STRATUM DESCRIPTION
100			Core Run # 10	98'-105'			RQD 98%	DARK GREY GNEISS		
101								Fresh, Massive, Very Hard, Fine-Coarse Grained, w/ Some Biotite		
102							Rec(%) 100%			Fracture
103										
104										Fracture
105							Rec(ft.) 7'0"	END BORING @ 105'		
106										
107										
108										
109										
110										
111										
112										
113										
114										
115										
116										
117										
118										
119										
120										

REMARKS: Well Recharges 5" In 24 Minutes, About 12" per Hour.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-038
OWNER Dulman

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-8-11
SHEET 1 OF 2
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 6¼" Hollow Stem Auger
DATE STARTED 4-23-88 DATE COMPLETED 4-23-88

BOREHOLE COMPLETION DEPTH 25'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS / 6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0										
1										
2										
3								Brown Fine Sand, Little Silt		
4										
5										
6										
7										
8										
9										
10										
11										
12										
13								(Wet) 13'6"		
14								Brown Fine-Coarse Sand, Trace Silt		
15										
16										
17										
18										
19								(Wet) 18'6"		
20								Brown Fine Sand, Trace Silt (Wet)		

REMARKS:
Water at 4'
Stratigraphic Log Taken From MW-8-B.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Dulman

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-8-I
SHEET 2 OF 2
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 6¼" Hollow Stem Auger
DATE STARTED 4-23-88 DATE COMPLETED 4-23-88

BOREHOLE COMPLETION DEPTH 25'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20								Brown Fine Sand, Trace Silt		
21										
22										
23										
24								Weathered Gneiss		
25								(Wet) 25'0		
26								End Boring @ 25'		
27										
28										
29								2" I.D. Stainless Steel Screen .010 Slot 25-14'		
30								2" I.D. PVC Schedule 40 Riser 14-(+)2'		
31								Sand 25'-11'		
32								Bentonite Balls 11'-7½'		
33								Grout 7½'-G.S.		
34										
35										
36										
37										
38										
39										
40										

REMARKS:
Stratigraphic Log Taken From MW-8-B.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Dulman

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-8-B
SHEET 1 OF 3
BY R J T DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Tworkowski
DRILL RIG Kent DK-5 DRILLING METHOD 6¼" Hollow Stem Auger
DATE STARTED 4-21-88 DATE COMPLETED 4-22-88

BOREHOLE COMPLETION DEPTH 60'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0										
1										
2										
3										
4										
5								Brown Fine Sand, Little Silt		
6			1	5-7'	24"	24"	5-10-12-13		25	ppm OVA
7										
8										
9										
10										
11			2	10-12'	24"	24"	4-4-4-4		2	ppm OVA
12										
13								(Wet) 13'6"		
14										
15										
16			3	15-17'	24"	24"	1-2-1-3	Brown Fine-Coarse Sand, Trace Silt	< 1	ppm OVA
17										
18								(Wet) 18'6"		
19								Brown Fine Sand, Trace Silt		
20								(Wet)		

REMARKS: Water at 4'.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Dulman

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº IN-8-B
SHEET 2 OF 3
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 6¼" Hollow Stem Auger
DATE STARTED 4-21-88 DATE COMPLETED 4-22-88

BOREHOLE COMPLETION DEPTH 60'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS /6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20										
21			4	20-22'	24"	24"		Brown Fine Sand, Trace Silt	2	ppm OVA
22										
23								(Wet) 23'0"		
24								Weathered Gneiss		
25								24'6"		
26			5	25-27'	24"	.05'	100/.05'	Gneiss	<1	ppm OVA
27										
28										
29										
30								30'		
31										
32										
33								RQD 100%		
34										
35			RUN # 1					Grey, Very Hard Gneiss, Massive, Fresh, Fine-Coarse Grained w/ Biotite and Large (2-3cm) K-Feldspar Crystals	Water Bearing	
36				30-40'						Fracture
37								Rec(%) 100%		
38										
39								Rec.(ft) 10'0"		
40										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Dulman

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-8-B
SHEET 3 OF 3
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 6¼" Hollow Stem Auger
DATE STARTED 4-21-88 DATE COMPLETED 4-22-88

BOREHOLE COMPLETION DEPTH 60'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS /6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
40										
41										
42										
43										
44										
45										
46										
47										
48			RUN # 2	40-50'			Rec.(ft) 10'0" Rec.(%) 100% RQD 99%	Grey, Very Hard Gneiss, Massive, Fresh, Fine-Coarse Grained w/ Biotite and Large (2-3cm) K-Fieldspar		Fracture
49										Fracture
50										Water Bearing
51										Fracture
52										
53										Water Bearing Fracture
54										
55										
56			RUN # 3	50-60'			Rec.(ft) 10'0" Rec.(%) 100% RQD 97%			
57										
58										
59										
60								End Boring @ 60'		

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

Bedford Village Wells

Shopping Arcade

PROJECT Nº 842-03B

OWNER Bedford Schools

WELL/BORING Nº MW-10-M

SHEET 1 OF 5

BY W.R.D. DATE

CHK'D DATE

DRILLING CONTRACTOR R & R International

DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch

DRILL RIG Kent DK-5 DRILLING METHOD 4¼" Hollow Stem Auger

DATE STARTED 5-25-88 DATE COMPLETED 5-26-88

BOREHOLE COMPLETION DEPTH 85.5'

INITIAL HOLE DIA.

GROUND SURFACE EL.

FINISHED TOP EL.

MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0								BROWN-GREY CLAYEY SILT		
1										
2										
3										
4										
5										
6			1	5-7'	24"	24"	7-8-8-9		0	ppm OVA
7										
8										
9								(Wet) 8'6"		
10										
11			2	10-12'	24"	24"	5-9-9-11		0	ppm OVA
12								GREY CLAYEY SILT		
13										
14										
15										
16			3	15-17'	24"	24"	11-7-8-8		0	ppm OVA
17										
18										
19										
20								(Wet)		

REMARKS:

STATIC WATER LEVEL DATE

LEVEL DATE

LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Bedford Schools

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-10-M
SHEET 2 OF 5
BY W.R.D. DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 4¼" Hollow Stem Auger
DATE STARTED 5-25-88 DATE COMPLETED 5-26-88

BOREHOLE COMPLETION DEPTH 85.5'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20								GREY CLAYEY SILT		
21			4	20-22'	24"	24"	6-5-7-7		0	ppm OVA
22										
23								(Wet) 23'6"		
24										
25								GREY SILTY CLAY		
26			5	25-27'	24"	24"	4-6-5-10		0	ppm OVA
27										
28								(Wet) 28'6"		
29										
30								GREY CLAYEY SILT		
31			6	30-32'	24"	24"	2-3-5-6		0	ppm OVA
32										
33								(Wet) 33'6"		
34								BROWN-GREY FINE-MEDIUM SAND, Little Silt		
35										
36			7	35-37'	24"	24"	wt/24		0	ppm OVA
37										
38								(Wet) 38'6"		
39								BROWN-GREY FINE SAND, Trace Silt		
40								(wet)		

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Bedford Schools
Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-10-M
SHEET 3 OF 5
BY W.R.D. DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 4¼" Hollow Stem Auger
DATE STARTED 5-25-88 DATE COMPLETED 5-26-88

BOREHOLE COMPLETION DEPTH 85.5'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
40										
41			8	40-42'	24"	8"	wt-wt-3-5	BROWN-GREY FINE SAND, Trace Silt	0	ppm OVA
42										
43								(Wet) 43'6"		
44								BROWN FINE-MEDIUM SAND, Trace Silt		
45										
46			9	45-47'	24"	24"	3-4-7-11		0	ppm OVA
47										
48								(Wet) 48'6"		
49								BROWN FINE SAND, Trace Silt		
50										
51			10	50-52'	24"	24"	6-11-12-15		0	ppm OVA
52										
53								(Wet) 53'6"		
54								GREY FINE SAND, Trace Silt Trace Rock Fragments		
55										
56			11	55-57'	24"	20"	17-35-34-54		0	ppm OVA
57										
58								(Wet) 58'6"		
59								GREY SILT, Little Clay Trace Rock Fragments		
60								(Wet)		

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Bedford Schools

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-10-M
SHEET 4 OF 5
BY W.R.D. DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 4¼" Hollow Stem Auger
DATE STARTED 5-25-88 DATE COMPLETED 5-26-88

BOREHOLE COMPLETION DEPTH 85.5'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
60								GREY SILT, Little Clay Trace Rock Fragments		
61			12	60-62'	24"	24"	45-43-75/5"		0	ppm OVA
62										
63								(Wet) 63'6"		
64								GREY SILT, Little Rock Fragments Little Very Fine Sand		
65										
66			13	65-67'	8'6"	8'6"	75-75/2.6"		1	ppm TIP
67										
68								(Wet) 68'6"		
69								GREY FINE SAND, Little Silt Trace Rock Fragments		
70										
71			14	70-72'	6"	6"	100/0.4"		1	ppm TIP
72										
73								(Wet) 73'6"		
74								BROWN FINE-COARSE SAND, Little Silt Little Rock Fragments		
75										
76			15	75-77'	24"	18"	75/75/0.2"		1	ppm TIP
77										
78										
79										
80										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Bedford Schools

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-10M
SHEET 5 OF 5
BY W.R.D. DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG Kent DK-5 DRILLING METHOD 4¼" Hollow Stem Auger
DATE STARTED 5-25-88 DATE COMPLETED 5-26-88

BOREHOLE COMPLETION DEPTH 85.5'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS /6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
80								BROWN FINE-COARSE SAND, Little Silt Little Rock Fragments		
81			16	80-82'	0.2"	0.2"	100/0.2"	WEATHERED ROCK	< 1	ppm TIP
82										
83										
84										
85			17	83.5-85.5'	0"	0"	100/0"			
86								End Boring @ 85.5'		
87								#6 Stainless Steel Screen 80-69'		
88								Sand 80-67'		
89								Bentonite Balls 67-64.5'		
90								Cement Grout 64.5'-G.S.		
91								PVC Riser 80-(+)2'		
92										
93										
94										
95										
96										
97										
98										
99										
100										

REMARKS:

WATER AT 2'.

