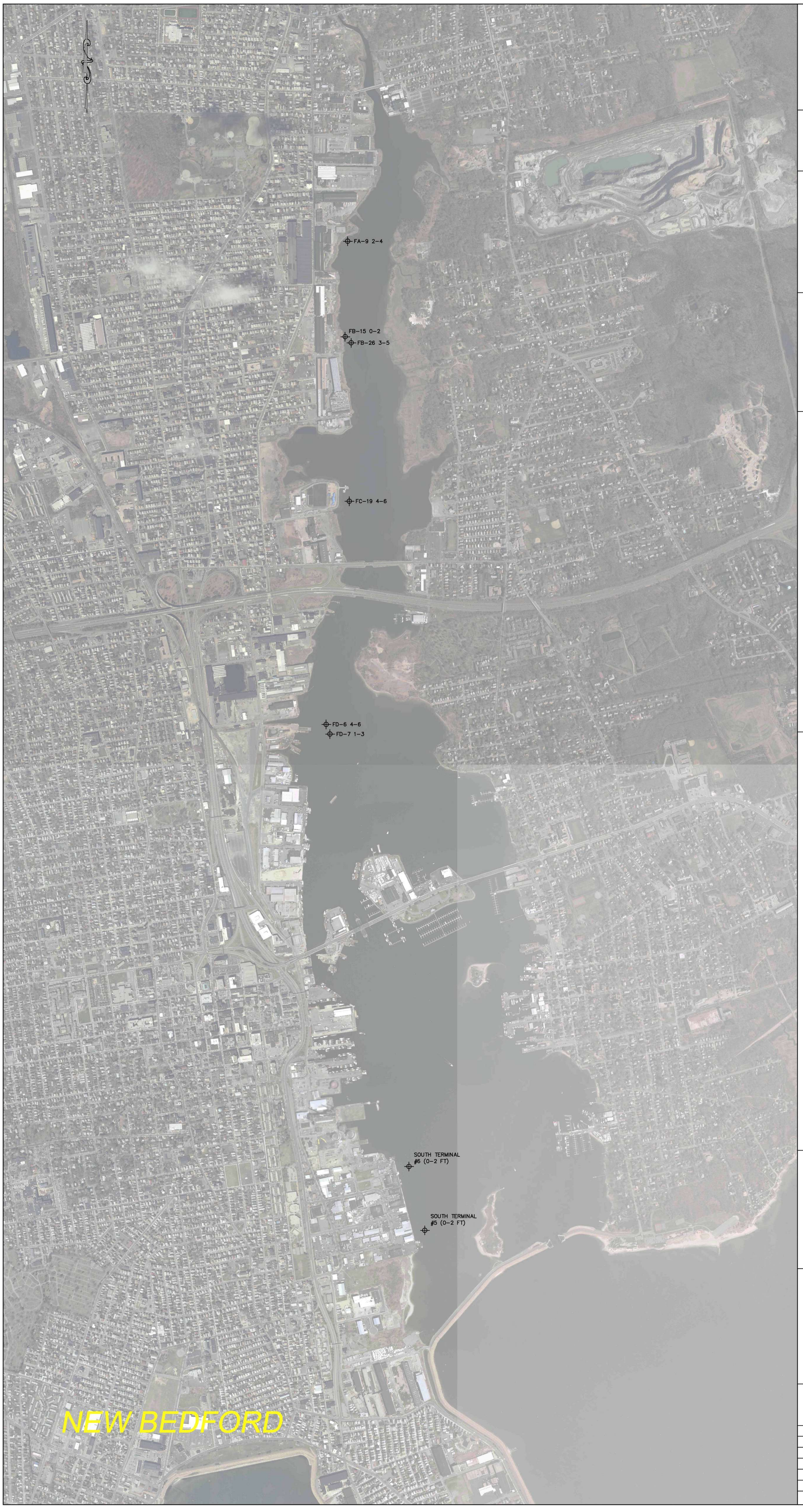

Apex Companies, LLC.

184 HIGH STREET
SUITE 502
BOSTON MA 02110
(617) 728-0070

REVISIONS

#	DATE	DESCRIPTION

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PREPARED FOR:

NEW BEDFORD
HARBOR DEVELOPMENT
COMMISSION

DRAWING TITLE:

HISTORIC ORGANIC SILT/CLAY HYDRAULIC CONDUCTIVITY SAMPLE LOCATIONS

Scale: 1"=750'

0 375 750 1500 2250 FEET

Date 1/16/12	Drawing No.
Proj. Mgr.	
Design	
Check	
Drawn	FIG. 1
Job. No. 6724	
Last Rev.	

P:\Jobs\6724 EPA CAD Cell\PLANS\HYDRAULIC_CONDUCTIVITY_SAMPLING_LOCATIONS_1-16-12.dwg

Average Hydraulic Conductivity of Organic Silt/Clay

Sample	Hydraulic Conductivity
S. Terminal #5 0-2	2.80E-07 cm/sec
S. Terminal #6 0-2	7.30E-08 cm/sec
FB-15 0-2	6.10E-07 cm/sec
FB-26 3-5	9.70E-07 cm/sec
FA-9 2-4	2.70E-07 cm/sec
FD-7 1-3	3.00E-07 cm/sec
FD-6 4-6	2.90E-07 cm/sec
FC-19 4-6	3.30E-07 cm/sec
Average Hydraulic Conductivity:	**3.9E-07 cm/sec**
Typically Landfill Liner Criteria:	**1.0E-07 cm/sec**

GeoTesting EXPRESS

Client:	Apex Companies, LLC		
Project Name:	South Terminal Extension		
Project Location:	New Bedford, MA		
GTX #:	10697		
Start Date:	4/15/2011	Tested By:	ema
End Date:	4/19/2011	Checked By:	njh
Boring #:	---	Test #:	k
Sample #:	#5		
Depth:	---		
Visual Description:	Wet, black silt		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084
Constant Volume

Sample Type:	Remolded	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	16/5/12

Sample Preparation: Compacted at moderate effort. Trimmings moisture content = 145%

Parameter	Initial	Final
Height, in	2.60	2.42
Diameter, in	2.87	2.59
Area, in^2	6.47	5.27
Volume, in^3	16.8	12.7
Mass, g	379	295
Bulk Density, pcf	85.7	88.0
Moisture Content, %	146.2	91.8
Dry Density, pcf	34.8	45.9
Degree of Saturation, %	---	93

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	95.42	Pressure Increment, psi:	4.946
Sample Pressure, psi:	90.05	B Coefficient:	0.99

FLOW DATA

Date	Trial #	Pressure, psi Cell	Pressure, psi Sample	Manometer Readings Z_1	Manometer Readings Z_2	Manometer Readings Z_1-Z_2	Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
4/18	1	90	85	8.0	7.8	0.2	36	16.4	3.2E-07	20	1.000	3.2E-07
4/18	2	90	85	8.0	7.8	0.2	38	16.4	3.0E-07	20	1.000	3.0E-07
4/18	3	90	85	8.0	7.8	0.2	44	16.4	2.6E-07	20	1.000	2.6E-07
4/18	4	90	85	8.0	7.8	0.2	48	16.4	2.4E-07	20	1.000	2.4E-07

PERMEABILITY AT 20° C: 2.8×10^{-7} cm/sec (@ 5 psi effective stress)

GeoTesting EXPRESS

Client:	Apex Companies, LLC		
Project Name:	South Terminal Extension		
Project Location:	New Bedford, MA		
GTX #:	10697		
Start Date:	4/15/2011	Tested By:	ema
End Date:	4/19/2011	Checked By:	njh
Boring #:	---	Test #:	k
Sample #:	#6		
Depth:	---		
Visual Description:	Wet, black silt		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084
Constant Volume

Sample Type:	Remolded	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	8/3

Sample Preparation: Compacted at moderate effort. Trimmings moisture content = 65.3%

Parameter	Initial	Final
Height, in	2.39	2.13
Diameter, in	2.87	2.69
Area, in^2	6.47	5.68
Volume, in^3	15.5	12.1
Mass, g	376	329
Bulk Density, pcf	92.4	103
Moisture Content, %	77.0	55.0
Dry Density, pcf	52.2	66.7
Degree of Saturation, %	---	97