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Shopping Arcade

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-11
SHEET 1 OF 2
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG CME-750 DRILLING METHOD 4¼" Hollow Stem Auger
DATE STARTED 7-12-88 DATE COMPLETED 7-13-88

BOREHOLE COMPLETION DEPTH 32'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
0								BROWN-GREY FINE-COARSE GRAVEL AND CLAYEY SILT		
1			1	0-2'	6.2"	6"	38-50/0.2"		1	ppm OVA
2										
3			2	2-4'	24"	18"	35-36-26-48		<1	ppm OVA
4								(Damp) 4'0"		
5			3	4-6'	12.3"	4"	11-48-50/0.3'	BROWN FINE-COARSE SAND AND CLAYEY SILT, Trace Gravel	<1	ppm OVA
6										
7			4	6-8'	12.4"	12"	25-32-54/0.4'		<1	ppm OVA
8										
9			5	8-10'	24"	24"	22-41-49-53		0	ppm OVA
10										
11			6	10-12'	10"	10"	40-50/4"		<1	ppm OVA
12								(Damp) 12'0"		
13			7	12-14'	24"	20"	21-32-40-44	BROWN CLAYEY SILT AND WEATHERED ROCK Some Muscovite and Biotite	0	ppm OVA
14										
15			8	14-16'	18.4"	12"	25-25-37-50/0.4"		0	ppm OVA
16										
17			9	16-18'	18.2"	15"	17-40-63-15/0.2"		0	ppm OVA
18										
19			10	18-20"	7"	4"	70-50/1"		<1	ppm OVA
20								(Damp) 20'0"		

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

Dvirka and Bartilucci CONSULTING ENGINEERS

PROJECT

PROJECT Nº 842-03B
OWNER Shopping Arcade

Bedford Village Wells
Shopping Arcade

WELL/BORING Nº MW-11
SHEET 2 OF 2
BY W R D DATE
CHK'D DATE

DRILLING CONTRACTOR R & R International
DRILLER Jim Bucksar ENGINEER/GEOLOGIST Dorsch
DRILL RIG CME-750 DRILLING METHOD 4¼" Hollow Stem Auger
DATE STARTED 7-12-88 DATE COMPLETED 7-13-88

BOREHOLE COMPLETION DEPTH 32'
INITIAL HOLE DIA.
GROUND SURFACE EL.
FINISHED TOP EL.
MEASUREMENT POINT

DEPTH (ft.)	SAMPLES	ABSOLUTE ELEVATION (msl)	SAMPLE Nº	SAMPLING INTERVAL (ft.)	PENETRATION (in.)	RECOVERY (in.)	BLOWS/6"	SAMPLE DESCRIPTION	OVA/HNU/ HEADSPACE READING (ppm)	STRATUM DESCRIPTION
20								BROWN CLAYEY SILT AND WEATHERED ROCK		
21			11	20-22'	2"	2"	100/2"		0	ppm OVA
22								(Damp) 22'0"		
23			12	22-24'	2"	2"	120/2"	BROWN FINE-MEDIUM SAND AND SILT	< 1	ppm OVA
24										
25			13	24-26'	0.3"	0.3"	120/0.3"		< 1	ppm OVA
26										
27			14	26-28'	4"	4"	120/4"		< 1	ppm OVA
28								(Damp) 28'0"		
29			15	28-30'	2"	2"	109/2"	GREY FINE-COARSE SAND AND SILT, Little Fine-Medium Gravel	< 1	ppm OVA
30								(Wet) 30'0"		
31			16	30-32'	1"	1"	100/1"	WEATHERED GNEISS	1	ppm OVA
32								END OF BORING @ 32'		
33										
34										
35										
36										
37										
38										
39										
40										

REMARKS:

STATIC WATER LEVEL DATE
LEVEL DATE
LEVEL DATE

APPENDIX E

SOIL GAS SURVEY

Soil Gas Survey

Final Report
Bedford Village Sites

August 1988

Prepared for:

James Clyne
New York State
Department of Environmental Conservation
Albany, New York

Prepared by:

Alan Humphrey, Environmental Scientist
U.S. Environmental Protection Agency
Environmental Response Branch
Edison, New Jersey

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1.0 INTRODUCTION

1.1 Background

The two Bedford Village groundwater contamination sites are located in central Westchester County approximately 40 miles north of New York City. Groundwater contamination by PCE and TCE has been documented at both the Hunting Ridge Mall site and the Shopping Arcade site through residential and monitoring well testing. The New York State Department of Environmental Conservation (NY DEC) is presently investigating the groundwater contamination at these sites.

1.2 Objective

The United States Environmental Protection Agency, Environmental Response Team (EPA/ERT) was contacted to conduct a soil gas survey at the two sites. The surveys were performed in order to determine the extent and migration of the contaminant plume, and to aid in placement of additional monitoring wells proposed by NY DEC.

2.0 METHODOLOGY

2.1 Soil Gas Sampling

The equipment and techniques applied to the task were consistent with standard ERT soil vapor survey techniques. A solid spring steel probe (5 feet long, 3/8 inch diameter) was used to create an open hole to a depth of four to five feet. A stainless steel tube (5 feet long, 1/4 inch diameter) with Teflon tubing attached was inserted into the open borehole. Modeling clay was packed around the tube at the surface to prevent entry of ambient air and a thin wire was used to clear the tube of any soil particles lodged in the bottom of the tube. Tygon tubing was attached to the tip of the tube and the hole was evacuated with a Gilian air pump for approximately 15 seconds to remove three volumes of air from the hole. Then the probe of an HNU Photoionization Organic Vapor Instrument was connected to the probe with Teflon tubing and a reading was recorded after 45-60 seconds.

2.2 Detection

The HNU was utilized to measure organic soil vapors four to five feet below the surface. The measurement of organic vapors by this method does not yield an actual concentration but it does provide a relative measure of volatile organic vapors when compared to background or readings from other boreholes. The HNU was calibrated with isobutylene; consequently, all readings should be considered total organics as isobutylene.

The HNU detection method is generally utilized as a quick and inexpensive screening tool. However, due to the relatively low concentrations of organic vapors present in the samples at the Bedford Village site, the usefulness of this method in delineating the contaminant plume was limited. Therefore, air samples were collected at each station for further analysis.

One liter Tedlar air sampling bags were placed inside a vacuum desiccator and connected to the stainless steel probe via the Teflon tubing. A Gilian air pump evacuated the desiccator, filling the Tedlar sampling bag with 500-600 ml of soil vapors drawn from a 4-5 foot depth. The Tedlar air sampling bags were analyzed by a Photovac Gas Chromatograph at a nearby location for specific volatile organic compounds. To further define a broader range of compounds and confirm those compounds identified by the Photovac, selected bags were used for sorption onto Tenex tubes. These tubes were then desorbed and analyzed for specific ions using GC/MS at the REAC lab facilities in Edison, New Jersey.

Tedlar bag samples were analyzed immediately by a Photovac GC equipped with a 10.2 eV photoionization detector. There were eleven standards utilized consisting of common aromatic and chlorinated volatile organic compounds including PCE, TCE, benzene, and toluene. Compounds with retention times that match components of the standard are tentatively identified and quantitated against the response area for these components. Unknown compounds are quantitated by using the area response of toluene. The method detection limit for PCE utilizing these procedures was 10 parts per billion (ppb).

2.3 Hunting Ridge Mall Site

2.3.1 Hunting Ridge Mall Site

The probable source of the contamination is suspected to be a dry cleaning operation located in the Hunting Ridge Mall (see Figure 1). It was decided by ERT and the OSC to sample the storm drains in the Mall parking lot, adjacent to the monitoring wells, and on the islands in the parking lot. The wooded area across Rt. 22 which is hydraulically downgradient would also be sampled extensively. Sample stations would be located at 100 foot intervals, though some samples would be taken at 75 foot intervals along Lake and Vinton Avenues, and at larger intervals along Turtle Pond Rd.

Samples 001 through 005 were collected in the Mall parking lot; 006 through 019 were located along the east side of Rt. 22; 020 through 026 along Vinten Ave.; and 027 through 029 were located near MW-6. Sample locations 030 through 034 were located along a line extending from MW-9 to MW-11; and 035 through 039 on a line from MW-5 to

MW-6. Samples 040 and 041 were taken on a line from the end of Turtle Pond Rd to the end of Lake Ave., while 042 to 048 were located along the north side of Lake Ave.

The transect for samples 050 to 053 were located on a line from MW-9 to MW-13, while the transect for samples 054 to 057 was perpendicular to the fence, starting at a point midway between MW-6 and MW-11. 058 was located by the fence near MW-13, and 0-59 through 0-61 are along Turtle Pond Rd.

2.3.2 Shopping Arcade Site

The suspected source of contamination at the Shopping Arcade site is a former dry cleaning operation at the Arcade building (Figure 2). A transect of sampling locations was identified along a retaining wall behind the Arcade (samples 01-08), using 25 intervals. Samples 09 thru 12 were taken at 50' intervals behind the Exxon station and the bank. The Arcade building uses a leach field for wastewater treatment and disposal, which is located on the hill directly behind the Arcade. To determine if this is a source of contamination, the leach field was located, and soil gas samples 013 to 021 were taken at 25 ft. intervals downhill of the leach field. Samples 022 and 023 were taken at 50 ft. intervals. Upgradient samples were taken at locations 024, 025, 026, and 027.