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	95.27	Pressure Increment, psi:	5.004
Sample Pressure, psi:	90.37	B Coefficient:	0.98

FLOW DATA

Date	Trial #	Pressure, psi		Manometer Readings			Elapsed Time,	Gradient	Permeability K,	Temp,		Permeability K @ 20 °C,
		Cell	Sample	Z_1	Z_2	Z_1-Z_2	sec		cm/sec	°C	R_t	cm/sec
4/18	2	90	85	8.0	7.9	0.1	60	18.6	7.7E-08	20	1.000	7.7E-08
4/18	3	90	85	8.0	7.9	0.1	63	18.6	7.3E-08	20	1.000	7.3E-08
4/18	4	90	85	8.0	7.9	0.1	66	18.6	7.0E-08	20	1.000	7.0E-08
4/18	5	90	85	8.0	7.9	0.1	66	18.6	7.0E-08	20	1.000	7.0E-08

PERMEABILITY AT 20° C: 7.3×10^{-8} cm/sec (@ 5 psi effective stress)

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084

Constant Gradient

Client:	Nobis Engineering	**Start Date:**	02/01/00
Project Name:	New Bedford Harbor Superfund Site	**End Date:**	2/4/00
Project Location:	New Bedford, MA	**Tested By:**	SWJ
GTX #:	2409	**Checked By:**	GTT
Boring #:	FB-15	**Sample Type:**	Undisturbed
Sample #:	UO-1	**Orientation:**	Vertical
Depth:	0-2 ft	**Test #:**	K8
Visual Description:	Moist, dark gray organic silt		

Sample Preparation: Extruded from Shelby tube, cut, trimmed and placed into permeameter at as received density and moisture content; trimmings moisture content = 121%

Permeant Fluid: de-aired tap water **Cell #:** —

Parameter	Initial	Final
Height, in	3.22	3.04
Diameter, in	2.90	2.71
Area, in^2	6.61	5.77
Volume, in^3	21.27	17.53
Mass, g	454	406
Bulk Density, pcf	81.1	88.0
Moisture Content, %	110	87.6
Dry Density, pcf	38.7	46.9

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	27.9	**Press. Increment, psi:**	5
Sample Pressure, psi:	25.9	**B Coefficient:**	0.96

FLOW DATA

Date	Elapsed Time, sec	Cell Pressure, psi	Inlet Pressure, psi	Outlet Pressure, psi	Grad-ient	Inflow V, cc	Outflow V, cc	Δ Inflow V, cc	Δ Outflow V, cc	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
02/03	—	27.9	26.9	24.9	18.2	10.20	14.95	—	—	—	—	—
02/03	11280	27.9	26.9	24.9	18.2	14.80	10.15	4.60	4.80	20	1.000	6.15E-07
02/03	—	27.9	26.9	24.9	18.2	11.30	14.10	—	—	—	—	—
02/03	5160	27.9	26.9	24.9	18.2	13.40	11.90	2.10	2.20	20	1.000	6.15E-07
02/04	—	27.9	26.9	24.9	18.2	9.80	15.55	—	—	—	—	—
02/04	12480	27.9	26.9	24.9	18.2	15.10	10.40	5.30	5.15	20	1.000	6.18E-07
02/04	—	27.9	26.9	24.9	18.2	10.95	14.00	—	—	—	—	—
02/04	10560	27.9	26.9	24.9	18.2	15.10	9.80	4.15	4.20	20	1.000	5.83E-07

PERMEABILITY AT 20 °C: 6.1 x 10^{-7} cm/sec (@ 2 psi effective stress)

Note: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084

Constant Gradient

Client:	Nobis Engineering	**Start Date:**	01/06/00
Project Name:	New Bedford Harbor Superfund Site	**End Date:**	1/17/00
Project Location:	New Bedford, MA	**Tested By:**	SWJ
GTX #:	2409	**Checked By:**	GTT
Boring #:	FB-26	**Sample Type:**	Undisturbed
Sample #:	UO-1	**Orientation:**	Vertical
Depth:	3-5 ft	**Test #:**	K9
Visual Description:	Moist, soft, dark gray organic silt with shells		