Samples hydraulically downgradient of the Arcade were collected at 50 ft. intervals along Route 22, starting with 028 at the Village Green and extending north beyond the Arcade to 044. Transects were located adjacent to and behind the theater, where samples 045 to 047, and 048 to 054 were collected.

Another transect (samples 055-061) was located along Court Road. Samples were also collected near monitoring well 5, and at 100 ft. intervals towards Rt. 22. One additional sample was collected 100 ft. northwest of point SA068, behind the adjacent commercial building.

3.0 RESULTS

3.1 Hunting Ridge Mall Site

The Photovac analysis results for the Hunting Ridge Mall site are presented in Table 1. Significant amounts of TCE were found in sample HRM 011. Sample HRM 029 shows trace amounts only. PCE, however, was detected in 16 samples, with trace amounts in additional samples (sample results reported as BMDL refer to contaminants which are present but at levels too low for quantitation). Table 2 lists those samples which contain PCE.

Figure 3 is a computer generated contour plot of PCE measured in the soil vapor. The highest concentrations occur in the wooded area across Rt. 22 from the Mall, along the transect extending from MW-6 to MW-5, and along the Rt. 22 transect. Lower concentrations were observed further downgradient in the wooded areas, as well as in isolated readings along Rt. 22 near Vinton Ave., and one reading along Lake Ave.

Low levels of benzene and toluene were found in all but one sample. This may be due to the general presence of these hydrocarbons in the environment, especially near urban areas, roads and highways. It may also be a result of the presence of these compounds in the Tedlar bags. To check for contamination, two unused air bags were filled with zero air and analyzed. They contained benzene and toluene, so apparently the bags were contaminated with BTX compounds at some point between manufacture and use. There was no PCE or TCE detected in the unused bags.

3.2 Shopping Arcade Site

The preliminary Photovac analysis results for the Shopping Arcade site are presented in Table 3. TCE was identified in 4 samples: SA036, SA037, SA038, and SA057. However, the results for SA036 and SA057 are believed to be interferences from the high levels of toluene and benzene and other hydrocarbons also found in the sample, and not TCE.

PCE was detected only in sample SA003, and trace amounts in SA050 and SA066. No target compounds were detected in the transects associated with the leach field.

Low levels of benzene and toluene were detected in nearly all samples. Reasons for this are discussed above in Section 3.1.

3.3 GC/MS RESULTS

Verification of field analyses was undertaken using Tenax tubes and the GC/MS. Ten Tedlar bag samples were chosen for GC/MS confirmation analysis. One to three hundred mL aliquots of each sample were adsorbed onto Tenax/carbon molecular sieve (CMS) sample cartridges. Samples were transferred by attaching the bags directly to the tubes, then pulling the sample through the tube using a glass syringe. Direction of the flow was such that the sample passed through the Tenax phase first. The sample tubes were then analyzed by thermal desorption onto a cryogenic trap, followed by GC/MS analysis.

Results of this analysis is presented in Table 4 - Soil Gas Analysis by GC/MS: Target Compounds. In general, the GC/MS data agrees well with the Photovac results. No PCE was detected in sample SA057, supporting the contention that the 1570 ppb PCE reported in the Photovac analysis results is indeed interference from other hydrocarbons. In other cases (SA036, HRM033, HRM057), Photovac results of fifty ppb or lower are confirmed as

below method detection limit for that sample on the GC/MS analysis. The presence of PCE was confirmed in the GC/MS. but the levels were not quantifiable.

4.0 DISCUSSION

4.1 Hunting Ridge Mall Site

Soil gas results may be affected by the site specific properties of the unsaturated zone. The variability of the site specific parameters must be recognized in order for correct interpretation to be made. Specifically, the soil properties affecting soil gas surveys are air filled porosity, soil texture, water content, soil organic matter content, shape and size of the soil pores, and depth of the unsaturated zone.

Of specific importance to the Bedford Village soil gas survey is the soil texture and soil organic matter content. In general, as the clay or silt content increases, the water holding capacity increases, cation exchange capacity increases and the rate of diffusion decreases. Soil boring logs from MW-6 and MW-5 shows the wooded area across Rt. 22 from the Mall to be predominantly fine to coarse sands capped with 5 to 6 feet of clayey silt. The coarse texture of these soils is well suited for soil gas survey work and the Photovac results of samples taken in this area indicate considerable upward migration of contaminant vapors.

The organic matter content of soil will affect soil gas migration through attenuation of organic compounds. The measure of the affinity of an organic compound for soil organic matter is its partition coefficient, K_{OC}, which relates the partitioning of the organic compound between the adsorbed phase and the soil solution relative to the organic carbon fraction. In general, compounds with low water solubility, such as PCE, often possess higher K_{OC} values.

This property may impact the soil gas results obtained in the Lake Ave./Vinton Ave. area. The soil borings indicate the presence of an 8 foot thick layer of silt and organic peat as MW-7 is approached. This high surface area and the exchange properties of the peat are ideal for the adsorption of organic compounds. Such a horizon would significantly depress any contaminant vapors migrating through it, making definition of the lateral extent of the plume difficult. In fact, the only sample along the Lake Ave. transect in which PCE was detected was 047, which was taken adjacent to the storm drain outlet. This outlet drains the Mall parking lot, which is the alleged source of the contamination.

The Photovac analysis of the soil gas collected during this survey produced a clear understanding of the location of the plume from which the contaminant vapors are emanating. According to the contour map, the plume is approximately 400 feet wide, and migrating downgradient, away from the suspected source in the Hunting Ridge Mall, roughly parallel to Vinton Avenue. The most contaminated area of the soil vapor plume is presently in the wooded area across Rt. 22 from the Mall about 200 feet from Rt. 22, and the plume itself extends up to 800 feet southeast of Rt. 22.

The lateral extent of the plume near Vinton and Lake Avenues is less well defined. A peat deposit associated with the feeder stream to Turtle Pond may be suppressing the detection of any contaminant vapors, thereby obscuring the northeastern edge of the contaminant plume. The combination of increased water holding capacity, increased organic adsorption, and decreased air filled pore space in the vadose zone along the Lake/Vinton Avenue area may be inhibiting the migration of vapors to the surface.

4.2 Shopping Arcade Site

The soil gas survey results shows only 1 sampling location where significant PCE contamination was detected. SA003 was located directly behind the former clay cleaning operation, and the presence of PCE along this retaining wall may be attributed to this establishment.

TCE contamination was reported by Photovac analysis at four locations at the Shopping Arcade site. The SA057 result was not confirmed by GC/MS analysis. The high levels of benzene, toluene, and other hydrocarbons at this site cause interferences which make positive identification of TCE by Photovac analysis difficult.

Similarly, samples SA036, SA037, and SA038 exhibited hydrocarbon interferences. All three locations were in close proximity to the Exxon service station. It is not uncommon to find such high levels of hydrocarbons in soil gas near gasoline stations. Analysis of SA036 by GC/MS confirmed this interference.

Results for the numerous soil gas sample points surrounding the leach field did not indicate a contamination problem associated with that structure. There was no indication of any soil gas detectable contamination adjacent to or behind the theater. The transect adjacent to MW-5 was also free of target contaminates.

It does not appear that geologic factors are suppressing upward soil gas migration. Soil borings previously taken at monitoring well 1 show a very shallow depth to bedrock (<9 feet); more than 20 feet of sands and silts are found near monitoring wells

2 and 3; groundwater is found at less than 20 feet below the surface at monitoring wells 4 and 5; and no distinct confining layers are evident. Under such conditions, the presence of groundwater contaminants associated with the leach field or other disposal sites would be detected by soil gas. It is possible, however, that contaminants may be migrating to the contaminated wells via fractured flow through the bedrock, and/or through man made "conduits" created when storm water or sanitary sewers are buried in gravel.

5.0 CONCLUSION

The soil gas survey at the Hunting Ridge Mall site proved to be a useful technique in delineating PCE migration in the groundwater. It proved that the presence of volatile compounds such as TCE and PCE can be delineated even when the groundwater concentrations of these compounds is less than 200 parts per billion. Provided geologic conditions are suitable, soil gas techniques can be utilized to investigate low level TCE and PCE contamination, which pose a serious threat to private and public water supplies at so many different sites. Completion of Phase II monitoring well installation and sampling should confirm the scenario presented in this report.

However, this technique detected little contamination at the Shopping Arcade site, despite documented groundwater contamination. Fractured flow through bedrock, and/or through man-made "conduits" may explain why widespread contamination was not evident using soil gas surveying. This hypothesis, however, requires further investigation.

TABLE 1

BEDFORD VILLAGE, NY SOIL GAS SURVEY
GC/PID RESULTS
HUNTING RIDGE MALL SITE
APRIL 18-21, 1988

CONCENTRATIONS IN PPB

SAMPLE LOCATION	SAMPLE DATE/ TIME	HNu READING(1)	[TCE] (2)	[PCE] (3)	[BENZENE]	[TOLUENE]	[ETHYL BENZENE]	[META-XYLENE]	[O-XYLENE/ STYRENE]
HRHC01A	4/18/88(1105)	0	ND	ND	18.4	79.1	BMDL	BMDL	ND
HRHC01B	4/18/88(1115)	0	ND	ND	15.6	84.8	BMDL	BMDL	BMDL
HRHC01C	4/18/88(1120)	0	BMDL	BMDL	13.2	67.9	ND	BMDL	ND
HRHC02	4/18/88(1038)	0.3	ND	BMDL	BMDL	49.8	BMDL	BMDL	ND
HRHC03	4/18/88(1055)	0.2	ND	ND	BMDL	58.6	BMDL	BMDL	ND
HRHC03B	4/18/88(1118)	0.2	ND	ND	BMDL	28.9	ND	ND	ND
HRHC04	4/18/88(?)	0.2	ND	BMDL	12.4	73.8	BMDL	BMDL	ND
HRHC05	4/18/88(1110)	0	ND	ND	BMDL	30.7	ND	ND	ND
HRHC06	4/18/88(?)	0.4	ND	BMDL*	23.9	39.7	ND	ND	ND
HRHC07	4/18/88(1147)	0	ND	ND	21.7	97.2	ND	BMDL	ND
HRHC08	4/18/88(1155)	0.8	ND	ND	23.1	50.4	ND	BMDL	ND
HRHC09	4/18/88(?)	0.2	ND	ND	23.6	61.3	ND	63.5	ND
HRHC10	4/18/88(?)	1.0	BMDL	450	12.8	44.4	BMDL	BMDL	ND
HRHC11	4/18/88(1209)	0.2	32.6	216	56.5	33.3	ND	ND	ND
HRHC12	4/19/88(0848)	?	ND	ND	23.2	51.8	ND	ND	ND
HRHC13	4/18/88(1225)	0.4	ND	46.8	30.3	49.6	BMDL	BMDL	ND
HRHC14	4/18/88(1215)	0.2	ND	54.4	13.0	24.6	ND	ND	ND
HRHC15	4/18/88(1230)	0	ND	ND	BMDL	35.4	ND	ND	ND
HRHC16	4/18/88(1225)	0	ND	ND	10.9	47.7	ND	ND	ND
HRHC17	4/18/88(1240)	0	ND	BMDL	BMDL	39.8	ND	ND	ND
HRHC18	4/18/88(1240)	0	ND	ND	28.4	41.1	ND	ND	ND
HRHC19	4/18/88(1250)	NEG	ND	ND	26.6	89.3	BMDL	BMDL	ND
HRHC20	4/18/88(?)	0	ND	ND	12.5	54.2	ND	ND	ND
HRHC20	4/18/88(1557)	0	ND	ND	32.0	39.2	ND	ND	ND
HRHC21	4/18/88(?)	?	ND	BMDL	15.2	84.4	BMDL	BMDL	ND
HRHC23	4/18/88(?)	0	ND	ND	25.1	30.8	ND	ND	ND
HRHC23C	4/18/88(?)	?	ND	ND	13.7	23.4	ND	ND	ND
HRHC24	4/18/88(1615)	0	ND	ND	13.7	41.9	ND	ND	ND
HRHC25	4/18/88(1610)	0.1	ND	ND	11.5	28.5	ND	ND	ND
HRHC26	4/18/88(1600)	0.4	ND	ND	18.4	44.5	ND	ND	ND

(1): Reading in ppm above background.
(2): Trichloroethylene.
(3): Tetrachloroethylene.
NEG: Negative reading.
ND: Not detected.
BMDL: Below method detection limit (<10 ppb; <50 ppb for ethyl benzene, xylenes, and styrene).
N/A: Not available.
*: Compound does not confirm by GC/MS.

TABLE 1

(cont.)

BEDFORD VILLAGE, NY SOIL GAS SURVEY

GC/PID RESULTS

HUNTING RIDGE MALL SITE

APRIL 18-21, 1988

CONCENTRATIONS IN PPB

SAMPLE LOCATION	SAMPLE DATE/ TIME	HNu READING(1)	(TCE) (2)	(PCE) (3)	(BENZENE)	(TOLUENE)	(ETHYL BENZENE)	(META-XYLENE)	(O-XYLENE/ STYRENE)
HRM027	4/18/88(1625)	0	ND	78.5	10.4	73.5	ND	BMDL	ND
HRM027B	4/18/88(1630)	0	ND	133	12.7	136	BMDL	BMDL	ND
HRM027BD	4/18/88(1630)	0	ND	51.2	27.7	32.3	ND	ND	ND
HRM028	4/18/88(1650)	0	ND	ND	13.6	61.6	ND	BMDL	ND
HRM029	4/18/88(1652)	N/A	BMDL	246	23.7	38.9	ND	ND	ND
HRM030	4/19/88(0915)	0.4	ND	ND	18.3	30.6	ND	ND	ND
HRM031	4/19/88(0925)	0	ND	ND	19.8	27.0	ND	ND	ND
HRM031B	4/20/88(1535)	0.1	ND	ND	41.6	138	ND	ND	ND
HRM032	4/19/88(0950)	0	ND	ND	49.6	281	BMDL	126	BMDL
HRM032D	4/19/88(0950)	0	ND	ND	36.3	189	ND	BMDL	ND
HRM032B	4/20/88(1720)	0.1	ND	ND	24.9	152	ND	ND	ND
HRM033	4/19/88(1005)	0.6	BMDL*	49.0	55.8	30.5	BMDL	134	BMDL
HRM034	4/19/88(1010)	0.8	ND	ND	20.9	31.9	ND	ND	ND
HRM034	4/20/88(1650)	0.2	ND	ND	45.3	188	ND	ND	ND
HRM035	4/19/88(1000)	0.1	ND	98.0	29.7	68.5	ND	ND	ND
HRM036	4/19/88(1010)	0.3	ND	847	45.8	258	BMDL	124	BMDL
HRM036D	4/19/88(1015)	0.3	ND	531	43.9	220	ND	53.3	BMDL
HRM037	4/19/88(1020)	0.1	ND	BMDL	42.4	256	BMDL	118	BMDL
HRM038	4/19/88(1030)	0	ND	ND	23.5	22.5	ND	ND	ND
HRM039	4/19/88(1040)	0	ND	ND	40.3	275	BMDL	138	BMDL
HRM040	4/19/88(1115)	0.2	ND	ND	ND	ND	ND	ND	ND
HRM041	4/19/88(1120)	0.1	ND	ND	19.1	81.7	ND	ND	ND
HRM042	4/19/88(1125)	0	ND	ND	38.2	212	BMDL	BMDL	BMDL
HRM043	4/19/88(1135)	0	ND	ND	22.9	123	BMDL	BMDL	BMDL
HRM044	4/19/88(1140)	0.2	ND	ND	22.7	145	ND	81.6	ND
HRM045	4/19/88(1145)	0	ND	ND	21.0	38.1	ND	ND	ND
HRM046	4/19/88(1146)	0	ND	ND	BMDL	BMDL	ND	ND	ND
HRM047	4/19/88(1155)	0.1	ND	34.2	17.8	105	BMDL	BMDL	ND
HRM048	4/19/88(1200)	0	ND	ND	10.6	53.8	ND	ND	ND
HRM049	4/20/88(1600)	0.1	ND	68.5	249	186	BMDL	BMDL	BMDL

(1): Reading in ppm above background.

(2): Trichloroethylene.

(3): Tetrachloroethylene.

NEG: Negative reading.

ND: Not detected.

BMDL: Below method detection limit (<10 ppb; <50 ppb for ethyl benzene, xylenes, and styrene).

N/A: Not available.

*: Compound does not confirm by GC/MS.

TABLE 1

(cont.)

BEDFORD VILLAGE, NY SOIL GAS SURVEY

GC/PID RESULTS

HUNTING RIDGE MALL SITE

APRIL 18-21, 1988

CONCENTRATIONS IN PPB

SAMPLE LOCATION	SAMPLE DATE/ TIME	HNu READING(1)	[TCE] (2)	[PCE] (3)	[BENZENE]	[TOLUENE]	[ETHYL BENZENE]	[META-XYLENE]	[O-XYLENE/ STYRENE]
[illegible]050A	4/20/88(1810)	0	ND	ND	55.8	216	ND	ND	ND
[illegible]050B	4/20/88(1750)	0	ND	ND	16.7	82.4	ND	ND	ND
[illegible]051	4/20/88(1820)	0	ND	ND	25.0	59.3	ND	ND	ND
[illegible]052	4/20/88(1830)	0	ND	ND	19.8	83.8	ND	ND	ND
[illegible]053	4/20/88(1840)	0.2	ND	ND	18.9	142	BMDL	BMDL	ND
[illegible]054	4/20/88(?)	0.3	ND	37.6	61.2	209	ND	BMDL	ND
[illegible]055	4/20/88(?)	0.3	ND	ND	16.2	69.7	ND	ND	ND
[illegible]056	4/20/88(?)	0.3	ND	ND	56.1	265	ND	BMDL	ND
[illegible]057	4/20/88(?)	0.3	BMDL	51.2	58.0	205	BMDL	112	ND
[illegible]058	4/20/88(?)	0.1	ND	ND	27.4	87.8	ND	ND	ND
[illegible]059	4/20/88(1910)	0.2	ND	ND	38.4	180	ND	ND	ND
[illegible]060	4/20/88(1915)	0	ND	ND	BMDL	56.9	ND	ND	ND
[illegible]061	4/20/88(1501)	0	ND	ND	17.0	86.8	ND	ND	ND
AA01(AMB)	4/19/88(0848)	N/A	ND	ND	24.4	166	BMDL	79.6	BMDL
BAG BLK (OPENED BOX)		N/A	ND	ND	BMDL	33.0	51.4	102	ND
BAG BLK (UNOPENED BOX)		N/A	ND	ND	BMDL	30.6	ND	ND	ND

(1): Reading in ppm above background.
(2): Trichloroethylene.
(3): Tetrachloroethylene.
NEG: Negative reading.
ND: Not detected.
BMDL: Below method detection limit (<10 ppb; <50 ppb for ethyl benzene, xylenes, and styrene).
N/A: Not available.
*: Compound does not confirm by GC/MS.