Sample Preparation: Extruded from Shelby tube, cut, trimmed and placed into permeameter at as received density and moisture content; trimmings moisture content = 122%

Permeant Fluid: de-aired tap water **Cell #:** —

Parameter	Initial	Final
Height, in	4.16	4.01
Diameter, in	2.84	2.67
Area, in^2	6.33	5.60
Volume, in^3	26.35	22.45
Mass, g	577	513
Bulk Density, pcf	83.2	86.9
Moisture Content, %	119	95.0
Dry Density, pcf	37.9	44.5

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	21.3	**Press. Increment, psi:**	5
Sample Pressure, psi:	19.2	**B Coefficient:**	0.98

FLOW DATA

Date	Elapsed Time, sec	Cell Pressure, psi	Inlet Pressure, psi	Outlet Pressure, psi	Gradient	Inflow V, cc	Outflow V, cc	Δ Inflow V, cc	Δ Outflow V, cc	Temp, °C	R_f	Permeability K @ 20 °C, cm/sec
01/14	—	21.1	20.1	18.1	13.8	10.40	14.70	—	—	—	—	—
01/14	8940	21.1	20.1	18.1	13.8	14.70	10.60	4.30	4.10	20	1.000	9.42E-07
01/15	—	21.1	20.1	18.1	13.8	10.00	15.10	—	—	—	—	—
01/15	8220	21.1	20.1	18.1	13.8	14.00	10.95	4.00	4.15	20	1.000	9.94E-07
01/17	—	21.1	20.1	18.1	13.8	11.55	13.35	—	—	—	—	—
01/17	6840	21.1	20.1	18.1	13.8	14.90	10.00	3.35	3.35	20	1.000	9.82E-07
01/17	—	21.1	20.1	18.1	13.8	10.60	14.85	—	—	—	—	—
01/17	7680	21.1	20.1	18.1	13.8	14.35	11.10	3.75	3.75	20	1.000	9.79E-07

PERMEABILITY AT 20 °C: 9.7×10^{-7} cm/sec (@ 2 psi effective stress)

Note: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084

Constant Gradient

Client:	Nobis Engineering	**Start Date:**	12/29/99
Project Name:	New Bedford Harbor Superfund Site	**End Date:**	1/10/00
Project Location:	New Bedford, MA	**Tested By:**	SWJ
GTX #:	2409	**Checked By:**	GTT
Boring #:	FA-9	**Sample Type:**	Undisturbed
Sample #:	UO-1	**Orientation:**	Vertical
Depth:	2-4 ft	**Test #:**	K5
Visual Description:	Moist, brown silty sand with gravel, organics		

Sample Preparation: *Extruded from Shelby tube, cut, trimmed and placed into permeameter at as received density and moisture content; trimmings moisture content = 104%*

Permeant Fluid: de-aired tap water **Cell #:** —

Parameter	Initial	Final
Height, in	2.50	2.42
Diameter, in	2.85	2.73
Area, in^2	6.38	5.85
Volume, in^3	15.95	14.17
Mass, g	363	328
Bulk Density, pcf	86.5	88.0
Moisture Content, %	117	96.2
Dry Density, pcf	39.8	44.9

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	27.9	**Press. Increment, psi:**	5
Sample Pressure, psi:	25.8	**B Coefficient:**	0.96

FLOW DATA

Date	Elapsed Time, sec	Cell Pressure, psi	Inlet Pressure, psi	Outlet Pressure, psi	Gradient	Inflow V, cc	Outflow V, cc	Δ Inflow V, cc	Δ Outflow V, cc	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
01/10	—	29.0	27.5	26.5	11.4	9.75	15.00	—	—	—	—	—
01/10	3540	29.0	27.5	26.5	11.4	10.15	14.50	0.40	0.50	20	1.000	2.94E-07
01/10	7920	29.0	27.5	26.5	11.4	10.60	14.00	0.85	1.00	20	1.000	2.70E-07
01/10	7140	29.0	27.5	26.5	11.4	10.90	13.65	0.75	0.85	20	1.000	2.59E-07
01/10	7260	29.0	27.5	26.5	11.4	11.30	13.10	0.70	0.90	20	1.000	2.55E-07