TABLE 2

Bedford Village, NY, Soil Gas Survey
Summary of GC/PID Results for PCE
Hunting Ridge Mall Site
April 18-21, 1988

Sample	PCE (in ppb)
HRM001C	BMDL
HRM002	BMDL
HRM004	BMDL
HRM006	BMDL
HRM010	450
HRM011	216
HRM013	46.8
HRM014	54.4
HRM017	BMDL
HRM021	BMDL
HRM027	78.5
HRM027B	133
HRM027D	51.2
HRM029	246
HRM033	49.0
HRM035	847
HRM036D	531
HRM037	BMDL
HRM047	34.2
HRM049	68.5
HRM054	37.6
HRM057	51.2

TABLE 3

BEDFORD VILLAGE, NY SOIL GAS SURVEY
GC/PID RESULTS
SHOPPING ARCADE SITE
APRIL 18-21, 1988

CONCENTRATIONS IN PPB

SAMPLE LOCATION	SAMPLE DATE/ TIME	HNu READING(1)	[TCE] (2)	[PCE] (3)	[BENZENE]	[TOLUENE]	[ETHYL BENZENE]	[META-XYLENE]	[O-XYLENE/ STYRENE]
SA001	4/19/88(1330)	8.2	ND	ND	BMDL	41.9	ND	ND	ND
SA002	4/19/88(1345)	0	ND	ND	28.7	65.5	ND	ND	ND
SA003	4/19/88(1355)	2.0	ND	344	12.0	60.2	ND	ND	ND
SA005	4/19/88(?)	0.5	ND	ND	15.4	65.7	ND	ND	ND
SA006	4/19/88(1405)	0.4	ND	ND	ND	ND	ND	ND	ND
SA007	4/19/88(1415)	0.2	ND	ND	BMDL	46.2	ND	ND	ND
SA008	4/19/88(1425)	0	ND	ND	11.1	33.9	ND	ND	ND
SA009	4/19/88(1430)	0.1	ND	ND	BMDL	BMDL	ND	ND	ND
SA010	4/19/88(1437)	2.7	ND	ND	13.9	37.0	ND	ND	ND
SA011	4/19/88(1440)	0.1	ND	ND	22.4	54.8	BMDL	BMDL	ND
SA012	4/19/88(1445)	0	ND	ND	15.6	56.1	ND	ND	ND
SA013	4/19/88(1500)	0	ND	ND	13.2	36.0	ND	ND	ND
SA014	4/19/88(1507)	0.2	ND	ND	10.8	30.5	ND	ND	ND
SA015	4/19/88(1505)	0	ND	ND	15.3	69.8	ND	ND	ND
SA016	4/19/88(1515)	0.2	ND	ND	10.3	48.1	ND	ND	ND
SA017	4/19/88(1512)	0	ND	ND	BMDL	BMDL	ND	ND	ND
SA018	4/19/88(1515)	0.2	ND	ND	11.6	35.4	ND	ND	ND
SA019	4/19/88(1525)	0.1	ND	ND	BMDL	17.8	ND	ND	ND
SA020	4/19/88(1525)	0	ND	ND	15.8	122	BMDL	BMDL	BMDL
SA021	4/19/88(1530)	0.1	ND	ND	12.0	33.7	ND	ND	ND
SA022	4/19/88(1535)	0.1	ND	ND	BMDL	23.0	ND	ND	ND
SA023	4/19/88(1540)	0	ND	ND	BMDL	35.5	ND	ND	ND
SA024	4/19/88(1535)	0.2	ND	ND	BMDL	73.5	BMDL	BMDL	ND
SA025	4/19/88(1550)	0.2	ND	ND	26.3	96.8	BMDL	BMDL	BMDL
SA026	4/19/88(1550)	0	ND	ND	BMDL	17.3	ND	ND	ND
SA027	4/19/88(1555)	0	ND	ND	22.0	48.1	ND	ND	ND
SA027D	4/19/88(1555)	0	ND	ND	BMDL	BMDL	ND	ND	ND
SA028	4/20/88(1640)	0.1	ND	ND	BMDL	33.9	ND	ND	ND
SA029	4/20/88(1645)	0.1	ND	ND	BMDL	31.3	BMDL	BMDL	ND
SA030	4/20/88(1650)	0	ND	ND	13.8	29.4	ND	ND	ND
SA030D	4/20/88(1655)	0	ND	ND	13.8	42.3	BMDL	BMDL	ND
SA031	4/20/88(1630)	0	ND	ND	ND	14.7	ND	ND	ND
SA032	4/20/88(1700)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(1): Reading in ppm above background.
(2): Trichloroethylene.
(3): Tetrachloroethylene.
NEG: Negative reading.
ND: Not detected.
BMDL: Below method detection limit (<10 ppb; <50 ppb for ethyl benzene, xylenes, and styrene).
N/A: Not available.
*: Compound does not confirm by GC/MS.

TABLE 3

(cont.)

BEDFORD VILLAGE, NY SOIL GAS SURVEY

GC/PID RESULTS

SHOPPING ARCADE SITE

APRIL 18-21, 1988

CONCENTRATIONS IN PPB

SAMPLE LOCATION	SAMPLE DATE/ TIME	HNu READING(1)	[TCE] (2)	[PCE] (3)	[BENZENE]	[TOLUENE]	[ETHYL BENZENE]	[META-XYLENE]	[O-XYLENE/ STYRENE]
SA033	4/20/88(1710)	0	ND	ND	12.3	45.6	BMDL	BMDL	ND
SA034	4/20/88(0900)	0.3	ND	ND	ND	BMDL	BMDL	BMDL	BMDL
SA035	4/20/88(0920)	0	ND	ND	ND	ND	ND	ND	ND
SA036	4/20/88(0905)	125	47.2*	ND	18.8	2160	ND	ND	ND
SA037	4/20/88(0912)	19.8	435	ND	145	2880	ND	ND	ND
SA038	4/20/88(0920)	16.3	792	ND	4730	28.9	ND	ND	ND
SA039	4/20/88(?)	?	ND	ND	ND	ND	ND	ND	ND
SA040	4/20/88(0938)	0.6	ND	ND	13.1	56.6	ND	ND	ND
SA041	4/20/88(0943)	0.2	ND	ND	10.9	29.6	ND	ND	ND
SA042	4/20/88(0950)	0.6	ND	ND	BMDL	37.9	ND	ND	ND
SA043	4/20/88(?)	0.1	ND	ND	13.3	47.3	ND	ND	ND
SA044	4/20/88(0950)	0.4	ND	ND	13.8	50.0	ND	ND	ND
SA045	4/20/88(1010)	0.8	ND	ND	35.0	99.7	ND	ND	ND
SA045D	4/20/88(1010)	0.8	ND	ND	BMDL	167	BMDL	88.1	BMDL
SA046	4/20/88(1017)	0.5	ND	ND	BMDL	33.5	ND	ND	ND
SA047	4/20/88(1025)	0.3	ND	ND	16.7	82.1	ND	ND	ND
SA049	4/20/88(1016)	0	ND	ND	15.7	158	ND	BMDL	BMDL
SA050	4/20/88(1055)	0.9	ND	BMDL	60.7	270	ND	BMDL	ND
SA051	4/20/88(1100)	0.4	ND	ND	14.0	57.2	ND	ND	ND
SA052	4/20/88(1051)	0.3	ND	ND	10.0	46.4	ND	ND	ND
SA053	4/20/88(1047)	0.2	ND	ND	15.1	59.6	ND	ND	ND
SA054	4/20/88(1042)	0.2	ND	ND	10.7	43.0	ND	ND	ND
SA055	4/20/88(1140)	0.1	ND	ND	23.1	77.1	ND	ND	ND
SA056	4/20/88(1141)	0.3	ND	ND	BMDL	84.3	ND	BMDL	BMDL
SA057	4/20/88(1150)	29.8	1570*	ND	355	3693	ND	ND	ND
SA058	4/20/88(1145)	0.2	ND	ND	BMDL	37.1	ND	ND	ND
SA059	4/20/88(1140)	0.1	ND	ND	BMDL	72.8	ND	ND	ND
SA060	4/20/88(1151)	0	ND	ND	12.6	46.8	ND	ND	ND
SA061	4/20/88(1200)	4.3	ND	ND	14.2	50.3	ND	ND	ND
SA062	4/20/88(1211)	0	ND	ND	18.6	41.6	ND	ND	ND
SA062A	4/20/88(1230)	0	ND	ND	ND	106	ND	BMDL	ND
SA063	4/20/88(?)	0.1	ND	ND	11.2	37.8	ND	ND	ND
SA064	4/20/88(1236)	0	ND	ND	10.3	36.4	ND	ND	ND

(1): Reading in ppm above background.

(2): Trichloroethylene.

(3): Tetrachloroethylene.

NEG: Negative reading.

ND: Not detected.

BMDL: Below method detection limit (<10 ppb; <50 ppb for ethyl benzene, xylenes, and styrene).

N/A: Not available.

*: Compound does not confirm by GC/MS.

TABLE 3

(cont.)

BEDFORD VILLAGE, NY SOIL GAS SURVEY

GC/PID RESULTS

SHOPPING ARCADE SITE

APRIL 18-21, 1988

CONCENTRATIONS IN PPB

SAMPLE LOCATION	SAMPLE DATE/ TIME	HNu READING(1)	[TCE] (2)	[PCE] (3)	[BENZENE]	[TOLUENE]	[ETHYL BENZENE]	[META-XYLENE]	[O-XYLENE/ STYRENE]
SA066	4/20/88(1255)	0	ND	BMDL	40.3	171	BMDL	140	ND
SA067(FLAT)	4/20/88(1310)	0.4	ND	ND	13.1	37.4	ND	ND	ND
SA068	4/20/88(1305)	2.3	ND	ND	ND	106	ND	ND	ND
SA069	4/20/88(1320)	0.1	ND	ND	ND	ND	ND	ND	ND

(1): Reading in ppm above background.
(2): Trichloroethylene.
(3): Tetrachloroethylene.
NEG: Negative reading.
ND: Not detected.
BMDL: Below method detection limit (<10 ppb; <50 ppb for ethyl benzene, xylenes, and styrene).
N/A: Not available.
*: Compound does not confirm by GC/MS.

TABLE 4

TARGET COMPOUNDS

SOIL GAS ANALYSIS BY GC/MS

SITE NAME : BEDFORD VILLAGE, NY SOIL GAS SURVEY

SAMPLE NAME/NUMBER :	SA-057	SA-018	SA-036	MW-035	MW-010	MW-057	SA-035	MW-006	MW-055	MW-006(1)	MW-033
DATE ANALYZED :	5/3/88	5/3/88	5/3/88	5/3/88	5/3/88	5/3/88	5/3/88	5/3/88	5/3/88	5/3/88	5/6/88
DATE SAMPLED :	4/20/88	4/19/88	4/20/88	4/19/88	4/18/88	4/20/88	4/20/88	4/18/88	4/20/88	4/18/88	4/19/88
DATE ADSORBED ON TENAX :	4/21/88	4/21/88	4/21/88	4/21/88	4/21/88	4/21/88	4/21/88	4/21/88	4/21/88	4/21/88	4/21/88
FRN :	26677	26678	26679	26680	26681	26683	26684	26685	26686	26687	26705
parameter	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	ND	ND	ND	120	ND	ND	BMDL	ND	ND	ND	250
trichlorofluoromethane	BMDL	BMDL	1700	BMDL	2500	400	BMDL	BMDL	230	BMDL	BMDL
methylene chloride	ND	ND	ND	ND	520	85	ND	ND	ND	ND	ND
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	ND	ND	560	220	220	44	74	35	86	100	290
carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzene	95	BMDL	BMDL	250	BMDL	BMDL	28	24	BMDL	33	53
trichloroethene	ND	ND	ND	ND	BMDL	BMDL	ND	BMDL	BMDL	ND	ND
toluene	220	140	870	150	650	71	160	120	67	160	210
tetrachloroethene	ND	BMDL	BMDL	58	435	BMDL	ND	BMDL	BMDL	BMDL	BMDL
ethyl benzene	BMDL	25	ND	BMDL	190	BMDL	34	25	25	29	180
m-xylene	110	100	BMDL	110	470	77	110	82	70	110	110
o-xylene	BMDL	38	BMDL	BMDL	180	BMDL	39	38	25	41	BMDL
styrene	BMDL	ND	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL
meta ethyltoluene	BMDL	BMDL	BMDL	BMDL	BMDL	BMDL	25	21	BMDL	23	BMDL
bromochloromethane (%)	72.3	80.5	39.8	68.5	42.5	64.3	69.1	57.5	52.8	3.4	115.4
p-bromofluorobenzene (%)	94.6	102.3	65.3	96.8	83.7	97.5	95.9	89.0	83.8	26.9	147.4
Sample volume (mL):	100	200	20	100	30	150	200	300	200	300	100
Method Detection Limit:	50	25	250	50	171	38	25	17	25	17	50

ND: Not detected.
BMDL: Below method detection limit.
(1): Duplicate analysis.

FIGURE 1

SOIL-GAS SURVEY
HUNTING RIDGE MALL SITE
BEDFORD VILLAGE, N.Y.
APRIL 18-20, 1988

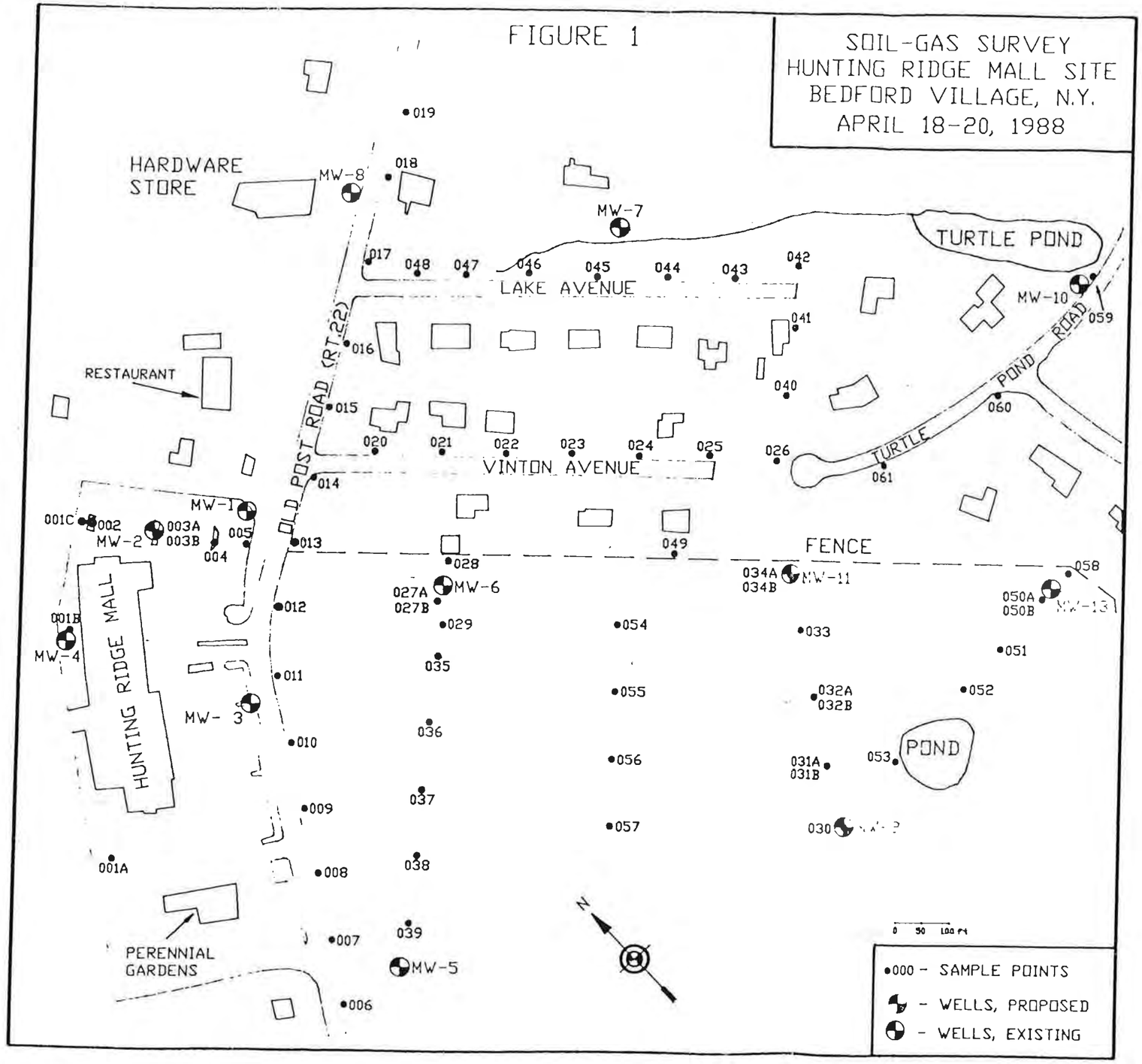
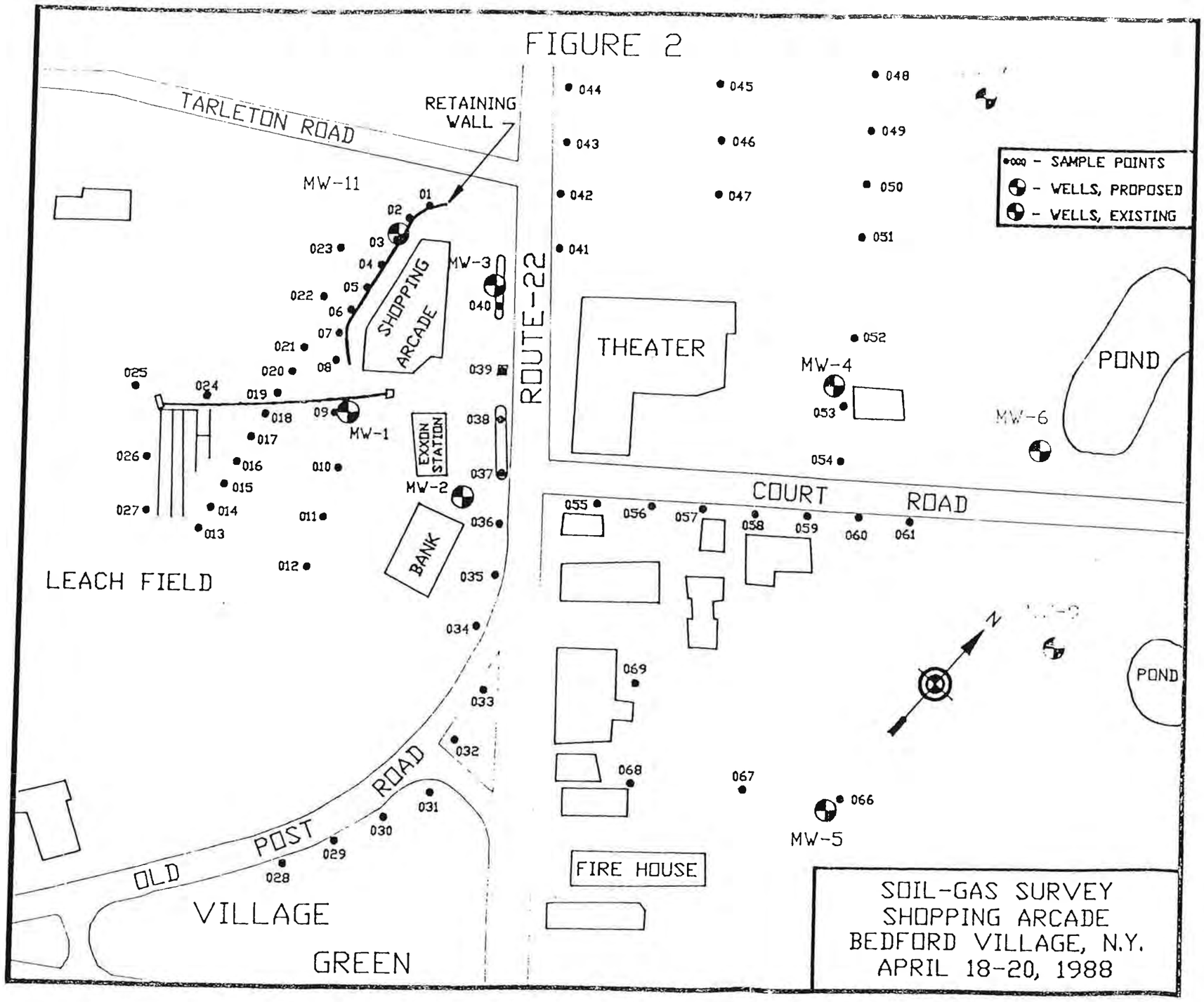