PERMEABILITY AT 20 °C: 2.7×10^{-7} cm/sec (@ 2 psi effective stress)

Note: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084

Constant Gradient

Client:	Nobis Engineering	**Start Date:**	12/15/99
Project Name:	New Bedford Harbor Superfund Site	**End Date:**	12/28/99
Project Location:	New Bedford, MA	**Tested By:**	SWJ
GTX #:	2409	**Checked By:**	GTT
Boring #:	FD-7	**Sample Type:**	Undisturbed
Sample #:	U-1	**Orientation:**	Vertical
Depth:	1-3	**Test #:**	K4
Visual Description:	Moist, black organic clay with sand		

Sample Preparation: Extruded from Shelby tube, cut, trimmed and placed into permeameter at as received density and moisture content; trimmings moisture content = 136%

Permeant Fluid: de-aired tap water **Cell #:** —

Parameter	Initial	Final
Height, in	2.05	1.85
Diameter, in	2.82	2.56
Area, in^2	6.22	5.15
Volume, in^3	12.76	9.52
Mass, g	265	205
Bulk Density, pcf	79.0	81.8
Moisture Content, %	144.3	89.0
Dry Density, pcf	32.3	43.3

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	105	**Press. Increment, psi:**	5
Sample Pressure, psi:	103	**B Coefficient:**	0.98

FLOW DATA

Date	Elapsed Time, sec	Cell Pressure, psi	Inlet Pressure, psi	Outlet Pressure, psi	Gradient	Inflow V, cc	Outflow V, cc	Δ Inflow V, cc	Δ Outflow V, cc	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
12/28	—	105.0	103.5	102.5	15.0	9.70	15.50	—	—	—	—	—
12/28	4140	105.0	103.5	102.5	15.0	10.35	14.80	0.65	0.70	20	1.000	3.28E-07
12/28	—	105.0	103.5	102.5	15.0	10.05	15.10	—	—	—	—	—
12/28	4620	105.0	103.5	102.5	15.0	10.75	14.40	0.70	0.70	20	1.000	3.05E-07
12/28	—	105.0	103.5	102.5	15.0	11.35	14.15	—	—	—	—	—
12/28	5040	105.0	103.5	102.5	15.0	12.05	13.45	0.70	0.70	20	1.000	2.80E-07
12/28	—	105.0	103.5	102.5	15.0	10.25	15.00	—	—	—	—	—
12/28	4500	105.0	103.5	102.5	15.0	10.90	14.35	0.65	0.65	20	1.000	2.91E-07

PERMEABILITY AT 20 °C: 3.0×10^{-7} cm/sec (@ 2 psi effective stress)

Note: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084

Constant Gradient

Client:	Nobis Engineering	**Start Date:**	12/15/99
Project Name:	New Bedford Harbor Superfund Site	**End Date:**	12/28/99
Project Location:	*New Bedford, MA*	***Tested By:***	SWJ
GTX #:	2409	**Checked By:**	GTT
Boring #:	FD-6	**Sample Type:**	Undisturbed
Sample #:	U-2	**Orientation:**	Vertical
Depth:	4-6	**Test #:**	K3
Visual Description:	Moist, very dark gray clayey sand with orgnics, shells		

Sample Preparation: Extruded from Shelby tube, cut, trimmed and placed into permeameter at as received density and moisture content; trimmings moisture content = 103%

Permeant Fluid: de-aired tap water **Cell #:** —

Parameter	Initial	Final
Height, in	4.15	4.00
Diameter, in	2.87	2.71
Area, in^2	6.47	5.77
Volume, in^3	26.85	23.07
Mass, g	599	545
Bulk Density, pcf	84.8	89.8
Moisture Content, %	104.6	86.2
Dry Density, pcf	41.5	48.2