FIGURE 2


TARLETON ROAD
RETAINING WALL
MW-11
01
02
03
04
05
06
07
08
09
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
SHOPPING ARCADE
EXXON STATION
BANK
ROUTE-22
THEATER
POND
COURT ROAD
LEACH FIELD
OLD POST ROAD
VILLAGE GREEN
FIRE HOUSE
010
011
012
013
014
015
016
017
018
019
020
021
022
023
024
025
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027
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066
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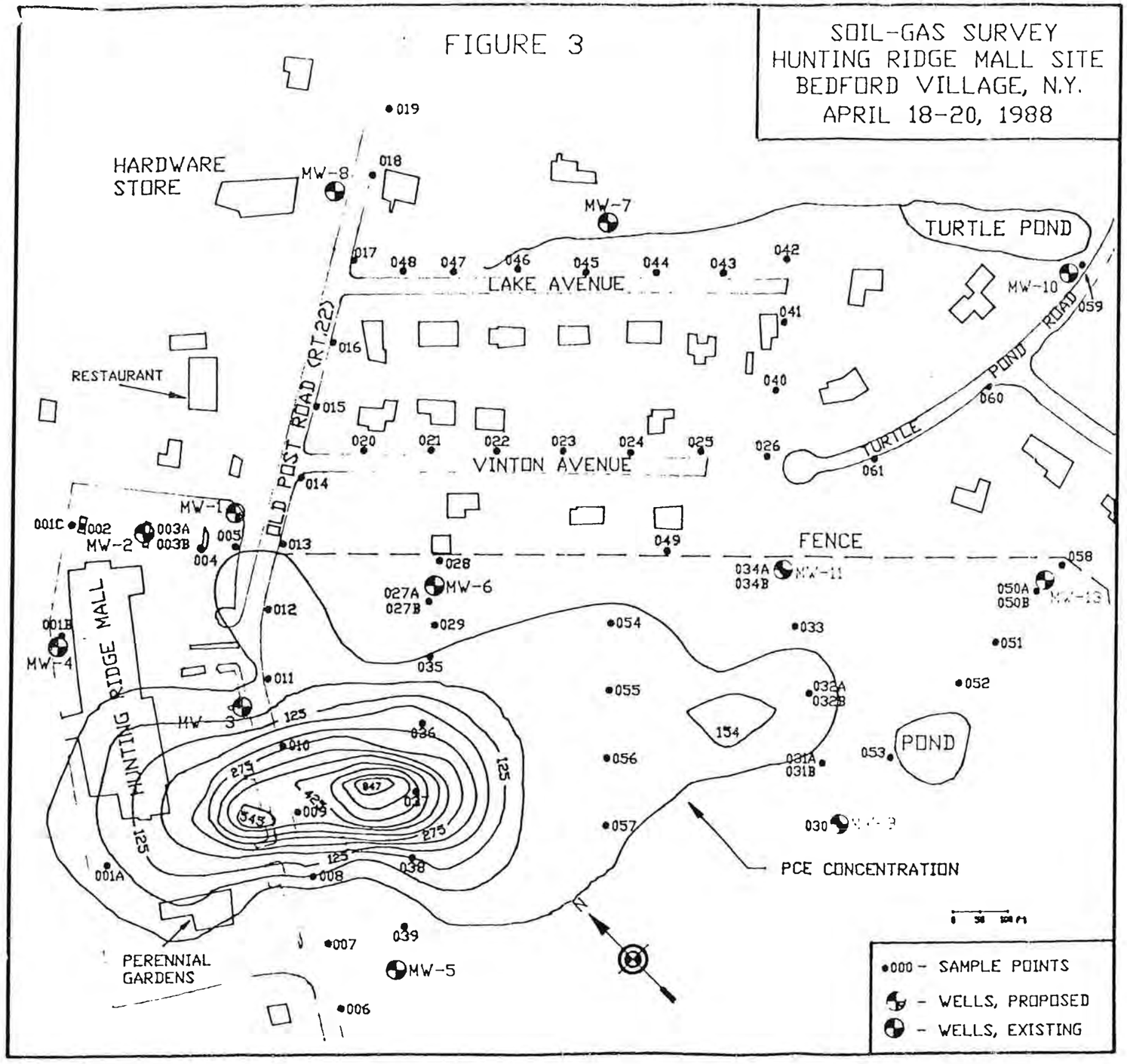
068
069
• - SAMPLE POINTS
- WELLS, PROPOSED
- WELLS, EXISTING
N
SOIL-GAS SURVEY
SHOPPING ARCADE
BEDFORD VILLAGE, N.Y.
APRIL 18-20, 1988

FIGURE 3

SOIL-GAS SURVEY
HUNTING RIDGE MALL SITE
BEDFORD VILLAGE, N.Y.
APRIL 18-20, 1988

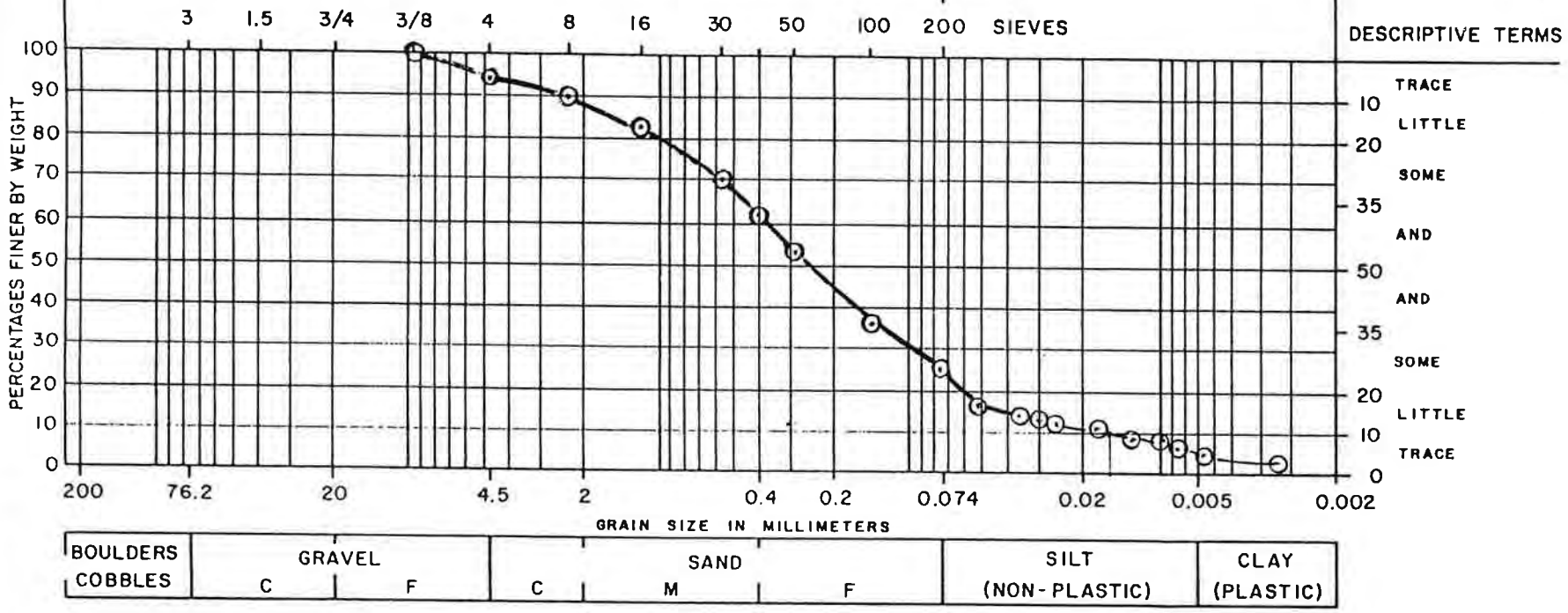


APPENDIX F

GRAIN SIZE ANALYSES

SOIL MECHANICS DRILLING CORP.
3770 MERRICK ROAD • SEAFORD, L. I., NEW YORK 11783 • (516) 221-2333

SIEVE ANALYSIS | HYDROMETER ANALYSIS



PREPARED FOR: DVIRKA & BARTILUCCI

JOB LOCATION: MW 3 M 15-22'

DESCRIPTION OF MATERIAL:

FINE TO COARSE SAND, SOME SILT, TRACE GRAVEL - BROWN

D_{10} 0.0175

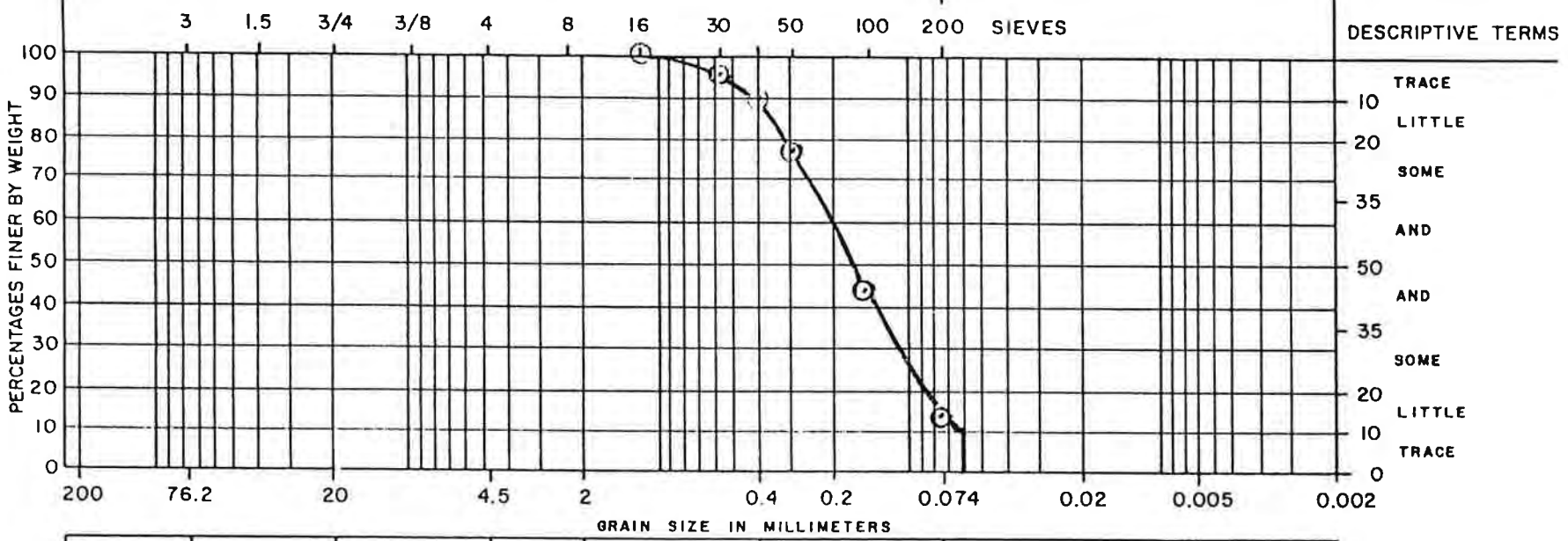
SIEVE	%PASSING
3/8	100
4	95.0
8	90.0
16	81.8
30	69.9
40	62.1
50	53.4
100	37.0
200	25.6

DATE: 3-24-89
JOB No. 89-198
SHEET No. 1

GRAIN SIZE ANALYSIS: IDENTIFICATION AND DESCRIPTION OF SOILS (UNIFIED SOILS CLASSIFICATION SYSTEM).

SOIL MECHANICS DRILLING CORP.
3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783 • (516) 221-2333

SIEVE ANALYSIS | HYDROMETER ANALYSIS



DESCRIPTIVE TERMS

TRACE	10
LITTLE	20
SOME	35
AND	50
AND	35
SOME	20
LITTLE	10
TRACE	0

BOULDERS COBBLES	GRAVEL C	GRAVEL F	SAND C	SAND M	SAND F	SILT (NON-PLASTIC)	CLAY (PLASTIC)

PREPARED FOR: DIVIRICA & BANDUCCI

JOB LOCATION: MW 4 M 25-32'

DESCRIPTION OF MATERIAL:

FINE TO MEDIUM SAND
LITTLE SILT - LT BROWN

D10 .065

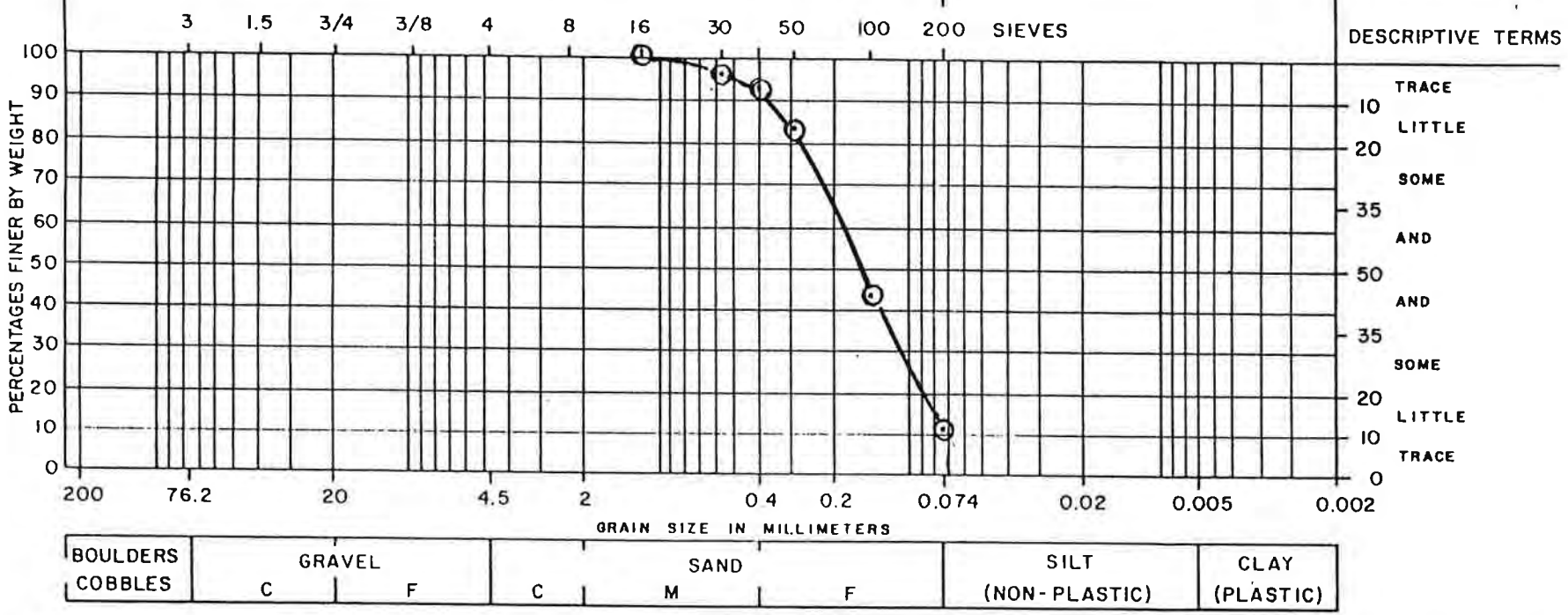
SIEVE	% PASSING
16	100
30	96.5
40	90.5
50	79.5
100	43.4
200	13.6

DATE: 3-25-89
JOB No. 89-198
SHEET No. 5

GRAIN SIZE ANALYSIS: IDENTIFICATION AND DESCRIPTION OF SOILS (UNIFIED SOILS CLASSIFICATION SYSTEM).

SOIL MECHANICS DRILLING CORP.
3770 MERRICK ROAD • SEAFORD, L.I., NEW YORK 11783 • (516) 221-2333

SIEVE ANALYSIS | HYDROMETER ANALYSIS



PREPARED FOR: DVIRKA + BARTILUCCI

JOB LOCATION: MW 5 D 50-57'

DESCRIPTION OF MATERIAL:

FINE TO MEDIUM SAND, LITTLE SILT - GREY

D10 .074

SIEVE	% PASSING
16	100
30	98.1
40	93.3
50	83.7
100	43.2
200	11.4

DATE: 3-24-89
JOB No. 89-198
SHEET No. 6

GRAIN SIZE ANALYSIS: IDENTIFICATION AND DESCRIPTION OF SOILS (UNIFIED SOILS CLASSIFICATION SYSTEM).

APPENDIX G

LABORATORY LETTER

TOTAL ANALYTICAL SERVICES FOR A SAFE ENVIRONMENT
nytest environmental inc

May 3, 1989

Dvirka & Bartilucci
6800 Jericho Tpke.
Syosset, N.Y. 11791

Attention: Lauren McCarthy
Subject : NEI Project No. 89-15538 (A)

Dear Ms. McCarthy:

Upon review of the data and sample bottles for samples N9-2572 and N9-2571 in Project 89-15538 (A), I have concluded that the report is correct.

Your previous information on these sample points has led you to believe that the samples were switched. If an inversion of sample labels occurred, it was probably during the time the label was marked on the sample vials. It is not likely that the analyst would switch the samples during analysis.

Very truly yours,

Nytest Environmental Inc.

Doug Sheeley
Laboratory Director

DS:gd

box 1518 □ 60 seaview blvd., port washington, ny 11050 □ (516) 625-5500