B COEFFICIENT DETERMINATION

Cell Pressure, psi: 105 **Press. Increment, psi:** 5
Sample Pressure, psi: 103 **B Coefficient:** 0.95 assumed

FLOW DATA

Date	Elapsed Time, sec	Cell Pressure, psi	Inlet Pressure, psi	Outlet Pressure, psi	Gradient	Inflow V, cc	Outflow V, cc	Δ Inflow V, cc	Δ Outflow V, cc	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
12/27	—	105.0	104.0	102.0	13.8	10.25	17.45	—	—	—	—	—
12/27	3720	105.0	104.0	102.0	13.8	10.85	16.80	0.60	0.65	20	1.000	3.26E-07
12/27	3480	105.0	104.0	102.0	13.8	11.35	16.25	0.50	0.55	20	1.000	2.93E-07
12/27	6780	105.0	104.0	102.0	13.8	11.80	15.80	0.95	1.00	20	1.000	2.79E-07
12/27	7140	105.0	104.0	102.0	13.8	12.90	14.80	1.10	1.00	20	1.000	2.86E-07
12/27	—	105.0	104.0	102.0	13.8	11.00	14.20	—	—	—	—	—
12/27	3180	105.0	104.0	102.0	13.8	11.45	13.75	0.45	0.45	20	1.000	2.75E-07

PERMEABILITY AT 20 °C: 2.9×10^{-7} cm/sec (@ 2 psi effective stress)

Note: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D 5084

Constant Gradient

Client:	Nobis Engineering	**Start Date:**	11/23/99
Project Name:	New Bedford Harbor Superfund Site	**End Date:**	11/26/99
Project Location:	New Bedford, MA	**Tested By:**	swj
GTX #:	2409	**Checked By:**	gtt
Boring #:	FC-19	**Sample Type:**	Undisturbed
Sample #:	UO-2	**Orientation:**	Vertical
Depth:	4-6	**Test #:**	K2
Visual Description:	Moist, dark gray organic silt		

Sample Preparation: Extruded from Shelby tube, cut, trimmed and placed into permeameter at as received density and moisture content; trimmings moisture content = 69.3%

Permeant Fluid: de-aired tap water **Cell #:** —

Parameter	Initial	Final
Height, in	2.27	2.14
Diameter, in	2.85	2.72
Area, in^2	6.38	5.81
Volume, in^3	14.48	12.43
Mass, g	363	327
Bulk Density, pcf	95.3	100.0
Moisture Content, %	74.8	57.5
Dry Density, pcf	54.5	63.5

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	105	**Press. Increment, psi:**	5
Sample Pressure, psi:	100	**B Coefficient:**	0.95 assumed

FLOW DATA

Date	Elapsed Time, sec	Cell Pressure, psi	Inlet Pressure, psi	Outlet Pressure, psi	Gradient	Inflow V, cc	Outflow V, cc	Δ Inflow V, cc	Δ Outflow V, cc	Temp, °C	R_f	Permeability K @ 20 °C, cm/sec
11/26	—	105.0	100.8	99.2	20.7	10.30	14.75	—	—	—	—	—
11/26	1920	105.0	100.8	99.2	20.7	10.75	14.25	0.45	0.50	20	1.000	3.19E-07
11/26	3420	105.0	100.8	99.2	20.7	11.50	13.30	0.75	0.95	20	1.000	3.20E-07
11/26	—	105.0	100.8	99.2	20.7	10.65	14.15	—	—	—	—	—
11/26	4080	105.0	100.8	99.2	20.7	11.55	13.10	0.90	1.05	20	1.000	3.08E-07
11/26	2220	105.0	100.8	99.2	20.7	12.15	12.50	0.60	0.60	20	1.000	3.48E-07

PERMEABILITY AT 20 °C: 3.3×10^{-7} cm/sec (@ 5 psi effective stress)

Note: These results apply only to the sample tested for the specific test conditions. The test procedures employed follow accepted industry practice and the indicated test method. GeoTesting *Express has no specific knowledge as to conditioning, origin, sampling procedure or intended use of the material.*